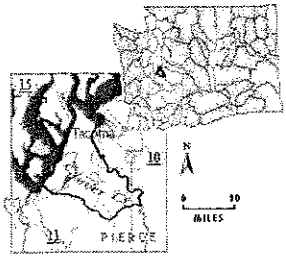
Chambers-Clover Watershed Management Plan

Final Draft

June 8, 2004



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III. Recommendations

A. Recommendations by Functional Categories

B. WRIA 12 Sub-Basin Action Plans

C. Technical Memorandum Recommendations

D. Interrelationships

E. Recommendations and Action Items Not Going Forward

III. Recommendations

This chapter presents the Planning Unit's recommendations in the following order.

- From a functional perspective;
- From active sub-basin planning processes for Clover Creek, Murray Creek, Sequalitchew Creek and Puget Creek; included are recommendations that are consistent with recommendations for the watershed as a whole; and
- From the consultant team's Technical Memorandum.

This chapter also addresses the interrelationships among the recommendations in the plan as well as the interrelationship of plan recommendations with other planning processes. Please see Chapter IV, Table 1 that indicates the priority rank of the recommendations, a draft schedule and a list of possible implementation entities. A placeholder for costs is included in the table to be completed during Phase 4, Implementation.

This chapter concludes with recommendations the group considered, but could not reach agreement on, to document their existence. The group specified that it would not address this category of recommendations in Phase 4.

A. Recommendations by Functional Categories

The Planning Unit elected to present its high priority recommendations in terms of functional categories that are specific to the needs and approaches identified for the Chambers-Clover Watershed. This approach enabled the group to evaluate and prioritize among the recommendations and to begin the process of reaching agreement on implementation issues, including which entities would undertake to implement the recommendations. It was assumed that much of the work related to implementation would be undertaken in Phase 4, after plan approval.

The following functional categories were used to present the recommendations:

- Streamflow and Groundwater
- Water Rights and Water Use Investigation
- Water Use Toolbox
- Water Quality
- Habitat
- Development Process
- Monitoring
- Education and Information
- Implementation

(See Appendix M for cross-references of the Planning Unit's priority issues and functional categories.)

Streamflow and Groundwater

Currently, the Chambers-Clover Watershed is closed to new surface water and groundwater appropriations in situations where groundwater is connected to surface waters. The watershed is closed to new surface water appropriations, in simplistic terms, due to seasonal lack of streamflow in streams throughout the watershed. This lack of streamflow is one of the primary water resource concerns facing the watershed, and finding a workable solution to the situation is crucial in order to have adequate water supplies for fish and people.

It is generally agreed that hydraulic continuity between surface and groundwater, especially with the shallow aquifer, is fairly high throughout most of the watershed. Where this occurs, the Planning Unit is in agreement that new water rights should not be granted from these sources.

The Planning Unit recommends that streams be restored to naturally functioning systems. Only a limited number of options exist for accomplishing restoration. One action proposed in this plan is the use of mitigation measures required with a new groundwater right (Recommendation 10). It is envisioned that a new groundwater right approved within the watershed would use deep aquifers that would have minimal or no negative impact on surface hydrology, and any impact would be mitigated. Also, a portion of the deep aquifer water would be used to augment streamflow as a condition of approval. In general, deeper aquifer withdrawals have much less impact than surface or shallow aquifer withdrawals. Additionally, the timing of deep aquifer impacts is typically quite different than withdrawals from surface or shallow aquifer sources. The Planning Unit recognizes that further study will be needed to determine the availability of deep aquifer sources, the timing and impacts on surface hydrology, and appropriate mitigation measures. (See Recommendation 13.)

The recommendations in the Streamflow and Groundwater Functional Category aim to restore streams to healthy, naturally-functioning systems with adequate flow. In order to accomplish this task, a coordinated vision for watershed streams first needs to be developed, including agreement on which stream segments to focus and how to factor in the historical conditions of the chosen streams. The study previously outlined in the Planning Unit's storage grant proposal (Appendix N) should be carried out in order to gain a better understanding of the causes of, and potential fixes to, the watershed's low flow conditions. After study and agreement on a scope of work for implementation, the plan envisions moving forward with agreed upon measures.

Partnerships with existing water right holders, water right applicants and others will be needed to reach the goal of healthy, naturally functioning systems with adequate flows. Further, it is envisioned that the implementing body will serve as a forum to form these partnerships. Phase 4 – Implementation should provide additional insight and direction on the formation of partnerships. This may require innovative approaches.

Following are the six recommendations related to streamflow and groundwater:

Recommendation 1: The Planning Unit recommends developing alternative visions for streams in WRIA 12 where loss of flow has been identified as a problem. (*high priority*)

Many individuals, government agencies and volunteer organizations have worked hard to restore streams in the watershed. However, a "vision" or goal has not been established. The steps outlined below will assist with formulating the vision.

Action Item 1a: Identify and reach consensus on which stream/stream segments will be addressed.

Because there is some confusion on existing stream segments, early identification of the segments will greatly assist future steps.

Dry creek bed near Tule Lake Road *photo courtesy of Jill Whitman*

Action Item 1b: Clarify how to use history of the streams – is historical condition the baseline?

The historical conditions of the watershed streams should be further researched, documented and evaluated. This information should be used with knowledge of current conditions to formulate policy and direct future efforts to manage the resources of the watershed.

Consensus has not been reached on the historical conditions of parts of the watershed. For example, some have said the natural streambed seal of Clover Creek has been broken, allowing portions of the creek to disappear in late summer, while others believe that this is a natural occurrence. Another viewpoint is that this is a seasonal disconnection of the streambed from its sustaining groundwater source because of overharvesting of groundwater from the shallow aquifer and aquifers in continuity therewith during the dry season. The Planning Unit recognizes that there are various accounts about the condition of the creeks in historic times, and extensive discussion about this issue continues.

Action Item 1c: Conduct the study outlined in the storage grant scope of work for generating data and evaluating methods for improving streamflow. (See Appendix N: Scope of Work for storage grant related to streamflow.)

The storage grant scope provides a good starting point for evaluating the means to improve streamflow.

Action Item 1d: Establish a goal for low flows (does not mean setting minimum instream flows).

Establishing a goal for low flows in streams where loss of flow is a problem will enable people to evaluate the progress and effectiveness of flow restoration activities. Several approaches are possible, and all would satisfy the need to measure progress:

- Determine flows needed for base flows through scientific study. Meeting the needs of fish and wildlife would be the priority in determining these base flows.
- Set a minimum target flow of 1 cfs as a low flow for Clover Creek. This would be a somewhat arbitrary flow target, but would provide a numerical, quantifiable goal.

- Set a goal of simply increasing streamflow during low flow periods. This approach would follow the "more flow is better" philosophy, but would not provide a straightforward measurement standard against which to measure success of restoration efforts. However it does eliminate the challenge of obtaining agreement of a numerical flow standard.

Action Item 1e: Develop and document the desired vision for creeks that have experienced loss of flow.
The end product should be visual, similar to architectural plans or models, so that people can see the anticipated end result for this work. It should also have numerical standards and criteria, such as flows, fish and wildlife use, riparian cover, etc.

Action Item 1f: Establish parameters and priorities for streamflow restoration projects.
All streamflow restoration projects should contribute to the vision. Of particular note: projects that integrate restoration/enhancement of stream conditions beyond simple flow restoration are preferred (such as riparian conditions, substrate, etc.).

Recommendation 2: Restore/augment low flows to streams that have experienced loss of flow. (*high priority*)
The Planning Unit has identified numerous potential actions that could help restore flows during low flow periods. Recommendations in the Water Use Toolbox category, especially Recommendation 10 will also help restore flows.

The possible approaches listed below could be undertaken after conducting the study identified in Action Item 1c (scope of work for storage grant related to streamflow). These actions could be undertaken individually or as a group. Some would require significant evaluation to determine the nature and magnitude of potential secondary impacts. All will help restore flows.

Possible Approach 2a: Reuse, recycle, and conserve water to minimize environmental impacts.
Water conservation, reuse and recycling will contribute to base flow restoration through the "tread lightly" philosophy. The implementing body should develop options to provide jurisdictions with further techniques for water reuse, recycling, and conservation. Examples of these options may include: development of landscape regulations requiring native vegetation; elimination of requirements for landscape berms; and, when irrigation is required, allowing only temporary drip irrigation until the vegetation is established.

Possible Approach 2b: Encourage action such as infiltration of stormwater and low-impact development, which recharge the surface aquifer with clean water.
Each jurisdiction should adopt measures ensuring no net loss of recharge and minimal impact to hydrologic functions. Jurisdictions within the watershed should work with the implementation body to: 1) discuss existing and proposed changes to critical area and stormwater regulations; 2) identify regulations that provide the greatest level of aquifer recharge; and, 3) strive for consistent regulations throughout the watershed.
Note: This action item relates to Development Process Recommendations 38 and 44.

Possible Approach 2c: Improve riparian conditions.
Healthy riparian conditions contribute to streamflow. The implementing body should support efforts to improve native riparian conditions along the streams within the watershed.

Possible Approach 2d: Restore surface flows to wetlands and tributaries. In addition to the mainstem of creeks, it is important to restore surface flows to wetlands and tributaries. For example, storm drains should be checked and corrected if they remove water from the watershed. Important habitat areas are located in these settings, and they also serve as water storage sites, gradually feeding flow into the mainstem creek system.

Possible Approach 2e: Seal stream beds.
Evidence suggests that, at least in certain locations, the impermeable seal in the stream bed is an important factor in retaining flow in the channel. Stream sealing projects have been conducted in the past with limited success, and new projects are currently under consideration.

Recommendation 3: Develop a policy regarding the exportation of WRIA 12 water to out-of-WRIA areas. (*high priority*)
A limited volume of water from WRIA 12 is currently used in adjacent watersheds. The transfer of additional water out of the watershed is currently under consideration by water purveyors and Ecology and may have negative impacts.

Recommendation 4: Conduct a numerical groundwater study, possibly developing a groundwater model, aimed at quantifying the amount of water contained in each aquifer, the magnitude of flow between aquifers, and whether water withdrawals could be manipulated between different aquifers to minimize impacts to surface water of concern. (*medium priority*)
A large quantity of groundwater is present in WRIA 12. In theory, a numerical model will help identify environmental impacts and potential mitigation measures that could provide a net benefit for habitat while supplying water for consumptive uses. The proposed numerical groundwater model will define the watershed-scale hydraulic relationships between different aquifers and surface water. Separate site-specific studies are expected to be required for processing water right applications and these specific studies may be conducted independently of a comprehensive numerical groundwater study. (See Water Use Toolbox Recommendation 10.)

It is recognized that a numerical groundwater study will be a large and expensive task that must be planned out carefully, including who will conduct and pay for the modeling. The model's limitations and uses must also be considered in the development and use of the study.

Recommendation 5: Conduct an evaluation of exempt well impacts in WRIA 12. (*low priority*)
It is believed that exempt wells are generally not creating a negative impact in this watershed. If specific areas are identified where there may be impacts, the implementing body should recommend that studies and recommendations be developed to mitigate the impacts.

Recommendation 6: Work to refine water budget from the Technical Assessment. (*low priority*)
Refine the water budget that was developed as part of the Technical Assessment.

Water Rights and Water Use Investigations

The recommendations within this category focus on obtaining a clearer picture of water use in the watershed while recognizing the only way to truly "clean up the water rights record" is through an adjudication process. As is the case with the Streamflow and Groundwater Functional Category recommendations, it is expected that partnerships with existing water right holders, in particular public water systems, and with water right applicants will be required to implement these recommendations. Pierce County Public Works and Utilities, as the lead agency in the implementation of the Pierce County Coordinated Water System Plan, is expected to provide a coordination role in recommendations pertaining to refining water use and water rights within the watershed. Additionally, involvement of the planning departments of the various jurisdictions within the watershed will be needed for successfully implementation as well.

The recommendations in this category have been broken down into two separate, but related, sub-areas:

- **Stopping illegal water use**: It is commonly agreed that illegal diversions of water, particularly illegal use of streams, is occurring within the watershed. Stopping such practices could have a positive impact on the low flow situation facing the watershed's streams.
- **Water right record clean up:** The water rights record was cursorily reviewed and summarized in Section 5 of the Technical Assessment. (A screened water rights list is included in Appendix E of the Assessment.) However, based upon follow-up work, it appears that the water rights database does not differentiate between primary and supplemental water rights and includes many water rights that may no longer be valid due to lack of use, resulting in statutory relinquishment and/or common law abandonment. Since water right holders cannot legally exceed their primary or instantaneous water right quantity on an annual basis or instantaneous basis, regardless of their supplemental rights, the primary rights and the instantaneous components are the only water rights that should be included when considering water legally available that is not currently being utilized. An additional step that would be necessary to clarify the water rights picture is to survey water rights holders to see if they are still using the water. It is likely that a number of water rights holders have either gone out of business or have connected to one of the many large public water systems that serve WRIA 12.

Stop Illegal Water Use

Recommendation 7: Encourage Ecology to identify and stop people who are using water without a valid water right. (*high priority*)
Unauthorized illegal diversions of water can negatively impact the watershed. Within WRIA 12, the most harmful illegal diversions may include water withdrawal from creeks for residential

irrigation purposes and ponds. A water right from Ecology is required before a person can legally divert water from a surface water source or use groundwater for more than 5,000 gallons per day. It is commonly believed that illegal water use is significant in WRIA 12. The Planning Unit does not support illegal water diversions/use and believes that, when the implementing body or others become aware of a possible illegal use of water, Ecology should be notified. (Ecology maintains a complaint tracking system to assign reports of illegal water use to appropriate staff for further research and appropriate follow-up.)

Another approach to solving this problem would be to inventory all valid water rights within an area of interest, identify those using water without a water right and require those without water rights to stop using water. A field staff person, often known as a "watermaster," could be assigned to enforce these actions. At this time, the Planning Unit is not recommending the establishment of a watermaster for WRIA 12; however a watershed coordinator/steward could assist in the implementation of this action. Note: The Pierce County Clover Creek Basin Plan recommended similar action on this issue. These actions should be coordinated.

Clean Up the Water Rights Records

Recommendation 8: Develop information related to municipal water supply necessary to provide water supply for anticipated population growth in WRIA 12. (*high priority*)
Numerous municipal water purveyors provide water to residents and businesses in WRIA 12. These purveyors conduct their own water supply planning as well as coordinate with each other, primarily through the Coordinated Water Supply Planning process. Despite this coordination, the Planning Unit does not have the necessary information to address one of its high priority issues: "providing water supply to meet anticipated population growth." In addition, under the Watershed Planning Act 2003 amendments, Planning Units are legally required to provide information about water rights and future use of water for municipal water purveyors.

Action Item 8a: Compile and analyze all water rights for each municipal water purveyor.
This task should include a description of how the water rights are used, including their status as primary versus supplemental and active versus inactive.

Action Item 8b: Tabulate water consumption data by purveyors.
Confirm water demand values provided by water purveyors for the Technical Assessment. Also, water demand numbers should be obtained from those who did not provide them previously.

Continue to refine and update water withdrawal and consumption data by purveyors. Information should be summarized on a yearly basis. This information should include updates on water supply, water demand, total connections and consumption, and estimates of remaining capacity in order to provide sufficient information to manage water resources and help guide land use decisions in the watershed. Interconnection between systems and their contributions to the regional water situation should also be included in this process. Larger purveyors should also indicate withdrawal permits, aquifer used and geographical service area.

Action Item 8c: Look at inchoate water rights.
Legislative Bill 2E2SHB 1338, Municipal Water Rights, requires watershed implementation plans to address the future use of inchoate water rights. Due to this requirement, doing so should be one of the first projects to undertake in implementation.

Compile future water demand projections for each municipal water purveyor, including projected surpluses/deficits, opportunities for interconnections between purveyors, and a discussion about what is known about water losses from each purveyor's system. Address the planned future use of existing water rights for municipal water supply purposes, as defined in RCW 90.03.015, that are inchoate, including how these rights will be used to meet the projected future needs identified in the Watershed Plan, and how the use of these rights will be addressed when implementing flow strategies identified in the Watershed Plan.

Action Item 8d: Assess the role of out-of-WRIA water that currently provides some water supply and could potentially provide more.
Several existing suppliers rely on out-of-watershed supplies. These supplies, including sources and volume, need to be identified and quantified.

Action Item 8e: Assess current water supply projects to provide additional municipal water from sources previously used for other purposes that are no longer needed.
The intention of this action item is to better use existing water rights within the watershed.

Recommendation 9: Take appropriate steps to develop and collect data and information regarding water rights and use the information to determine the need for a streamlined adjudication. (*high priority*)
A complete understanding of the magnitude of valid water rights does not exist for WRIA 12. Without such an understanding, it is impossible to know the true quantity of water in WRIA 12. It is inadvisable for Ecology to consider reopening the basin and difficult to evaluate changes to current water rights. To function without this information is similar to writing checks from a bank account for which you do not know the balance. The steps outlined below would provide the basic information needed.

Action Item 9a: Conduct a screening and range of estimates for Chambers-Clover water rights claims.
In most WRIAs around the state, many more water right claims are on the books than are actually valid. Many of the invalid claims are obviously so, for example, the dates of claimed water uses are too late to be valid. An initial screening could eliminate many of these, leaving a smaller subset that requires further evaluation. The remaining subset could be further evaluated and given the information provided on the claim, an estimate of potential water use developed. Ideally, part of this exercise would be to map the water right claims, which would further assist in evaluating their potential impact. This task would not include any sort of legal determination of validity (such as an adjudication) for the water right claims. That step could be initiated later if the Planning Unit deems it appropriate and desirable.

Action Item 9b: Review available information for large water rights (municipal and other uses).

The focus for this task is to understand how large water rights are being used. Are any rights not being used? Larger water rights are singled out because of their significant impact on water resources in WRIA 12.

Action Item 9c: Compile and review Chambers-Clover water rights applications.
Proposals for new water use, as well as change of existing water use, must be understood to assess potential future impacts.

Action Item 9d: Consider federal and tribal water rights.
Federal and tribal water rights are not listed in Ecology records, nor are they quantified anywhere. An estimate of the potential magnitude of federal and tribal water rights in WRIA 12 should be generated. Because of the large federal land holdings and facilities, and time immemorial tribal rights this is likely to have an impact.

Action Item 9e: Identify whether water rights are being used.
Study whether or not areas with existing water rights are being served by a source of public water, and report the information to Ecology. For example, if an agricultural water right exists for a piece of property now containing a subdivision, most likely the water right is not being used as originally intended.

Optional Action Item 9f: Recommend an adjudication of basin (streamlined).
The adjudication process has developed a bad reputation in the State of Washington, primarily because of the length of time recent adjudications have taken to complete. Also, the expense and burden of proof on the water right claim holder are unpopular. However, based on a recent special report to the legislature, the state may consider alternative approaches to traditional adjudication that could be completed in a much shorter timeframe. One of these approaches could be suitable for WRIA 12.

The implementing body should consider recommending an adjudication (streamlined or otherwise) to the Department of Ecology as a potential tool should it be determined that the watershed would benefit from such a process. The implementing body should monitor other processes addressing adjudication for applicability to the Chambers-Clover Watershed.

Currently, base flows are not fully supported within the watershed. If all the water rights within the watershed were used to their maximum extent, the situation would be magnified. One step in addressing this problem is to identify unused water rights and the current use of water rights. The Planning Unit recognizes that the best way to clean the books of water rights that are no longer valid is to undergo adjudication. It may be worth pursuing adjudication on a smaller area rather than the entire watershed.

Water Use Toolbox

Currently, water systems operating in the watershed are experiencing increased demands for water due to population growth and increased economic development. While using water more efficiently through conservation programs can provide additional water needed for growth and should be recognized as being the first "new source" of water for people, it must be noted that

conservation can stretch water supplies only so far and, therefore, many water systems in the watershed will eventually need additional sources of water to provide for increased growth related demands. It is imperative, however, that the need for additional water supplies for growth be balanced with the need to improve the low flow conditions of the streams in the watershed.

Many factors have contributed to the low flow conditions of the watershed's streams, including the pumping of water for drinking, industry and irrigation purposes, particularly from the shallow aquifer. The recommendations in this chapter promote more efficient, flexible ways to provide water for consumptive uses, while recognizing and looking to improve the low flow conditions facing the watershed. This is accomplished by encouraging water conservation activities, studying the possibility of deep aquifer pumping rather than the use of existing shallow aquifer wells, and supporting new groundwater rights where there is a net benefit to aquatic habitat.

Recommendation 10: Ecology should consider new groundwater rights where there is a net benefit to aquatic habitat. (*high priority*)
Ecology should consider mitigation offered by a groundwater right applicant that provides a net benefit to the aquatic habitat in addition to providing public water supply. In those situations where a net benefit is clearly identified it is recognized that the granting of the water right application is an effective means to achieve an immediate and long-term benefit to both the aquatic habitat and public water supply. When Ecology determines that the net benefit to the aquatic habitat exceeds the net adverse surface water impacts that may result, the right should be granted, provided there are monitoring requirements to ensure the continuation of the net aquatic benefits identified in the water right decision.

Recommendation 11: Encourage cost-effective water conservation for existing and new development. (*high priority*)
Water conservation programs are proven tools to bring about efficient use of water by customers. Under legislation passed in 2003, additional conservation programs will be required for all municipal water purveyors. At a minimum, water purveyors in the watershed should adopt and implement conservation programs consistent with state law. Existing guidelines include but are not limited to source and customer meters, public education, technical assistance, and incentives and other measures. Pierce County should review water system plans to ensure consistency with this action. The implementing body should review non-municipal water rights to identify where focused conservation measures may benefit the watershed.

Recommendation 12: In considering legal water right use, Ecology should recognize numerous approaches for municipal water purveyors to employ in supplying consumptive water needs in the most environmentally responsible manner. Several of the approaches mentioned below need studies and evaluations of their potential impacts before than can be considered or allowed. (*high priority*)
These approaches may include some of the following alternatives:

- Transfer surface water rights to groundwater
- Use of interruptible water rights for a portion of supply

- Water conservation programs
- Water rights trust program
- Integration of the use of reclaimed water
- Encouraging return of water to surface water bodies
- Water storage projects
- Watershed mitigation
- Regional water supply, or coordinated water system planning
- Connecting water supply planning to growth management or comprehensive planning

Recommendation 13: Evaluate the concept of encouraging large water users to withdraw water from deep aquifers instead of shallow aquifers. (*medium priority*)
Transferring the point of withdrawal of large water rights from the shallow aquifer or surface water to deep aquifers could promote recovery and restoration of the surface water and shallow groundwater system in WRIA 12. This concept would need further evaluation to understand the potential negative impacts, as well as secondary effects. Furthermore, this recommendation may only be feasible if Ecology is flexible on its definition of "same body of groundwater." The Implementing Body should consider the following action:

Action Item 13a: Conduct a study to determine the potential impacts from deep aquifer pumping.

Action Item 13b: Develop incentives for water purveyors to transfer shallow aquifer use to deep aquifers.

Water Quality

Water quality recommendations include actions addressing coordination, stormwater, and correcting water quality problems.

Recommendation 14: Coordinate water quality priorities and actions with other stakeholders. (*high priority*)

Action Item 14a: Support the Chambers-Clover Creek Watershed Council's ongoing work to address nonpoint source pollution in the watershed.
In order to successfully carry out efforts to prevent and control nonpoint sources of pollution, it is essential to have a group to provide energy and guidance in the implementation of adopted and approved plans.

Action Item 14b: Coordinate with Puget Sound Water Quality Action Team.
Continue to use resources provided by the Puget Sound Action Team and other agencies.

Puget Sound Action Team: Sample Materials Available

- 2000 Puget Sound Water Quality Management Plan
- "Stormwater Runoff Pollution Zone: No Wading, No Swimming, No Shellfish Harvesting" brochure
- Shellfish Stewardship: Caring for the Resource
- Healthy Horses, Clean Water – A Guide to Environmentally Friendly Horsekeeping
- Fact Sheet: Monitoring to Assess the Health of Puget Sound
- 2002 Puget Sound Update

Action Item 14c: Coordinate with government agencies engaged in construction projects within the WRIA.
Construction sites can cause water quality problems, particularly those related to transportation projects. Jurisdictions, agencies, and other groups conducting work within rights-of-way should use protective environmental practices to maintain and improve the quality and recharge of water in the watershed. Work currently underway to protect and enhance fish habitat and water quality is recognized and should continue.

Recommendation 15: Prevent and correct water quality problems associated with stormwater. (*high priority*)
The Planning Unit recommends addressing stormwater through the following actions. This recommendation ties to Recommendations 45 and 46 in the Development Process Category.

Action Item 15a: All stormwater should be treated to state stormwater NPDES standards before draining to streams and other surface waters.
The Planning Unit recognizes that stormwater is a significant source of nonpoint source pollution in WRIA 12.

Action Item 15b: Retrofit storm drains to remove pollutants.
Historically, storm drains have been used to collect and transport stormwater without providing treatment to remove pollutants. Stormwater, especially in urban areas, contains pollutants, with the concentrations varying greatly from location to location and from storm to storm. The implementing body should work with jurisdictions and private property owners to identify incentives to retrofit storm drains and provide water quality treatment. Catch basin filters are one tool that should be considered for retrofitting projects.

Action Item 15c: Encourage new technology for stormwater treatment.
Stormwater technologies can change rapidly, and the Planning Unit encourages use of the most current technology.

Recommendation 16: Undertake a project to assess water quality problems and develop and implement solutions. Because the Water Quality Study proposed as part of this watershed planning effort would fulfill a number of these actions (16a and 16b), look at Phase 4 to prioritize and implement the recommendations. (*high priority with evaluation of priorities after completion of the Water Quality, Quantity, and Habitat Monitoring Study*)

The results of the proposed Water Quality Study will answer a number of these action items. Specific recommendations from the study should be evaluated during implementation to further prioritize actions. Existing recommendations include the following action items:

Action Item 16a: Conduct Water Quality Study funded through the watershed planning effort.
This includes identifying water quality problems in the WRIA, determining probable causes, developing solutions, and prioritizing actions to correct identified water quality problems.

Action Item 16b: Address problems of 303(d) waters to avoid TMDLs.
If possible, action must be taken to prevent and/or correct problems before listing on the 303(d) list occurs. Once listed, a TMDL (or off ramp) is required. This would necessitate reducing or eliminating the 303(d)-listed concern and Ecology de-listing the stream segments from the 303(d) list.

Action Item 16c: Consider corrective action efforts on Steilacoom Lake.
Develop a study of the hydrology, including the potential impact of up-gradient lakes, and look for ways to improve water quality in Steilacoom Lake, which has one of the most acute water quality problem areas in the watershed. Possible actions include considering possible new sources of fresh water for the lake which would need to be weighed with other water needs.

Action Item 16d: Evaluate the concept of withdrawing authorized water for irrigation use from the deeper areas of Gravelly and American Lakes to promote use of the excess nutrients that accumulate in those waters.
This may decrease the need for property owners to fertilize their yards, since the deeper waters contain high concentrations of nutrients.

Action Item 16e: Consider conducting Phase 1 and Phase 2 lake restoration work for other lakes in the watershed.
Phase 1 includes assessing lake conditions and deciding what steps should be taken to improve water quality. Phase 2 is the implementation of recommended actions.

Action Item 16f: Continue work to prevent access by livestock and other animals to streams and other surface water bodies.

Action Item 16g: Support local efforts to provide sewer service to American Lake Gardens and Tillicum.
The older septic systems in the American Lake Gardens and Tillicum areas of the watershed may be contributing to poor water quality (particularly nutrient loading to American Lake).

Habitat

The recommendations in this Functional Category have been broken down into four separate, but related, sub-categories: tribal input; support salmon restoration efforts through coordination with

other processes; support restoration efforts through assistance with project development, coordination and permitting; and habitat restoration projects.

It is important to note the Watershed Management Act requirement in regards to coordination with "2496" salmon recovery efforts: "Where habitat restoration activities are being developed under Chapter 2496, Laws of 1998, such activities shall be relied on as the primary nonregulatory habitat component for fish habitat under this chapter." (RCW 90.82.100) Pierce County serves as the lead in the 2496 process for the Chamber-Clover Watershed.

Coordination with the WRIA 10 and 12 2496 effort is essential. (See Recommendation 2.) However the Watershed Plan cannot rely solely on the 2496 work to build a healthy aquatic environment in WRIA 12. This is due to the following three reasons:

1) The 2496 effort does not identify the target conditions the Planning Unit wants to accomplish for fish and wildlife habitat. Rather, the 2496 work is a process to solicit, rank, and fund projects to improve salmonid conditions in the watershed;
2) The 2496 effort combines both WRIAs 10 and 12 and is focused on addressing mostly Endangered Species Act (ESA) listed stocks, such as the Puyallup/White River Chinook salmon, and not other species including steelhead, cutthroat, and chum in WRIA 12. The 2496 Salmon Habitat Protection and Restoration Strategy does identify coho as the priority species in WRIA 12 but the Salmon Recovery Funding Board gives preference to projects that enhance Chinook stocks, and;
3) The 2496 effort gives priority to those watersheds that are still relatively pristine and WRIA 12 is a highly modified, urbanized watershed.

Setting a habitat condition target, specifically flows, is the key component in restoring a healthy aquatic environment. A process should be conducted to reach agreement on the flows and habitat improvements needed to support healthy and diverse aquatic and riparian communities (target flows and conditions).

Partnerships with existing habitat interests will be needed to define and reach habitat condition targets. The implementing body will serve as a forum to form and foster these partnerships. Implementation should provide additional insight and direction on the formation of partnerships, the identification of target conditions and accomplishing projects not addressed through the 2496 process. The following recommendations will help lead us to improving habitat by improving flows, eliminating non-native vegetation, and enhancing riparian environment.

Tribal Input

Recommendation 17: Seek tribal input on habitat values, visions and goals through a formal process. (*high priority*)

With time immemorial water rights, the Puyallup Tribe, as well as the Nisqually and Squaxin Island Tribes, have important roles related to habitat protection and restoration in the Chambers-Clover watershed. Not only do the tribes share a co-management role, they have conducted extensive work restoring salmon habitat. A better knowledge of tribal perspective is important in further defining what recommendations should be considered.

Support Salmon Restoration Efforts through Coordination with Other Processes

Recommendation 18: Understand and support salmon recovery efforts at local and regional level. (*high priority*)
Salmon and other native fish have been heavily impacted by development and other human activity within the watershed. The Chambers-Clover Planning Unit supports the various efforts occurring under the Salmon Recovery Act 2496 and other processes for addressing salmon recovery. The implementing body should assist with Pierce County's Salmon Recovery Funding effort, the Chambers-Clover Watershed Council's work and other salmon recovery efforts.

Recommendation 19: Work to set a coordinated common recovery goal for salmon. (*high priority*)
A common, coordinated salmon recovery and protection goal has not been established for the watershed. The Chambers-Clover Planning Unit recommends that a common salmon recovery and protection goal be established and supported by all jurisdictions for WRIA 12. This goal should include the identification of target species (coho, chum, steelhead and cutthroat trout). The 2004 *Salmon Habitat Protection and Restoration Strategy* developed by WRIAs 10 and 12 identifies coho as the priority stock for WRIA 12.

Recommendation 20: Work to enhance and coordinate efforts of local restoration and permitting groups. (*high priority*)
Efforts to restore and maintain habitat are essential to support the natural resources of the watershed. The Planning Unit strongly supports appropriate efforts by agencies, organizations and individuals to protect and improve habitat within the watershed. Efforts should be coordinated to ensure efficient use of habitat funding and resources. Permitting agencies include the Washington Department of Fish and Wildlife, U.S. Army Corps of Engineers, NOAA and the U.S. Fish and Wildlife Service.

Recommendation 21: Establish and maintain a "clearinghouse" for information on grant sources for restoration. (*medium priority*)
Securing sources of funding and support for restoration and enhancement work is always extremely difficult. To the extent possible, efforts should be made to identify sources of support and have that information readily at hand to match with specific project proposals.
The implementing body should include on its website links to other websites that provide information on restoration and enhancement resources.

Recommendation 22: Balance fish and wildlife needs throughout the entire watershed ecosystem. (*medium priority*)
A healthy watershed consists of many different plants and animals in addition to salmon. An example is the role of beavers in helping to moderate the flow of flood waters through the watershed. The needs of other (non-target species) fish and wildlife within the watershed should be considered in the development of comprehensive salmon recovery efforts. Where particular needs or concerns are identified, the Planning Unit recommends that specific actions be researched, developed, and implemented to recover and support the needs of wildlife within the watershed.

Support Restoration Efforts through Assistance with Project Development, Coordination and Permitting

Recommendation 23: Jurisdictions should continue to support the efforts of the Chambers-Clover Creek Watershed Council to develop a list, rank the projects, and secure funding for restoration projects in the Chambers-Clover Watershed in a cooperative effort to maximize the restoration efforts within the watershed. (*high priority*)
Many habitat restoration/enhancement projects need to be accomplished within the watershed. It is important to identify potential projects and support projects with the best chances of receiving funding. The development of an agreed-upon list for the entire watershed would help focus scarce resources on the most needed projects within the watershed. The Chambers-Clover Creek Watershed Council has begun an effort to list and prioritize potential restoration projects within the watershed.

Recommendation 24: The Planning Unit recommends that jurisdictions within the watershed work with restoration groups and agencies to assist and expedite the permitting processes for habitat-related projects to the maximum extent possible. (*high priority*)
Project delays caused by slow permit processes can have a negative impact on urgent restoration work, especially for projects that have a limited window of time to work in streams.

Recommendation 25: The Chambers-Clover Planning Unit recommends that the jurisdictions within the watershed review development regulations to ensure that restoration activities are addressed in their permitting process. (*high priority*)
Organizations conducting habitat restoration projects have spent additional time in the permitting process because the projects were not covered in development regulations.

Recommendation 26: The Chambers-Clover Planning Unit recommends that jurisdictions within the watershed consider reducing or eliminating permit fees and paperwork documents for habitat-related projects when conducted by non-profit organizations and/or consider crediting permit fees as an in-kind contribution to the project. (*low priority*)
Many dedicated non-profit groups conduct restoration efforts within the watershed.

Recommendation 27: Prioritize the role of water for habitat enhancement or restoration by selected sub-areas within WRIA 12. (*low priority*)
Water can play a key role in habitat enhancement and restoration.

Habitat Restoration Projects

Recommendation 28: Identify, prioritize and work to remove anthropogenic fish barriers. (*high priority*)
The implementing body should offer assistance to the salmon recovery effort and jurisdictions and others working to meet salmonid recovery goals to identify, prioritize, and replace all fish barriers. Culverts and other fish barriers have been identified through a number of efforts, including the Clover Creek Basin Plan, Fish Passage Barrier and Surface Water Diversion Screening Assessment and Prioritization Manual, the Limiting Factor's Analysis, and the "EDT" process. However, agreement does not exist on the number and relative importance of these

barriers. Some work has been accomplished through salmon recovery funding to remove or mitigate certain barriers, but many fish barriers remain.

Recommendation 29: Monitoring existing buffers to maintain and prevent encroachments. (*high priority*)
Informal development sometimes occurs within buffer areas and can compromise the beneficial functions of the buffer. Once established, buffers are typically not monitored for impacts from new development. The implementing body should work with jurisdictions and others to ensure the maintenance of existing buffers. Jurisdictions should conduct comprehensive land use assessments (through on-site visits, review aerial photography and other methods) on a periodic basis to determine the condition of buffers. Organizations or individuals frequenting riparian areas should note any degradation or impacts to existing buffers and report this information to the city or county where the buffer is located. Jurisdictions should then follow up on this information.

Recommendation 30: Jurisdictions should pursue actions to preserve, acquire, and protect aquatic, riparian and nearshore habitat, including wetland areas. (*high priority*)
The community in WRIA 12 values healthy aquatic environments. Existing development has encroached on stream corridors and much riparian area has been lost. There is a need to protect stream corridor, riparian, wetland and nearshore areas that still exist, as these areas are essential for a healthy aquatic environment. The Planning Unit supports Pierce County's and other jurisdictions' and organizations' work to identify and preserve important properties in the watershed.

Recommendation 31: Inventory off-channel habitat for coho creeks. (*medium priority*)
This would include a field study, monitoring and prioritization.

Recommendation 32: Restrict and eliminate non-native vegetation and restore native vegetation. (*medium priority*)
Invasive, non-native vegetation has impacted habitat in areas of the watershed. Local volunteer groups and others have worked to eliminate non-native vegetation and restore habitat functions by planting native vegetation. However, the problem is so great that it is necessary to develop a comprehensive strategy for prevention, control and remediation of areas damaged by non-native, invasive vegetation. The implementing body should work with jurisdictions and others to develop a comprehensive strategy to address non-native, invasive vegetation. An early step in development of the strategy should be to identify the current distribution of non-native, invasive vegetation and those areas that are most severely impacted. The strategy should include provisions for replanting with a range of native plants to establish a diverse floral community. A mono-crop is not appropriate in most locations.

Recommendation 33: Implement a program to mitigate unnatural peak flows. (*medium priority*)
Flows play an important role in forming habitat in stream channels. Development has altered streamflows, creating more frequent and higher flows during the wet season and lower flows during the dry season. These changes in flow have negatively impacted habitat and water quality in the watershed and have changed aquifer recharge characteristics. Regional detention

ponds have been developed in parts of the watershed to mitigate high flows. Jurisdictions should, at a minimum, implement Ecology's stormwater guidelines.

Recommendation 34: Look at nearshore habitat in greater detail; maintain or look at alternatives as needed. (*medium priority*)
Our collective values with regards to the nearshore environment have not been well-defined. The implementing body should work with jurisdictions and other interested parties to gain a better understanding of the nearshore environment and should foster efforts to plan for nearshore protection and enhancement.

Recommendation 35: Increase riparian buffers. (*medium priority*)
Buffers, areas with native vegetation, along streams filter rainwater moving across the surface of the land. In addition to water quality benefits, buffers provide important habitat for wildlife and serve as a food source, protective cover, and a multitude of other benefits for fish. One difficulty with establishing adequate buffers is that the width necessary to protect resources can vary from location to location.

Jurisdictions should use best available science as they update their regulations pertaining to riparian buffers and coordinate with one another as they update their critical areas regulations. This coordination could allow the consistent application of the most protective buffers throughout the watershed and make it easier for the public, including developers, to know buffer requirements. Jurisdictions should work with others to establish or enlarge buffers to the extent possible in areas developed without adequate buffers.

Recommendation 36: Perform a study to identify what nutrients are needed for healthy salmonid streams, especially nutrients that are necessary for salmon reproduction and may come from salmon carcasses. (*low priority*)
Develop a project to evaluate existing and historical nutrient concentrations in WRIA 12 streams. These nutrient concentrations would be evaluated to determine the acceptable range for various salmonid species and lifestyles and compared with the ideal concentrations for salmonid production and with state water quality standards. The project should also examine the relationship between, and possible conflicts with, water quality standards and optimal concentrations for supporting salmonid production.

Recommendation 37: Research historical information to support restoration efforts. (*low priority*)
This task focuses on identifying critical attributes for restoration that have not been previously identified. Certain aspects are already discussed in potential plan language, such as the relationship between streamflow and aquifer levels. What additional elements should be discussed: Forest cover? Fish counts? Meanders? Off-channel? Stream morphology?

Development Process

The recommendations in the Development Process Functional Category focus on the importance of protecting natural functions (e.g. wetlands, recharge) as land is developed, considering the availability of water supplies in land use planning processes, and recommending that

jurisdictions within the watershed adopt the latest Ecology stormwater manual. These recommendations fall into two sub-categories:

- Preservation of natural functions and desirable, low-impact land uses
- Planning activities

Preservation of Desirable, Low-Impact Land Uses

Recommendation 38: Protect existing wetlands and restore wetlands that have been lost or degraded. (*high priority*)

The Chambers-Clover Planning Unit recognizes the importance of wetlands in the watershed for many purposes: purifying and storing water, recharging aquifers, protecting fish, and habitat purposes. This recommendation includes the following three action items:

Sequalitchew Creek Slough *photo courtesy of Jill Tillman*

Action Item 38a: Wetland mapping.
Although wetland maps exist for most of the WRIA, the accuracy and completeness of these maps has been questioned. In order to successfully manage the natural resources in the watershed, the location of wetlands must be known. Therefore, updating wetland maps is recommended. The Planning Unit also recommends a field survey component.

Action Item 38b: Wetland inventory and delineation.
A wetland inventory would indicate, in a general sense, where and what class of wetlands exist in the watershed. Wetland delineations are a more detailed mapping and characterization of wetlands. Wetland delineations in the WRIA have typically been linked to development proposals, and the Planning Unit recommends additional delineation work with the understanding that such work is valid for only a specific amount of time. Therefore, delineations should be done for site-specific reasons, such as development, property purchases and other purposes.

Action Item 38c: Wetland Protection and Restoration Program.
The Planning Unit recommends that each jurisdiction in the watershed maintain, or establish, a general program of wetland protection and restoration. As funding becomes available, restoration/enhancement projects that expand wet areas or reconnect the floodplain should be given additional weight. The creation of new wetlands would be a lower priority, due to the difficulty of successfully creating functional wetlands. The implementing body should develop a recommended strategy of wetland protection and restoration for jurisdictions to consider as guidance for continuing or developing a comprehensive wetland strategy or program. Up-to-date guidance documents should be considered as the strategy is developed.

Recommendation 39: Encourage low-impact development. (*high priority*)
Low-impact development refers to a development philosophy and approach that minimizes impacts to the surrounding environment. Low-impact development can be a means to protect aquifer recharge and water quality and promote water conservation measures. Studies have shown that low-impact development can also be very cost effective. The Planning Unit supports Pierce County's effort to study and promote low-impact development and recommends that all jurisdictions in the watershed support Pierce County in this effort.

Recommendation 40: Promote policies that leave native vegetation as buffers around developments. (*high priority*)
Buffers with native vegetation provide habitat, water quality and water quantity benefits. Jurisdictions in the watershed should work to have an effective program to retain and enhance buffer areas with native vegetation. This could be partially accomplished by coordinating critical areas updates.

Recommendation 41: Identify and acquire important areas for conservation. (*high priority*)
In order to help protect essential natural areas, it is important to consider properties that may be acquired by purchase, easement, or other mechanisms to secure maintenance and support of the essential functions these areas provide. Jurisdictions and others should continue efforts to protect unique natural areas or other areas that benefit watershed functions. This needs to be done in cooperation with property owners and respecting private property rights; this does not envision taking land.

Recommendation 42: Promote land use policies that encourage non-motorized vehicle use. (*low priority*)
The Planning Unit supports land use policies that encourage the reduction of the use of motorized vehicles. Examples include ensuring cul-de-sac type developments have a trail system linking cul-de-sacs to main roads, "town center" type commercial developments that encourage people to walk from store to store rather than drive, or the use of hybrid vehicles and non-fossil fuel vehicles such as bicycles.

Planning Activities

Recommendation 43: Develop a tally of available connections identified in water system plans; update regularly. (*high priority*)
Knowledge of the water available, within the scope of approved water system plans, should be on hand. Such knowledge should be used as jurisdictions consider amendments to land use plans. Water purveyors should work with the implementing body to maintain an up-to-date balance of the water available for development within the watershed. The format of the balance should be developed by the water purveyors with the implementing body to ensure that the most useful information can be made available. The balance should be made available to each local jurisdiction for inclusion in its comprehensive planning and consideration of development projects.

Recommendation 44: Jurisdictions should coordinate their updates of Comprehensive Land Use Plans and use the Watershed Plan in the update process. (*medium priority*)
Legislative amendments to comprehensive plan land use designations that intensify land use should demonstrate how infrastructure needs will be met. Jurisdictions in the watershed should coordinate with each other to ensure minimal impact to the natural environment and adequate availability of water resources. The implementing body may be of assistance in this process. Jurisdictions should refer to the Watershed Plan when land use plans and regulations are updated and incorporate relevant provisions from the Watershed Plan to protect water quantity, water quality, and habitat. As development occurs, the protective measures should then be applied.

In order to ensure adequate protection of watershed resources, the provisions of the Watershed Plan should be applied to updates of comprehensive plans, water system plans, "CIP" plans, sewer system plans, and other planning efforts that guide growth and development within the watershed.

Recommendation 45: Review effectiveness of existing stormwater management practices throughout WRIA 12. This review should include a survey of active construction projects, as well as completed projects, to allow evaluation of stormwater requirements. (*medium priority*)
Construction and other development create runoff impacts unless properly mitigated. The only way to determine whether specific requirements work is to examine their results when put into action. The implementing body should review the existing practices and controls required by current regulations and, if considered warranted, recommend changes and/or additional measures for construction and development to maintain and improve water quality.

Recommendation 46: Jurisdictions should continue to implement comprehensive stormwater management programs that require careful stormwater control during construction and permanent stormwater management measures, properly maintained to prevent/minimize environmental impact from stormwater. Jurisdictions should adopt the latest Ecology Stormwater Manual. (*high priority*)

Action Item 46a: Support jurisdictions in requiring Best Management Practices (BMPs), etc. for stormwater control from construction sites.
Construction site stormwater can create water quantity, water quality and habitat problems. All construction projects are required to control stormwater releases through the use of BMPs. Strict use of construction site BMPs is critical.

Action Item 46b: Support jurisdictions in requiring permanent stormwater management and control measures from new developments.
Following construction, new development projects continue to create stormwater impacts. Most projects are required to include permanent stormwater management and control measures. The ongoing use and maintenance of these stormwater measures is critical to preventing stormwater impacts.

Action Item 46c: Support jurisdictions in encouraging the use of stormwater infiltration facilities.

Biofiltration swales, when properly placed, can be a simple, effective stormwater control measure that also promotes aquifer recharge. Jurisdictions within the watershed are encouraged to promote the use of properly designed and placed stormwater treatment and infiltration facilities, such as biofiltration swales, in new development and retrofitting projects. This should include a mechanism to ensure ongoing maintenance.

Action Item 46d: The implementing body and/or jurisdictions should work with the local, state, and federal agencies, including Washington State Department of Transportation (WSDOT,) regarding their use of stormwater management and control measures, such as biofiltration swales.
All efforts regarding stormwater management and control measures are important components of water resource quality in the Chambers-Clover Watershed and need to be better understood and further encouraged.

WSDOT's stormwater program for its transportation facilities has slightly different needs and approaches because its facilities are linear in shape and are located statewide. Because of the large scale of WSDOT's program, there may also be opportunities to coordinate local projects with WSDOT projects. For this reason, the Planning Unit recommends coordinating with WSDOT regarding stormwater and other watershed projects in WRIA 12.

Monitoring

Monitoring activities are important to the Planning Unit. Monitoring is the only way to keep abreast of the water resources situation in the watershed, including improved conditions resulting from the implementation of the many recommendations contained in the Watershed Plan. This category of recommendations includes action under the following sub-categories:

- Develop a monitoring program for WRIA 12.
- Specific monitoring needs. This listing is not intended to be comprehensive at this time; additional monitoring needs will be identified through development of the coordinated monitoring program.

Develop a Monitoring Program

Note that the Water Quality Grant project will address much of this. A **WQS next to an action item indicates that the Water Quality Study will address all or part of this action item. The following list of action items detail the necessary steps in developing this program.*

Recommendation 47: The Planning Unit recommends developing a monitoring program that addresses water quantity, water quality, and habitat monitoring. (*high priority*)
This will be included in the monitoring study and completed for the Implementation phase of the watershed planning effort.

Action Item 47a: Review all existing monitoring, identify purpose and gaps, and determine what additional sampling is needed and who will conduct.
WQS *– This action item will be done, except for deciding who will conduct the monitoring program.*

An effective monitoring strategy should include review of existing monitoring information. Such review will help define needs for additional and/or different monitoring.

Action Item 47b: Rank monitoring priorities. WQS
Given the finite nature of funding and other resources, priorities must be set.

Action Item 47c: Identify and secure stable funding for the monitoring program. Identify some funding sources. WQS
Funding may be necessary to:

- Support groups currently conducting monitoring to upgrade practices and equipment.
- Provide financial, logistical, laboratory and other related support to volunteer monitoring groups as appropriate to accomplish mutually agreed upon monitoring projects.
- Fund dedicated monitoring staff.
- Create a basin steward/stream stewardship program.
- Designate or establish a grant coordinator.

Action Item 47d: Develop standardized protocols for monitoring. WQS
This is important so that data collected by different groups is comparable and is of acceptable quality.

Action Item 47e: Determine data management program including quality control procedures, access to data and publication of data. WQS
A process must be in place to effectively gather, analyze, review and convey monitoring information in a useful manner. The monitoring program will describe the data management methods/system. A monitoring data clearinghouse could be established for this purpose. Ecology's Environmental Information Monitoring (EIM) system is a clearinghouse that is available for statewide use, and consideration should be given to linking appropriate watershed information with the state system.

Action Item 47f: Consider creating or retaining an "independent" entity for quality control review of monitoring program.
It is important to maintain credibility in managing monitoring efforts. Consideration should be given to incorporating independent third-party review of monitoring efforts to ensure credibility.

Specific Monitoring Needs

Recommendation 48: Implement the monitoring in Recommendation 1. (*high priority*)

Possible Monitoring Option 48a - Continue streamflow gauging throughout the watershed, with priority on continuing the gauging station of Chambers Creek below Leach Creek.
Accurate, ongoing streamflow records are necessary to assess flow trends and effectiveness of streamflow restoration actions recommended in this plan.

Possible Monitoring Option 48b - Monitor groundwater/surface water connections. Quantify, at least on a pilot or priority sub-basin basis, the timing and physical extent of hydraulic continuity as between ground (aquifers) and surface (stream) waters.

Possible Monitoring Option 48c - Initiate Stream Survey Using Northwest Indian Fisheries Commission (NWIFC) Protocol. The implementing body should identify which methodology(s) should be used and work to conduct needed instream, riparian and nearshore assessments to identify and prioritize needed restoration and enhancement work. Knowledge of stream characteristics is essential for effective management of instream and riparian resources within the watershed. There are a number of survey techniques available in the northwest, and some surveys have already been conducted in WRIA 12. Modeling has also been conducted under the "EDT" process.

Possible Monitoring Option 48d -Wetland monitoring. The implementing body should work with jurisdictions, organizations and agencies to establish a comprehensive wetland sampling and monitoring program. The wetland monitoring program should be coordinated with water quality, quantity and habitat monitoring conducted within the watershed and consider state guidelines for wetland monitoring. Historically, wetlands have provided a variety of benefits, including water quality, quantity, and habitat functions. These important functions have typically not been quantified and monitored.

Possible Monitoring Option 48e -Nearshore habitat monitoring. In order to gain a better understanding of the conditions, functions, and use of the nearshore, a strategy should be developed to assess, evaluate, and monitor the nearshore. The implementing body should work with others to conduct a nearshore assessment and establish a nearshore monitoring program. The nearshore has provided a plethora of benefits, including essential habitat for salmonid passage, rearing for many important species, and forage. The nearshore has historically received little attention.

Possible Monitoring Option 48f -Spawner surveys and tallying the number of smolts going out. Salmonid populations have been severely impacted in the last 100 years. The implementing body should work with others to develop spawner and smolt surveys to quantify and track salmonid use within the watershed. While there is incomplete information on the historical fish use, there have been estimates on the potential fish use in portions of the watershed through the "EDT" process. To gain a better understanding of current fish use of the watershed's streams, wetlands, and nearshore areas, monitoring of spawners and smolts could be conducted. These surveys would contribute to the understanding of the overall health of salmonids using the watershed.

Possible Monitoring Option 48g -Wildlife surveys. The implementing body should work with groups in the watershed who conduct wildlife and bird surveys to document animal use. The survey results should be made available on a watershed web page, or linked to other web pages that provide further information on habitat. An example of a bird survey is the annual Audubon bird count. The diversity and extent of wildlife reflects the health of a watershed. Wildlife and bird surveys document the use of habitat by animals and birds.

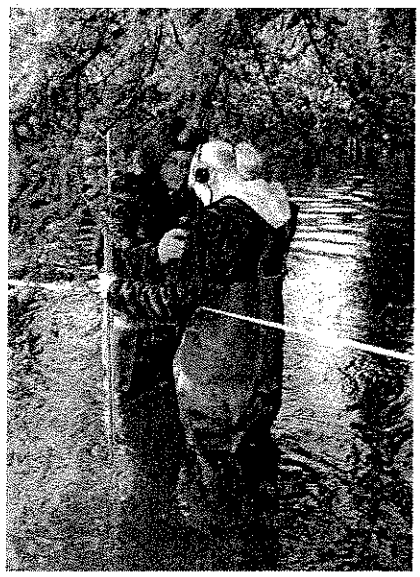
Possible Monitoring Option 48h -Riparian vegetation monitoring. The implementing body should work with jurisdictions, agencies and others to establish a comprehensive riparian vegetation monitoring program, including data management, storage and use. Native riparian vegetation provides a variety of benefits. The extent and condition of riparian areas has not been consistently monitored. Development has impacted riparian areas and many riparian areas have been destroyed or altered in the past century.

Possible Monitoring Option 48i -WRIA-scale Benthic Index of Biological Integrity (B-IBI) monitoring macroinvertebrates. The implementing body should work with jurisdictions and agencies to implement WRIA-wide biological monitoring recommended in the water quality supplemental grant project. Biological monitoring provides an excellent picture of the health of a water body. Biological monitoring can reflect the effects of periodic events that cannot be registered by occasional traditional (chemical) monitoring practices. Several different types of biological monitoring are available.

Possible Monitoring Option 48j -Installing meters on ponds to ensure water entering is equal to water leaving. Develop a study to quantify flows entering and leaving ponds as part of a "loss of streamflow" study. In order to successfully manage water use within the watershed, an adequate understanding of water use is essential. There is a concern that ponds within the watershed are an important factor in the loss of streamflow and that it would be very useful to quantify impacts of ponds on streamflow. Meters on ponds have been mentioned as one method that can be used to ensure knowledge of water use. However, metering may not be a feasible approach. For illegal water users, the use would be ordered stopped by Ecology. For existing legal users, meters are not typically required by Ecology. Meters would be most useful for legal new ponds; however the establishment of new water rights for ponds is not envisioned at this time. Other techniques can be employed to estimate the impact of existing ponds on streamflow.

Education and Information

Within the Chambers-Clover Watershed, efforts are already underway to educate teachers, students and the general public about the benefits of reducing their reliance on water resources. City of Tacoma and Pierce County officials predict that publicity about the watershed planning process will not only heighten the public's awareness of watershed issues, it will also encourage further development and collaboration of environmental programs in the Chambers-Clover Watershed.



Pacific Lutheran University students monitoring water quality *photo courtesy of Lara Koger*

Highlights of Existing Efforts

- Through Pierce County Environmental Services Education Program, classroom educators introduce students to recycling, natural resources, water

quality and many other environmental issues. Role-playing, hands-on activities, games and simple chemical tests help students learn how life is interconnected.

- Pierce County Environmental Services offers teacher training programs through Project WET (Water Education for Teachers) to Pierce County educators.
- The City of Tacoma awards $50,000 a year in Make a Splash Grants, funding designed to prevent surface water pollution and protect and restore clean water within Tacoma city limits.
- Educational brochures on a variety of topics from water quality to green gardening are available at no cost to residents of Pierce County.
- Worm bin composting classes are available through Pierce County. Fee includes bin, worms and instructional material.
- The Tacoma-Pierce County Children's Water Festival, sponsored by the Tacoma-Pierce County Health Department, Pierce County Environmental Services, the City of Tacoma, Tacoma Water, the Regional Water Association of Pierce County and Citizens for a Healthy Bay, promotes the importance of water resource protection and conservation. The 2003 inaugural event hosted twenty volunteer presenters who educated approximately 525 fifth-graders from local school districts. For 2004, more than 800 fifth graders from six school districts across Pierce County will participate in a variety of engaging activities that emphasize the value of water in everyone's life.
- Pierce County's Chambers Creek Wastewater Treatment Plant was recognized by the US Environmental Protection Agency (EPA) in 1996 as one of the best-run facilities of its kind in the nation. The facility, which overlooks Puget Sound between Steilacoom and University Place, received a national first-place award for an outstanding Operations and Maintenance Program in the Large Secondary category at the annual EPA Wastewater Management Excellence Awards Ceremony.
- Cascade Land Conservancy has identified Clover Creek as an area of high interest in their long range plans for preservation of open space and wildlife habitat in Pierce County. Three preserves totaling nearly ninety acres have already been established along Clover Creek.[1]
- Pierce Conservation District Stream Team provides education and raises public awareness through stream monitoring, habitat restoration, trash removal and storm drain stenciling. They also partner with local middle and high schools to do water quality monitoring[2].
- Puget Creek Restoration Society and Clover Creek Council are working with schools, colleges and universities to improve habitat conditions for the WRIA 12 streams.
- For the past 15 years, Environmental Studies majors and minors at Pacific Lutheran University have been involved with monitoring projects within the watershed. During their junior year, students are required to take an Environmental Methods course,

[1] Students from Pacific Lutheran University, Washington High School, Clover Park High and Charles Wright Academy are just a few of the schools that have participated.
[2] Conversation with Jamie Gordon 3/16/04

collecting data at five sites for use in an indicator study. Results can be found at www.nsci.plu.edu/~jwhitman/envt350/indicator/ccindicator.html.[3]

Recommendation for Additional Educational Programs

To build on the existing efforts and strengthen awareness of watershed issues, the Planning Unit makes the following recommendation.

Recommendation 49: The Planning Unit or implementing group as well as other jurisdictions should inform the public and seek public input in a proactive manner in the implementation of this Planning effort or in related planning efforts. (*high priority*) Informing the public of why watershed planning and implementation is important to their quality of life and the health of the region requires a proactive and involved approach. Efforts should encourage informing the public of the needs, the reasons why, how they are impacted, and then allow for their input and involvement in the decisions that are made.

Possible Education/Information Tools

Chambers-Clover Planning Unit members have made several recommendations for increasing public education and outreach, with the intent of promoting a responsible watershed stewardship ethic.

- Provide information on ways to reduce, reuse and recycle natural resources.
- Encourage low-impact development for individuals and businesses.
- Provide more teacher trainings and information about existing resources.
- Involve more organizations with environmental education.
- Establish a Watershed Coordinator position to form partnerships with community members and use their expertise to raise watershed awareness and create a strong stewardship program.
- Provide education on the value of salmon habitat, including wetlands and stream ecology through workshops and field studies.
- Offer training in how to use biological assessment as an educational and action tool to determine the health of salmon habitat.
- Teach habitat restoration skills to teachers, students and homeowners.
- Provide teachers, students and homeowners with an opportunity to apply the knowledge and skills they have learned to a habitat restoration project.
- Push to use environmental education as an integrating context (combine with math, science and social science curriculum) to improve test scores, retention and participation.

Action Item 49a: Monitoring information publicized and the information is made available to the general public.
It is important to share monitoring information with the general public in a user-friendly manner. The implementing body should coordinate a periodic "State of the Watershed" report.

[3] Conversation with Rose McKenny, 4/28/04.

Action Item 49b: Education about bioinfiltration swales, etc.
The Planning Unit recommends that the jurisdictions within the watershed educate the public regarding the importance of bioinfiltration swales. The use of properly placed and maintained bioinfiltration swales throughout the watershed can help to improve the water quality of the watershed and improve recharge rates to the upper aquifer. The Planning Unit is concerned that the general public may not understand the importance and function of biofiltration swales.

Implementation

The Chambers-Clover Planning Unit has spent countless hours developing the Chambers-Clover Watershed Management Plan and recognizes that the plan can only be successful if it is seen through Phase 4 of the process – Implementation. In 2003, the legislature recognized that effective implementation is critical to the established "2514" planning process and amended the Watershed Management Act (90.82) to include a Phase 4 --Implementation. Phase 4 of the planning process begins when the final plan is adopted by the county(ies) in a watershed. State funding available for implementation is $400,000, distributed over five years, with a required 10% match, which may be in the form of in-kind services. Within one year of receiving Phase 4 funding, a detailed implementation plan is required. It is possible, however, to begin implementation of the Watershed Plan without state funding. Such implementation activities would only occur with available resources. It is anticipated that the Planning Unit will continue meeting for approximately one year after plan approval whether Phase 4 funding is received or not.

The Implementation Functional Category recommendations are separated into the following sub-categories:

- **Management**: The implementation of the Watershed Management Plan will involve many different organizations and many of the plan's recommendations center on the theme of an implementing body to carry out individual recommendations. In addition to the implementation body, a lead agency will be selected to help oversee the implementation of the plan.
- **Funding**: Annual funding will be required for successful implementation of the plan and to support the implementation body.
- **Effectiveness (Adaptive Management)**: The implementation of a Watershed Plan may be destined for unsatisfactory results or failure if an effective monitoring, measuring and feedback loop is not built into the plan implementation process. Without such a system, there is no practical way in which to understand what is successful and what should be changed or modified.
- **Coordination**: It is the intent of the Planning Unit to minimize duplication of efforts by coordinating with other entities planning in the watershed.

Taken together, the Implementation Functional Category recommends a strategy to successfully implement the plan. The Planning Unit will continue to meet for a period of time to help begin

the implementation of the plan. In addition, a lead agency will apply for Phase 4 funding and provide administrative assistance in plan implementation. A feedback loop will be developed to ensure continued relevance and effectiveness of plan recommendations.

Management

There are several options for the structure of the Phase 4 implementation body.

Recommendation 50: The Planning Unit should be tasked with overseeing at least the next year of implementation of the plan under Phase 4 funding. (*high priority*)

Recommendation 51: As part of the funding or other means of Phase 4 Implementation, the Planning Unit should consider, evaluate, and recommend a longer-term entity for overseeing and coordinating the implementation of the plan. The group that has been discussed as a possible long-term lead entity is the Chambers-Clover Creek Watershed Council. (*high priority*).

Entities that should be considered (but not limited to) are:

- The existing Planning Unit
- The Chambers-Clover Creek Watershed Council (formed to address nonpoint pollution in the watershed)
- A sub-committee of the current Watershed Council
- A new entity formed from a number of agencies currently represented on the Planning Unit

The final structure of this coordinating and advisory entity will be determined as a first step in Phase 4 – Implementation. The Planning Unit will consider capabilities of hiring staff and consultants, receiving grants and loans, the ability to generate other funding, effectiveness, the ability of the entity to achieve plan goals and recommendations, and the need for multi-representation, similar to the existing Planning Unit. The current Planning Unit, particularly those representing governmental agencies, will remain committed to finding an equitable and balanced governance and operational structure.

Recommendation 52: The lead agency acting on behalf of the Planning Unit or its successor should be Pierce County or the TPCHD. (*high priority*)

Funding

Current legislation under House Bill 1336 provides $100,000 per year for three years to fund Phase 4 Implementation activities under Watershed Planning. At the end of the three-year period, a two-year extension may be available for up to $50,000 each year. A ten percent match is required to apply for implementation funding, which could include financial contributions or in-kind goods and services directly related to coordination and oversight functions. This match can be provided by the implementing body or combined commitments from federal agencies, tribal governments, local governments, special districts, or other local organizations.

Recommendation 53: Apply for 2514 Watershed Management Planning Phase 4 funding from Ecology. (*high priority*)
Ecology does have implementation funding available for Watershed Planning Phase 4 (Implementation) that should be considered and pursued for starting implementation efforts.

Recommendation 54: Develop an approach for ongoing local funding for the Watershed Management Plan. (*high priority*)
As part of the early implementation phase, the local agencies should pursue evaluating local funding sources, especially from the standpoint of funding an ongoing watershed implementation effort.

Recommendation 55: Evaluate and pursue other grants for funding for specific recommendations for implementation. (*high priority*)
The Planning Unit should consider specific grant requests that would allow for implementation of certain recommendations such as the Streamflow Study. Appendix O details a preliminary list of potential sources of funding.

Effectiveness (Adaptive Management)

Recommendation 56: During plan implementation, the Planning Unit should develop and institute an adaptive management system that creates the ability to measure and monitor its effectiveness and make changes as necessary to correct deficiencies. (*high priority*)

Recommendation 57: Consider climate change information from the University of Washington Climate Impacts Group (Appendix P), NOAA, Tacoma, and others. (*medium priority*)
The Planning Unit recognizes that the potential impacts of climate change on water resources are an important component to consider when planning for water needs in the long-term. The implementing body should use peer-reviewed information available from climate groups as the management plan is implemented. The implementing body should also coordinate with others on the use of this information within the watershed. The implementing body should provide this information to water purveyors for use when developing their individual water system plans (i.e. the potential impact on demand numbers and supply). This information should also be considered by jurisdictions as they develop regulations, such as buffer width requirements, protecting natural resources.

Coordination

Recent legislation (2E2SHB 1336) requires the Planning Unit, in developing its Phase 4 Implementation Plan, to consult with other entities planning in the watershed and identify and seek to eliminate any activities or policies that are duplicate or inconsistent.

Recommendation 58: Coordinate with other planning efforts (Puget Creek Watershed Management Plan, Green River Watershed, etc.). (*high priority*)
A number of planning and implementation efforts to improve water quantity, water quality, and habitat are underway in WRIA 12. To prevent duplication of efforts and to maximize available

funds, the watershed management plan must coordinate with these efforts. The implementing body should develop a master email list that includes all parties who are involved in efforts within the watershed, including salmon recovery efforts. The implementing body should oversee the development of a website that can help enhance coordination within the watershed. Jurisdictions within the watershed should invite the implementation body to participate in all water-related public forums, planning processes, and public program reviews in an effort to maximize the effectiveness and efficiency of public resources. The implementation body should sponsor an annual meeting for everyone working on water-related activities in WRIA 12.

Recommendation 59: Designate or establish a basin steward/stream steward program. (*high priority*)
To successfully implement a comprehensive Watershed Plan, adequate funding, resources, support and involvement are necessary to help carry out plan actions. Currently assistance is provided by a variety of sources to help carry out existing plans and support the work of groups involved in watershed stewardship. The implementing body should work with agencies, jurisdictions and others to develop a detailed implementation strategy for this stewardship program. The implementation plan should address: habitat work, including restoration, education, monitoring, data and resource acquisition; grant needs; and basin steward/coordinator needs.

*Possible Action Item 59a: Establish a group for coordinating habitat restoration, education, monitoring, data and resource acquisition. (*medium priority*)*
This group would become a focal point for actually planning and implementing habitat work and would provide a balanced perspective when determining priorities. Using an existing group, such as the Chambers-Clover Creek Watershed Council or the Salmon Recovery Technical Committee (ESHB 2496) would provide efficiencies and eliminate establishment of a duplicative group.

Coordination of restoration/enhancement efforts can direct limited resources to the most needed projects and maximize the use of public resources. The implementing body should work with jurisdictions, tribes, organizations and others to help guide the development of project lists for restoration and enhancement activities. The Chambers-Clover Creek Watershed Council is currently developing a master list of needed habitat projects.

Placeholder: The Implementation Chapter needs a discussion of "obligations".

Placeholder: The Planning Unit should work to develop a plan amendment process.

Placeholder: An implementation checklist should be developed. Some checklist items may include:

Finalize lead agency responsibilities
Determine the initial recommendations to be worked on
Finalize the lead agency

B. WRIA 12 Sub-Basin Action Plans

This section of the Watershed Management Plan contains recommendations presented as sub-basin action plans for Clover, Murray, Sequalitchew and Puget Creeks. The Clover Creek Basin Study was conducted by Pierce County effort, prior to the development of the Chambers-Clover Watershed Plan. For Murray and Sequalitchew Creeks, members of the Planning Unit chose to address water-related planning activities more specifically in sub-basins because they are distinct, located primarily on the Fort Lewis Military Reservation and Washington Army National Guard at Camp Murray, and have active sub-basin planning efforts. Sub-basin committees comprised of Planning Unit members and other interested parties developed and negotiated these action plans. Citizens of Puget Creek sub-basin evaluated and determined action for Puget Creek.

Recommendations in the sub-basin action plans are consistent with watershed-wide actions. If conflicts are identified between sub-basin and watershed-wide actions, the watershed-wide actions will supersede recommended actions made in the sub-basin plan.

Pierce County Water Program's Clover Creek Basin Plan

The Planning Unit for the Chambers-Clover Watershed developed a list of high priority issues for the Chambers-Clover Watershed Management Plan (designated by the Washington State Department of Ecology as Water Resource Inventory Area or WRIA 12.) The Clover Creek Basin Plan is one of the most recent and comprehensive planning documents available for the Clover Creek portion of WRIA 12. It includes habitat survey data, drainage and water quality technical information as well as recommendations that pertain to drainage, water quality and habitat.

Because many recommendations in the Pierce County Water Program's Clover Creek Basin Plan (Tetra Tech/KCM, 2002) are directly transferable to the goals and objectives of the WRIA 12 Watershed Plan, the Planning Unit requested consultant assistance in identifying the recommendations from the Clover Creek Basin Plan that would be relevant to these high priority issues.

This section summarizes the Clover Creek Basin Plan. A more detailed summary can be found in Appendix G, the Technical Memorandum and the entire document can be found on CD, included with this report. Table III – 1 presents the 22 relevant recommendations by issue and identifies an additional recommendation that overlaps the issues at the end of the table.

TABLE III – 1
HIGH PRIORITY ISSUES AND RELEVANT RECOMMENDATIONS FROM THE CLOVER CREEK BASIN PLAN

High Priority Issue	Clover Creek Recommendations
Water Quantity 1: Determine if adequate water will be available.	• Revise the southeast Clover Creek/Steilacoom basin boundary.
Water Quantity 2: Loss of streamflow.	• Recommend Ecology take actions on illegal diversions.

TABLE III – 1
HIGH PRIORITY ISSUES AND RELEVANT RECOMMENDATIONS FROM THE CLOVER CREEK BASIN PLAN

High Priority Issue	Clover Creek Recommendations
	• Conduct a low-impact development pilot. • Ensure surface water management standards are implemented in the basin in private and public developments by conducting inspections and making referrals for educational, technical assistance, or, if necessary, by applying existing County enforcement procedures.
Water Quantity 3: Coordinating zoning, land use and urban planning.	• None
Water Quantity 4: Water quantity, quality and habitat monitoring.	• Develop and implement a Surface Water Management Monitoring Program.
Water Quality 1: Nonpoint pollution.	• Increase inspections for compliance with stormwater requirements and NPDES permit. • Adopt updated stormwater quality standards. • Upgrade and administer the Pierce County's Floodplain Regulations to address groundwater and pothole flooding. • Enhance wetland areas. • Maintain and retrofit existing detention facilities to reduce first-flush contaminants. • Continue to retrofit existing dry wells.
Habitat 1: Defining fish and wildlife needs.	• Determine habitat value of unsurveyed reaches of North Fork Clover Creek, Morey Creek, Coffee Creek, unnamed tributaries to Clover Creek, and the mainstem Clover Creek.
Habitat 2: Attaining and/or maintaining stream and riparian conditions.	• Revise and administer the County's Critical Areas Ordinance to require all stream-related construction projects to protect the integrity of stream structures and to establish adequate buffer requirements. • Review current filling and grading regulations and determine if changes to their administration are needed. If changes are needed, make recommendations and determine costs. • Livestock fencing. • Restore riparian buffers. • Spanaway Creek restoration projects. • Clover Creek Main Stem restoration projects. • North Fork Clover Creek restoration projects. • Removal of fish passage barriers. • Property buy-outs to reduce future flood damages.
Habitat 3: Monitoring stream and riparian conditions.	• None.
Overlapping Recommendation	Develop and implement an education, outreach, and technical assistance program.

Murray Creek Sub-Basin Action Plan

Murray Creek is hydraulically connected to groundwater; therefore its streamflow is strongly influenced by the amount of groundwater seepage into and out of the creek. Under natural conditions Murray Creek consisted of upstream gaining and mixed reaches and downstream losing and mixed reaches. Prior to 1994, the upstream gain in streamflow exceeded the downstream loss and Murray Creek maintained perennial flow from Kinsey Marsh to American Lake. However, during the summers of 1994 and 1995 and intermittently since that time, the lower reach of Murray Creek has gone dry.

Studies conducted to determine the causative factors of loss of streamflow in Murray Creek have identified a number of potential causes for this loss; these include both natural and anthropogenic causes. Natural causes include: (1) climate effects on groundwater storage and streamflow; (2) creek bed scouring; (3) invasive plants; and (5) beaver dams. Anthropogenic causes include: (1) Madigan Army Medical Center cooling system groundwater pumping; (2) Logistic Center groundwater remediation activities; (3) impervious surface areas; (4) road-crossing obstructions to streamflow; and (5) disturbances to the creek bed in the vicinity of I-5.

Intermittent streamflow in the lower reach of Murray Creek is of concern to many. Historically the creek was a perennial stream flowing into American Lake. As such, it served as an important (and the only) spawning stream for the lake's native cutthroat trout and kokanee salmon population. It also provided American Lake with its only natural source of inflowing low phosphate and nitrate surface water. This surface water inflow augmented groundwater inflow to increase American Lake's flushing rate, which served to moderate the rate of phosphate build up in the lake's bottom sediments. Fish habitat and phosphate dilution benefits are lost or compromised when Murray Creek does not flow to American Lake.

The lack of streamflow has not only resulted in the loss of considerable fish habitat in Murray Creek, it has also restricted fish migration because of a build up of a muck delta where Murray Creek enters American Lake. Low water levels in the creek make some culverts at road crossings impassable for fish further impeding their migration.

Problem Statements

- Anthropogenic activities in the vicinity of Murray Creek continue to have the potential to affect the groundwater levels and thereby impact streamflow in some reaches of Murray Creek.
- The loss or reduction of streamflow in Murray Creek since 1994 has had two significant impacts on American Lake. First, it eliminated the creek as the only spawning stream for native cutthroat trout and kokanee salmon. Second, it eliminated one source of low phosphate and nitrate surface water vital to moderating the build up of phosphate in the lake. American Lake currently has high phosphorus content and is listed as an impaired water body on the EPA (d) list.
- Murray Creek is currently under the influence of several natural conditions that impound the creek waters allowing infiltration, and resulting in a corresponding decrease in volume available for flow.

- Existing culverts under the roadways on Fort Lewis and Camp Murray are inadequate for fish passage.

Short Term Action Plan

- Prepare Natural Conditions Maintenance Plan for Murray Creek.
- Remove natural and anthropogenic obstructions in Murray Creek.
- Remove invasive species in the stream corridor.
- Replant native species in the stream corridor.
- Conduct an assessment of all culverts to determine water transport capacity and ability to allow for fish migration.
- Prepare and implement a regular maintenance program for culverts under roads crossing Murray Creek.
- Replace culverts under roads crossing Murray Creek (Fort Lewis, Camp Murray and I-5).
- Prepare and implement a Monitoring Plan to assess Murray Creek streamflow and the factors that impact streamflow.
- Explore with the Department of Fish and Wildlife various options for utilizing the lower reach of Murray Creek to stock kokanee fry and implement best option.

Sequalitchew Creek bottom, *photo courtesy of Jill Tillman*

Long-Term Action Plan

- Contract for a study to determine and make recommendations as follows:
    - Influence of water withdrawals for the Madigan cooling system.
    - Influence of trichloroethylene (TCE) remediation in the Logistics Center area.
    - Effect of impervious surfaces in the area.
    - Historic groundwater level compared to present.
    - Effect on Murray Creek of wetlands in the vicinity of the Creek's headwaters.
    - Overall recommended actions to restore streamflow based on consideration of all factors in a dynamic system.
- Implement recommendations to achieve long-term goal of restoring streamflow to Murray Creek.
- Replace culverts deemed inadequate for fish migration based on the culvert assessment.
- Study the affect of gravel extraction operations near the headwaters of Murray Creek.

Sequalitchew Creek Sub-Basin Action Plan

Sequalitchew Creek is a small creek that flows southwest out of the west end of Sequalitchew Lake located on Fort Lewis, then west, through the City of DuPont to Puget Sound, a distance of

approximately three miles. At the headwaters, it runs under a gravel road and is carried over a manmade storm water canal in culverts. From there, it goes through Hamer Marsh (Fort Lewis) and Edmond Marsh (City of DuPont), then descends 200-feet through a steep-sided ravine and then passes through a large culvert under the Burlington Northern and Santa Fe Railroad tracks before discharging into Puget Sound.

Sequalitchew Lake is immediately adjacent to Sequalitchew Springs, the main source of drinking water for Fort Lewis. The lake level and the level of the springs are such that a rise of one foot in the lake will contaminate the springs with lake water.

Between 1949 and 1954, Fort Lewis constructed a backflow weir at Sequalitchew Springs and a series of dikes and weirs at the headwaters of Sequalitchew Creek to protect a primary source of water at Fort Lewis (Sequalitchew Springs) and to maintain the historic level of Sequalitchew Lake. These structures allow excess water to discharge into a stormwater canal.

The marshes associated with the creek are densely vegetated with emergent, floating and submerged plants. Parts of the creek are impenetrable from the thick vegetative cover.

When there was a fish hatchery operation in Sequalitchew Creek (1980s until 1997), juvenile fish migrating downstream to Puget Sound had a difficult time due to the fairly flat gradient of the upper creek and vegetation clogging the creek channels.

Recorded creek blockages created by beaver dams date from 1982. In that year, the Washington State Game Department removed eight beaver dams on the creek.

Before the closure of the fish hatchery in 1997, coho salmon spawned and reared in all accessible portions of the creek below the lake. Estimates based on available spawning and rearing areas at that time showed the potential capacity of not more than 200 adult coho.

Historical water quality sampling conducted in 1997 reported creek temperatures ranged from 2.9 to 18.5°C. Dissolved oxygen concentrations were fairly low near the headwaters due to the influence of Hamer and Edmond marshes but were good near the mouth of the creek. The pH levels were fairly acidic ranging from 5.7 to 7.9 again due to the influence of the marshes.

In recent years, observed streamflow in Sequalitchew Creek has decreased to the point that most times there is at least one dry reach in the vicinity of Center Drive in the City of DuPont. Several reasons for this condition have been advanced. These include natural causes, e.g. beaver dams and invasive plants, and anthropogenic causes, e.g. reduced flow into Sequalitchew Creek from Sequalitchew Lake, release of lake water into the storm water canal and inadequate culverts under DuPont-Steilacoom Road. The lack of streamflow has resulted in the loss of considerable fish habitat in Sequalitchew Creek.

Problem Statements

- Historical information indicates the upper reaches of Sequalitchew Creek have a very small gradient that impacts streamflow and fish habitat.

- Natural obstructions (e.g. beaver dams and vegetation) and manmade culverts are restricting and chocking streamflow.
- Sequalitchew Creek has at least one losing reach and perhaps one or more mixed reaches.
- The upper and middle sections of Sequalitchew Creek are currently under the influence of several natural conditions that impound the creek waters allowing infiltration and a corresponding decrease in volume available for flow.
- The current level of Sequalitchew Lake is maintained at a set maximum level to protect the main water source of Fort Lewis from lake water contamination. The mechanism for maintaining the level may divert water essential to the maintenance of streamflow in Sequalitchew Creek.
- Creek water backs up above the existing culvert(s) under DuPont Steilacoom Road. This may be indication they are inadequate for fish passage and may be inadequate for proper flow in Sequalitchew Creek.

Puget Creek Watershed Management Plan

Unlike the Murray Creek Plan and the Sequalitchew Creek Plan, the Puget Creek Watershed Management Plan was not developed as part of the Chambers-Clover Watershed Management Plan. However, the recommendations in the Puget Creek Watershed Management Plan are similar to the other sub-basin plans in that they work to improve water quality and habitat conditions for a portion of the Chambers-Clover Watershed. For this reason, a summary of the Puget Creek Watershed Management Plan is included here.

Background

The Puget Creek Watershed covers nearly 1,400 acres of North Tacoma. A sub-basin of the Chambers-Clover Creek Watershed, Puget Creek is located in a highly urbanized, single-family residential setting. Puget Creek is one of several gulches in Tacoma creating a unique network of urban forests. One of the few gulches with a perennial stream, Puget Creek once sustained viable chum and coho salmon and cutthroat trout runs. Stormwater basins now divert much of the creek flow. Due to the decrease in creek flow from logging and development, the salmon run was greatly diminished. Recently, a 60-foot section of culvert that blocked salmon passage was replaced and improved with concrete weir pools that allow full salmon access.

Puget Gulch includes a number of features. Puget Park, located near the head of Puget Gulch, serves as a small neighborhood park and playground. A trail leads from Puget Park to the gulch below which offers trail connections with the Ruston Way waterfront. Puget Gardens is located at the base of the gulch and is a former residential property. Puget Creek runs 1650 feet through the gulch and is habitat for a multitude of animals and salmon. After cutting through the gulch, Puget Creek then empties into Puget Sound's Commencement Bay. Puget Gulch is vegetated with emerging Douglas fir and second growth hardwood. Invasive vegetation is spreading within the area. Large stumps are present, indicating a historic forest.

In March 2002, Cooke Scientific Services, Inc. (CSS) identified and classified the wetlands located in the lower section of Puget Gulch where the stream originates and down slope of that area. CSS indicated that there are multiple wetlands ranging in scale from Category II to Category III wetlands.

Overall water quality for Puget Creek is generally good. Dissolved oxygen measurements taken in 1994 were somewhat low, with the stations in the upper reaches of the creek having more frequent low dissolved oxygen concentrations. Five weirs were installed in 1995 and the dissolved oxygen content has increased substantially.

Since 1997, the Pierce County Stream Team (PCST) has been documenting the discharge flow from Puget Creek. Their findings indicate that there is a significant year round streamflow capable of sustaining chum and coho salmon and cutthroat trout runs.

Since 1987, volunteers have been working to restore the salmon run and improve Puget Creek. In 2000, the non-profit Puget Creek Restoration Society (PCRS) was formed to help restore and raise awareness about the creek. As a continuation of their efforts, the watershed management plan was developed to help guide PCRS and other public and private interests and agencies in their efforts to restore the creek and raise awareness about the surrounding watershed. The Puget Creek Watershed Management Plan seeks to develop a set of operational policies, procedures, and activities that will preserve and enhance the Puget Creek Watershed. The plan is expected to be used as a tool to achieve these goals and establish a guideline for coordinated management and maintenance efforts by the City of Tacoma, Metropolitan Park District of Tacoma and PCRS volunteers concerned with the watershed.

Problem Statements

- Since 2000, four sanitary and storm sewer line breaks have been documented in Puget Gulch. These were repaired expeditiously by the City of Tacoma once they were informed, but the potential for failed sewer lines remains problem.
- Past logging, filling and mill operations have had a dramatic impact upon historic conditions.
- The process of erosion and sediment control has been a problem within Puget Gulch.
- From a fish standpoint, Puget Creek is deficient in pool area and also suffers from excessive fine sediment. Most of the reach is less than 0.5' in depth, which could promote heating problems during warm periods. The limited shade provided in some reaches may also be a factor.
- Unauthorized tree removal/pruning, diversion of stream water, the increased amount of impervious surfaces in the sub-basin, and stream channelization all further threaten Puget Creek.

Recommended Actions

The purpose of the Puget Creek Watershed Management Plan is to protect the terrestrial and aquatic ecosystems for their natural values. This includes protection and restoration of the salmon habitat. Within these parameters, there are opportunities for environmental education and low-intensity public uses where such uses do not adversely impact the natural resource values the area was intended to protect. Both the needs of the park users and the ecological importance of the watershed should be considered by the Metropolitan Park District of Tacoma in its management of Puget Creek Watershed. Similarly, the City of Tacoma should recognize both the

needs for utility maintenance and the ecological importance of watershed management when conducting storm and sanitary sewer and bridge maintenance.

- Form an "Adopt-A-Park" group for Puget Creek Watershed.
- Involve local businesses in clean-up efforts. Develop a regular schedule of park clean-ups.
- Provide sustained leadership for the stewardship of Puget Creek Watershed.
- Import spawning gravel to the stream as appropriate.
- Leave streamflow as it is now presently configured. Review periodically to evaluate possible improvements including increasing streamflow.
- Maintain ponds in Puget Gardens to support the needs of salmonids.
- Support continued evaluation and monitoring of the creek and seek grants and other funding for necessary improvements, such as carcass placement, egg placement, and near shore eelgrass and green crab beach monitoring.
- Reincorporate lost streamflow back into the mainstem.
- Enhance restoration projects that promote native plant diversity.
- Control exotics and, as possible, rid the gulch of invasive species.
- Minimize, or preferably eliminate, the use of chemical herbicides and pesticides in Puget Gardens.
- Vegetate the stream corridor with native plants to enhance cover and shade.
- Develop a Puget Gulch tour program.
- Provide a map showing the designated trail system.
- Develop a self-guiding trail booklet that keys to a system of numbered posts.
- Better inform the public about Puget Gulch and its unique resources.
- Two parcels to the west of C.I. Shenanigan's along Ruston Way have been purchased by Pierce County and are held in the Conservation Futures Program to protect them for habitat in perpetuity. Three additional parcels to the northwest of the City of Tacoma Right of Way and east of the Katie Down's Restaurant should be purchased as they become available to preserve the nearshore habitat from future development.
- Encourage the City of Tacoma to set aside the right of way at Puget Beach as a conservation easement.

Water Quality, Quantity and Habitat Monitoring Program

Monitoring of water quality for various studies in WRIA 12 has been conducted primarily by the Department of Ecology and the Tacoma-Pierce County Health Department since 1976. These sampling efforts and those conducted through the years for a variety of purposes by nearly a dozen other organizations have provided information useful to them but not uniform or statistically comparable to provide a definitive assessment of water quality trends over time.

The purpose of the Comprehensive Monitoring Plan (CMP) was to create a plan that would define a program for water quality, water quantity and habitat monitoring for all forms such as

surface water, groundwater, and nearshore areas. Such a program would permit meaningful data analyses, evaluation and management including a tracking process that could be cooperatively implemented and centrally coordinated; it could also provide guidance for project implementation and evaluation.

The Washington State Category 5, 303(d) list contains 31 locations within WRIA 12 where water quality does not meet state standards. The state is required by federal law to prepare an analysis called a Total Maximum Daily Load (TMDL) or Water Cleanup Plan for each of these 303(d) listed water bodies. The primary parameters that do not meet state standards are dissolved oxygen, temperature, fecal coliform bacteria, and total phosphorus.

Additional pollutants are beginning to appear in WRIA 12 waters. Lead, mercury, arsenic, PCB's and a large variety of organic pollutants have been detected in many locations nearshore and within creeks and lakes. These water bodies have been listed as Category 2, Waters of Concern.

The CMP provides a suggested framework for organization and management of all of the interested agencies and organizations that perform monitoring in WRIA 12. The "Policy Group" would then refine and instigate a coordinated monitoring plan that would prioritize the 303(d) water bodies for actions such as TMDL's and would identify and prioritize the high-quality water bodies within the WRIA for implementation of protective measures. The CMP describes various funding scenarios, methods for prioritization of program activities, suggestions for additional monitoring sites, standard sampling and analysis protocols, and monitoring of other biological, chemical and physical indicators for determination of trends in watershed health over time.

C. Technical Memorandum Recommendations

The following recommendations are based on the Technical Memorandum and Level 1 Assessment.

TABLE III – 2
CONCEPTUAL WATERSHED MANAGEMENT PLAN RECOMMENDATIONS BASED ON THE WRIA 12 TECHNICAL ASSESSMENT

High Priority Issue	Conceptual Recommendation
Water Quantity 1: Lack of specific water source/ system capacity/water rights analysis to determine if water will be available to provide for the anticipated population growth in WRIA 12.	• Conduct a study with components listed in TA Table 2. • Collect additional data (primarily measurements) to refine actual water use estimates for residential, commercial, and industrial use. • Analyze the probable impact of water conservation programs on future water demand.

TABLE III – 2
CONCEPTUAL WATERSHED MANAGEMENT PLAN RECOMMENDATIONS
BASED ON THE WRIA 12 TECHNICAL ASSESSMENT

High Priority Issue	Conceptual Recommendation
Water Quantity 2: Loss of streamflow.	• Establish and maintain long-term streamflow monitoring stations (see Water Quantity Issue 4). • Identify illegal diversions. • Conduct a monitoring study to evaluate how, where, and why Clover Creek loses base flow. • Develop a unified vision for desired flow conditions in Clover Creek, taking into consideration the urbanized character of much of the watershed. • Consider an "Alternative Futures" analysis approach, taking into account alternatives that could be envisioned for the future of the basin and steps that should be taken now to realize those alternatives.
Water Quantity 3: Coordinating zoning, land use and urban planning with municipal water availability and environmental water needs.	• Recommend jurisdictions integrate Watershed Management Plan recommendations dealing with water supply and environmental water needs with zoning, land use and urban planning. • Recommend implementation project to create and analyze GIS data needed for above-recommended coordination to identify where conflicts exist. • Consider an "Alternatives Futures" analysis approach, taking into account alternatives that could be envisioned for the future of the basin and steps that should be taken now to realize those alternatives.
Water Quantity 4: Water quantity, quality, and habitat monitoring.	• Develop uniform stream reach delineation or at least a key to correlating existing delineations that differ from each other. • Develop and implement a coordinated monitoring program that addresses water quantity, water quality, instream flow, and habitat needs. At a minimum, this program should cover monitoring needs listed in TA Tables 6 and 10. • Riparian zone assessment. • For all monitoring, define objectives, data quality, and protocols.
Water Quality 1: Nonpoint source pollution.	• Develop and implement coordinated monitoring program as described above under Water Quantity 4. • Identify specific corrective measures for each nonpoint source issue • Evaluate the potential role of flow augmentation in helping to solve water quality problems. Formulate recommendations regarding flow augmentation. • Evaluate the positive and negative role of septic systems on groundwater quality and quantity. Formulate recommendations regarding septic systems in the WRIA. • Consolidate information from existing stormwater programs to better understand regional stormwater approaches, effects, commonalities, and differences.
Habitat 1: Defining fish and wildlife needs, including historical, current, and future conditions.	• Obtain accurate, up-to-date data on fish distribution and quality/quantity of fish habitat. This will require field surveys.

TABLE III – 2 CONCEPTUAL WATERSHED MANAGEMENT PLAN RECOMMENDATIONS BASED ON THE WRIA 12 TECHNICAL ASSESSMENT	
High Priority Issue	**Conceptual Recommendation**
Habitat 2: Attaining and/or maintaining the agreed-upon stream and allied riparian conditions for fish and wildlife as defined in the management plan.	• Prioritize fish enhancement projects.
Habitat 3: Monitoring stream and riparian conditions.	• See coordinated monitoring program recommendation under Water Quantity 4.

D. Interrelationships

Interrelationships Between Functional Categories

Many of the recommendations in this Watershed Plan are interrelated, and when one recommendation is acted upon, progress may be made toward another recommendation. The Planning Unit explicitly noted the need for those who undertake implementation of a Watershed Plan to be aware of and to analyze the interrelationships among the recommendations. This consideration should include an identification of possible benefits a recommended action could have for other functional categories and recommendations and secondary consequences an action could have for other functional categories and recommendations.

Where an action could have benefits, those implementing the action should try to maximize opportunities to achieve multiple benefits. Where an action could have negative consequences, those implementing should seek to minimize the impacts. The Planning Unit expects that the SEPA review of proposed actions would provide the logical opportunity for considering specific action's benefits and detriments before final decision-making.

Table III-4 below uses examples from two recommendations and provides detailed description of the benefits and secondary impacts. It is for illustration only to show the level of analysis that should be conducted for each recommendation as it is implemented. For a complete list of possible interrelationships between all recommendations, without the detailed explanation, please see Appendix Q.

TABLE III – 3
RECOMMENDATIONS AND BENEFITS TO FUNCTIONAL CATEGORIES

Recommendation	Description	Other Recommendations That May Be Reinforced	Other Recommendations That May Conflict
Development Process 41: Identify and acquire important areas for conservation.	In order to help protect essential natural areas, it is important to consider properties that may be acquired by purchase, easement, or other mechanism(s) to secure maintenance and support of the essential functions these areas provide. Stakeholders should continue efforts to protect unique conservation sites in cooperation with property owners and respecting private property rights. This does not envision taking land.	**Streamflow and Groundwater** – Purchase of natural lands would keep and allow for more natural runoff and groundwater infiltration patterns that would benefit streamflows and groundwater levels. **Water Use Toolbox** – Purchase of natural lands could improve groundwater and streamflow conditions and possibly allow for water use opportunities. **Water Quality** – Natural lands that are preserved would provide buffers and conditions to improve both ground and surface water quality because of natural purification capabilities. **Habitat** – Purchase of natural areas would protect habitat from development, thus preserving habitat.	No secondary impacts.
Development Process Recommendation 46: Jurisdictions should continue to implement comprehensive stormwater management programs that require careful stormwater control during construction, and permanent stormwater management measures, properly maintained to prevent/minimize environmental impact from stormwater.	Construction site stormwater can create water quantity, water quality and habitat problems. Most projects are required to include stormwater management and control measures. The ongoing maintenance of stormwater measures is critical to preventing stormwater impacts. Jurisdictions within the watershed are encouraged to promote the use of properly designed and placed stormwater treatment and infiltration facilities in new development and retrofitting projects.	**Streamflow and Groundwater** – Any positive changes in how stormwater is handled can result in improved streamflow and groundwater conditions. **Water Quality** – Appropriate handling of stormwater can allow for more natural pollutant removal and thus improvements in water quality. **Habitat** – Handling stormwater with more natural techniques can additionally provide additional habitat as well as improve water quality and flow timing that can improve existing habitat. **Education** – Purchase of land would require educating the public to explain the purpose of such a long-term monitoring program and to determine the effectiveness of such a purchase in terms of water resource improvements. **Development Process** – Addressing stormwater in the development review process allows for upfront action that benefits water quality and quantity.	**Development Process -** Stormwater requirements will possibly necessitate code changes, plan review focus, and enforcement, all of which require more time, effort and costs. **Monitoring** – Long-term success in addressing stormwater issues requires monitoring that adds to the costs.

Interrelationships with Other Planning Processes

Other watershed management planning efforts are underway both adjacent to this basin as well as throughout Washington State. Coordination should occur with adjacent areas to make use of the best ideas from other basins as well as to enhance implementation.

In addition, the Chambers-Clover Watershed should coordinate with efforts across the state to look for commonalities and opportunities to encourage specific state departments (Ecology or Fish and Wildlife), the legislature, or the governor to implement changes in law, regulation, programs, or funding that would benefit watershed planning efforts. The more broadly supported ideas are, the more likely they will find support at the state level.

As noted above, the goal of coordination would be to maximize opportunities for multiple benefits, including partnerships to achieve common goals and minimize negative consequences. The Planning Unit also stipulated that those responsible for implementing recommendations should coordinate their planning with other appropriate planning efforts. These planning efforts should include:

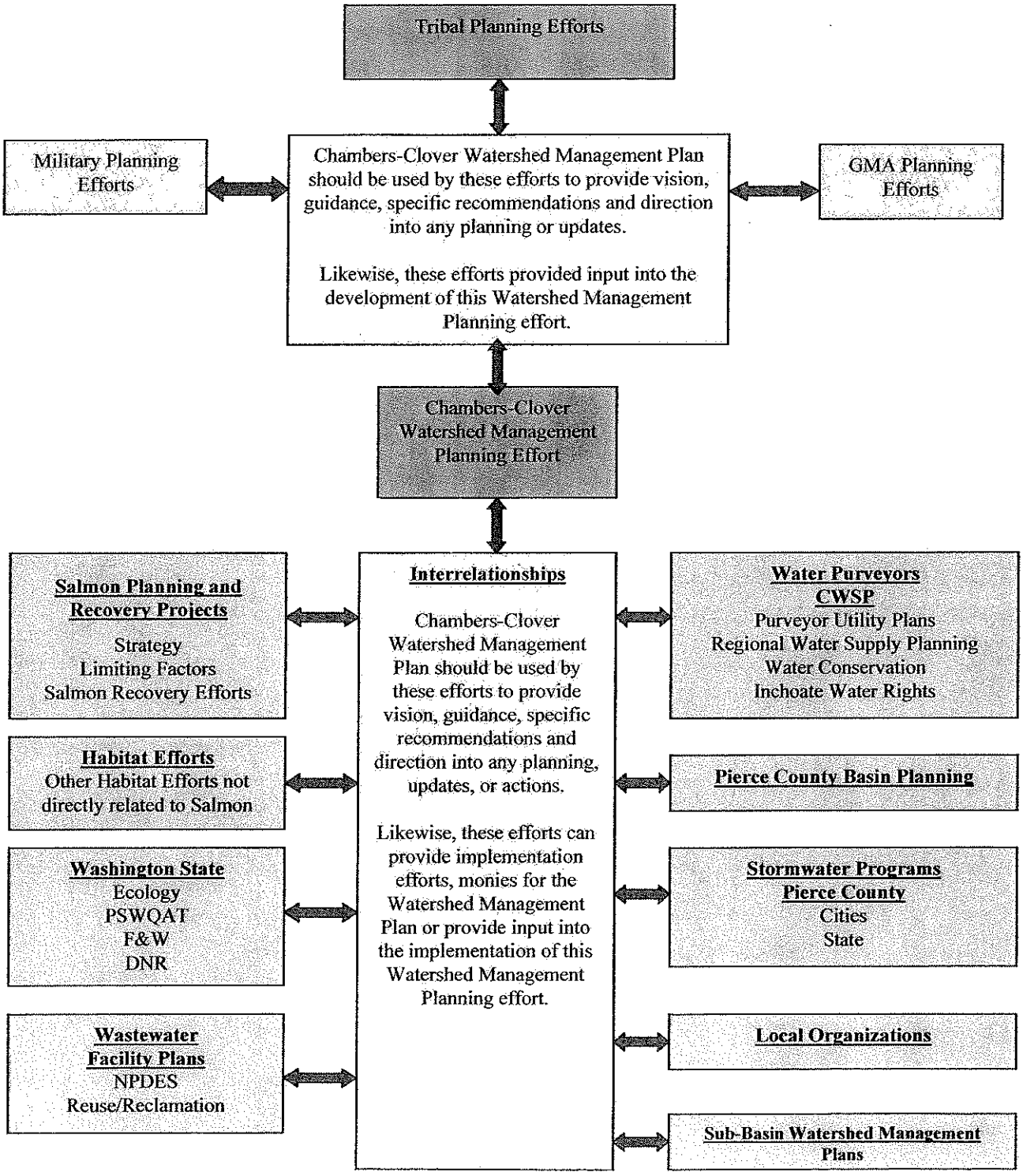
- Other efforts within the Chambers-Clover Watershed.
- Regional efforts that impact the Chambers-Clover watershed, like Growth Management Planning (GMA) or Coordinated Water System Planning (CWSP).
- Watershed planning undertaken under state legislation (ESHB 2514 and 2496) in adjacent watersheds, regionally and at the state level.

Coordination should occur with the following planning processes:

- Growth Management Act – Make sure that watershed recommendations respond to GMA Planning requirements and provide information to such efforts and direct that the findings of this Watershed Management Planning effort be considered and incorporated into updates of the GMA Plan.
- Coordinated Water System Plans – CWSP efforts can provide substantial information to Watershed Planning and implementation. Likewise, this planning effort should provide direction and guidance for any CWSP efforts.
- Purveyor water system plans– Master Plan efforts can provide substantial information to Watershed Planning and implementation. Likewise, this planning effort should provide direction and guidance for any master planning efforts.
- WSDOT (Focus on stormwater, growth impacts, environmental impacts from new roads or construction of roads or repairs) – This plan should be used by WSDOT in their planning, design, construction and maintenance of roads within the Chambers-Clover Watershed.
- Shared Strategy for Puget Sound (salmon recovery planning) – The priorities that are set out in the strategy and other salmon-related documents should include consideration of the recommendations of this plan, especially those related to habitat.

- Puget Sound Action Team – The PSAT should be aware of the recommendations of this plan and consider funding opportunities available for implementing this plan.
- Regional Water Supply Plans – Any Regional Water Supply Planning can lead to assisting implementation of this plan. Any such efforts should consider and comply with the recommendations and guidance of this plan.
- Pierce County's Basin Planning Program – Sub-Basin Planning should use this plan to provide guidance, direction, and vision.
- Chambers-Clover Watershed (Management) Action Plan.
- Municipalities and military base planning processes and projects (Ft. Lewis and McChord Air Force Base) – Municipal and military processes and projects should use the plan's vision, guidance, direction and recommendations.
- Department of Ecology's Water Quality Program's Water Quality Management Area (WQMA) Process.

Planning Group Interrelationships



E. Recommendations and Action Items Not Going Forward

This section of the chapter contains the recommendations and action items that were considered by the Planning Unit, but for which no consensus was reached. They are included here to document their existence, but they are *not* recommended by the Planning Unit.

TABLE III – 4
RECOMMENDATIONS AND ACTION ITEMS LACKING PLANNING UNIT CONSENSUS

Recommendation or Action Item
Streamflow and Groundwater Possible Approach: Augment flows to Clover Creek from upper levels of lakes. Study the potential to use water from the upper levels of lakes to augment streamflows.
Streamflow and Groundwater Possible Approach: Set lake levels to help restore and maintain creek flows. The implementing body should work with agencies to develop a study to identify the correlation between the level of American Lake and Clover Creek flows between Steilacoom Lake and McChord Air Force Base. If there is a set elevation of American Lake below which Clover Creek dries up, then the implementing body should recommend that Ecology establish a minimum lake level restriction for American Lake. The implementing body should also work with others to develop a strategy to increase volume in the shallow aquifer to maintain a minimum lake level.
Streamflow and Groundwater Possible Approach : Encourage use of reclaimed wastewater to augment streamflow. With regards to long-term sewage plans, jurisdictions should give a higher priority to reclaimed water. Water and wastewater systems should use reclaimed water to augment streamflows and recharge the watershed's aquifers. The Technical Assessment estimated 9% of the water leaving WRIA 12 flows directly to Puget Sound via the sanitary sewer system rather than recharging aquifers as previously occurred when on-site sewage systems were utilized.
Streamflow and Groundwater Possible Approach: Replenish water in shallow aquifer from deeper aquifer. It has been suggested that deeper aquifer water be used to replenish, supplement, and in some cases, replace surface and shallow aquifer water. This concept would need further evaluation to determine the nature and extent of secondary effects. If feasible, it could also be considered an allowable mitigation for new water rights. Replenish water in shallow aquifer from deeper aquifer.
Streamflow and Groundwater Possible Approach: Restore water levels in surface aquifer to pre-1930s level. It is widely believed that groundwater levels in the surface aquifer have dropped since 1930 for a variety of reasons, all related to human activities. It is likely that if groundwater levels were restored, base flows would also be restored in most locations. However this would be an enormous undertaking, with many secondary impacts that people would consider undesirable (such as increased flooding). Such a project would need thorough evaluation.
Water Rights and Water Use Investigation Recommendation: Evaluate the concept of reopening the Chambers-Clover Watershed to new water rights. (*low priority*) The Chambers-Clover Watershed is currently closed to new surface water diversions and to new groundwater diversions when it is determined that a new groundwater right may impact surface water. In order to justify new groundwater rights, base flows must be established and met.

TABLE III – 4 RECOMMENDATIONS AND ACTION ITEMS LACKING PLANNING UNIT CONSENSUS
Recommendation or Action Item
Development Process Recommendation: Support jurisdictions in changing development approval process such that applicants are required to demonstrate proof of water supply early in the application process. Controversial, Pierce County is currently addressing. (*high priority*) The Planning Unit identified this need because some past developments received preliminary plan approval that allowed developments to proceed even if water was not available, resulting in environmental damage and subsequently halting the projects. Community Plan language was adopted by the Pierce County Council in 2003 to require a "valid" water availability letter at the time of application. The Pierce County Planning Department is working to develop the necessary development regulations consistent with the new policy direction. The implementing body should review the revised development regulations to ensure that this concern has been adequately addressed.
Development Process Recommendation: Preserve agricultural land and agricultural uses. (*medium priority*) The Planning Unit considers environmentally responsible agriculture to be a desirable land use. Although WRIA 12 is dominated by urban development, and currently no significant commercial agricultural use occurs within the watershed, the Planning Unit recommends and encourages the continued use of land for agricultural purposes. If managed responsibly, the parcels of land within the watershed with small-scale agricultural use have less impact on the environment than urban development. They also provide a desirable diversity of land use within the WRIA.