

What is stormwater and why is it a concern?

Stormwater is the water that runs off surfaces such as rooftops, paved streets, highways, and parking lots as well as hard grassy surfaces like lawns, play fields, and graveled roads and parking lots. Although runoff occurs from all land cover types if there is sufficient rainfall, stormwater as addressed in federal and state regulations only applies to runoff associated with urban developed or developing areas with impervious surfaces. Stormwater from all sources is a concern because it can contribute to flooding during the wet winter months and to impaired water quality at all times of the year. In particular, stormwater can impact:

- **Human Health:** Stormwater may contain toxic metals, organic compounds, and bacterial/viral pathogens that make the water unsafe for people to drink and/or swim in.
- **Salmon Habitat:** In western Washington pollutants in urban stormwater can have a direct harmful effect on salmon. Changes to stream flow regimes erode stream banks and add silt, altering salmon habitat quality and function.
- **Drinking Water:** In some areas of Washington gravelly soils allow rapid infiltration of stormwater that can contaminate aquifers used for drinking water.
- **Degraded Water Bodies:** Stormwater is the leading contributor to water quality pollution of urban waterways and has been identified as a source that needs to be controlled in two Chehalis Basin TMDLs.
- **Stream Flow Regimes:** Large areas of impermeable surfaces cause rapid runoff during the periods of heavy rainfall common to western Washington. This runoff has to go somewhere and the results are higher peak flows in streams and rivers that can lead to flooding, scouring of stream beds, stream bank erosion. These higher peak flows also reduce opportunity for infiltration and ground water recharge which can reduce summer low flows. See references for additional information.

The impacts from stormwater are most noticeable in large, highly developed areas with large areas of impervious surfaces. However, studies indicate that negative effects can also happen at very low levels: as little as 5% impervious surface in a watershed can start to show effects. In a watershed as large as the Chehalis Basin (2600 square miles), it is difficult to imagine that the threshold for impacts from impervious surfaces has occurred on a basin-wide scale. It is important to remember, however, that existing cities and towns are also part of smaller subbasins. Viewed in the context of these smaller subbasins, it is very possible for impervious surfaces to have tremendous impacts on these smaller systems. It is these same smaller systems - not the main stem of

the Chehalis River — that provide the habitat critical to spawning and rearing of young salmon.

The only controls on stormwater in rural areas are construction and development controls that county governments apply even though, in ‘rural’ areas of the basin, changes in land use that fall far short of ‘paved over’ still affect runoff. Converting forest land to pasture land has a measurable effect on runoff. When one considers the large amount of acreage in the Chehalis Basin that has been converted from forest land to pasture land, it may well turn out that the overall impact on the amount of runoff is greater from rural lands than it is from urbanized areas.

What is the current regulatory program in Washington to address stormwater impacts?

In 1987, Congress changed the federal Clean Water Act by declaring the discharge of stormwater (traditionally considered a nonpoint source) from certain industries and municipalities to be a point source of pollution requiring National Pollutant Discharge Elimination System (NPDES) permits. Washington State has been delegated authority by the U.S. Environmental Protection Agency (EPA) to implement these permits.

The EPA stormwater regulations presently establish two phases for the stormwater permit program.

- Phase I stormwater NPDES permits have been issued to cover stormwater discharges from certain industries, from construction sites involving five or more acres and from municipalities with populations of more than 100,000. No municipal stormwater permits have been issued in the Chehalis Basin because no cities yet meet the population criterion, but stormwater permits for construction sites have been issued.
- Phase II: In October 1999 the final Phase II stormwater regulations were signed into rule by EPA. They expanded the requirement for stormwater permits to include an evaluation of cities that have a population greater than 10,000 and a population density greater than 1,000 people per square mile to determine if a stormwater permit is necessary. Aberdeen and Centralia could be affected by Phase II requirements. Phase II also reduced the size of construction sites that must be covered from five acres to one. This expansion of the construction site permit is likely to affect thousands of sites. Other government-controlled or caused discharges (county drains or highway right-of-ways, for example) could be included in Phase II.

It is possible that further regulation beyond Phase II may apply to municipalities with fewer than 10,000 citizens, although there are no plans for doing this at this time.

When will Ecology begin to issue permits under Phase II?

According to EPA rules, Ecology was to develop permit guidelines for all of Phase II by December 2002, and permits were to be issued by March 2003. Ecology did not meet the 2002 deadline and permits have not been issued. Ecology is waiting until after the legislature adjourns in 2003 to begin drafting the Phase II general permits. A draft will be ready for the legislative session in 2004 so the legislature can review the draft permit. The current schedule calls for the permit to be adopted after the legislature adjourns in 2004. Ecology will probably use two draft laws prepared by the 2003 legislature that deal with Phase II (ESHB 1689) as a template when it drafts and adopts the Phase II permit.

Ecology plans to prepare one general permit for western Washington and another for eastern Washington rather than issuing permits for individual jurisdictions.

What will Phase II Stormwater programs address?

Phase II Stormwater programs will address six elements:

- Public education and outreach on stormwater impacts
- Public participation and involvement in stormwater management programs
- Detection and elimination of illicit discharges
- Construction site stormwater runoff control for sites one acre or larger
- Post-construction storm water runoff control for sites one acre or larger
- Pollution prevention and good housekeeping for municipal operations

Ecology has yet to decide whether to include a requirement to adopt the *Stormwater Management Manual for Western Washington* or a technically-equivalent manual and whether to include all or part of a jurisdiction.¹

Industries and Construction Sites

Stormwater discharges from industries and construction sites are regulated under separate general permits that were issued by Ecology in November 1995. The permits require the development and implementation of a Stormwater Pollution Prevention Plan (SWPPP). The SWPPP for construction sites is primarily a temporary erosion and sediment control plan. The SWPPP for industrial facilities is a documented plan to identify, prevent, and control the contamination of stormwater discharges.

How is stormwater runoff from roads to be addressed?

The Washington State Department of Transportation (WSDOT) is responsible for hundreds of miles of roads in the Chehalis Basin that contribute to

1. In the Chehalis Basin, the cities of Ocean Shores and Aberdeen and Jefferson County have adopted the *Stormwater Management Manual for Western Washington* when this paper was written.

stormwater runoff. WSDOT has agreed to a statewide permit to avoid having a piecemeal stormwater program and to promote better management of stormwater runoff from all state highways. Ecology is starting the process of issuing a statewide stormwater permit to WSDOT. The permit will cover runoff from state highways, rest areas, weigh stations, scenic view points, park and ride lots, ferry terminals, and maintenance facilities.

How can impacts of changes in land use be addressed?

One approach being evaluated in other areas of the state is to encourage cluster development so that no more than 10% of a basin would become impervious surface and approximately 65% of the basin would remain forested. Studies have shown that this balance results in no net loss to aquatic resources. Although this balance might be difficult to achieve in those subbasins that have already been developed, there could be opportunities in other Chehalis River subbasins for such an approach. Another approach is a low impact development ordinance.

What are some possible solutions?

<i>Possible Solutions</i>	<i>What You Get with this Solution</i>	<i>Comments</i>
1. Status Quo	<ul style="list-style-type: none"> • Maintain existing regulations • Implement Phase II Stormwater program under federal and state regulations • Make no effort to address existing development outside of Phase II communities 	<ul style="list-style-type: none"> • Short-term implementation and long-term program development would be driven by federal and state regulations. • Stormwater will be addressed as a nonpoint source as TMDLS are developed.
2. Focus on Public Education and Outreach	<ul style="list-style-type: none"> • Passive program - use existing stormwater education programs • Active program - adopt existing material to the specific conditions in the Chehalis Basin • Review existing runoff models and use one or more of them to predict levels of runoff that can be expected as land use in the basin changes from forest to agriculture to suburban to urban. • Explain impacts of impervious surface and stormwater on water resources in the Chehalis Basin, including methods for improving timing and quality of runoff • Identify ways that municipalities, industries and individual home/landowners can reduce stormwater impacts. • Focus on voluntary efforts. 	<ul style="list-style-type: none"> • Difficult to document results. • Education alone may not result in adequate protection.
3. Study specific problems and develop recommendations for implementation	<ul style="list-style-type: none"> • Analyze the extent of stormwater problems and causes in both rural areas and areas of urbanization and expected growth. • Identify tools that individuals and jurisdictions can apply to reduce the effects of stormwater runoff. • Identify tools that jurisdictions can apply to meet growth objectives without increasing stormwater runoff. 	<ul style="list-style-type: none"> • Existing computer models such as LTHIA may provide a tool that can help evaluate alternatives. See: www.ecn.purdue.edu/runoff/lthianew/index.htm

<i>Possible Solutions</i>	<i>What You Get with this Solution</i>	<i>Comments</i>
4. Voluntary implementation of stormwater programs (the enlightened self-interest approach)	<ul style="list-style-type: none"> • Design implementation for localized conditions in the Chehalis Basin. • Adopt some or all Phase II elements for urbanizing areas. • Provide more flexibility than responding to regulations requiring that action be taken. • Recognize voluntary implementation. Jurisdictions that have voluntarily implemented controls should be rewarded with “credits” that will allow them additional time to comply with new regulations that come into effect. • Monitor stormwater conditions and the effectiveness of control actions. 	<ul style="list-style-type: none"> • Do you get the same level of protection with voluntary programs as you do with regulations? • Ocean Shores has a \$9.00 per month fee per lot for stormwater control. Other jurisdictions have similar fees.
5. Funding	<ul style="list-style-type: none"> • Build appropriate stormwater control into current planning efforts and development costs rather than deferring costs into the future. • Create a retrofit program to encourage existing developments to take steps to improve stormwater quality to preserve existing water resources. 	<ul style="list-style-type: none"> • Funding and assistance program would need to be set up
6. Regulations for new development and redevelopment	<ul style="list-style-type: none"> • Link to planning / building codes. • With improved development practices municipalities may be able to avoid the TMDL process. 	<ul style="list-style-type: none"> • Is compliance better under local programs or under state/federal programs?
7. Encourage formation of county, city, and special district stormwater utilities	<ul style="list-style-type: none"> • Provide a dedicated funding source for addressing stormwater • Address stormwater regulatory requirements proactively 	<ul style="list-style-type: none"> • Costs are paid directly by basin residents.

Recommendations

Adopt Options #2 through #7.

Implementation

Except for those areas that fall under Phase II stormwater regulations, implementation would be carried out by individual jurisdictions, businesses and home/land owners as voluntary measures.

References/Suggested Reading

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Horner, Richard and Christopher W. May. February 1999. Regional Study Supports Natural Land Cover Protection as Leading Best Management Practice for Maintaining Stream Ecological Integrity. Conference Papers of Comprehensive Stormwater and Aquatic Ecolgystem Management. Auckland New Zealand.

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Total Maximum Daily Loads (TMDLs)

Supplement Section IV –
Issues/Recommendations

Part B – Issue Papers

Chehalis Basin Watershed Planning Issue Paper

What is the purpose of this issue paper?

This issue paper describes what TMDLs or Water Cleanup Plans are, why they are developed, how they affect residents of the Chehalis Basin, and options to improve TMDL outcomes.

What is the issue?

The Chehalis Basin Partnership established the following water quality goals:

“Prevent degradation of, and/or improve water quality to have clean water (as defined in the Washington State Water Quality Standards) for all fish, wildlife and human uses.”

Some of the waters in the Chehalis Basin do not meet minimum federal and state standards for clean water. The federal Clean Water Act provides a mechanism for cleaning up such waters - it is called a Total Maximum Daily Load (TMDL). (TMDLs are also called Water Cleanup Plans.) The intent of TMDLs is to improve water quality so people, fish and wildlife have clean water.

While people generally support clean water (which is the goal of TMDLs), four concerns about TMDLs have emerged:

- First, TMDLs are very complex and can take a long time to develop. This can make it difficult for local government and citizens to participate and can result in citizens feeling that they have been excluded from the process.
- Second, TMDLs may have significant impacts on small communities, businesses and individuals, and the costs associated with implementing TMDL recommendations can be very high. This raises people's level of anxiety, and they can become defensive, making it difficult to communicate effectively.
- Third, some waters experience significant levels of nonpoint source pollution and it can be difficult to regulate against nonpoint sources.
- Fourth, if nonpoint sources of pollution cannot be regulated with “reasonable assurance,” under federal regulations the required pollution reductions all fall on point sources. This can result in very high costs for point sources, such as municipalities that operate sewage treatment plants. The emphasis on point source controls raises an equity issue: point sources that must bear high costs to reduce their discharges while nonpoint sources may not be forced to reduce their discharges and therefore may not bear any costs at all.

What is the background to TMDLs?

The federal Clean Water Act of 1972 set a goal that all of the nation's waters will be "fishable and swimmable" by 1983. It requires states to adopt water quality standards, assess water quality on a regular basis, and identify those waters where water quality standards are not being met. This list of impaired waters is called the 303(d) list. When water quality impairments are identified, the law requires that a water quality clean-up approach be developed to restore the quality of the water so that water quality standards will be met. Under the Clean Water Act the process of developing an approach to restore water quality is called a Total Maximum Daily Load (TMDL). The purpose of a TMDL is to improve the quality of waters so people, fish and wildlife have clean water.

The TMDL process involves a series of steps:

- Identify the type, amount and sources of water pollution in a particular waterbody.
- Analyze how much the pollution needs to be reduced to achieve clean water.
- Provide strategies to control pollution.
- After public review, submit a strategy to implement the findings to EPA for approval.
- After EPA approves a specific TMDL, develop a Detailed Implementation Plan. It identifies specific actions that need to be taken, organizations responsible for implementing those actions, a monitoring plan to evaluate effectiveness, and an implementation schedule.

In 1992, the first TMDL in the Chehalis Basin was completed for Dioxin in Grays Harbor. The table on the following page indicates the current status of TMDLs in the Chehalis Basin.

What are some potential solutions?

Basin-Wide Comprehensive Monitoring Plan – Implementation of the basin-wide comprehensive monitoring plan being developed as part of the watershed plan for the Chehalis Basin will:

- identify improvements to impaired waters that result from implementing existing TMDLs or other initiatives,
- identify additional areas that may need the level of study addressed in a TMDL,
- help to prioritize areas for cleanup and protection, and
- serve as a resource allocation tool as implementation of existing TMDLs moves forward.

Additional Funding –

- a) The Chehalis Basin Partnership may want to seek legislative authorization for a dedicated funding percentage within the state water quality

account to fund projects in the Basin, such as Spokane and Seattle Metro have had since 1987.

- b) The Chehalis Basin Watershed plan could evaluate ways to share the costs of protecting water quality more equitably between point and nonpoint sources of pollution. Citizens who do not pay to support wastewater treatment and stormwater runoff control in communities because they live in rural areas could pay to support local nonpoint source pollution control programs offered through the county or local conservation districts.

Local involvement in TMDL development and implementation – The Chehalis Basin Watershed Plan could evaluate how the TMDL process could be improved in the future so that federal, state and local interests are all addressed in the most effective and efficient manner. This could include greater local control of TMDL processes. If this recommendation is adopted, it should also include an evaluation of greater local responsibility for the outcome. (Currently the state is responsible under the Clean Water Act for developing TMDLs and ensuring they achieve the desired water quality results.)

TMDLs in the Chehalis Basin

<i>Areas of Chehalis Basin Affected</i>	<i>Impaired Water Quality Parameter</i>					
	Dissolved Oxygen	Temperature	Fecal Coliform Bacteria	Phosphorous	Dioxin	Chlorine
Black River	●	●	●	●		
Duck Lake				○		
Grays Harbor			○		●	
Humptulips River		●				
Simpson Timberlands		●				
Upper Chehalis River	●	●				
Wildcat Creek	●		●			●

- *TMDL under Development*
- *TMDL Approved, Implementation Underway*
- *TMDL Implementation Complete, Tracking*

Changes to state laws, regulations or policies to provide equity and flexibility under TMDLs – The Chehalis Basin Watershed plan could evaluate how equity between point and nonpoint pollution controls might be achieved. The watershed plan could evaluate

- Greater reliance on the principles of adaptive management for TMDLs.
- The potential for successful pollution trading in the Chehalis Basin.
- The current focus on point sources and potential benefits of redirecting attention towards cleaning up nonpoint sources.

Changes to state policies regarding nonpoint source pollution controls – The Chehalis Basin Watershed Plan could evaluate if existing state law (for example RCW 90.48) provides sufficient authority to control nonpoint sources where they contribute to water quality. If not, the Plan could address the equity issue between control of point and nonpoint sources of pollution.

What actions are recommended to address TMDL issues in the Chehalis Basin?

- Be proactive — develop a program to clean up water quality impairments before TMDLs need to be implemented.
- Develop programs to address nonpoint sources of pollution in the Chehalis Basin so that a more equitable system for improving water quality will exist.
- Propose a “package” of improvements to the state to address nonpoint pollution, not a single approach.
- Avoid problems that result in future TMDLs by promoting water quality.
- Develop approaches to keep forestry and agriculture on the land which will reduce future impairments caused by more intensive forms of land use.
- Develop standards for reasonable assurance for nonpoint source reduction. This will let local communities know what the standard is if they want to use their authority to produce programs that will relieve the pressure on point sources.
- Set up a regional water quality board to manage water to prevent future TMDLs.
- Look at opportunities for pollution trading in the Chehalis Basin.
- Develop sources for funding water quality improvements.
- Develop a prioritized list of TMDL projects where 303d impairment listings already exist.

Chehalis Basin Watershed Planning Issue Paper

What is the issue?

Most individuals who pioneered the lands in the Chehalis Basin found value in the resources available, such as timber, fertile land for agriculture, and fish. In later years, land management practices have altered the condition of habitat that fish require for survival. As with many human endeavors, people did not recognize or take into consideration the impacts of these practices on habitat. (In some cases, people did and do not recognize that the impacts they are causing as individuals can add up to a cumulative impact on habitat that is significant.) Nevertheless, these past practices have indeed had a cumulative impact on habitat and it is now recognized that habitat needs in the Chehalis Basin should be addressed, in a coordinated fashion, to sustain healthy fish and wildlife populations.

What does “habitat” mean?

Habitat is defined as the environment in which an organism or biological population usually lives or grows. In the Chehalis River Basin, an estuary, river, stream, creek, lake, pond, wetland, or riparian area all qualify as aquatic habitat. Approximately 3,353 linear stream miles drain 2,660 square miles in the Chehalis Basin that native fish and wildlife rely on as their habitat (Smith 2001). Upland habitat includes forested communities and prairies. Conditions in all of these habitats range from relatively undisturbed natural areas to areas that have been significantly impacted by human activity.

Why is habitat included as an issue?

The Chehalis Basin Partnership (CBP) chose to address ‘habitat’ in its watershed management planning efforts for the Chehalis Basin. This interest was echoed by citizens who attended four public outreach meetings for watershed planning held in 2002; they identified restoring and protecting habitat as issues that should be addressed through the watershed plan. They also expressed a desire to continue their use of the natural resources of the basin, including fishing, hunting, and surface water. Surface water is used for irrigation, drinking water, and agriculture.

What habitat-related work is underway?

Currently, numerous efforts are underway to address habitat in the Chehalis Basin. This work is encouraged and funded through numerous programs, including the following:

- Watershed Planning Act, RCW 90.82
- Salmon Recovery Act, RCW 77.85
- US Fish and Wildlife Service’s Chehalis Fisheries Restoration Program

- Chehalis Basin Fisheries Task Force
- Army Corps of Engineers' Ecosystem Restoration Study
- Confederated Tribes of the Chehalis

Many participants, including local citizens, counties, cities, state agencies, federal agencies, Indian tribes, and conservation districts dedicate countless hours and resources for habitat restoration/preservation efforts. Coordination of these efforts is needed to make the most efficient use of these efforts.

What do we know about habitat in the Chehalis Basin?

Rivers are sensitive indicators of environmental stress, as shown when excess sediment supply and channel adjustments occur due to deforestation, overgrazing, land development and other watershed activities that create impacts on stream systems. . If we are to successfully co-exist with the river, we must better understand the consequences of our actions on river systems and associated values. This will be especially important as human population continues to increase and the number of competing and conflicting uses associated with our rivers also increases.

Natural rivers, which are self-constructed and self-maintained, constantly seek their own stability (Leopold et al., 1964). Unfortunately, for flood control and drainage purposes, rivers have been straightened, leveed, deepened, over-widened, lined with foreign materials, steepened, diverted, and altered in a manner to decrease their natural function and stability. Such alterations have created major and continuing maintenance problems, promoted a high risk for failure, and, as a consequence, the loss of many of the natural resource values of the river . For example, the removal of the most woody debris from streams leads to severe channel instability as the normal flow regimes create numerous debris torrent events that scour the channels down to bedrock. This effectively destroys fish habitat for numerous species of anadromous fish (Rosgen, 1996).

- The following fish species have been identified as “at risk” within the Chehalis Basin (WDFW 2003). **State Sensitive:** Coho Salmon (*Federal Candidate*)
- Coastal Cutthroat Trout (*Federal Species of Concern*)
- Bulltrout (*Federal Threatened*)
- Olympic Mudminnow (*State Sensitive¹*) (*found only in the Chehalis Basin*)

The information in the table to the right is from the Chehalis Basin Limiting Factors Analysis Report (Smith 2001). Priority subbasins were established to evaluate and allocate grant funding for some salmon habitat restoration and

1. State Sensitive is native species that is vulnerable or declining and is likely to become endangered or threatened in a significant portion or its range within the state without cooperative management or removal of threats)

preservation projects. This list does not indicate priorities for all fish and wildlife preservation and restoration efforts.

What factors limit salmon habitat in the Chehalis Basin?

Many factors influence the health of salmon habitat. In the Chehalis Basin, the following factors have been identified, but many are not fully understood because of limited field information.

- Sedimentation
- Channel conditions (incision, aggradation, etc)
- Water usage
- Water quality
- Salmonid escapement estimates
- Fish habitat use and distribution
- Stream flow
- Instream and off-channel habitat components (pools, large woody debris, etc)
- Riparian conditions
- Land cover
- Fish habitat blockages

Estuarine Habitat

Grays Harbor and the lower portions of rivers that drain into Grays Harbor that are influenced by salinity are considered to be estuarine habitat. Estimated estuarine habitat loss in Grays Harbor is low (30%) compared to other areas in Washington State. Grays Harbor provides vital feeding and transitional habitat for salmonids, both when juveniles leave the rivers to enter saltwater and when adults return to the rivers to spawn.

North Bay is relatively undeveloped while the inner harbor is heavily industrialized (Smith 2001). Smith also notes that Pulp mills, landfills, sewage treatment plants, and log storage facilities are all located in the inner harbor. In addition, the inner harbor is regularly dredged. However, high quality estuarine habitat exists in areas such as Bowerman Basin, which is a National Wildlife Refuge, and Elk River, which is a WDNR Natural Area.

Water Quality

Documented water quality problems in the Chehalis Basin include high temperature and low dissolved oxygen. For more information on this topic, please refer to the Water Quality Issue Paper.

Water Quantity

Low summer flows are a problem throughout much of the Chehalis Basin. For additional information on this topic, please refer to the Water Quantity Core Issue Paper.

Current CBP Subbasin Prioritization for Habitat Restoration

refer to Chehalis Basin Plan for Habitat Restoration for specific subbasin habitat needs

High Priority Subbasins

- Chehalis River Mainstem
- Grays Harbor Estuary
- Satsop River
- Humptulips River
- Wynoochee River
- South Fork Chehalis River
- Skookumchuck River
- Newaukum River
- Black River
- Hoquiam River
- Wishkah River

Medium Priority Subbasins

- Upper Chehalis/tribs (upstream of Pe Ell)
- Johns River
- Cloquallum River
- Elk Creek (WRIA 23)
- Mox Chehalis Creek
- Delezene River
- Rock/Williams Creeks
- Garrard Creek
- Lincoln Creek
- Scatter Creek
- Elk River

Low Priority Subbasins

- Porter Creek
- Cedar Creek
- Stearns Creek
- Bunker Creek
- Rock Creek (near Crim Creek)
- Salzer Creek
- Gibson Creek
- Newman/Vance Creek
- Workman Creek
- Independence Creek
- Dillenbaugh Creek
- Newkah, Charley, O'Leary, Stafford, Indian, Chapin Creeks

Riparian

Riparian degradation is extensive throughout the following subbasins:

- Wynoochee
- Satsop
- Cloquallum
- Garrard
- Lincoln
- Skookumchuck
- Newaukum
- Salzer
- Bunker
- South Fork Chehalis

The lower reaches of most of the other subbasins have “poor” riparian conditions. Where levels of instream LWD are known, they are generally low. . Loss of multi-story riparian vegetation causes reduced shading of the water, which leads to increased water temperature. Also, non-native invasive plant species can dominate the riparian zone, leading to decreased habitat complexity and benefits.

Sediment

Excess sediment delivery is a major problem throughout most of the subbasins. The high levels of sedimentation coupled with the low levels of LWD result in high sediment transport rates. This can increase the impact of scour, channel incision, and width-to-depth ratios, resulting in less habitat complexity. Dredging impacts, which include channel deepening and spoil deposition, are another concern in Grays Harbor.

Local bank erosion is common and can occur naturally throughout the Chehalis Basin. Bank erosion can also be exacerbated by human activities. Subbasins with high levels of bank erosion include:

- Wynoochee River
- Satsop River
- Newman Creek
- Porter Creek
- Gibson Creek
- Black River
- Skookumchuck River
- Newaukum River
- Stearns Creek
- South Fork Chehalis River
- Crim-Rock Creek
- Upper Chehalis River
- Elk Creek
- Scammon Creek
- Lincoln Creek
- Rock/Williams Creeks
- Workman/Delezene Creeks

In the Chehalis Basin large sediment loads originate from the Satsop, Wynoochee, Newaukum, South Fork Chehalis, and upper Chehalis subbasins. Possible causes of excessive sedimentation are:

- Loss of riparian vegetation along the mainstem (mainly as a result of agriculture and urbanization) coupled with conversion of conifer to hardwoods.
- Lack of LWD.

- Landscape alterations (i.e., ditches, dikes, drain tiles, etc.).
- Increase in magnitude of peak flows caused by forest management activities.

The density of roads, measured in miles of road per square mile, is a common indicator of potential sediment impacts in a watershed because forest roads are frequently a major source of sediment. Where roads have been built on moderate to steep slopes, landslides are one of the greatest problems, and sidecast roads, where loose sediment is piled on the hillside, pose a notable risk. In the Chehalis Basin, the following subbasins have high road densities:²

- | | |
|----------------------|--------------------------------|
| • Upper Chehalis | • Elk Creek |
| • Scatter Creek | • Rock Creek (near Crim Creek) |
| • Stearns Creek | • Black River |
| • Skookumchuck River | • Lincoln Creek |
| • Newman Creek | • Independence Creek |
| • Mox Chehalis Creek | • Elk River |
| • Delezene Creek | • Johns River |
| • Workman Creek | • Wishkah River |
| • Bunker Creek | • Hoquiam River |
| • Newaukum River | |

Road densities are also an indicator of potential fish habitat blockages. Using NMFS standards, none of the subbasins in the Chehalis Basin rate “good” for road density; most rate “poor.”

Channel Incision

The main stem Chehalis River has been severely impacted by channel incision, which is thought to be caused by:

- Debris torrents in the upper Chehalis.
- Increased sediment transport due to increased sediment loads from tributaries coupled with an extensive loss of LWD.
- Increased peak flows due to changes in land cover vegetation.
- Landscape alterations (i.e., ditches, dikes, drain tiles, etc.).

Floodplain impacts

Many fish species rely on river/floodplain features beyond the main channel. These features include mature, healthy, diverse vegetation, organic debris of various sizes, and side- and off-channel submerged areas. For example, the Chehalis basin is the second greatest coho salmon smolt producer in Western Washington (Seiler 2000), and coho salmon depend heavily on side-channel and off-channel rearing habitat.

² According to NMFS criteria, high means more than three miles of roads/ square mile.
Last Revised March 20, 2003 (alternative solutions added 3/24/03)

Unfortunately, many human activities damage these floodplain features. Examples of these activities include wetland draining and filling (such as for urbanization or agriculture), removing riparian vegetation, straightening the river channel and reinforcing the river banks with artificial materials like riprap. Increased sediment transport (leading to channel incision) may also be a factor in the Chehalis Basin. The loss of LWD has likely contributed to a loss of side-channel habitat.

Table 2 summarizes documented floodplain impacts in the Chehalis Basin in three categories: excellent habitat, poor habitat, and areas where specific issues have been identified.

Table 2: Known Floodplain Impacts in the Chehalis Watershed	
Excellent floodplain habitat	<ul style="list-style-type: none"> Lower mainstem Chehalis from RM 1-11
"Poor" floodplain due to bank protection and channelization	<ul style="list-style-type: none"> Lower Skookumchuck River. Hanaford Creek
Other floodplain impacts such as channel incision or loss of refuge habitat have been identified in parts of the following subbasins (not enough data to rate high, medium, low)	<div> <ul style="list-style-type: none"> Newaukum River Satsop River Wynoochee River Wishkah River Hoquiam River <ul style="list-style-type: none"> Newman Creek Cloquallum Creek China Creek Salzer Creek Stearns Creek </div>

How does streamflow affect ecology?

Water is a critical part of the habitat of fish, and the variability of water, both surface, and subsurface, has a direct effect on fish life histories and fish survival. All the salmonids (chum, coho, Chinook, steelhead) depend on having adequate flow in fall to reach spawning grounds and adequate flow in spring to out-migrate. Chum salmon, for instance, enter the Grays Harbor tributaries between early October and mid-December; spawning peaks in mid-November. The chum fry start their way oceanward in February, March and April, after a short stay in the streams.

It is important to remember that fish in the Chehalis Basin have evolved their life history strategies in response to the natural flow regime as it existed prior to European settlement (Bunn and Arthington 2002, Quinn and Quak 2003). Withdrawals of surface water from streams and rivers by basin residents can affect the natural hydrologic flow regime and, therefore, impact where fish live. Changing the natural flow patterns may make conditions hostile to the fish that live there. For example, fish may be less successful in reaching their spawning grounds, incubating their eggs to hatching, rearing, or migrating downstream, and, subsequently, those species' numbers may decline

Periodic flooding is also important to the ecology of a stream. Flood flows maintain the natural hydrology of a river by allowing the river to meander unconstrained and to create off-stream channels. These channels are then utilized by Coho and other fish species for over winter rearing.

What role do ocean-derived nutrients play?

Ocean-derived nutrients are important to aquatic ecosystems and their component parts, whether primary producers, scavengers, browsers, or predators (Michael 2002). Basically, a salmon fry emerges in freshwater streams/river and resides in these waters for a certain period of time (length of time depends on the species). While residing in these waters, these juvenile fish feed upon prey until they reach a point (ranging from a few weeks to a year or more) at which time they migrate to saltwater as smolts (usually in the spring). At this point the salmon remain in saltwater from one to four years feeding on oceanic prey species, which are the major contributor to the salmon's overall growth. Later, the salmon returns to its natal stream with these consumed ocean-derived nutrients and deposits them in the freshwater system through its decomposing carcass after spawning. Although juvenile salmonids have been observed directly feeding from spawned-out salmon carcasses, the main benefit of these carcasses is the nutrient load taken in by primary producers, that, in turn, are consumed by juvenile salmonid prey (macroinvertebrates).

What technical resources are available?

In addition to the Limiting Factors Analysis and other literature cited, two other plans have been developed for the basin: the Chehalis Basin Plan for Habitat Restoration and Chehalis Basin Salmonid Habitat Restoration and Preservation Work Plan. The Chehalis Basin Partnership established a Steering/Technical Committee with representatives from state, tribal, federal, local agencies and citizens to address and make recommendations on a variety of issues in the basin, including habitat issues. This committee has met monthly since 1999.

Technical resources available to the Steering/Technical Committee and the Partnership include:

- Ecosystem Diagnosis and Treatment model (EDT) to be completed in the near future for part of the Basin;
- Historical hydrologic modeling now being done by the Army Corps of Engineers' and
- An Instream Flow Incremental Methodology (IFIM) study soon to be completed for six sites in the Chehalis basin by a team from Ecology and WDFW.

In addition, the Chehalis Basin Partnership sponsored a Level 1 Assessment and has done Level 2 work through watershed planning grants. The USFWS surveyed habitat degradation throughout the Chehalis Basin and reported findings in a 1993 report titled, "Chehalis River Basin Fishery Resources:

Salmon and Steelhead Habitat Degradations.” These documents address a wide variety of resource and water issues in the basin, including habitat.

What are some potential solutions?

A) **Leave current habitat restoration structure as it is.**

This is the status quo alternative. It would continue ongoing assessments, field inventories, and project implementations. Although the current efforts are effective for habitat restoration in the Chehalis Basin, they are not the most efficient. The current structure does not allow for consistent communication and interaction amongst the various groups involved in habitat restoration in this basin.

B) **Develop a better communication structure among the various groups involved in habitat restoration within the Chehalis Basin.**

- Create a contact list of all active groups / participants in the Chehalis Basin active in the habitat restoration effort. This would be a useful tool for potential project sponsors to coordinate partnerships and project development.
- Communicate group efforts and accomplishments through the CBP and/or existing Lead Entity on a regular basis.
- Develop a Lead Entity Technical Advisory Group that meets on a regular basis (monthly/bi-monthly) for project review, technical assistance, strategy revisions, project updates, monitoring strategy development, etc.

C) **Develop a comprehensive basin-wide habitat restoration / preservation effort.**

C1) Create a central non-profit organization to coordinate basin restoration activities to:

- Serve as a clearinghouse for data in the Chehalis Basin;
Provide assistance to residents of the Chehalis Basin on fish and wildlife recovery, similar to the ‘cooperative extension’ model;
- Provide eligibility for various grant funds and not rely solely on state funds.
- Develop and/or utilize existing database systems that manage data collected and projects implemented. This system could be GIS (Geographic Information System)-based software or some combination of software applications such as the Corps Ecosystem Restoration/EDT product, if appropriate.
- Establish a Technical Advisory Group, which meets regularly (monthly/bi-monthly) for project review, technical assistance, project updates, and strategy revisions.
- Develop a ‘small’ project (\$5,000 or less) funding source and process.
- Develop a group of volunteers to work on projects as they arise, or coordinate with local Regional Fish Enhancement Groups to make use of volunteer labor.

- C2) Work towards developing a single habitat restoration strategy (e.g., *Chehalis Basin Plan for Habitat Restoration*). Components of the strategy could
- Inventory and categorize habitat areas in the Chehalis River Basin;
 - Develop strategies that identify, protect, and preserve all high quality habitat areas;
 - Identify habitat areas of moderate quality for restoration and connectivity to high quality areas;
 - Work with stakeholder groups to develop criteria for prioritizing areas for restoration and connectivity;
 - Work with local, state, federal and tribal entities to fund preservation and restoration efforts;
 - Document in the strategy the current funding sources with the funding schedules, project requirements, funding restrictions, and contact information.
- C3) Develop a monitoring strategy for determining how effective habitat enhancement efforts have been, for instance, have fish returned to sites where enhancement (culverts, planting, large woody debris placement) has been completed?
- C4) Educate the public about how they can best protect habitat on their own land. This was a message consistently heard at the public hearings. Suggestions include:
- Phone list of agency personnel who can help individual residents;
 - Listing of grants, possibly placed on a website, that individual landowners and small groups can apply for to enhance habitats on their own or public lands;
 - Publications such as “Drops of Water” to provide information to the basin’s residents;
 - Fund school education efforts so that future generations understand the basin, its habitats, and human, fish, and wildlife residents.

How could the cost-effectiveness of habitat recommendations be assessed?

It is difficult to put a cost on habitat. Residents in the Basin all depend in one way or another on the resources of the basin including: hunting, fishing, clam digging, drinking water, wood products, agriculture, recreational and

commercial boating, and residential. Impacting habitat also affects those activities that rely upon a healthy environment.

Currently, multiple funding efforts in the Chehalis Basin are focused on salmonid habitat restoration, and no single, consistent method is used for identifying, reviewing, or prioritizing salmonid habitat restoration projects. A mechanism needs to be developed to coordinate these efforts in a manner that is easy for potential project sponsors to utilize. Ultimately, a user-friendly process will result in participation from individuals who may be reluctant to participate in the current processes.

How could the recommendations be implemented?

The Partnership may wish to consider creating an organization group such as described above in “solution option C”. This group would then carry out the recommendations put forth here and others as needed.

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Alternative Solutions

<i>Alternative Solution</i>	<i>What Do You Get With This Solution</i>	<i>Comments</i>
1. Rely on recommendations and priorities from 2496 process and strategy, but have watershed management plan recommend organizational and coordination components	<ul style="list-style-type: none"> • Coordinated, consistent priorities, with implementation funding and mechanism • Defines organizational and coordination approaches 	Organizational components would address who would be responsible, what organization might track progress, how this effort would be coordinated with other efforts
2. Rely on Army Corps habitat study and implementation effort, but have watershed management plan recommend organizational and coordination components	<ul style="list-style-type: none"> • Coordinated, consistent priorities with implementation funding and mechanism • Provides input into Strategy Plan • Defines organizational and coordination approaches 	Organizational/coordination components would address who would be responsible, what organization might track progress, how this effort would be coordinated with other efforts
3. Develop habitat project priorities	<ul style="list-style-type: none"> • Provide coordinated, consistent habitat improvement plan and priorities 	
4. Develop a community outreach program for habitat elements	<ul style="list-style-type: none"> • Provide Chehalis Basin residents with general/specific knowledge of program • Use existing groups to provide information 	
5. Informational person (Water Master, WSU Extension, WDFW, USFW, Other?) for folks to provide information about habitat, BMP's for land owners, funding, etc.	<ul style="list-style-type: none"> • Address property owner concerns about options available for managing land while minimizing water resource impacts 	
6. Coordinated multi-agency approach including USFW, WDFW, others	<ul style="list-style-type: none"> • Watershed plan would provide coordinated, consistent priorities with implementation funding and mechanism • Provides input into Strategy Plan • Defines organizational and coordination approaches 	Organizational components would address who would be responsible for each element, what organization might track progress, how this effort would be coordinated with other efforts
7. Develop/identify a "small project" funding source (for projects in the up-to \$20,000 range?)	<ul style="list-style-type: none"> • Small projects that normally do not receive funding can be funded • Allows for smaller land owners to become involved and knowledgeable of habitat improvement methods 	

Management Framework

Chehalis Basin Watershed Planning Issue Paper

What is the issue?

This paper addresses the issue of which legal entity or entities will be responsible for oversight of and funding for implementation of recommendations in the Chehalis Basin Watershed Plan.

The Watershed Planning Act does not specify how watershed plan implementation should be managed. Planning Units such as the Chehalis Basin Partnership do not by themselves have the authority in state law to carry out water resource or land management actions necessary to effectively manage the watershed. Moreover, implementation is likely to be complicated because the geographic area the management framework encompasses is the entire Chehalis Basin. Some recommended solutions may impact small areas that involve a single local jurisdiction, while others will cross many jurisdictional boundaries. It will be necessary to coordinate Plan implementation and management across jurisdictions as small as local water districts and as large as the state and federal government.

What entities have jurisdiction and authorities in the Chehalis Basin?

The Chehalis River basin (the Basin) covers 2,500 square miles and involves numerous government jurisdictions, listed in the table at right. An asterisk indicates membership in the Chehalis Basin Partnership.

The Chehalis Basin Partnership (the Partnership) is a broadly representative body that is already focused on water issues. The Partnership will play a vital role in facilitating and overseeing the formation and execution of agreements for water resources management.

Who should be involved in Plan implementation?

The management framework for implementation of the Chehalis Basin Watershed Plan must involve all member agencies of the Partnership. While all of these agencies will not need to participate in day-to-day management decisions, they may be asked to sign Inter-Local or other voluntary agreements targeted at efficient, equitable and effective water resource use in the Basin.

What current programs and funding can facilitate implementation of Plan recommendations?

The Watershed Planning Act provides funds to develop watershed plans but

The Chehalis River basin involves numerous government jurisdictions

Counties

Grays Harbor County*
Lewis County*
Mason County*
Thurston County*
Pacific County
Jefferson County
Cowlitz County
Wahkiakum County

Cities

Aberdeen*	Bucoda
Centralia*	Chehalis*
Cosmopolis*	Elma*
Hoquiam*	McCleary*
Montesano*	Napavine*
Ocean Shores*	PeEll*
Tenino	Westport*

Tribes

Confederated Tribes of the Chehalis*
Quinault Indian Nation

Water Purveyors

Boistfort Valley Water Company
Grays Harbor County Water District #2

Other

Port of Chehalis*
Chehalis Basin Fisheries Task Force
US Fish & Wildlife Service
US Forest Service
National Park Service
US Army Corps of Engineers
US EPA
WA Dept. of Agriculture*
WA Dept. of Ecology*
WA Dept. of Fish & Wildlife*
WA Dept. of Natural Resources*
WA Dept. of Health

not to implement them. The Partnership (or the designated managing entity for the Watershed Plan) must take advantage of existing programs, plans, and their associated funding to implement Plan recommendations and maximize the effectiveness of water resource management in the Basin. Among others, these programs and plans. include:

Funding Sources

- Watershed Planning Act – Phase 4 Funding
- US Army Corps of Engineers Ecosystem Restoration Study
- Salmon Recovery Funding via ESHB 2496

Coordinating Efforts

- City & County Comprehensive Plans
- Coordinated Water System Plans
- Monitoring and Enforcement Programs
- Surface or Storm Water Management Plans
- Total Maximum Daily Load Studies
- Shorelines Management Act Plans

Technical

Available science begins with the Chehalis Basin Level 1 Assessment and the more than 100 studies and reports it summarizes. Additional technical work performed under Level 2 of the watershed planning effort will also be utilized, including:

- Water Quantity Evaluation
- Instream Flow Gauging
- Water Storage Assessment
- Water Quality Monitoring Program

The entity or entities responsible for management of Chehalis Basin water resources must ensure that new studies are added to the body of existing knowledge and are used in updates to the Watershed Plan and subsequent policies or actions.

What are some possible solutions?

Coordination of effective water resource management will be a challenge because of the number of jurisdictions and stakeholders in a river basin the size of the Chehalis, but it can be accomplished. Mechanisms to achieve coordinated management include:

- Voluntary Inter-Local Agreements,
- Creation of a broadly representative governing body to oversee implementation (for example, the Chehalis Basin Partnership could incorpo-

rate as a legal entity and become the “Implementation Lead Agency”), and/or

- Creation of a Funding and Implementation Committee.

Two additional options are envisioned in the Implementation Committee report to the State Legislature:

- Establishment of a Water Master who would be empowered to make decisions related to water withdrawals, water right transfers, etc.
- Creation a Water Resources District to handle water resource management decisions and to fund the implementation of these decisions. (Potentially, the Partnership could apply to become a Water Resources District, should that type of special district eventually be authorized to levy taxes to fund water resource management.)

If the Partnership does not want to pursue either of these options, the local governments of the Basin must carry much of the implementation load.

What actions are recommended?

1. Voluntary Inter-Local Agreements designed to preserve the health and integrity of the basin’s water resources.
2. Funding & Implementation Committee (either a sub-committee of Steering/Technical, or added duty for STC)
3. Creation of a legal entity that is a broadly representative governing body to oversee implementation: recommend CBP become a legal entity (Council of Governments, Water Resources District if legislatively created, or other)
4. Establishing/appointing a Water Master to make decisions on water withdrawals, water right transfers, etc.

Jurisdictional participation needed for implementation

Ideally, entities participating in implementation of recommendations will include all jurisdictions in the Basin and all water resource interests on the Partnership, including the those listed at right.

Implementation funding

Funding for water resources management in the Chehalis Basin is a significant issue, one that will continue to loom large into the future. There has already been an impressive commitment of volunteer hours by the citizen representatives on the Partnership and the Citizens Advisory Committee; it is hoped that this level of commitment will continue. As mentioned, it would be wise to establish a Funding and Implementation Committee of the Partnership, perhaps as an offshoot of the Steering/Technical Committee. The Partnership should continue to take advantage of substantial resources that may be available through grants (e.g., Salmon Recovery Funding Board, Centennial Clean Water Fund, etc.).

Ideal implementation participants include all municipalities in the Basin and all resource interests on the Partnership.

Counties

Grays Harbor	Lewis
Mason	Thurston

Cities

Aberdeen	Centralia
Chehalis	Elma
Hoquiam	McCleary
Montesano	Napavine
Ocean Shores	PeEll
Westport	

Tribes

Chehalis Confederated Tribes
Quinalt Indian Nation

Port Districts

Port of Grays Harbor
Port of Chehalis

Water Supply Utilities

Boistfort Valley Water
Grays Harbor Water District #2

State & Federal Agencies

US Army Corps of Engineers
US Department of Agriculture
US EPA
US Fish & Wildlife
US Forest Service
Washington State Departments of Ecology
Fish & Wildlife
Natural Resources

Voluntary Agreements Between Local Governments

*Supplement Section VI –
Issues/Recommendations
Part B – Issue Papers*

Chehalis Basin Watershed Planning Issue Paper

Topic/Issue: Voluntary Agreements between local governments¹

Members of the Chehalis Basin Partnership (the Partnership) have clearly expressed a strong preference for avoiding additional regulations if an issue can be addressed using either existing regulations or voluntary agreements between local governments (including tribes) and other water users.

The issue is how voluntary agreements can be structured so that they successfully address issues and produce desired changes in policy and behavior. The Partnership has not yet discussed this issue.

What is the background to this issue?

The Partnership is a broadly representative body for the basin that is already focused on water issues. As such, the Partnership can and should play a vital role in the formation and execution of agreements for water resources management. Because the specific actions and language in voluntary agreements must be based on available technical information, voluntary agreements should be developed under the guidance of the Partnership's Steering/Technical Committee or by the Partnership itself.

Technical

Voluntary agreements could take the form of Memoranda of Understanding or Inter-Local Agreements. The latter are more legally binding than the former and may be more appropriate because RCW 90.82 requires governments to act on agreements in watershed plans that are approved by county legislative authorities.

The technical information needed to support the development and implementation of voluntary agreements is largely available. Most of the data were compiled during the watershed planning process, either for the Level 1 Assessment or as part of Level 2 studies. Additional data on instream flow levels are needed over the long term to inform the Partnership about the condition of stream flows and the possible effects of actions taken to implement voluntary agreements made during the watershed planning process. Other data needs can likely be met through existing government programs or resources, whether state, federal, local or tribal.

1. This paper deals with voluntary agreements between government agencies to act on Watershed Plan recommendations. Voluntary actions by water users of the Chehalis basin as a result of this Plan are a separate issue, covered primarily in the Water Conservation issue paper.

The State Department of Ecology's Phase 4 Implementation Report lists criteria necessary for managing implementation of specific actions recommended in a watershed plan:

1. Effectiveness in working across local jurisdictional boundaries
2. Legal authority to construct and maintain projects and to implement water resource management programs
3. Adequate staffing, financial resources, and technical capability to construct and maintain projects and to implement water resource management programs
4. Local leadership and accountability, including involvement by elected officials
5. Preservation of independent decision-making authority of local governments and organizations with regard to their facilities and responsibilities
6. Minimization or avoidance of new layers of bureaucracy and regulation, including permitting requirements affecting local citizens and business activities

The Partnership already meets criteria #1, 4, and 5 and can assist with 6. Criterion #2 can be fulfilled by member agencies who possess such legal authority or by the Partnership if it were to become a legal entity. With respect to #3, Grays Harbor County has set a precedent by supplying the staff time of Lee Napier from its Department of Community Planning to coordinate Salmon Recovery and Watershed Planning for the Partnership.

Possible Solutions & Toolbox

The Partnership should consider creating a Funding and Implementation Committee (analogous to the Steering/Technical Committee) or adding funding and implementation issues to the duties of the Steering Technical/Committee so that these issues receive the serious attention they need and deserve.

The Partnership could consider reconstituting itself as a legal entity to enable it to make and implement voluntary agreements that will produce policies and behaviors that will benefit water resources in the basin.

If the Partnership were to become a legal entity, it could:

- Apply for grant funds to support implementation of solutions
- Hire a Water Resources Coordinator for the Chehalis Basin who could:
 - Oversee water quality and other monitoring efforts
 - Review existing government data-gathering programs or resources, whether state, federal, local or tribal
 - Follow through on correspondence, data requests, lobbying and other communications with government agencies

- Levy taxes or collect fees to help fund management of water resources

While the specific actions and language outlined in voluntary agreements must be developed under the guidance of the Partnership's Steering/Technical Committee or by the Partnership itself, a partial list of actions and topics to consider for voluntary agreements includes the following:

- Policies to reduce per capita water use through voluntary conservation measures, especially in summer months
- Policies encouraging or mandating low impact development to:
 - Absorb surface water and minimize stormwater runoff (on-site stormwater management options now include impervious surface area reduction, permeable pavements, vegetated swales, and soil rehabilitation)
 - Protect existing healthy riparian corridors
 - Avoid water-intensive development
- Support for irrigation methods that use water efficiently
- Public information to encourage citizens to make changes that will have positive effects on water resources

Recommendations

The citizens and governments of the Chehalis Basin are fortunate to have a relatively undeveloped land base. With proper management, the basin has the potential to achieve and maintain healthy water resources throughout the basin.

- Governments participating in the Partnership would benefit from drafting and signing a series of voluntary agreements designed to preserve and improve the basin's ecological health and integrity.
- It is also recommended that the Partnership become a legal entity to oversee and coordinate implementation of agreements in the watershed plan to benefit water resources management in the basin.

Implementation

While funding for water resources management in the Chehalis Basin is a significant issue and is likely to remain so into the future, there has already been an impressive commitment of volunteer hours by the citizen representatives on the Partnership and Citizens Advisory Committee. It is highly desirable for this level of commitment to continue.

In addition, substantial resources may be available through grants, and the Partnership should continue to take advantage of these (e.g., Salmon Recovery Funding Board, Centennial Clean Water Fund, etc.)

