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# ***Chambers-Clover Creek Watershed Management Committee***

## **Watershed Action Plan**

**A Water Quality Plan for Reducing Nonpoint Pollution**

**October 1997**

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## EXECUTIVE SUMMARY

There can be no mistaking that the Chambers-Clover Creek Watershed is urban. A raindrop falling in this watershed is more likely to land on a parking lot, a road, a roof, or a lawn than on anything else. For many years, residents have thought the problem was only a matter of moving those unwanted raindrops to someplace more convenient. But that is changing.

The lakes and streams in the Chambers-Clover Creek Watershed offer much more than stormwater conveyance. Tens of thousands of people use Lake Steilacoom, American Lake, Spanaway Lake, and the part of Puget Sound which is in the watershed on an annual basis for swimming, fishing, and boating. Chambers Creek supports runs of Chinook, Coho, Chum, Pink, and Steelhead salmon. The groundwater underlying the watershed is the only source of drinking water for more than 168,000 people. Watershed residents are not turning a blind eye to the importance of streams in their community. Clover Creek Council is one of the most active stream advocacy groups in the state. For these reasons and more, people have come together to create the Chambers-Clover Creek Watershed Action Plan in order to protect the watershed and the many benefits it provides. It is the vision of the Chambers-Clover Creek Watershed Management Committee that has driven the creation of this plan, and they see a watershed which can and will benefit from its implementation.

The soul of this document is in the *action items*; these are recommendations for certain groups or agencies to change their activities or initiate activities in order to improve water quality. The action items describe regulatory activities, programmatic, educational, operational, research, or capital improvement activities. Action items are assigned lead implementors, 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.

This Watershed Action Plan contains 56 Action Items describing various types of efforts to directly or indirectly improve water quality. The watershed committee avoided duplicating or creating unnecessary expense in expanding government programs. Significant effort was spent in identifying private solutions to water quality problems and in coordinating and improving **existing** programs.

**If all action items are implemented, the total estimated financial cost of this plan is \$2,200,000 million dollars.**

Each lead implementor was requested to provide a letter of concurrence. The letter is intended to obligate those individuals to take action and follow through on their respective portion of the plan.

## **FACTS ABOUT THE WATERSHED**

A watershed is the geographic region that drains water (and everything water carries) into a 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 Action Team, 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. A single incident performed by one person may not have any noticeable impact, but the combined effect of many people performing the same action results in significant pollutant loading. For example, one car with an oil leak probably would not influence Puget Sound, but 100,000 leaking cars could produce enough oil to threaten life in nearby streams.

The Chambers-Clover Creek Watershed extends from the town of Ruston on Commencement Bay, south to DuPont, and then east to Frederickson, covering approximately 95,345 acres of land (149 square miles). Seven municipalities, three military reservations, and one drainage district, as well as Pierce County, have jurisdiction concerning water quality. The cities include: Tacoma, Ruston, Fircrest, University Place, Lakewood, Steilacoom, and DuPont. University Place and Lakewood incorporated at the end of the watershed action planning process in 1996.

The Chambers-Clover Creek drainage is considered to be two systems: the Steilacoom Lake Subwatershed (Clover Creek), and the Chambers Bay Subwatershed, which is below the lake. (Chambers Creek flows from Steilacoom Lake to Chambers Bay.) The surface waters of Tacoma West Subwatershed and the American Lake Subwatershed are not connected to Chambers Creek or Clover Creek. However, ground water connects all major lakes in the watershed. Tacoma West Subwatershed is made up of short drainages flowing directly to Puget Sound. The State of Washington has designated the watershed as Water Resource Inventory Area 12 (WRIA 12).

More than 267,000 people live within the area. Population in the Chambers-Clover Creek Watershed is projected to increase by 97,000 to 360,000 people by the year 2020. Almost the entire watershed falls within the Comprehensive Urban Growth Area proposed by the Pierce County Council. This area is expected to accommodate most of the county's future urban services and land uses. Most of the remaining watershed is built up, or has large portions of federally reserved land.

Approximately 55% of the watershed (52,000 acres) is open natural cover or forest land. Less than half of this forest and natural cover (21,000 acres) is federally managed and not available for development. Much of the future development will be focused on approximately 30% of the watershed (25,800 acres) in the Steilacoom Lake (Clover Creek) Subwatershed. Substantial areas have been set aside for commercial and industrial uses. One-third of the future population (115,000) will reside in the Clover Creek/Lake Steilacoom Subwatershed by the year 2020. In order to accommodate this

growth and future commercial zones, built-up or urban land cover will replace forested and natural cover. When that development occurs, runoff characteristics will convert from those associated with existing natural cover to those associated with urban runoff. The result will be increased nonpoint pollution.

## **EXISTING WATERSHED POLLUTION PROBLEMS**

Water quality in the Chambers Clover Creek Watershed has deteriorated substantially as the area has become urbanized over the past century. Fish habitat has been impaired and native runs have substantially declined; in the cases of the Chambers-Clover Creek early coho run (*O. kisutch*) and the Chambers-Leach Creek summer chum run (*O. keta*), they are extinct.

Fishing and swimming have been periodically limited within many of the streams and lakes in the watershed. Compliance with State Surface Water Quality Standards (WAC 173-201a) for fecal coliform organisms, dissolved oxygen, temperature, pH, turbidity, and toxic metals have been exceeded within many streams and lakes. Chambers, Clover, and Sequelitchew Creeks have all been found to have fecal coliform bacteria levels consistently exceeding state maximums. Toxic metal contamination has occurred on the Asarco Superfund site in the Tacoma West Subwatershed, but also at other locations in the Chambers-Clover Creek Watershed. Concentrations of copper exceeding chronic toxicity levels were found at several locations along Clover Creek. Concentrations of zinc exceeding acute toxicity levels were found on the North Fork of Clover Creek. An area of Pierce County including the Chambers Clover Creek Watershed has been designated a Sole Source Aquifer by the Environmental Protection Agency because of its vulnerability to contamination. Remediation of groundwater contamination from three dangerous organic chemicals began in 1981. Shallow and deep aquifer contamination by nitrates and chlorides have also been a concern.

In response to the Federal Clean Water Act, the Washington State Legislature in 1982 created RCW 90.70, which led to the creation of WAC 400-12 by the Puget Sound Action Team. WAC 400-12, the Nonpoint Rule, authorizes local governments and state agencies to establish planning processes leading to the implementation of watershed action plans for the purpose of reducing nonpoint pollution.

Pierce County was selected as the lead agency to coordinate the ranking and action plan development process. Decisions on the order and rank of watersheds in 1989 were based, primarily, on the degree of degradation, the potential for preservation, and the beneficial uses in need of protection.

The Chambers-Clover Creek Watershed was selected in Pierce County for the second watershed planning effort following the Lower Puyallup Watershed.

## **PUBLIC INVOLVEMENT AND COORDINATION**

A committee of 13 people was created in 1993 by the Pierce County Council and became the Chambers-Clover Creek Watershed Management Committee (CCCWMC).<sup>\*</sup> The Committee has produced two documents: the Watershed Characterization which describes conditions within the watershed; and the Chambers Clover Creek Watershed Action Plan. The Characterization is summarized in the following Chapter 2.

All meetings were advertised and open to the public. More public meetings were held to allow people the opportunity to comment on the Preliminary Draft Chambers-Clover Creek Watershed Action Plan. Strong coordination and communication with all stakeholders - those who might have something to gain or lose in the watershed - was emphasized. This included people from the private sector, and federal, state, and local governments.

## **PLAN IMPLEMENTATION**

The Action Plan includes a program for implementation and monitoring. Action items for implementing the overall Action Plan were developed 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 Basin Advisory Council in Chambers-Clover Creek Watershed. They would oversee implementation of the plan in cooperation with Pierce County. Pierce County will facilitate the completion of action items and foster funding sources to cover implementation costs.

## **APPROVALS**

The Washington State Department of Ecology approved the Chambers-Clover Creek Watershed Action Plan on October 6, 1997. The plan received SEPA review and was accepted as an addendum to the "Final Environmental Impact Statement, Comprehensive Plan for Pierce County, Washington" and the "Final Supplemental Environmental Impact Statement for Pierce County, Washington" on March 5, 1996.

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<sup>\*</sup> Originally known as the Tacoma Watershed Management Committee.

## KEY TO ACRONYMS

BMP	Best Management Practice
BAC	Chambers-Clover Creek Basin Advisory Committee
CCC-WMC	Chambers-Clover Creek Watershed Management Committee
CFSA	Consolidated Farm Services Agency
CO-OP	Pierce County Cooperative Extension
DNR	Washington Department of Natural Resources
DOH	Washington Department of Health
ECOLOGY	Washington Department of Ecology
EPA	Environmental Protection Agency
FPA	Forest Practices Act
GIS	Geographic Information Systems
GMA	Growth Management Act
IAC	Inter-Agency Committee for Outdoor Recreation
MPD	Metropolitan Parks District
MSD	Marine Sanitation Device
NPDES	National Pollutant Discharge Elimination System
NRCS	Natural Resources Conservation Service
PALS	Pierce County Planning and Land Services Department
PC	Pierce County
PCCD	Pierce County Conservation District
PIE	Public Involvement and Education grant
PSAT	Puget Sound Action Team
QA/QC	Quality Assessment/Quality Control
RCW	Revised Code of Washington
SWM	Surface Water Management Entities
TPCHD	Tacoma-Pierce County Health Department
USDA	United States Department of Agriculture
USGS	United States Geological Survey
UW	University of Washington
WAC	Washington Administrative Code
WDFW	Washington Department of Fish and Wildlife
WFFA	Washington Farm and Forestry Association
WRD	Water Resources Department, Pierce County
WSU	Washington State University Cooperative Extension



## CHAPTER 1: INTRODUCTION

The Chambers-Clover Creek Watershed Action Plan represents an effort to improve water quality by reducing sources of nonpoint water pollution in the Chambers-Clover Creek Watershed.

This document contains:

- \* Background information on the development of the Action Plan;
- \* A summary of the Watershed Characterization;
- \* Action items for reducing nonpoint pollution, organized by pollution source;
- \* An implementation and monitoring program;
- \* Summaries and explanations of costs for implementing agencies.

The Watershed Characterization (a separate document), is a description of the Chambers-Clover Creek Watershed. It includes information on the physical features of the watershed, biological features of the watershed, general water quality conditions, and upland and riparian habitat conditions for each of the four subwatersheds. A summary of this document and the subwatersheds is found in the following chapter.

The Chambers-Clover Creek Watershed Management Committee developed action items for the prevention of nonpoint pollution and improvement of water quality. The action items are summarized in **Table 1, Chambers-Clover Creek Watershed Action Plan Lead Implementors**. The following elements have been identified for each action item:

- \* Details on the action(s) to be taken;
- \* Lead implementor and cooperator(s);
- \* Estimated cost;
- \* Potential funding source(s) and type(s);
- \* Implementation benefit(s);
- \* The type of pollution source control;
- \* A time frame for implementing the action;
- \* A suggested startup date.

A detailed explanation of each of these elements may be found in the *Explanation of Source Control Action Items* which precedes the source chapters. The implementation program identifies a lead agency for the implementation of the Action Plan as a whole and addresses financing and coordination issues. 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 purpose of the plan is to identify, correct, and prevent nonpoint source pollution and protect beneficial uses of water. Beneficial uses of water include: fishing, wildlife habitat, recreation, navigation, cultural identity, aesthetics, and industrial, agricultural, and 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. A watershed is the geographic region that drains water (and everything water carries) into a river, river system, or body of water. All land within a watershed drains to a common outlet, and every activity on land has the potential to be a source of nonpoint pollution which cumulatively affect the entire watershed.

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. Riparian zone alteration can impact water quality by changing the water's temperature and its sediment load.

Nonpoint pollution is causing significant problems in the Chambers-Clover Creek Watershed. The watershed collects the cumulative pollution of nonpoint sources and flushes into area lakes and/or Puget Sound. (See *Figure 1 - Plan Area*.) A more detailed explanation of the problems, including pollutants found within the watershed, is contained in the Chambers-Clover Creek Watershed Characterization. A brief summary of the Characterization findings may be found in Chapter 2 of this document.

## **WATERSHED PLANNING - AUTHORITY**

The Puget Sound Water Quality Authority Act of 1985 established the Puget Sound Water Quality Authority (PSWQA) and the Puget Sound Water Quality Management Plan (the Puget Sound Plan). PSWQA promulgated Chapter 400-12 of the Washington Administrative Code, "Local Planning and Management of Nonpoint Source Pollution". WAC 400-12 is also known as the "Nonpoint Rule".

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 Chambers-Clover Creek Watershed was ranked number two behind the Lower Puyallup Watershed. Watershed action plans are closely coordinated with the programs of other federal, state, and local agencies.

Pierce County Public Works and Utilities has provided staff support to the Chambers-Clover Creek Watershed Management Committee. The project has been funded by a Centennial Clean Water Fund Grant from the Washington State Department of Ecology.

## **THE WATERSHED MANAGEMENT COMMITTEE**

The Chambers-Clover Creek Watershed Action Plan has been developed by the Chambers-Clover Creek Watershed Management Committee, in conformance with the Nonpoint Rule. Pierce County is the designated lead agency. 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 applications, 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. R93-222S.

The members of the Committee represent many interests and affected parties within the watershed. Concerned private citizens, Indian tribes, environmental groups, fishermen, city governments, public utilities, a conservation district, businesses, and farmers are represented. A list of committee members is found on the inside cover of this document.

## **PLAN DEVELOPMENT**

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. The Chambers-Clover Creek Watershed Action Plan includes action items which use such tactics as education, financing, coordination, capital improvement, regulations, voluntary incentives, program development, maintenance and operation, and research to bring about positive changes in behavior and water quality. The action items in the Watershed Plan were developed in three stages.

The Committee divided into five subcommittees addressing agriculture & forest practices, boats and marinas, on-site sewage disposal, stormwater and erosion, and all other sources. Subcommittees were formed to evaluate and develop potential action items and plan their implementation. The Watershed Management Committee also

recruited additional public input and technical expertise for the subcommittees. 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.

Secondly, all action items requiring a significant environmental education component were referred to an Environmental Education Subcommittee for overall coordination and development by educators. The Watershed Management Committee considered this educational approach a significant and valuable innovation to the watershed action planning process under the Nonpoint Rule.

Finally, the action items were reviewed by staff and the Watershed Management Committee to insure that a variety of approaches were used to address sources. The Committee and staff considered each action item for its technical feasibility, legality, ease of implementation, ability to improve water quality, ability to protect beneficial uses, effects on groundwater, consistency with other plans, and ability to have direct action by the public. Many draft action items were removed, combined, or altered as a result of these deliberations.

## **PUBLIC INVOLVEMENT**

The citizen involvement process was a major part of the program to address nonpoint water pollution. Open houses occurred in each of the four subwatershed areas within the Chambers-Clover Creek Watershed during 1993 and information booths were manned for one weekend at the Tacoma Mall and two years at the Western Washington State Fair. Several tours of the watershed were either developed by staff or coordinated with other natural resource agencies. Various brochures and media conveyances concerning nonpoint pollution have also occurred. The complete mailing list for the Chambers-Clover Creek project includes over two hundred addresses. All work sessions and all of the Committee's regular meetings were open for public comment and participation. At least one public meeting will be held to allow people the opportunity to comment on the plan. The plan is available to the public and a notice has been published to that effect. Subsequent revisions of this Watershed Action Plan will include changes resulting from the public hearing and comment process.

## **COORDINATION WITH THE PIERCE COUNTY COMPREHENSIVE LAND USE PLAN**

Chambers-Clover Creek Watershed Management Committee staff have worked with Pierce County staff assigned to Growth Management Act compliance in an effort to cultivate consistency between the programs. 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.

## CONCURRENCE

Local governments and private groups have had the opportunity to review and comment on the Draft Watershed Action Plan. The Watershed Committee responded to the comments and the Action Plan was modified to address significant concerns. At the completion of these modifications, each implementing agency was 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 was 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.



## CHAPTER 2: SUMMARY OF THE WATERSHED CHARACTERIZATION

The Watershed Characterization describes the current physical, biological, and habitat conditions within the Chambers-Clover Creek Watershed. It contains an assessment of current watershed conditions including an assessment of each of the four subwatersheds. *The information in this section has been summarized from the comprehensive Characterization document.*

The Chambers-Clover Creek Watershed Management Committee distributed the Watershed Characterization Report in November 1994 for public comment. The Committee reached consensus that the document appropriately reflects currently available information on the condition of the watershed. Additional significant information may be appended to the Characterization in the future.

### DESCRIPTION OF THE WATERSHED

**Location:** The Chambers-Clover Creek Watershed boundaries are defined as Washington State Water Resource Inventory Area (WRIA) 12. The watershed is located in central Pierce County, between Puget Sound on the west and the community of Graham on the east. Point Defiance and the southwest shore of Commencement Bay serve as the watershed's northern boundary and the City of DuPont is located near the southern boundary. (See *Figure 1- Plan Area.*) The watershed contains approximately 95,345 acres of land (149 square miles).

**Climate:** The climate within the watershed is mild with average winter temperatures above freezing and summer temperatures generally below 80°F. The watershed experiences a frost-free growing season of approximately 250 days per year. Typically, 38 to 40 inches of precipitation occurs per year; about two-thirds falls between October and March of each year. Approximately 50% to 60% of the watershed's precipitation becomes groundwater recharge.

**Topography:** The watershed lies within the central part of the Puget Sound Lowland, an elongated topographic and structural trough that extends from the Canadian Border to the Willamette Valley in Oregon. The Puget Lowland is bounded on the east by the Cascade Mountains and on the west by the Olympic Mountains and the Willapa Hills. Lowland topography is generally flat and elevations within the watershed range from sea level to 600 feet.

Because glaciers occupied the Puget Sound Lowland several times during the Ice Age, most of the topographic features in the watershed are a direct result of glacial deposition or erosion. These features include several distinct channels cut by high velocity glacial meltwater streams. These channels have steep slopes or bluffs and include the *Clover Creek Channel*, the *Kirby Channel*, and the *South Tacoma Channel*.

Steep bluffs border Puget Sound which have steep canyons intersecting them, and steeply rolling hills and valleys occur in the northwestern portion of the watershed. The Clover Creek floodplain cuts through the center of the watershed, flowing from east to west, ending just west of Interstate 5. The Chambers Creek canyon, two miles long and up to 200 feet deep, drains to Chambers Bay on Puget Sound.

**Geology:** Because of glacial advances and retreats ending 11,000 years ago, the watershed has a complex geology. Glacial outwash refers to gravels deposited as the glacier advances and recedes. Glacial till is often referred to as hardpan, a layer of soil which has been compacted by the weight of the glacier and contains enough small particles or clay to make it impervious to water. Several alternating layers of till and outwash form aquifers upon which local residents may draw for drinking water. Till layers also cause ground water to move horizontally and supply water to many of the lakes in the western portion of the watershed.

A tremendous amount of outwash material was deposited onto the western area of the watershed as a result of the most recent glacial event, the Vashon glaciation. The four most common soil associations found within the Chambers-Clover Creek Watershed are the Kapowsin, Spanaway, Alderwood, and Everett associations. The poor soils found within the watershed either drain too well or very poorly. This results in a high potential for septic system failure because of high water tables, insufficient filtration to adequately protect groundwater quality, or an underlying compacted till layer which prevents proper functioning during periods of high rainfall.

Most of the watershed is now sewered with American Lake Gardens and the southeastern area of the watershed near Spanaway and Graham as the most notable exceptions.

**Hydrology:** Because highly permeable gravelly soils derived from glacial outwash cover so much of the watershed, it is estimated that approximately 50% to 60% of the watershed's precipitation becomes groundwater recharge. Precipitation is estimated to recharge the Chambers/Clover Creek Basin at a rate of 120,300 acre-feet per year. Infiltration from precipitation accounts for about 66% of the total basin recharge. Stormwater contributes 21% to the recharge budget, septic tanks make up 11%, and surface water bodies contribute 2%. The depth to groundwater in the basin ranges from 0 to more than 100 feet.

Most of the groundwater in the watershed moves at an average rate of about 4.4 feet per day to the west toward Puget Sound.

The interconnection between surface and ground water prompted the EPA to designate all of the area within the watershed as part of a Sole Source Aquifer System to provide limited federal protection to drinking water supplies. Contamination of shallow groundwater occurred as early as 1939; as a result, wells were constructed to tap into the deeper groundwater system.

**Biological Conditions:** Because of the extensive shoreline and abundant surface water, diverse populations of marine, freshwater, and anadromous fish have existed in the watershed. Loss of feeding, spawning, and rearing habitat throughout all portions of the watershed has limited native anadromous fish populations. Water quality and flow conditions in the Chambers/Clover Creek Watershed have also significantly deteriorated as the area has become urbanized over the past century. As a result of these impairments and also fishing pressures, native runs have substantially declined; in the cases of the Chambers-Clover early coho run (*O. kisutch*) and the Chambers - Leach summer chum run (*O. keta*), they are extinct.

The overall return of hatchery salmon to the watershed is strong, but steelhead have dramatically declined in the last two years. The genetic diversity comprising these anadromous fish is significantly smaller than historical times. Sport fishing is widespread in the watershed lakes and streams, and is supported by trout stocking.

Macroinvertebrates include worms, snails, clams, crustaceans and insects that live in streams. Information is being gathered in the watershed because macroinvertebrates are **key** biological indicators of stream water quality and recent stream contamination. Seven preliminary samples along Clover Creek varied between poor and fair for water quality and species diversity.

There are many significant water quality problems in the watershed's lakes and streams. Swimmers itch and toxic algae blooms are recurring problems in the area's lakes. American Lake and Steilacoom Lake have experienced severe toxic blooming cycles. About 100 cases of swimmers itch have occurred between 1990 and 1992. State standards for fecal coliform bacteria levels were violated consistently in streams throughout the Chambers-Clover Creek Watershed. However, fecal coliform bacteria readings in lakes were fairly low. Dissolved oxygen or (DO) standards measure low, and are a problem in many of the lakes in the Chambers-Clover Creek Watershed.

A great amount of wildlife and plant species are found in the watershed. Numerous birds, mammals, amphibians, and reptiles live within or travel through the area. Minke whales, porpoises, seals, and sea lions have been observed in the Tacoma Narrows. A large number of bird species are using the watershed. Sensitive, threatened, or endangered species of animals found within the watershed include; **Great Blue Heron, Purple Martin, Western Bluebird, Western Pond Turtle, Osprey, Bald Eagle, Green-backed Heron, Pileated Woodpecker, Marbled Murrelet, Peregrine Falcon, Western Gray Squirrel.** These sensitive, threatened, or endangered plant species are found within the watershed; **White Top Aster, Torrey's Peavine, Swamp Sandwort, Bog Clubmoss, Chain-fern, and Common Blue-Cup.**

**Habitat:** Habitat refers to the specific instream, riparian, lake, wetland, or upland environment where organisms live and depend upon for food and shelter. Habitat in this watershed is considered part of the Western Hemlock Vegetative Zone, but much of it is fragmented islands of habitat within the urban landscape. This urban habitat

fragmentation leads to extinction of larger predators, overpopulation of smaller predators, and removal of valued species from the watershed. Instream and riparian habitat has also been heavily modified because of development.

Different classes of upland native plant communities (including 13 subclasses) are known to occur or likely to occur within the watershed. They include Forest Communities and Prairie-associated Communities. Prairie-associated plant communities support species otherwise rarely found in Western Washington and Oregon.

**Land Use:** Land use is a major factor affecting water quality. Forested land produces the lowest rate of pollutant loadings. Agricultural lands contribute the highest rates of nutrient loadings and may contribute high sediment levels but have low rates otherwise. Urban or developed land uses produce high pollutant levels. Six land cover classes in the watershed were derived from satellite-remote-sensing data. The following is a break down of those land uses. It is important to note that this is land cover data; although it is not land use data, it indicates land use.

Agricultural land (297 acres, or 0.3% of the watershed) combines active (crops) and open (pasture) agriculture. "Hobby farms" typically contain livestock, but are generally not detected in this class because of their small sizes.

Built up land (39,785 acres, or 42%) combines residential, commercial, and industrial uses. These different land uses have different rates of impervious surface, different effects on water quality, and different implications for population growth. Data is available for the Clover Creek/Lake Steilacoom Subwatershed from the USGS which produced a report distinguishing between these different land uses

Other natural cover (34,099 acres, or 36%) is primarily grasses, shrubs, and brush. Much of this land is under the management of Fort Lewis but also includes schools, golf courses, cemeteries, landfills, and possibly "hobby farms."

Forest lands (17,703 acres, or 19%) represent deciduous, coniferous, and mixed forest plant communities.

Water (2,126 acres, or 2%) generally represents the presence of lakes.

Non-vegetated cover (1,335 acres, or 1 %) generally represents bare soil, gravel, and sandy areas, and bare exposed rock. A very small amount of the watershed was identified by the study as having perennial snow and ice but this is believed to be an error in data collection or interpretation.

Population projections for the Chambers-Clover Creek Watershed predict that the total number of residents will rise from 267,000 people to 360,000 people by 2020. Most of the watershed falls within the urban growth boundary which is expected to accommodate most of the county's future urban services and land uses. In order to

accommodate almost 100,000 additional residents, built-up or urban cover will replace forested and natural cover. When that occurs, runoff characteristics will convert from those associated with the existing cover to those associated with urban runoff.

Urban water bodies can expect to receive higher storm flows and lower base flows. Metals, organic compounds, fecal coliform bacteria, and suspended solid levels are consistently revealed as ongoing problems. Nutrient contributions will be lower in those areas where agricultural land uses are replaced by urban land uses, but nutrient levels will still be moderate. In addition, urban runoff is known to have lower dissolved oxygen levels and higher demands for the oxygen existing in the water. As a result, ammonia levels will rise because less oxygen will be available to convert organic nitrogen into nitrite and nitrate. Higher temperatures may also be seen in urban runoff because less shading is available and water may warm up in stormwater detention ponds before it is released to the receiving waters. As a whole, it is likely that streams and lakes within the watershed will violate water quality standards as the watershed becomes more urban.

A general assessment of trends suggests that nitrogen loading to groundwater from septic systems in the basin will decrease as sewer services are expanded. However, the percentage of nitrogen loading from stormwater will increase as sewer services are expanded because increased densities are usually associated with this expansion, increasing the amount of stormwater runoff from impervious surfaces. In addition, the stormwater recharging into the aquifer will have increased levels of fecal coliform bacteria, organic compounds, and metals. Efforts to retrofit existing drywells and upgrade existing stormwater design requirements may help to reduce the amount of pollutants in stormwater. Trends toward increased development may result in lower groundwater levels in the future. This is because recharge areas will be covered by impervious surfaces while the demand for water will increase.

The Chambers-Clover Creek Watershed is divided into four subwatersheds; the Chambers Bay, Clover Creek/Lake Steilacoom, Tacoma West, and American Lake. The surface waters of the Tacoma West Subwatershed and the American Lake Subwatershed are not connected to Chambers Creek or Clover Creek; however, ground water connects all major lakes in the Watershed. The State of Washington has designated the watershed as Water Resource Inventory Area 12, (WRIA 12).

**Chambers Bay Subwatershed:** This subwatershed is 17,295 acres or 18% of the total watershed. Residential land uses dominate the Chambers Bay Subwatershed mixed with commercial and industrial land uses. Low density, built-up land uses cover 68% of the subwatershed. Natural cover (land covers other than agricultural or forested) blankets an additional 26% of the subwatershed and includes land uses such as schools, golf courses, and cemeteries. Six percent of the subwatershed is forested. This subwatershed includes all drainages downstream of Lake Steilacoom and includes such waterbodies as Chambers Creek, Flett Creek, Leach Creek, Snake Lake, and Wapato Lake. There is an extensive wetland system within this subbasin associated

with Flett Creek, and additional wetlands associated with Leach Creek and Chambers Creek.

Douglas fir/Pacific madrone/salal plant communities survive on undeveloped slopes with dense shrub layers in the north end. Also small, isolated, but significant remnants of Prairie-associated plant communities survive as well as thickets of Douglas fir/California hazel plant communities. The Cities of Fircrest, University Place, Lakewood, and Tacoma have jurisdiction over a large portion of this subwatershed.

The overall quality of Chambers Creek instream/riverine habitat for salmonids is considered excellent by the Washington Department of Fish and Wildlife but is limited by stream flow problems. Chambers Creek supports approximately twenty species of fish including the presence of five northwestern salmonid species. These include native wild and artificially propagated anadromous fish stock. The lower reaches is part of a natural area and has remained mainly undisturbed.

Water quality is varied throughout this subwatershed. Fecal coliform counts in upper Chambers have consistently exceeded state maximums. Leech Creek has had levels of PAHs (an organic chemical), exceeding proposed standards. Problems with dissolved oxygen, pH, nutrients and ammonia have occurred in two lakes.

The entire subwatershed is within the Urban Growth Boundary. Additional development will occur between areas of existing development, thereby reducing upland habitat. Development will occur around Flett Creek and increase pollutant loadings to water bodies.

**Clover Creek/Steilacoom Lake Subwatershed:** This subwatershed is 45,161 acres, or 47% of the total watershed area. It is almost twice the size of the second largest subbasin within the Chambers-Clover Creek Watershed. Land use patterns vary widely with highly urbanized areas near Lakewood and urban development in strips along roads throughout the rest of the subwatershed. The density of residential development also varies widely. Thirty-five percent of the subwatershed is built up land, 0.3% is agricultural, 19% is forested, and 44% supports natural cover other than forestry or agriculture. Built up areas include residential, commercial, transportation, schools and golf courses.

This subwatershed includes Steilacoom Lake and all drainages upstream such as: Clover Creek, the North Fork (of Clover Creek), Spanaway Lake, Spanaway Creek, and Morey Creek. The Chambers-Clover Creek aquifer is the only source of drinking water for more than 168,000 people. The subwatershed includes the municipality of Lakewood and the communities of Parkland and Spanaway, McChord Air Force Base, and significant areas of Ft. Lewis. There is an extensive wetland system in this subbasin in the Spanaway Marsh area south of Spanaway Lake.

Upland habitat has been significantly altered or removed and replaced with development or exposed gravel throughout the Clover Creek/Steilacoom Lake Subwatershed. Vegetative cover is usually characterized by grass and ornamental

plantings. Some remnant Oregon White Oak groves remain. Vegetative cover in Spanaway and the Brookdale area consists of wetter forest plant communities with cottonwood and hardwoods near the creeks and associated wetlands. Shrubs and large meadows are a dominant feature.

The overall quality of instream/riverine habitat for salmonids in the watershed varies from poor to moderate. Increased and more varied vegetative cover would improve habitat conditions, as would improvements allowing for greater variations in instream flow. Habitat may be limited in upper reaches due to low summer flows. Spanaway Creek has good habitat.

Water quality in the Clover Creek/Steilacoom Lake Subwatershed has been a topic of concern for many local residents. Steilacoom Lake is being overrun by invasive plant growth and salmon died for unknown reasons in Clover Creek in 1993. Extensive water quality sampling has occurred on Clover Creek by the Department of Interior United States Geological Survey. Groundwater was examined under the direction of the Tacoma-Pierce County Health Department, and they are currently studying Steilacoom Lake because of the lake's excessive plant growth and toxic algae blooms. Tributaries north of Brookdale Road seem to be contributing the highest rates of pollutants to Clover Creek. Zinc levels were the most problematic with concentrations exceeding acute toxicity levels on the North Fork of Clover Creek at Waller Road. Dissolved oxygen levels in Clover Creek repeatedly have dropped below state standards. Copper levels exceeding chronic toxicity levels were detected just upstream of Interstate 5. Lead concentration in excess of chronic toxicity levels were detected on the North Fork, as well as on Clover Creek at the Spanaway Loop Road, and just downstream of McChord Air Force Base. Four small, but significant fish kills have been documented and associated with "first flush" conditions in Clover Creek. "First flush" is a rain event that occurs after an extended period of little or no rainfall. Stormwater runoff typically contains higher concentrations of pollutants during first flush events.

The Clover Creek/Steilacoom Lake Subwatershed has the bulk of undeveloped land within the Chambers-Clover Creek Watershed. Census tracts in this subwatershed are projected to keep pace with and exceed the overall Pierce County growth rates. Population in this subwatershed is projected to increase from 79,000 to 115,000 people by 2020. The entire subwatershed is within the urban growth boundary, with the exception of a rural transitional zone near the North Fork of Clover Creek. Much of the future development will be focused on approximately 24,000 acres (25%) on forest and open land in the subwatershed. Substantial areas have been zoned for commercial and industrial uses. When that development occurs, runoff characteristics will convert from those associated with the existing cover to those associated with urban runoff. It is likely that most of the fecal coliform and nutrient problems coming from lawn and garden chemicals, pets, and small farms will increase as the subwatershed develops and residential densities increase.

**American Lake Subwatershed:** At 24 thousand acres, this subwatershed represents one quarter of the area of the Chambers-Clover Creek Watershed. Land cover within

the American Lake Subwatershed is 27% built up, less than 1% agriculture, 29% forested land, and 38% other natural cover such as grass. American Lake Subwatershed contains large areas of undeveloped land.

The topography of American Lake Subwatershed is fairly flat and, as a result, surface water tends to concentrate into lakes and wetlands. Groundwater also has an important hydrologic role within this watershed and supplies water to American Lake, Gravelly Lake, Lake Louise, Sequalitchew Lake, Lake Louise, Murray Creek, Sequalitchew Creek and many wetlands. A very large area of surface water 1400 Acres or 5.7%, is contained in the American Lake Subwatershed. Fort Lewis military reservation and Camp Murray dominate the use and ownership of land, but the subwatershed also contains the municipalities of Lakewood, DuPont and Steilacoom, and the community of American Lake Gardens. Weyerhaeuser is also constructing a large planned community in DuPont known as Northwest Landing. The lakes support a great deal of recreational use including fishing, swimming, boating, and sea planes.

There are significant amounts of upland habitat in the American Lake Subwatershed, largely the result of preservation efforts of the U.S. Army (Fort Lewis). Forest communities of the Western Hemlock association occupy large areas of north Fort Lewis. Prairies associated with Oregon White Oak groves are common throughout this subwatershed. The subwatershed has areas of very high wildlife and rare plant value. There are extensive wetland systems within this subwatershed associated with American Lake, Murray Creek, and in the area of DuPont. The lakes have resident spiny ray fish populations as well as rainbow trout. Kokanee salmon (landlocked sockeye) are introduced annually into American Lake. Murray Creek supports cut throat trout and Kokanee. Sequalitchew Lake is home to a satellite WDFW fish hatchery for rearing coho salmon. Coho salmon spawn and rear in all accessible portions of Sequalitchew Creek below the Sequalitchew Lake. Chum salmon are known to spawn in the lower 200 yards of creek upstream of the mouth. Vegetation causes significant problems for juvenile fish migrating down Sequalitchew Creek to Puget Sound.

Water quality problems gained media attention in 1989 when American Lake experienced a toxic algae bloom. The lake has had high nutrient concentrations for many years and an effort is underway to determine the sources beyond the known fact that groundwater supplying American Lake is enriched with phosphorous and nitrate. Assessments of American Lake over the last six years found elevated concentrations of copper, lead, antimony, cadmium, and silver, polyaromatic hydrocarbons (PAHs), in the sediments of the lake. Moderately high concentrations of total phosphorous have been found in Murray Creek. High fecal coliform levels has been found in Sequalitchew Creek, Murray Creek, and drains leading into American Lake.

The subwatershed contains an estimated population of 52 thousand people, or 20 percent of the watershed population. Population is expected to increase over 14 thousand people by the year 2020, yet its proportion of the over all watershed population will decline to 18 percent. All of the privately held land in the subwatershed is within the urban growth boundary. Additional development will occur primarily as "in

fill" in existing urban areas. Impacts to habitat and existing pollutant loadings to water bodies are not expected to significantly increase.

**Tacoma West Subwatershed:** This is the smallest subwatershed within the Chambers-Clover Creek Watershed. It is 8,706 acres, or 9% of the total area and contains an estimated population of 55,000 people, or 21 percent of the watershed population. Tacoma West Subwatershed is highly urbanized with 67% of the land cover characterized as built up. Forested cover makes up 11% of the subwatershed and other natural cover accounts for 16% of the cover type. Most of the forested land cover is contributed by Point Defiance Park at the northern tip of the subwatershed.

The Tacoma West Subwatershed consists of small, relatively unknown creeks which drain directly to Puget Sound or Commencement Bay and do not serve as tributaries to larger creek systems, nor do they drain any significant lakes. The creeks include Mason, Puget, Asarco, Ruston, Narrows, Corbit, Gold, Brookside, Crystal Springs, and Day. They often cut through the steep cliffs that border Puget Sound, creating steep canyons or gulches. Natural or substantially altered marine shoreline are major features of the subwatershed. Significant features and towns in Tacoma West Subwatershed include the Lone Star Gravel Mine site, the Chambers Creek and the North Tacoma Wastewater Treatment Plants, the Salmon Beach community built on marine pilings, the Narrows Bridge, and the municipalities of Ruston, Tacoma, University Place, and Fircrest.

Upland habitat originally consisted of Douglas Fir and Western Red Cedar forests. Most habitat is confined to small areas and has been extensively replaced by landscaped areas of residential and commercial development. Point Defiance Park contains significant areas of natural forest and the 1994 Tacoma Open Space Plan identifies approximately 1000 acres of parks, creeks, gulches and corridors as areas of importance to wildlife. Puget Creek presently provides low value riparian and instream habitat for juvenile chum and coho, but habitat restoration efforts are underway in Puget Creek. Riparian habitat is substantially limited in other drainages and fish passage is sometimes blocked. Some seasonal and perennial streams support searun cutthroat trout.

Water quality impacts from the old Asarco smelter site itself, is considered a point source and is being handled through the EPA Superfund Program. Overall water quality data is somewhat limited, but metals and suspended solids are problems in ASARCO and Ruston Creek. Crystal Springs and Day Creeks have had E. coli counts exceeding state standards.

The population is projected to increase 15 thousand by the year 2020. Most growth will occur in the Fircrest and University Place areas. The rest of the subwatershed has been developed fairly intensively so it is unlikely that future development pressures will have a significant impact on water quality.

## **CHAPTER 3: PROBLEM DEFINITION**

The problem definition discusses the extent of water quality problems resulting from nonpoint pollution within the Chambers-Clover Creek Watershed. The purpose of this chapter is to clarify what the problems in the watershed are from the point of view of the Chambers-Clover Creek Watershed Management Committee. A watershed characterization has been completed and that data coincides with the findings of the committee. This section will review the beneficial uses of water occurring within the watershed and the extent to which they are being limited by water quality problems. It will also assess the extent to which individual waterbodies are being impacted by nonpoint pollution. Sources of pollution will be compared and their significance to existing problems assessed. Finally, the adequacy of existing programs to address these nonpoint pollution problems will be reviewed.

### **BENEFICIAL USES**

People know that they need water in order to survive. However, we use water for far more purposes than just drinking it and all of these uses may be jeopardized if the wrong substances pollute it. The Chambers-Clover Creek Watershed Management Committee developed a list of beneficial uses that are occurring within the watershed. In addition to describing these uses the committee identified the economic impacts to those uses if water quality reached unacceptably poor levels. Finally, the committee developed measures that could be used to mark improvements in the watershed's ability to support those uses.

The Committee felt that evidence of improved conditions for all uses could be found: in water quality samples which show that water is meeting all applicable standards and is improving, through surveys indicating that beneficial uses are continuing or improving, and in anecdotal evidence of improvements.

### **Household Uses**

Household uses of water include drinking, cooking, bathing, cleaning, sewage removal, and landscaping uses. Some economic impacts that might occur if water quality declined might include an increase in utility costs to treat domestic water, increased spending on bottled water, and the possibility of increased medical costs to treat illnesses related to consuming contaminated water.

The Committee hopes to see the following results if drinking water quality improves and people became more conscientious about the impact of their household activities on water quality: drinking water would meet or exceed government drinking water quality standards with little or no treatment, sales of bottled water would decline, sales of hazardous household products would decrease while sales of safe alternatives would

increase, and more ecologically sound products would be developed, marketed, and sold.

There are over 267,000 people residing within the watershed who depend upon household uses of water. For most of these people, groundwater is the primary source of domestic water supply. Because of past contamination problems, most wells are now constructed to draw water from deep aquifer sources. Increasing levels of coliform bacteria, nitrate, and chloride levels have all been detected in the shallow aquifer. Contamination of the groundwater by hazardous organic compounds has been detected in a few isolated areas. Pierce County plans to expand sewer services to most of the watershed which should decrease the amount of nitrates and bacteria reaching the groundwater through septic systems. However, Pierce County's Comprehensive Plan proposes urban densities within the watershed which may increase the potential for contamination from other sources. Chlorination of groundwater sources does occur within the watershed at a few high production well sites and is becoming more widely practiced.

Buying habits are difficult to assess because data is not collected on a watershed basis. However, grocery stores in the area do devote large amounts of shelf space to bottled water products. An analysis of buying habits performed by the Washington Toxics Coalition on data from Seattle and Tacoma grocery stores found that local residents bought ten times more cleaners with "Danger" or "Warning" labels between July of 1991 and July of 1993 than they did of safer alternatives.

Drinking water as a beneficial use is only moderately impaired at this time. However, the potential for widespread groundwater contamination is high so the beneficial use of drinking water in the Chambers-Clover Creek Watershed is best described as threatened and should include the entire extent of the watershed.

### **Commercial/Industrial**

Commercial and industrial uses of water are often similar to domestic uses in that they include: providing drinking water, cleaning, and sewage treatment opportunities to employees and patrons. But, industrial and commercial uses provide these services at a much higher volume than a traditional residential use. In addition, some industrial uses may require large quantities of process water. Industries or commercial enterprises associated with other beneficial uses of water such as commercial and recreational fishing are impacted in other ways. Some economic impacts that could occur as a result of water quality degradation might include loss of employment and tax revenues if industries relocate due to poor water quality, high water utility costs, or the loss of local fish resources.

The Committee hopes to see the following results if water quality improves: a strong water related recreation-based industry and a stronger, localized, commercial fishing industry. There are currently a number of businesses selling bait and fishing tackle

within the watershed. There are nine marinas in the watershed which offer a variety of services. Some supply gas to boats, bait, fishing tackle, and boat maintenance services as well as basic moorage. The fishing industry in Washington State is a major economic factor. Commercial fishing generates about \$90 million annually and employs 2,000 to 3,000 people (The News Tribune, December 26, 1994).

The watershed supports a great deal of commercial activity but limited amounts of industrial land uses. While fishing related commercial activities do take place within the watershed they are not a substantial percentage of the area's economic activity. However, businesses are heavily impacted by increasingly stringent regulations regarding the quality of their wastewater discharges, stormwater management fees, and development restrictions. These actions have increased the cost of doing business for many commercial and industrial uses. These regulations might be seen as an impairment of a beneficial use, but it is their impact on water quality which is being regulated rather than their beneficial use of the water.

Commercial and industrial uses of water are threatened throughout the watershed for the same reasons that household water supplies are considered threatened.

### **Fish and Wildlife Habitat**

Fish and wildlife also make use of water in a variety of ways. They drink it but it is also part of a larger ecosystem that they depend upon. Fish need streams with clear water and clean gravel to spawn. The water needs to support a good population of insects to feed the juvenile salmon. The reproductive cycle of aquatic insects is dependent upon water. A number of animal species feed on aquatic macroinvertebrates and wetland plants. The economic impact of losing these resources include an increase in the cost of seafood and a decline in fishing and hunting related industries.

The Committee hopes to see the following results from improved water quality: increased population numbers and greater species diversity for all life forms including plants, birds, mammals (except small carnivores), and fish.

The Chambers-Clover Creek Watershed supports a variety of fish and wildlife species which are described at length in the Biological Conditions chapter of the watershed characterization. Species diversity and genetic diversity in fish is declining. The system has experienced the extinction of an early Coho run, a summer Chum run, and the Chambers Creek Sea-run Cutthroat is at risk. Macroinvertebrate samples from Clover Creek found that most of the creek was experiencing poor or fair species diversity levels. The number of organisms collected were also found to be low.

Significant fish and wildlife habitat areas within the watershed may be found in Chambers Creek Canyon, at Point Defiance, in Snake Lake Park, and on the Fort Lewis military reservation.

## **Recreation**

Recreational uses associated with water include: fishing, swimming, water skiing, boating, and wildlife viewing. The economic impacts to this beneficial use as a result of degraded water quality might be seen in lower property values, condemned beaches, lower boat sales, lower boat fuel sales, lower tackle and bait sales, lower sports equipment sales, and lower fishing license revenues. Park user fees might need to be implemented or raised to support cleanup efforts. As a result of successfully implementing the Watershed Action Plan, the Committee hoped to see an increase in water-related park usage that out-paces local population growth and an increase the number and level of use of boat pumpouts.

A significant amount of business is created by Washington's 400,000 sport salmon fishermen. In 1991, retail sales on fishing equipment totaled \$69.8 million in Washington State. An additional \$19.7 million was spent by recreational anglers on camping equipment, rain gear, and fishing apparel. In 1991, Washington residents spent over \$106 million on boats and \$24 million on outboard engines for the purpose of recreational fishing. Boats used for fishing account for almost 80% of boat sales in Washington. Moorage, storage, maintenance, and accessories of boats cost recreational fisherman \$38 million in 1991. \$40 million was spent by fishermen on boat fuel. The average angler spent \$295 in 1991 on trip costs such as travel, lodging, and rental fees. These trip costs generated a total of \$285 million in 1991. In 1991, sportfishing supported 27,200 jobs, created \$802 million in retail sales, and generated \$1.4 billion in total economic effects. (National Marine Trade Association, 1992.)

Important water-related recreational opportunities occur within the watershed. Boating takes place on Puget Sound and on American, Steilacoom, Gravelly, and Spanaway lakes. Fishing occurs in Puget Sound of Point Defiance, in Chambers Bay, on American Lake, on Steilacoom Lake, and on Spanaway Lake. Swimming opportunities are available at most lakes and at Point Defiance and Titlow beaches.

## **Agriculture/Aquaculture**

Agriculture and aquaculture are both centered around food production. Agricultural activities include irrigation for crops and watering livestock. Aquaculture involves the raising of fish and shellfish for recreational purposes and human consumption. Clean water is essential to maintain the purity of consumable foods. Potential economic results from impacts to agriculture and aquaculture could include higher food prices, less seafood available, and a weaker fishing industry. Benefits to agriculture and aquaculture from reducing nonpoint pollution might be measured by seeing more shellfish beds available for harvest and a greater variety of agriculture and aquaculture products from within the watershed.

Aquaculture takes place on American and Sequelitchew lakes in the form of fish net pens. Garrison Springs hatchery is another example of aquaculture occurring within the

watershed. Agricultural land uses within the watershed are scattered and characterized by smaller lot sizes. Most agricultural activities are centered on livestock but there are also growers of Christmas trees, nursery items, and small vegetable plots.

## **Quality of Life**

Quality of life refers to the aesthetic and climatic conditions for which the Pacific Northwest is known. The temperate climate, lush vegetation, and many opportunities for views of water are all reasons why people choose to live and vacation in this area. If poor water quality were to impact this beneficial use, the most obvious economic impact would be lower property values. If nonpoint source pollution were successfully decreased, surveys of local residents would reveal an improved image of the local environment, an increase in recreational users, and increases in the total square footage of open space within the watershed. Quality of life is heavily impacted by other beneficial uses so threats to uses such as drinking, recreation, and fish consumption should also be seen as threats to the quality of life.

Property values of homes located on Steilacoom Lake have decreased by 15 to 20% and may be attributed to water quality issues. These values are being impacted by severe invasive plant growth problems occurring in the lake and by publicity surrounding copper levels in the lake sediments. Most of the other lakes within the watershed are also surrounded by lakeshore residents and may experience similar problems. The value of properties located along creeks may be impacted by flooding, low flows, and modifications which reduce the aesthetic appeal of the creek.

## **Cultural and Ceremonial**

Cultural and ceremonial uses of water are shared by both the local Native American population and residents from other backgrounds. The Puyallup and Steilacoom Indian tribes have a long history of dependence upon fish and shellfish as food sources. Indian tribes traditionally celebrate the annual return of salmon runs and fishing is still an important family, tribal, and economic activity among the local Native American population. The collection and consumption of fish and shellfish is also important to the large Southeast Asian population living and fishing within the watershed. In fact, fishing has become a popular and important family activity for watershed residents of all backgrounds. Families throughout the region traditionally gather and celebrate the opening days of fishing, clamming, and boating seasons. Many annual family celebrations and reunions are associated with locations on lakes, rivers, and Puget Sound and are often connected with holidays such as Memorial Day, Labor Day, and the Fourth of July. The potential economic impact of poor water quality on this beneficial use might include lawsuits from Indian tribes and a reduction in tourism related revenues. If nonpoint pollution were successfully decreased the local area might see an increase in the number and size of celebrations centered around water and fish migration. Attendance at water-related celebrations would increase.

There are currently a few small local celebrations associated with water occurring within the watershed. Local groups and schools which raise baby salmon often celebrate the release of the salmon into local creeks. The Clover Creek Council organizes a community celebration focussed on Clover Creek as an annual event.

### **Service/Utility**

There are a number of services and utilities which manage water related issues. Water is used to produce electricity, to convey sewage, and to suppress fires. Utilities supply drinking water, manage storm drainage, and provide flood control. Poor water quality and result in economic impacts such as higher utility bills, higher water costs, higher costs for capital improvements, and/or high rates of flood damage. An improvement in conditions could be measured by a reduction in the rate and severity of flooding and in groundwater that meets drinking water quality standards with less or no treatment.

The Pierce County Public Works and Utilities Department has an annual budget to maintain and construct public stormwater facilities. Private property owners also support the installation and maintenance of stormwater facilities on private lands. In addition, there are over 1500 water supply systems within Pierce County and most purveyors within the Chambers-Clover Creek Watershed depend upon groundwater to supply their customers.

### **Transportation**

Transportation is an economically important beneficial use of water. Many products and natural resources are transported by ship. Poor water quality can impact transportation by causing invasive aquatic weed growth and contaminating sediments in harbors. The weeds can interfere the ability of vessels to negotiate shallow waters and contaminated sediments make dredging much more costly. Most aquatic transportation occurring within the watershed is supporting recreational uses. Some gravel mine products are shipped from within the watershed. The Chambers-Clover Creek Watershed Management Committee feels that the best measure of impacts to transportation from water quality would be to track any decline from the present level of support.

### **WATERBODIES**

The condition of the waterbodies within the Chambers-Clover Creek Watershed is discussed at great length in both the Water Quality Chapter and subwatershed chapters of the characterization. Those chapters review sampling results, compliance with WAC 173-12A, and habitat conditions on individual stream reaches. The Chambers-Clover Creek Watershed Management Committee analyzed data in those sections and determined stream segments to be impaired or threatened by nonpoint pollution and extent of impairment and degree of water quality degradation. In addition to stream

segments, the condition of the groundwater, wetlands, and lakes were also reviewed. The Committee understands that all of these waterbodies are subject to water pollution. Steilacoom Lake, and Chambers, Leech, and Clover Creeks seem most threatened and impaired.

## **REVIEW OF EXISTING PROGRAMS**

Each source is addressed within specific source control chapters within this document. The introduction to each source discusses the extent to which it occurs within the watershed and the agencies administering programs which impact that source. The limitations of these agencies and organizations are described within those sections. Appendix B also analyzes existing programs to prevent and correct nonpoint pollution. Federal, state, local, and other water quality programs are reviewed and addressed.



## EXPLANATION OF 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 of nonpoint pollution, the Chambers Clover Creek Watershed Management Committee chose to organize nonpoint pollution source control into six generalized categories: agriculture & forestry, boats and marinas, on-site sewage, stormwater/erosion, other, and public involvement/environmental education. 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, goals and objectives of each subcommittee for dealing with their particular pollution source, and specific pollution 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.

**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:** This 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:** Care was taken to limit additional tax burdens. Most actions either identify grants or modification of existing programs. How the funding source will support the financing of the action item is explained. Funding types include: grants, fees, general funds, rates, 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 time in which the lead implementor would begin the action item. Some action items may need to be delayed until other actions or action items are completed. These time frames are based on the assumption that the Watershed Action Plan will be quickly adopted.

## **CHAPTER 4: AGRICULTURE AND FORESTRY ACTION ITEMS**

### **AGRICULTURE**

Agricultural activities are significant to the economic well being of Pierce County and the State of Washington. With production valued at over \$3 billion annually, agriculture is Washington's leading industry. Although there is only a small amount of commercial agricultural activity in this watershed (flower growers, some dairy and cattle raising, one poultry processing farm), the Chambers-Clover Creek Watershed Management Committee (CCC-WMC) identified agriculture as a beneficial use of water which should be protected, and felt that an increase in the number and variety of commercial agricultural products from within the watershed might be a good indicator that protection was occurring.

Agriculture also includes aquaculture, or the production of fish or shellfish for human consumption. Fish net pens for aquaculture are located on American and Sequelitchew Lakes. The Department of Fish and Wildlife supports the Garrison Springs Fish Hatchery near Chambers Creek just downstream of Steilacoom Lake. Most of these net pen and hatchery fish will be released to lakes and stream systems to complete their life cycles and are not raised to adulthood. Many of these fish are used to stock rivers and lakes for sport fishing purposes. While these fish may not go directly to the grocery store, they must be of sufficient quality to be safely consumed. There are no commercial shellfish beds within the watershed. Titlow Beach, south of the Narrows Bridge in Tacoma, is closed to recreational shellfishing.

The Agriculture and Forestry subcommittee of the CCC-WMC identified water quality benefits from preserving commercial farm lands that follow good management practices. Agricultural land uses require limited amounts of impervious cover (which are commonly tied to increased flooding and pollution), and crop farms encourage absorption of rain water by the soil. Commercial farmers in the area are particularly concerned about water quality issues because pollution has the potential to impact the quality, purity, and marketability of their products. As a result, they have a vested interest in fostering good stewardship practices.

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...." (WAC 400-12-525(4)(a)(v)).

## REVIEW OF ISSUES

Agriculture is considered to be land upon which crops are grown and harvested, or livestock is kept. Within the Chambers-Clover Creek Watershed, there are approximately 2,400 acres of land in agricultural taxation. This means that the owners applied for taxation relief and that their commercial or hobby agricultural operation generates more than \$500 of income annually. The value of the property for taxation purposes is then based on its current use (farming) rather than its highest potential use.

The assessed value of the property may be reduced by as much as 90%. If property owners wish to convert their land to another use, they must pay back the amount of the tax benefit they received in the preceding seven years. Many farmers do not choose to take advantage of the reduced tax program because there is no benefit if the land is converted within seven years. Farmers who feel that development pressures and regulations will make farming unprofitable are hesitant to apply for the relief.

There are approximately 7,700 acres within the watershed that have a residential density of 1 dwelling unit on 2 or more acres. These parcels have a likelihood of supporting agricultural practices, but the property owners: 1) have chosen not to take advantage of agricultural taxation; 2) have small hobby farms that are not always profit generating; 3) may be committed to another type of land use that is not agriculturally related. If the combined total of 10,100 acres approximates the actual amount of land being used for agricultural activities within the watershed, then agricultural land uses would make up about 10% of the watershed.

4-H Programs administered by the Pierce County Cooperative Extension are extremely active within the watershed boundaries. There are approximately 27 4-H clubs in the watershed, with programs for horses, goats, and rabbits being the most active.

If improperly managed, animals may cause sedimentation from either direct access to streams or from overgrazing. Fecal matter problems may also come from animals having direct access to streams 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. Manure is also a potential source of pathogenic bacteria. Fish and their habitat can also be impacted by sediment covering up spawning beds, damaging fish gills, and reducing their ability to find food. Potential pollutants in runoff from improperly handled crop farming activities include: sediment from tilled fields, fertilizers, herbicides, rodenticides, and insecticides.

Farm size affects water quality. Small hobby farms (under 5 acres) may have fewer animals, but they often operate at animal densities higher than those found on larger farms. A large number of small hobby farms may have a greater cumulative impact on water quality than a large farm with acreage equal to that of the local small hobby farm population. The problem is partly due to higher animal densities but also because small lots do not have the space needed to support effective management practices. As a result the greatest potential source of nonpoint pollution from agricultural lands is

believed to be from small hobby farms. It is not possible to confirm the exact number of small hobby farms that exist within the watershed. Residential lots of less than 2 acres supporting livestock within the watershed are not unusual. Horse, rabbit, and goat populations seem to increase as an area becomes more suburban in nature, with agricultural activities occurring on these smaller sized lots as well. Rabbits and goats need limited holding areas. Horses, while they are large, can be kept at fairly high densities in boarding stables. These animals also tend to make suitable pets or provide opportunities for recreation. From time to time, exotic animals, sometimes considered pets, have also been kept in the suburbanizing areas of this watershed.

Large acreage farms have the potential to be point sources in certain situations. For instance, runoff from farming practices such as field preparation and heavily used livestock holding or feeding areas may contain high levels of sediment. Good manure handling practices are vital. Fish kills have been known to occur when manure spray guns have been placed too close to creeks or allowed to run for too long a period of time in one location. There are no dairy lands within the watershed that support significant dairy cow populations, so poor dairy waste management is not believed to be a water quality problem in this watershed. However, there are a number of horse stabling facilities in the area, so manure and pasture management practices for large farms are believed to be relevant to controlling pollution from nonpoint sources.

The Chambers-Clover Creek Watershed is characterized by urban and suburban land uses. The expected trend for land currently used for agricultural purposes is that it will be converted to small hobby farms, residential, or industrial uses over time. The entire watershed falls within the Proposed Urban Growth Boundary for Pierce County, and as such, is designated for higher land use densities.

## EXISTING PROGRAMS

**United States Environmental Protection Agency (EPA):** EPA has oversight of the implementation of the Federal Clean Water Act. The Clean Water Act states that animal feeding operations of significant size (700 confined animals) are required to have National Pollutant Discharge Elimination System (NPDES) permits. However, there are no animal feeding operations that surpass the threshold within the Chambers-Clover Creek Watershed. EPA also has authority to register pesticides for either general or restricted use. EPA certifies pesticide applicators in all states which do not have an applicator certification program that has been approved by EPA. States have the authority to regulate the sale and use of federally registered pesticides and have primary enforcement responsibility.

**United States Department of Agriculture (USDA):** USDA has a number of programs which impact agricultural activities. The U.S. Natural Resources Conservation Service (NRCS) is a technical agency within USDA which assists private land owners with implementing soil and water conservation practices. NRCS technicians study the characteristics of the land and the agricultural operation and provide the land owner with

a list of recommended best management practices (BMPs) as well as the cost of implementing them. NRCS is also available to design needed structural improvements and to help find funding for implementing BMPs.

Another element of the USDA is the Consolidated Farm Services Agency (CFSA). Each county has an elected committee of local farmers that decide which proposals should receive grants. The CFSA offers loans and loan guarantees to farmers for pollution abatement practices and devices if the farmer is unable to obtain credit elsewhere. The CFSA also offers cost-share assistance for establishing and/or replanting woodlots, improving timber stands, and improving wildlife habitat.

**Small Business Administration (SBA):** SBA provides loans to individual farmers and corporate farms to cover expenditures or losses caused by complying with state or federal regulations. EPA must certify that the proposed equipment is "necessary and adequate" to meet pollution control requirements.

**Washington State Department of Ecology:** Ecology administers grant monies which are used to support implementation of BMPs and also to establish educational programs for addressing pollution from agricultural sources.

**Washington State Conservation Commission:** The Conservation Commission supervises the activities of all of the Conservation Districts within all of the counties. The Commission monitors regulatory changes that will impact the Districts. The Commission receives a share of the Centennial Clean Water Fund and decides how those grant monies will be appropriated.

**Washington State Department of Agriculture (WSDA):** The State Department of Agriculture licenses pesticide applicators and checks the quality and safety of agricultural products.

**Washington State Growth Management Act (GMA):** This piece of legislation requires all of the counties surrounding Puget Sound to develop comprehensive, long range, land use plans. These decisions will impact agricultural lands either by establishing zoning and land use patterns that will encourage and protect existing agricultural practices within the watershed, or by allowing incompatible land uses and higher densities which might hamper the ability of agricultural uses to continue operating. The plans are supposed to identify resource lands (including agriculture lands), and develop programs to protect them.

**Pierce County Planning and Land Services Department (PALS):** PALS issues wetland permits for new or expanded uses within 150 feet of wetlands.

**Pierce County Assessor/Treasurer Office:** The Assessor's Office processes applications for Agricultural Open Space taxation.

**Pierce County Conservation District:** The Conservation District is a distinct subdivision of Washington State government which is directed by an elected Board of Supervisors. The Board directs the actions of the District Manager who supervises technicians employed by the district. Technicians contact farmers, write farm plans, and provide technical assistance for the installation of BMPs. Another significant role the Conservation District plays is in providing education about conservation practices and water quality. The Conservation District also develops and maintains inventories of small farms, dairies, and crop lands within Pierce County. The Pierce County Conservation also writes grants in cooperation with other agencies for the implementation of BMPs

**Pierce County-Washington State University Cooperative Extension:** The Cooperative Extension program associates state universities with local agents who work directly with local residents on agricultural issues. Washington State University supports a Pierce County Cooperative Extension program with assistance from local governments.

**King-Pierce County Farm Bureau:** The bureau monitors state and local legislative action pertaining to farmers, updates its members, and lobbies for their interests. They also provide guidance and a network for farmers seeking advice on a particular problem.

**King-Pierce County Cattlemen's Association:** The association is involved in the same activities as the King-Pierce County Farm Bureau except that their members are cattle farmers.

The primary agencies working with agricultural land owners in Pierce County are the Pierce County Conservation District, the Natural Resource Conservation Service (NRCS), Consolidated Farm Services Agency (CFSA), and the Pierce County-WSU Cooperative Extension.

## **FOREST PRACTICES**

The Chambers-Clover Creek Watershed contains little forest land compared to other land uses. There are only about 80 acres of land within the watershed that have been placed in forest land taxation. As a result, logging impacts from land in the watershed boundary are relatively low compared to other nonpoint sources of pollution. However, WAC 400-12 recommends that all watershed action plans review any problems related to forest practices that might exist within the watershed.

## REVIEW OF ISSUES

Forest practice concerns within the Chambers-Clover Creek Watershed are focussed primarily on small forest lots and land conversions. Small lot timber harvesting is a concern because they are difficult to regulate. The owners know very little about managing a timber resource, and most owners do not intend to keep the property long enough to realize a profit from another harvest. As a result, less care may be taken in the harvesting process.

When performed improperly, 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 access road siting, installation, 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 removed, high water temperatures may threaten salmon runs. These impacts can be avoided if the practice is conscientiously performed and in accordance with existing regulations.

Another impact which may occur even in situations when logging has been performed carefully, are runoff rate changes. After the trees are removed, stormwater runoff hits creeks at higher rates of flow over a shorter period of time. Forests hold water back to some extent, allowing stormwater to reach streams more slowly and over a longer period of time. Short, forceful, high peaks of flow can damage stream channels by scouring them out.

Forest practices are regulated by the Forest Practices Act (FPA). The FPA includes provisions for leaving streamside management zones of 50 feet on larger salmon-supporting streams, and 25 feet on smaller salmon-supporting streams. It also includes standards for construction of roads, landings, and skid trails. The Timber, Fish, and Wildlife Agreement (TFW) of 1987 included changes in the way the FPA was being implemented. TFW called for better management of roads, riparian zones, slopes, archaeological resources, old growth, and harvesting practices. The Shoreline Management Act limits timber harvests within 200 feet of "shorelines of statewide significance" (Puget Sound, major rivers and lakes) by allowing the removal of no more than 30% of the merchantable timber. Commercial timber harvest of this 30% generally does not require a shoreline permit.

## EXISTING PROGRAMS

**United States Forest Service:** The Forest Service manages over 2 million acres of commercial forest land in Western Washington. Commercial forest operators sign contracts with the Forest Service to harvest the timber on Forest Service land. The National Forest Management Act requires the Forest Service to manage the land in a certain way and to specify in their contracts with commercial foresters that watershed conditions will not be adversely damaged, that the land will be replanted, that water bodies will be protected, and that harvesting systems will not be selected purely by what brings in the greatest dollar return.

**Washington State Department of Ecology:** Ecology is responsible for reviewing regulations pertaining to the control of nonpoint pollution from forest practices and to modify those regulations where appropriate. Ecology may also work in cooperation with the Forest Practices Board to promulgate new forest practice regulations to achieve compliance with water pollution control laws. In addition, Ecology monitors water quality and water quality trends. After first notifying the Department of Natural Resources, Ecology may take enforcement action if a forest practice violates water quality standards. Ecology ranked priority problem areas within the state by the extent of the activity taking place.

**Washington State Department of Natural Resources (DNR):** DNR has primary administrative and enforcement responsibilities for the Forest Practices Act. The department issues permits for all timber harvest activities within the state that call for the removal of more than 5000 board feet of timber per year from a parcel with the intention of selling the harvest. DNR also provides education and incentive programs to forest land owners, assisting them with replanting and encourage stewardship of forest lands. DNR has been given the responsibility of managing 3.1 million acres of state-owned trust lands. About 2.1 million acres of that is forest land. These lands are supposed to produce a "reasonable income" for the public school system. State law requires that these trust lands be harvested on a continuing basis.

**Washington State Forest Practices Board:** The Board was established by the Forest Practices Act and is charged with preparing forest practice regulations. The intent of the regulations is to provide agencies with criteria for the review and inspection of forest practices. The members of the Board are appointed by the governor. The Commissioner of Public Lands, the directors of the Departments of Trade and Economic Development, Agriculture, and Ecology are all represented on the Board. Six members of the public and one county elected official also serve. Ecology and the Board must agree on any new water quality regulations regarding forest practices before they may be promulgated.

**Washington State Department of Fish and Wildlife:** Fish and Wildlife reviews all forest practice permits to verify that they are in compliance with the State Hydraulic Code which applies to any activity within the ordinary high water line (freshwater) or mean high water line (saltwater). An approved forest practice permit is also considered

to be a Hydraulic Project Approval (HPA). Fish and Wildlife can cite forest operators for violations of the Hydraulic Code but not for violations of Forest Practice Regulations.

**Washington State Growth Management Act (GMA):** The GMA requires all of the counties surrounding Puget Sound to develop comprehensive plans for future growth. A land use zoning designation for forest lands has been established and will continue. In addition, special designation as a forest resource land as requested by the property owner provides protection from incompatible land uses being established on adjoining parcels.

**Washington Farm and Forestry Association (WFFA):** The WFFA administers education programs addressing water quality, forest land conversion, and reforestation.

**Pierce County-Washington State University Cooperative Extension:** The Cooperative Extension provides education programs on forestry, partly through the 4-H system.

**Pierce County Planning and Land Services (PALS):** PALS reviews all forest practice permit applications that include a proposal to convert the land from timber use. Pierce County performs environmental reviews (SEPA) on the proposed forest practice and requires that land owners obtain the appropriate permits for the new land use before it recommends that DNR approve the forest practice. Pierce County also implements Site Development Regulations which govern the clearing of land over 2 acres in size.

**Pierce County Assessor/Treasurer Office:** The Assessor's Office manages the County's Open Space taxation program which provides property tax relief opportunities to timber land owners. The owners must apply for relief, and they must submit a management plan with their application. In most cases, the Natural Resources Conservation Service writes the plans for the applicants.

**Natural Resources Conservation Service (NRCS):** NRCS provides technical assistance to land owners and develops conservation plans in partnership with the Pierce County Conservation District. They also coordinate grant programs and financial assistance programs for implementation of conservation plans with the Pierce County Conservation District.

## **PROBLEM DEFINITION**

1. A collective ethic of stewardship has not been established in Pierce County.
2. Development within the watershed is unguided.
3. There is inefficient government agency coordination and implementation of regulations.
4. Bias exists.
5. Consumers are not paying the true cost (production and disposal) of products.
6. Funds are misdirected and not reaching the most necessary and effective programs.
7. Incentives are needed to encourage people to change poor practices.

## **GOALS**

1. Increase conservation education.
2. Establish assistance and responsibility to manage land well.
3. Equitable treatment by government agencies (laws applied equally to everyone, including government).
4. Manage growth effectively.
5. Good data collection to identify problems more accurately and incentives to use the latest technological advances.
6. Promote agricultural land uses and open space.
7. Standardize and equalize the Forest Practices Act.

## **OBJECTIVES**

1. Improve the agriculture and forestry industries financial well being.
2. Encourage proactive leadership.
3. Identify and advertise the cost of consumptive actions.
4. Ensure the ability to farm. Coordinate land use decisions.
5. Raise the public consciousness about the value of agriculture and forestry.
6. Co-locate government services.

## **ACTION ITEMS**

### **AF 1 INVENTORY ALL SMALL AND HOBBY FARMS WITHIN THE WATERSHED**

All small and hobby farms in the watershed would be inventoried. These farms would also be ranked to establish a priority order for implementing best management practices (BMPs). Ranking criteria would be based on the potential to cause nonpoint pollution and would contain such elements as, proximity to water, vegetation coverage, number and type of animals per acre, soil type, and whether or not best management practices were already taking place.

<b>Lead Implementor:</b>	PC Conservation District
<b>Cooperators:</b>	NRCS, FFA, PC Assessor/Treasurer
<b>Estimated Cost:</b>	\$40,000
<b>Potential Funding Source:</b>	Ecology, EPA, USDA
<b>Potential Funding Type:</b>	Grant
<b>Benefit:</b>	Data collected from small and hobby farms in this watershed would allow for an assessment of their impacts to water quality. Implementation of a small-scale program could be expanded to other watersheds where small and hobby farms are greater in frequency and in significance to water quality
<b>Type of Source Control:</b>	Information and monitoring
<b>Time Frame:</b>	One year
<b>Startup Date:</b>	1/1/98

## **AF 2 IMPLEMENTATION OF BEST MANAGEMENT PRACTICES ON SMALL AND HOBBY FARMS BASED UPON THE INVENTORY AND PRIORITIZATION**

In conjunction with the inventory and prioritization of small and hobby farms, implementation of BMPs could begin on the lands which head the list. Continuance of the program could be assured with the initial small and hobby farm owners helping to promote BMPs to other landowners on the list or in their general area.

<b>Lead Implementor:</b>	PC Conservation District
<b>Cooperators:</b>	NRCS, Consolidated Farm Services Agency (CFSA)
<b>Estimated Cost:</b>	\$125,000
<b>Potential Funding Source:</b>	Ecology, EPA, USDA
<b>Potential Funding Type:</b>	Grants
<b>Benefit:</b>	Implementation of BMPs, greater awareness of small and hobby farm impacts to water quality
<b>Type of Source Control:</b>	Education, changed behavior from implementation of BMPs (voluntary incentive)
<b>Time Frame:</b>	Ongoing
<b>Startup Date:</b>	6/1/98

**AF 3 DISTRIBUTE MANAGEMENT (BMP) PAMPHLET TO FARMS (INCLUDING SMALL AND HOBBY)**

Focus distribution of a pamphlet to small and hobby farm owners. The pamphlet would list agencies that can be contacted for assistance in establishing agricultural best management practices (BMPs). Pamphlets will:

- \* include information about agricultural BMPs and why they are important;
- \* remind land owners that poor practices may negatively impact water quality;
- \* inform them that poor practices may be illegal & subject to fines.

These pamphlets might be distributed to agriculture-related businesses (e.g. feed stores, tractor dealers, agriculture supply stores).

<b>Lead Implementor:</b>	PC Conservation District
<b>Cooperators:</b>	NRCS, CFSA, PC-WSU Cooperative Extension, PC Assessor/Treasurer, all local governments
<b>Estimated Cost:</b>	\$10,000 (first-year cost)
<b>Potential Funding Source:</b>	Ecology, EPA, USDA
<b>Potential Funding Type:</b>	Grants
<b>Benefit:</b>	Increased awareness, government action
<b>Type of Source Control:</b>	Education, data collection
<b>Time Frame:</b>	Ongoing
<b>Startup Date:</b>	1/1/98



#### **4 DEVELOP RADIO ADS TO RAISE AWARENESS OF AGRICULTURAL AND FORESTRY NONPOINT POLLUTION ISSUES**

Fifteen- to thirty-second radio advertisements would be developed by the King-Pierce County Farm Bureau and the King-Pierce County Cattlemen's Association, to be played on local radio stations as public service announcements (required by the FCC). The spots should be well-produced, informative, entertaining or even humorous, yet focus on serious issues related to water quality and farming practices. The ads will target small and hobby farm owners as their audience. Costs include distribution-on-request to Cattlemen's Associations, Farm Bureaus, Conservation Districts, and radio stations in western Washington counties.

<b>Lead Implementor:</b>	King-Pierce County Cattlemen's Association, King-Pierce County Farm Bureau
<b>Cooperators:</b>	Local radio stations, technical schools, Puget Sound Action Team, WSU-Puyallup Research and Extension Center
<b>Estimated Cost:</b>	\$20,000
<b>Potential Funding Source:</b>	Ecology
<b>Potential Funding Type:</b>	Grants, general funds
<b>Benefit:</b>	Increase awareness
<b>Type of Source Control:</b>	Education
<b>Time Frame:</b>	Ongoing
<b>Startup Date:</b>	6/1/97

**AF 5 FACILITATE URBAN REFORESTATION AND STREAM BANK RESTORATION PROJECTS THROUGH EXISTING ORGANIZATIONS**

The Chambers-Clover Creek Basin Advisory Committee (BAC) will coordinate the prioritization and financing (to include at least the purchase of plant and stream stabilization materials) for the restoration of stream banks and the replanting of trees in certain areas within the watershed. Existing groups such as the Pierce County Stream Team and the Clover Creek Council will be supplied the proper materials and supervision to undertake the projects chosen.

<b>Lead Implementor:</b>	Chambers-Clover Creek Basin Advisory Committee
<b>Cooperators:</b>	Clover Creek Council, PC Stream Team, local school districts
<b>Estimated Costs:</b>	\$10,000
<b>Potential Funding Source:</b>	American Forestry Association, Washington State Fish and Wildlife Department, PC Conservation District
<b>Potential Funding Type:</b>	Grants, loans, donations
<b>Benefit:</b>	Restore riparian and other areas by planting native vegetation, improve habitat, community involvement
<b>Type of Source Control:</b>	Improved habitat and ecosystems
<b>Time Frame:</b>	Ongoing
<b>Startup Date:</b>	12/1/95

## **CHAPTER 5: BOATS & MARINAS ACTION ITEMS**

Recreational boating is a common and popular pastime within the Chambers-Clover Creek Watershed. In 1992, there were 23,263 boats registered in Pierce County (registration applies only to boats over 16 feet in length and motorized with 10 horsepower or greater engines). Metropolitan Parks District records indicate that in 1992 approximately 14,280 additional boat owners who had not yet renewed their registrations. The actual number of boaters would be much higher if small boat users and users from outside Pierce County were included. (Pierce County Boat Launch Task Force, 1994).

The recreational boating industry has an estimated \$2.14 billion impact on Washington State's economy and employs approximately 21,000 people statewide. Puget Sound accounts for 80% of these totals. (PSWQA, State of the Sound 1992 Report).

Recreational boating in the watershed occurs on Puget Sound near Point Defiance, along the Tacoma Narrows, and in the local freshwater lakes. There are nine marinas within the watershed: Breakwater Marina, Tacoma Yacht Club, Chambers Creek Marina, Day Island Marina, Day Island Yacht Club, Salters Point, Steilacoom Marina, Narrows View Marina, and Point Defiance Boat House. There are live-aboards within the watershed but they are few in number. The five marine boat launch ramps within the watershed are located at Solo Point (Fort Lewis), Steilacoom, Narrows Marina, Titlow Park (currently a private launch for the Tacoma Outboard Association), and Point Defiance. Overnight moorage on saltwater is available at the Old Town Dock. Mooring buoys have been established offshore of Owens Beach for overnight anchorage. Freshwater boat launches are provided at American Lake, Steilacoom Lake, Lake Louise, and Spanaway Lake. There is one amphibious airplane dock on American Lake.

While poor boating practices may occur on both salt and fresh waters, it is believed that salt water boating habits afford greater opportunities to impact water quality because trips are usually longer and marinas make it easier for owners to store their boats on the water. However, poor freshwater boating practices (such as moving a boat from lake to lake without washing) have allowed the spread of noxious aquatic plant species. Leakage or spilling fuels or oils are also contributing pollutants.

The Chambers-Clover Creek Watershed Management Committee has determined that boating activities within the watershed are significant enough to require attention, both for the purpose of reducing nonpoint pollution and for supporting the continuation of recreational boating.

### **REVIEW OF ISSUES**

Nonpoint pollution concerns from boating stems primarily from the discharge of untreated or inadequately treated sewage. While all untreated sewage can have a negative impact on water quality, fresh fecal matter is of particular concern because there is a greater potential for the presence and survival of pathogens that may contaminate shellfish. Direct discharge from a boat can allow fresh fecal matter immediate access to the water column. Boats with installed toilets should not allow direct discharge of sewage. They are usually equipped with a Marine Sanitation Device (MSD) that either treats the sewage (types I and II) or places it in a holding tank (type III) for later pumpout. It was the intent of the 1972 Clean Vessel Act that type I and II tanks serve as an interim means of sewage treatment until more pumpout stations were established. But only one pumpout station exists in the watershed, at Point Defiance, and access is often limited. Type III holding tanks are only effective in Puget Sound if facilities exist to pump them out.

Services are also scarce at popular boating destinations that do not have an associated marina. Only 10% of registered vessels have installed toilets, and trips to these destinations can create problems. Portable toilets, or Port-a-pottys, are often used by boat owners who have no installed toilets on board; disposal of the waste should be to a land-based sewage treatment system, but if no disposal system is available, it creates a dilemma. The U.S. Coast Guard may issue fines for up to \$2000 for anyone illegally discharging sewage from a boat.

The disposal of water from sinks and showers can also be an issue. The problem is that cleaning products can contain chlorine, phosphates, salts, and metals. In a household environment, many of these products are rendered harmless by sewage treatment processes. Boaters' wash water bypasses this treatment stage. Many boaters are aware of the need to use nontoxic products, but product education needs to continue.

Other potential pollutants from boating activities are related to the care and maintenance of a boat. General boat maintenance often includes painting, wood refinishing, cleaning, and engine repair. Bottom paints on boat hulls are proving to be a tough issue for boaters. Traditionally, bottom paints have been self-sloughing, meaning they shed microns of paint and any marine growth. To inhibit barnacle growth, these paints contain a high level of copper, a common biocide. Prior to 1989, self-sloughing paints contained tributyltin (TBT) which is even more toxic than copper. When sloughed off, these paints directly contribute contaminants to bottom sediments. Sloughing occurs at much higher rates when the boat bottom is cleaned as part of regular maintenance, but at an excessive rate if the cleaning technique is too abrasive. However, many new bottom paints are appearing on the market to provide alternatives to self-sloughing paints. Marinas and businesses providing boat hull cleaning services are now required to lay tarps underneath the boats to limit pollutants entering the water, and if a pressure washer is used, the water must be collected and treated. Any boat owner using a grid is required to do the same, and any significant sanding to be done must be done inside an enclosed area to limit airborne particles from reaching the water.

In addition to hull upkeep, the repair and maintenance of boat engines may also provide opportunities for contaminants to reach the water. Pollutants might include motor oil, gasoline, sulfuric acid from batteries, antifreeze, and transmission fluid. Gasoline may be spilled when refueling, either at a marine gas station or spills from portable gas cans. Local marina operators are seeing more potential for spills from individual gas cans since marinas are closing their gas stations due to the difficulty of meeting environmental requirements. Maximum fines for violating regulations restricting the introduction of these substances into marine waters range from \$10,000 to \$25,000.

Bilges also provide opportunities for pollutants to enter Puget Sound if grease, oil, or fuel are in bilgewater and are then pumped out. There are products which will collect any oil or fuel that spills into the bilge but boaters need to be encouraged to use and maintain them. Pans and absorbent materials can be placed under the engine to collect any drips or leaks. These oil absorption products also provide a backup if an accident occurs. Filters attached to bilge pumps are also able to remove some of the pollutants that might get into the bilge.

Recent legislation has implemented severe restrictions on throwing litter and garbage overboard. Plastic and styrofoam can be particularly harmful to marine wildlife. No food wastes, plastic, metal, or packaging may be thrown overboard within the waters of Puget Sound. Violators of no dumping regulations may be liable for up to \$25,000 in civil penalties, \$50,000 in fines, and may be jailed for up to five years.

Water quality sampling which can document the actual pollutant contribution of boats to Puget Sound is difficult to obtain because the pollutants found in waters used heavily by boaters may come from land sources and not from boating activities. Also, tidal action may move pollutants away from the area fairly rapidly. Dilution is also a significant factor in assessing the impact of boating on water quality.

Water Management Laboratories Inc. performed a series of samples in the area of Day Island in 1987 with the intent of measuring differences in bacteria levels during periods of high boat use. A number of samples were taken in the area which help determine the effect of surface runoff on sampling results. Samples were only taken on dry days. The study found low bacteria levels during low boat use and distinct increases in bacteria levels in most instances of high boat use. Low boat use samples were usually within the parameters. Low boat use periods were assessed during normal weekdays and included the activities of at least three live-aboards and a few other regular boat users. High boat use measures were taken over holiday weekends, such as the Fourth of July and Labor Day. A stormwater outfall and Crystal Creek, which flow into Day Island Bay, were also sampled and showed consistently higher levels of fecal coliform bacteria than the bay. There was no correlation between high bacteria levels in these surface water sources and bacteria levels found in the two marinas. In fact, some of the highest readings found in Crystal Creek came when Day Island Marina's samples showed fairly low levels of fecal coliform. (Water Management Laboratories Inc., 1987). The Boats and Marinas Subcommittee assessed the results and concluded that any elevated fecal

coliform counts being generated by boating activities within the area was most likely coming from occasional boaters rather than from problems with sewage handling by live-aboards.

Beyond this one study, no conclusive water quality sampling has been performed for the purpose of identifying the extent of nonpoint pollution being contributed by salt water marinas within the watershed. The Committee has chosen to assume that poor boating and marina management practices within the watershed will contribute problems similar to those identified in other areas of Puget Sound. Anecdotal evidence from members of the boating community suggests that polluting practices are occurring particularly among occasional boaters. The Boats and Marinas Subcommittee of the Chambers-Clover Creek Watershed Management Committee agreed that the problem should be addressed, but that other nonpoint and point sources (such as stormwater) should be acknowledged as having a more significant impact on water quality within the watershed.

Data collection is needed to provide a more complete picture of the true impact that recreational boating has on water quality within the watershed. Samples need to differentiate between the pollution contributions of land based activities, commercial or military shipping, and recreational boating. Ongoing sampling is needed to measure trends and the impact of implementing the Action Plan and/or regulations. Finally, a centralized library is needed to collect the data and make it available to public agencies, boating organizations, decision makers, and the public.

A number of fees are charged to boaters for the licensing and operation of their vessels. Each registration fee of \$6 - \$10 per vessel goes into the state general fund. Any money over \$1.1 million collected from the fee goes for Marine Patrol and authorized Safe Boating programs. Boating excise taxes generate \$6 million in state revenue, of which \$5 million goes into the state general fund and \$1 million is passed on to the Washington State Parks and Recreation Commission for boating programs. In addition, a fee of \$3 is collected from each boat trailer license to pay for the Freshwater Aquatic Plant Management Program. This program funds efforts to control invasive aquatic plant problems on lakes and waterbodies with public boat ramp facilities.

## **EXISTING PROGRAMS**

**United States Environmental Protection Agency (EPA):** EPA is charged with administering the Federal Clean Water Act. This includes overseeing state level implementation of the National Pollutant Discharge Elimination System (NPDES) permitting program, under which boatyards and marinas are permitted. Most Marinas receive an exemption from the General Permit for Marinas. In order to comply with their exemption a marina may not allow certain boat maintenance activities such as pressure washing, or hull scrubbing by unpermitted divers. Divers who perform hull scrubbing services must have their own permits.

EPA also develops evaluation criteria and guidelines for implementing the Clean Water Act. The agency has no permitting authority for marinas (that is vested with the Corps of Engineers) but is authorized to veto dredge and fill permits which are often needed to establish and maintain marina activities.

**Puget Sound Water Quality Authority (PSWQA):** The Authority developed the Puget Sound Water Quality Management Plan as a means of implementing the requirements of the Clean Water Act at the state level. The Puget Sound Plan addresses pollution from boats and marinas as part of its element regarding nonpoint source pollution. The Authority oversees implementation of the Puget Sound Plan as well as distributing federal grant monies earmarked for funding implementation of the Clean Water Act.

**United States Coast Guard:** The Clean Water Act delegates the responsibility for enforcing marine sanitation device standards to the Coast Guard. The Coast Guard focusses on the behaviors of individual boaters by providing safety courses and enforcing Marine Sanitation Device (MSD) regulations. Coast Guard enforcement presence has been fairly limited in the watershed, partly because the agency's priorities have been toward controlling drug trafficking. No other jurisdictions have the authority to enforce MSD regulations without a Memorandum of Understanding (MOU) with the Coast Guard. If a local jurisdiction does assess a fine, the money goes to the Coast Guard and not the enforcing agency.

At this time, the Coast Guard will board vessels to insure that they are properly equipped, but they are not issuing citations when a boat illegally dumps sewage. However, a boat may be cited if their Y-valve is adjusted to allow direct discharge of sewage into Puget Sound whether it is currently discharging or not. The Coast Guard does participate in the cleanup and enforcement of significant petroleum and noxious substance spills.

**U.S. Army Corps of Engineers:** The Corps of Engineers has direct permitting authority for coastal marinas.

**Washington State Parks and Recreation Commission:** The primary role of the Parks and Recreation Commission for boating activities has been to provide boater education and to coordinate programs and planning related to boating. The Commission maintains boating facilities and polices boating activities occurring in state parks. The Commission also distributes federal grant monies to local agencies for the installation of pumpout stations and other facilities. The Commission coordinated the efforts of a Boaters' Task Force which was created for the purpose of designing a boaters' education program and to draft legislation requiring sufficient pumpouts at moorage facilities. The task force was disbanded upon completion of the two tasks. The Commission has created a new task force to address enforcement issues related to MSD installation and use. An enforcement strategy with the Coast Guard will be designed to allow local governments the authority to enforce MSD regulations and to keep any fines they collect. The Commission conducts surveys of boating activities, behaviors, and trends to provide data upon which to base future programs and actions.

Finally, the Commission administers Federal Clean Vessel Act grants and other state grant programs for boating monies.

(State Park Rangers are authorized to enforce all state laws but limit their activities to State Park lands.)

**Washington State Department of Ecology:** Ecology establishes water quality standards for the state. If a new marina is to be developed, it must obtain a certification from Ecology that it will not violate those water quality standards. Ecology's Shoreline Program administers the Shoreline Management Act which requires special permits and reviews for marinas and other facilities built on the shoreline and offshore. While local governments actually issue shoreline permits, all applications are forwarded to Ecology for review. Ecology recently completed revisions to the Shoreline Master Program Handbook which includes guidelines on the siting and design of new or expanding marinas. Ecology's Central Programs division addresses hazardous spill response and would be called in if a marine spill were to occur. Ecology worked with the Washington State Parks and Recreation Commission on the boating task force that established a boating education program and will work with the Commission on developing a strategy for enforcing MSD requirements.

Ecology also manages the Freshwater Aquatic Plants Management Program which is funded by a \$3 fee on boat trailer licenses. This program is intended to address freshwater invasive aquatic weed problems on lakes with public boat ramps and collects about \$600,000 per year. Most of the monies pay for aquatic plant management plans and implementation of those plans. However, a certain portion is set aside to resolve early infestation problems. Invasive plants are a boating related issue because boats are a common source of transport for invasive weeds between lakes.

**Washington State Department of Health (DOH):** DOH addresses boating problems relating to shellfish contamination and sewage disposal. DOH performs extensive sampling of shellfish growing areas and determines their suitability for consumption. If shellfish are contaminated, DOH will identify possible sources of contamination. DOH will be working with the Department of Ecology on the possible designation of "No Discharge" areas and "No Anchorage" areas. "No Discharge" areas would prohibit the use of type I and II marine sanitation devices and emptying portable toilets directly into the water. "No Anchorage" areas would prohibit boats from anchoring in waters near sensitive shellfish beds. DOH will also be working with the Department of Ecology on developing guidelines for the siting, design, renovation, or expansion of marinas, particularly as they relate to sewage disposal.

**Washington State Department of Fish and Wildlife:** The Department of Fish and Wildlife issues Hydraulic Project Approval (HPA) permits for any work done in fresh or saltwaters of the state that may impact the flow. Also, Fish and Wildlife enforcement staff may issue citations to boaters if their activities impact the quality of a fisheries resource.

**Washington State Department of Natural Resources (DNR):** DNR manages state-owned lands which include most aquatic lands and shorelines. In the Chambers-Clover Creek Watershed, most of the shoreline is owned by the state and a new marina would need to obtain a lease from DNR in order to operate. Because their primary mission is to manage state properties, DNR may refuse certain lease conditions based on water quality issues. For example, DNR might not allow the location of a marina next to an existing shellfish bed if the resources will conflict.

As the owner of leased property, DNR may demand that tenants follow certain practices if they wish to keep their lease.

**Inter-Agency Committee for Outdoor Recreation (IAC):** IAC is primarily a grant management agency for recreational monies that are dedicated by the state legislature. IAC offers grants for the construction and establishment of recreational facilities including those relating to boating. Such facilities might include boat ramps, bathrooms, and short-term moorage.

**Washington State Department of Licensing:** The Department of Licensing collects registration and appropriate excise taxes on boats. They also track boat ownership data.

**Pierce County Parks and Recreation Department:** The Pierce County Parks and Recreation Department has plans relating to recreational boating opportunities and they apply for grants to construct recreational boating facilities.

**Metropolitan Parks District of Tacoma (MPD):** MPD has the same responsibilities in their district as the Pierce County Parks and Recreation Department has in unincorporated Pierce County.

**Pierce County Sheriff's Department:** The Pierce County Sheriff's Department is authorized to enforce boating regulations, and they have a division equipped to patrol the waters. The Sheriff's Department has agreed to enforce all regulations on Pierce County Parks and Recreation Department properties.

Local governments issue shoreline permits for marinas and docks and may condition permit approvals to include the use of BMPs, boater education, sewage disposal facilities, and provisions for insuring that pumpouts are maintained. The City of Tacoma is currently reviewing new conditions that they may place on marina and boat launch facilities as part of issuing shoreline permits.

## **PROBLEM DEFINITION**

1. No requirements to demonstrate boater proficiency.
2. Too many agencies addressing boating issues.
3. Boat owners' participation in state and local decision-making processes is limited.
4. Inadequate enforcement of existing regulations.
5. Limited factual database exists to support allegations of water pollution from boaters.

## **GOALS**

1. Provide more publicly operated sewage disposal facilities for boaters, increase accessibility, and eliminate user fees.
2. Provide more education and enforcement of existing regulations.
3. Encourage regulators to continue researching the probable side effects of establishing new regulations.
4. Establish a database to measure progress and assess boating impacts on water quality.
5. Maximize the use of boating-derived revenues to support public boating facilities and activities which will improve water quality.
6. Re-create an environment that organisms can live in.
7. Provide incentives to private marina operators who voluntarily provide pollution control facilities and services.

## **OBJECTIVES**

1. Coordinate:
  - a) Agencies and agency actions relating to boats and marinas;
  - b) Boating regulatory activities, including enforcement and establishment of new regulations and procedures;
  - c) Education activities for boaters;
  - d) Data collection activities.
2. Educate boaters.
3. Implement current procedures, measures, and regulations.
4. Install more facilities at marinas and boat launches.

## **ACTION ITEMS**

### **BM 1 SUPPORT THE CONSOLIDATION OF STATE-LEVEL BOATING ACTIVITIES UNDER ONE AGENCY**

Use Oregon's single agency approach as a model. (There are currently 11 state agencies involved in boating issues.) Consolidation will avoid duplication of efforts, provide a single source of direction to boaters, coordinate efforts, insure uniformity of regulations and consistency in enforcement. Pierce County's state legislators would be contacted to educate them on this need, to gain their support, to get them to sponsor the bill, and to ensure the language is in the proper form.

<b>Lead Implementor:</b>	PC State Legislators
<b>Cooperators:</b>	Northwest Boating Council
<b>Estimated Cost:</b>	\$20,000 (estimated restructuring costs)
<b>Potential Funding Source:</b>	Volunteered, legislative process
<b>Potential Funding Type:</b>	State general fund
<b>Benefit:</b>	Simplification and coordination of agency actions
<b>Type of Source Control:</b>	Coordination
<b>Time Frame:</b>	One time
<b>Startup Date:</b>	9/1/95

**BM 2 COORDINATE PIERCE COUNTY BOATING-RELATED ISSUES THROUGH THE PIERCE COUNTY BOATING COMMISSION**

The Chambers-Clover Creek Watershed Management Committee identified the following boating issues which focus on coordination and improved water quality.

- 1) review existing and proposed regulations concerned with boating and marinas, to insure water quality is not over looked,
- 2) track how boating taxes are being used,
- 3) provide a point of contact for agencies regarding the boating community's opinions,
- 4) coordination of enforcement agencies for pumpout access and other boating regulations.

The boating commission would update the Basin Advisory Committee (BAC) annually on their efforts to address the above issues.

<b>Lead Implementor:</b>	Pierce County Boating Advisory Commission
<b>Cooperators:</b>	All local governments, marina owners, North West Boating Council
<b>Estimated Cost:</b>	\$3,000
<b>Potential Funding Source:</b>	Washington State Parks and Recreation Commission
<b>Potential Funding Type:</b>	Grants, private sector
<b>Benefit:</b>	To keep boating and marina regulations related to water quality issues, workable, reasonable and effective
<b>Type of Source Control:</b>	Coordination
<b>Time Frame:</b>	Ongoing
<b>Startup Date:</b>	ASAP

### **BM 3 SUPPORT THE PUGET SOUND AMBIENT MONITORING PROGRAM**

The Puget Sound Action Team coordinates the Puget Sound Ambient Monitoring Program (PSAMP) at stations throughout Puget Sound. PSAMP would receive additional funding to better differentiate the water pollution derived from land-based activities, recreational boating, and commercial shipping.

One aspect of investigating recreational boating would be increased sampling around marinas. It is expected that observations on visible changes in boaters's behaviors would be reported in addition to changes in aquatic populations. Library services would be provided to catalog and index the collected data. Results of these data collection efforts would be made available to the public and to affected agencies. Sampling results would be used to monitor trends and evaluate the impact of implementing regulations and action plan recommendations.

<b>Lead Implementor:</b>	Ecology
<b>Cooperators:</b>	Puget Sound Action Team, Washington State Parks and Recreation Commission, PC Parks and Recreation Department, Clover Park Technical College
<b>Estimated Cost:</b>	\$50,000 annually
<b>Potential Funding Source:</b>	EPA
<b>Potential Funding Type:</b>	Grant
<b>Benefit:</b>	Centralized data source and regular collection; Current data available and accessible
<b>Type of Source Control:</b>	Research
<b>Time Frame:</b>	Ongoing
<b>Startup Date:</b>	Existing program

#### **BM 4 ENFORCE ACCESS TO PUBLIC BOATING FACILITIES**

A contact enforcement agency will be identified. That agency will regularly patrol pumpout locations and issue citations or remove vessels as needed. The phone number of that agency will be posted at all pumpout stations so that boaters may report problems related to maintaining access to the station. The enforcing agency will track and publish reports on their activities and findings.

<b>Lead Implementor:</b>	Law enforcement departments for Pierce County, Steilacoom, Lakewood, University Place, Ruston, Tacoma
<b>Cooperators:</b>	Same as above, MPD
<b>Estimated Cost:</b>	\$3,000 per jurisdiction
<b>Potential Funding Source:</b>	All local governments
<b>Potential Funding Type:</b>	General funds
<b>Benefit:</b>	Increased accessibility to available pumpouts, greater awareness of the need for access to these services
<b>Type of Source Control:</b>	Enforcement
<b>Time Frame:</b>	Ongoing
<b>Startup Date:</b>	12/1/95

**BM 5 COORDINATE AND INCREASE VISIBILITY OF ENFORCEMENT AGENCIES' ACTIVITIES RELATED TO BOATING**

This will include increasing the amount of patrols being performed and publicizing enforcement actions. Increased patrols would make people more conscious of the activities they perform which are unsafe or polluting. They would also provide incentives for people to learn proper boating practices.

Enforcement agencies will meet annually to coordinate enforcement activities, clarify authority, track problems, coordinate efforts, and report back to the Northwest Boating Council on progress.

<b>Lead Implementor:</b>	PC Sheriff and city police departments
<b>Cooperators:</b>	US Coast Guard, Washington State Parks and Recreation Commission, Ecology, Department of Fish and Wildlife, Metropolitan Parks District, PC Parks and Recreation Department
<b>Estimated Cost:</b>	\$80,000 annually
<b>Potential Funding Source:</b>	Washington State (excise tax collection)
<b>Potential Funding Type:</b>	General fund
<b>Benefit:</b>	High visibility of enforcement enhances proper boating practices
<b>Type of Source Control:</b>	Enforcement
<b>Time Frame:</b>	Ongoing
<b>Startup Date:</b>	Existing program

**BM 6 INSTALL MORE BOATING PUMPOUT STATIONS AND OTHER SUPPORT FACILITIES**

Install three new pumpout stations, one each at the Steilacoom public launch and Old Town Dock, and an additional pumpout station at Point Defiance if boat launches and moorage are expanded. Install porta-potty dump stations at public boat launches. Also, install dumpsters at public boat launches and destination sites. All facilities would be publicly owned and maintained. Maintenance and enforcement responsibilities would be defined at the time of installation, and signs would be installed with contact numbers for the responsible agency.

<b>Lead Implementor:</b>	Steilacoom, MPD of Tacoma
<b>Cooperators:</b>	Washington State Parks and Recreation Commission, Inter-Agency Committee for Outdoor Recreation (IAC), PC Parks and Recreation Department
<b>Estimated Cost:</b>	\$30,000 per site
<b>Potential Funding Source:</b>	Washington State Parks and Recreation Commission
<b>Potential Funding Type:</b>	Grants
<b>Benefit:</b>	More opportunities for boaters to dispose of sewage properly
<b>Type of Source Control:</b>	Capital Improvement
<b>Time Frame:</b>	One time
<b>Startup Date:</b>	9/1/95

## **BM 7 SUPPORT EFFORTS TO CREATE AN OPERATOR'S LICENSING PROGRAM FOR BOATERS**

The Washington State Legislature would assess the potential and need for requiring a license to operate a boat. If structured in the same way as vehicle licensing, this program would allow for opportunities to educate the boating public on safety issues and the environmental impacts of poor boating practices.

This would also foster a greater sense of responsibility among boaters.

Revenue generated from the fees should be dedicated to boating activities such as building or maintaining docks, pumpout stations, and support materials for the program.

<b>Lead Implementor:</b>	PC State Legislators
<b>Cooperators:</b>	Washington State Department of Licensing, Washington State Parks and Recreation Commission/Boating Division, Northwest Boating Council
<b>Estimated Cost:</b>	\$5,000
<b>Potential Funding Source:</b>	Washington State Department of Licensing
<b>Potential Funding Type:</b>	Fees
<b>Benefit:</b>	Safer and cleaner boating practices
<b>Type of Source Control:</b>	Education
<b>Time Frame:</b>	Ongoing
<b>Startup Date:</b>	6/1/96



## **CHAPTER 6: ON-SITE SEWAGE ACTION ITEMS**

The Puget Sound Action Team estimates that approximately one-third of the residences in the Puget Sound Basin are served by on-site sewage systems (OSSs), and of these, approximately 3 to 5 percent are failing. (Puget Sound Water Quality Authority, 1991.)

Over time, OSSs may affect the water quality of the immediate area in which they are located. They present a potential source of nonpoint water pollution when systems fail to function properly or when individual systems are installed at densities higher than what an area's soils can accommodate. Improper maintenance may cause even a well-designed system to fail in a short period of time. Non-surfacing OSS failure can be difficult to detect in permeable soils. Because these failures can go unnoticed, ground water contamination is more likely.

### **REVIEW OF ISSUES**

The Chambers-Clover Creek Basin aquifer is the sole source of drinking water for over 169,000 Pierce County residents, which is over 60 percent of the residents in the watershed. An area including the Chambers-Clover Creek Watershed was designated a sole-source aquifer by the U.S. Environmental Protection Agency (EPA) in 1993. (Pierce County, 1994, VIII-59.) Although controls governing OSS density, design characteristics, and installation practices have increased, the Washington State Department of Ecology (Ecology) maintains that incidents of contamination are increasing in frequency and the trend is toward decreasing water quality. (Ecology, 1994.)

### **Individual and Community On-Site Sewage Systems**

Although conventional OSSs are purposely designed to last 20 - 30 years, most of the soil associations predominating the Chambers Clover Creek Watershed have features unfavorable and difficult to overcome for on-site sewage system use. The 1979 Soil Survey of Pierce County, Washington, and the 1980 U.S. Army Soil Survey of Ft. Lewis identify hard pan layers, perched aquifers, and excessive permeability. Forty percent (40%) of the watershed is made up of excessively drained soils. Detailed descriptions of soil associations are found in the Characterization, or Phase One, document.

Sewage disposal for much of the eastern half of the Chambers-Clover Creek Watershed still occurs on-site, primarily through individual systems. As of 1980, 40,000 people lived in the unsewered area of the eastern half. This represents an estimated 13,300 active individual on-site sewage systems. This estimate does not include OSS systems in the North Tacoma Subwatershed, or University Place. (Pierce County, 1994.) Community systems are used to serve multi-family residential complexes, businesses, or groups of individual residences where sanitary sewers are not available. A groundwater study was undertaken by the Tacoma-Pierce County Health Department

(TPCHD) in 1988 and the Final Clover/Chambers Creek Basin Ground Water Management Program was published December, 1991. It recommends increasing smaller community and commercial OSS requirements, and increasing "setbacks" or reserve areas around community systems, and increasing inspections. The purpose of the requirements would be to prevent adverse impacts of Community OSSs. (TPCHD, 1988, 1991.)

## EXISTING PROGRAMS

**United States Environmental Protection Agency (EPA):** EPA administers the Federal Clean Water Act. The Act is the major federal authority for water quality protection. It authorized the National Pollutant Discharge Elimination System (NPDES) permitting program. The Act is also the major Federal regulation governing sewer services and wastewater treatment. The Act provides for EPA to assign responsibility to Ecology to administer NPDES permits and other federal regulations, and to develop additional standards.

**Washington State Department of Ecology:** The nonpoint water pollution problems in the Chambers-Clover Creek Watershed led to state regulatory involvement and orders to build a treatment plant and operate a sewer system. Pierce County remains under authority of the Washington State Department of Ecology Compliance Order DE 74-57 mandating the sewerage of the Chambers-Clover Creek Basin. (Ecology, 1994.)

**Tacoma-Pierce County Health Department (TPCHD):** The Washington State Department of Health (DOH) permits OSSs between 3500 and 14,499 GPD and Ecology issues permits for on-site systems greater than 14,500 GPD. TPCHD has authority to regulate OSSs releasing less than 3500 gallons of effluent per day (GPD). (Pierce County, 1994, VIII-75.)

*Chambers-Clover Creek On-site Sewage:* TPCHD adopted regulations prohibiting the permanent installation of OSSs within the Comprehensive Urban Growth Area (CUGA), inclusive of the Chambers-Clover Creek Watershed, after July 1, 1993. The Tacoma-Pierce County Board of Health will soon adopt new On-Site Sewage Disposal Rules and Regulations incorporating increased state requirements of OSS design and installation.

*Public Health:* TPCHD investigates complaints to determine potential impact to public health and coordinates with the Pierce County Prosecutor's Office for consideration of charges. TPCHD supports an On-site Sewage Advisory Board, with representatives of the development and real estate industry, septic tank designers and installers, and public agencies. Operation and Maintenance (O & M) program activities assess ongoing OSS performance. The Chambers-Clover Creek Watershed Committee recommends that the general combined fund should be used as a dedicated source for O & M programs because building fees are an unstable source. O & M of existing systems will always be required, but

there is no guarantee of consistent building starts. TPCHD reviews development proposals to ensure adequate spacing and placement of OSSs based on soil suitability. They also manage environmental grants and special projects. (TPCHD, 1993.)

**Pierce County Public Works & Utilities Department:** The Pierce County Public Works & Utilities Department operates the wastewater treatment plant serving the Chambers-Clover Creek Watershed and promotes related environmental education efforts. Most of the towns and cities within the watershed are supported by municipal sewer systems. These include the City of Tacoma, Fort Lewis, South Hill Sewer District, the Village of DuPont, the Town of Steilacoom, and the City of Fircrest.

**Pierce County Planning and Land Services Department (PALS):** PALS developed the Comprehensive Land Use Plan. Pierce County policy stated in the Comprehensive Land Use Plan and the Sewerage General Plan is to:

- (1) *provide sewer service to those people who are willing to pay for it, and*
- (2) *tie community systems onto permanent sanitary sewer systems.... because of continued concern for further contamination of groundwater by remaining on-site sewage systems".* (Pierce County, 1994, VIII-31)

**Urban Growth Area (CUGA):** The Comprehensive Land Use Plan allows for infill and gradual development of sewer services using a phased, or "tier" approach, within the Comprehensive Urban Growth Area (CUGA). The boundary of the CUGA generally includes the Chambers-Clover Creek Watershed, but areas south of 208th Street, and the area north of Brookdale Road and south of Highway 512 are excluded and identified as "rural" lands. These areas are zoned to have densities no more than one dwelling unit per five acres south of 208th street, and one dwelling per 2.5 acres north of Brookdale Road. However, these "rural" zones have pockets of developed land or land that will be developed at higher densities because of past permits. On-site sewage systems have failed in this general area, and specifically in the Summit-Waller area, because of poor soil conditions.

**Installing On-site Sewage Systems.** OSS's installed after July 1, 1993 are interim. These systems are required to hook up to sewer when it becomes available. OSSs approved before 7/1/93 will be required to hook to an available sewer interceptor if the OSS fails, or a Utilities Local Improvement (Sewer) District is subsequently formed. A "hook-up" can also be required if a significant increase in use of OSSs occurs. The Pierce County Comprehensive Land Use Plan "**UT-S Objective 14**" also limits the permanent use of OSSs and requires assurances for their interim permitting within the CUGA. (Pierce County, 1994, VIII-75.)

*Sanitary Sewer.* The Land Use Plan also creates an economic incentive to sewer parcels within the CUGA. Maximum residential density doubles and developers can make more money if sewer service is provided.

### **PROBLEM DEFINITION**

1. On-site inspection, education, and enforcement programs need adequate financial support.
2. There is a lack of scientific data proving on-site septic contamination and informing the public of this problem.
3. Agencies have conflicting priorities and lack coordination. Regulations similarly conflict or are inconsistently enforced.
4. Public and political support for programs to address on-site problems is needed.

### **GOALS**

1. Create greater public awareness of on-site system problems.
2. Provide affordable financial assistance to repair failing OSSs.
3. Develop an operation and maintenance program.
4. Provide more sewer availability in septic problem areas.
5. Improve water quality in groundwater and surface water.

### **OBJECTIVES**

1. Identify priority septic/water quality problem areas.
2. Educate and inform target groups of the general public, students, elected officials, the OSS industry, and regulators.
3. Coordinate agency actions, priorities, and regulations.
4. Establish a consistent water quality funding base.

## ACTION ITEMS

### OS 1 MAINTENANCE AND EDUCATIONAL MAILING TO ON-SITE SEWAGE SYSTEM OWNERS

The Tacoma-Pierce County Health Department (TPCHD) and the pumper industry would jointly fund and cooperate in mailing a periodic reminder to homeowners in specific geographic sections of Pierce County which are not on sewer. These areas would be selected by TPCHD staff. The mailing could be developed from addresses in the Assessor's records. Areas in the county would be covered on a five-year rotating cycle. This effort would be coordinated with qualified pumpers. The TPCHD would have to determine how to identify target areas.

This mailing effort would be coordinated with environmental education efforts and the TPCHD on-site sewage system (OSS) Operation and Maintenance Program mentioned in following Actions. The mailing would include a disclaimer against endorsing individual pumpers, information describing a "self inspection" of an OSS, and guidance on when and where to obtain a professional inspection.

Grants plus funds from the pumpers would pay for the mailing. Estimates are at the highest reasonable cost. Considerable savings could be realized through contracting with professional mailers or having the pumper industry take most of the responsibility for the mailing.

<b>Lead Implementor:</b>	TPCHD
<b>Cooperators:</b>	Septic pumpers, PC Assessor/Treasurer, PC Public Works & Utilities, Tacoma Public Works
<b>Estimated Cost:</b>	\$40,000 Annually
<b>Potential Funding Source:</b>	Centennial or PIE grant, on-site sewage pumpers,
<b>Potential Funding Type:</b>	Grant, service fee, funds from pumpers
<b>Benefit:</b>	Education, extended life of OSS
<b>Type of Source Control:</b>	Education
<b>Time Frame:</b>	Yearly
<b>Startup Date:</b>	9/1/96



## **OS 2 MAINTAIN THE ON-SITE ENFORCEMENT PROGRAM**

This would involve continuing and improving the existing program for inspecting unpermitted septic systems and investigating system failures in Pierce County and the cities. This would help to resolve problems with improperly installed septic systems and identify systems which need to be replaced or repaired. Pierce County and constituents of the TPCHD should maintain adequate levels of staffing and stabilize funding. Funding alternatives, including expanding the fee structure, should be considered.

<b>Lead Implementor:</b>	TPCHD
<b>Cooperators:</b>	PC Public Works and Utilities, PC Prosecuting Attorney's Office, Tacoma Public Works
<b>Estimated Cost:</b>	\$250,000 annual budget
<b>Potential Funding Source:</b>	Pierce County, TPCHD
<b>Potential Funding Type:</b>	Fees, general fund
<b>Benefit:</b>	Ground water quality protection
<b>Type of Source Control:</b>	Enforcement
<b>Time Frame:</b>	Ongoing
<b>Startup Date:</b>	Existing program

### **OS 3 CONDUCT A SANITARY SURVEY IN ON-SITE SEWAGE SYSTEM PROBLEM AREAS**

The revised on-site sewage system (OSS) disposal regulations allow health departments to educate homeowners and monitor system performance in areas of special concern. Sanitary surveys would be conducted in areas that have demonstrated a high incidence of OSS failure. Sanitary surveys are OSS inspections which are conducted to address a specific pollution problem in a given area. They comprise all, or almost all of the OSSs in a given area. They are detailed and thorough, requiring about six hours for each house, with the number of houses depending upon the area that has been delineated. This effort will build on mapping and data collection (Action Item MO 3), along with OSS environmental education efforts described in this Watershed Action Plan (Action Item ED 9). Enforcement of regulations would also be required by the TPCHD, and any action, if necessary, would be referred to the Pierce County Prosecuting Attorney's Office.

Survey results will be shared with sewer utility providers so that they may target future expansion of their service areas toward problem neighborhoods.

<b>Lead Implementor:</b>	TPCHD
<b>Cooperators:</b>	Ecology, Pierce County Prosecuting Attorney's Office, Tacoma Public Works
<b>Estimated Cost:</b>	\$400 per house
<b>Potential Funding Source:</b>	Ecology, EPA, Pierce County
<b>Potential Funding Type:</b>	Grants, general fund
<b>Benefit:</b>	Identify and correct failing OSSs in areas of special concern
<b>Type of Source Control:</b>	Monitoring
<b>Time Frame:</b>	Ongoing project dependent
<b>Startup Date:</b>	6/1/96

#### **OS 4 DEVELOP THE TPCHD OPERATION AND MAINTENANCE PROGRAM.**

Current on-site sewage system (OSS) disposal regulations mandate health departments to implement an Operation and Maintenance (O & M) Program, beginning with areas of special concern and certain other situations. By the year 2000, OSS regulations require the operation and maintenance program to include all OSS in Pierce County. OSS owners would comply with conditions for renewing operating permits. TPCHD should further develop O & M procedures of OSSs, including inspection of existing systems. This includes inspections of commercial and community systems under 3500 gallons per day, until either type are hooked to sewer. TPCHD should encourage private industry to participate in on-site inspections for the O & M Program.

In cooperation with this effort, TPCHD will develop and offer information on financing programs for repairs.

<b>Lead Implementor:</b>	TPCHD
<b>Cooperators:</b>	OSS private industry, Tacoma Public Works, Pierce County Public Works and Utilities
<b>Estimated Cost:</b>	\$200,000 annual budget
<b>Potential Funding Source:</b>	TPCHD
<b>Potential Funding Type:</b>	Fees from OSS permits , certifications of private OSS professionals
<b>Benefit:</b>	Public health, on-site tracking and prevention
<b>Type of Source Control:</b>	Education
<b>Time Frame:</b>	Ongoing
<b>Startup Date:</b>	12/1/95

## **CHAPTER 7: STORMWATER/EROSION ACTION ITEMS**

Stormwater in the Chambers-Clover Creek Watershed generally refers to the pattern of water flow as a result of human impact. This is a very significant issue because of the urban nature of the watershed, the potential financial costs of stormwater control, and stormwater's potentially deleterious effects on soil, habitat, fisheries, and water quality. The nonpoint pollution source categories described under WAC 400-12 of Agriculture & Forestry, On-site, and Other are mainly indistinct from the nonpoint pollution source category of Stormwater. Failures in the first three categories all contribute to Stormwater problems.

### **REVIEW OF ISSUES**

Stormwater impacts water quality and habitat in two ways: pollutant loadings and quantity of flow. These two elements are closely linked because water quality often deteriorates during flood events.

In 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 may 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. Increased sediments, altering natural drainage courses, and degrading streambanks all negatively impact habitat. Clearing land aggravates flooding conditions as well 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 decreasing the carrying capacity of streams.

### **Water Quality**

Water quality problems associated with stormwater include pollutants associated with urban runoff, "first flush" conditions, and groundwater contamination.

### **Urban Runoff**

Contaminants typically associated with urban stormwater include suspended sediments, nutrients, pathogens, organic compounds, and metals. While some of these pollutants can be associated with rural uses, organic compounds and metals are most often associated with urban land uses. The quality of stormwater runoff from forested areas is generally high.

Development results in an increase in impervious area which, in turn, results in increased pollutant loading to stormwater runoff. The nutrient loading in runoff (phosphorus, nitrogen) from impervious surfaces is notably higher. The loading of metals such as zinc and lead also increases with higher rates of impervious cover but not at the same high proportional rate as nutrients. (Montgomery, 1991 A, 7-1)

Land uses not only reflect the amount of impervious surfaces and their subsequent potential for contributing to nonpoint pollution, but also the quality and makeup of stormwater. The following description of pollutants generated by land use categories was taken, in part, from the Pierce County Storm Drainage and Surface Water Management Plan.

**Residential:** Runoff from residential areas will generally contain increased levels of coliform bacteria, nitrates (from lawn and garden fertilizers), pesticides (from lawn and garden applications), metals (from automobile emissions and runoff from degrading metallic surfaces), and oil and grease from leaking engines or dumping of waste oil.

**Commercial:** Commercial areas typically have stormwater runoff with relatively high concentrations of metals, oil and grease. These contaminants typically are derived from parking lot runoff which empties into storm drains.

**Industrial:** Industrial areas typically have high concentrations of metals and certain hydrocarbons. Industrial facilities where stormwater comes into contact with process materials can be a substantial localized source of pollutants in stormwater runoff. Residential, commercial, and industrial land uses total about 39,000 acres or 40% of the watershed.

**Agriculture:** Agricultural areas, including cropland and pasture, tend to have increased concentrations of suspended sediments, nutrients (nitrates and phosphates), coliform bacteria, organic compounds from pesticides and fertilizers, and higher oxygen demand in stormwater runoff. Even though few commercial farms function in the watershed, about 10,000 acres, or 11% of the watershed is used agriculturally.

**Forested:** Undisturbed forest lands typically have very low pollutant concentrations during storm runoff. However, activities such as logging result in increases in suspended sediments and nutrients, particularly nitrates and phosphates. Increased suspended sediments result from soil disturbance. Nitrates and phosphates are also released when the native soils are disturbed. Forests account for 19% of the watershed. Most of the forest area is in the American Lake Subwatershed. (Montgomery, 1991 A, 7-1)

## "First Flush" Conditions

One vehicle for contamination is "first flush" conditions where a residue of pollutants will build up on impervious surfaces during a dry spell. The first storm will flush a concentration of these substances into the waterways, sometimes delivering a damaging or lethal dose of pollutants to fish and other organisms. Several "fish kill" events have occurred in recent years on Clover Creek after first flush conditions. Careful site planning and treatment of stormwater are needed to protect natural drainage systems and habitat. (Pierce County, 1994, II-78)

## Groundwater Contamination

An additional factor in the Chambers-Clover Creek Watershed is groundwater recharge. Land uses which contaminate surface stormwater can eventually cause contamination of groundwater in aquifer recharge areas. A previous lack of adopted standards and the scattered nature of urban development in unincorporated Pierce County has resulted in smaller, site-specific systems for handling stormwater runoff. These systems often use ground disposal with percolation devices such as dry wells, or release stormwater into the natural surface drainage system. In some cases, localized flooding occurs as these "dry wells" and surface conveyances both prove inadequate to accept the volume of storm events. (Pierce County, 1994, II-78)

Percolation systems demand continued maintenance by Pierce County, private developers, or property owners. They do not adequately treat and cleanse the water of contaminants before it enters the groundwater supply. This is particularly serious in the Chambers Clover Creek Watershed because much of the underlying soils are highly permeable and allow for the infiltration of surface waters into the shallow groundwater. The preceding On-site Sewage Chapter provides a more detailed discussion of groundwater contamination and aquifer protection. The aquifer is equally at risk from on-site sewage and stormwater pollutants because potential sources of drinking water are effected and the pollutants travel through the shallow ground water into the area lakes and streams. (Pierce County, 1994, V-3)

Presently 55% (51,800 acres) of the Chambers-Clover Creek Watershed is forested and grassland. Urban land uses are expected to increase throughout the watershed and especially in the Clover Creek Subwatershed. Sixtytwo percent of this Subwatershed is currently forest and grassland, but extensive areas are zoned for future commercial use.

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* and *suburban* stormwater runoff. Urban stormwater problems most often stem from increases in impervious surfaces and vehicular pollutants.

## EXISTING PROGRAMS

**United States Environmental Protection Agency (EPA):** EPA administers the Federal Clean Water Act. The Act is the major federal authority for water quality protection. It authorized 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. In the last few years, NPDES permitting expanded to include the discharges of municipal storm drain systems. Local jurisdictions are responsible for the quality of the stormwater they convey into 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 Pierce County, the City of Tacoma, McChord Air Force Base, and Ft. Lewis. Eventually, all jurisdictions may be required to participate.

**Washington State Department of Ecology:** While EPA is the lead agency for NPDES permits, it is Ecology's responsibility to review, condition, and issue the permits. Locally, general NPDES permits are required of many existing industrial and commercial operations. NPDES permits are required for construction activities disturbing 5 acres or more. Municipal permits issued to local jurisdictions having populations over 100,000 will require high standards of water quality to be maintained.

Ecology's Water Quality Program has developed the State Stormwater Manual which sets design standards for stormwater systems. Pierce County requires these standards be adhered to in Aquifer Recharge Areas and Sensitive Areas. The Chambers-Clover Creek Watershed is one of two Aquifer Recharge Areas in Pierce County. All local jurisdictions are required to adopt the Manual's design standards or standards of equal or greater stringency. See below under "Pierce County Surface Water Management" for more information on this subject.

### **Washington State Dept. of Community Development, Growth Management**

**Division:** The Division is responsible for coordinating and advising jurisdictions in the development of each county's comprehensive plan to satisfy the Growth Management Act. In response to the Growth Management Act, cities and counties were required to create land use controls and direct capital improvement planning. The Pierce County Comprehensive Plan was completed December, 1994.

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.

### **Washington State Dept. of Community Development, Emergency Management**

**Division:** This Division has the authority to designate flood plains and flood response.

**Washington State Department of Fish and Wildlife:** Fish and Wildlife has the authority to issue Hydraulic Project Approvals for all construction activities that occur within streams and on shorelines.

**Washington State Puget Sound Water Quality Authority (PSWQA):** PSWQA drafted many of the stormwater requirements. PSWQA was originally established in 1983 by the Puget Sound Water Quality Act (RCW 90.70). PSWQA was restructured in 1985 and charged with developing and overseeing the implementation of a comprehensive management plan for Puget Sound and its related waterways. PSWQA has prepared the 1991 Puget Sound Water Quality Management Plan which includes four program elements related to surface water management.

- SW 1 Required operation and maintenance programs and runoff ordinances: stormwater programs for counties and cities.
- SW 2 Starting with from six of the larger cities in the basin and four other cities, required comprehensive urban stormwater programs.
- SW 3 Required the use of technical manuals and assistance on stormwater and erosion controls by local jurisdictions.
- SW 4 Required Ecology to prepare rules, guidelines, and model ordinances for SW-1 and SW-2. (Pierce County 1991, A)

**Washington State Department of Transportation (DOT):** DOT has a major role in stormwater control because of the runoff from all the state highways it has built.

**Pierce County Department of Planning and Land Services:** The Pierce County Comprehensive Plan was developed by PALS. It contains four specific objectives concerning stormwater in the land use and environmental sections of the plan. These are *Lu - Sw Objectives* 80 - 84. Other important parts of the Environmental Element of the Plan call for watershed planning and protection of water quality, (*ENV Objective* 5, 6, and 8). Most of the watershed except for comparably small areas of the north fork of Clover Creek and the southeast corner of the watershed, lies within the Urban Growth Area Boundary of the Pierce County Comprehensive Plan. Details of land use zoning, parcel size, and future development arising out of the Comprehensive Plan can be found in Chapter 5.

*The Shoreline Management Use Regulations for Pierce County* are administered by PALS. These regulate all development proposals within 200 feet of the ordinary high water mark of all streams and rivers with average flows greater than 20 cubic feet per second, lakes greater than 20 acres in size, and Puget Sound. Wetlands associated with any of these shorelines are also subject to shoreline review.

**Stormwater Design Manual:** Pierce County and the City of Tacoma each developed their own stormwater manuals to replace the State Stormwater Manual. The manual calls for Basin Planning and recommends overall policies for stormwater management. Implementation will require 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 (O&M) standards for both public and private drainage systems, and Best Management Practices for new construction will be implemented.

**City of Tacoma Public Works Department:** The Public Works Department manages stormwater for the City of Tacoma through a Stormwater Utility. In some areas, such as the Foss drainage basin, stormwater is collected and is piped directly to Puget Sound. In other areas, such as the T-Street Gulch, stormwater is discharged to a stream which is eventually collected in a large pipe and released to the Puyallup River. The City also has several large detention basins that collect water from the Flett and Leach creek drainage basins. These detention basins discharge stormwater to Flett Creek which then flows into Chambers Creek and out into Puget Sound.

The City of Tacoma has received its NPDES permit from the Department of Ecology, and has submitted its Stormwater Management Manual to the Department of Ecology for review. The Manual consists of three volumes: a Design Manual; a Stormwater Pollution Prevention Manual (a Guide to Best Management Practices for Industries, Businesses, and Homeowners); and a Comprehensive Stormwater Management Plan.

**Municipal Stormwater Management:** There is some effort for local communities to adopt the Pierce County-Tacoma Manual. 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. It is unknown if the smaller jurisdictions will accept either the Pierce County or Tacoma Stormwater Manuals. The existing stormwater permit requirements of the Department of Ecology will help the smaller urban areas more effectively manage stormwater.

**Pierce County Public Works Surface Water Management Section (SWM):** The largest stormwater management utility in the watershed is the Pierce County Public Works Surface Water Management Section (SWM). It was established in 1988.

A *Comprehensive Storm Drainage Master Plan* was prepared by SWM in 1991. The Plan applies to unincorporated areas of Pierce County. 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.

*Education* is a significant within SWM. It is coordinated with other jurisdictions and includes training programs for builders and other professionals, public awareness campaigns, student groups, and formal classes.

**Drainage Districts:** One Drainage District (19), lies within the Chambers Clover Creek Watershed. It was created in 1922. It encompasses the North Fork tributary to Clover Creek and parts of Parkland, Midland, and a small portion of the City of Tacoma. Its purpose is to improve and maintain drainage systems within specific geographic areas.

## **PROBLEM DEFINITION**

1. Historical emphasis on growth and development has failed to protect the area's natural resources. This has resulted in water quantity and quality problems [excessive polluted runoff].
2. Current and historical conditions have resulted in too much run off and polluted waters. There is currently a lack of jurisdictional coordination including inadequate regulations and enforcement.
3. Comprehensive environmental education programs are needed. These programs should integrate quantity and quality issues.

## **GOALS**

1. Establish, Consistent, Predictable, Affordable and Maintainable Standards.
2. Manage Watershed Through Multi-Jurisdictional Cooperation.
3. Establish and Maintain Sustainable Biological Diversity in the Watershed.
4. Healthy Watersheds, Water Quality and Adequate Quantity Year Round.
5. Create Comprehensive Ongoing Educational Programs.

## **OBJECTIVES**

1. Emphasize Ecosystems and the Environment.
2. Develop and Implement Stormwater Erosion Best Management Practices (BMP).
3. Improve Water Quality Enforcement Programs in the Watershed.
4. Educate the Public and Decision Makers in Water.
5. Increase funding for Water Quality Protection.
6. Do Planning On Watershed Basis.
7. Encourage Public Involvement and Public Support.
8. Create Incentive Programs to Preserve and Protect Natural Resources.
9. Develop a coordinated and streamlined approach for all agencies to enforce water quality.

## ACTION ITEMS

### SW 1 ANALYZE WATERSHEDS AND DEVELOP BASIN PLANS TO RESTORE INDIVIDUAL STREAMS

Analyses of stream drainages would be conducted on an as-needed basis. The analyses would be comprehensive, scientific assessments based on techniques outlined in *Environmental Objective 6*, and in *Land Use-Stormwater Objective 81.1, .2, .3, and .4* of the Pierce County Comprehensive Land Use Plan. Selected analyses would provide the basis for urban and rural watershed restoration programs. Watershed restoration programs would prescribe structural and non-structural changes to improve habitat, water quality, and water quantity within stream reaches. The structural changes will include extent and design of natural vegetation buffers and riparian corridors, and design of stormwater facilities. The non-structural changes would include coordination and development of community involvement, environmental education, and other changes in how people use the land.

Minimum requirement #9 of the Pierce County Stormwater Design Manual calls for Basin Planning. "Watershed restoration programs" will meet the definition for "Basin Plans":


*"Watershed-based basin plans may be used to modify any or all of the Minimum Requirements, provided that the level of protection for surface or ground water achieved by the basin plan will equal or exceed that which would be achieved by the Minimum Requirements in absence of a basin plan. Basin plans shall evaluate and include, as necessary, retrofitting of BMPs for existing development and/or redevelopment in order to achieve watershed-wide pollutant reduction goals."*

<b>Lead Implementor:</b>	PC Public Works and Utilities, Fort Lewis, all Cities
<b>Cooperators:</b>	All local governments
<b>Estimated Cost:</b>	\$5,555
<b>Potential Funding Source:</b>	Ecology, EPA, local governments
<b>Potential Funding Type:</b>	Grants, local governments' SWM funds
<b>Benefit:</b>	Increased coordination, education, improved design standards and habitat
<b>Type of Source Control:</b>	Capitol Improvement, research, natural buffers, education
<b>Time Frame:</b>	Ongoing
<b>Startup Date:</b>	12/1/95

**SW 2 SUPPORT ORDINANCES AND ACTIONS IMPLEMENTING AND/OR ADOPTING THE PIERCE COUNTY OR CITY OF TACOMA STORMWATER MANAGEMENT MANUAL**

Support ordinances and actions implementing either the Pierce County or City of Tacoma Stormwater Management Manuals, both of which include water quality requirements. Jurisdictions should continue to develop, complete, and adopt stormwater design manuals.

The ordinances and actions would coordinate existing enforcement programs of fines and citations. Enforcement penalties are outlined in the Pierce County Stormwater Management Manual and in the City of Tacoma's ordinance titled Sewage Disposal and Drainage Regulations and Rates, Including Industrial Wastewater Pretreatment Program, Chapter 12.08. Enforcement will be coordinated with education where possible.

<b>Lead Implementor:</b>	Pierce County Water Resources, City of Tacoma
<b>Cooperators:</b>	All other local governments
<b>Estimated Cost:</b>	None 
<b>Potential Funding Source:</b>	Ecology, local governments
<b>Potential Funding Type:</b>	Grants, local governments' SWM funds
<b>Benefit:</b>	Improved design standards and habitat
<b>Type of Source Control:</b>	Regulatory
<b>Time Frame:</b>	Ongoing
<b>Startup Date:</b>	9/1/95

### **SW 3 PIERCE COUNTY COUNCIL WOULD ADOPT AN OPEN SPACE PUBLIC BENEFIT RATING SYSTEM**

A Public Benefit Rating System would provide an incentive for maintaining open space and habitat areas within urban settings by allowing for property tax reductions.

The Pierce County Comprehensive Land Use Plan *Land Use-Open Space Objective 57*, Revised Code of Washington (RCW) Article 84, Washington Administrative Code (WAC) Article 458, and Pierce County Code Chapter 2.114 determine property types which qualify for open space taxation: The open space statute defines *open space-timberland*, *open space-agriculture*, and *open space - open space*. The County Council may choose to create a Public Benefit Rating System as defined under the RCW. *Open space - open space* is the only classification that would be affected by a Rating System.

The Planning Department would develop an *Open Space Plan*, with appropriate participation from the public and the Planning Commission. The Plan would identify open space priorities for the community based on a survey of valued features. The characterization portion of this Watershed Action Plan and relevant research material developed for the land use element of the Pierce County Comprehensive Land Use Plan could be used to identify significant features. Once identified, these features would be prioritized and assigned numeric values which would allow for the grading of parcels. The ability of a parcel to protect and enhance water quality should be identified as a significant feature and incorporated into the rating system.

This grading systems may also be used to prioritize land being considered for acquisition by the County. An official open space map should be established which would identify both parcels in open space taxation and areas which the County would like to preserve as open space.

The Assessor/Treasurer Department would be involved in the development of the plan to ensure that the Rating System is workable and reduces taxes. The impact to remaining taxpayers as the tax burden is shifted would be considered. Overall public access requirements under RCW 84 would be examined. The rating system should go before the Council for adoption

Upon adoption, the planner implementing the program would assess and grade each parcel based on the priorities outlined in the Benefit Rating System. These rating would be presented to the Planning Commission and the County Council for approval. The rating would then be used by the assessor to determine an appropriate level of taxation benefit to the property owner. If a Rating System is established in this county, each parcel currently under open space - open space would have to be rated under the Public Benefit Rating System as a matter of law. The taxpayer would then have the opportunity to accept the rating or no

longer participate in the program. However, those who choose to no longer participate would not owe compensating tax because it is a legislative change.

<b>Lead Implementor:</b>	PC Planning and Land Services (PALS)
<b>Cooperators:</b>	PC Assessor/Treasurer
<b>Estimated Cost:</b>	\$40,000 a) 1/2 for Study b) 1/2 to change the ordinance
<b>Potential Funding Source:</b>	Pierce County
<b>Potential Funding Type:</b>	General fund
<b>Benefit:</b>	BMP implementation and riparian zone revegetation; preserving the original flora along creeks while benefiting property owners
<b>Type of Source Control:</b>	Voluntary incentive
<b>Time Frame:</b>	One time
<b>Startup Date:</b>	1/1/96

**SW 4 MAINTAIN BENEFICIAL VEGETATION IN ROADSIDES, BANKS, AND DRAINAGES, AND LIMIT HERBICIDE USE**

Ninety percent of the roadside ditches and embankments in Pierce County are sprayed. Management of roadside vegetation would emphasize limiting the use of herbicides and incorporate the following efforts:

- A. Riparian vegetation would be planted and maintained in manmade and natural drainages. This includes selecting inexpensive indigenous plants useful as water purifiers. *Salal* is an example. Maintaining and planting vegetation would occur in a manner which does not increase flooding or reduce safe visibility for motorists.  
Note: Human consumption of roadside plants or berries is not endorsed;
- B. Preserving or restoring trees and indigenous vegetation in areas adjacent to creeks and natural drainages would be encouraged. Areas farther from fish-bearing streams would require less riparian plant restoration. "Man-made" facilities such as stormwater retention ponds would be used in these areas;
- C. Groups and individuals would be encouraged to adopt roads;
- D. Design standards will be established for major roads to encourage manual/mechanical maintenance. Walking and bicycling paths would also be considered in these designs.

<b>Lead Implementor:</b>	Chambers-Clover Creek Basin Advisory Committee
<b>Cooperators:</b>	All local governments, drainage districts, Tacoma Public Works, Fort Lewis
<b>Estimated Cost:</b>	None
<b>Potential Funding Source:</b>	Local governments
<b>Potential Funding Type:</b>	Existing programs
<b>Benefit:</b>	Decrease herbicide use, increase riparian habitat, increase sense of citizen "ownership"
<b>Type of Source Control:</b>	Capital Improvement
<b>Time Frame:</b>	Ongoing
<b>Startup Date:</b>	9/1/95

**SW 5 ENCOURAGE RETROFITTING PROGRAMS FOR EXISTING STORM DRAIN SYSTEMS TO IMPROVE WATER QUALITY AND HABITAT**

Jurisdictions would maintain and continue existing retrofitting programs for storm drain systems because of their importance to water quality. Retrofitting is the process of going in and upgrading an existing facility so that is able to function more effeciently or provide benefits that its original technology does not support. Pierce County Storm Drainage and Surface Water Management (SWM) and the cities' utility departments within this watershed have established scheduled, capital facilities budgets for their retrofitting programs.

<b>Lead Implementor:</b>	Pierce County, Fort Lewis, McChord AFB, DuPont, Steilacoom, Lakewood, University Place, Fircrest, Ruston, Tacoma
<b>Cooperators:</b>	Drainage districts
<b>Estimated Cost:</b>	None
<b>Potential Funding Source:</b>	Local governments
<b>Potential Funding Type:</b>	Local governments' SWM funds
<b>Benefit:</b>	Improved storm drain systems for water quality and fish access
<b>Type of Source Control:</b>	BMPs
<b>Time Frame:</b>	Ongoing
<b>Startup Date:</b>	Existing Program

**SW 6 ESTABLISH OIL LEAK (DRIP) TESTING AS PART OF AUTOMOBILE EMISSION TESTING**

The State Legislature would amend the state law requiring automobile emission inspections to include inspection for automobile leaks. Leaks would be identified while the air emission test is in progress. The rationale behind this action is to stop the pollutants at the source rather than dealing with its effects.

<b>Lead Implementor:</b>	PC State Legislators
<b>Cooperators:</b>	Washington State Legislature
<b>Estimated Cost:</b>	\$20,000
<b>Potential Funding Source:</b>	Washington State Department of Licensing, motorists
<b>Potential Funding Type:</b>	Inspection fees
<b>Benefit:</b>	Increase awareness, reduce contamination in runoff
<b>Type of Source Control:</b>	Regulatory, enforcement
<b>Time Frame:</b>	Ongoing
<b>Startup Date:</b>	6/1/96

**SW 7 ENCOURAGE THE ESTABLISHMENT OF STREAM TEAMS IN ALL JURISDICTIONS**

The Stream Team adult volunteer program currently serves Puyallup, Tacoma, and Pierce County. Stream Team volunteers identify and gather information on potential water quality problems. The Stream Team Coordinator supports volunteers and organizations wishing to perform such tasks as stenciling storm drains, water quality sampling, and habitat and riparian zone assessment. The municipalities of DuPont, Steilacoom, Lakewood, University Place, Fircrest, and Ruston would develop or expand the existing Stream Team volunteer program in their jurisdictions. All jurisdictions will work towards establishing an integrated, coordinated funding system to help support the existing program.

<b>Lead Implementor:</b>	PC Conservation District
<b>Cooperators:</b>	All local governments, NRCS, Tacoma Public Works
<b>Estimated Cost:</b>	\$5,000 per jurisdiction
<b>Potential Funding Source:</b>	EPA, Ecology, utility budgets, cities and towns
<b>Potential Funding Type:</b>	Grants, local governments' SWM funds
<b>Benefit:</b>	Data collection and assessment resulting in identification of problem areas, implementation of BMPs, changes in behavior
<b>Type of Source Control:</b>	Education, monitoring, enforcement
<b>Time Frame:</b>	Ongoing
<b>Startup Date:</b>	Existing program

**SW 8 ESTABLISH LAND USE DESIGN STANDARDS WHICH REDUCE IMPERVIOUS SURFACE AREA**

Land use regulations, development standards, and design standards would be reviewed by Pierce County, DuPont, Steilacoom, Lakewood, University Place, Fircrest, Ruston, and Tacoma to reduce impervious area. Both Pierce County and the Tacoma Stormwater Design Manuals would also be subject to modified standards.

Land Use Regulations would be reviewed by the jurisdictions to reduce impervious area, including:

- A. The types of land uses allowed in jurisdictional areas, such as industrial, commercial, and residential uses;
- B. Minimum lot sizes allowed by certain zones.

Development/Design Standards that have direct impacts on the quantity and quality of water within the watershed would be reviewed by the jurisdictions. Where possible, replace impervious surfaces with gravel, lattice-lawns or grass-crete, increased vegetation, or similar approaches focusing on:

- 1) sidewalk construction
- 2) curb and gutter construction
- 3) retention/detention ponds
- 4) the percentage (%) of lot coverage
- 5) street width
- 6) building setbacks from streams
- 7) road sides
- 8) off street parking
- 9) parking lots, building/parking ratios.

Land use design standards outside of urban growth areas would be the least restrictive. It is expected that the cost of this review would be absorbed in existing staff assignments.

<b>Lead Implementor:</b>	BAC (Chambers-Clover Creek Basin Advisory Committee)
<b>Cooperators:</b>	All local governments, Tacoma Public Works
<b>Estimated Cost:</b>	None
<b>Potential Funding Source:</b>	Local governments
<b>Potential Funding Type:</b>	General allocation funds
<b>Benefit:</b>	Reduce stormwater runoff and increase on-site vegetation
<b>Type of Source Control:</b>	Research, coordination, regulation
<b>Time Frame:</b>	One time
<b>Startup Date:</b>	1/1/96

## **SW 9 PURSUE MANAGEMENT SOLUTIONS FOR HANDLING VACTOR WASTE**

Pierce County staff will investigate solutions to the management of vactor waste now being collected in Pierce County and associated jurisdictions. These wastes are commonly collected by eductor trucks which spray water in storm drainage facilities (catch basins) to loosen collected sediments, and then pump the water and sediments out.

Appropriate, long range disposal methods need to be established for both the liquid and solid wastes resulting from this process. The slurry pumped out (vactor waste) is generally a combination of many substances, in need of long range management.

<b>Lead Implementor:</b>	Pierce County Public Works
<b>Cooperators:</b>	All other local governments who want to join
<b>Estimated Cost:</b>	\$40,000
<b>Potential Funding Source:</b>	Ecology
<b>Potential Funding Type:</b>	Grants, local contributions
<b>Benefit:</b>	Long range management of vactor waste
<b>Type of Source Control:</b>	Uncertain
<b>Time Frame:</b>	As soon as possible
<b>Startup Date:</b>	1/97

## **CHAPTER 8: OTHER ACTION ITEMS**

Washington Administrative Code (WAC) 400-12 directs watershed management committees to evaluate the need for source control action items to control pollution from pesticides, landfills, septage, 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.

The Tacoma Watershed Management Committee established an Other Subcommittee to address these issues and determine whether or not there are problems within this watershed. The following Review of Issues discusses problems related to household hazardous waste, pesticides, landfills, illegal dumping, surface mines, contaminated sites, and biosolids. Septage is not included because the Subcommittee felt that septage disposal and handling should be addressed as part of the On-site Sewage Disposal recommendations because it is related to septic tank maintenance.

### **REVIEW OF ISSUES**

#### **Household Hazardous Waste**

Household hazardous waste (if it is not handled, used, or disposed of properly) has the potential to cause significant problems within the watershed. A hazardous product may be toxic, highly carcinogenic, corrosive, flammable, reactive, or an irritant to skin and eyes. Products which are highly reactive with other common chemicals or persist in the environment for a long period of time before degrading are believed to pose an even greater potential for danger. Hazardous household products can include such items as: batteries, cleaners, paints, insect and rodent poisons, vehicle fluids, glues, some cosmetics (eg. nail polish), and wood preservatives.

The Washington Toxics Coalition issued "A Preliminary Analysis of Cleaners and Pesticides Sales in Seattle/Tacoma Grocery Stores" in 1994 and identified a number of trends in the cleaner and pesticide purchasing activities. They found that sales of hazardous products far outweigh sales of safer alternative products. On the other hand, sales of hazardous products are showing slight decreases while alternative products are showing definite signs of growth. The report mentions that some nationally known brands are planning to market safer alternative products and predicts that this will result in increased sales of alternatives. The Coalition divided cleaners into two subgroups based on their potential toxicity. Cleaners with danger or warning labels outsold safer alternatives by a factor of ten from July of 1991 to July of 1993. (Dickey, 1994.) While these statistics are not specific to the buying habits of watershed residents there is no reason to believe that their purchasing trends are substantially different. This indicates that people are continuing to use hazardous household products on a regular basis. As a result, some products will be used up but others will be stored or need disposal.

On average, each Pierce County household generates approximately 26.5 pounds of hazardous waste annually (TPCHD, Local Hazardous Waste Management Plan, 1990). Based on that estimate, households in the Tacoma Watershed may be generating over 2 million pounds of hazardous waste each year. Typical disposal methods may include pouring the substance on the ground, washing it down a household drain, placing it in a garbage can for regular collection, recycling, or giving it to another party for use or disposal. Vehicle fluids have a higher rate of ground disposal than other products but household cleaners have a higher rate of drain disposal than other substances. (TPCHD, 1990.) Sewage treatment plants are equipped to handle limited amounts of household cleaners but they are not designed to handle unusually large quantities of toxic substances or materials not intended for household use. Septic tanks depend upon healthy bacterial activity to function properly and may be threatened by excessive amounts of antibacterial cleaners or other toxic products. There are no storm drain systems within the watershed connected to sewage treatment plants. Other than some oil/water separation, stormwater is not treated and household hazardous wastes that enter them have may have direct access to surface and ground water.

It is common for people to store hazardous household products, saving leftover substances for future use. During 1987 and 1988 Tacoma-Pierce County collection days, the average age of all household hazardous wastes collected was between 5 and 10 years. Substances over 40 years in age were collected. Storage is not inherently dangerous but it may increase the opportunity for problems. Containers may deteriorate over time and allow leakage. Illegible or missing labels may lead to misuse of the contents or accidental mixing with other items. Large quantities can create a fire hazard or release toxic fumes during a fire. (TPCHD, 1990.) Flood events provide an opportunity for toxic substances to enter surface waters.

To address these problems, the Tacoma-Pierce County Health Department (TPCHD) developed the Tacoma-Pierce County Local Hazardous Waste Management Plan in 1990. Pierce County and all the municipalities within Pierce County adopted the plan. The plan includes alternatives for educating the public and providing collection services. The Clover/Chambers Creek Basin Ground Water Management Program and the Tacoma-Pierce County Solid Waste Management Plan both recommend implementation of the Local Hazardous Waste Management Plan as a means of addressing household hazardous waste issues and controlling contamination of local groundwater resources.

In their efforts to implement the Local Hazardous Waste Management Plan, local jurisdictions have developed a number of programs including: collection events, regular collection sites, a telephone hotline, brochures, and working with private businesses to collect oil and antifreeze.

In 1993, the City of Tacoma collected 88 tons of household hazardous waste not counting used motor oil. With 4,584 participants, this amounted to an average of 38.5 pounds per person. These items were collected at both the City's permanent facility and by its mobile unit. Tacoma established a permanent collection facility at the

Tacoma Landfill site near Fircrest in 1990 which serves Tacoma residents but also Pierce County and other city residents through contract. In 1993, the City's mobile facility visited five sites and stayed for approximately two weeks at each. The household hazardous waste collection program costs the city about \$300,000 per year. In 1993, most of these costs were grant funded but the 1994 budget was covered primarily by solid waste tipping fees. The City's program does not accept latex paint, explosives, ammunition, asbestos, contaminated soils, or commercially generated wastes but does refer people to private businesses which recycle or dispose of these items. Latex paints are not accepted because they are not particularly hazardous if they have been properly prepared for disposal. Homeowners can easily prepare latex paints for disposal in their garbage can by allowing them to dry out. The most common item collected by Tacoma--excluding used motor oil--is oil based paint, which accounts for about half of the total weight collected. Paints will deteriorate and become unusable if they are not stored properly, increasing the likelihood that they will need disposal. Other commonly collected items include car batteries and miscellaneous poisons. Tacoma has found that people who are changing residences will bring in larger quantities. (Gary Kato, City of Tacoma, pers. comm., June 21, 1994)

Up to the fall of 1994, Pierce County sponsored a minimum of two major collection events per year in coordination with the City of Tacoma and other local jurisdictions. Beginning in the fall of 1994, the County began contracting with Tacoma to hold at least 4 events per year. Zip codes are now being used to target collection events by geographic areas. Three joint events have already been held under the new contract. Residents who are not able to attend the event in their area can receive a coupon allowing them to take their waste the City of Tacoma' permanent collection site.

In 1993, Pierce County Household Hazardous Waste Collection Events attracted over 900 vehicles and collected over 82,600 pounds of waste material and averaged 91.8 pounds per participant. Household cleaners, pesticides, oil-based paints, used motor oil, antifreeze, and auto batteries were among the most common items collected. Explosives were not accepted. Commercial wastes are not accepted during these collection events but small commercial generators who did attend the events were given information on how to dispose of their hazardous wastes. The cost to Pierce County for each participant was approximately \$50 with a total program budget of \$400,000 for 1994. Grants will cover \$260,000 of that amount and the County's share will be \$140,000. Each pound of household hazardous waste typically costs about \$1.25 for disposal. The Department of Ecology sponsors grants to local jurisdictions to offset the cost of providing household hazardous waste collection programs. Each event requires a health and safety plan to address any potential for spills, health risks, fires, or explosions. (Pierce County Solid Waste, 1994.)

Fort Lewis offers household hazardous waste collection every Wednesday afternoon. They have contracted with Northwest Enviro Services to properly dispose of the items collected. There are approximately 3500 household units on the base that are served under the contract. Used motor oil, oven cleaners, fertilizers, and paints are among the more common items collected. Explosives are not accepted but information is provided

on proper disposal of them. The current program has been in place since June of 1993 and Fort Lewis estimates that approximately 3,000-4,000 pounds of waste will be collected in its first year of operation. Like other jurisdictions, Fort Lewis sees larger one-time contributions from people who are changing residences. The traditionally mobile nature of military populations increases the likelihood that households will utilize regular collection opportunities. (Ken Smith, Environmental and Natural Resources Division, Fort Lewis, pers. comm., June 20, 1994)

The City of Tacoma collects used motor oil at its permanent collection facility but motor oil is also collected at a number of local stores and gas stations. There are over 20 private businesses within the Tacoma Watershed which will accept used motor oil from homeowners who do their own maintenance. These businesses include Schuck's Auto Supply stores, Al's Auto Supply stores, most Texaco stations, and Jiffy Lubes. Most do not charge for disposal but maximum amounts accepted per person are common. (TPCHD, "Used Oil Collection", 1994.) In 1993, 174,526 gallons of used motor oil were collected and recycled via drop-off recycling programs in all of Pierce County. In 1994, 126,755 gallons had been collected as of November 1. Some private companies are also accepting used antifreeze and oil filters for recycling. In Pierce County, private companies collected 13 tons of used antifreeze and 16 tons of used oil filters during 1993. Private oil haulers/recyclers collected 456,754 gallons from gas stations, repair shops, and the agricultural community in 1993. Fort Lewis recycled 500 gallons of oil in 1993. (Pierce County Solid Waste Division, 1994.) In addition, local merchants manage the State's deposit program for auto batteries, giving consumers a cash incentive to turn in their old batteries when they purchase new ones.

Pierce County and the City of Tacoma are investigating other ways of addressing household hazardous waste issues. Educating consumers on proper purchasing and use of products is seen as a way to impact household hazardous waste generation on a long term basis. Goals include teaching people to: purchase less hazardous products, safely use up the products they currently possess, store products properly, and buy only the quantity needed for immediate use. The communities of Fircrest, DuPont, and Steilacoom have also adopted the Hazardous Waste Plan which designates the city of Tacoma, Pierce County, and the Health Department to implement the programs on their behalf.

Within the Tacoma Watershed, the Tacoma-Pierce County Health Department (TPCHD), Pierce County Public Works and Utilities Department, Metropolitan Parks District through Snake Lake Nature Center, WSU Cooperative Extension, and the City of Tacoma are all involved in programs to educate the public about household hazardous waste.

The Washington State Department of Ecology (DOE) has both educational and enforcement programs for addressing hazardous wastes from commercial sites. These programs, combined with efforts to clean up existing contamination, require local businesses to assess the wastes they produce and handle them with greater care. In

addition, DOE offers technical assistance to small businesses and publishes an educational newsletter called Shoptalk on a quarterly basis.

Businesses which generate or store over 220 pounds (half of a 55 gallon drum) of hazardous waste per month are required to obtain a generator identification number and to track all of their wastes and how they handle and dispose of them. Each business of this generator size is also required by the Department of Ecology to have a hazardous waste management plan. (Metro, 1992.) The feeling of the subcommittee was that current regulations, restrictions, and programs regarding hazardous wastes generated by business are sufficient to address any problems they might potentially cause within the Tacoma Watershed. In addition, the stringency of existing regulations and enforcement is making it less cost-effective for businesses to manufacture and transport hazardous products or use hazardous products in their manufacturing processes. This is encouraging businesses to use alternative substances, reduce waste, and recycle where possible.

In 1988, the South Tacoma Groundwater Protection District (STGPD) was established in an effort to protect the groundwater quality of the South Tacoma Aquifer. South Tacoma groundwater supplies up to 40% of Tacoma's drinking water supply during summer months and the geology of the area makes it particularly vulnerable to contamination. As part of this ordinance, the Tacoma-Pierce County Health Department administers an annual permit program for underground storage tanks and businesses which handle more than 220 pounds of hazardous materials on a monthly basis. The STGPD permit requirements are generally more stringent than state requirements for hazardous waste management and underground storage tanks. The TPCHD inspections performed in 1993 found that compliance levels were fairly high. (TPCHD, Waste Management Section, September 1993.)

During 1995, Pierce County will perform a waste audit to determine the types of waste being generated within Pierce County and in what quantities. Upon completion of that audit, Pierce County will evaluate the existing household hazardous waste programs and make appropriate changes. (Pierce County Solid Waste, 1994.)

## **Pesticides**

Within this chapter, "pesticides" will refer to chemicals used specifically for the control of pests. Pests may include insects, rodents, weeds, fungi, etc.. A 1990 study of pesticide use in Puget Sound surface waters found that the following pesticides were most likely to turn up in surface water quality samples: **diazinon**, 2,4-dichlorophenoxyacetic (**2,4-D**), **dicamba**, **bromacil**, and **diuron**. **Dicamba** and **2,4-D** are used to control weeds in grain crops, lawns, golf courses, road sides, and forestry. **Diuron** and **bromacil** are herbicides. **Diazinon** is an insecticide that is widely used for agricultural, industrial, and home uses. (PTI, 1991.) Diazinon is used by homeowners to control crane fly larvae in lawns, to control insects on ornamental plants, and to kill spiders.

Pesticides used primarily in urban areas within Puget Sound include **chlorpyrifos**, **lindane**, and **dichlobenil**. **Chlorpyrifos** is used to control insects on lawns, ornamental plants, and vegetables. It is also used to control ants. **Lindane** is an insecticide and wood preservative. **Dichlobenil** is an herbaceous weed killer. (PTI, 1991.)

The Chambers Creek Wastewater Treatment Plant samples for insecticide loadings on a quarterly basis and provides an indication of the products being used by watershed residents. Samples taken in 1994 have detected the use of **chlorpyrifos**, **diazinon**, and **lindane**. The samples indicate fairly consistent insecticide usage within the plant's service area. Staff at the plant see three types of disposal or usage patterns: illegal dumping of products (some of which have been banned), professional use, and household use. Staff attribute the detection of **chlordan**e during one sampling event in 1994 to an illegal dumping incident. **Lindane** has also been detected and attributed to over-the-counter head lice shampoos. (Steve Thompson, Chambers Creek Wastewater Treatment Plant, pers. comm., June 1994)

Storm water quality samples performed by Pierce County's Surface Water Management Division (SWM) have been limited to priority pollutants (commonly used pesticides are not currently being sampled). SWM tests for priority pesticides as part of their NPDES permit agreement with the Department of Ecology. Only two pesticides have been detected in their samples and they include one incidence of DDT detection and recurring detection of lindane. DDT is incredibly persistent within the environment so it is difficult to say where the product came from or how long ago it was spread. (Heather Kibbey, Pierce County Surface Water Management, pers. comm., 1994.) Lindane is also very persistent within the environment but it has been banned from common use for many years. Lindane is still permitted for mite control on animals and wood preservation but both must be performed by a licensed pesticide applier and the product is now fairly difficult to find. (Robin Schoen-Nessa, Department of Agriculture, pers. comm., June 28, 1994.) Wood that was treated with lindane to prevent termite and carpenter ant infestation may still be in a position to contribute traces of the product to the stormwater system and it may be possible that homeowners are using up lindane they still have.

According to the United States Environmental Protection Agency, 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).

Due to the limited amount of information available on pesticide levels in the watershed, it is assumed that existing programs will address pesticide issues related to large volume applications. 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 all considered to be point sources for water pollution and programs exist for resolving the contamination issues associated with all three sites. However, each resident and business within the watershed generates waste which must be managed. On an average day, 8 pounds of solid waste are generated per capita within Pierce County. (Steve Wamback, pers. comm., August 1993). Based on this estimate, about 1.5 million pounds of solid waste are being generated daily within the Tacoma Watershed.

There are two active landfills within the watershed at the Tacoma Landfill site and at the Fort Lewis Landfill. Tacoma Landfill is taking about one-third of the City of Tacoma's waste stream and placing it in a lined cell that meets the current standards for landfill design. (The waste within a landfill is managed by sections called cells, as opposed to layers. Each landfill site has a variety of cells that are either closed, operating, or being closed.) The rest of Tacoma's waste is incinerated, sent to Hidden Valley, or exported to an out-of-County landfill.

The Fort Lewis Landfill accepts mixed municipal and demolition wastes at a rate of about 110 tons per day. The rate of demolition wastes currently supported are not expected to continue so the average daily disposal rate should fall to 50 or 60 tons per day. The landfill currently has one operating cell that is lined and meets current standards. Fort Lewis predicts that the current cell will be able to accommodate their expected capacity for another 12 years. The Fort is also exploring the possibility of completing their waste-to-energy plant.

The Hidden Valley Landfill, which serves residents of Pierce County, Tacoma, DuPont, Fircrest, and Steilacoom, is located just outside of the Tacoma watershed boundary near Highway 162 (Meridian Avenue) south of Thun Field airport. The leachate from the landfill is pretreated and then piped to the Chambers Creek Wastewater Treatment Plant for further processing. Hidden Valley is proposed for closure by 1997. Both Pierce County and Tacoma anticipate that they will need additional disposal capacity by 1997. Studies are underway to evaluate the alternatives for siting a landfill within the county.

Landfill siting, design, and permitting are governed by the Department of Ecology and the Health Department in compliance with federal regulations. In addition, the entire Tacoma Watershed boundary falls within an EPA designated Sole Source Drinking

Water Aquifer which may hinder efforts to locate a new landfill within the area without exhaustive study of a potential site.

## Recycling

While watershed residents are still generating solid waste, Pierce County recycling programs diverted 42% of all trash away from local landfills in 1993 and the recycling rate is estimated to reach 47% in 1994. The County's goal for the program is to reach a 50% recycling rate in 1995. Currently, over 80% of the single-family curbside trash collection customers in Pierce County are also receiving curbside recycling for newsprint, glass, tin, aluminum, mixed-waste paper, envelopes, and junk mail. (About 75% of multi-family complexes also offer recycling opportunities for their residents.) In 1992, this program reduced each participating household's landfill contribution by 41 pounds per month. (Pierce County Solid Waste Division, 1993.) Recycling programs on Fort Lewis divert 21% of the solid waste stream away from landfills (Fort Lewis, March 1994). All of the cities within the Chambers-Clover Creek Watershed have recycling programs similar to Pierce County's and all jurisdictions are coordinating their recycling efforts.

In addition to providing curbside recycling services, Pierce County has an extensive public outreach program to educate the public on the importance of purchasing products made from recycled materials. The *GreenHouse Exhibit*, constructed in 1993, is an 875 square foot modular home and its contents were created entirely from recycled, reused, and non-toxic materials. The *GreenHouse* has been displayed at the spring and fall Puyallup Fairs and at the Tacoma Home & Garden Show. Approximately, 600,000 people have been through the exhibit. The house is set up and landscaped at each location, using composted yard debris for the plants and recycled plastic lumber for the fencing. Additional products displayed include carpeting made from recycled plastic soda bottles, in-home recycling systems, shoes made from a variety of materials, insulation made from newspapers, and roofing made from aluminum cans, tires, and old computer casings among other items. The display changes continually as new products are added. The County, local cities, private haulers, and recyclers in the areas have all won numerous awards for their recycling and educational programs.

The Clean Washington Center in Seattle also works to educate businesses and the public about recycled products. The Center also works to improve markets for recovered materials. The Clean Washington Center is a division of the Washington Department of Trade and Economic Development. The Center tries to find ways for businesses to incorporate recovered materials into their production systems that will either save the business money or improve the quality of the product. (Biocycle, January 1994.)

EPA has recently developed a new program called "Waste Wise" with the intention of encouraging businesses to reduce their waste. The purpose is to inform businesses about the cost benefits of waste reduction. The program is free and participants receive two documents, EPA's Guide for Reducing Waste and Waste Prevention Pays Off. The

documents contain tips on reducing waste and a number of case studies demonstrating successful waste reduction activities that have been implemented by other businesses. Participating businesses are expected to set waste reduction goals and to report their progress to EPA. (Recycling Insight, 1994.)

### **Composting**

Around 35-40% of all single-family households within Pierce County and incorporated areas (excluding Tacoma and Ruston) 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. The Purdy Yardwaste Composting Facility handled 239% more yardwaste in 1993. Yardwaste recycling collection has been established at Pierce County's landfills and transfer stations for self-haulers. There is a substantial tipping fee reduction for participants who direct their waste into the composting system rather than dumping it as regular garbage. (Pierce County Solid Waste Division, 1994.) In addition, bans on outdoor burning have forced local residents to seek out other options for disposing of yardwaste and encouraged use of yardwaste collection programs.

The Purdy Yardwaste Composting Facility handled 32,101 tons of yardwaste in 1993 and will handle a similar amount in 1994. It is owned by Pierce County and operated under contract by Land Recovery, Inc. (LRI). The facility earned the Pierce County Solid Waste Division an Environmental Achievement/Recycling Award from **City and State Magazine** in 1993. After about 45-60 days at the facility, yardwaste is converted into high quality compost and marketed as a soil amendment product called PREP (Pierce County Recycled Earth Products). The demand for this product is very high so Pierce County and LRI are investigating expansion opportunities for the program. (Pierce County Solid Waste Division, 1994.) LRI is now experimenting with techniques for inoculating the composted material with beneficial microorganisms. The intent is to develop a compost that will eliminate or reduce the need to use pesticides and fungicides. (Pierce County Solid Waste Division, 1994.)

There are private companies accepting yardwaste in the area. Northwest Cascade accepts certain yard and construction wastes and composts them into soil amendments. The company also accepts compost, septage, and biosolids. The Northwest Cascade collection facility is located in the watershed near the intersection of I-5 and Highway 512. Their composting facility is located near Hidden Valley Landfill, outside of the Chambers-Clover Creek Watershed.

In addition, the Pierce County Solid Waste Division is trying to teach residents to compost yard and kitchen wastes on their own properties. The Division has two recycling educators who provide information on managing compost heaps, building compost bins, and on using worm bins for kitchen waste recycling. They also provide workshops on composting for businesses and institutions.

## **Illegal Dumping**

Illegal dumping, for the purposes of this plan, refers to promiscuous, intentional dumping of significant amounts of waste in unpermitted areas. Illegal dump sites are secluded areas where repeated dumping of trash takes place. These sites pose a number of problems. They threaten the natural environment, can pollute the air and water, breed pests, and deface the landscape. They also obscure the true cost of managing solid waste because they lead to underestimation of disposal capacity. Finally, the cost of disposing of illegally dumped waste is far greater than the cost of proper disposal. (Ecology, Solid Waste Services Program, July 1993.)

Illegal dumping is a continuing problem within Pierce County. Fort Lewis performs regular cleanups of illegally dumped waste on military lands but does not track the amount of waste collected. The Health Department reports that the most significant increase has been in the illegal dumping of commercial and construction materials which are more difficult to trace. This is in spite of an increase in the number of private companies accepting this waste for recycling. (John Sherman, TPCHD, pers. comm., 1994) There are no records on the amounts or types of illegally dumped waste.

Illegal dumping issues are handled by the 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 within the Health Department. 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, the Health Department 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, the Health Department 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 the Health Department to 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.

The City of Tacoma established a program known as "Tacoma Cares" which is addressing illegal dumping problems.

The Department of Ecology's Waste Reduction, Recycling, and Litter Control Program tracks littering offenses along roads. They have a toll-free hotline for citizens to report littering violations. (Ecology, 1991.)

## **Surface Mines**

There are 11 surface mines within the Chambers-Clover Creek Watershed. These mines are generally operating in or near the Frederickson area, near Steilacoom, and in

Parkland near the intersection of Interstate 5 and Highway 512. Sand and gravel mining is an important economic resource for Pierce County.

The geologic conditions that make for good gravel mining resources also make them productive sources of drinking water. Surface mining alters groundwater infiltration dynamics and can increase groundwater vulnerability simply by decreasing the physical separation of groundwater from the surface. Potential sources of pollutants from surface mining include: turbid rinse water, poor quality reclamation fill, batch processing of associated products such as asphalt and concrete, truck and equipment wash runoff, and fuel storage and handling.

The Department of Natural Resources (DNR) licenses surface mines and requires the submittal of appropriate management plans. The Department of Natural Resources enforces any violations of reclamation plans while the Department of Ecology enforces violations of operating procedures. The fill used in reclamation may be governed by the Tacoma-Pierce County Health Department's solid waste permitting process. Some older gravel mines are being converted to inert debris landfills. Inert waste is defined by state law in WAC 173-304-100(40) and means "noncombustible, nondangerous solid wastes that are likely to retain their physical and chemical structure under expected conditions of disposal, including resistance to biological attack and chemical attack from acidic rainwater."

There is insufficient data to indicate that typical gravel pit operating procedures degrade groundwater quality. However, the inherently rocky and well-drained nature of gravel pit soils would increase the likelihood for a future land uses to contaminate the ground water, particularly if reclamation is not properly done and inappropriate materials are used for fill. (Virginia Stern, DOH, 1993.) As a result, the subcommittee chose to flag gravel mine reclamation as a potential nonpoint pollution issue.

There are four large gravel mining sites in the Frederickson area. Industrial land uses have been proposed for the area. It is likely that these sites will be converted to industrial land uses when the available gravel has been removed. Other existing gravel mining sites are in areas that will most likely be converted to residential and light industrial uses.

Pierce County has purchased the Lone Star gravel mine site adjacent to the Chambers Creek Wastewater Treatment Plant. The entire site now covers 658 acres. Lone Star has leased the property and will continue to mine the site until 1999. Gravel has been removed from that location for almost one hundred years, leaving much of the site without soil. The mine generates about 5 million metric tons of gravel per year. When gravel mining activities are discontinued, Pierce County will gain possession and commence soil reclamation processes so that the site will be able to support vegetation. The County will be completing a master site plan process to evaluate alternative uses for the site during the next few years.

## **Biosolids**

The Chambers-Clover Creek Watershed supports a large, urban population and is extensively sewered. As a result, local utilities must dispose of the biosolids generated during regular wastewater treatment plant operations. Land application is recommended, by both federal and state guidelines, as the most appropriate use of biosolids because of their high organic content and potential nutrient value.

Biosolid application within the Chambers-Clover Creek Watershed amounts to approximately 925 dry tons per year. Biosolids are applied at 40% of the maximum nutrient level that the soil and plants can absorb. Some biosolids from the Tacoma Wastewater Treatment Plant are mixed with soil and sawdust and distributed to small property owners but this amounts for only a small portion of biosolids distribution. (Mel Kemper, pers. comm., August 25, 1993.)

The Tacoma-Pierce County Health Department issues permits for all biosolid applications of over one acre in Pierce County. Each permit application requires SEPA review by the agency with jurisdiction. Careful records are kept about the sites and the amount of biosolids applied. The existing programs seem to be effectively preventing nonpoint source pollution problems related to biosolids application. Homeowners applying bagged biosolid products to their land are not required to have permits to use these products. Public education efforts are needed to decrease public opposition to appropriate and beneficial biosolid applications.

Biosolids from the Chambers Creek Wastewater Treatment Plant are transported out of Pierce County to an approved farm application site. The Chambers Creek Plant is looking at alternatives to create a composted biosolid product that is suitable for use as an all-purpose fertilizer and soil amendment.

## **PROBLEM DEFINITION**

1. Government structure discourages interjurisdictional cooperation.
2. Citizens are uninformed and don't see the need to change present practices.
3. Leaders need a common agenda.
4. Some programs lack sufficient data to prove need.
5. Cost of products does not reflect proper handling and disposal costs.
6. Need to develop teacher training and certification for environmental education.
7. Need viable enforcement methods.
8. Establishing new programs and facilities is expensive.
9. Incentives exist which encourage violation of laws.
10. Lakes management.

## **GOALS**

1. Well-educated consumers who understand that nonpoint pollution is a concern.
2. Coordination and consistency among agencies.
3. Increased precycling and consumer use of recycled products.
4. Reduction in the number of illegal dumping incidents.
5. Appropriate pesticide use practiced.
6. Appropriate and cost-effective household hazardous waste collection.
7. Model for inventory and measurement of watershed conditions.
8. Improved water quality.
9. Environmental education integrated into school curriculums.
10. Increased composting of organic and yard wastes.
11. Increased public and private partnerships.
12. State-of-the-art disposal capacity.
13. Model established for reclaiming gravel mines.
14. Lakes management.

## **OBJECTIVES**

1. Change behavior of public through education.
2. Streamline regulatory procedures.
3. Promote proper use of pesticides and hazardous substances.
4. Improve agency coordination.
5. Strengthen school environmental education programs.
6. Increase markets for recycled materials.
7. Explore gravel mine reclamation options.
8. Create viable enforcement tools.
9. Examine mandatory collection options.
10. Educate policy makers.
11. Make decisions based on need and cost-effectiveness.
12. Stimulate public involvement and ownership (stewardship).
13. Lakes management.

## **ACTION ITEMS**

### **OT 1 UPDATE SURFACE MINE RECLAMATION REQUIREMENTS AND DEVELOP BEST MANAGEMENT PRACTICES (BMPs) FOR MINE RECLAMATION TECHNIQUES**

The State of Washington would update its requirements for surface mine reclamation and develop BMPs which consider the use of composted biosolids and yardwaste to improve and enhance soil development and vegetative growth on sites. The Department of Natural Resources (DNR) in cooperation with the Department of Ecology (Ecology) would support and monitor the results of model projects to develop new alternatives. DNR and Ecology would work out an agreement on the types of fill that may be allowed in mine reclamation. DNR would work with local permitting agencies to streamline and clarify state and local permit requirements and environmental review processes for mine reclamation.

<b>Lead Implementor:</b>	DNR
<b>Cooperators:</b>	Ecology, PC PALS, PC Public Works and Utilities, TPCHD, surface mine owners
<b>Estimated Cost:</b>	\$100,000
<b>Potential Funding Source:</b>	Washington State
<b>Potential Funding Type:</b>	Permit fees, general funds
<b>Benefit:</b>	Improved land reclamation techniques that will prevent runoff, provide for biofiltration, develop soil, and provide for vegetative regrowth on sites
<b>Type of Source Control:</b>	Research, coordination
<b>Time Frame:</b>	One time
<b>Startup Date:</b>	1/1/96

**OT 2a IMPLEMENT A CITATION SYSTEM FOR IMPROPER STORAGE OF SOLID WASTE AND CONTINUE PROSECUTING ILLEGAL DUMPING ACTIVITIES**

Revised Code of Washington allows the TPCHD to issue citations for improper solid waste storage. The new citation process was put in place and is helping to resolve solid waste concerns in the county. The citation system is applied only in those cases where a property owner is mishandling solid waste on their own parcel.

TPCHD will continue working with the Pierce County Sheriff and the Pierce County Prosecutor's office to identify and prosecute people who dump solid waste on County property or on the property of other land owners.

<b>Lead Implementors:</b>	TPCHD, PC Prosecuting Attorney's Office
<b>Cooperators:</b>	Cities and towns within the watershed, Tacoma Public Works, Pierce County Sheriff's Department
<b>Estimated Cost:</b>	\$10,000 annual budget
<b>Potential Funding Source:</b>	Solid waste programs
<b>Potential Funding Type:</b>	General Fund, Solid Waste Dumping fees
<b>Benefit:</b>	Cleanup of solid waste
<b>Type of Source Control:</b>	Enforcement
<b>Time Frame:</b>	Ongoing
<b>Startup Date:</b>	1/1/96

## **OT2b EXAMINE OPTIONS TO RESOLVE ILLEGAL DUMPING PROBLEMS**

In the process of updating the Tacoma-Pierce County Solid Waste Management Plan, the Solid Waste Division will address illegal dumping practices. The division will work with the cities and the Tacoma-Pierce County Health Department to evaluate strategies to reduce the problem. The evaluation will include management strategies such as mandatory collection in cities, Health Department enforcement activities and will coordinate education with the County's Solid Waste Division to provide citizens with clear, convenient and cost-effective options for recycling, composting and proper disposal of their waste. Once illegal dumping strategies are selected, education programs will be developed to compliment those efforts.

<b>Lead Implementors:</b>	Pierce County Solid Waste Division
<b>Cooperators:</b>	TPCHD, cities
<b>Estimated Cost:</b>	No additional cost for planning or education
<b>Potential Funding Source:</b>	Pierce County, cities
<b>Potential Funding Type:</b>	County disposal fees, city utility rates
<b>Benefit:</b>	To reduce and resolve illegal dumping
<b>Type of Source Control:</b>	Education
<b>Time Frame:</b>	One time and ongoing education
<b>Startup Date:</b>	1996 and ongoing

### **OT3 ENCOURAGE DEVELOPMENT OF LAKE MANAGEMENT GOALS FOR ALL LAKES WITHING THE WATERSHED**

The CCC Watershed has a number of lakes within its boundaries which are currently encountering a variety of lake management problems. Addressing issues related to the appropriate handling of plant and algae growth is one of the most common concerns.

The CCC Watershed Management Committee would like to see lake management goals established for each lake within the watershed. Goals would be developed by lakeshore residents, residents of the area draining into the lake, lake users, and representatives from effected agencies. This may include: the Department of Fish and Wildlife, the Department of Ecology, State Parks, local parks and recreation departments, and any local jurisdictions.

The Implementation Committee (BAC) would provide lake associations with assistance in trying to obtain grant funding for these processes and in locating someone to facilitate the process.

<b>Lead Implementors:</b>	Lake Associations
<b>Cooperators:</b>	All jurisdictions in the watershed
<b>Estimated Cost:</b>	Different for individual lake
<b>Potential Funding Sources:</b>	Ecology, private sector
<b>Potential Funding Type:</b>	State General Fund, private sector
<b>Benefit:</b>	A direct application of resource management at the basin level. Will add to the water quality of the watershed and lake
<b>Type of Source Control:</b>	Goal development
<b>Time Frame:</b>	Ongoing
<b>Startup Date:</b>	ASAP



## **CHAPTER 9: PUBLIC INVOLVEMENT/ENVIRONMENTAL EDUCATION ACTION ITEMS**

Under the Washington Administrative Code, (Nonpoint Rule) watershed committees must develop specific plans for involving and educating the public in matters of nonpoint source pollution control. The watershed committee is also required to take other specific public involvement steps during the course of plan development.

### **REVIEW OF ISSUES**

Previous watershed planning in Pierce County (for the Lower Puyallup River Watershed and the Burley-Minter Watershed), and an informal group of environmental educators in 1993 recognized that widespread and complex problems make environmental education difficult in Pierce County. Based on this assessment and what was done in these previous watershed plans, the Chambers-Clover Creek Watershed Committee determined that environmental education would be more effective if considered as a major component rather than following the lesser requirements under the Nonpoint Rule. Therefore, an education subcommittee was formed to recommend Action Items for nonpoint pollution education, as well as overseeing any Action Items from the other subcommittees with respect to education about their nonpoint pollution source.

There are several environmental education programs in varying stages of development throughout Pierce County. People involved in these programs or having expertise or special knowledge about environmental education as it relates to the Chambers-Clover Creek Watershed were specifically invited to participate in the planning process. One recurring comment, not only among Education Subcommittee members, but other subcommittee members when discussing education, was that more coordination and communication take place between these programs. What has taken place recently in Pierce County, as will be described below, have been efforts by the Pierce County Public Works and Utilities' Environmental Services Division and others to accomplish this objective.

### **EXISTING PROGRAMS**

**United States Environmental Protection Agency (EPA):** Administers a variety of federal environmental laws and programs with environmental education components from the Federal Regional (#10) Office in Seattle. The Clean Water Act and the Superfund List are two of the most significant programs. Funds are passed through to state and local entities. Some educational programs are administered regionally.

**Puget Sound Water Quality Authority:** The Authority was created by legislative action as an independent entity, dedicated to cleaning the Sound. The Authority has several

environmental educators/public information specialists and a strong emphasis on public involvement/education.

**United States Coast Guard:** Conducts and approves boater safety and clean boat practices in Puget Sound. Enforces these regulations and standards.

**U.S. Army Corps of Engineers:** The Corps supports education and training programs primarily developed for wetland biologists, wetland delineation specialists, and other environmental professionals specializing in wetlands.

**Washington State Department of Parks and Recreation:** The primary role of the Parks and Recreation Department concerning education is to provide boater education, and to coordinate programs and planning related to boating.

**Washington State Department of Ecology (Ecology):** As the lead Washington State environmental agency, Ecology is active at most levels. The department participates in two state agency education planning committees, employs various "Program - Area" educators/public information specialists, and operates limited state-wide education efforts on a variety of environmental topics. Ecology negotiates with the Federal Government, recognized Indian Tribes, and units of local governments and special districts concerning environmental education. Ecology administers a variety of state/federal grants, loans, and technical assistance programs for governments focussing in whole or in part on environmental education.

**Washington State Department of Fish and Wildlife:** Provides education, class instruction, and outreach concerning harvesting regulations, ecological sensitivity, fish rearing, and general environmental behavior.

**Washington State Department of Natural Resources (DNR):** Provides technical assistance to landowners concerning urban forestry, Forest Practices Act (FPA) compliance, and USDA/ASCS cost-sharing programs.

**Inter-Agency Committee for Outdoor Recreation (IAC):** The IAC is primarily a grant-management agency for recreational monies that are dedicated by the state legislature.

**Office of State Superintendent of Public Instruction (SPI):** SPI is charged with developing an environmental curriculum to be made available to local districts. SPI receives federal funding for this purpose, assists local school districts, and advises state agencies.

**Consolidated Farm Services Agency and Natural Resources Conservation Services (CFSA and NRCS):** The CFSA and NRCS work cooperatively and with local Conservation Districts in a variety of incentive and educational programs directed loosely at Forestry and Agricultural activities. NRCS provides technical assistance to

landowners and farmers for soil and drainage-related problems, and for management of animal waste.

**Metropolitan Park District (MPD):** Through the Nature Center at Snake Lake, the MPD has a variety of programs to "increase our understanding and appreciation of the natural world." Water quality programs include a community education program (watershed boundary signs, storm drain stenciling, Best Management Practices for homeowners), a grade 4-5 "Wetland Wonders" curriculum which includes a field trip at the Nature Center, a "Beach Ranger" program emphasizing the conservation of marine life along the urban beaches of Puget Sound, environmental multi-media resource material available for checkout, and hands-on environmental displays at the Nature Center.

MPD and many other jurisdictions formed a surface water quality coalition to implement a multi-faceted education project funded by a 1993 Department of Ecology Centennial Clean Water Grant. These other entities include the Pierce County Storm Drainage and Surface Water Management Department (SWM), the Pierce County Conservation District (PCCD), the City of Puyallup Public Works, and the City of Tacoma Public Works along with Ecology. The programs in the project include a comprehensive water quality middle school curriculum on non-point pollution, an after-school water stewardship program for elementary-aged students, and instruction to high school teachers on how to do water quality testing. These curricula are available to most school districts in Pierce County including those in the Chambers-Clover Creek Watershed.

The grant also provided funds for printed materials and a travelling educational display panel to be available from the Snake Lake Nature Center on nonpoint pollution or other water or nature topics. That portion of Clarks Creek and a pond located in De Coursey Park in Puyallup have been developed with grant money into demonstration sites to model landscape methods and homeowner activities that reduce impacts to water quality. Six sets of panels or signs on nonpoint pollution have been installed at various locations in the park, all with funds from the Centennial Clean Water Grant. Finally, money from this grant was used to fund the beginning of a Pierce County "Stream Team" volunteer program, which will be summarized in the *Surface Water Management* section below.

**Pierce County Parks and Recreation Department:** This department and other municipal parks departments have plans relating to outdoor recreational opportunities and summer outdoor education programs.

**Pierce County Sheriff's Department:** The department is authorized to enforce boating regulations and has a division equipped to patrol on the water.

**Pierce County Public Works and Utilities, Environmental Services Division:** The Environmental Services Division is comprised of three divisions: Solid Waste, Water Resources, and Administrative Services. Water Resources is divided into seven

departments, three of which have environmental education as one of their functions: River Improvement, Storm Drainage and Surface Water Management (SWM), and Watershed Planning, which provides the staff for this document. The Solid Waste Division is presently the only division that funds a fulltime environmental education staff. However, beginning in 1996, other departments within the Water Resources Division will help fund the education programs.

*River Improvement* has designed brochures to educate the public about preparing for floods, floodplain development and management, and conveys information to the public during floods.

*Surface Water Management (SWM)*, along with the surface water management departments of the City of Puyallup and the City of Tacoma, began funding the Pierce County "Stream Team" volunteer program after the 1993 Centennial Grant ended in February, 1995. The coordinator for the program is managed through the Pierce County Conservation District. Volunteers are trained to do water quality testing on many of the streams in Pierce County, and to gather stream corridor and wildlife data. Opportunities for classes or groups to do stormdrain stenciling are provided, as well as some stream restoration activities.

SWM is responsible for the education element of a 1991 Centennial Clean Water Grant from Ecology for the Clover Creek Watershed. Initial funds were used to purchase water quality testing kits, and a workshop was given to train teachers on the use of this equipment. Present efforts, being done with cooperation by Solid Waste environmental education staff, include increasing opportunities to use the test kits, and some classroom presentations addressing nonpoint pollution sources, identification and impacts.

*Pierce County Solid Waste Division* educators provide about 250 classroom presentations each year. NO TIME TO WASTE and WASTE & WATER presentations are offered to K-12 schools, both public and private, as well as home schools. Information about waste reduction, recycling, composting, and wastewater is provided in the former presentation, while students are taught how water is recycled, how it becomes polluted, and ways people can avoid stressing nature's ability to clean water in the latter presentation. Alternatives to household hazardous products is covered in water presentation as well. Solid Waste educators work in cooperation with Ecology to provide several teacher workshops for clock hour credit. The workshops present lessons and activities dealing with the effects of waste on water. Curricula and training on household hazardous products is also provided.

*Educational Resources for Loan/Distribution* - The Solid Waste Division has donated brochures, books and videos on waste reduction, recycling and household hazardous products to the Pierce County Public Library system. Videos, books and activity kits are loaned to Pierce County educators and homeschoolers. The materials include information about how waste impacts

water resources. Educational displays on household hazardous products are available for loan and have been actively displayed throughout Pierce County.

*Environmental Education Exhibit* - The Solid Waste Division coordinates a large environmental education exhibit at the Puyallup fair grounds during Spring Fair. Exhibits teach about recycling, waste reduction, household hazardous product alternatives, composting and water conservation.

*Information Line* - The Solid Waste Division staffs an information line Monday - Friday from 7:30 a.m. to 4:30 p.m. The information line provides the public with information about recycling, waste reduction, composting and household hazardous waste.

**Pierce County Conservation District (PCCD):** PCCD operates various programs independently and in cooperation with NRCS, CFSA, and SWM. Programs are vigorously promoted and include non-regulatory outreach to agriculturalists in the form of farm inventories, farm plans, Best Management Practices for farmers, as well as stream signing projects, newsletter publication, school presentations, Project Learning Tree, and legislative tours. As stated previously, PCCD manages the Pierce County Stream Team program and provides office support for the coordinator. The Conservation District envisions eventually expanding the program to include every tributary in the county.

**City of Tacoma Refuse Utility:** The utility offers presentations on recycling and hazardous waste management to public schools, an information line on the same subjects, and provides tours, informational literature, and educational displays and videos for loan. The utility has been the driving force behind the Tacoma Public School District's environmental education program.

**City of Tacoma Water:** Educational efforts include technical advice for conservation, water reuse, industrial conservation incentives, landscaping, and educational displays.

**Tacoma-Pierce County Health Department (TPCHD):** The Tacoma-Pierce County Health Department has educational efforts relating to nonpoint pollution and public health and safety in two of its sections: Water Resources and Waste Management.

*Water Resources* educational activities include one-on-one contact with the public concerning on-site septic system function and maintenance, fish and shellfish quality, groundwater and surface water quality, land development, and drinking water issues. Quarterly newsletters are developed and mailed to water purveyors and professionals in the on-site septic system industry. Classroom presentations are given upon request and staff availability, and signs are posted and/or public service announcements are presented if a public health threat exists. Public meetings are conducted if a particular need arises and brochures are also developed on an as-needed basis. Grant-related educational activities

incorporate the above-listed methods and frequently include the formation of a citizen committee to oversee the grant project.

*Waste Management* educates in the areas of household hazardous waste, hazardous waste (spill response), removal of underground storage tanks, and oversight of landfills. This section provides waste reduction guidance, a central Information and Referral for hazardous waste, technical assistance, a waste disposal directory, on-site consultations, workshops, written materials, posters, factsheets, video displays, portable exhibits, and public service announcements directed at household hazardous waste and small-quantity generators of hazardous waste.

**Citizens for a Healthy Bay (CHB):** A nonprofit citizens action group, CHB publishes a monthly newsletter, instigates a local Kid's Day program as part of Washington Coasts Week, and has an effective but resource-limited water quality citizen involvement program directed at Puget Sound, from Commencement Bay to the Tacoma Narrows Bridge. CHB also has an outreach effort to non-English speaking people about shellfish edibility.

**WSU Cooperative Extension & WSU Puyallup Research & Extension Center**

provide a variety of intermediate and advanced assistance, research, and conference facilities. In addition to 4-H, WSU Cooperative Extension has operated water quality education grants of general focus in the county. Cooperative Extension has a pool of volunteers trained through their Waterwatchers and Master Gardeners program. Forestry education is offered through individual assistance, seminars, and workshops periodically throughout the year on an ongoing basis. One on one technical assistance and workshops on the use of pesticides and herbicides are provided to vegetable and small fruit farmers.

*Tacoma Public School District* has an Environmental Curriculum Coordinator funded by the City of Tacoma Refuse and Sewer Utilities and Tacoma Public Utilities. The Coordinator is currently involved in an inventory of existing curriculum resources inside and outside Tacoma School District and will develop a coordinated environmental curriculum.

*Steilacoom High School, Franklin Pierce School District, and Clover Park High School* provide various environmental education programs to their students. These include stream assessments, water quality sampling, and farm best management practices.

*Pacific Lutheran University, Department Earth Sciences,* provides an annual watershed assessment and planning class.

*Clover Park Technical College* provides a water quality technician training program, including laboratory training. The college is also leading development

of an environmental training consortium for community colleges in the Puget Sound Basin.

### **PROBLEM DEFINITION**

1. Consistent funding is not available for school and multi-agency partnership programs.
2. A plan to identify, develop, and coordinate environmental education resources is needed.
3. Leadership to spearhead and coordinate curriculum, the environmental knowledge base, and action planning is needed.
4. Lack of consistent enforcement contradicts and dilutes the benefit of environmental education.
5. The environment is a lower priority than other issues (e.g. violence, attendance problems, etc.).
6. There is a lack of stewardship and ecological awareness in the population and society as a whole.
7. Individual teachers and the public do not "see the value" of environmental education, especially as a "return on investment".

### **GOALS**

1. Instill the need for more environmentally conscientious behavior in watershed residents.
2. Develop and provide more educational resources (e.g. community education, resource materials, field experience, etc.).
3. Increase environmental accountability by enforcing environmental standards.
4. Improve the viability of county watersheds through restoration and preservation.
5. Implement a local, comprehensive environmental curriculum.
6. Establish adequate funding for environmental education in and outside the schools.
7. Develop multiple agency partnerships for providing environmental education and volunteer programs.

### **OBJECTIVES**

1. Establish public/private partnerships for environmental education.
2. Establish leadership and coordination of environmental educators.
3. Utilize people and volunteers more effectively.
4. Develop creative funding of environmental education programs.
5. Maximize publicity to create environmental awareness through formal and informal means.
6. Create incentives to change behaviors of the community and institutions.
7. Increase enforcement as a base of communication and education.

## ACTION ITEMS

### ED 1a CONTINUE DEVELOPMENT OF ENVIRONMENTAL EDUCATION PROGRAMS PIERCE COUNTY ENVIRONMENTAL SERVICES DIVISION

The Pierce County Environmental Services Division would continue to provide school districts and teachers with information about how to incorporate waste management, recycling, composting, water quality issues (agriculture, forestry, on-site sewage systems, stormwater runoff, wetlands and groundwater protection), and household hazardous waste problems into their curriculums. Environmental Services Division would expand informational services about protecting water resources from nonpoint sources of pollution.

Information pertaining to waste management and recycling should include: evaluating the true cost of products; the cost of remediating contaminated sites; the energy needed to produce certain items; the impact to the land on which production occurs; waste and proper disposal; and recycling costs.

Services would continue to include classroom presentations, assistance in accredited teacher training programs, and maintenance of loaner libraries. The Division would continue distribution of brochures, displays, and other activity ideas to schools, libraries, and home schooling programs. Loaner library materials include books, videos, lesson plans, and lab equipment. Services would continue to be provided to public and private schools as well as home schooling or alternative schooling. Development of programs by Environmental Services Division will also include:

- \* Establishment of environmental education sites to reinforce watershed education.
- \* Water quality sampling sites near many of the schools.
- \* Guided fieldtrips around school grounds to discuss land use impacts.
- \* Opportunities for water quality projects for students.
- \* Coordination between citizen volunteers, students, educators, businesses, and agencies on data collecting and water quality issues.

<b>Lead Implementor:</b>	PC Solid Waste Division
<b>Cooperators:</b>	PC School Districts, Clover Park Technical College, private schools, PC Conservation District
<b>Estimated Cost:</b>	\$170,000 (new program costs)
<b>Potential Funding Source:</b>	PC Public Works and Utilities, Centennial Clean Water Fund
<b>Potential Funding Type:</b>	Fees, general funds, grants
<b>Benefit:</b>	Potential to reach the majority of students in Pierce County
<b>Type of Source Control:</b>	Education, coordination

**Time Frame:** Ongoing  
**Startup Date:** Existing program

**ED 1b CONTINUE DEVELOPMENT OF ENVIRONMENTAL EDUCATION PROGRAMS IN TACOMA PUBLIC SCHOOLS AND OTHER PUBLIC SCHOOLS**

Tacoma Public Schools would continue to provide educational opportunities regarding waste management, recycling, composting, water quality issues (stormwater runoff, groundwater contamination, agriculture and forestry practices), and household hazardous waste problems. Information pertaining to waste management and recycling should include: evaluating the true cost of products; the cost of remediating contaminated sites; the energy needed to produce certain items; the impact to the land on which production occurs; waste and proper disposal; and recycling costs. Tacoma Public Schools would expand informational services about protecting water resources from nonpoint sources of pollution. Services would continue to include classroom presentations and assistance in accredited teacher training programs. Tacoma Public Schools would continue distribution of brochures, displays, and other activity ideas to schools, libraries, and home schooling programs.

Development of programs will also include:

- \* Water quality sampling sites near many of the schools.
- \* Guided fieldtrips around school grounds to discuss land use impacts.
- \* Opportunities for water quality projects for students.
- \* Coordination between citizen volunteers, students, educators, businesses, and agencies on data collecting and water quality issues.

**Lead Implementor:** Tacoma Public School District, City of Tacoma  
**Cooperators:** Tacoma Sewage Utility, MPD, other agencies  
**Estimated Cost:** Existing Program  
**Potential Funding Source:** Tacoma Public Works, Tacoma Public School District, Centennial Clean Water Fund, Tacoma Public Utilities  
**Potential Funding Type:** Fees, general funds, grants  
**Benefit:** Potential to reach the majority of students in Tacoma Public Schools  
**Type of Source Control:** Education, coordination  
**Time Frame:** Ongoing  
**Startup Date:** Existing program

## **ED 2 DEVELOP AND INCREASE INTERNSHIP OPPORTUNITIES**

Agencies, businesses, and local non-profit organizations and environmental groups would offer more internships to post-secondary school students. Two programs that might utilize interns would be Project GREEN and Stream Team.

They should advertise topic specific internship opportunities through the Public Service Center which communicates with all of the colleges.

<b>Lead Implementor:</b>	Pacific Lutheran University, University of Puget Sound, University of Washington (Tacoma Branch), The Evergreen State College, Tacoma Community College, Pierce Community College, Clover Park Technical College
<b>Cooperators:</b>	PC Public Works and Utilities, PC Conservation District, TPCHD, local businesses, Pierce County environmental and non-profit organizations
<b>Estimated Cost:</b>	\$3,000
<b>Potential Funding Source:</b>	Existing budgets, Centennial Clean Water Fund
<b>Potential Funding Type:</b>	General funds, grants
<b>Benefit:</b>	Utilizing valuable, inexpensive labor while enabling experienced to be gained
<b>Type of Source Control:</b>	Education
<b>Time Frame:</b>	Ongoing
<b>Startup Date:</b>	9/1/95

### **ED 3 SCHOOL BUSINESS LIAISON POSITIONS FOR THE ENVIRONMENT**

Designate one position in every school district and university as Environmental Coordinator. Encourage funding of these positions by local businesses. The coordinator would keep track of opportunities for students and businesses to work together. Activities might include tours of business facilities, business sponsorship of educational materials and stream restoration supplies, and using business lands for interpretive sites. (These activities would be closely coordinated through planning activities in Action Item ED 1, and with volunteer activities of Action Item SW 7 and referral activities of Action Item ED 5A. Competition would not occur.)

<b>Lead Implementor:</b>	School districts or State Superintendent
<b>Cooperators:</b>	Local businesses, governments
<b>Estimated Cost:</b>	\$3,000
<b>Potential Funding Source:</b>	Local businesses, school districts
<b>Potential Funding Type:</b>	Grants, donations
<b>Benefit:</b>	Liaison and communication between schools and the community
<b>Type of Source Control:</b>	Education
<b>Time Frame:</b>	Ongoing
<b>Startup Date:</b>	1/1/96

**ED 4 CREATE CHAMBERS-CLOVER CREEK WATERSHED NONPOINT POLLUTION ENVIRONMENTAL DISPLAYS AND EXHIBITS**

Create a display or diorama about the watershed and move it around the lobbies of local businesses, agencies, government buildings, and libraries. It should be very specific to the local community and fit with local schools' water quality curricula, and should impact multiple age levels.

Design a model landscape to illustrate techniques to conserve water, reduce chemical use, compost, and facilitate infiltration of stormwater. The exhibit will be used with the *GreenHouse*, a recycled house built by the Solid Waste Division and displayed in various locations including the Western Washington State Fair and at the Puyallup Spring Fair. A semi-permanent site is being considered (possibly within the CCC Watershed). The exhibit will be ready for public display in 1996.

Education signage about the Chambers/Clover Creek Watershed and water quality trips to reduce nonpoint pollution will be installed at the information kiosk at Seeley Lake Park, a small wetland in the watershed. The park includes a pathway and is the site of the Lakewood Community Center and Pierce County Parks, Recreation, and Community Services. A poster will be created for distribution from the sign panel that educates about the Chambers-Clover Creek Watershed. The signs will be installed by the winter of 1996.

<b>Lead Implementor:</b>	PC Water Resources Division
<b>Cooperators:</b>	MPD, Ecology Shell Fish Program
<b>Estimated Cost:</b>	\$15,000
<b>Potential Funding Source:</b>	Ecology, Pierce County
<b>Potential Funding Type:</b>	Grants, fees
<b>Benefit:</b>	Behavioral change, education
<b>Type of Source Control:</b>	Education
<b>Time Frame:</b>	Onetime
<b>Startup Date:</b>	9/1/95

## **ED 5a PUBLIC INVOLVEMENT, INFORMATION AND REFERRAL**

Local governments within the watershed will contribute money to expand Pierce County Public Works and Utilities/Environmental Services Division's information and referral function. It would provide "one-stop shopping for the public" to answer questions and refer all environmentally-related programs, i.e., who is doing what, when, and where. It will answer the question of, "How can my children and I get involved?" The program would include:

- \* Referral to the appropriate agency any question or problem (such as a spill) regarding nonpoint pollution from land use activities.
- \* Establishing an electronic bulletin board advertising opportunities, activities, internships, speakers, and events concerning environmental programs and issues. Placement of the bulletin board to be determined.
- \* Continuing to gather educational material and public information videos and distribute copies to each public library in the Cities and County.
- \* Establishing a public speakers list for any business or group interested in a presentation or speech on water quality issues.
- \* Establishing a list of groups or businesses currently using Best Management Practices for referring others who are interested in beginning these practices.

<b>Lead Implementor:</b>	PC Public Works and Utilities
<b>Cooperators:</b>	All local governments, private and public schools, PC Conservation District, PC Cooperative Extension, county and city libraries, non-profit environmental organizations,
<b>Estimated Cost:</b>	\$15,000 (1/4 Full-time employee)
<b>Potential Funding Source:</b>	Ecology, local governments
<b>Potential Funding Type:</b>	Grants, general funds
<b>Benefit:</b>	Efficient use of resources, opportunity to reach people quickly
<b>Type of Source Control:</b>	Education
<b>Time Frame:</b>	Ongoing
<b>Startup Date:</b>	9/1/95

## **ED 5b A COUNTYWIDE INFORMATIONAL AGRICULTURE/FORESTRY HOTLINE**

A person would be assigned the task of taking calls and requests for information related to agricultural and forest practice activities. This person would be able to direct calls and requests to the appropriate agency. (The hotline number might be included in the radio advertisements recommended in Action Item AF 4.) A computer network or mail system would need to be accessible so that agencies would be able to update the person taking the calls on their activities.

<b>Lead Implementor:</b>	WSU Research and Cooperative Extension Center
<b>Cooperators:</b>	WSDA, PC Conservation District, NRCS, Consolidated Farm Services Agency, DNR, US Department of Interior, Washington Farm and Forestry Association
<b>Estimated Cost:</b>	\$25,000
<b>Potential Funding Source:</b>	All agencies would split costs
<b>Potential Funding Type:</b>	Grants or general fund
<b>Benefit:</b>	Customer satisfaction, increased efficiency
<b>Type of Source Control:</b>	Enhancement of services
<b>Time Frame:</b>	Ongoing
<b>Startup Date:</b>	9/1/95

**ED 6 LOCAL BUSINESSES ADOPT AND PROMOTE BEST MANAGEMENT PRACTICES**

A program will be set up through the Chambers-Clover Creek Basin Advisory Committee (BAC) to assist large and small businesses within the watershed. Each business would be assisted in creating and applying customized best management practices (BMPs). Recognition of meeting the self-created standards (as outlined in each BMP) will include a publicly displayed logo. The logo will inspire the public to use these businesses over other similar businesses. (Legal opinions as to the legality of government endorsement of private business will be verified.) Information from Action Item ED 5A about similar businesses using BMPs would be helpful.

<b>Lead Implementor:</b>	Chambers-Clover Creek Basin Advisory Committee
<b>Cooperators:</b>	All local governments, Project GREEN, homeowners associations, Tacoma Public Works
<b>Estimated Cost:</b>	\$10,000 to plan and establish a prototype
<b>Potential Funding Source:</b>	Participating businesses
<b>Potential Funding Type:</b>	Assess fees to businesses - fees are linked to the size of the business
<b>Benefit:</b>	Reduction in stormwater runoff and other types of pollution through a BMP and reward system
<b>Type of Source Control:</b>	Education
<b>Time Frame:</b>	Ongoing
<b>Startup Date:</b>	3/1/96

**THE FOLLOWING PUBLIC INVOLVEMENT/EDUCATION ACTION ITEMS CAME FROM THE RESPECTIVE NONPOINT SOURCE SUBCOMMITTEES**

**BOATS AND MARINAS**

**ED 7 INCORPORATE BOATING EDUCATION ELEMENT INTO EXISTING WATER EDUCATION PROGRAMS**

The distribution of educational materials (brochures) through existing school programs offered by the Environmental Services Division of Public Works and Utilities would encourage student involvement in summer programs, boater groups, and day camps such as the YMCA. Agencies and groups operating these programs would be responsible for providing the materials to the Division.

**Lead Implementor:** PC Environmental Services Division, PC Parks and Recreation Department, MPD

**Cooperators:** Washington State Parks and Recreation Commission, YMCA, boating groups, Tacoma Public Works

**Estimated Cost:** \$15,000

**Potential Funding Source:** Washington State Parks and Recreation Commission (for educational material)

**Potential Funding Type:** Grant

**Benefit:** Expanded education and awareness on the part of the boating public

**Type of Source Control:** Education

**Time Frame:** Ongoing

**Startup Date:** 3/1/96

## **ED 8 PRODUCE BOATING WATER QUALITY VIDEO**

This would include contacting local vocational institutions and requesting that they submit proposals for developing a video. The video would contain educational information on responsible boating practices and emphasize water quality issues. Students would draft scripts which would be reviewed by the local Boating Advisory Committee. One script would be selected and prepared by the students. The intent would be to utilize local resources and give students valuable experience. Once completed, the video and funding to make copies could be given to the Boating Division of the Washington State Parks and Recreation Commission, the Pierce County Sheriff's Department, and the Northwest Boating Council for distribution.

<b>Lead Implementor:</b>	Clover Park Technical College or Bates Technical College
<b>Cooperators:</b>	Local television and cable companies, Boating Advisory Committee, Washington State Parks and Recreation Commission/Boating Division
<b>Estimated Cost:</b>	\$15,000
<b>Potential Funding Source:</b>	PIE
<b>Potential Funding Type:</b>	Grant
<b>Benefit:</b>	Increase boater awareness
<b>Type of Source Control:</b>	Education
<b>Time Frame:</b>	One time
<b>Startup Date:</b>	9/1/95

## ON-SITE SEWAGE SYSTEMS

### ED 9 DEVELOPMENT AND DISTRIBUTION OF ON-SITE SEWAGE SYSTEM INFORMATION

Brochures and materials jointly developed by the Tacoma-Pierce County Health Department and the Pierce County Environmental Services Division concerning maintenance, care, and operation of on-site septic systems would be distributed to students who reside in areas with a significant frequency of on-site systems, including the Chambers-Clover Creek Watershed. Pierce County's Environmental Services Division would be responsible for distributing the material in this watershed as part of their ongoing school program on nonpoint pollution.

<b>Lead Implementor:</b>	TPCHD
<b>Cooperators:</b>	PC Environmental Services Division, Tacoma Public Works, Puyallup Public Works, PC Conservation District, MPD, septic pumpers, real estate companies, general contractors, Tacoma Public Works
<b>Estimated Cost:</b>	\$4,000
<b>Potential Funding Source:</b>	Centennial PIE Grants, Pierce County, businesses
<b>Potential Funding Type:</b>	Grant, fees, business investment, general fund
<b>Benefit:</b>	Potential to reach the majority of students not served by sewer in Pierce County
<b>Type of Source Control:</b>	Education
<b>Time Frame:</b>	One time
<b>Startup Date:</b>	1/96

## STORMWATER

### ED 10 VIOLATOR FINES DIRECTED FOR EDUCATION

Nonpoint pollution - surface water runoff ordinances will include a violations section. Enforcement of these ordinances will fall to each jurisdiction. Violators would be encouraged to comply with an ordinance before any citations were issued. The ordinances will direct a portion of fines to environmental education.

<b>Lead Implementor:</b>	Pierce County, DuPont, Steilacoom, Lakewood, University Place, Fircrest, Ruston, Tacoma
<b>Cooperators:</b>	All local governments
<b>Estimated Cost:</b>	\$50,000 per jurisdiction for enforcement officers, office and legal support
<b>Potential Funding Source:</b>	Local governments
<b>Potential Funding Type:</b>	Fines, general funds
<b>Benefit:</b>	Balances enforcement with education
<b>Type of Source Control:</b>	Regulatory, enforcement, education
<b>Time Frame:</b>	Ongoing
<b>Startup Date:</b>	1/1/96

## OTHER

### ED 11 CONTINUE TO SUPPORT YARDWASTE COMPOSTING PROGRAMS AND TO ENCOURAGE RESIDENTS TO SIGN-UP FOR CURBSIDE YARDWASTE COLLECTION

Local governments would continue to support existing yardwaste composting and collection programs in cooperation with hauling companies and private composting businesses. This not only would include continuing to promote participation by residents in yard waste collection services, but local governments would continue to promote backyard composting by residents wherever practical, as well as support for rate incentives for self-haulers, monitoring of data, and refinement of the program. Monitoring would evaluate the volume and nature of the yardwaste that composted or otherwise diverted from landfills. Agencies would continue educational workshops and other programs about composting methods and alternatives, working with school districts, institutions and landscaping businesses on composting methods, and developing alternative collection programs for businesses.

<b>Lead Implementors:</b>	PC Solid Waste Division, Tacoma Refuse Utility
<b>Cooperators:</b>	All local governments, WSU Master Gardeners Program, school districts, hauling companies, private composting companies
<b>Estimated Cost:</b>	None
<b>Potential Funding Source:</b>	Local government allocations
<b>Potential Funding Type:</b>	Solid waste tipping fees (Pierce County), solid waste utility fees (Tacoma), grants
<b>Benefit:</b>	Easy access to curbside collection service and composting facilities will help to reduce illegal dumping of yardwastes, proper composting allows for organic fertilizing instead of chemical fertilizing
<b>Type of Source Control:</b>	Education
<b>Time Frame:</b>	Ongoing
<b>Startup Date:</b>	Existing programs

**ED 12 CONTINUE AND EXPAND UPON EXISTING GENERAL PUBLIC OUTREACH PROGRAMS CONCERNING HOUSEHOLD HAZARDOUS WASTE, WASTE REDUCTION, AND RECYCLING**

There are a number of adopted plans which currently have educational elements. These plans include the Local Hazardous Waste Management Plan and the Tacoma-Pierce County Solid Waste Management Plan. The intent would be to build upon existing successes and utilize programs that are already recognized by the public and carry out the educational recommendations of those plans. Programs would be coordinated with information from the Clean Washington Center and the Washington State Department of Ecology. Two existing successful programs upon which to build are the curbside recycling program, and targeting specific days to collect household hazardous waste. Education programs could include:

- \* Exhibits which demonstrate recycled products, substitutes for household hazardous waste products, and composting techniques as they might be used in a residential setting (e.g. Pierce County's **GreenHouse** Exhibit).
- \* Workshops, exhibits, and information programs to businesses about recycling, waste reduction, and product substitution.
- \* Research, studies, and grants by the Clean Washington Center to promote use of products made from recycled materials.
- \* Update of local government procurement plans for buying recycled products including use of compost in public works projects.

<b>Lead Implementor:</b>	PC Solid Waste Division, TPCHD, Tacoma Refuse Utility
<b>Cooperators:</b>	Clean Washington Center, Ecology, all local governments, industry associations
<b>Estimated Cost:</b>	None
<b>Potential Funding Source:</b>	Local government allocations
<b>Potential Funding Type:</b>	State Grants, fees (tipping or utility)
<b>Benefit:</b>	Reduction in the use of household hazardous wastes, increased use of recycled products, increased use of environmentally-friendly alternative production methods (BMPs)
<b>Type of Source Control:</b>	Education, research
<b>Time Frame:</b>	Ongoing
<b>Startup Date:</b>	Existing programs

**ED 13 DEVELOP AGGRESSIVE PUBLIC EDUCATION PROGRAMS AND PROVIDE WORKSHOP OPPORTUNITIES FOR HOMEOWNERS TO LEARN ABOUT THE PROPER USE OF PESTICIDES AND PESTICIDE ALTERNATIVES**

The WSU Cooperative Extension (in coordination with other educational agencies) would aggressively offer and market workshops, classes, and demonstration sites for homeowners on how to use pesticides and Integrated Pest Management (IPM). An appropriate training program would be established and offered regularly at local libraries, hardware stores, schools, or other locations. One target audience would be those who purchase pesticide concentrates instead of ready-to-use (RTU) formulations since concentrates have the highest potential for misuse. Local businesses could be asked to cooperate by handing out flyers about the workshops at point-of-purchase. Any certification program, such as Master Gardeners or Master Landscapers, would include this training. In addition, the Cooperative Extension Service in cooperation with Clover Park Technical College would develop an aggressive informational program about the proper use of pesticides. Students in media and photography classes could develop video projects on the subject and the Extension Service could utilize public service announcements and public access cable services to promote the workshops. Businesses and facilities using IPM would sponsor events that would teach people how IPM works and how it is being applied. In addition to pesticides, consumers would learn to identify and purchase fertilizers with slow-release formulas. Slow-release formulas can add to the fertility of the soils, can be applied significantly less often, and are less likely to cause spikes in the nitrogen levels of runoff.

<b>Lead Implementors:</b>	Cooperative Extension--Master Gardeners Program
<b>Cooperators:</b>	PC Parks and Recreation Department, MPD, Clover Park Technical College, local cable companies, golf courses, industry associations, hardware stores
<b>Estimated Cost:</b>	\$50,000
<b>Potential Funding Source:</b>	U.S. Department of Agriculture
<b>Potential Funding Type:</b>	Grants
<b>Benefit:</b>	Reduced impact on water quality from improperly used pesticides and herbicides, increased education on Integrated Pest Management (IPM)
<b>Type of Source Control:</b>	Education
<b>Timeframe:</b>	Ongoing
<b>Startup Date:</b>	1/1/96

**ED 14a ESTABLISH A RECOGNITION PROGRAM FOR BUSINESSES AND CITIZENS**

This would be an annual recognition award to a business, citizen, or community group for the community project that contributed to improving water quality within the watershed with a voluntary, low-cost, innovative, and simple solution to a specific nonpoint source problem. Education projects would also qualify. The purpose of this award is to bring attention to the simple things that the local community can do to change its habits, prevent surface and ground water pollution, and educate themselves about the issues. It is designed to generate commitment to water quality and foster competition among businesses, groups, or citizens for the award, and to be sponsors of the award. A cash award would provide an incentive to groups which could use the money for other projects. The local Chamber of Commerce or business community could be involved by raising money and presenting the award as a public service.

<b>Lead Implementor:</b>	PC Conservation District
<b>Cooperators:</b>	Ecology, Puget Sound Action Team, PC Environmental Services Division, City of Tacoma, NRCS, Tacoma Public Works
<b>Estimated Cost:</b>	\$5,000
<b>Potential Funding Source:</b>	Centennial PIE Grants, business community
<b>Potential Funding Type:</b>	Grants, business community
<b>Benefit:</b>	Increase the sense of citizen "ownership" of the watershed
<b>Type of Source Control:</b>	Voluntary incentive
<b>Time Frame:</b>	Ongoing
<b>Startup date:</b>	12/1/96

## **ED 14b LOCAL AGENCIES ISSUE ENVIRONMENTAL AWARDS**

Each organization that promotes environmental awareness and improvement would sponsor an environmental excellence award to be given to local programs, organizations, and businesses. Each agency would need to develop criteria for their award.

<b>Lead Implementor:</b>	Pierce County Environmental Services
<b>Cooperators:</b>	TPCHD, TacUSE, PC Conservation District, NRCS, MPD, City of Tacoma, federal government
<b>Estimated Cost:</b>	\$2,000
<b>Potential Funding Source:</b>	General fund, Pierce County environmental organizations
<b>Potential Funding Type:</b>	General fund, private donations
<b>Benefit:</b>	Increased awareness
<b>Type of Source Control:</b>	Education
<b>Time Frame:</b>	Annual
<b>Startup Date:</b>	12/1/96

## **ED 14c MEDIA COVERAGE ON AWARD WINNING FARMS**

Award winning farms, both large and small, would be identified and used as examples of how farms should be managed to minimize water quality problems. The Pierce County Conservation District and the Pierce County Farm Bureau will jointly choose the award winning farms. Tours will be conducted on these farms for the general public, the press, secondary schools, and science students at higher education institutions such as WSU.

Agriculture and forestry interpretive signs would provide opportunities for people to better understand BMPs. The signs would need to be established along roads with high visibility and would explain the practices taking place and their value. Farms signs could explain the different types of practices that take place from season to season. Forestry signs could explain the different types of management activities that contribute to urbanizing forests.

<b>Lead Implementor:</b>	PC Conservation District, PC Farm Bureau, PC Cattlemens' Association
<b>Cooperators:</b>	U.S. Forest Service, Sierra Club, Tahoma Audubon Society, Tahoma Land Conservancy, PC-WSU Cooperative Extension, Key Bank, news media, farmers, technical colleges, NRCS
<b>Estimated Cost:</b>	\$20,000
<b>Potential Funding Source:</b>	Centennial PIE Grants Conservation Commission, Key Bank, Washington Water Sportsman Club, environmental groups (above), Trout Unlimited
<b>Potential Funding Type:</b>	Grant, donations
<b>Benefit:</b>	Recognition of good management practices, increase visibility
<b>Type of Source Control:</b>	Education
<b>Time Frame:</b>	Annually
<b>Startup Date:</b>	12/1/96

**ED 15 COMMUNITY ORGANIZATIONS INTERESTED AND INVOLVED IN STREAM RESTORATION PROJECTS THAT IMPLEMENT WATERSHED PLANS, SHOULD QUALIFY FOR EXPEDITED PERMIT REVIEW**

As spelled in state law, local stream restoration groups, will be considered for expedited permit review when a complete application and qualified projects are (those generally recognized in watershed plans) submitted to the appropriate permitting agency or jurisdiction. This will allow ecological improvements to be made in a timely manner.

Projects might include:

- Fence building along streams
- Gravel placement
- Debris removal
- Placement of large woody debris
- Livestock watering
- Cattle crossing construction
- Revegetation
- Weir placement
- Deflector placement
- Bank protection/non-hardening techniques
- Culvert baffles for fish passage

<b>Lead Implementor:</b>	All jurisdictions in the watershed
<b>Cooperators:</b>	All jurisdictions in the watershed
<b>Estimated Cost:</b>	N/A
<b>Potential Funding Source:</b>	N/A
<b>Potential Funding Type:</b>	N/A
<b>Benefit:</b>	To allow local stream restoration groups to move quickly and perform their work as the weather and seasons demand. It will also allow work to be done when volunteers are ready to work
<b>Type of Source Control:</b>	N/A
<b>Time Frame:</b>	On going
<b>Startup Date:</b>	As soon as possible

## CHAPTER 10: IMPLEMENTATION AND MONITORING PROGRAM

It is intended that each implementing agency - federal, state, local, tribal, the private sector, and individuals - concur with this Watershed Action Plan. Such concurrence will impose costs, either increased budget allocations, or "opportunity costs" of changing "business as usual" and better utilizing existing resources. Descriptions of the specific actions required of each implementing agency are found in the chapters addressing sources of water pollution - Agriculture & Forestry, Boats & Marinas, On-site Sewage, Stormwater & Erosion, Other, and Public Involvement and Education.

### LEAD AGENCY

The lead agency for the Chambers-Clover Creek Watershed Action Plan following concurrence will be the Pierce County Regional Council (PCRC). The PCRC would establish a Chambers-Clover Creek Basin Advisory Committee (**BAC**) as described in Action Items IM 1 & IM 2. It is expected that Pierce County will manage budgetary requirements of **BAC**. The **BAC** will closely coordinate with any other River Basin Advisory Councils.

### ESTIMATED COSTS AND BUDGET

**Appendix C1** of this Watershed Action Plan, summarizes and groups the Action Items by Lead Implementor. This Watershed Action Plan contains 52 Action Items describing various types of efforts to directly or indirectly improve water quality. The watershed committee avoided duplicating or creating unnecessary expense in expanding government programs. Significant effort was spent in identifying private solutions to water quality problems and in coordinating and improving **existing** programs. Ten action items name existing "on the ground" programs.

**If all action items are implemented, the total estimated financial cost is approximately \$2 million dollars.** Ten of the action items account for a majority of the costs.

Of the 52 action items, 25 have identified grant funding totalling approximately \$500,000, 10 actions items have identified general funds totalling approximately \$600,000 and 13 have identified fees totalling approximately \$750,000. Seven of the action items are estimated to cost nothing and the cost of eight is estimated at less than \$5,000.

## LEAD IMPLEMENTORS

**Appendix C**, provides a listing of the lead implementors those agencies implementing the source control action items. The **BAC** will coordinate all action items and various other issues including animal habitat, recreation, industrial uses, aquifer recharge, open space, development, and creek restoration.

Other agencies cooperating in implementation of the plan include Pierce County Public Works & Utilities, Pierce County Planning, the cities of DuPont, Steilacoom, Lakewood, University Place, Ruston, Tacoma, Metropolitan Parks District, Tacoma-Pierce County Health Department, the Puyallup Indian Tribe, Pierce County Cooperative Extension, the Pierce County Conservation District, Clover Park Technical College, Clover Park School District, and a number of State agencies including Fish & Wildlife, Health, Ecology, Parks and Recreation, and the Puget Sound Action Team. Private organizations which have been identified as potential cooperators include the Clover Creek Council, various Chambers of Commerce, Project Green, Northwest Boating Council, King-Pierce County Cattlemen's Association, and King-Pierce County Farm Bureau.

## COORDINATION AND EVALUATION

The Chambers-Clover Creek Basin Committee (**BAC**) will be responsible for overall coordination of plan implementation, monitoring, and public involvement as described in this chapter and Chapter 8 of this watershed action plan. **BAC** will coordinate related concerns including animal habitat, recreation, industrial uses, aquifer recharge, open space, development, and creek restoration.

**BAC** 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. **BAC** will meet annually with affected agencies and parties to coordinate action items and overall implementation strategies and evaluate the effectiveness of the plan. Quarterly meetings will occur to develop a working relationship between agencies, share information, track progress, and facilitate the decision making that needs to occur at annual meetings. Annual meetings with affected agencies/parties will undertake the following tasks:

- \* Coordination and integration with: 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 **BAC** will evaluate the overall effectiveness of the Action Plan based on "hard data" submitted by the Lead Implementors, and staff analyses based on information generated as a result of implementing the Action Items. "Hard data" describing at a minimum, those parameters under Section 303 d) of the Federal Clean Water Act will be requested.
- \* The **BAC** will chronicle results from the annual evaluation meeting and report to the Washington State Department of Ecology within two months after the meeting.
- \* The first evaluation meeting for the Chambers-Clover Creek Watershed Action Plan will be within one year after final certification of the plan by the Department of Ecology.

## **PUBLIC INVOLVEMENT**

The Chambers-Clover Creek Basin Advisory Committee (**BAC**) will be convened as part of the annual evaluation. The **BAC** will:

- \* seek public comment on ongoing and proposed implementation and monitoring activities.
- \* and work with all implementing agencies to evaluate the effectiveness of the proposed plan.
- \* seek public input on the effectiveness of public involvement both from an historic and ongoing perspective.

## **ANNUAL MILESTONES**

Each action item estimates a time frame for startup. Additional milestones will be established by the **BAC**. These milestones will include restoration projects.

## **FINANCING ELEMENT**

Implementation and monitoring of Chambers-Clover Creek 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 estimated that over half the projected costs for implementing the action items are 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 Chambers-Clover Creek Watershed Management Plan are presented below.

**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.

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 grants through the Natural Resources Conservation Service and the Consolidated Farm Services Agency.

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 Action Team.

Grant funds have several limitations. Substantial effort is required for application; receipt of grant funds is competitive and not guaranteed, and existing grant funds are probably not sufficient to meet current demand. 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. Many of the action items identify significant private contributions.

**Existing Local Revenues:** The Surface Water Management Division of the Pierce County Public Works Department (SWM), assesses fees to support their work within unincorporated Pierce County. SWM does not assess fees in incorporated areas.

Much of the watershed lies within incorporated boundaries of cities. Some jurisdictions do not have 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. The single drainage district in the watershed uses its funding solely for capital improvement and drainage course maintenance activities.

Septic Maintenance Districts can function as special service districts. 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.

General fund revenues from the various jurisdictions could be one means of financing actions. Fees may also be a funding mechanism. Bond elections for special purposes are also possible through Pierce County. Directing surface water management fees to water quality/quantity problems within the new municipalities is a preferred revenue source.

**Intergovernmental Cost Sharing:** Implementation of the Chambers-Clover Creek Watershed Action Plan will require cooperation between the Chambers-Clover Creek Basin Advisory Committee (**BAC**) and other jurisdictions, both in terms of funding and responsibility. Pierce County, the cities of DuPont, Steilacoom, Lakewood, University Place, Ruston, Tacoma, and the Metropolitan Parks District, Tacoma-Pierce County Health Department, the Puyallup Indian Tribe, Pierce County Cooperative Extension, the Pierce County Conservation District, Clover Park Technical College, Clover Park School District, and a number of State agencies would explore entering into interlocal agreements as a way to help fund selected plan actions. This includes the establishment of the Chambers-Clover Creek Basin Advisory Committee.

The Chambers-Clover Creek Watershed Management Committee recognizes that limited funding may prevent full implementation of the watershed plan. Plan implementation must include efforts to prioritize expenditures and identify additional funding sources. The **BAC** will work to refine and prioritize actions during the implementation stage.

## THE DISPUTE RESOLUTION PROCESS

The Chambers-Clover Creek Watershed Management Committee consists of fourteen members. Three members have been designated to serve on the Dispute Resolution Committee. This committee will resolve differences between the full committee and Lead Implementors of the Watershed Action Plan. It is possible that disputes may arise either in attempting to achieve "concurrence" with the plan, or in implementing action items after the action plan is approved. If a Lead Implementor does not completely concur with language written in the first, or updated drafts, that Lead Implementor will be asked to informally discuss the problem with the Dispute Resolution Committee, in an attempt to reach a compromise. If the parties are unable to reach agreement, the full committee will be asked to meet and determine the final dispute resolution approach, including voting as necessary.

Once the action plan is adopted, resolution of possible disputes concerning implementation of action items will occur in a similar manner between the Lead Implementor and the **BAC**. It will be through voluntary discussion in an informal group approach. The **BAC** will determine the final dispute resolution approach, including voting as necessary.

## REVISIONS TO THE PLAN

The Chambers-Clover Creek Watershed Action Plan is intended to be adaptive as knowledge of water pollution increases and other situations change. As a result, the Chambers-Clover Creek Watershed Action Plan should be re-evaluated annually and revised every two years from the date of approval by the Department of Ecology. At that time, the Chambers-Clover Creek Basin Advisory Committee (**BAC**) will convene to revise the plan. Revisions will be subject to review by Pierce County Council and coordinated with Ecology as needed.

The annual evaluation meeting and annual report will be utilized as a means to revise the plan. All efforts to revise the plan will incorporate public involvement and education.

## **ACTION ITEMS**

### **IM 1 ESTABLISH CHAMBERS-CLOVER CREEK BASIN ADVISORY COMMITTEE (BAC)**

The Pierce County Council would convene a Chamber-Clover Creek Basin Advisory Committee (BAC) after receiving a list of recommended candidates from the Chambers-Clover Creek Watershed Management Committee.

The Watershed Management Committee will then sunset.

Pierce County will provide staff support for the new BAC at ¼ time FTE, for the first year, to assist in a smooth transition. Local jurisdictions within the watershed are encouraged to contribute to the employee salary to offset the County contribution by transferring funds to the county, by a population formula. The larger the jurisdiction the greater the contribution should be. These figures will be worked out by the assigned BAC staff once the funding is budgeted by the County.

The BAC will coordinate with and report to Pierce County Council and all of the municipalities, the military reservations, Indian Nations and other interested entities.

The first priority of the Advisory Committee would be to implement the Chambers-Clover Creek Watershed Action Plan.

Specific coordination activities of the BAC would include, but not be limited to:

- Improve water quality through coordination with neighborhoods and existing neighborhood boards for review of zoning, land use actions, sensitive areas, best management practices, and special area plans for drainages.
- Make land use advisory recommendations (zoning, sensitive areas, etc.), including enforcement of ordinances, to all cooperators.
- Make related planning recommendations concerning transportation, utilities, stormwater, water quantity, water quality, recreation, and economic development.
- Develop implementation priorities for the watershed plan based on available funding and water quality data.
- Review results of action item implementation, including habitat restoration.
- Support local advocacy groups for the Chambers-Clover Creek Watershed. A local community organization in the watershed would be charged with promoting and recognizing programs in the watershed aimed at solving or preventing nonpoint pollution problems. The group could survey residents about their activities and knowledge of issues and transmit the results to the agencies or governments which are

implementing action items. They could act as a focal point for citizens to contact for information or for reference to appropriate agencies about a particular nonpoint issue. This should increase citizen awareness and generate support for actions.

- **BAC** will hold an annual Chambers-Clover Creek Watershed **Community “Town Hall” Meeting** beginning the last week of the month, 12 months after official appointment. The BAC will: review actions taken during the past year, inform others about changes to their programs, exchange information, and gather citizen input on non-point water quality issues related specifically to the Chambers-Clover Creek Watershed.

<b>Lead Implementor:</b>	Pierce County Council
<b>Cooperators:</b>	All local governments and military reservations withing the watershed
<b>Estimated Cost:</b>	\$21,000
<b>Potential Funding Source:</b>	Ecology, Local government
<b>Potential Funding Type:</b>	Grant, general funds
<b>Benefit:</b>	BAC start-up, plan implemented, coordination between jurisdictions
<b>Type of Source Control:</b>	Administrative
<b>Time Frame:</b>	One time
<b>Startup Date:</b>	After local, state plan approved

**IM 2 SUPPORT THE CHAMBERS-CLOVER CREEK BASIN ADVISORY COMMITTEE (BAC)**

Supporting the Basin Advisory Committee (**BAC**) means funding staff and other needs once the Committee is established. During the first year, an annual meeting and one meeting per quarter will be staffed by a planner supported by local government contributions.

Staff will organize meetings of the BAC and advisory committees, publish minutes and agendas, compile and publish findings from long-term monitoring research, pursue grant funding of activities, coordinate activities of lead implementors, perform public outreach, track environmental education efforts, track action plan progress, report to the BAC and Ecology, participate in additional planning efforts occurring within the watershed (including Basin Planning, protecting shellfish beds, and additional Watershed Plans), and field public input related to the Action Plan.

It is possible that a large part of the annual cost will be supported by grants and private donations.

The BAC and staff will implement the Chambers-Clover Creek Watershed Action Plan in coordination with the Comprehensive Plans of local jurisdictions and Ecology.

<b>Lead Implementor:</b>	Pierce County Council
<b>Cooperators:</b>	All local governments and military reservations within the watershed
<b>Estimated Cost:</b>	See IM 1
<b>Potential Funding Source:</b>	Ecology, Local government
<b>Potential Funding Type:</b>	Grant, general funds
<b>Benefit:</b>	Costs are shared, communication between jurisdictions is facilitated, recommendations come from multi-jurisdictional source
<b>Type of Source Control:</b>	Administrative
<b>Time Frame:</b>	One time
<b>Startup Date:</b>	After local, state plan approved IM 2

**IM 3 COORDINATION OF AGENCIES - ELIMINATION OF CONFLICTING POLICIES RELATED TO WATER QUALITY**

The Pierce County Planning and Land Services Department and/or Public Works and Utilities would coordinate an effort to eliminate conflicting development and regulatory policies. The departments would compare existing regulations within Pierce County for consistency, focusing on Land Use Development Regulations, TPCHD Regulations, the Coordinated Water System Plan, the Stormwater Design Manual, and the Pierce County Comprehensive Plan. PALS, TPCHD, and Water Programs Managers would develop a format of review to identify possible conflicts and overlap between municipal, county, state, and federal regulations.

<b>Lead Implementor:</b>	PC Planning and Land Services/Public Works and Utilities
<b>Cooperators:</b>	TPCHD, other affected local governments and agencies
<b>Estimated Cost:</b>	See IM 1
<b>Potential Funding Source:</b>	Ecology, Local government
<b>Potential Funding Type:</b>	Grant, general funds
<b>Benefit:</b>	Reduce regulation and increase efficiency, help implement the Stormwater Design Manual and the Pierce County Comprehensive Plan
<b>Type of Source Control:</b>	Coordination
<b>Time Frame:</b>	One time
<b>Startup Date:</b>	After local, state plan approved

**IM 4 ESTABLISH AN AQUIFER PROTECTION DISTRICT WITHIN THE CHAMBERS-CLOVER CREEK WATERSHED**

Water Programs Division and TPCHD staff would analyze and verify the justification for an Aquifer Protection Area. This work would follow implementation alternatives of the Clover-Chambers Creek Groundwater Management Plan. The purpose of designating a Protection Area would be to increase funding for protection of the aquifer and the regulation of on-site systems. A proposal and brief scope of work would be summarized. Fees would be spent to follow the existing basin protection plan and to monitor and inspect OSSs for compliance with applicable standards. An "Aquifer Protection Area Ordinance" would be prepared by staff for Pierce County Council. If the Council approves, it must be placed on the ballot where both the formation of the district and the assessment of fees must be approved by the voters (under RCW 36.36). Other alternatives including those described in the plan to establish a permanent funding source for ground water protection will be explored during this preparation.

<b>Lead Implementor:</b>	Pierce County Water Programs
<b>Cooperators:</b>	Local governments, Tacoma Public Works
<b>Estimated Cost:</b>	\$250,000
<b>Potential Funding Source:</b>	Pierce County or TPCHD
<b>Potential Funding Type:</b>	General fund, Centennial Clean Water Grant
<b>Benefit:</b>	Permanent, predictable funding for groundwater protection
<b>Type of Source Control:</b>	Funding
<b>Time Frame:</b>	One time
<b>Startup Date:</b>	11/1/96



## **CHAPTER 11: LONG TERM MONITORING**

The intent of this section is to outline a monitoring and measuring program that will determine the effectiveness of this Watershed Action Plan. At stake is the credibility, workability, and public acceptance of the plan. This monitoring program will provide information on trends related to water quality, habitat, biologic, and land use conditions of the Chambers-Clover Creek Watershed. New, corrected or improved data and information will also be gathered and used to update the Plan. The schedule established will insure a timely process for monitoring.

### **WATER QUALITY**

The Chambers-Clover Creek Watershed is comprised of many streams and lakes. There are no major rivers within the boundaries. Because it is very urbanized there has been substantial non-point pollution to the water in years past. There continues to be threats to the beneficial uses of water, and the continued rate of growth simply compounds those threats. Because a sole source aquifer exists, and because so many people in this watershed depend on this aquifer, surface and ground water pollution should be of the utmost concern to the residents of the area.

The (BAC) will monitor surface and ground water sites using Washington State Department of Ecology quality assurance and quality control measures, (QA\QC). The BAC will also work in coordination with Chapter 173-201A WAC, water quality standards, for surface waters of the State of Washington.

### **Sampling Frequency, Duration and Locations**

Long-term surface water sampling will be collected at monthly intervals and during storm events, with no ending date set. Ground water sampling will be taken once a month for 24 months. A monitoring map identifying sampling sites will be created.

### **Analytical Parameters**

Flow rate, temperature, pH, dissolved oxygen (DO), and conductivity will be measured in the field. Both surface water and ground water samples will be analyzed in a laboratory for fecal coliform, total suspended solids (TSS), total petroleum hydrocarbons (TPH), total phosphorus (TP), nitrate and nitrite, hardness, zinc, lead, and copper. Results of the sampling will be presented to the BAC with the appropriate analysis and conclusions. Efforts will be made to coordinate the data collection with established professional procedures.

## **HABITAT CONDITIONS**

Fish and wildlife habitats are fundamental ingredients to a healthy watershed. When streams are shaded, clean and cold, fish generally thrive, prosper, and return year after year. When vegetative cover includes forests of deciduous and evergreen trees standing tall and dense, large and small game usually inhabit the area.

Urban development has historically impacted the minimum area required for a balanced natural habitat. For this reason, the BAC will actively monitor the watershed's remaining natural habitat.

### **Observations, Inventories, and Frequency**

The inventories completed by the Washington Department of Fish and Wildlife (DOFW) for priority species and habitats including riparian habitats of exceptional quality, will be used as a baseline from which we can gauge new trends. The BAC will conduct site visits and stream walks at locations identified on Monitoring Map #2. While on site, habitat will be observed and inventoried. This will be done on a monthly basis. Photographs will be taken from the same location in the same direction at the same time of day so that comparisons can be made from month to month and from year to year. Flora will be inventoried and evaluated for their overall abilities to enhance or protect wetlands, streams, and lakes.

### **Scientific Parameters**

A Botanist, Biologist, Horticulturalist, Urban Forester, and Liminologist will help establish a credible inventory system.

## **BIOLOGICAL CONDITIONS**

Even more indicative of the health of a watershed than water quality is the condition of the natural biological systems within its boundaries. By understanding and monitoring the multitude of living systems, conclusions can be drawn, and appropriate actions recommended. Because many species have declined while others are now extinct, the BAC will expend significant energy to understand the status and the trends likely to influence biological systems in the future.

### **Observations, Inventories, and Sampling**

Observations and inventories of all species within a 500-foot study area from wetlands, streams, and lakes as identified on Monitoring Map #3 will be done on a monthly basis. Biological sampling will include instream macroinvertebrates, and fish counts which will include sizes, health, and numbers of fish. Diseases which may be attributed to or aggravated by nonpoint source pollution will also be identified, when possible, as a result of this research model.

The Timber, Fish, and Wildlife Agreement's Ambient Monitoring Manual and rapid assessment procedures for benthic communities will be used. Additional methods may also be utilized to assess biological conditions and population growth.

Existing dams, weirs, and fish ladders will be inventoried and observed for their impacts on the biologic systems.

Bird counts will also be taken. All species will be identified and recorded. Small and large animals will also be observed, inventoried and recorded.

## **LAND USE PATTERNS**

More than any other threat to the health of a watershed is human activity. The harvesting, reshaping, filling, paving, building, and inhabiting the landscape usually means an altered environment. Continued growth, whether residential, commercial or industrial, impacts nature's balanced systems. The areas with the highest probability to impact water quality would be those areas closest to the water bodies. When professional design standards are maintained, new land uses can be non-degrading to water quality.

Establishing a 1995 inventory and then monitoring all land uses within the watershed will be another objective to the BAC.

## **Observation, Inventory, and Monitoring Techniques**

All existing land use activities within the watershed will be observed by a windshield or walking survey, then inventoried and placed on Monitoring Map #4. Ground photographs will be taken initially in the summer of 1995 in all directions surrounding wetlands, streams, and lakes. These photos will be used in the future to compare patterns of growth. Tracking land use activities with the use of a Geographic Information System would be very useful. Monitoring land use actions such as Zone Changes, Variances, and Conditional Use Permits and other similar requests will take place. The most up-to-date air photos of the entire watershed will be collected. They will be compared to more modern photos taken as the years go by.

## **Professional standards**

Land use planners now employed in the Environmental Services Division will establish the existing land use categories, with assistance from the local jurisdictions within the watershed.

## **ANNUAL REPORT CARD TO CITIZENS OF THE WATERSHED**

The BAC will present a watershed report card at the annual meeting. This report card will also be made available to all media. Categories and grading criteria will be developed by the BAC.

## **THOSE INVOLVED IN MONITORING**

Local groups such as the Clover Creek Council, Project GREEN, Stream Team, and biology, environmental science, and water quality students, along with other volunteers can all contribute to the monitoring and measuring steps outlined above. There will be substantial reliance on the existing programs federal, state, and local agencies have in place.

## ACTION ITEMS

### **MO 1a COORDINATED, CERTIFIED PROGRAM WILL BE ESTABLISHED TO ORGANIZE VOLUNTEERS RESPONSIBLE FOR COLLECTING WATER QUALITY, HABITAT, BIOLOGICAL, AND LAND USE DATA IN THE WATERSHED**

All monitoring issues, as outlined above, will be implemented through this action item.

<b>Lead Implementor:</b>	PC Public Works and Utilities/Watershed Planners and Environmental Educators, Ecology, BAC, volunteers
<b>Cooperators:</b>	All local governments, PCCD, Stream Team
<b>Estimated Cost:</b>	\$20,000
<b>Potential Funding Source:</b>	All local governments
<b>Potential Funding Type:</b>	General funds
<b>Benefit:</b>	Certification for volunteers, monitoring the watershed for overall, long-term water quality improvements
<b>Type of Source Control:</b>	Monitoring the effectiveness of the plan
<b>Time Frame:</b>	Ongoing
<b>Startup Date:</b>	8/1/95

## **MO 2 ESTABLISH A WATER LIBRARY**

Pierce County Public Works and Utilities will establish a site for documents related to water issues. Available publications might include reference materials, Environmental Impact Statements, watershed plans, water supply plans, stormwater plans, basin plans, fisheries and habitat information, water quality sampling reports, and other materials related to nonpoint sources of pollution. Pierce County would serve as the clearinghouse for all water quality data collected within the County or within watersheds which Pierce County shares with other jurisdictions.

<b>Lead Implementor:</b>	PC Environmental Services Division
<b>Cooperators:</b>	Other PC departments, TPCHD, USGS, City of Tacoma, Ecology
<b>Estimated Cost:</b>	\$25,000 operational
<b>Potential Funding Source:</b>	PC Environmental Services Division
<b>Potential Funding Type:</b>	Fees, fees for service
<b>Benefit:</b>	Public health, on-site tracking and nonpoint pollution prevention; general water quality information
<b>Type of Source Control:</b>	Research
<b>Time Frame:</b>	Ongoing
<b>Startup Date:</b>	12/1/95

**MO 3 ESTABLISH AN ELECTRONIC DATA LIBRARY WITH AN INTERNET CONNECTION**

A water quality resource library would be developed for Pierce County and other public agencies. The data library would include OSS and water quality areas of concern. It will be maintained by the Environmental Services Division of Public Works and Utilities, including mapping requirements. Participating agencies will contribute to operating costs.

It will also map water quality data and support use of a Geographic Information System (GIS). This will include a data gathering and data management effort with existing programs. One such program, the United States Geological Survey (USGS), has extensive surface and ground water quality data including spatial data of potential benefit to Pierce County.

If possible, data will be made accessible to Internet users. One component of library development will consider incorporating any wellhead protection elements of the TPCHD databases. This may include mapping septic system failures.

<b>Lead Implementor:</b>	PC Environmental Services Division
<b>Cooperators:</b>	Other PC departments, TPCHD, USGS
<b>Estimated Cost:</b>	\$50,000 operational (startup costs not available)
<b>Potential Funding Source:</b>	PC Environmental Services Division
<b>Potential Funding Type:</b>	Fees, fees for service
<b>Benefit:</b>	Public health, on-site tracking and nonpoint pollution prevention; general water quality information
<b>Type of Source Control:</b>	Research
<b>Time Frame:</b>	Ongoing
<b>Startup Date:</b>	12/1/95



# **A P P E N D I X**

- A. WAC 400-12
- B. Current Water Quality Programs
- C. Chambers-Clover Creek Watershed Matrix
- D. SEPA Decision
- E. Letter of Concurrence form Lead Implementors