Watershed Action Agenda:

Priorities for Focus within the Chambers-Clover Creek Watershed

2007 through 2011

Chambers-Clover Creek Watershed Council

"Communities working together for a healthy watershed"

Prepared with assistance from Pierce County Public Works and Utilities Water Programs

The mission of the Chambers-Clover Creek Watershed Council is to promote the protection and enhancement of the Chambers-Clover Creek Watershed.

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All active members of the CCWC who contributed to this Action Agenda!

Front cover photo: Clover Creek, Lakewood.

For additional information or to request additional copies of this document, please contact Pierce County Public Works and Utilities, Water Programs Division, at (253) 798-2725, or via email at pc-ccwc@co.pierce.wa.us. This Action Agenda is also available on the CCWC website at:
www.co.pierce.wa.us/pc/services/home/environ/water/ps/ccwc/main.htm

July 2007

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Commonly Used Acronyms

BMP	*Best Management Practice*
CCWC	*Chambers-Clover Creek Watershed Council*
CLC	*Cascade Land Conservancy*
DOH	*Washington State Department of Health*
EPA	*U.S. Environmental Protection Agency*
ESA	*Endangered Species Act*
ESC	*Erosion and sediment control*
FTE	*Full-time equivalent*
HB	*Washington State House Bill*
LID	*Low Impact Development*
NPDES	*National Pollution Discharge Elimination System*
O & M	*Operations and maintenance*
OSS	*Onsite septic system*
PALS	*Pierce County Planning and Land Services*
PCD	*Pierce Conservation District*
SRFB	*Salmon Recovery Funding Boards*
SWM	*Pierce County Surface Water Management*
TMDL	*Total Maximum Daily Load*
TPCHD	*Tacoma-Pierce County Health Department*
USGS	*U.S. Geological Survey*
WAC	*Washington Administrative Code*
WDFW	*Washington Department of Fish and Wildlife*
WDOE	*Washington Department of Ecology*
WRIA	*Water Resources Inventory Area*

Introduction to the Watershed

Satellite image of the Chambers-Clover Creek Watershed. Courtesy of William Bowen, http://geogdata.csun.edu, © 2005.

The Chambers-Clover Creek Watershed

is located in central Pierce County, between Puget Sound on the west and Graham on the east. Point Defiance is to the north and Fort Lewis and the City of Dupont are to the south. The watershed totals 149 square miles and includes seven cities, unincorporated Pierce County, three military reservations, and one drainage district. Clover and Chambers Creeks are the major streams with Leach, Flett and Spanaway as tributaries. Streams draining directly to Puget Sound include Puget and Sequalitchew creeks. Major lakes are American, Spanaway, Steilacoom, Gravelly, Wapato, Louise and Waughop lakes.

Over 300,000 people live in the Chambers-Clover Creek Watershed, with 49% of the total area used for residential, commercial, or industrial purposes. However, substantial amounts of forested and natural lands, much of which is federally managed, do currently exist in the watershed, serving important water quality and wildlife habitat functions. Many sensitive species of fish and wildlife depend upon the waters and land of the watershed for essential habitat, including Chinook, coho, and chum salmon, peregrine falcon, western gray squirrel, and bald eagle.

The Chambers-Clover Watershed is impaired and degraded as a result of human activities and urban development. Groundwater levels and stream flows have been decreasing, and the quality of surface and ground waters, as well as lakes and south Puget Sound is degraded. Streams no longer receive sufficient base flow (from groundwater), many wetlands have been drained, filled or become disconnected from groundwater, salmon and wildlife habitat has decreased, and toxic algae blooms are common in all major lakes (except Gravelly Lake).

The Chambers-Clover Creek Watershed has been the focus of watershed planning efforts since 1992, when the Puget Sound Water Quality Authority adopted Chapter 400-12 of the Washington Administrative Code. Known as the “Nonpoint Rule,” WAC 400-12 called for counties throughout the Puget Sound region to convene watershed committees to develop

watershed action plans. The purpose of the watershed plans was to identify sources of nonpoint pollution within the watershed, and recommend actions to reduce and prevent nonpoint pollution in the future. The Chambers-Clover Creek Watershed Action Plan was completed in 1997 and contained 56 actions. The action plan also identified which jurisdictions, state agencies, and other organizations would be responsible for implementation and the estimated costs.

The watershed action planning process was also the genesis of the Chambers-Clover Creek Watershed Council (CCWC). While the primary function of the group is to help facilitate the implementation of the watershed action plans, the members of the CCWC are also dedicated to improving fish habitat and fostering a sense of stewardship among watershed residents. Actions taken by the Council are consistent with their mission, which advocates the protection, restoration and enhancement of the Chambers-Clover Creek Watershed. CCWC members include representatives from local governments, tribes, businesses, elected officials, environmental agencies, non-profit groups, and private citizens. (Please see the appendix of this document for a complete list of CCWC members.)

In addition to the watershed action planning process, the Chambers-Clover Creek Watershed has also been the focus of a number of other major planning efforts. A salmon recovery plan for the watershed (WRIA 12) was completed in 2005 (together with WRIA 10), a requirement of the federal listing of Puget Sound Chinook as threatened under the Endangered Species Act. The Washington State Department of Ecology continues to develop water cleanup plans for impaired water bodies, as well as administer Clean Water Act implementation programs, such as NPDES permitting. Pierce County completed the Clover Creek Basin Plan in 2003, which focuses on water quality, flooding and habitat issues in

The intent of this Action Agenda is to outline the ten actions identified by the Chambers-Clover Creek Watershed Council as deserving the highest priority attention for implementation over the next five years.

It represents the interests of the Council to protect and improve the health of our Watershed.

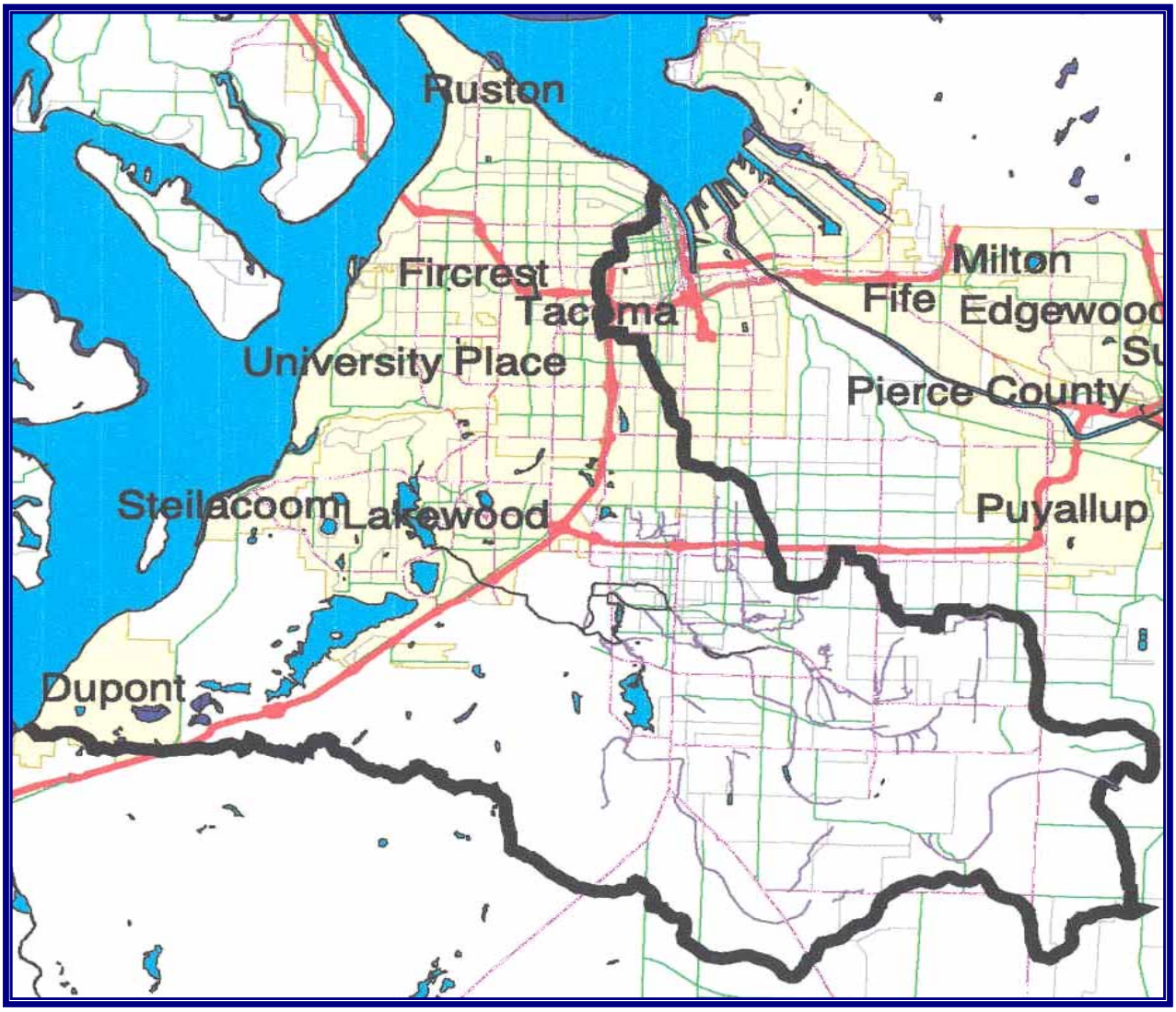
the unincorporated area. Additionally, a comprehensive watershed management plan (also known as a "2514 Plan") for WRIA 12 was completed in 2004. While this plan was not approved by all stakeholders, data collected for the watershed assessment has proven useful for other planning efforts in the watershed.

Throughout these planning efforts, Pierce County Public Works and Utilities, Water Programs Division, has been committed to supporting the CCWC by providing resources and staff support. In 2004, Pierce County conducted an evaluation of the four watershed action plans within its jurisdiction, evaluating the actions contained in the watershed plans and identifying those actions with the greatest potential benefit to water quality. Many of those actions are reflected here.

In order to update the 1997 Action Plan, the Chambers-Clover Creek Watershed Council developed this 5-year Action Agenda to focus and guide its efforts from 2007 through 2011. The intent of this document is to outline the ten actions identified by the CCWC as deserving the highest priority attention for implementation within the Watershed. Topics addressed within these ten priority actions include riparian restoration, stormwater management, on-site septic system maintenance and repair, and public education programs. These actions incorporate elements of the 1997 watershed action plan, Pierce County's 2004 evaluation noted above, and the priorities of the CCWC. Water quality, water quantity and habitat issues are addressed. The Action Agenda also represents the interests of the Chambers-Clover Creek Watershed Council to protect and improve the overall health of our watershed.

Fish ladder on Clover Creek, Lakewood.

The Chambers-Clover Creek Watershed (WRIA 12)



CCWC Watershed Vision, Goals, and Objectives

Leach Creek, downstream of culvert replacement project (see p. 27 photo). Sept 2006.

Protecting the health of the Chambers-Clover Creek Watershed is central to the mission of the Chambers-Clover Creek Watershed Council. CCWC members promote the protection, restoration and enhancement of the watershed, and envision healthy ecosystems and a high quality of life for the people and wildlife living within the watershed boundaries.

CCWC Vision for the Watershed

People can use their water for drinking, swimming, and fishing. Development is done with the least impact on water quality and flows. Rainwater is filtered and returned to the ground or streams similar to natural process. Wetlands, streams, and beaches are protected by natural buffers. Ground and surface waters are not contaminated by human activities. Streams have year-round flows that follow historical patterns. Most historical fish populations are sustained naturally. Citizens understand watershed issues and help keep waters clean and beneficial. Success or failure is measured.

Because maintaining and improving environmental health within a highly urbanized area is complex, the CCWC has identified **six goals** upon which to focus their efforts. These goals address issues of water quality and wildlife habitat, while also encouraging sustainable patterns of land use and development. The following goals were developed by the Watershed Council (please see Appendix A for a detailed list of the corresponding objectives).

CCWC Goals

1) Water will be clean enough and available in sufficient quantity to support beneficial uses and meet or exceed water quality standards for surface and groundwater.

2) The Watershed will support healthy fish and wildlife populations.

3) Land use and development patterns will be coordinated, effective, and sustainable.

4) Quality outdoor recreational opportunities will be available.

5) Human and solid waste, and stormwater runoff will be responsibly managed to avoid contamination of surface and ground water.

6) Watershed residents will be educated about water quality and quantity issues and will take action to protect, restore, and steward the environment.

This Action Agenda was developed to focus the efforts of the Chambers-Clover Creek Watershed Council, and is intended to help ensure that the actions taken by the Council over the next five years move the group closer to achieving their goals. The CCWC will continue to utilize Pierce County Water Programs Division staff support, and will look to other local jurisdictions, organizations, and citizens to increase their participation and support of the Council's efforts. The members of the CCWC recognize that collective action will be most effective and result in a greater collective benefit.

To become involved in the activities of the Chambers-Clover Creek Watershed Council, or for more information, please contact the Pierce County Watershed Coordinator at (253) 798-2725.

The mission of the Chambers-Clover Creek Watershed Council is to promote the protection and enhancement of the Chambers-Clover Creek Watershed.

Priority Action Items 2007-2011

Local cub scouts planting trees along Clover Creek. April 2003.

The Chambers-Clover Creek Watershed Council has identified ten high priority action items upon which to focus in the next five years. These action items are intended to reduce nonpoint source pollution, protect, restore and enhance natural systems and habitat, and increase public awareness of and involvement in watershed activities.

- ***Title***
- ***CCWC Goals* - watershed council goals addressed by the action item**
- ***Action Description* - brief description of the action, including key components**
- ***Benefits* - benefits of action implementation to the health of the watershed**
- ***Implementation* - information on implementing entities and action implementation**
- ***Monitoring and Performance Measures* - means for measuring success**
- ***Cost Implications and Potential Funding Sources* - Preliminary cost information**

The action items which follow are presented in no particular order.

Action Item #1:

Minimize and Manage Runoff from New Development

Drainage bioswale planted with native plant species, High Point Neighborhood, Seattle. Sept 2006.

CCWC Goals Addressed:

1. **Water Quality & Quantity**
2. **Healthy Fish & Wildlife**
3. **Land Use & Development**

Action Description

This action involves two components: (1) supporting and encouraging implementation of **Low Impact Development** programs in Pierce County and watershed cities to minimize the impact of new development on stormwater runoff, flooding and water quality; and (2) supporting and encouraging the implementation of **Erosion and Sediment Control** (ESC) accepted best management practices (BMPs) on new construction to reduce impacts on water quality and sedimentation of spawning habitat.

Low impact development **(**LID**)** is a more environmentally sensitive, and potentially a more cost-effective, approach to developing land, minimizing and managing stormwater runoff. Many jurisdictions are implementing LID techniques to help protect their waters and natural resources, and to comply with state and federal requirements for stormwater management. *This action encourages local jurisdictions to develop and implement LID programs as part of their response to NPDES stormwater requirements and to minimize the adverse impacts from new development.* It could also include a "Built Green" program element. This should also include limiting the loss of forest cover in conversion to urban uses (e.g., forest clearing trading rights for reforestation in other parts of the watershed).

Erosion and sediment control on construction sites is typically required for all new development. Requirements are contained in stormwater management manuals and compliance is overseen by local governments. *This action encourages local government inspection staff and construction contractors to emphasize the importance of erosion and sediment control and final site stabilization during the development phase of projects.* Focus is on implementation of accepted ESC best management practices.

Benefits

The benefits of low impact development include reduced downstream erosion, improved groundwater recharge, reduced wetland,

stream and habitat impacts, and improved site aesthetics. It can also lead to reduced site infrastructure and associated costs, reduced maintenance costs, and enhanced public awareness.

The benefits of better erosion and sediment control include reduced impacts on water quality and habitat, and more workable construction sites. The intent is to prevent the transport of sediment to streams, wetlands, lakes, drainage systems and adjacent properties. Sediment transport can result in major adverse impacts, including flooding due to obstructed drainage systems, smothering of salmon spawning gravels, nutrient enrichment of lakes, and turbid water conditions.

Implementation

The primary implementing entities for this action are the county and cities, Master Builders, architects/designers, and construction contractors (see matrix). This should be implemented where feasible through ordinances, stormwater management manuals, development standards, and permitting requirements. It can also be an important part of stormwater management efforts under the NPDES permit for Phase 1 and 2 jurisdictions. Master Builders and construction contractors also have an important role in implementation. ESC efforts are being implemented by all jurisdictions, but a renewed effort is recommended in 2007-2011 in the Chambers-Clover watershed. Some jurisdictions have initiated LID programs (e.g., Pierce County, Tacoma), but there is potential to substantially increase the number of projects employing LID techniques.

Monitoring and Performance Measures

Monitoring will consist of surveying local jurisdictions to document the number of LID projects implemented in the watershed. ESC requirements for new construction are in place for all jurisdictions, but the extent of implementation varies. A survey of local jurisdictions could be carried out to assess levels of implementation and enforcement. Successful LID pilot projects and model ESC implementation efforts could be recognized. Meadow on the Hylebos is an example of a project that is being monitored for water quality and quantity.

Cost Implications and Possible Funding Sources

The costs to implement this program in the Chambers-Clover watershed vary by jurisdiction and degree of implementation. Pierce County has a half-time LID engineer developing a program and working with developers, design engineers and contractors on LID projects. Smaller jurisdictions could incorporate pilot LID elements into community development, planning or public works departments. ESC requirements are typically included as part of development standards or stormwater management manuals. Implementation and inspection is carried out by developers, contractors, and local government inspection staff.

LID program development is typically funded by Surface Water Management (SWM) utilities and fees from rate payers, and development fees for new development. Typical order of magnitude costs are moderate ($50-100,000 per year for staff), depending on the size of the jurisdiction. The Puget Sound Action Team has worked with local governments in the region to revise their municipal codes and development standards to include LID. Grants are also available to Puget Sound local governments for LID demonstration projects.

Action Item #2:

Maintain and Retrofit Existing Stormwater Facilities

Action Description

In the Chambers-Clover watershed, there has been extensive construction of stormwater management facilities over the past 20 years to minimize the impact of new development on flooding and water quality. Examples of stormwater management facilities include detention and retention ponds, biofiltration swales, and infiltration facilities. Maintenance of these facilities is critical to ensure they continue to perform optimally and provide benefits over their useful life. *Local jurisdictions should have inspection programs for both public and private facilities. Inspection and maintenance of facilities should be adequately funded and carried out according to a regular schedule.*

There are many residential neighborhoods and commercial areas in the Chambers-Clover watershed that were built before water quality or detention requirements were in place. As such, stormwater is discharged directly to receiving waters without treatment. Stormwater retrofitting is the process of upgrading an existing facility so that it is able to function more efficiently or provide benefits that its original technology does not support, or constructing a stormwater system or facility in an already built-up area. Another example is removal of existing pavement and replacement with porous pavement. *During redevelopment, or as pilot and demonstration projects, local jurisdictions should seek opportunities to retrofit stormwater system to reduce runoff from impervious surfaces, recharge groundwater and improve water quality treatment.*

CCWC Goals Addressed:
1. **Water Quality & Quantity**
3. **Land Use & Development**
5. **Human & Solid Waste and Runoff Management**

Stormwater drainage bioswale with level spreader, Frederickson. Jan 2006.

Benefits

Properly maintained stormwater facilities function optimally, help protect water quality and reduce flooding and/or recharge groundwater. This protects downstream creeks, wetlands, and lakes, as well as fish and wildlife. Conversely, poorly maintained facilities can sometimes act as a source of pollutants. Retrofitting of already built-up areas can reduce nutrient, bacteria, metals, and trace organic loadings in stormwater. This improves water quality and can help restore or protect water for uses such as drinking, swimming and fishing.

Implementation

The primary implementing entities for this action are Pierce County, cities, homeowners' associations, and private businesses. Maintenance is typically required by stormwater drainage regulations and carried out by public works departments or private parties. If the project's drainage facilities are not dedicated to, and accepted by, the local jurisdiction, a property owners' association is typically required to carry out maintenance. An operation and maintenance manual, including a maintenance schedule, should be developed for stormwater facilities. Retrofitting of stormwater facilities is not required by any regulation, but should be encouraged to assist in attaining water quality standards, as part of Washington Department of Ecology Water Cleanup (TMDL) plans, NPDES permit programs, or lake management plans. Pierce County is currently designing a retrofit project for a stormwater discharge to Clover Creek at Pacific Avenue South and has applied to WDOE for funding to pursue several retrofits in the Chambers-Clover watershed.

Monitoring and Performance Measures

Monitoring will consist of surveying local jurisdictions to document current levels of stormwater maintenance activities. This includes inspection and maintenance of public facilities, and inspection and follow-up monitoring of private facilities. Frequency of inspection and maintenance activities for different facility types should be documented. Retrofitting efforts by local jurisdictions should be documented. Model maintenance and retrofitting programs should be publicly recognized and promoted.

Cost Implications and Possible Funding Sources

The costs to implement this action in the Chambers-Clover watershed vary by size of jurisdiction and number of facilities to maintain. Most maintenance programs are funded by SWM utility fees. The portion of the annual budget devoted to inspection and maintenance programs depends on its overall importance relative to other priorities (e.g., planning, capital projects, monitoring, and education programs). The percentage of overall budgets devoted to inspection and maintenance may vary from less than 10% to near 50%, depending on the jurisdiction. Typical order of magnitude costs are moderate to high ($50-100,000 for small jurisdictions to hundreds of thousands of dollars for large jurisdictions). The cost of retrofitting programs is highly variable. Retrofit project costs can vary from tens to hundreds of thousand of dollars, depending on the size and type of facility or area treated.

Stormwater filtration vault near Lake Louise, Lakewood. Sept 2006.

Action Item #3:

Restore Streams, Wetlands, and Riparian Areas

Action Description

Many areas along streams, wetlands and lakes have been stripped of shoreline vegetation and in-stream large woody debris. This action item would target particular stream reaches or wetlands for native revegetation efforts during the next five years to enhance habitat, provide shade over the long term, and stabilize streambanks. *This action involves identifying priority stream reaches, selecting sites for restoration, site preparation, planting, and maintenance as needed to control non-native vegetation and ensure plant establishment.*

Benefits

Healthy riparian buffers benefit water quality by controlling erosion and filtering surface water runoff, reducing the amount of sedimentation and nutrients reaching the water body. Native plants along streambanks also provide shade, keep water cool for fish and protect water quality. (High water temperatures can negatively impact the amount of dissolved oxygen in the water body, and may result in the designation of the site, by EPA, as an impaired water body under Section 303(d) of the Clean Water Act.) Vegetated riparian areas are an essential source of habitat for fish and wildlife, not only in upland areas, but also as a source of instream woody debris and habitat features, particularly with respect to juvenile salmon and trout.

Implementation

The primary implementing entities for this action include the CCWC, Pierce County, watershed cities, Stream Team and Pierce Conservation District (PCD), "Friends of" groups, and other nonprofit organizations. These organizations will work in close partnership with local land owners, local jurisdictions, and volunteers. Please see the Implementation Matrix for a complete list of specific implementing entities.

CCWC Goals Addressed:

1. **Water Quality & Quantity**
2. **Healthy Fish & Wildlife**
6. **Public Education**

Convergence of Spanaway and Morey Creeks. June 2004.

Volunteer planting event at Pierce County stormwater pond W-1, Midland. Nov 2003.

Monitoring and Performance Measures

Monitoring of this item will consist of site visits to planted areas over the first 5 years after planting to ensure plant establishment and invasive control. Monitoring should be carried out by the lead organization for the planting project, and carried out in association with local groups as feasible. Percent survival of trees and shrubs after three years should be recorded to help judge success of planting efforts and inform future efforts related to this action.

Cost Implications and Possible Funding Sources

The cost to implement this program in the Chambers-Clover watershed will vary according to the particular scope and constraints of each project. Some costs associated with riparian planting projects, such as the purchase of native plants, may be covered by local jurisdictions or the PCD. It may be necessary to seek additional funding from grant programs such as SRFB or local Community Salmon Funds for large-scale projects. There is also great potential to utilize volunteer resources for implementing this action item. Order of magnitude costs for this type of project are small ($2000-10,000), depending on area planted, site preparation needs and maintenance requirements.

Action Item #4:

Improved Onsite Septic and Wastewater Treatment System Management

Action Description

Much of the rural and low-density urban areas of the Chambers-Clover watershed are served by onsite septic systems (OSS) for wastewater treatment. There are also high densities of OSS along the shorelines of and discharging to American, Spanaway, and Waughop lakes. Older systems, those that are inadequately maintained, those in poor soils or high groundwater conditions are more prone to failure, and can cause surface and/or groundwater contamination. The Tacoma-Pierce County Health Department (TPCHD) regulates septic system designs, installation and maintenance. Homeowners are responsible for the operation and maintenance of their septic systems. *This action focuses on the following elements: (1) maintenance and educational mailings to onsite septic system owners, (2) a sanitary survey of onsite septic system problem areas, (3) educational workshops, and (4) financial assistance programs to help homeowners repair failing septic systems. In addition, it is recommended that areas of high density and failing septic systems near American, Spanaway and Waughop lakes be sewered and treated with conventional wastewater treatment*. This action helps ensure that septic system owners are more educated about their responsibilities, septic system problem areas are identified and addressed, and water quality impacts are minimized.

CCWC Goals Addressed:
1. **Water Quality & Quantity**
5. **Human & Solid Waste and Runoff Management**

Benefits

Properly maintained and operating onsite septic systems treat domestic wastewater and help recharge local groundwater. This action targets a higher level of awareness and maintenance on the part of OSS owners, and the identification of problem areas by local health departments. This should help reduce bacterial and nutrient loadings to creeks and wetlands, and help achieve water quality standards and protect beneficial uses. Discharges from failing OSS or inadequately treated wastewater are contributing to high nutrient loadings to lakes. Sewering of key areas will help reduce nutrient loadings and toxic algae blooms.

Onsite septic system drainfield components for new residential construction.

Implementation

The primary implementing entities for this action are TPCHD, septic system pumping service providers, OSS owners, and the City of Lakewood. The first three elements under this action will be implemented in part by TPCHD to comply with new state requirements. In July 2005, the State Board of Health adopted WAC 246-272A and in March 2006, the legislature enacted HB 1458 to support and enhance local jurisdictions' onsite sewage system management programs. Among changes approved were additional siting and design standards and increased focus on system operation and maintenance. The 12 Puget Sound counties must submit onsite sewage system management plans to the Washington State Department of Health (DOH) by July 2007. Management plan topic areas should include: (a) development and maintenance of an inventory of OSS; (b) identification of sensitive areas, including marine recovery areas; (c) operation, monitoring, and maintenance in sensitive areas and marine recovery areas; (d) educating homeowners on their O&M responsibilities; (e) reminding homeowners to complete O&M; (f) enforcing permitting, O&M and repair requirements in the WAC; (g) describing capacity of local health to implement the plan; and, (h) coordinating the plan with the local planning authority.

The fourth element within this action, financial assistance programs to help homeowners repair failing septic systems, is anticipated to be implemented, at least in part, through a new grant and loan project that has been applied for and offered to TPCHD from the Department of Ecology. The project will provide grant and loan assistance to qualifying low income residents and loan assistance to other qualifying residents to assist in the repair of failing on-site septic systems. This project is designed to compliment the existing low interest loans available through Pierce County Department of Community Services Housing Programs.

Monitoring and Performance Measures

The monitoring needs and performance measures have not yet been fully developed for this action item. Performance measures may include: the number of OSS educational presentations given; the number of OSS educational materials mailed; the number of sanitary surveys of OSS problem areas; and, the number of low interest loans or grants that were given to property owners with a failing system. Performance measures may also include information on the number of OSS inspections performed and the maintenance measures taken. Monitoring could also include monitoring wells strategically placed down gradient of areas having high concentrations of onsite septic systems to test for nitrates, phosphorus, and other contaminants. An action item update every 3-5 years would help gauge the success of this action on improving the proper operation and maintenance of OSS.

Cost Implications and Possible Funding Sources

The costs to implement this action in the Chambers-Clover watershed would largely be borne by the health department and OSS owners. Many of the elements of this action are included in the state requirements that counties must complete in 2007. Staff at TPCHD is working on the management plan. The cost to individual homeowners of more frequent maintenance (usually pumping), every 3-5 years depends on the current level of maintenance, the type of system, and the location of the system. OSS pumping typically costs between $200-500, depending on the size of the tank. Full septic system repair or replacement can cost $5,000-25,000, or more depending on site conditions and design requirements. Sewering of areas currently on septic systems could cost up to $10,000 per residence for hook-up fees.

Action Item #5:

Enhance Understanding of Ground and Surface Water Interactions

Action Description

One of the most pressing problems in the watershed is an adequate supply of water for human use and instream (e.g., fish) uses. The relationship between surface and ground water in WRIA 12 affects many resource issues, including: (1) lake levels, (2) water quality in creeks, wetlands, and lakes, (3) the quantity and duration of low flows in streams that may be either seasonal or perennial. Other important topics to examine include: (1) water rights, changes and transfers, (2) improving water quality through managing water quantity, (3) wetlands hydrologic and subsurface connections, and (4) the merit of altering the permeability of stream bottoms to help maintain summer low flows.

CCWC Goals Addressed:

1. **Water Quality & Quantity**
6. **Public Education**

This action seeks to enhance our understanding of surface and ground water interactions through participation in the US Geological Survey study entitled "Characterization and Numerical Simulation of the Water Resources in the Chambers-Clover Creek Watershed" and through regular updates to the CCWC through the series entitled "Understanding Our Watershed."

CCWC members learning about conditions in Lake Steilacoom. Sept 2006.

Benefits

The geology, glacial history, and the interaction of surface and ground water in the Chambers-Clover watershed is complex. A better understanding of surface flows, sub-surface water bearing layers and the overall water budget will enhance our ability to evaluate alternative water resource management options and strategies (e.g., modifications in groundwater withdrawals, waste water reuse). This type of information will also serve other action items, including onsite septic system management, lakes management, and regional salmon recovery.

Implementation

The key element of this action will be implemented by the USGS, PCD, Pierce County, water purveyors, Department of Ecology, TPCHD, and the City of Tacoma. The study will consist of data collection, development of conceptual and numerical models, simulation of management alternatives and reporting. A watershed conference is planned for fall 2007 focused on the state of our understanding with respect to surface and groundwater interactions in the watershed, as well as other topics.

The "Understanding Our Watershed" series has been largely carried out by the CCWC Director of Research.

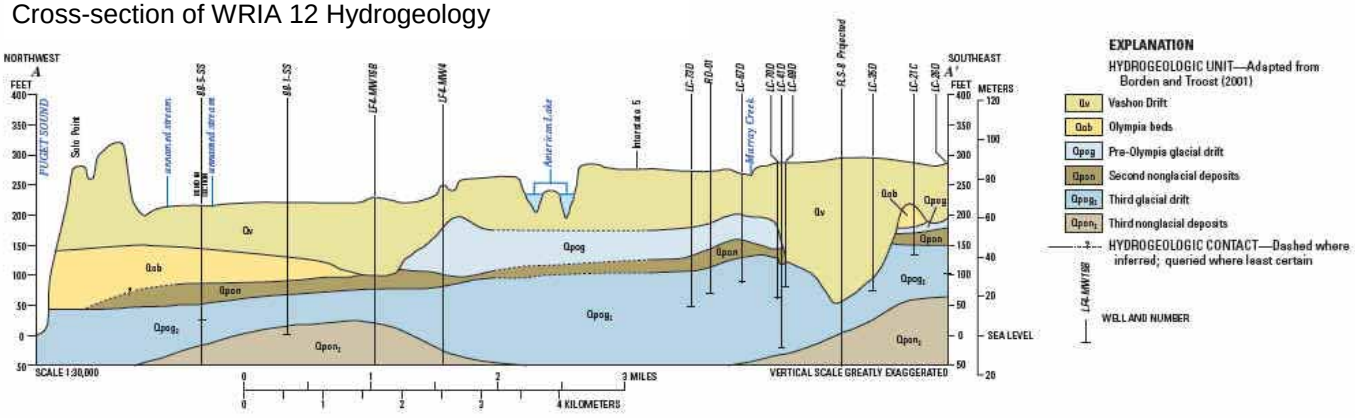
Monitoring and Performance Measures

Data collection and monitoring for this action includes stream gauging, water level monitoring of wells and geophysical surveys both by USGS and local participants or sponsors. This includes both historical and newly-collected data from ongoing monitoring programs.

Cost Implications and Possible Funding Sources

The USGS study is estimated to cost $820,000 over five years, with half of the cost being covered by the USGS and the other half provided by local sponsors. There will also be some additional costs for in-kind services provided by project participants.

Cross-section of WRIA 12 Hydrogeology



Action Item #6:

Review Existing Regulations and Monitor Enforcement

DO NOT REMOVE THIS NOTICE UNDER PENALTY OF LAW

STOP WORK ORDER

CITY OF LAKEWOOD, WASHINGTON
6000 MAIN STREET SW
LAKEWOOD, WASHINGTON 98499
253-512-2261 EXT-138

ALL PERSONS ARE HEREBY ORDERED TO STOP WORK AT ONCE DUE TO EITHER BEING DONE CONTRARY TO THE PROVISIONS OF THE UNIFORM BUILDING CODE OR OTHER PERTINENT LAWS AND ORDINANCES IMPLEMENTED THROUGH THE ADOPTION OF THE UNIFORM BUILDING CODE. FINES IN THE AMOUNT NOT TO EXCEED $250.00 PER DAY FOR EACH DAY THE INFRACTION EXISTS MAY BE IMPOSED ON THOSE WHO FAIL TO RESPOND TO THIS ORDER.

ADDRESS OF PREMISES POSTED: _____
CODE AND SECTION VIOLATION: _____
DATE: _____ TIME: _____

THE FOLLOWING ITEMS SHALL BE ADDRESSED PRIOR TO ANY FURTHER WORK ON THIS PROJECT OR CODE ENFORCEMENT VIOLATION:

- BUILDING PERMIT APPLICATION
- ZONING CLEARANCE
- LAND CLEARING PERMIT
- SIGN PERMIT
- LAND USE APPROVALS
- PLANS REQUIRED
- PLUMBING PERMIT REQUIRED
- MECHANICAL PERMIT REQUIRED
- RIGHT OF WAY PERMIT REQUIRED

COMMENTS: _____

BUILDING OFFICIAL: _____

CODE ENFORCEMENT OFFICIAL: _____

Example of a stop work order used by local jurisdictions.

CCWC Goals Addressed:

1. Water Quality & Quantity
2. Healthy Fish & Wildlife
3. Land Use & Development
6. Public Education

Action Description

Local governments have regulations to address water resources in the watershed (e.g., critical areas ordinances, stormwater regulations), but lack of enforcement causes potentially significant impacts on fish, water quality and quantity downstream. The filling of wetlands or floodplains without a permit, lack of erosion and sediment control on construction sites, and tree cutting in riparian areas and other topics directly affect downstream water quality and quantity. *This action would involve watershed council review of these regulations, enforcement issues, and recommendations for implementation in Pierce County and watershed cities.* This action could also involve monitoring citizen reports and complaints from each jurisdiction and tracking the actions taken by enforcement staff to correct confirmed violations of enacted codes.

Benefits

Many regulations exist governing the development process and permitted activities in and around critical areas. If these regulations and requirements are followed and enforced, they can go a considerable way in protecting natural resources and overall watershed health. This protects water quality, quantity and fish and wildlife habitat. High-quality, functioning aquatic and terrestrial habitats help support the overall food chain (including predator-prey relationships), nutrient cycling and species diversity.

Implementation

This action will be implemented by the CCWC, Pierce County and watershed cities. The CCWC has begun to learn about wetland regulations in the watershed, with examples from Pierce County and the City of Lakewood in spring 2006. In 2006, the CCWC is collecting information about the protection of critical area resources in Pierce County through meetings with officials at the Department of Planning and Land Services (PALS). The focus is on activities occurring over the past 24

months, including hearing examiner requirements, violations, management reports, and follow-up. An analysis of how other counties such as Thurston or King counties address enforcement of critical area regulations will also be included as part of this effort. Draft and final reports and recommendations will be discussed with the director of PALS and be provided to the Pierce County Executive. Similar reviews could be done for other local jurisdictions in the watershed, and for other topics (e.g., erosion and sediment control on construction sites).

Monitoring and Performance Measures

Monitoring for this action involves review of key critical area regulations at Pierce County and watershed cities. Specific review will include how local jurisdictions follow up on violations and enforcement of existing regulations. Monitoring for this action involves reviewing existing records on hearing examiner conditions, violations of critical area regulations, and follow-up over the past 24 months. The monitoring could also include a comparison of implementation efforts for different jurisdictions in the watershed.

Finally, for specific violations, specific monitoring could include photo documentation, notification of responsible agencies, and follow-up with action taken. Violations and enforcement could be publicized.

Cost Implications and Possible Funding Sources

The initial implementation of this action is being carried out by volunteer efforts of CCWC members. The implementation costs for potential changes to programs or enforcement levels (e.g., staff) will depend on the findings of the review of existing regulations and their enforcement. Additional FTEs for enforcement staff at Pierce County or watershed cities would cost between $50-80,000, depending on the jurisdiction and level of staffing. Costs could be covered by development fees, general funds, and utility fees. Fines for violations could also contribute funding to cover some costs.

Illegal tree-cutting in the riparian buffer zone along Clover Creek. April 2006.

Action Item #7:

Restore Beneficial Uses of Lakes

Toxic algae bloom in Waughop Lake, Lakewood. Sept 2006.

CCWC Goals Addressed:

1. **Water Quality & Quantity**
2. **Healthy Fish & Wildlife**
4. **Outdoor Recreation**

Action Description

Water quality and surface water levels in the lakes of WRIA 12 are a topic of great interest. Concerns include dropping lake water levels, nutrient enrichment of lakes, the occurrence of toxic algae blooms, and lakeside and watershed development. There are three large lakes (American, Steilacoom, and Spanaway) and numerous small lakes in the watershed that have been affected. *This action could focus on (1) shoreline and watershed regulations governing development and stormwater management in various jurisdictions, (2) lakes management including runoff or in-lake treatment options, (3) the possible formation of lake management districts to address a variety of lake management issues, and (4) funding of expanded lake monitoring efforts.*

Benefits

Lakes provide important habitat for fish and wildlife, as well as recreational and aesthetic opportunities for people. Good quality water, as measured by phosphorus and chlorophyll a concentrations and lake clarity (e.g., measured using a secchi disk), helps ensure that the beneficial uses of lakes are protected. Shoreline, watershed and stormwater management actions designed to protect inflow (surface and ground water) water quality and limit increases in external nutrient loadings can protect lake water quality. For some lakes, management of internal nutrient loadings may also be necessary.

Implementation

The primary implementing entities for this action include cities, Pierce County, Pierce Conservation District and lake improvement clubs. Local cities, Pierce County, and private landowners manage stormwater runoff from developed areas draining to lakes. Septic system owners are responsible for maintaining onsite septic systems in residential areas not served by sewers. Lake improvement clubs (e.g., Lake Steilacoom Improvement Club) provide for various levels of lakes management, including aquatic weed management or in-lake treatment. The Washington State Department

of Ecology has an algae management program and provides grant funds for lakes management planning and aquatic weeds management. The Tacoma-Pierce County Health Department is responsible for monitoring toxic algae blooms and bacterial levels to ensure that swimming areas are safe for public use. TPCHD also posts closure notices when necessary to protect public health. In 2007, Pierce County Water Programs is initiating an assessment of the fiscal ramifications of establishing a "lakes management" program focused on water quality protection in the Water Programs Division.

Monitoring and Performance Measures

Monitoring of lakes in WRIA 12 is variable. The Pierce Conservation District coordinates a citizen monitoring program and does some water quality monitoring. The water quality of some tributaries is monitored by Pierce County. In-lake monitoring is carried out by lake improvement clubs, TPCHD, and other agencies on occasion. There is no comprehensive water quality monitoring program of lakes. Lake water levels are monitored by citizens. The Pierce Conservation District's monitoring program could be expanded to include the volunteer monitoring of all lakes in WRIA 12.

Cost Implications and Possible Funding Sources

Lake management plans were funded by Centennial Clean Water Fund grants from the Department of Ecology for American Lake and Lake Steilacoom. These plans typically cost $150,000-200,000. Implementation of some stormwater management actions has occurred in these lake watersheds. The City of Lakewood has provided funding support to the Lake Steilacoom improvement club to test "Solarbees" in 2006-7. Limited funding is available from the Department of Ecology for grants focused on freshwater aquatic plant projects. In 2007, Pierce County will be assessing the fiscal ramifications of establishing a "lakes management" program in the Water Programs Division. The analysis will evaluate what a program might look like under different levels of efforts, degree and timing of implementation, and discrete objectives (e.g., water quality, toxic algae management).

Toxic algae bloom due to eutrophic conditions in Lake Steilacoom. Sept 2006.

Action Item #8:

Promote Education, Outreach, and Public Involvement

Action Description

This action involves five components: (1) providing a monthly meeting for discussion of important watershed topics; (2) sponsoring tours of the watershed; (3) maintaining a CCWC website; (4) publishing an annual or bi-annual report; (5) providing public input to local governments in the implementation of their projects; and (6) involving students in hands-on activities and learning opportunities in the watershed. Also included in this item are any advertisement or publicity activities associated with the promotion of the above six components. Working with local jurisdictions, non-profit organizations (e.g., Puget Creek Restoration Society, Citizens for a Healthy Bay, Trout Unlimited) and adjacent watershed councils (e.g., Puyallup, Nisqually) to leverage efforts is desirable. Focus should be on educating citizens, elected officials, water purveyors and resource agency staff regarding the state of the watershed and what can be done to restore natural functions.

Benefits

Focused education and outreach efforts will increase public awareness of watershed issues. The intent of this item is to engage Chambers-Clover watershed residents in connecting human action to watershed health. By encouraging and facilitating changes in behavior over time, a strong public outreach program would minimize the impacts of everyday human activities on water quality, water quantity, and fish and wildlife habitat.

CCWC Goals Addressed:
6. Public Education
All CCWC Goals

Implementation

The primary implementing entities for this action include the CCWC, Pierce County, watershed cities, PCD, non-profit groups, and the Washington Department of Ecology. Outreach activities associated with this action item could also be done in conjunction with local schools. Please see the Implementation Matrix for a complete list of specific implementing entities.

CCWC booth at NatureFest, Lakewood. Oct 2004.

CCWC Chair Al Schmauder talks to kids about the life cycle of Chinook salmon at NatureFest, Lakewood. Oct 2006.

Monitoring and Performance Measures

Monitoring of this item will consist of assessing whether functions associated with this action item are well attended and received by members of the public. Monitoring will be the responsibility of the CCWC, will be conducted on an ongoing basis, and will shape future efforts connected to this task. A successful education and outreach program will be reflected by increased public attendance at monthly meetings and other watershed events (e.g., watershed conference).

Cost Implications and Possible Funding Sources

The cost to implement this education and outreach action (program) in the Chambers-Clover watershed is likely to be covered by the implementing entities noted above and volunteer efforts of CCWC members. A total of approximately 0.5 – 0.7 FTE of paid staff and volunteer effort is estimated to be expended on this action. Additional resources would allow the program to be expanded to reach more people, or increase the number of products or outputs. Additionally, there is great potential to utilize volunteer resources for implementing this action item. Current level of effort is small to moderate cost compared to other actions.

Action Item #9:

Support Local and Regional Salmon Recovery Efforts in WRIA 12

Coho salmon spawning in Clover Creek. Fall 1997.

CCWC Goals Addressed:

2. **Healthy Fish & Wildlife**
6. **Public Education**

Action Description

WRIA 12 is home to Chinook, coho, and chum salmon, as well as steelhead and cutthroat trout. (Historically, sockeye were also present in the watershed). Both Chinook and steelhead salmon are listed as Threatened under the Endangered Species Act. Although they were known to spawn in Chambers Creek in the past, Chinook salmon are currently collected at the WDFW hatchery at Chambers Bay and do not spawn naturally in WRIA 12. As such, the primary habitat focus is on juvenile rearing in the marine nearshore. There are a number of projects in the marine nearshore that could bring funding and support to the watershed, and increase citizen participation in the CCWC. *This action could involve a number of components, including: (1) supporting applications for Salmon Recovery Funding Board (SRFB) funding in the marine nearshore of WRIA 12; (2) working with estuarine issues near the mouths of key tributaries (Chambers Creek, Puget Creek, Sequalichew Creek, and Titlow Beach pocket estuary); (3) educational workshops focused on marine shoreline landowners; (4) freshwater efforts that focus on fish passage and habitat enhancement to support coho, steelhead, and native cutthroat trout; and (5) restoring a naturally spawning Chinook run in Chambers Creek.*

Benefits

Salmon are a key indicator species, reflecting the general health of our watershed. Actions taken to improve conditions for salmon will also benefit people and other species of wildlife, as water quality is improved and habitat is protected. Salmon are also an important cultural icon, both within WRIA 12 and throughout the Pacific Northwest. Increased focus on salmon recovery efforts will improve visibility of watershed issues and increase public participation in CCWC activities, as well as benefit fish.

Implementation

The primary implementing entities for this action include Pierce County, WDFW, cities, PCD, “Friends of” groups, and other non profit organizations. Organizations such as CLC, PCD, and Pierce County have historically

acted as project sponsors for the SRFB process, with applications being submitted through the Pierce County (WRIA 10/12) Lead Entity. Educational workshops (as outlined above) could be coordinated and presented by the CCWC. Please see the Implementation Matrix for a complete list of specific implementing entities.

Monitoring and Performance Measures

WDFW and the Puyallup Tribe are the primary entities involved in monitoring of fish abundance and timing in the watershed. This includes both adult returns and juvenile fish rearing. WDFW captures all Chinook salmon at the Chambers Bay fish trap for its hatchery programs. The tribe has monitored juvenile presence in the estuary during some years. Other entities, including South Puget Salmon Salmon Enhancement Group (SPSSEG) and Pierce County, carry out habitat project monitoring. An assessment of the WRIA 12 shoreline south of Point Defiance is being done by SPSSEG in 2006-7 to identify priority projects for restoration.

Cost Implications and Possible Funding Sources

The cost to implement salmon recovery efforts in the Chambers-Clover watershed depends on the type of project (preservation, restoration) or activity. Pierce County supports the lead entity efforts and Salmon Recovery Funding Board (SRFB) process through a state grant. Funding for protection or restoration projects comes from SRFB, the Community Salmon Fund, local jurisdictions, resource agencies, tribes and non-profit organizations. Educational workshops should be coordinated with the overall education effort.

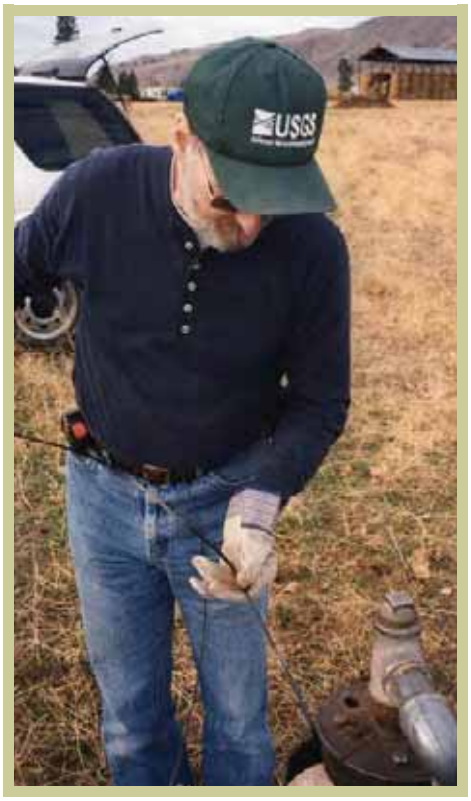
SRFB-funded box culvert installation to improve fish passage in Leach Creek, under Bridgeport Way SW, University Place. July 2005.

Action Item #10:

Monitor the Watershed and Report Results

Action Description

A variety of monitoring is occurring in the watershed to measure various indicators and environmental conditions. A "State of the Watershed" assessment is proposed as a way to compile information on key indicators to measure change or trends over time. Monitoring could focus on specific environmental indicators such as water quality, streamflow, groundwater levels, macro-invertebrate diversity, and salmonid abundance or productivity. A watershed assessment could be completed on an annual or bi-annual basis in association with the report on activities and accomplishments of the CCWC and members.



USGS employee monitoring groundwater quality.

CCWC Goals Addressed:
All CCWC Goals

This action would select and track these watershed indicators over the 5-year timeframe of this Action Agenda to measure the "State of the Watershed" and monitor trends and conditions that influence watershed health.

Benefits

Monitoring of water quality, aquatic biota, and habitat will help us measure the success of implementation efforts over time by establishing baseline conditions, detecting problems, or tracking trends. By tracking watershed indicators, CCWC and other actions can be assessed for effectiveness and benefits, and revised as needed to achieve targets or outcomes. A healthy watershed will also protect human health by providing clean drinking water and supporting safe recreational opportunities.

Implementation

It is expected that data and information to be included in the "State of the Watershed" assessment will be collected by others. B-IBI data are being collected by Pierce County, salmon data are being collected by the tribes and WDFW, and water quality data are being collected by the tribes, Pierce County, Pierce Conservation District and the Department of Ecology. Water quantity data are currently being collected by USGS and Pierce County. Pacific Lutheran University also collects data

Aquatic insect (B-IBI) sampling in Chambers Creek, Lakewood. Sept 2003.

and reports on watershed indicators annually. A variety of marine nearshore and creek water quality and habitat data are currently being collected by the Puget Creek Restoration Society. The watershed assessment will be completed by the CCWC, with assistance from committees and interested partners. Please see the Implementation Matrix for a complete list of specific implementing entities.

Monitoring and Performance Measures

As noted above, monitoring is expected to be carried out by multiple parties and compiled for the assessment by the CCWC. The intent is to complete annual or bi-annual "State of the Watershed" assessments that are understandable by the public. A key measure of success will be public education and better understanding of watershed trends.

Cost Implications and Possible Funding Sources

The cost to implement this action is likely to be minimal, as the cost of data collection related to the indicators is currently covered by many implementing entities. There may be small costs associated with printing and distributing of annual or bi-annual assessments to the broader public.

Appendix A
CCWC Goals & Objectives

Please note: These goals and objectives provide a framework to guide the actions. More detail on these goals and objectives will be defined in annual workplans and for specific projects.

1) Water will be clean enough and available in sufficient quantity to support beneficial uses and meet or exceed water quality standards for surface and groundwater.

a) Surface water quality will meet or exceed Washington State Water Quality Standards (WAC 173-201a as amended).
b) Macroinvertebrate sampling will show greater diversity.
c) Drinking water will require minimal treatment for safe consumption by humans.
d) Groundwater will meet or exceed Washington State Water Quality Standards (WAC 173-200).
e) Reduce the number of impaired 303(d) listed water bodies.
f) Groundwater recharge will approach natural rates.
g) Storm events will result in lower and longer peak flows in local streams.
h) Maintain or reduce amount of impervious land cover.
i) Preserve acreage of undeveloped floodplains.

2) The Watershed will support healthy fish and wildlife populations.

a) Maintain or increase the diversity of native fish, wildlife, and bird species found in the Watershed.
b) Reduce the number of species listed as threatened or endangered under the Endangered Species Act.
c) Increase the number of stream miles available for wild, native fish populations.
d) Increase the amount of acreage identified as available habitat for wildlife.
e) Increase diversity of instream habitat available.

3) Land use and development patterns will be coordinated, effective, and sustainable.

a) Riparian and wetland buffers will be adequate to protect beneficial uses.
b) Foster a high rate of compliance with county and local city Comprehensive Plans, Development Regulations, and Critical Areas Ordinances.
c) Foster a high rate of consistency and coordination between agencies and jurisdictions.
d) Sustain and increase the amount of connected native vegetation corridors throughout the Watershed.

4) Quality outdoor recreational opportunities will be available.

a) There will be a healthy and stable sport fishing industry.
b) There will be a healthy and stable outdoor recreation industry.
c) Increase the quantity and connectedness of improved trails.

5) Human and solid waste, and stormwater runoff will be responsibly managed to avoid contamination of surface and ground water.

a) All sewage systems will provide optimal treatment quality by using state-of-the-art technology.
b) Sewer areas of high density and failing septic systems near American, Spanaway, and Waughop lakes.
c) Reduce inflow and infiltration (I/I) in municipal wastewater collection systems.
d) Decrease rate of on-site sewage system failures.
e) Reduce illegal dumping incidents.
f) Increase rate of recycling by Watershed residents through creating more opportunities for recycling a wider variety of wastes.

6) Watershed residents will be educated about water quality and quantity issues and will take action to protect, restore, and steward the environment.

a) Increase participation by Watershed residents in Stream Team and/or habitat restoration events.
b) Increase participation in programs like the Backyard Wildlife Sanctuary Program.
c) Encourage shift in local sales away from hazardous household and garden products in favor of environmentally friendly alternatives.
d) Cultivate relationships with the local media through issuing press releases and increasing general visibility of watershed issues.
e) Provide opportunities for elected officials to become more knowledgeable about watershed issues

Appendix B
Implementation Matrix & CCWC Members

Implementing Entity and Corresponding Areas of Jurisdiction	#1: New Development/LID	#2: Stormwater Mgmt.	#3: Riparian Planting	#4: Onsite Septic Mgt.	#5: GW/SW Interaction	#6: Enforce Existing Regulations	#7: Lakes/Shoreline Mgmt.	#8: Education/Outreach	#9: Regional Salmon Recovery	#10: Monitoring/Reporting
Chambers-Clover Creek Watershed Council			X		X	X		X	X	X
Pierce County Water Programs	X	X	X		X	X	X	X	X	X
Pierce Conservation District			X		X		X	X	X	X
Puyallup Tribe			X		X			X	X	X
Tacoma-Pierce Co. Health Department				X	X		X	X		X
City of Tacoma	X	X	X			X	X	X	X	X
City of Lakewood	X	X	X			X	X			
City of University Place	X	X	X			X				
City of Dupont	X	X	X			X				
Town of Fircrest	X	X	X			X				
Town of Ruston	X	X	X			X				
Town of Steilacoom	X	X	X			X				
Fort Lewis	X	X	X							
McChord Air Force Base	X	X								
Washington Dept. of Ecology	X	X				X	X	X		X
Washington Dept. of Fish and Wildlife						X		X	X	X
Washington Dept. of Transportation	X	X				X				
Puget Sound Action Team	X							X		
U.S. Geological Survey					X					X
Master Builders Association	X									
Water purveyors			X	X	X					X

Implementing Entity and Corresponding Areas of Jurisdiction	#1: New Development/LID	#2: Stormwater Mgmt.	#3: Riparian Planting	#4: Onsite Septic Mgt.	#5: GW/SW Interaction	#6: Enforce Existing Regulations	#7: Lakes/Shoreline Mgmt.	#8: Education/Outreach	#9: Regional Salmon Recovery	#10: Monitoring/Reporting
Drainage districts		X	X					X		
Puget Creek Restoration Society			X					X	X	X
Leach Creek Watershed Stewards			X							
Clover Creek Council			X						X	X
Citizens for a Healthy Bay			X							X
Cascade Land Conservancy			X						X	
South Puget Sound Salmon Enhancement Gp.			X				X		X	X
Pacific Lutheran University			X					X		X
Schools, churches, scouts, others			X					X		
Metro Parks Tacoma			X				X	X		

Chambers-Clover Creek Watershed Council
Pierce County Public Works and Utilities
Water Programs Division
July 2007