

Watershed Management Plan

Skokomish-Dosewallips Water Resource Inventory Area (WRIA 16) Including the WRIA 14 South Shore Sub-basin

May 11, 2006

As Adopted by the WRIA 16 Planning Unit



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Acknowledgments

The WRIA 16 Planning Unit, active since 1999, deserves primary credit for developing this watershed plan. Through countless hours of research, discussions, and meetings, the Planning Unit initiated or contributed to the findings presented in this report and developed the numerous recommendations.

The following table lists the WRIA 16 Planning Unit members at the time of the plan's adoption.

Planning Unit Members	Primary Representative	Alternate Representative
<i>Initiating Governments</i>		
Jefferson County	David Sullivan	Tami Pokorny
Mason County	Tim Sheldon	Pam Bennett-Cumming
Mason County PUD #1	Debbie Knipschield	Ron Gold
Washington State Dept. of Ecology	Phil Wiatrak	
Skokomish Tribe	Guy Milller	Marty Ereth Jeff Heinis Jack Turner
<i>Other Voting Members</i>		
Agriculture Interests	<i>Vacant</i>	
Citizen Interests – Jefferson County	George Sickel	Bud Schindler
Citizen Interests – Mason County	Barbara Levette	
Development Interests	Doc Allott	
Environmental Interests	Constance Ibsen	
Forestry Interests	<i>Vacant</i>	
Growth Management Interests	Warren Dawes	
Jefferson County PUD #1	Bill Graham	Wayne King
Lake Issues	George Fisher	
Port Districts	Frank Benavente	
Realtors and Builders	<i>Vacant</i>	
Recreation Interests	Frances Arnold	
Shellfish Industry Interests	Henry Bloomfield	
<i>Non-Voting Members (Ex Officio)</i>		
Hood Canal Coordinating Council	Dave Christensen	
Hood Canal Salmon Enhancement Group	Dan Hannafious	Neil Werner
Mason County Conservation District	Shannon Kirby	
Puget Sound Action Team	Stuart Glasoe	
Washington Sea Grant	Teri King	
WA State Dept. of Fish and Wildlife	Bob Burkle	
WA State Dept. of Transportation	Ken Stone	

Susan Gulick of Sound Resolutions served as project manager and facilitator for the WRIA 16 Planning Unit. Peter Erickson of Cascadia Consulting Group was the primary plan writer, with contributions from Susan Gulick. Marley Shoaf, Laura Blackmore, Christy Shelton, and Colleen Thumlert of Cascadia Consulting Group also contributed to the plan, as did several Planning Unit members.

Bill Graham of the Jefferson County PUD #1 took the photos on the cover, as well as most of the photos within this watershed plan.

Mike Woodall at the Washington State Department of Ecology produced the full-page maps.

Summary of Watershed Plan

The Skokomish-Dosewallips watershed – or Water Resource Inventory Area (WRIA) 16 – is located on the eastern slope of Washington State’s Olympic Peninsula. Bordering the western and southern shores of Hood Canal, the watershed’s 670 square miles of diverse landscape cover an area from the snow-capped Olympic Mountains at over 7,000 feet high to the low-lying floodplains of the Skokomish River Valley. A rural area with a growing population and a strong summer tourist season, WRIA 16 has approximately 8,000 permanent residents, most of which reside along the shore of Hood Canal. The largest communities in the watershed are Brinnon, Lilliwaup, Hoodsport, Potlatch, and Union.

WRIA 16 includes several rivers and streams that flow from headwaters in the Olympic Mountains down to Hood Canal, which is a natural, glacier-carved fjord that is part of Puget Sound. The largest rivers in the watershed are the Skokomish, Dosewallips, Hamma Hamma, and Duckabush rivers. Many smaller streams, some of which are intermittent, also flow directly into Hood Canal. Annual precipitation ranges from 250 inches per year in parts of the Olympic Mountains to approximately 60 inches per year along Hood Canal. The southern shore of Hood Canal, between Union and the western outskirts of Belfair, is also considered in this plan. Although technically part of the neighboring Kennedy-Goldsborough watershed (WRIA 14), Hood Canal’s southern shore is being considered here through agreement with the WRIA 14 Planning Unit to help consolidate planning for Hood Canal and the nearshore environment.

The economy in WRIA 16 relies largely on shellfish harvesting, commercial forestry, tourism, Christmas-tree farming, and some agriculture. Many WRIA 16 residents commute to employment outside WRIA 16 in communities such as Shelton or Port Townsend.

The Watershed Planning Process

In 1998, the Washington State Legislature passed the Watershed Management Act, codified in the Revised Code of Washington, Title 90, Chapter 82 (RCW 90.82). This law focuses on addressing water quantity, water quality, fish habitat, and instream flow at the local level. Under the act, the state grants funding to a Planning Unit, consisting of public agencies and non-governmental members, in each watershed. In the Skokomish-Dosewallips watershed (WRIA 16), the Planning Unit consists of a broad mix of entities, including Mason and Jefferson counties, the Skokomish Tribe¹, The Port of Hoodsport, Mason County Public Utility District #1, local community groups, citizen representatives, and other environmental, development, and recreation interests. The WRIA 16



WRIA 16 includes snow-capped mountains and lowland floodplains

The WRIA 16 Planning Unit has been working on watershed planning since 1999

¹ For a full discussion of the Tribe’s participation see the footnote on page 5.

Summary of Watershed Management Plan

Planning Unit has been working together on watershed planning since 1999. They adopted this watershed plan, which is intended to guide future water resource management in WRIA 16, on May 11, 2006. It was then adopted by the Mason and Jefferson county commissioners on [insert date].

WRIA 16's Water Resources

As part of its watershed planning process, the WRIA 16 Planning Unit has commissioned several assessments of WRIA 16's water quantity, water quality, fish habitat, and instream flow. These assessments provide a scientific foundation for watershed planning in the region, and they identified the following conditions in WRIA 16:

- **Water supply appears adequate in the short term, but more data are needed to assess expected future quantities and needs and to determine whether low summer flows impair fish habitat.** Stream flows are lower in the summer, and a rigorous analysis is needed to determine whether these lower flows are adequate to protect fish habitat and the other uses the streams provide. In addition, current data are insufficient to assess the continuity between ground and surface waters and provide other information that would help process applications for water rights in the watershed.
- **Water conservation would help avoid future water supply problems, particularly in high-growth areas such as the south shore of Hood Canal.** Water conservation may also help mitigate the possible long-term effects of climate change and may be needed to help address possible low-flow concerns in summer months.
- **Water-quality concerns do exist, as fecal coliform and stream temperature exceed state standards in several streams.** Fecal coliform and associated pathogens and nutrients can be a threat to public health as well as to the health of Hood Canal's aquatic ecosystems. High stream temperatures threaten habitat for a variety of organisms, including salmon.
- **Hood Canal suffers from low levels of dissolved oxygen.** WRIA 16 streams and stormwater runoff carry pathogens, nutrients, and chemicals from septic systems, highways, animal manure, and other sources into Hood Canal. Nitrogen in Hood Canal contributes to excessive algae and to the low dissolved oxygen problem in Hood Canal. Like other animals, marine life needs oxygen to survive. Low levels of dissolved oxygen are responsible for the widespread "fish kills" in Hood Canal that have affected thousands of juvenile perch and numerous fish, octopi, and sea cucumbers.
- **Saltwater intrusion may soon be a concern along the southern shore of Hood Canal.** Shoreline development of this area brings

The Planning Unit identified 19 key issues related to WRIA 16's water quantity, water quality, and habitat. These issues are briefly summarized at right. The Planning Unit will be addressing instream flow recommendations in a future, separate process

Summary of Watershed Management Plan

increased demand for water. Recent tests have indicated that increased pumping from aquifers in the area would likely lead to saltwater intrusion from Hood Canal into those aquifers.

- **Fish habitat has been compromised by development, land use, and historical forestry practices.** Roads and land development in the lower reaches of many streams have degraded stream habitat and limited fish access. Dike-building, stream-channeling, and removal of large woody debris have decreased habitat quality. Landslides in or near forest clear cuts have contributed excess sediment to creeks. Culverts and other barriers block fish migration in several creeks. And finally, bulkheads and shoreline development have degraded nearshore habitat.

The WRIA 16 Planning Unit considered the above conditions, together with numerous other issues identified by the group or by the scientific literature, as it developed recommendations for WRIA 16's water resources.

Overview of Recommendations for WRIA 16's Water Resources

The WRIA 16 Planning Unit brainstormed over 100 options to address the key issues it identified in the watershed. After reviewing these options, the Planning Unit developed its final recommendations, which were adopted by consensus on May 11, 2006.

The Planning Unit made recommendations concerning the following topics:

- **Expanded and coordinated monitoring of water quantity and quality, plus other information gathering:** prioritized water-quantity studies and funding, further water-quality monitoring, increased coordination among agencies, and new assessments;
- **Water conservation:** strategies for water conservation, including financial incentives;
- **Management of water supply and use:** planning activities to review and consider modifying the development, management, and exchange of the water supply to adapt and prepare for changing demands in WRIA 16;
- **On-site septic systems:** efforts to inspect, maintain, upgrade, or replace septic systems that pose risks to water quality in WRIA 16;
- **Animal waste:** strategies to reduce the water-quality impacts of animal manure and pet wastes;
- **Stormwater:** strategies to minimize impervious surface, preserve native vegetation, implement best management practices, establish buffers, and expand local government stormwater programs;

The WRIA 16 Planning Unit made numerous recommendations concerning the water quality, water quantity, and habitat of the watershed, including several recommendations addressing Hood Canal

Summary of Watershed Management Plan

*The Planning Unit's
recommendations appear
starting on page 34 of this
watershed plan*

- **Fish habitat:** support for numerous existing programs that are working to address habitat for salmon and other fish;
- **Hood Canal:** strategies to monitor and assess, review regulations and permitting requirements, educate the public, consider financial incentives, remove debris, and other activities related to water-quality and habitat impacts on Hood Canal;
- **Funding:** pursuit of a stable, ongoing funding source to enable implementation of this plan's recommendations;
- **Education and outreach:** communication of information and techniques to WRIA 16 residents and businesses;
- **Enforcement:** better enforcement of existing laws that would protect or improve water resources;
- **Support for ongoing activities, implementation, and other recommendations:** continued efforts by local governments to continue, improve, or integrate existing programs, functions, or planning efforts.

The details of each recommendation, as well as numerous other options considered, are discussed further in the full *Watershed Management Plan* and its appendices. The Planning Unit intends to refine and prioritize its recommendations when it completes an implementation plan during Phase IV of Washington's watershed planning process.

Table of Contents

1. Introduction and Background.....	3
1.1. Watershed Planning in WRIA 16.....	3
1.2. WRIA 16 Planning Unit.....	4
1.3. Document Organization	8
2. WRIA 16: State of the Watershed.....	9
2.1. Water Quantity.....	10
2.2. Water Quality	20
2.3. Habitat.....	27
2.4. Instream Flow	32
3. Recommendations: Water Quantity.....	34
3.1. Data Needs	34
3.2. Water Conservation	35
3.3. Water Supply and Use	35
4. Recommendations: Water Quality	37
4.1. Data Needs.....	38
4.2. On-site Septic Systems	39
4.3. Animal Waste	40
4.4. Stormwater	40
4.5. Other	41
5. Recommendations: Habitat	42
6. Other Recommendations	44
6.1. Hood Canal	44
6.2. Funding.....	48
6.3. Education and Outreach.....	48
6.4. Enforcement	49
6.5. Support for Ongoing Activities.....	50
6.6. Information Gathering.....	51
6.7. Plan Implementation.....	52

7. Implementing the Plan	53
8. Works Cited.....	54
9. Glossary	61
Appendix A. Sub-basin Summaries	65
Dosewallips Sub-basin	65
Duckabush Sub-basin.....	69
Hamma Hamma Sub-basin	72
Finch/Lilliwaup Sub-basin.....	76
Skokomish Sub-basin	80
South Shore Sub-basin.....	87
Hood Canal and the Nearshore Environment.....	92
Appendix B. Key Issues and Options: Water Quantity	95
Appendix C. Key Issues and Options: Water Quality.....	109
Appendix D. Key Issues and Options: Habitat	133
Appendix E. Addressing Cumulative or Cross-Cutting Issues	143
Appendix F. Options for Funding New Efforts	147
Appendix G. Supporting Documents	157

1. Introduction and Background

This document is a watershed management plan for the Skokomish and Dosewallips Rivers Water Resource Inventory Area (WRIA), also known as WRIA 16. WRIA 16, located in western Washington State, includes several watersheds that flow east from the Olympic Mountains into Hood Canal. The southern shore of Hood Canal, between Union and the western outskirts of Belfair, is also considered in this plan. Although technically a part of neighboring WRIA 14, Hood Canal's southern shore is being considered here through agreement with the WRIA 14 Planning Unit to help consolidate planning for Hood Canal and the nearshore environment. The largest rivers in WRIA 16 are the Skokomish, Dosewallips, Hamma Hamma, and Duckabush rivers; many smaller streams also flow directly into Hood Canal, which is part of Puget Sound. A map of WRIA 16 can be found on page 7.

This document represents the culmination of years of diligent and careful work by community members, scientists, government planners, private business leaders, landowners, and tribes. These and other involved parties have studied the watershed, identified issues and concerns, and developed recommendations for improving the water quantity, water quality, and aquatic habitat in WRIA 16.²

1.1. Watershed Planning in WRIA 16

Communities, industry, agriculture, and aquatic life all depend on reliable supplies of clean water. Yet in many areas of Washington, water quantity, water quality, and fish and wildlife habitat are threatened. To address these concerns, the State Legislature passed the Watershed Management Act in 1998. This Act provides a framework for local citizens, interest groups, government organizations, and tribes to identify and solve water-related issues collaboratively in each of 62 Water Resource Inventory Areas (WRIAs) delineated throughout the state. In its essence, the Act requires WRIAs throughout the state to determine the status of their own water resources and plan for future management.

The Act (and its amendment in 2003) identified the following stages to Watershed Planning.

- **Phase I – Assemble a Planning Unit.** The Watershed Planning Act enabled specific local governments to initiate watershed planning by forming local groups, termed *Planning Units*, to conduct the



*The Upper Dosewallips River
(photo by Bill Graham)*

*The Washington State
legislature passed the
Watershed Management
Act in 1998*

² A compilation of the Planning Unit's previous efforts can be found on the Department of Ecology's web page for WRIA 16, <http://www.ecy.wa.gov/apps/watersheds/planning/16.html>

1 Introduction and Background

Technical and scientific studies commissioned by the Planning Unit can be found on the Department of Ecology's web page for WRIA 16 planning, <http://www.ecy.wa.gov/apps/watersheds/planning/16.html>

planning. Table 1 lists the current members of WRIA 16's Planning Unit, a group that initially formed in 1999.

- **Phase II – Assemble the available science into Technical Assessments.** The Watershed Planning Act specifies that a Technical Assessment must be conducted to assemble the existing information on the watershed – information that will allow the Planning Unit to identify key issues and make sound recommendations. The WRIA 16 Planning Unit commissioned a compilation and review of existing data (termed a Level 1 Assessment), as well as some follow-up work to gather new data to fill gaps.
- **Phase III – Develop a Watershed Plan and make recommendations.** Third, Planning Units are directed to identify key issues in the watershed, develop strategies to address them, and make recommendations in the form of a Watershed Plan, such as this document. The Act defines a specific, consensus-based process for approving watershed plans.
- **Phase IV – Implement the Watershed Plan.** In accordance with the agreed-upon recommendations and actions documented in the Phase III Plan, Planning Units and other stakeholders may begin implementing recommendations from the Watershed Plan or they may develop a more-detailed implementation plan.

The WRIA 16 Planning Unit is proud to present this document, which represents the culmination of Phases I, II, and III of WRIA 16's watershed planning process.

1.2. WRIA 16 Planning Unit

Table 1 lists the interests and organizations represented on the WRIA 16 Planning Unit; these interests have participated in the process that created this watershed plan. Mason County serves as the lead agency for watershed planning in WRIA 16.



Mason County PUD #1 is a Planning Unit Member and the frequent site of Planning Unit meetings

Table 1. WRIA 16 Planning Unit Members

Initiating Governments (Consensus Approval)

Jefferson County
 Mason County (lead agency)
 Mason County Public Utility District #1
 Skokomish Tribe³
 Washington State Department of Ecology

Other Voting Members (Majority Vote Approval)

Agriculture Interests	Jefferson County PUD #1
Citizen Interests – Jefferson County	Lake Issues
Citizen Interests – Mason County	Port Districts
Development Interests	Realtors and Builders
Environment Interests	Recreation Interests
Forestry Interests	Shellfish Industry Interests
Growth Management Interests	

Ex Officio (Non-Voting Members)

Hood Canal Coordinating Council	Washington Sea Grant
Hood Canal Salmon Enhancement Group	WA State Department of Fish and Wildlife
Mason County Conservation District	WA State Department of Transportation
Puget Sound Action Team	



Big leaf maple trees near Staircase along the North Fork of the Skokomish River

³ The Skokomish Indian Tribe has participated in developing this plan in an effort to cooperatively work with neighboring governments and water users to improve the quality of the WRIA 16 watershed. The Tribe is concerned, however, that this plan not compromise its ongoing and future efforts in other arenas to protect and enforce tribal and individual members' rights, including but not limited to judicial and administrative proceedings as related to the Cushman Hydroelectric Project. Additionally, by Resolutions Nos. 98-76 and 00-19, the Skokomish Tribal Council declared that its participation not constitute agreement as to: (1) the availability of any surface or groundwaters in WRIA 16, at least during certain months of the year; (2) the amount of federally reserved rights in WRIA 16; (3) the estimated quantity of water available for further appropriation; and (4) any process that will interfere with its position in FERC licensing proceedings for the Cushman Project. Finally, the Tribe's participation does not constitute agreement that further studies are needed to determine the cause or degree of degradation in the WRIA 16 basin, or that higher instream flows will not substantially improve or resolve the degradation in WRIA 16 described in this plan.

1 Introduction and Background

For more information on the watershed planning process in Washington, please refer to the Department of Ecology's website on watershed planning at www.ecy.wa.gov/watershed.



Big-leaf maple trees in the Dosewallips valley

Once a watershed plan is completed, a Planning Unit can approve it either by consensus of all Planning Unit members or by consensus of the government members and a majority of the non-government members.

Once a plan has been approved by the Planning Unit it is forwarded to the county commissioners for adoption. If the plan is adopted, the lead agency and others can begin implementing the recommendations or conduct further planning to develop the details of implementation.

This watershed plan was approved by the WRIA 16 Planning Unit by consensus on May 11, 2006 and by the Mason and Jefferson county commissioners on [insert date]. The Planning Unit now intends to assemble an implementation plan during Phase IV of Washington's watershed planning process.

The Planning Unit recognizes that integrating watershed planning with the State's Growth Management Act can be a challenge. The Growth Management Act (codified primarily as RCW 36.70A) requires counties to designate and take measures to protect natural areas of critical ecological value, including wetlands, areas with a critical recharging effect on aquifers used for potable water, fish and wildlife habitat conservation areas, frequently flooded areas, and geologically hazardous areas. These objectives overlap with this Watershed Plan's focus on water quantity, water quality, and habitat. Because of this overlap and the more detailed treatment of water resources provided in this Watershed Plan, the WRIA 16 Planning Unit considers this Plan to be a tool that complements the Growth Management planning process.

1.3. Document Organization

After this introductory chapter, this document proceeds by describing the “State of the Watershed” (a summary of the existing conditions in the watershed), then describes the particular issues and the Planning Unit’s recommendations for addressing each issue.

In summary, the Watershed Plan includes these sections:

- **Chapter 2: State of the Watershed** provides an overview of the existing information concerning WRIA 16 in terms of water quantity, water quality, habitat, and instream flow, including a discussion of the key issues in the watershed. Note that this chapter includes summary information from all five WRIA 16 sub-basins, but more detailed information about each area can be found in the appendices. Note also that this watershed plan includes the south shore of Hood Canal (“South Shore,” a sixth sub-basin). Although this region is technically part of WRIA 14, it is considered here under agreement with the WRIA 14 Planning Unit to help consolidate planning for Hood Canal and the nearshore environment, two topics addressed by this watershed plan.

- **Chapters 3-6: Recommendations** presents the Planning Unit’s recommendations for addressing the key issues in the watershed. However, please note the following disclaimer.

Nothing in this plan creates an obligation for a Planning Unit member unless that member determines that funding is available. Government members may also prioritize tasks based on available funding and need. Many of these issues will be clarified in Phase IV of watershed planning, when the Planning Unit prepares a detailed implementation plan and begins implementation of the Watershed Plan.

- **Chapter 7: Implementing the Plan** summarizes the Planning Unit’s intentions for implementing this plan.

In addition, please see the appendices for more detailed information about WRIA 16; in particular, the appendices include a summary of each WRIA 16 sub-basin – information which helped inform the “State of the Watershed” chapter, as well as descriptions of the options the Planning Unit considered in developing its recommendations.

Watershed Plan Chapters

1. Introduction
2. State of the Watershed
3. Recommendations:
Water Quantity
4. Recommendations:
Water Quality
5. Recommendations:
Habitat
6. Other Recommendations
7. Implementation

2. WRIA 16: State of the Watershed

The Skokomish-Dosewallips watershed (WRIA 16) is located on the eastern slope of the Olympic Peninsula, along the western and southern shores of Hood Canal. The basin's 670 square miles of diverse landscape covers an area from the snow-capped Olympic Mountains at over 7,000 feet high to the low-lying floodplains of the Skokomish River Valley. Over 800 miles of streams and rivers flow throughout WRIA 16, and over 60% of the watershed's land area is located in the Olympic National Park and the Olympic National Forest (Golder Associates, 2003). A large portion (nearly 90%) of the watershed consists of forests and timber-harvesting areas (PSCRBT, 1995). Apart from the floodplain and delta areas of the area, most of the watershed lies directly on top of bedrock, a factor that limits the ability of the ground to absorb and retain water as groundwater (Golder Associates, 2003).

Numerous scientific assessments have been completed in WRIA 16. This chapter summarizes the results and conclusions from these studies according to the four topic areas addressed by watershed planning in Washington:

- **Water quantity** – the quantity of water available for humans, fish, and other users.
- **Water quality** – the chemical, physical, and biological characteristics of the water;
- **Habitat** – the quality and quantity of habitat available for fish in the watershed; and
- **Instream flow** – information and recommendations concerning minimum stream flows needed in the watershed to support the various uses that the streams support.

Although the above topics will be discussed in separate sections, please note that they are closely related and can directly affect each other. For example, quality of fish habitat depends on water quantity, water quality, and instream flow.



WRIA 16 includes snow-capped mountains and lowland floodplains

2 WRIA 16 – State of the Watershed

In addition, please note that for the purposes of this document, WRIA 16 consists of six sub-basins. Five sub-basins are officially part of WRIA 16, and the sixth, the South Shore sub-basin, is officially part of WRIA 14. The South Shore sub-basin is considered here, under agreement with the WRIA 14 Planning Unit, to consolidate planning for Hood Canal and the nearshore environment. The six sub-basins are:

- Dosewallips River sub-basin;
- Duckabush River sub-basin;
- Hamma Hamma River sub-basin;
- Finch/Lilliwaup Creeks sub-basin;
- Skokomish River sub-basin (including the North Fork, South Fork, and mainstem); and the
- South Shore sub-basin.

Key findings from particular sub-basins or creeks will be identified in this chapter as appropriate, but for a more detailed look at findings for each sub-basin, please see Appendix A.

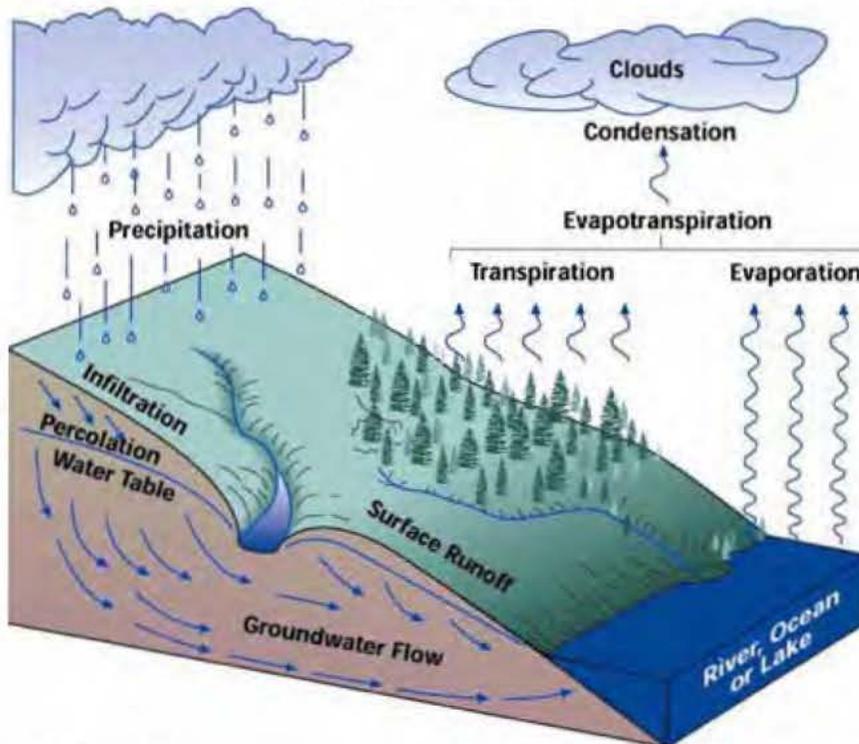
2.1. Water Quantity

In a watershed, water is present both as *surface water* (streams) and as *groundwater*. Although they may appear to be separate water sources, surface water and groundwater are often closely connected – a concept called *hydraulic continuity*. Groundwater can feed streams and, in turn, streams can recharge groundwater. A visible example of the interaction of groundwater and surface water is a wetland, as many wetlands are sites where groundwater is discharged to the surface. Wetlands serve many important functions in WRIA 16, including wildlife habitat, improvement of water quality, and moderation of streamflow (PSCRBT, 1995).

All surface water and groundwater originates when rain, snow, or other forms of precipitation fall in the watershed. Some precipitation is intercepted by trees and plants, and some is stored as snow and glaciers, but a large portion either percolates into the ground or flows directly into streams or Hood Canal. The process by which water enters, travels through, and exits a watershed is termed the *hydrologic cycle*.

Competing demands and uncertainty about future water supplies indicate that careful planning is needed to avoid future conflict over WRIA 16's water resources

Figure 2. The Hydrologic Cycle
(Golder Associates, 2003)



In WRIA 16, the majority of precipitation falls during the winter months, as moisture-laden clouds coming off the Pacific Ocean drop up to 250 inches of precipitation per year on the Olympic Mountains. By the time these clouds travel east to reach the lower portions of WRIA 16 and Hood Canal, most of their precipitation has already fallen. Consequently, precipitation along Hood Canal is about 60 inches per year. The highest, peak stream flows in many streams closely follow precipitation patterns; peak flows occur in winter when most rain falls. Streams that are fed significantly by snowpack, however, may not have their maximum flows in winter. Such streams often experience peak flows in late fall (before precipitation turns to snow) and again in late spring (when warming air temperatures melt the snow) (Golder Associates, 2003).

The precipitation that falls in WRIA 16 feeds both the surface water and groundwater of the basin.

SURFACE AND GROUNDWATER QUANTITIES

The *Level 1 Technical Assessment* estimated that the total annual volume of precipitation in WRIA 16 averages approximately 3.4 million acre-feet per year (AF/yr). An acre-foot is a volume of water equivalent to one foot of precipitation over an acre of land and is a common unit used by

In WRIA 16, snowmelt from the Olympic mountain is critical to spring and summer streamflow in the Dosewallips, Duckabush, and Hamma Hamma Rivers, as well as in the North Fork of the Skokomish River

2 WRIA 16 – State of the Watershed



The mainstem of the Skokomish River

hydrologists to quantify the amount of water entering a watershed (Golder Associates, 2003).⁴ An acre-foot is equal to 325,851 gallons.

Of the 3.4 million AF/yr of precipitation, the consultants estimated that about 3 million AF/yr, or nearly 90%, flows through the basin in streams or as groundwater and is therefore available for human, fish, or other uses. The remaining 10% of the precipitation that falls in WRIA 16 either evaporates or is consumed by plants (Golder Associates, 2003).

The *Level 1 Technical Assessment* also estimated that the quantity of water discharged to Hood Canal from groundwater is less than 1% of the quantity of water discharged by streams, or less 30,000 AF/yr. The consultants did not, however, provide an estimate of the amount of water stored as groundwater. Groundwater infiltration, flow, and storage are likely limited by the fact that bedrock lies near the surface in most of the watershed and so there is not a layer of sand or gravel to hold water (Golder Associates, 2003). More information is needed on WRIA 16's groundwater resources, a need that was previously identified in an effort undertaken for Mason County and the Hood Canal Coordinating Council by the Puget Sound Cooperative River Basin Team (PSCRBT, 1995).

Table 2 displays the annual surface water and groundwater flows of WRIA 16's sub-basins.

Table 2. Annual Surface and Groundwater Flows in WRIA 16⁵
(Golder Associates, 2003)

Sub-basin	Annual Flow (Acre-feet per year)
Dosewallips sub-basin	454,612
Duckabush sub-basin	333,642
Hamma Hamma sub-basin	470,069
Finch/Lilliwaup sub-basin	206,389
Skokomish sub-basin	1,478,710
South Shore sub-basin	59,550
Total	3,002,972

Note: Figures may not add to total due to rounding

⁴ An acre of land is approximately equal to the size of a football field.

⁵ Golder Associates estimates that less than 1% of these totals are discharged as groundwater.

The above table displays the estimates of current flows in each WRIA 16 sub-basin. It is important to realize, however, that these flows are just estimates of likely flows in any given year. Climate variations – whether natural periodic variations such as El Niño or longer-term global climate change – can have significant impact on the quantity and timing of water in WRIA 16's streams and aquifers.

In particular, climate change could have a profound impact on WRIA 16's future water resources. Over the next 20-40 years, increased global and regional temperatures are expected to lead to reduced snowpack and receding glaciers in the Olympic mountains. Since several WRIA 16 streams depend on snow and glacial meltwater, these changes would lead to increased winter-time flows, as more precipitation will fall as rain rather than snow. In addition, increased temperatures would lead to decreased spring and summer-time flows, as snowpack and glaciers are reduced. Furthermore, spring peak flows are predicted to occur two to six weeks earlier than they do currently (University of Washington Climate Impacts Group, 2004).

WATER ALLOCATION

According to Washington State law, the waters of the state collectively belong to the public and cannot be owned by any one individual or group. Instead, individuals or groups may be granted rights to them if the use legally qualifies as *beneficial*. According to RCW 90.54.020, beneficial use is defined as “Uses of water for domestic, stock watering, industrial, commercial, agricultural, irrigation, hydroelectric power production, mining, fish and wildlife maintenance and enhancement, recreational, and thermal power production purposes, and preservation of environmental and aesthetic values, and all other uses compatible with the enjoyment of the public waters of the state.”

A water right is a legal authorization to use a predefined quantity of public water for a designated, beneficial use. Any use of surface water (lakes, ponds, rivers, streams, or springs) that began after the state water code was enacted in 1917 requires a water right. Likewise, groundwater withdrawals from 1945 onward, when the state groundwater code was enacted, require a water right. The relative priority of rights is determined by the seniority of the application dates. Entities that began using water before the two codes were enacted, however, are “grandfathered” in and allowed to maintain their rights; these users have been required to file “claims” with the Department of Ecology to document the amount and location of their pre-code water use.

Exceptions do exist, however, as some uses do not require water rights. Groundwater use of up to 5,000 gallons per day is exempt for domestic purposes, stock watering, industrial purposes and watering a lawn up to one-half acre in size. Wells that are exempted by the water code are often called “permit-exempt wells.” An estimated 2,460 people in WRIA 16

Water Rights: Did you know?

The waters of the state belong to the public and cannot be owned by any one individual or group. Instead, individuals or groups may apply and be granted rights to use the water for beneficial use. The relative priority of rights is determined by the seniority of the application dates

Over half of the total water allocated in WRIA 16 is in the Skokomish sub-basin. The South Shore sub-basin, where many water right applications are also pending, has the highest allocation as a percent of water supply

Cushman Dam has been undergoing a relicensing process with the Federal Energy Regulatory Commission (FERC). Key stakeholders in this contentious process have been Tacoma Power (the dam's owner), the Skokomish Tribe, and the Cushman community. Because of this separate process, this watershed plan will not make recommendations concerning the dam

(nearly one-third of the population) draw their water from permit-exempt wells; water use from these wells can amount to a significant amount of water (Golder Associates, 2003).

In WRIA 16, the total allocation of water for consumptive uses⁶ through water rights is approximately 16,000 AF/yr, or approximately 0.5% of the total streamflow (3 million AF/yr) in the basin (Golder Associates, 2003). Golder Associates excluded water rights for hydropower uses (including Cushman Dam) and fish propagation in this total because these uses generally return water to the stream and so are termed *non-consumptive*.⁷ Non-consumptive uses are when there is no diversion or diminishment from the source water body, or when diverted water is returned directly to the point of diversion. However, the estimated 333,000 AF/yr of water used for hydropower at Cushman Dam are discharged directly to Hood Canal (Golder Associates, 2003); since this water is not returned to the Skokomish River (hence diminishing the source) the use does not meet the definition of *non-consumptive*. Accordingly, a revised figure for the total allocation of water for consumptive use, including the total used for hydropower at Cushman Dam, would be about 350,000 AF/yr. This watershed plan will not directly address Cushman Dam because of the separate relicensing process underway (see sidebar).

Of the 16,000 AF/yr of water that is allocated for consumptive uses other than Cushman Dam, groundwater composes slightly more than half (56%) and surface water represents less than half (44%). A similar split also exists between municipal/residential (46%) and irrigation uses (51%), with less than 2% allocated for commercial or industrial purposes (Golder Associates, 2003). The majority of water allocations are located in the Skokomish and Finch/Lilliwaup sub-basins.

In addition to the water rights already allocated, several applications for new water rights are pending, especially in the North Fork of the Skokomish River. Pending applications for surface water rights total nearly 5,000 gallons per minute (gpm), and pending applications for groundwater rights total nearly 9,000 gpm.⁸ According to the *Level 1 Technical Assessment*, current information is inadequate to determine whether granting rights to these pending applications would impair stream flows and fish habitat (Golder Associates, 2003).

As demand for water elsewhere continues to increase, outside entities may apply for permits to transfer water from WRIA 16 to other areas. For

⁶ Consumptive water uses are those that consume water from streams or groundwater, diminishing the water source at the point of appropriation. Examples of consumptive use are household use and irrigation. Non-consumptive use means a type of water use where either there is no diversion from a source body, or where there is no discernible diminishment of the source. Use of water for fish hatcheries and hydropower are often considered non-consumptive when they immediately return the diverted water to the stream.

⁷ The total also excludes water rights for fire suppression.

⁸ The unit of water quantity for water right applications is gallons per minute because the total annual volume of water in acre-feet is negotiated during the application process.

example, a company has applied for a permit to fill large bladders of water in WRIA 16 for transport to California. The Department of Ecology reviews and approves or denies water-right applications.

In reviewing these applications, the Planning Unit believes the following criteria are particularly important:

- Impacts on water circulation in Hood Canal;
- Climate change;
- Projected local growth and future demand on the particular water source;
- Impacts on instream flows and critical habitat;
- Tribal water rights;
- Public health impacts and benefits;
- Impacts of high stream flows on habitat creation and function;
- The environmental and socio economic impact of the proposed infrastructure to collect and transport water; and
- Water recharge impacts and benefits.

In general, the Planning Unit is opposed to large-scale transfer of water out of the WRIA but does not oppose reasonable withdrawals of water during high stream flows to enhance stream flows in another basin or to allow local bottling of water. If water is to be transferred to another basin, the Planning Unit would like to ensure that the receiving entity has instituted maximum conservation efforts before relying on imported water. However, the Skokomish Tribe is opposed to any transfers of water from WRIA 16 to other areas or watersheds.

Tribal Rights

Washington State grants the rights for the types of water allocations discussed above. Tribes may have access to separate water rights reserved through treaties with the federal government. The Skokomish Tribe has a claim for separate water rights reserved by it and other tribes in the Treaty of Point No Point, Jan. 26, 1855, 12 Stat. 933. In 1908, the U.S. Supreme Court in *Winters v. U.S.* held that when the federal government establishes a reservation, the government impliedly reserved a quantity of water necessary to fulfill the primary purposes of the reservation. This has become known as the “Winters Doctrine.” Tribal treaty water rights have an earlier priority date than the 40 state-granted rights discussed above. For most tribes, however, including for the Skokomish, these rights have not been confirmed or quantified by the courts. The Skokomish Tribe did make its claim when it filed a “Notice of Tribal Water Rights Pursuant to RCW 90.14.068” on June 24, 1998. RCW 90.14.068 established a new filing period for statements of claim for water and groundwater rights that vested before the 1917 Water Code and 1945 Ground Water Code. The Tribe



*Butler Creek,
Dosewallips Sub-basin*

The Skokomish Tribe has special federal water rights under the Winters Doctrine. These rights have not been quantified, however

noted that its rights vested under federal law and were not subject to determination or compromise under state law.

The Skokomish Tribe also has a claim for aboriginal water rights. In 1983, the U.S. Supreme Court in *U.S. v. Adair* held that when a Tribe retains fishing rights in a treaty, it also retains water rights to maintain in-stream flows of sufficient quality and quantity to support that fishery. The 1974 district court case *U.S. v. Washington* (which is commonly referred to as the Boldt decision) reaffirmed the Skokomish Tribe's treaty reservation of fishing rights in "usual and accustomed" fishing area. Such water rights have a priority date of "time immemorial." These flows have also not been quantified, however, which further complicates efforts by tribes, watershed planning groups, and others to assess water resources in WRIA 16.

WATER USE

For uses other than Cushman Dam – with an estimated annual use of 333,000 AF/yr (Golder Associates, 2003) – actual *use* of water is generally less than what is allocated. Although most water use is not metered, the *Level 1 Technical Assessment* estimated that:

WRIA 16 water users consume only a small fraction of water flowing through the watershed. However, seasonal and local variations indicate that careful planning and conservation are necessary, especially given other needs, such as fish habitat

- Actual **residential** water use in WRIA 16 is between 1,000-1,500 acre-feet per year (AF/yr), or less than 20% of the approximately 7,500 AF/yr allocated for community and residential use. Approximately 323 AF/yr of the 1,000-1,500 AF/yr was estimated to be withdrawn from permit-exempt wells.
- Water used for **irrigation** amounts to less than 500 AF/yr, which represents about 6% of the approximately 8,200 AF/yr *allocated* for this use.⁹
- In **total**, the actual estimated water use in the basin is estimated to be 2,000 AF/yr, or less than 0.07% of the total basin streamflow of 3 million AF/yr. Compared to other watersheds in Washington, the percentage of streamflow used in WRIA 16 is very low (Golder Associates, 2003).

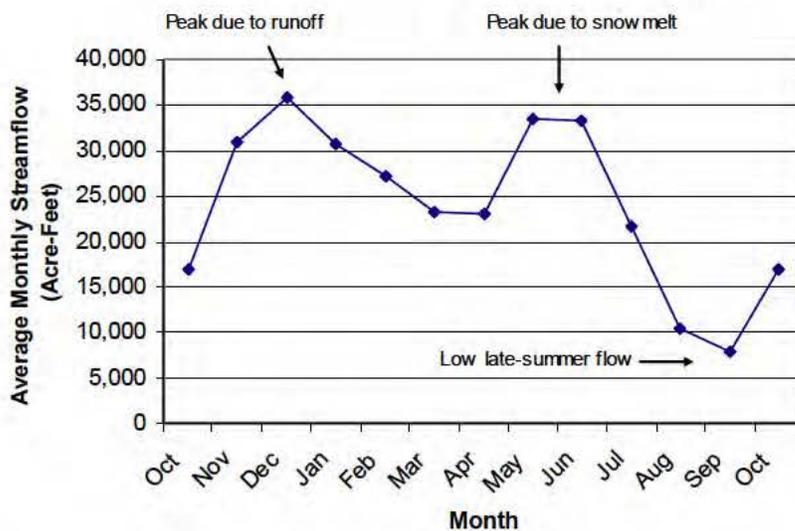
However, caution should be used in interpreting this conclusion for two reasons. First, peak water supply and peak water use may not coincide, meaning that in some months a much higher fraction of the stream flow may be used. For example, water demand generally peaks in summer and early fall, when crops, lawns, golf courses, and gardens require watering, just as water supply is at its lowest. (See Figure 3 for a sample hydrograph from the Duckabush River; other WRIA 16 streams that originate in the Olympic Mountains show similar streamflow patterns, whereas lower-elevation streams do not show the second, late-spring peak associated with snow

⁹ According to Washington's Water Right Tracking System, *acres irrigated* applies to a wide variety of irrigation types, including agricultural irrigation, lawn/garden irrigation, and golf course irrigation.

melt). Second, this assessment of water use does not take into account the needs of the other resources supported by WRIA 16's streams, such as fish habitat. The WRIA 16 Planning Unit, the Skokomish Tribe, and the Department of Ecology are planning to undertake an instream flow process that will help assess and quantify the needs of these other resources.

Figure 3. Average Monthly Streamflow in the Duckabush River, 1938-2003

(USGS Gauge 1205400, as reported in Golder Associates, 2003)



WRIA 16's water use is expected to increase as permanent and seasonal populations grow. The *Level 1 Technical Assessment* estimated that residential water use would increase by approximately 265 AF/yr by 2010 (Golder Associates, 2003). Additional increases in water demand would be realized if expansion in agriculture, tourism-related business, or industry occurs, or if the current water right applications are approved.

CLIMATE CHANGE

In addition to population growth, global climate change is expected to exert a major influence on future water demand.

Research and modeling at the University of Washington has indicated that average annual temperatures in the region are expected to increase 2.5 degrees F by the 2020s and 3.8 degrees F by the 2040s. Winter precipitation is expected to increase by about 8% (UW Climate Impacts Group, 2004).

Climate change projections have important implications for Pacific Northwest water supplies. In general, rivers that derive some portion of flow from snowmelt (including most WRIA 16 sub-basins) will see

Climate change is likely to reduce spring stream flows in WRIA 16

increased winter flow, earlier peak spring flow (by up to four weeks), and reduced summer flow as rising temperatures reduce mountain snowpack. These changes in streamflow timing have already been observed in many streams and rivers throughout the Pacific Northwest. A particular concern is that this shift in streamflow timing may affect WRIA 16 streams' ability to meet water demands during the driest time of the year by lengthening the time between peak spring runoff and the onset of fall rains (UW Climate Impacts Group, 2004).

Streams that do not derive much, if any, flow from snowmelt – such as lower-elevation tributaries, including all of the South Shore sub-basin – will also experience changes, although the likely impacts have not been definitively predicted or quantified. If total winter precipitation increases as projected and/or precipitation intensity in individual storms increases, annual flow volumes in rain-dominant basins should increase, as would the severity of floods (UW Climate Impacts Group, 2004).

Based on their research into the likely impacts of climate change, the University of Washington researchers recommend that Planning Units consider climate impacts in the watershed planning and implementation process. In particular, they recommend building the capacity required to manage climate impacts efficiently before and as they occur, including expanding use of seasonal forecasts in water resource management, diversifying water sources, increasing water storage, connecting regional water systems, improving water conservation and efficiency, using greywater, and water banking (UW Climate Impacts Group, 2004).

SUMMARY AND KEY ISSUES: WATER QUANTITY

Of the estimated 3 million acre-feet per year of water that flow through WRIA 16's sub-basins as streamflow or groundwater, only a small percentage is allocated for human use. While this fact seems to indicate that water in WRIA 16 is bountiful, several factors complicate the assessment and indicate that caution and further analysis are warranted. In particular, the fact that water demand is highest when stream-flows are lowest, the significant number of water right applications waiting to be processed, and the lack of data about actual water use from community and private wells indicate that assessment of water resources is not as simple as comparing streamflows to water allocations.

Furthermore, high stream flows do not necessarily indicate excess water, as these high flows can be necessary for transporting sediment downstream and for maintaining important salmon habitat features such as side channels and refuge areas. In addition, the long-term effects of global climate change may greatly affect the timing and magnitude of WRIA 16 streamflows, particularly for those streams that are significantly fed by snowpack or glaciers (UW Climate Impacts Group, 2004.) Finally, please note that the assessment of water quantity summarized in this section did not take into account the minimum flows that would be required to support

Key issues concerning water quantity:

- *Low summer stream flows*
- *Uncertainty over future water supplies*
- *Climate change*
- *Permit-exempt wells*
- *Too few data*
- *Water export*

the instream resources provided by the streams, such as fish habitat. If water for fish and other aquatic organisms is considered, further water conflicts may become apparent.

In summary, based on an assessment of the existing available science and information on WRIA 16's water quantity, the following key issues emerge.

- **Low summer stream flows** may limit the supplies of clean water for people and fish in summer months. Furthermore, growth increases water demand and raises concern about the watershed's ability to ensure adequate **future water supplies**. For example, residents of the South Shore sub-basin are already experiencing water-supply limits. Even where no acute problems exist currently, the competing demands for water – particularly in the summer – indicate that careful planning and early action could help avoid future conflict. Conflicts could be made worse by the long-term effects of **global climate change**, which may greatly affect the timing and magnitude of WRIA 16 streamflows. Research conducted by the University of Washington has indicated that projected temperature and precipitation increases will have the greatest impact on streams that are at least partially fed by snowmelt, such as most WRIA 16 streams.
- **Water-right exemptions** (e.g., **permit-exempt wells**) provide little or no incentive for water conservation. Most notably, groundwater use up to 5,000 gallons per day is exempt for domestic purposes, stock watering, industrial purposes, and watering a lawn up to one-half acre in size. There are an estimated 2,460 people served by such “permit-exempt wells” in WRIA 16 (Golder Associates, 2003) that have no legal – and little financial – reason to use less water.
- As water supply shortages intensify in other Western Washington watersheds or even other western states, WRIA 16 could face pressure for **water export** (also called “out-of-basin transfer”), or providing water to other communities outside the watershed's boundaries.
- **Too few streamflow and groundwater-quantity data and analyses** exist in WRIA 16 to fully support some water resource planning and water-right decisions. Although Planning Unit members have gathered considerable data through stream gauging and other means, more information is still needed to understand how and if granting new water rights would impair existing rights, uses, or instream flows needed to support aquatic habitat. Furthermore, additional opportunities exist to analyze historical streamflow data and expand current stream gauging to facilitate future study of water availability in WRIA 16. Finally, few data exist on the quantities and connectivity of groundwater in the watershed.



Chapters 3 through 6 will present recommendations for addressing these issues.

For more information on WRIA 16's water quantity, please see:

- Individual sub-basin chapters in the appendix of this document
- *WRIA 16 Level 1 Technical Assessment* (Golder Associates, 2003)

The water quality of WRIA 16's streams can affect people, wildlife, and commerce

2.2. Water Quality

Water quality is a term used to describe the chemical, physical, and biological characteristics of water. Maintaining good water quality is important to conserve and enhance natural habitats, aquatic life, and wildlife. Good water quality is also necessary to support agriculture, recreation, and shellfish harvesting. By closely monitoring water quality, planners and others can track potential concerns in the watershed and stay abreast of how effectively development, land use, and other human uses are being managed to protect public health and the environment.

In general, where data are available, scientific studies indicate that freshwater quality in WRIA 16 is good. Little information is known, however, about water quality for much of the watershed (EnviroVision, 2003 and Golder Associates, 2003).

The United States Geological Survey (USGS), the U.S. Forest Service, Department of Ecology (Ecology), WDFW, state and county departments of health, the Hood Canal Dissolved Oxygen Program, and the Skokomish Tribe have conducted or are currently conducting water quality monitoring in WRIA 16. These organizations are monitoring water quality parameters such as temperature, pH, conductance, phosphorus, dissolved oxygen, flow, fecal coliform, nitrate, and nitrite (EnviroVision, 2003 and USGS, 2004a). For example, Mason County Department of Environmental Health monitors fecal coliform in 19 streams in WRIA 16 in both wet and dry seasons as well as summer monitoring of lake swimming beaches. The agency also conducts more focused studies of these and other parameters in particular problem areas (Pam Bennett-Cumming, Mason County, personal communication, May 26, 2005). Another large effort is the Hood Canal Dissolved Oxygen Program's three-year study to gather and use water-quality data and computer modeling to quantify the role of various natural processes and human actions in Hood Canal's low dissolved oxygen problem (HCDOP, 2005).

Clearly, many entities, including government, non-profit groups, and the WRIA 16 Planning Unit, are working on the issue of water quality in the Hood Canal region. In RCW 90.88, the Washington State Legislature directed the Hood Canal Coordinating Council to conduct a regional governance study by December 1, 2007. The Planning Unit has recognized the need for consistent coordination of policy implementation throughout

Hood Canal. The Planning Unit represents key interests, is educated on the water-related issues and concerns of local citizens, and should be an essential participant in any regional governance study.

Water quality studies have identified several fresh and marine water bodies in WRIA 16 that are impaired based on temperature, fecal coliform, pH, and dissolved oxygen measurements. Ecology has identified fecal coliform bacteria, low dissolved oxygen, pH levels, and high stream temperatures as water quality concerns in WRIA 16 water bodies.

Fecal coliform bacteria are present at high levels in Finch Creek, Hunter Creek, parts of Hood Canal (stretch from Great Bend to Lynch Cove), Ten Acre Creek, Happy Hollow Creek, the Skokomish River, Twanoh Falls Creek, Twanoh Creek, Sunset Beach Creek, and an unnamed creek near Sunset Beach Creek. Fecal coliform are bacteria that are found in the feces of warm-blooded animals and can be used to detect the potential presence of disease-causing organisms in water. Failing septic systems, livestock, pet waste, human recreational activities, and wildlife (including seals) are potential sources of fecal coliform bacteria in the watershed.

Septic systems have been found to contribute to fecal coliform levels in the South Shore sub-basin (Golder Associates, 2003 and EnviroVision, 2003). Replacing septic tanks with sewer systems may help to address water quality problems in the watershed. Two tradeoffs of increasing sewer availability are: (1) unlike septic systems, sewers do not allow water to re-infiltrate where it could be available for other uses, and (2) unless zoning limitations were maintained, the increased availability of sewers may encourage development along the shorelines of sensitive areas, which could negatively affect water quality by increasing impervious surfaces and thereby pollutant-containing runoff.

Fecal coliform is a particular concern for WRIA 16's commercial shellfish growing and recreational shellfish harvesting areas. The State Department of Health (DOH) evaluates commercially- and recreationally-harvested shellfish growing areas to determine suitability for harvest. DOH has classified several WRIA 16 sites as restricted, prohibited, or threatened. In 2001, DOH listed seven open and three closed recreational harvesting areas along the coastline of the watershed (Golder Associates, 2003), but in 2005 DOH also closed parts of Annas Bay (Washington State Department of Health, 2005).

Low dissolved oxygen concentrations are a concern in the Hood Canal portion of WRIA 16, particularly from the Great Bend to the Lynch Cove areas (Washington State Department of Ecology, 2005). Dissolved oxygen is the amount of oxygen in water and adequate levels of dissolved oxygen are critical for aquatic life. Excessive nitrogen inputs, which lead to algae growth, and slow deep circulation have been identified as the primary factors contributing to low concentrations of dissolved oxygen in Hood Canal (USGS, 2004b). Stormwater drainage, particularly near Hoodspout, may contribute to impaired water quality in the Hood Canal. Stormwater



Oyster harvesting, a significant industry in WRIA 16, can be affected by water pollution

draining into the Canal is an issue in areas of dense development which contain more impervious surfaces from which stormwater can enter the Canal.

High stream temperatures have been recorded in Dosewallips River, Marple Creek, Rocky Brook, Duckabush River, Lebar Creek, the South Fork of the Skokomish River, and Fulton Creek. Cool water is important for the health and survival of fish and other aquatic communities.

Temperature changes can affect the development, growth, migration, and risk of disease in fish, especially salmon (Washington State Department of Ecology, 2004). The loss of native vegetation such as shade-providing trees, low summer stream flows, and agricultural and timber activities may contribute to increased water temperatures in WRIA 16 water bodies.

pH levels fall outside state standards in the Great Bend and Lynch Cove water bodies of Hood Canal (Washington State Department of Ecology, 2005). Exceedances of pH standards often result from the natural photosynthetic processes that occur in algal blooms, which have become more common with increase nitrogen inputs. Fish typically thrive in water bodies that have a neutral pH (a pH of 7 is considered neutral on a scale of 0-14). Fluctuation in pH, either above or below the normal level, can be a serious threat to aquatic health.

Additional impacts on water quality throughout WRIA 16 include runoff from Highway 101, 106, and 119, and other contamination sources such as pesticides, fertilizers, and saltwater intrusion.

THE 303(D) LIST

The U.S. Environmental Protection Agency (EPA), under provisions of the federal Clean Water Act, requires Ecology to identify water bodies in the state that do not meet water quality standards. Impaired water bodies are put on a list of impaired or threatened water bodies called the 303(d) list. Table 3 identifies water bodies in WRIA 16 that are listed on the 1998 and 2004 303(d) lists. It is important to note that there are limited data on the water quality of streams and rivers in the watershed, and the absence of a water body on Ecology's 303(d) list does not necessarily mean that the water body meets state water quality standards (EnviroVision, 2003). In addition to the chemical and physical parameters tracked by Ecology, analysis of other water-quality parameters, such as biological indicators, would help assemble an even more thorough assessment of water quality.

Provisions of the Clean Water Act require Ecology to develop water clean-up plans for water bodies that are on the 303(d) list. One type of water clean-up plan is a Total Maximum Daily Load Study (TMDL). A TMDL is a clean-up plan that considers how much pollutant a specific water body can receive while meeting water quality standards. Ecology completed a TMDL for the Skokomish River in 2003 to address fecal coliform (Ecology, 2003b). The Skokomish River TMDL also addresses Purdy Creek, Weaver Creek, Hunter Creek, and Ten Acre Creek, four creeks that are tributaries

What is a TMDL?

- *A TMDL, which stands for Total Maximum Daily Load, is a water clean up plan and process that is intended to return water bodies to their normal, healthy conditions.*
- *Ecology prioritizes and schedules water bodies to receive cleanup plans.*
- *Ecology, local governments, communities, and citizens work together to develop water quality solutions.*

to the Skokomish River. Another TMDL in WRIA 15, Union River, has also been completed and is relevant to WRIA 16 water quality (Washington State Department of Ecology, 2003c). Union River, which is in WRIA 15 but flows into southern Hood Canal at Belfair, has been shown to have fecal coliform contamination and may be a significant source of water quality degradation in Lower Hood Canal (Golder Associates, 2003). No TMDLs are currently scheduled for other rivers or creeks in WRIA 16.

2 WRIA 16 – State of the Watershed

Table 3. Summary of 303(d) Listings in WRIA 16
 (Washington Department of Ecology, 2005)
Category 5 Listings Only¹⁰

Sub-basin and Creek	1998 Listing	2004 Listing
Dosewallips sub-basin		
Dosewallips River	-	Temp
Duckabush sub-basin		
Duckabush River	-	Temp
Finch/Lilliwaup sub-basin		
Finch Creek	-	FC
Skokomish sub-basin		
Hunter Creek	-	FC
Lebar Creek	-	Temp
Purdy Creek	FC	-
Skokomish River, South Fork	-	Temp
Skokomish River, Hwy 106 segment	FC	FC ¹¹
Skokomish River	FC	-
Ten Acre Creek	FC	FC
Weaver Creek	FC	-
Hamma-Hamma sub-basin		
Fulton Creek	-	Temp
South Shore sub-basin		
Great Bend/Lynch Cove	DO, pH	FC, DO, pH
Happy Hollow Creek	FC	FC
Sunset Beach Creek	-	FC
Twanoh Creek	-	FC
Twanoh Falls Creek	pH	FC
Unnamed Creek ¹²	-	FC
Hood Canal sub-basin		
Hood Canal	-	DO
Hood Canal (South)	DO	DO

DO = Dissolved Oxygen; FC = Fecal Coliform; Temp = Temperature

¹⁰ The Department of Ecology classifies water bodies into five categories – only Category 5 waters are in need of cleanup plans and are submitted as the official 303(d) list.

¹¹ According to Ken Koch at the Washington State Department of Ecology, Ecology added this segment of the Skokomish River between Highway 106 and Hood Canal because it was not included in the Skokomish River TMDL. Creeks included in the Skokomish TMDL have a water clean-up plan in place and so are not included on the 303(d) list.

¹² The unnamed creek is located near the Sunset Beach Creek, in Township 22N, Range 02W, Section 12.

All six WRIA 16 sub-basins have some water-quality concerns

In addition to the limited existing body of knowledge on WRIA 16's water quality, the *Surface Water Quality Monitoring Strategy* recommends further efforts to improve water quality information. The authors suggest quantifying temperature and dissolved oxygen levels, establish new and existing stream flow gauging stations, developing a centralized water resource database, and focusing water resource assessment efforts on densely populated areas (EnviroVision, 2003).

SUMMARY AND KEY ISSUES: WATER QUALITY

Available data indicate that WRIA 16's streams and rivers get a "passing grade" for most parameters. Data are limited in some areas, however, and several specific problems do exist, particularly related to fecal coliform and high stream temperatures. Based on consideration of the existing science and information on WRIA 16's water quality, the following key issues emerge.

- **Fecal coliform** levels exceed state standards in a number of streams, particularly in Skokomish, South Shore, and Finch/Lilliwaup sub-basins. Fecal coliform and associated pathogens originate from animals and humans, can be a threat to public health, and have resulted in the closure of shellfish harvesting areas. Sources of fecal coliform can also contribute nitrogen, which can lead to algae blooms, such as those in Hood Canal.
- **Stream temperatures** exceed state standards in several streams, including stretches of both the Dosewallips and Skokomish rivers. Salmon and other aquatic life depend on cool water throughout their life cycle. A variety of factors – especially decreased tree cover, reduced shade, and low summer flows – can contribute to elevated stream temperatures.
- **Low levels of dissolved oxygen** affect Hood Canal's water quality and fish habitat. Low levels of dissolved oxygen are responsible for fish kills in Hood Canal.
- **Stormwater runoff** (including from state routes 106, 101 and 119) degrades water quality and carries pollutants into Hood Canal, including the **nearshore environment**. Stormwater contributes nitrogen inputs to Hood Canal's dissolved oxygen problem and can also carry other pollutants, such as fecal coliform, excessive sediment, pesticides, fertilizers, and vehicle-related pollutants.
- **Pesticides and fertilizers** can also degrade water quality. Pesticides (including herbicides, insecticides, and fungicides) in water bodies have been shown to harm aquatic life (National Academy of Sciences and National Academy of Engineering, 1973). In response to these concerns, especially for threatened and endangered salmon runs, a

Key issues concerning water quality:

- *Fecal coliform*
- *Stream temperatures*
- *Low dissolved oxygen*
- *Stormwater*
- *Pesticides and fertilizers*
- *Sewer systems and development*
- *Saltwater intrusion*
- *Too few data*

2 WRIA 16 – State of the Watershed

federal judge banned the use of certain pesticides within 20 yards of salmon-bearing streams (Welch, 2004). In addition, fertilizers can degrade water quality by contributing to excessive algae growth, among other factors. The potential for pesticides and fertilizers to affect water quality adversely is particularly high when they are over-used or applied near waterbodies.

- The development of **sewer systems** could increase the pressure on local governments to allow future development beyond what was originally planned or permitted, unless zoning limits were implemented specifically to address this concern. Along shorelines and in sensitive areas, the water-quality and habitat gains made by replacing septic systems with a sewer may be offset by the increased stormwater impacts of any new development.
- **Saltwater intrusion** threatens drinking water along the shores of Hood Canal, especially in the South Shore sub-basin. Saltwater intrusion is the seeping of saltwater into freshwater aquifers. Areas where freshwater aquifers are at or below the water level of Hood Canal – and where groundwater pumping rates are high – are particularly susceptible to saltwater intrusion.
- **Too few water-quality data** exist in WRIA 16 to fully support some water resources decisions. For example, more data are needed to understand the sources and extent of fecal coliform pollution and to more clearly document and plan for concerns in rapidly-developing areas such as the South Shore sub-basin.

For more information on WRIA 16's water quality, please see:

- Individual sub-basin chapters in the appendix of this document
- *WRIA 16 Level 1 Technical Assessment* (Golder Associates, 2003)
- *WRIA 16 Surface Water Quality Monitoring Strategy* (EnviroVision, 2003)
- Washington State Department of Ecology's Water Quality webpage (<http://www.ecy.wa.gov/programs/wq/wqhome.html>)
- *Skokomish River Detailed Implementation Plan for Fecal Coliform Bacteria* (Ecology, 2003b)
- Washington State Department of Health's Shellfish website (<http://www.doh.wa.gov/ehp/sf/>)
- Mason County Water Quality Report Card

2.3. Habitat

WRIA 16's streams and nearshore environment provide habitat for fish, shellfish, and other aquatic animals and organisms. In this watershed plan, fish (especially salmon) and shellfish are the primary focus for habitat-related efforts, although actions to improve their habitat will also benefit other wildlife.

Water quality, water quantity and flow, stream and river physical features, riparian zones (the area of living and dead vegetative material adjacent to a stream), upland terrestrial conditions, and ecosystem interactions all affect habitat quantity and quality (WCC, 2003). The majority of streams and rivers in WRIA 16 provide spawning and rearing habitat for many salmonid species: chinook, chum, coho, pink, kokanee, steelhead, bull trout, and sea-run cutthroat trout, although in many cases steep cascades, waterfalls, or manmade obstacles limit fish passage (PSCRBT, 1995). The Hood Canal summer chum, Puget Sound chinook, and Puget Sound bull trout are listed as threatened species under the federal Endangered Species Act (WCC, 2003). Historically, the streams of WRIA 16 supported more fish than they do today (PSCRBT, 1995).

Land use activities associated with transportation, development, forest practices, shellfish farming, and agriculture have all had impacts on fish habitat in WRIA 16 (WCC, 2003), as discussed in the following section.

Transportation and shoreline development have altered many important features of salmonid habitat. For example, Routes 101 and 106, running along the shoreline of WRIA 16, have blocked tidal sloughs and distributary channels, interrupted backshore sediment delivery that is needed to sustain and support the intertidal habitat, and directly covered fish habitat. Shoreline development such as bulkheads, fill, roads, highways, docks, and piers can also affect habitat that salmon rely upon for migration, rearing, and refuge (see Figure 4). For example, in addition to directly covering habitat, development can cause the removal of riparian vegetation and buffer zones that are important for protecting habitat from non-native species, providing insect food sources, and providing protective shade from high temperatures. Sedimentation resulting from landslides, road failures, and other forms of erosion also affects habitat quality in the watershed (WCC, 2003).

The Washington Conservation Commission (WCC) has developed an extensive report on the factors limiting salmon and steelhead habitat in WRIA 16. This report, Salmon and Steelhead Habitat Limiting Factors, is available directly from the WCC and provided the bulk of the information on habitat presented in this document

Figure 4. Example of Shoreline Development, including Bulkheads, Docks/Piers, Groins, and Fill, in the Finch/Lilliwaup Sub-basin (Ecology Oblique Photo #100908, 2000)



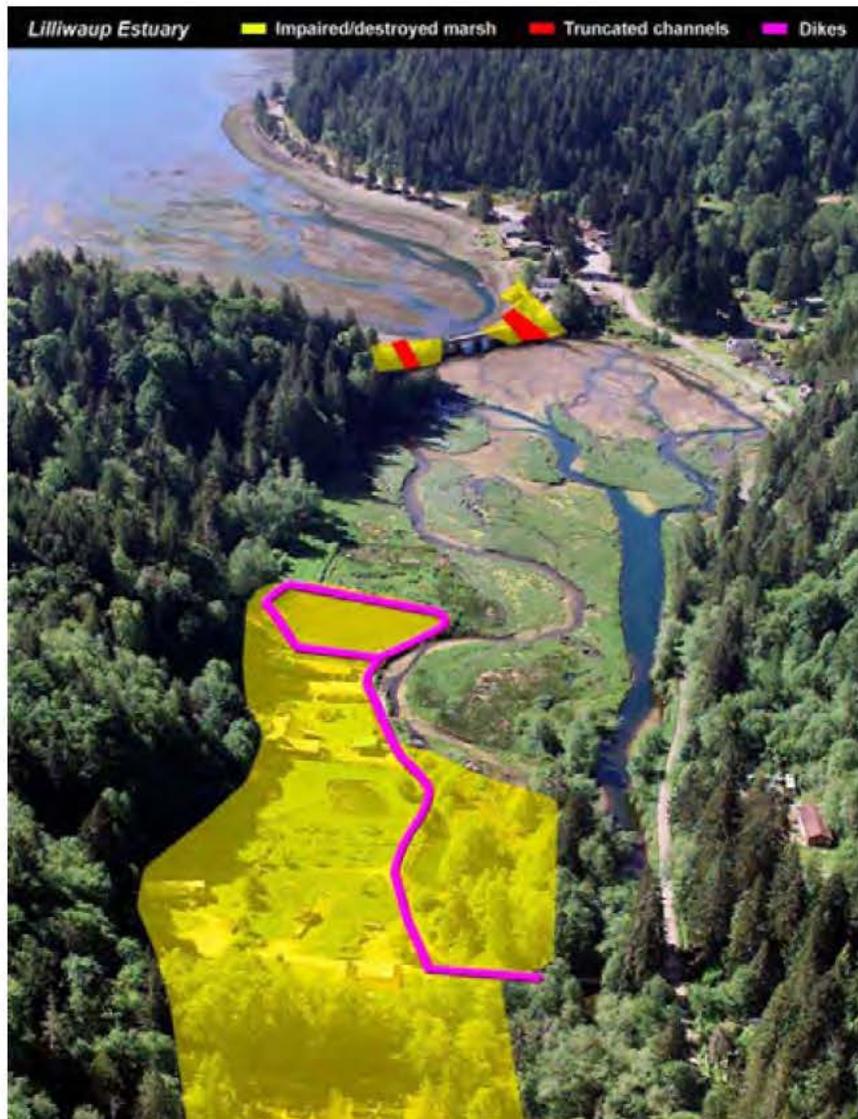
Forest practices may also affect salmon habitat in the watershed. In particular, large clearcuts, inadequate riparian vegetation, and poorly constructed or maintained forest roads and culverts have all altered salmon habitat in WRIA 16. These changes are particularly evident on state and privately owned forest lands but are also present on certain National Forest lands that have been harvested. In contrast, habitat conditions in the Olympic National Park and on those U.S. Forest Service lands protected from logging are generally among the healthiest natural habitats in WRIA 16. Riparian degradation in the lower Dosewallips River, McDonald Creek, lower Hamma Hamma River, lower Lilliwaup River, Skokomish River, and lower Duckabush River has been attributed to forest practices (WCC, 2003).

Agricultural activities and development can channelize mainstems and tributaries, drain beaver ponds, and threaten or destroy forested riparian zones. Development and agricultural activities in the watershed have, in some cases, disconnected floodplains from side channel habitats, removed large woody debris, reduced channel complexity and instream structure, removed riparian vegetation, caused sediment accumulation in channels, and decreased streambed and streambank stability throughout the watershed. (See Figure 5 for an example of development on lower Lilliwaup creek). Removal of large woody debris has reduced habitat quality in many streams in WRIA 16 (WCC, 2003).

One factor that may contribute to the impact of development on floodplains and other critical areas are local policies regarding danger trees, defined as trees that pose an imminent danger to life or property. In stream and wildlife buffer areas, county regulations restrict tree-cutting to help protect fish and wildlife habitat. However, these regulations make

exceptions to allow for cutting trees that are identified by an arborist or professional forester as danger trees. The definition of danger tree can be open to different interpretations and may be misused by landowners who wish to cut trees for sightlines or other uses of their property. Furthermore, other approaches to managing danger trees may provide greater habitat protection than simply removing the whole tree.

Figure 5. Example of Development Impacts on Estuary and Riparian Areas
(WCC, 2003)



Finally, the impacts of **invasive species** and **abandoned fishing gear and boats** can alter habitat for fish and other wildlife. Invasive species are plants, animals, or other organisms that are non-native to an area and whose introduction causes economic, environmental, or human harm. Some invasive species (such as knotweed) can directly affect fish habitat by invading streams. A particular local focus is on invasive species that have been designated as noxious weeds (such as knotweed, tansy ragwort, and many others). Mason and Jefferson counties both maintain Noxious Weed Control Boards to assist landowners with weed identification and control. Invasive marine animals can also cause problems. For example, a highly invasive species of tunicate (sea squirt) has recently been found in Puget Sound. This tunicate grows in large colonies, spreads across shellfish beds, and chokes off the habitat and food supplies of fish and shellfish.



Roads and highways are just one of the factors that have impaired WRIA 16's salmon habitat. This photo shows an early highway (perhaps an early Highway 101) along Hood Canal. Photo courtesy of the Washington State Department of Transportation

Derelict (abandoned) fishing gear and boats affect wildlife and people. Lost or abandoned nets, lines, traps, boats, unused dock pilings, anchors, floats, and other equipment can: (1) trap and wound fish, shellfish, seabirds, and marine mammals; (2) entangle swimmers or divers; (3) damage recreational boats or commercial vessels; (4) degrade marine eelgrass beds or other important habitats; and (5) create unpleasant sights.

To address the factors and impacts discussed above, several efforts are underway in WRIA 16 to plan for salmon recovery and implement habitat restoration activities. For example, the Hood Canal Coordinating Council (HCCC) is the Lead Entity for salmon recovery in the Hood Canal region and has drafted a *Salmon Habitat Recovery Strategy* to guide recovery efforts in the region (HCCC, 2004). The HCCC has also drafted a *Summer Chum Recovery Plan* (HCCC, 2005) which includes several recommended recovery actions. In addition, Shared Strategy is a collaborative Puget Sound-wide effort to engage local citizens, governments, tribes, technical experts and policymakers to take action to protect and restore salmon runs in the Puget Sound region. The efforts of Shared Strategy in Hood Canal are focused primarily on assisting with the recovery of threatened summer chum in Hood Canal (Shared Strategy, 2005a).

SUMMARY AND KEY ISSUES: HABITAT

Based on review of the existing habitat assessments conducted in WRIA 16, the Planning Unit has identified the following key issues to be addressed by this watershed plan. Note that elevated stream temperatures are an additional issue that affects habitat; this issue is discussed in the Water Quality section, which begins on page 20.

- **Floodplain connectivity, channel complexity, and riparian conditions have all been degraded by development.** In particular, diking, bank armoring, and highway construction have removed streamside habitat and blocked access to side channels. Riparian areas have been developed for residential or agricultural use, thereby removing vegetation that helped control runoff and

Development and human activity have altered WRIA 16's fish and wildlife habitat in several ways

sedimentation, shaded streams and helped keep stream temperatures cool, provided a source of large woody debris, provided habitat for terrestrial animals, and naturally protected streambanks from erosion.

- **The frequency of large woody debris in streams has been rated poor in many streams.** Large woody debris (LWD) has been removed from streams and its sources (forested riparian areas) have been reduced. LWD in streams provides salmon habitat through shade and protection; LWD also increases channel complexity and helps form and maintain pools, which provide a refuge from predators and floods for juvenile salmon (WCC, 2003).
- **High levels of fine sediments** result from landslides and other forms of erosion associated with poor forest practices as well as improper forest road construction, maintenance, and abandonment. High levels of fine sediments can reduce the survival of incubating fish eggs in streamside gravel as well as disrupt the lifecycle of benthic invertebrates, a class of small stream residents that are an important component of the food chain and frequently used indicator of ecosystem health (WCC, 2003).
- **Nearshore habitat is affected by bulkheads and other armoring** that lead to direct destruction of habitat and loss of beaches. Bulkheads and other armoring can also lead to changes in the quantity, size, and composition of sediment and in the strength of the waves – changes that can limit the ability of fish to spawn and find food and shelter from predators (WCC, 2003). Furthermore, bulkheads that span small streams and springs may limit fish passage.
- **Culverts and other barriers** limit fish passage. The most obvious of these barriers are dams and diversions with no passage facilities that prevent adult salmon from reaching historically used spawning grounds. Poorly designed culverts can also alter stream dynamics and prevent fish (particularly for coho) from reaching upstream rearing areas (WCC, 2003).
- **Invasive species**, including plants, animals, or other organisms can affect habitat for fish and other wildlife.
- **Derelict fishing gear and boats** affects wildlife and people. Lost or abandoned nets, lines, traps, boats, unused dock pilings, anchors, floats, and other equipment can harm wildlife, personal property, and even humans.

For more information on WRIA 16's fish habitat, please see:

- Individual sub-basin chapters in the appendix of this document
- Washington State Conservation Commission's *Salmon and Steelhead Limiting Factors* (WCC, 2003)
- *East Jefferson County Salmonid Refugia Report* (May and Peterson, 2003)

2.4. Instream Flow

The amount of water flowing in a stream is often called *stream flow*. In the context of watershed planning, the related term *instream flow* means a stream flow regime adopted as a regulation (Washington State Departments of Ecology and Fish and Wildlife, 2003). An instream flow is typically a minimum flow rate that is set by rule to support fish habitat, although instream flows could also be set to protect water quality, recreation, or other resources that the stream provides.

Instream flows usually serve two objectives: to determine whether and when to allow new water uses, and to define the minimum flows needed to support habitat or other instream uses (Washington State Departments of Ecology and Fish and Wildlife, 2003). Once instream flows are set by rule, they become a water right and thereby they condition any water right applications made subsequently. For example, if stream flows are lower than the set instream flow, a basin may be closed to further water appropriation or withdrawals. Such closure has occurred in several streams in neighboring WRIA 14, including Alderbrook Creek and Twanoh Creek in the South Shore sub-basin considered in this Watershed Plan.

However, instream flows have no effect on water rights that existed before the instream flow rule was set, as instream flows are junior to all existing water rights at the time of their adoption (Rushton, 2003). Tribal water rights bring a complication to definitions of existing water rights and the instream flow process, because tribal water rights are often not quantified but by law have a higher legal priority than state-granted rights. Many Tribes in the Puget Sound region are dissatisfied with Ecology's instream flow process because they believe their tribal water rights are not adequately protected in the process. For more information on Tribal water rights, please see the Skokomish Sub-basin section in the appendix.

Two previous studies, both conducted over twenty years ago, have addressed instream flow recommendations in WRIA 16. The first was conducted by the Department of Fisheries (now the Washington Department of Fish and Wildlife) and included the Dosewallips, Duckabush, Hamma Hamma, Eagle, Finch, Fulton, John, and Jorsted rivers and creeks. The second was conducted by the U.S. Fish and Wildlife Service and included the North Fork, South Fork, and mainstem Skokomish rivers (Golder Associates, 2003). These studies would be a natural starting point for efforts to set instream flows in WRIA 16, a process that will be undertaken by the Planning Unit, Ecology, and the Skokomish Tribe outside of the watershed planning process documented in this report.

Streamflow data collected by Planning Unit members and other organizations will also be very valuable in efforts to recommend instream flows. For example, Aspect Consulting recently completed a new study to support the Planning Unit's instream flow process. Aspect gathered new stream flow data on the Dosewallips River, Duckabush River, Fulton Creek,

Two creeks in the South Shore sub-basin were closed to further appropriation or water withdrawals in 1984 by WAC 173-514. Alderbrook Creek and Twanoh Creeks are both closed to further appropriation between May 1 and October 31

Hamma Hamma River, John Creek, Jorsted Creek, and Eagle Creek. Aspect also identified some minimum flows that would be required to enable fish passage in Fulton, John, and Jorsted creeks (Aspect Consulting, 2005).

Planning Unit initiating governments can elect to recommend instream flows through a process set forth by the state Watershed Planning Act of 1998 (RCW 90.82). The law directs Ecology to seek consensus and approval among the Planning Unit members. In the absence of consensus, Ecology can set instream flows itself, in consultation with affected tribes and other state agencies.



3. Recommendations: Water Quantity

Section 2.1 of Chapter 2 identified several issues concerning WRIA 16's water quantity. This chapter presents recommendations to address the issues identified.

In particular, the Planning Unit is making recommendations concerning the following topics:

- **Data Needs.** As discussed in Chapter 2, considerable data has already been collected by Planning Unit members and other organizations, but in some cases there are still insufficient data and analyses to fully support water resources planning and water-right decisions on streamflow and groundwater-quantity.
- **Water Conservation.** Water conservation could help avoid or lessen the impact of current and future conflicts over water supply due to low summer stream flows, growth, competing demands, and potential climate change and variability.
- **Water Supply and Use.** Planning efforts to review and consider modifying the development and management of the water supply may be needed to adapt to and prepare for changing demands in WRIA 16.

The Planning Unit's recommendations can be found below.

Disclaimer: nothing in this plan creates an obligation for a Planning Unit member unless that member determines that funding is available. Government members may also prioritize tasks based on available funding and need. Many of these issues will be clarified in Phase IV of watershed planning, when the Planning Unit prepares a detailed implementation plan.

For further discussion of additional options considered, please see Appendix B.

3.1. Data Needs

- 3.1.1. The Planning Unit recommends that Mason and Jefferson counties, the Skokomish Tribe, and water purveyors develop a prioritized list of surface and groundwater-quantity monitoring activities and pursue funding (e.g. grants) for ongoing, comprehensive water-quantity monitoring throughout the watershed.

3.2. Water Conservation

- 3.2.1. The Planning Unit supports the tiered rate structures adopted by the Jefferson and Mason PUDs #1 to encourage water conservation and encourages other water purveyors in the WRIA to adopt similar rate structures.
- 3.2.2. The Planning Unit recommends that all water purveyors in the WRIA pursue funding to offer rebates for the purchase of low-flow fixtures and appliances to encourage water conservation.
- 3.2.3. The Planning Unit recommends that water purveyors offer meters for sale to all interested water users in the WRIA and encourage water users to voluntarily meter their water use.
- 3.2.4. The Planning Unit recommends that Mason and Jefferson counties encourage *new* golf courses in the WRIA to adopt and implement golf course management plans that address water conservation strategies (including water re-use), use of pesticides (including herbicides and insecticides) and fertilizers and other water-related impacts. The Planning Unit also recommends that Mason and Jefferson counties encourage *existing* golf courses to adopt golf course management plans.
- 3.2.5. The Planning Unit recommends that the state departments of Health and Ecology review alternative sewage and greywater treatment systems and revise regulations to allow greater use of these alternative sources of reused water, as appropriate.

3.3. Water Supply and Use

- 3.3.1. The Planning Unit recommends that the Department of Ecology, Mason and Jefferson counties, and water purveyors encourage the development and/or consolidation of small public water systems over the proliferation of exempt wells in areas: a) where appropriate zoning exists; b) where growth is anticipated by county planning efforts; and c) when it is fiscally feasible.

3 Recommendations: Water Quantity

- 3.3.2. The Planning Unit recommends that Mason and Jefferson counties, as part of planning under the Growth Management Act (GMA), determine how much additional water will be required to meet the water supply needs of single domestic wells and public water systems in the WRIA. At a minimum, the counties should use long-range demand forecasting consistent with GMA timelines (currently 20 years), but they are encouraged to consider 50 years. The counties should also work with water purveyors to integrate water supply forecasts into their analysis.
- 3.3.3. The Planning Unit recommends that the Department of Ecology work with Planning Unit members to develop and implement water trust and water banking opportunities that enhance instream flows.
- 3.3.4. The Planning Unit recommends that the Department of Ecology involve local governments, tribal governments, and the Planning Unit throughout the review of applications for out-of-basin water transfers.
- 3.3.5. The Planning Unit recommends that the Department of Ecology work with the legislature to recommend a specific quantity threshold for the amount of rainwater that can be captured without a permit and request that the legislature expressly authorize rainwater capture in quantities below this threshold. This permit exemption recommendation does not imply a recommended change in Washington State Department of Health policy regarding rain catchment for potable purposes.
- 3.3.6. The Planning Unit recommends pursuing collaborative opportunities among Mason and Jefferson Counties, Mason and Jefferson PUDs, and the Skokomish Tribe to investigate the feasibility of multi-purpose storage projects that utilize seasonally available water to enhance aquifers and stream flows during critical low flow periods, while taking into account the benefits of high stream flows. This recommendation is merely to collaboratively study the feasibility of multi-purpose storage in WRIA 16 and should not be construed as a recommendation for any particular multi-purpose storage project.

4. Recommendations: Water Quality

Section 2.2 of Chapter 2 identified several issues concerning WRIA 16's water quality, with a particular focus on fecal coliform. This chapter presents recommendations to address the issues identified.

In particular, the Planning Unit is making recommendations concerning the following topics:

- **Water Quality Monitoring and Data Needs.** Too few water-quality data exist in WRIA 16 to fully support some water resource decisions. For example, more data are needed to understand the sources and extent of fecal coliform pollution and to document and plan for concerns in rapidly developing areas such as the South Shore sub-basin.
- **On-site Septic Systems.** Septic systems can be a source of fecal coliform pollution, a contaminant for which levels exceed state standards in a number of WRIA 16 streams, as well as other pathogens or nutrients that can contaminate groundwater. Fecal coliform and associated pathogens originate from animals and humans, can threaten public health, and have resulted in the closure of shellfish harvesting areas. Pollution sources that are high in fecal coliform are usually also high in nitrogen, which can contribute to algae blooms, such as those in Hood Canal.
- **Animal Waste.** Animal waste from pets and livestock is another source of fecal coliform.
- **Stormwater.** Stormwater runoff (including from state routes 106, 101, and 119) degrades water quality and carries pollutants into the nearshore environment and Hood Canal. Stormwater contributes nitrogen, exacerbating Hood Canal's dissolved oxygen problem, and can also contribute other pollutants, such as fecal coliform, excessive sediment, pesticides, and fertilizers.
- **Other Water Quality Recommendations** to help address other issues such as pesticide use and saltwater intrusion.



*A maidenhair fern in
WRIA 16*

The Planning Unit's water-quality recommendations can be found below.

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For further discussion of additional options considered, please see Appendix C.

4.1. Data Needs

- 4.1.1. The Planning Unit recommends that the *WRIA 16 Surface Water Quality Monitoring Strategy* be implemented (same as recommendation 6.1.1).
- 4.1.2. The Planning Unit recommends that existing organizations conducting water quality monitoring continue to work together and with the Planning Unit to ensure that consistent, coordinated water quality monitoring occurs that is responsive to the concerns of the community and is protective of the environment, including chemical, biological and physical health.
- 4.1.3. The Planning Unit encourages the state departments of Health and Ecology to better coordinate their respective water quality monitoring efforts, including data sharing, rule making, enforcement, and other regulatory efforts.
- 4.1.4. The Planning Unit recommends that Mason and Jefferson counties and the Department of Ecology prepare an inventory of current and former dump sites and landfills and, where appropriate, prepare and implement clean-up plans. Mason and Jefferson Counties should also seek grant funding to compile and assess water quality data from these sites.
- 4.1.5. The Planning Unit recommends that Mason County and the Department of Ecology continue water quality monitoring efforts and initiate further investigations, as appropriate, at the Webb Hill biosolids application site to identify and assess impacts to surface and groundwater.
- 4.1.6. The Planning Unit recommends that the Mason and Jefferson county health departments promote and encourage periodic voluntary measurement of water quality and water depth in individual wells. Water depth measurement should be conducted by a professional to protect the aquifer from contamination.
- 4.1.7. The Planning Unit recommends that the Mason and Jefferson county health departments continue to track studies and other efforts underway to determine the impacts of nutrient and pathogen loading from septic systems near sensitive water bodies, and work with the Planning Unit to consider appropriate options, alternatives, or standards that might be pursued.

4.2. On-site Septic Systems

- 4.2.1. The Planning Unit recommends that Jefferson and Mason counties continue and expand their efforts to implement septic system operation and maintenance (O&M) programs and encourages the two counties to work together to collect comparable data. The Planning Unit recommends that the counties compile an annual report on the results of the O&M program for the local boards of health, and that this report be available to the public. Finally, the Planning Unit recommends that septic system inspections be required on a regular basis (as appropriate based on location, type and age).
- 4.2.2. The Planning Unit recommends that Mason and Jefferson counties continue to identify failing septic systems and notify landowners of the need for remedial actions.
- 4.2.3. The Planning Unit recommends that Mason and Jefferson counties assess the feasibility and effectiveness of providing sewer or community septic systems in environmentally sensitive areas, particularly where nutrients and pathogens are a concern. The Planning Unit also recommends that, where appropriate, the counties and the state Department of Health encourage alternative methods of septic waste management, including nutrient removal, non-discharging toilets, and greywater treatment systems.
- 4.2.4. The Planning Unit recommends that Mason and Jefferson counties consider a broad range of funding options to offset the costs of septic upgrades or conversion to community systems along shorelines or in other sensitive areas.
- 4.2.5. The Planning Unit recommends that Mason County require a septic system inspection by a certified septic professional upon the sale or transfer of property and require pumping if appropriate. The Planning Unit also recommends that Jefferson County continue its current program and work to improve compliance.
- 4.2.6. The Planning Unit recommends that Mason and Jefferson counties encourage homeowner associations or private and public utilities to establish community

wastewater treatment systems for appropriate new developments of four or more homes.

4.3. Animal Waste

- 4.3.1. The Planning Unit encourages those farms in or adjacent to critical areas of the WRIA to have a current farm plan. Farm plans should consider seasonal restrictions on animal pastures to protect streams and floodplains from manure. The Planning Unit also recommends that the Mason and Jefferson conservation districts seek funding to 1) prepare farm plans, 2) provide financial assistance to help landowners implement agricultural best-management-practices, and 3) evaluate how effectively the farm plans and best management practices are being implemented.
- 4.3.2. The Planning Unit recommends that Mason and Jefferson counties require that manure in floodplains be managed in a manner that protects floodwaters from manure contamination.
- 4.3.3. The Planning Unit recommends that, where appropriate, Mason and Jefferson counties and the Washington State Parks Commission consider programs for the management of domestic animal waste at state and county parks in the WRIA.

4.4. Stormwater

- 4.4.1. The Planning Unit encourages Mason and Jefferson counties to ensure that County regulations minimize impervious surfaces and, to the extent feasible based on site conditions, maximize on-site infiltration, detention or reuse.
- 4.4.2. The Planning Unit recommends that Mason and Jefferson counties encourage retention of native vegetation throughout the WRIA.
- 4.4.3. The Planning Unit recommends that the legislature fully fund the Washington State Department of Transportation's stormwater management activities for state highways in the WRIA.

- 4.4.4. The Planning Unit recommends that Mason and Jefferson counties, along with other appropriate agencies, pursue funding for best management practices along roadside ditches, including planting and vegetation retention, topsoil improvements, and installation and maintenance of filter strips to filter stormwater pollutants.
- 4.4.5. The Planning Unit encourages the Washington Forest Practices Board to establish riparian buffer regulations and road maintenance and abandonment planning criteria, based on best available science, for all forestland owners who are required to get a forest practices permit.
- 4.4.6. The Planning Unit recommends that Mason and Jefferson counties expand their stormwater management programs by adopting stormwater provisions, such as those in the current Puget Sound Conservation and Recovery Plan, including:
- Stormwater controls for appropriate new development and redevelopment;
 - Stormwater site plan reviews;
 - Stormwater control at construction sites;
 - Proper operation and maintenance at stormwater facilities;
 - Pollution source controls;
 - Illicit discharges and water quality response;
 - Problem identification and ranking;
 - Low impact development; and
 - Public education and outreach on stormwater.

4.5. Other

- 4.5.1. The Planning Unit recommends that Mason and Jefferson counties develop and implement a coordinated Integrated Pest Management program to minimize the use of pesticides (including herbicides and insecticides) on publicly owned land.
- 4.5.2. The Planning Unit recommends that Mason County identify areas that are susceptible to seawater intrusion and consider adopting a program to address seawater intrusion. The Planning Unit also recommends that Jefferson County share information with Mason County on their saltwater intrusion program.



5. Recommendations: Habitat

Section 2.3 of Chapter 2 identified several issues concerning WRIA 16's habitat related to stream channel and riparian conditions, large woody debris, sedimentation, the nearshore environment, and fish passage barriers. This chapter presents the Planning Unit's recommendations to address habitat issues in WRIA 16.

Disclaimer: *nothing in this plan creates an obligation for a Planning Unit member unless that member determines that funding is available. Government members may also prioritize tasks based on available funding and need. Many of these issues will be clarified in Phase IV of watershed planning, when the Planning Unit prepares a detailed implementation plan.*

For additional options considered, please see Appendix D.

- 5.1.1. **The Planning Unit supports the following ongoing activities and recommends that these programs and/or similar programs be continued:**
- Efforts by all the groups and agencies working to implement salmon recovery plans and associated projects;
 - Habitat acquisition programs or conservation easements funded or implemented by land trusts, the Salmon Recovery Funding Board, Lead Entity groups, the Shared Strategy for Puget Sound, and others.
 - Efforts to revegetate riparian areas;
 - Efforts to improve large woody debris in streams;
 - Salmon recovery efforts to address floodplain connectivity, riparian degradation, and channel complexity;
 - Floodwater management planning to be integrated with salmon recovery efforts;
 - Efforts to reduce adverse sedimentation;
 - Efforts by the Mason County Weed Board to control invasive species;
 - Efforts by the Mason and Jefferson conservation districts to implement the Conservation Reserve Enhancement Program (CREP).
- 5.1.2. **The Planning Unit recommends that Mason and Jefferson counties adopt ordinances requiring or encouraging vegetative management as the first approach to danger trees in critical areas or their buffers. The Planning Unit also recommends that Mason and Jefferson counties and the state Department of Natural Resources**

(DNR) develop and implement requirements that felled danger trees (as defined by the DNR) in critical areas or buffers must remain on site as large woody debris, as appropriate.

- 5.1.3. The Planning Unit recommends that the State Department of Natural Resources work with local entities to validate the stream typing designations in WRIA 16 with ground-truthing (i.e., field work) during seasonally appropriate times.
- 5.1.4. The Planning Unit encourages the State Forest Practices Board to swiftly adopt the Adaptive Management Program rule-making petitions presented by the Policy Committee of the Forest and Fish Program in accordance with WAC 222-12-045.
- 5.1.5. The Planning Unit encourages Mason and Jefferson counties to consider such tools as a Conservation Futures Program, the transfer of development rights, and mitigation banking to preserve critical habitat.



Low tide along Hood Canal near the Skokomish Reservation

6. Other Recommendations

In addition to recommendations specific to water quantity, water quality, and habitat issues, the Planning Unit made several other recommendations that either span these issues or address other concerns. These recommendations fall in to one of several categories:

- **Hood Canal.** Officially this watershed plan applies only to the portion of Hood Canal that lies within WRIA 16's boundaries (including the South Shore sub-basin) as displayed on Figure 1. The Planning Unit made recommendations for Hood Canal and encourages other entities to consider these recommendations for all of Hood Canal.
- **Funding.** Several of the Planning Unit's recommendations could require significant resources to implement. New funding sources may be needed to obtain the benefits of improved water resources in WRIA 16.
- **Enforcement.** In some cases, better enforcement of existing laws could bring compliance and improved water resources.
- **Education and outreach** strategies can be useful to spread information and strategies to watershed residents and businesses.
- **Support for ongoing activities.** In some cases, other existing activities are having or are expected to have significant positive impact in the WRIA. The Planning Unit has specifically recommended the continuation of some of these efforts.
- **Information gathering.** The Planning Unit recommends several broad information and research efforts.
- **Plan implementation.** The Planning Unit recommends two coordinated efforts to facilitate watershed plan implementation.

Following are the Planning Unit's recommendations on the above topics.

Disclaimer: *nothing in this plan creates an obligation for a Planning Unit member unless that member determines that funding is available. Government members may also prioritize tasks based on available funding and need. Many of these issues will be clarified in Phase IV of watershed planning, when the Planning Unit prepares a detailed implementation plan.*

6.1. Hood Canal

Although this plan officially applies only to the portion of Hood Canal that is in the WRIA 16 Planning Area (including the South Shore sub-basin) as depicted on the map in Figure 1, the Planning Unit encourages other

entities and decision-makers on Hood Canal (including Kitsap County) to consider these recommendations for all of Hood Canal.

- 6.1.1. The Planning Unit recommends that the *WRIA 16 Surface Water Quality Monitoring Strategy* be implemented (same as recommendation 4.1.1).
- 6.1.2. The Planning Unit recommends that, due to the special concerns in Hood Canal, the Department of Ecology consider including permit conditions requiring new wastewater treatment plants to include a water reuse/recharge component which eliminates the discharge of effluent into Hood Canal. The Planning Unit also recommends that Ecology strongly consider options to minimize discharges into Hood Canal when permits are renewed.
- 6.1.3. The Planning Unit recommends that the state departments of Natural Resources and Fish and Wildlife, the Parks Commission, and the U.S. Forest Service provide an adequate number of toilets and soap dispensers at their popular fishing, camping or other highly-used recreation sites, where appropriate.
- 6.1.4. The Planning Unit recommends that Mason and Jefferson counties consider partnering with other stakeholders (such as State Parks and the Interagency Committee on Outdoor Recreation) to assess the adequacy of campground and marine pump-out stations for recreation vehicles and boats and then upgrade the facilities where necessary, subject to available funding. (See also recommendation 6.5.6.)
- 6.1.5. The Planning Unit recommends that the State Legislature develop specific provisions that allow for sewer systems in an Aquatic Rehabilitation Zone when necessary to protect the environment from degradation. Sewer systems in such locations would only be appropriate if they are necessary to protect basic health and safety or the environment. These sewer systems must also be financially feasible at rural densities.
- 6.1.6. The Planning Unit recommends that if sewer systems are installed outside an Urban Growth Area to alleviate septic impacts in Hood Canal, Mason and Jefferson counties maintain the growth, density and build-out limits found within their respective Comprehensive Plan and development regulations.

6 Other Recommendations

- 6.1.7. The Planning Unit recommends that the Washington State Department of Transportation consider the sensitivity of Hood Canal in prioritizing stormwater projects.
- 6.1.8. The Planning Unit recommends that Mason and Jefferson counties, the Washington State University Extension offices in Mason and Jefferson counties, Mason and Jefferson conservation districts, Washington Sea Grant, and the Hood Canal Coordinating Council pursue funding to educate homeowners and businesses on the need to minimize use of pesticides (including herbicides and insecticides) and fertilizers and encourage the use of natural, slow-release fertilizers such as compost. Due to the special concerns of excess nitrogen and phosphorous in Hood Canal, the use of fertilizers should be strongly discouraged in the proximity of water (i.e. lakes, rivers, streams or marine waters).
- 6.1.9. The Planning Unit recommends that the Puget Sound Action Team, the Hood Canal Coordinating Council, and other agencies implementing projects to address low dissolved oxygen, continue to track, publish and update measurable results from all funded projects so that this information can be easily shared and accessed by other participating entities and the general public.
- 6.1.10. The Planning Unit recommends that Mason and Jefferson counties expand existing education and outreach programs for residents to emphasize information on the benefits of avoiding nitrogen and phosphorous in household products, and to encourage retailers to offer these alternative products for sale in their stores.
- 6.1.11. The Planning Unit recommends that, as specified in the coordinating requirements of RCW 90.88.030(1)(b), the Hood Canal Coordinating Council solicit participation from Watershed Planning Units in developing its regional governance study design, research, and recommendations. The Planning Unit's intent is to assist the Council in developing governance recommendations that will clarify the roles and responsibilities of the many agencies and organizations involved in Hood Canal efforts, eliminate duplication, and optimize service delivery efficiencies.

- 6.1.12. The Planning Unit recommends that Mason and Jefferson counties review their respective Shoreline Master programs and development regulations, and revise them if necessary to minimize new structures on riparian habitat (as defined by RCW 79A.15.010 (7)). The Planning Unit recommends that Mason County pursue funding to revise its Shoreline Master Plan (SMP) to incorporate the recommendations of this watershed plan. The Planning Unit also recommends Ecology give high priority to funding this effort due to the designation of Hood Canal Aquatic Rehabilitation Zone One.
- 6.1.13. In updating Shoreline Master Programs, the Planning Unit recommends that Mason and Jefferson counties consider: 1) initiating a public education program to educate the public about the impacts of shoreline structures and the need to move toward alternatives; 2) developing and implementing incentives for removing and replacing hard bulkheads and other shoreline structures that impede natural processes; and 3) adopting stringent restrictions on the installation of new hard bulkheads or other shoreline structures that impede natural processes, as well as encouraging soft-armoring or other non-structural alternatives where feasible.
- 6.1.14. The Planning Unit recommends that Mason and Jefferson counties consider the impacts to and protection of marine drift cells and source sediments in issuing shoreline and other land use permits.
- 6.1.15. The Planning Unit recommends that Mason and Jefferson counties encourage shoreline landowners to establish local improvement districts to fund the protection and restoration of shorelines.
- 6.1.16. The Planning Unit recommends that the state Department of Natural Resources and tribes be fully funded to remove derelict or abandoned anchors, boats, floats, nets, treated pilings, and other debris in Hood Canal to improve and restore eelgrass beds and other natural habitat.
- 6.1.17. The Planning Unit recommends that the Legislature separate WRIA 14 into two WRIs (14A and 14B) and that the south shore of Hood Canal (which is included in the WRIA 16 Planning Process under an agreement between WRIs 14 and 16) be designated as WRIA 14B. The Planning Unit also recommends that WRIA 14B continue

to be administered as part of WRIA 16 during plan implementation.

- 6.1.18. The Planning Unit supports an evaluation of marine mammals' impacts on fecal and nutrient loading in Hood Canal.

6.2. Funding

- 6.2.1. The Planning Unit recommends that the legislature provide stable, ongoing funding for the implementation of watershed plans.
- 6.2.2. The Planning Unit recommends that as part of its "Governance Study," the Hood Canal Coordinating Council include considerations for creating a stable, ongoing funding source to implement the recommendations of the watershed plan or similar programs.

6.3. Education and Outreach

- 6.3.1. The Planning Unit recommends that the Department of Ecology work with the Planning Unit to develop and implement an ongoing education/outreach effort for current and future water users on state laws governing the use of permit-exempt groundwater withdrawals. The education and outreach program should encourage the development of small public water systems as an alternative to the proliferation of permit-exempt wells. The Planning Unit also recommends that the benefits of shared water systems for new development be advocated through existing outreach programs.
- 6.3.2. The Planning Unit recommends that the Mason and Jefferson counties continue to give information to realtors and homeowners on fecal coliform/pathogen and nutrient impacts and prevention strategies, including proper septic system inspection, operation and maintenance, and pet waste management. In addition, the Planning Unit recommends that conservation districts and Washington State University Extension offices continue to provide information about livestock waste management and best management practices.
- 6.3.3. The Planning Unit recommends that Mason and Jefferson counties initiate public education encouraging

landowners to maintain native vegetative cover, which will improve stormwater infiltration.

- 6.3.4. The Planning Unit recommends that Mason and Jefferson counties and the Washington Department of Fish and Wildlife provide all applicants for bulkhead or armoring permits educational materials that explain why bulkheads are discouraged and provide information on beneficial alternatives.
- 6.3.5. The Planning Unit recommends that the Planning Unit, with assistance from the Department of Ecology, develop a periodic report card on the state of the watershed and that this report be posted on the Department of Ecology web site.

6.4. Enforcement

- 6.4.1. The Planning Unit recommends that the state legislature adequately fund the Department of Ecology's enforcement operations to stop egregious illegal water withdrawals and diversions as well as water quality violations. The Department of Ecology should also coordinate with appropriate Planning Unit members to prioritize and initiate actions to bring those who are illegally withdrawing water into compliance.
- 6.4.2. The Planning Unit recommends that state and local governments establish clear civil penalties to better enforce existing prohibitions to removing large woody debris from streams.
- 6.4.3. The Planning Unit recognizes that full compliance with existing laws and regulations would address many of the issues identified in this watershed plan. The Planning Unit recommends that the State Legislature and the boards of county commissioners for Mason and Jefferson counties give high priority to adequately funding compliance and enforcement activities.
- 6.4.4. The Planning Unit recommends that Mason and Jefferson counties increase enforcement of illegal greywater and black-water discharges.

6.5. Support for Ongoing Activities

- 6.5.1. The Planning Unit recommends that the Puget Sound Action Team, Washington Sea Grant, and Washington State University Extension continue their stormwater education and outreach programs in the watershed.
- 6.5.2. The Planning Unit recommends that Mason and Jefferson counties continue to revise their critical areas ordinances based on best available science to provide adequate buffers, require compliance with Habitat Management Plans, establish and enforce improved stormwater treatment and controls, and maintain undeveloped marine drift cells. The Planning Unit also recommends that each county develop a matrix of critical areas buffers and setbacks as a single, consolidated source of reference.
- 6.5.3. The Planning Unit also recommends that Mason and Jefferson counties continue to encourage multiple-user docks and stream crossings to minimize the number of structures that impair habitat.
- 6.5.4. The Planning Unit recommends that Mason and Jefferson counties continue to revise their development regulations to ensure they are consistent with the Washington Department of Fish and Wildlife's fish passage guidelines (<http://wdfw.wa.gov/hab/engineer/habeng.htm>).
- 6.5.5. The Planning Unit recommends the Master Gardener curriculum continue to focus on minimizing the use of pesticides (including herbicides and insecticides) and fertilizers and emphasizing alternatives.
- 6.5.6. The Planning Unit supports the Hood Canal Coordinating Council's efforts to assess whether the number of marine septic pumping stations are adequate to serve recreational boating in Hood Canal. The assessment should determine if the existing sites are adequately maintained and whether new sites are needed in specific areas. The assessment should also include recommendations for public education. (See also recommendation 6.1.4.)
- 6.5.7. The Planning Unit supports the activities of the Hood Canal Dissolved Oxygen Program and recommends that

Planning Unit members continue participating in this and other regional efforts to address low dissolved oxygen issues. The Planning Unit also encourages HCDOP to address the impacts of low dissolved oxygen on ecological communities as well as on entire ecosystems.

- 6.5.8. The Planning Unit supports water resource clean up efforts in the watershed, including TMDLs and shellfish protection districts.

6.6. Information Gathering

- 6.6.1. The Planning Unit recommends that the following studies be completed, as funding allows. The Planning Unit recommends that Planning Unit members and other appropriate entities cooperatively pursue funding to complete these studies:
- A study of the comparative impact on impaired rivers and streams of withdrawing water from deeper confined aquifers as opposed to withdrawing water from shallow, unconfined aquifers thought to be in more direct hydraulic continuity with streams.
 - A modeling or research effort to predict more specifically the stream flow impacts from climate change on WRIA 16 streams;
 - Preparation of a groundwater quality monitoring strategy;
 - Preparation of a groundwater quantity monitoring strategy;
 - Exploring additional water storage opportunities; and
 - GPS mapping and typing of wetlands by trained staff on routine site visits.
- 6.6.2. The Planning Unit recommends that the Department of Ecology provide technical assistance to the Planning Unit to prepare a plan for the development of a shared database of water related data, including GIS data sets. The plan will assign responsibilities to various Planning Unit members for data gathering, entry and maintenance of the database.
- 6.6.3. The Planning Unit recommends that the legislature create and fund a clearinghouse for all data and information gathered on Hood Canal. The information should be housed at a single location (such as the State Library) and made easily accessible to the public.

- 6.6.4. The Planning Unit recommends that copies of all publications and documents regarding Hood Canal be given to the Timberland Library System for easy access by local residents.

6.7. Plan Implementation

- 6.7.1. The Planning Unit recommends that Mason and Jefferson counties implement mechanisms to improve coordination and communication between water quality and water resource staff (including land use, public works and environmental health staff). This could range from improved channels of communication to consolidating these staff into a single department.
- 6.7.2. The Planning Unit encourages Mason and Jefferson counties to incorporate the watershed plan recommendations, where appropriate, into the local Comprehensive Plan, including resource ordinances and development regulations.

7. Implementing the Plan

As discussed in Chapter 1, the Watershed Management Act (RCW 90.92) and its 2003 amendment identified four phases to watershed planning in Washington. This watershed plan represents the culmination of phases I, II, and III. It was approved by the Planning Unit by consensus on May 11, 2006 and the Mason and Jefferson county commissioners on [insert date].

The next logical step for WRIA 16 is to implement this watershed plan. Plan implementation is Phase IV of watershed planning; Phase IV was created in 2003 when the Legislature amended RCW 90.82. The State provides funds to Planning Units in the first year after County adoption to create a detailed implementation plan. Subsequent funding is also available to implement the watershed plan.

The WRIA 16 Planning Unit intends to assemble a detailed implementation plan in Phase IV that details specific actions, responsible parties, a timeline, and funding sources. In addition, the Planning Unit made two recommendations concerning implementation of this plan, Recommendations 6.7.1 and 6.7.2 in Chapter 6.



The view from Mount Elinor

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9. Glossary

303(d) list – A list of water bodies that do not meet water-quality standards; the list is periodically assembled by the State for submission to the federal Environmental Protection Agency to meet the requirements of Section 303(d) of the 1972 Clean Water Act

Acre-foot – A unit for measuring the volume of water, is equal to the quantity of water required to cover one acre to a depth of 1 foot and is equal to 43,560 cubic feet or 325,851 gallons. The term is commonly used in measuring volumes of water used or stored.

Allocation – The designation of specific amounts of water for specific beneficial uses.

Anadromous – the behavior exhibited by some fish (such as many salmonids) that involves spawning and rearing of juveniles in fresh water, followed by a migration of juveniles to the ocean and eventual return of adults to their birth location to spawn and die.

Aquifer – layer of underground sand, gravel, or permeable rock that stores and/or transmits water, such as to wells and springs.

Aquifer recharge – Water added to an aquifer, such as rainfall that seeps into the ground.

Beneficial use – A use of water resulting in appreciable gain or benefit to the user, consistent with state law. In Washington, beneficial use is defined by RCW 90.54.020 as “Uses of water for domestic, stock watering, industrial, commercial, agricultural, irrigation, hydroelectric power production, mining, fish and wildlife maintenance and enhancement, recreational, and thermal power production purposes, and preservation of environmental and aesthetic values, and all other uses compatible with the enjoyment of the public waters of the state.”

Bulkheads – Bulkheads are retaining wall-like structures whose primary purpose is to hold or prevent sliding of soil caused by wave erosion.

cfs – Cubic feet per second. One cfs is equal to a volume of water one foot high and one foot wide flowing a distance of one foot in one second. One cfs is equal to 7.48 gallons of water flowing each second.

Conductance – A rapid method of estimating the dissolved solids content of a water supply by determining the capacity of a water sample to carry an electrical current.

Consumptive use – a use of water that diminishes the water source at the point where it was taken.

Dissolved oxygen – The amount of gaseous oxygen dissolved in water; adequate levels of dissolved oxygen are critical for aquatic life.

Endangered species – A species that is listed as endangered under the federal or state Endangered Species Act (or both). These species are considered in critical danger of extinction if protection measures are not taken.

Fecal coliform – Bacteria found in the intestinal tracts of mammals and, therefore in, fecal matter; their presence in water is an indicator of pollution and possible contamination by pathogens.

Groundwater – Water found beneath the surface of the ground; groundwater is primarily water which has seeped down from the surface by migrating through the interstitial spaces in soils and geologic formations.

Hydraulic continuity – The connection between groundwater and surface water bodies.

Hydrograph – A graph that shows water flows over time for a specific location in a stream.

Hydrologic cycle – The complete circuit pursued by water in nature, including 1. falling of precipitation (rain, hail, sleet, snow, dew); 2. the journal of fallen water over and through the earth's surface formations; and 3. eventual evaporation of the water and its return to the atmosphere to again fall as precipitation.

Instream flow – Minimum flows that must be met in a stream to protect the resources and benefits that stream provides.

Large woody debris – Logs that have fallen into or next to streams; the Center for Water and Watershed studies at the University of Washington specifies that large woody debris must have a diameter of at least 10 cm and a length of at least 2 m, but many definitions exist; large woody debris is important for salmon habitat because it provides shade and protection, pools for refuge, and increases channel complexity.

Mass wasting – A form of erosion characterized by the downslope movement of soil, sediment, or rock; mass wasting events along the banks of rivers and streams can cause large amounts of sediment to be released into the water and deposited downstream.

Nonpoint source pollution – Pollution from a source that cannot be specifically identified and pinpointed, such as run-off from fields or roads.

Non-consumptive use – A use of water where either there is no diversion of water from the source or where there is no discernible diminishment of the source.

Percolate – To pass through, or permeate.

pH – A measure of the relative acidity or alkalinity of water. Water with a pH of 7 is neutral; lower pH levels indicate increasing acidity, while pH levels higher than 7 indicate increasingly basic (alkaline) solutions.

Planning Unit – A local group that is formed to assess water resources, identify water needs, and recommend watershed management strategies.

Pool – A slower, deeper area of a stream channel. Fish use pools for resting, rearing and refuge.

Riffle – A shallow, gravelly, faster-moving section of a stream in which salmon find insects to eat and also use for spawning.

Salmonid – Fish species that are, or are related to, salmon, such as trout and steelhead.

Saltwater intrusion – The invasion of a body of fresh water (including groundwater) by saltwater, due to its greater density; in the context of WRIA 16, this term refers to the movement of seawater into freshwater aquifers along Hood Canal.

Stormwater – The water and associated material draining into streams, lakes, or sewers as the result of rain or other storm.

Streamflow – The water discharge that occurs in a natural channel.

Surface water – All water naturally open to the atmosphere (such as rivers, lakes, reservoirs, streams, impoundments, seas, estuaries, etc.) and all springs, wells, or other collectors which are directly influenced by surface water

Suspended sediment – That portion of the sediment load suspended in the water column. Distinct from bedload, which is defined as the material rolling along the bed. Relative size of the suspended sediment is determined by flow characteristics, such as velocity.

TMDL – Total Maximum Daily Load: the maximum amount of a pollutant that a waterbody can receive and still meet water quality standards. TMDLs are typically set by government agencies.

Tributary – A smaller stream that flows into a larger stream.

Water purveyor – An agency or person that supplies water.

Water right – A legal authorization to use a predefined quantity of public water for a designated, beneficial use.

Watershed – The land area that drains into a stream or other water body (e.g., a lake or ocean); as such, WRIA 16 is not technically a single watershed but a number of watersheds; WRIA 16 could also be considered part of the Hood Canal watershed.

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Appendix A. Sub-basin Summaries

This appendix presents the “state of the sub-basin” – a summary of the existing science – for each of WRIA 16’s six sub-basins. Information in this appendix helped inform the “State of the Watershed” chapter (Chapter 2) as well as the key issues to be addressed for water quantity, water quality, and habitat.

The sub-basins addressed in this chapter include:

- Dosewallips
- Duckabush
- Hamma Hamma
- Finch/Lilliwaup
- Skokomish (including the North Fork, South Fork, and mainstem); and
- South Shore.

Dosewallips Sub-basin

The Dosewallips sub-basin is the northernmost sub-basin in WRIA 16 and is the largest watershed entering the northern portion of Hood Canal. The sub-basin drains an area of 130 square miles (83,825 acres), including nearly 132 miles of streams and tributaries. The Dosewallips River is one of the largest rivers in eastern Jefferson County. The river flows east from the snowfields of the Olympic Mountains into the Hood Canal near the town of Brinnon. Additional creeks and tributaries in the sub-basin include Rocky Brook Creek, Walker Creek, and Turner Creek (Golder Associates, 2003).

The vast majority (93%) of the watershed is contained within the Olympic National Park and Olympic National Forest. The remaining land in the watershed is rural residential, commercial, and private forest land. Brinnon, the largest town in the sub-basin, is located at the mouth of the Dosewallips River (Golder Associates, 2003).

WATER QUANTITY

The Dosewallips is the second largest river in WRIA 16 after the Skokomish River. Total discharge of water from the sub-basin, including both surface water (streamflow) and groundwater seepage to Hood Canal, is an estimated 454,612 acre-feet per year (AF/yr) (Golder Associates,



A Sub-basin Summaries

2003). Of this total, an estimated 919 AF/yr are allocated as surface water and groundwater, and 9 AF/yr are consumed via permit-exempt wells (Golder Associates, 2003). Table 4, below, summarizes the known information on water quantity in the Dosewallips sub-basin.

Table 4. Summary of Water Quantity Information for the Dosewallips Sub-basin

	Annual volume (Acre-feet per year)
Estimated surface water discharge	447,952
Estimated groundwater seepage	6,660
Total estimated discharge	454,612
Surface water allocation	274
Groundwater allocation	645
Total allocation	919
Estimated permit-exempt well use	9

Of the 919 AF/yr allocated water, approximately 70% is allocated for domestic and municipal uses, with 25% allocated for irrigation. Less than 600 people live in the sub-basin (Census 2000), an estimated 71 of whom draw their water from permit-exempt wells; total estimated residential demand is 76 AF/yr. In 2010, an estimated 86 more people will live in the sub-basin, increasing projected residential demand to 88 AF/yr (Golder Associates, 2003).

Eight applications for groundwater and two applications for surface water are pending in the Dosewallips sub-basin (Golder Associates, 2003).

WATER QUALITY

The Department of Ecology listed the Dosewallips River as an impaired water body due to temperature levels that exceed state standards. Increased temperatures may be caused by a 20% decrease in riparian vegetation along the lower reaches of the river (WCC, 2003). Available water quality data do not indicate any other water-quality concerns in the Dosewallips sub-basin.

HABITAT

The lower reaches of the Dosewallips river support chinook, coho, summer chum, pink salmon, steelhead and cutthroat trout. Steep topography and the impassible Cascade Falls block anadromous fish (fish that migrate from the sea to freshwater to breed) passage above mile 12 (May and Peterson, 2003).

The primary factors associated with decline in fish populations in the sub-basin are:

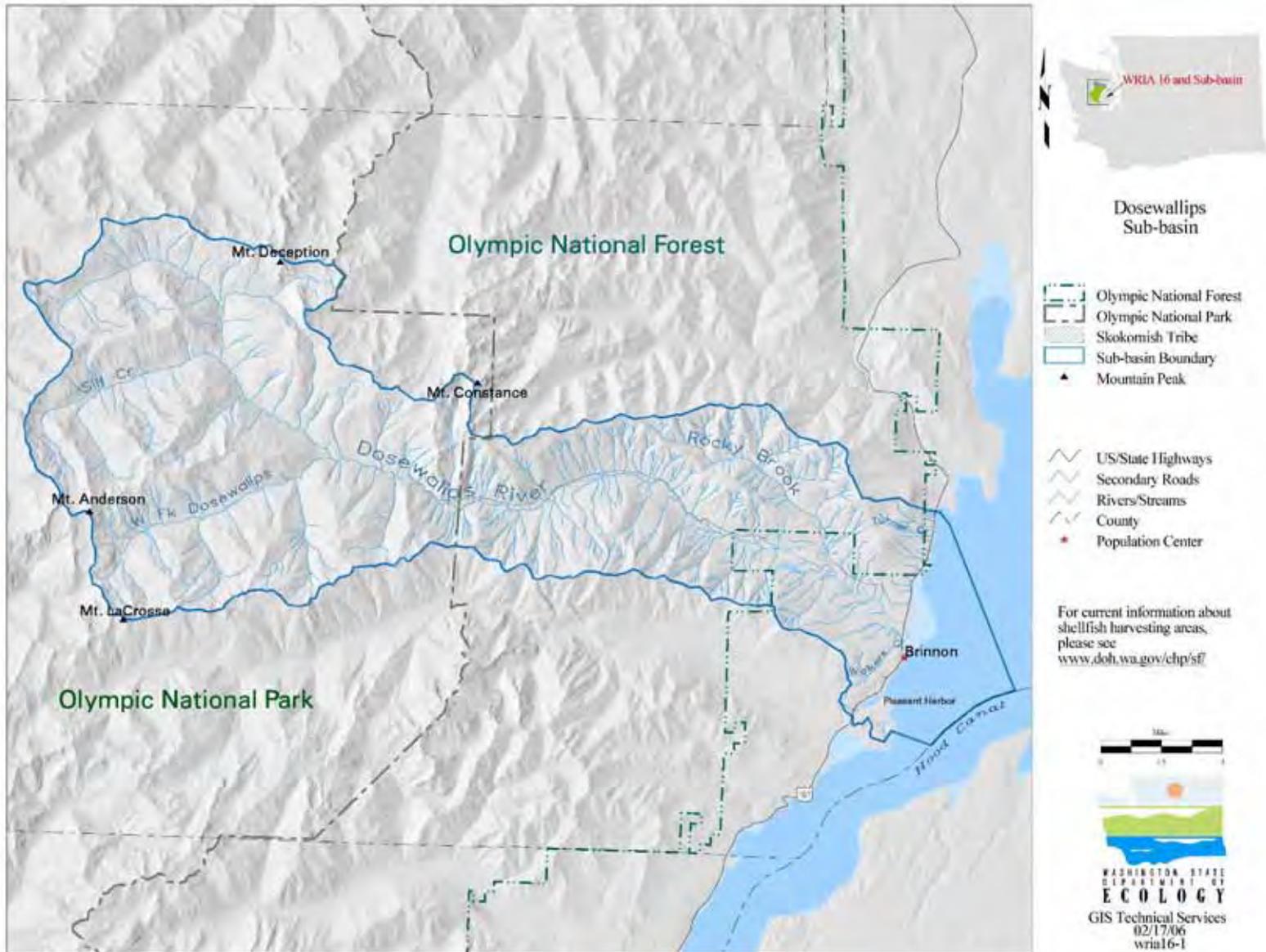
- **Low channel complexity**, which has resulted from dike construction, stream channelization, and removal of large woody debris along the mouth of the Dosewallips River and estuary (WCC, 2003). Natural, complex stream channels that contain riffles and pools are important for maintaining quality fish habitat.
- **Degradation of the estuary and riparian areas** of the Dosewallips River has limited fish habitat. Highway 101, residential development, and agricultural activities have disturbed fish habitat by disconnecting important side channels from the estuary and floodplains (May and Peterson, 2003) and removing riparian, or streamside, vegetation (WCC, 2003). Riparian vegetation provides insect food sources for fish, shaded cover from high temperatures, streambank stability, and woody debris to create complex habitats.
- **Fish passage barriers** can restrict or prevent fish migration and spawning. For example, culverts limit fish passage throughout the sub-basin, including in Rocky Brook Creek, Walker Creek, and Turner Creek at Highway 101 (WCC, 2003).

KEY ISSUES IN THE SUB-BASIN

Based on the existing technical information in the Dosewallips sub-basin, the following key issues emerge:

- Temperature measurements in the Dosewallips River exceed state standards.
- Roads, residential development, and agricultural activities have degraded and limited fish access to habitat in the estuary and in riparian areas;
- The construction of dikes, channeling of the stream, and removal of large woody debris have led to decreased habitat quality; and
- Culverts block fish passage in several creeks throughout the sub-basin.
- Population growth (especially in the Brinnon area) may place further strain on water resources in the future.

Figure 6. Map of the Dosewallips Sub-basin



Duckabush Sub-basin

The Duckabush sub-basin, located in southeastern Jefferson County, covers an area of 81.6 square miles (52,256 acres). The vast majority (89%) of the sub-basin is situated in the Olympic National Park and the Olympic National Forest. The remaining 11% of the sub-basin consists of privately owned forests, rural residential property, and parks. Land-use along the eastern portion of the sub-basin (along the lower 1.5 miles of the Duckabush River) is managed for timber harvest and rural residential and commercial development (Golder Associates, 2003).

The Duckabush River, originating near Mt. Duckabush, is the largest stream draining the sub-basin. The Duckabush River drains into a broad estuary at Hood Canal, four miles south of Brinnon (Golder Associates, 2003)..



WATER QUANTITY

Total discharge of water from the Duckabush River sub-basin, including both surface water (streamflow) and groundwater seepage to Hood Canal, is an estimated 333,642 acre-feet per year (AF/yr) (Golder Associates, 2003). Of this total, an estimated 254 AF/yr are allocated as surface water and groundwater, and 40 AF/yr are consumed via permit-exempt wells. Table 5, below, summarizes the known information on water quantity in the Duckabush sub-basin.

Table 5. Summary of Water Quantity in the Duckabush Sub-basin

	Annual volume (Acre-feet per year)
Estimated surface water discharge	330,891
Estimated groundwater seepage	2,751
Total estimated discharge	333,642
Surface water allocation	68
Groundwater allocation	186
Total allocation	254
Estimated permit-exempt well use	40

Of the 254 AF/yr of allocated water, approximately 67% is allocated for domestic and municipal uses, with 32% allocated for irrigation. Less than 400 people live in the sub-basin (Census 2000), the majority of whom (estimated at 306) draw their water from permit-exempt wells; total estimated residential demand is 48 AF/yr. In 2010, an estimated 56 more people will live in the sub-basin, increasing projected residential demand to 56 AF/yr (Golder Associates, 2003).

A Sub-basin Summaries

Four applications for groundwater are pending in the Duckabush sub-basin; no applications for surface water are pending (Golder Associates, 2003).

WATER QUALITY

The Department of Ecology considers the Duckabush River to be impaired based on water temperature exceedances measured in 2002 at river mile 4.5.

HABITAT

The Duckabush sub-basin provides habitat for chinook, coho, chum, and pink salmon, as well as steelhead and cutthroat trout. Steep river walls, impassable falls, and cascades limit anadromous fish populations to the lower 7.5 miles of the Duckabush River (May and Peterson, 2003).

The lower reaches of the Duckabush are in relatively good condition, although much like the Dosewallips, development in the Duckabush has limited habitat by decreasing channel complexity and contributing to degradation of the estuary and riparian areas.

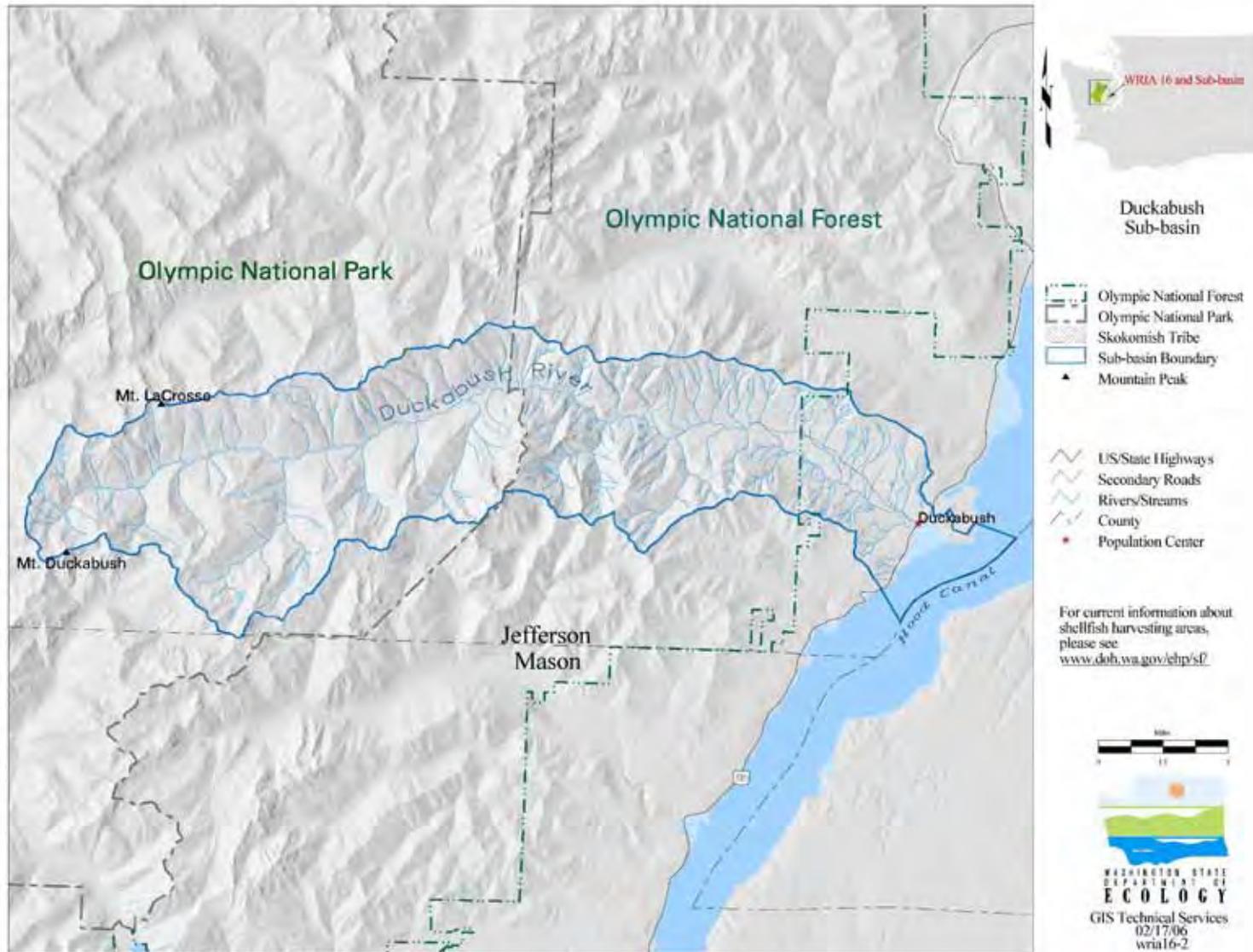
In general, habitat above (west) of the estuary is in good condition due to the management practices of the Olympic National Park and Olympic National Forest (May and Peterson, 2003). The main factor that has limited habitat quality in the middle and upper reaches is **excess sediment delivery** to stream channels in the sub-basin is caused by mass wasting events resulting from road construction, logging and clearcuts, and fire (natural and human-caused) (May and Peterson, 2003). Above-normal levels of suspended and deposited sediment can be harmful to fish health and can negatively impact water and habitat quality. Few artificial barriers exist – most are natural cascades or waterfalls.

KEY ISSUES IN THE DUCKABUSH SUB-BASIN

Based on the existing technical information in the Duckabush sub-basin, the following key issues emerge:

- Limited available water temperature and pH measurements have led the Department of Ecology to consider the Duckabush River a “water body of concern.” More temperature and pH data are needed to discern whether or not a problem exists.
- Roads and residential development have degraded and limited fish access to habitat in the estuary and in riparian areas;
- The construction of dikes, channeling of the stream, and removal of large woody debris have led to decreased habitat quality;
- Streams suffer from excess sediment loads due to a variety of factors, including road building, poor forest management practices, and fire; and
- Population growth and future development may place further strain on water resources in the sub-basin.

Figure 7. Duckabush Sub-basin





Hamma Hamma Sub-basin

The Hamma Hamma sub-basin is centrally located in WRIA 16, covers 117.5 square miles, and is comprised of 74.1 miles of extensive tributary drainages and several alpine lakes. The vast majority (95%) of the sub-basin is within the Olympic National Forest and Olympic National Park. Land-use in the remaining 5% of the watershed is agricultural and residential and is concentrated along the lower reaches of the Hamma Hamma River and along Hood Canal. The population in the sub-basin (300 in 2000) is concentrated in the town of Eldon located near the mouth of the Hamma Hamma River (Golder Associates, 2003).

The Hamma Hamma River is the largest stream in the sub-basin. Several smaller creeks and tributaries flow through the sub-basin, including McDonald Creek, Fulton Creek, Schaerer Creek, Waketickeh Creek, Johns Creek, and an unnamed tributary to Hood Canal (Golder Associates, 2003).

WATER QUANTITY

Total discharge of water from the Hamma Hamma River sub-basin, including both surface water (streamflow) and groundwater seepage to Hood Canal, is an estimated 470,069 acre-feet per year (AF/yr). Of this total, an estimated 689 AF/yr are allocated as surface water and groundwater. A small amount of water is also consumed via permit-exempt wells, but the consultants for the Technical Assessment were not able to estimate it due to lack of data (Golder Associates, 2003).

Table 6 summarizes the known information on water quantity in the Hamma Hamma sub-basin.



(Hamma Hamma River, Ecology Oblique Photo, 2001)

Table 6. Summary of Water Quantity

**Information for the
Hamma Hamma Sub-basin**

	Annual volume (Acre-feet per year)
Estimated surface water discharge	461,743
Estimated groundwater seepage	8,326
Total estimated discharge	470,069
Surface water allocation	313
Groundwater allocation	376
Total allocation	689
Estimated permit-exempt well use	Unknown

Of the 689 AF/yr of allocated water, approximately 75% is allocated for domestic and municipal uses, with 23% allocated for irrigation. Less than 300 people live in the sub-basin (Census 2000); total estimated residential demand is 39 AF/yr. By 2010, population in the sub-basin is expected to decrease slightly, decreasing projected residential demand to 36 AF/yr (Golder Associates, 2003).

Two applications for groundwater and one application for surface water are pending in the Hamma Hamma sub-basin (Golder Associates, 2003).

WATER QUALITY

The Department of Ecology considers Fulton Creek an impaired water body based on measured exceedances of state temperature standards. Temperature measurements were taken near Highway 101. Ecology has listed McDonald Creek as a water body of concern based on measurements of temperature; however, more data are needed to determine if the Creek is an impaired water body requiring a water clean-up plan.

HABITAT

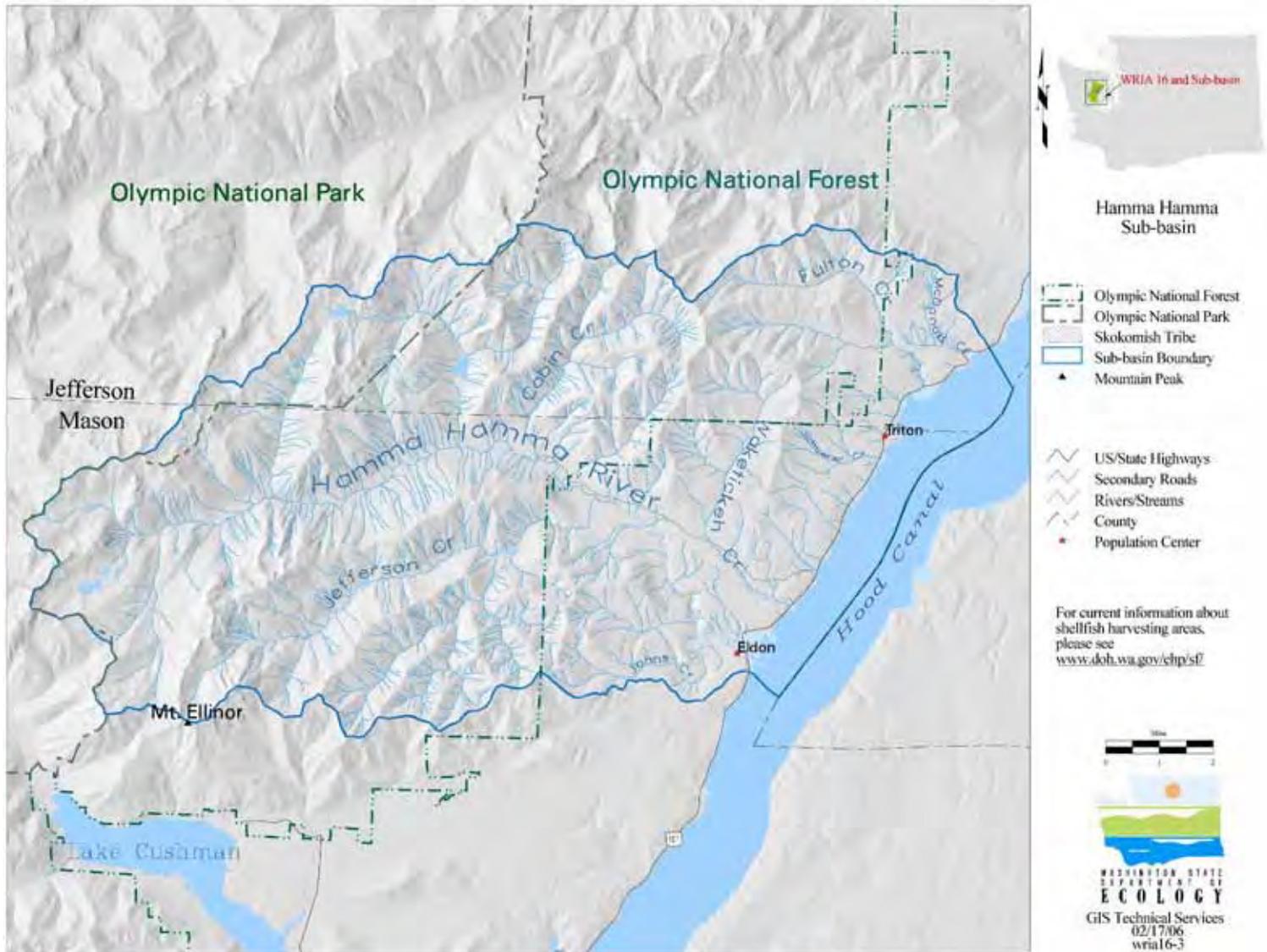
The Hamma Hamma sub-basin supports coho, chum, cutthroat, chinook, pink, and steelhead species. As in other sub-basins, development and agricultural activities have resulted in degraded riparian and estuarine habitat. In addition, elevated levels of fine sediment entering the lower reaches of the Hamma Hamma River and John Creek are likely caused by landslides associated with poor logging practices (WCC, 2003).

KEY ISSUES

Based on the existing technical information in the Hamma Hamma sub-basin, the following key issues emerge:

- Fulton Creek fails state water-quality standards for high water temperatures. Some high temperatures have also been measured in McDonald Creek, but more data are needed to discern whether or not a problem exists;
- Roads, residential development, and agriculture have degraded and limited fish access to habitat in the estuary and in riparian areas;
- The construction of dikes, channeling of the stream, and removal of large woody debris have led to decreased habitat quality; and
- The Hamma Hamma River and John Creek experience excess fine sediment loads, likely due to landslides associated with poor forest management practices.

Figure 8. Map of the Hamma Hamma Sub-basin





Finch/Lilliwaup Sub-basin

The Finch/Lilliwaup sub-basin, which includes the extensive wetlands located in the Upper Lilliwaup Valley, is 54.7 square miles and is drained by several smaller creeks rather than one large river. The creeks that drain the sub-basin are the Jorsted Creek, Ayoeh Creek, Eagle Creek, Lilliwaup Creek, Little Lilliwaup Creek, Sund Creek, Miller Creek, Clark Creek, Finch Creek and Hill Creek (Golder Associates, 2003).

Commercial and residential development is concentrated along the eastern portion of the sub-basin along the shore of Hood Canal in the towns of Lilliwaup and Hoodspport. Hoodspport is the largest town in the sub-basin, as well as the location of a salmon hatchery. The upper reaches of the sub-basin support logging, recreation, and Christmas tree farming (Golder Associates, 2003).

WATER QUANTITY

Total discharge of water from the Finch/Lilliwaup sub-basin, including both surface water (streamflow) and groundwater seepage to Hood Canal, is an estimated 206,389 acre-feet per year (AF/yr) (Golder Associates, 2003). Of this total, an estimated 2,449 AF/yr are allocated as surface water and groundwater, and 13 AF/yr are consumed via permit-exempt wells. Table 5, below, summarizes the known information on water quantity in the Finch/Lilliwaup sub-basin.

Table 7. Summary of Water Quantity Information for the Finch/Lilliwaup Sub-basin
(Golder Associates, 2003)

	Annual volume (Acre-feet per year)
Estimated surface water discharge	192,561
Estimated groundwater seepage	13,828
Total estimated discharge	206,389
Surface water allocation	1,026
Groundwater allocation	1,423
Total allocation	2,449
Estimated permit-exempt well use	13

Of the 2,449 AF/yr of allocated water, approximately 92% is allocated for domestic and municipal uses (the highest percentage of any sub-basin), with 7% allocated for irrigation. Approximately 1,100 people live in the sub-basin (Census 2000), an estimated 103 of whom draw their water from

permit-exempt wells; total estimated residential demand is 143 AF/yr. In 2010, an estimated 31 more people will live in the sub-basin, increasing projected residential demand to 148 AF/yr (Golder Associates, 2003).

Six applications for groundwater and one application for surface water are currently pending in the Finch/Lilliwaup sub-basin (Golder Associates, 2003).

WATER QUALITY

The Department of Ecology listed Finch Creek as an impaired water body due to fecal coliform levels above state water-quality standards. The exact cause of elevated fecal levels has not been determined; however, possible causes include failing septic systems and pet waste (EnviroVision, 2003). Stormwater drainage near Hoodsport may also impact water quality in the lower reaches of the sub-basin and Hood Canal. Ecology listed Lilliwaup Creek as a water body of concern based on measured levels of fecal coliform. More data need to be collected to determine if the Creek is impaired and needs a water clean-up plan. However, the fact that the Department of Health has closed shellfish harvesting in Lilliwaup Bay (Washington State Department of Health, 2005) is likely indicative of elevated fecal coliform levels in Lilliwaup Creek.

HABITAT

The Finch/Lilliwaup sub-basin supports many salmonid species including chum, coho, chinook, and pink salmon, as well as cutthroat trout and steelhead. Anadromous fish populations are generally limited to the lower reaches of the sub-basin because of natural barriers (waterfalls and cascades) as well as artificial structures (e.g., the hatchery intake structure at mile 0.3 on Finch Creek). Habitat quality in the sub-basin is similar to that in other WRIA 16 sub-basins. In general, estuarine degradation and loss of riparian vegetation limit habitat quality for anadromous fish in the lower reaches of the sub-basin. In the upper reaches, resident fish are blocked by culverts or other barriers on several creeks, including Jorsted Creek, Eagle Creek, upper Lilliwaup Creek, Little Lilliwaup Creek, and Miller Creek. Other structures also block transport of woody debris and sediment, including two culverts at Highway 101 along Ayock Creek and Little Lilliwaup Creek, a hatchery intake structure at Finch Creek, and a 20-foot dam on Hill Creek (WCC, 2003).

ISSUES

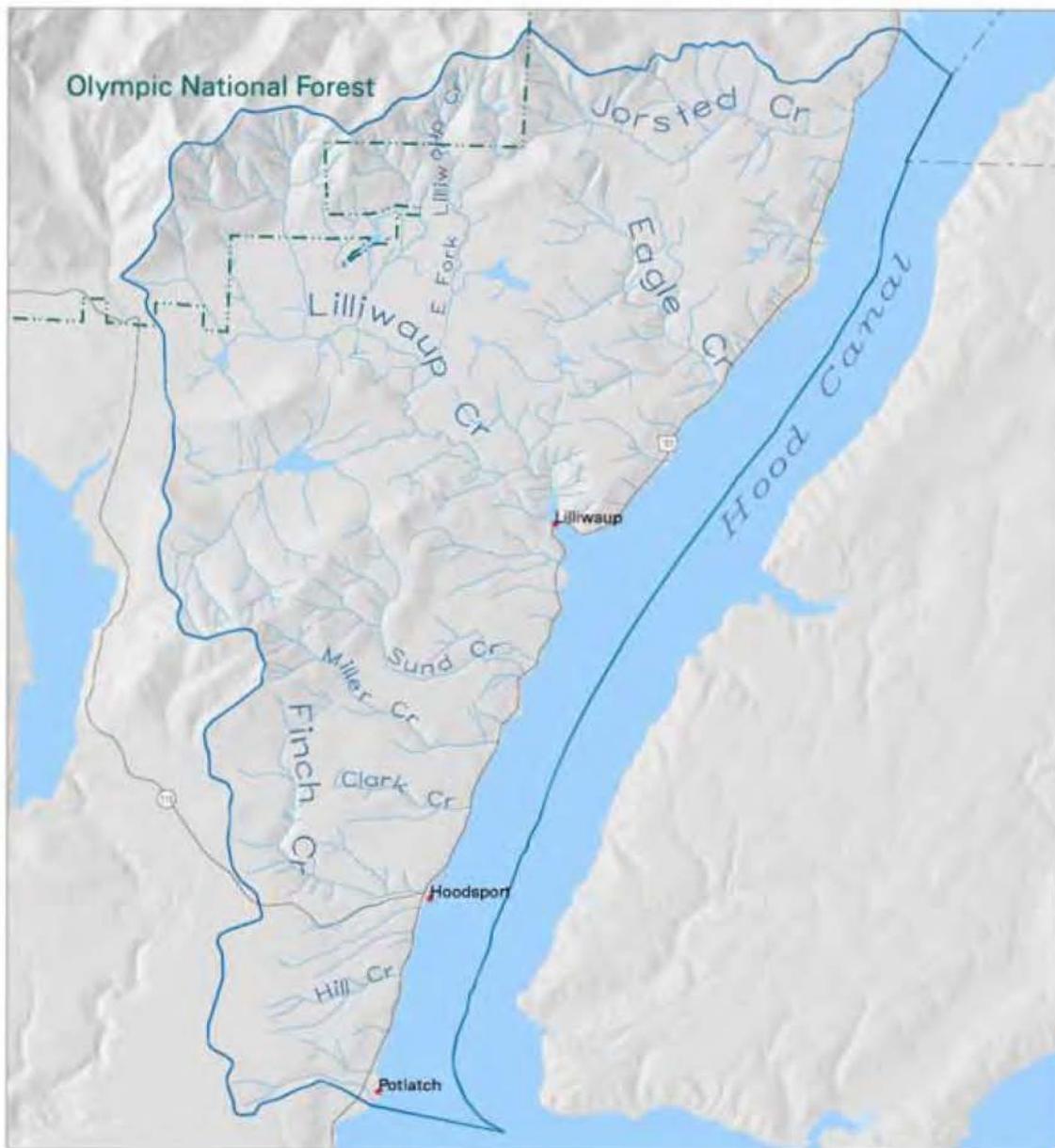
Based on the existing technical information in the Finch/Lilliwaup sub-basin, the following key issues emerge:

- Fecal coliform levels in Finch and Lilliwaup Creeks have exceeded state water quality standards, but more data are needed, particularly in Lilliwaup Creek;

A Sub-basin Summaries

- Stormwater drainage into Hood Canal has been cited as contributor to poor water quality near Hoodspout;
- Roads and residential development have degraded and limited fish access to habitat in the estuary and in riparian areas;
- The construction of dikes, channeling of the stream, and removal of large woody debris have led to decreased habitat quality; and
- Culverts and other structures limit fish passage in several creeks and can block transport of woody debris.
- Population growth and future development may place further strain on water resources in the sub-basin.

Figure 9. Map of the Finch/Lilliwaup Sub-basin



Finch/Lilliwaup Sub-basin



GIS Technical Services
02/17/06
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- Olympic National Forest
- Olympic National Park
- Skokomish Tribe
- Sub-basin Boundary
- Mountain Peak
- US/State Highways
- Secondary Roads
- Rivers/Streams
- County
- Population Center

For current information about shellfish harvesting areas, please see www.doh.wa.gov/chp/sf/





Skokomish Sub-basin

The Skokomish sub-basin is approximately 240 square miles and drains rivers from the eastern slopes of the Olympic Mountains to the southern shores of Hood Canal and Annas Bay. The Skokomish River, with its 80 miles of main stem and over 260 miles of tributaries, empties into a tidal estuary and delta that are the largest in the Hood Canal basin. The river enters the Great Bend, or “elbow,” of Hood Canal, between the rural towns of Potlatch and Union. There are four independent Hood Canal tributaries in the sub-basin, located to the north of the Skokomish delta: Minerva Creek, Potlatch State Park Creek, Enetai Creek, and an unnamed Creek near the Canal Side Diner.

Land use in the sub-basin is managed primarily for hydropower, agriculture, and forestry.

Discussion of the Skokomish sub-basin will include discussion of findings particular to the North Fork, South Fork, and Main Stem of the Skokomish River. These sections of the river are described in more detail below.

- **The North Fork** of the Skokomish River drains an area of nearly 120 square miles. The North Fork originates in the Mount Skokomish/Mount Stone area of Olympic National Park and flows east through heavily forested terrain into the Cushman and Kokanee Reservoirs before joining the main stem. Most of the water contained in the Cushman Reservoir goes to the City of Tacoma’s power generating facility and is discharged into Hood Canal, rather than through the Skokomish River. Approximately 1,000 people (2000 census) live in the area, with almost one third concentrated along the shores of Lake Cushman (Golder Associates, 2003).
- **The South Fork** of the Skokomish River originates in the Olympic National Park and contributes the majority of the Skokomish River’s current flow. The primary land use in the basin is forestry; the U.S. Forest Service manages 80% of the basin and the Green Diamond Resource Company owns approximately 13%. Over half (60%) of the basin has been logged since the 1920s; 40% is currently old growth forest and alpine vegetation (WCC, 2003).
- **The main stem** of the Skokomish River flows nine miles between the junction of the North and South Forks to Annas Bay and the Great Bend in the Hood Canal. The main stem of the Skokomish River flows through a wide, fertile valley supporting rural hobby farms, rural residential development, agriculture, hay and Christmas tree production, and the Skokomish Tribal Reservation. Approximately 1,350 people live in the main stem basin (Golder Associates, 2003). Tributaries to the main stem of the Skokomish River include Purdy Creek, Weaver Creek, Hunter Creek, and Richert

Springs. Rich shellfish resources and shellfish beds are located in Annas Bay and Potlatch State Park.

WATER QUANTITY

The Skokomish River is by far the largest river in WRIA 16. Of all water that flows through WRIA 16, approximately half flows through the Skokomish River sub-basin. Total discharge of water from the sub-basin, including both surface water (streamflow) and groundwater seepage to Hood Canal, is an estimated 1,478,710 acre-feet per year (AF/yr) (Golder Associates, 2003). Total water allocation in the Skokomish River sub-basin is also the highest of all WRIA 16 sub-basins. Furthermore, a higher percentage of the Skokomish River sub-basin's annual discharge is allocated than in any other sub-basin except the South Shore sub-basin (Golder Associates, 2003).

An estimated 9,933 AF/yr are allocated for consumptive use under Washington State Water Law in the sub-basin – 4,754 as surface water and 5,179 as groundwater. An estimated 261 AF/yr are consumed via permit-exempt wells. Table 5, below, summarizes the known information on water quantity in the Skokomish sub-basin. Note that diversion for hydropower use at Cushman dam is estimated at 333,310 AF/yr (Golder Associates, 2003).



A Sub-basin Summaries

**Table 8. Summary of Water Quantity Information
for the Skokomish Sub-basin
(Golder Associates, 2003)**

	Annual volume (Acre-feet per year)			Total
	North Fork	South Fork	Main Stem	
Estimated surface water discharge	711,792	663,438	94,648	1,469,878
Estimated groundwater seepage	N/A ¹³	N/A ¹³	8,832 ¹³	8,832
Total estimated discharge	711,792	663,438	103,480	1,478,710
Surface water allocation	787	515	3,452	4,754
Groundwater allocation	1,027	1,147	3,005	5,179
Total allocation	1,814	1,662	6,457	9,933
Estimated hydropower diversion	333,310	0	0	333,310
Total allocation + hydropower diversion	335,124	1,662	6,457	343,323
Estimated permit-exempt well use	102	27	132	261

Of the 9,933 AF/yr of allocated water, only 25% is allocated for domestic and municipal uses (the lowest percentage of any sub-basin), with nearly three-quarters (73%) allocated for irrigation. Approximately 2,600 people live in the sub-basin, mostly in the lower portion (Census 2000); total estimated residential demand is 346 AF/yr. An estimated 1,980 of these residents draw their water from permit-exempt wells, for a demand of 261 AF/yr. In 2010, an estimated 731 more people will live in the sub-basin, increasing total projected residential demand from 346 AF/yr to 480 AF/yr (Golder Associates, 2003).

Six applications for groundwater and four applications for surface water are currently pending in the Skokomish sub-basin (Golder Associates, 2003).

In addition to the water allocations discussed above, the Skokomish Tribe has a claim for separate water rights reserved by it and other tribes in the Treaty of Point No Point, Jan. 26, 1855, 12 Stat. 933. In *Winters v. U.S.* (1908), the U.S. Supreme Court held that when the federal government establishes a reservation, the government implicitly reserved a quantity of water necessary to fulfill the primary purposes of the reservation. This has

¹³ Groundwater seepage was estimated by Golder Associates based on length of a sub-basin's Hood Canal waterfront. The North Fork and South Fork of the Skokomish River do not have any Hood Canal waterfront, and so no groundwater seepage was estimated for these streams. However, the two streams do provide groundwater storage and flows, likely to the lower section of the Skokomish River sub-basin or possibly to neighboring sub-basins.

become known as the “Winters Doctrine.” Tribal treaty water rights have an earlier priority date than the 40 state-granted rights discussed above. In most cases, however, including for the Skokomish Tribe, these rights have not been quantified.

In Washington State, tribes also have water rights related to fishing rights. The 1974 district court case *United States v. Washington* (which is commonly referred to as the Boldt decision) reaffirmed tribal fishing rights and specified that water of sufficient quality and quantity must be provided to sustain fish runs for commercial, ceremonial, and subsistence purposes in the tribes’ “usual and accustomed” treaty fishing area. These flows have also not been quantified, however, further complicating efforts by tribes, watershed planning groups, and others to assess water resources.

WATER QUALITY

There are several impaired water bodies in the Skokomish sub-basin and several water bodies for which a water clean-up plan or TMDL has been completed. Ecology considers Lebar Creek, the South Fork of the Skokomish River, and a small segment of the Skokomish main stem to be impaired water bodies. A TMDL, approved by Ecology, was completed for the main stem of the Skokomish River and its tributaries: Purdy Creek, Ten Acre Creek, Hunter Creek, and Weaver Creek (Ecology, 2001a).

- Ecology listed the **South Fork** of the Skokomish River and a tributary, Lebar Creek, as impaired due to temperature measurements above state water-quality standards. Elevated temperature levels are partially attributable to sediment deposition and channel widening, which increases warming of the water from the sun (WCC, 2003).
- A watershed clean-up and implementation plan for the **Main Stem** of the Skokomish River, including Purdy Creek, Ten Acre Creek, Weaver Creek, and Hunter Creek was completed in February 2003 (Ecology, 2003b). This plan was a cooperative effort between Ecology and local government agencies, the Skokomish Tribe, and local residents. The plan identified agriculture, septic system failure, recreation activities, and wildlife as key contributors to the elevated fecal coliform levels and recommended a variety of actions to reduce or mitigate fecal coliform levels (Ecology, 2003b). Particular “areas of concern” identified in the detailed implementation plan include Weaver Creek, Ten Acre Creek, and the Skokomish mainstem and Purdy Creek between the Highway 101 and Highway 106 Bridges. A portion of the Skokomish River mainstem downstream of Highway 106 is still listed on the 303 (d) list because it was not included in the TMDL. In addition, the final 303(d) listings published in November 2005 do list Hunter Creek and Ten Acre creek as impaired water bodies, even though they have a TMDL plan in place.

A Sub-basin Summaries

HABITAT

The Skokomish sub-basin provides habitat for many anadromous fish species including chum, chinook, coho, steelhead, and cutthroat and trout. Bull trout, resident cutthroat trout, and rainbow trout are also present. Historically, sockeye stocks were also present. Individual sockeye are observed every year in the lower Skokomish basin, but biologists don't believe a viable population is currently present. A landlocked (Kokanee) sockeye population exists in Lake Cushman and Lake Kokanee and is supported by hatchery augmentation. Landlocked chinook salmon are also present in Lake Cushman. Following is a discussion of fish habitat in the North, South, and Main forks of the Skokomish River.

- **The North Fork** of the Skokomish River provides habitat for resident and anadromous fish. Assessment of habitat quality is limited due to litigation surrounding the Cushman Dam. Several culverts block resident fish migration on Dow Creek, Big Creek, and near the Tacoma Utility Power House. An earthen dam on the Enetai Creek also blocks fish passage (WCC, 2003). In addition, McTaggart Creek has two partial fish barriers and an impassable structure that diverts the entire flow into the hydropower facility (Skokomish Tribe, personal communication, December 23, 2004).
- Habitat quality in the upper and middle reaches of the **South Fork** of the Skokomish River is good. The U.S. Forest Service is restoring riparian corridors near Lebar Creek and Cedar Creek, as well as other riparian zones under their ownership. Erosion at the abandoned hydropower development, near Lebar Creek and Brown Creek, is a potential problem (WCC, 2003).

Habitat quality in the lower reaches of the South Fork is compromised by sediment aggradation, channelization, and loss of riparian vegetation. The source of built-up sediment is likely the result of mass wasting and road failures related to forestry practices upstream, including in Vance Creek. The lower reaches of the South Fork flowing through the Skokomish Valley have been channelized, armored, and diked and riparian vegetation throughout the valley is sparse due to agricultural land-use. Woody debris is often removed for private use including firewood and fence posts (WCC, 2003).

- Barriers, channelization, sediment build-up (aggradation), and riparian loss reduce habitat quality along the **Main Stem** of the Skokomish River. A majority of the main stem has been diked and channelized which has eliminated access to side channel and wetland habitat and reduced channel complexity. Over half (62%) of the mainstem is sparsely vegetated and has been cleared for agriculture (WCC, 2003). One factor that may contribute to an elevated degree of sediment aggradation in the main stem is the diversion of stream flow from the North Fork to Cushman Dam. With less water flowing in the Skokomish River, the river may not be able to carry as

much sediment out to the estuary as in historical times (Skokomish Tribe, personal communication, December 23, 2004).

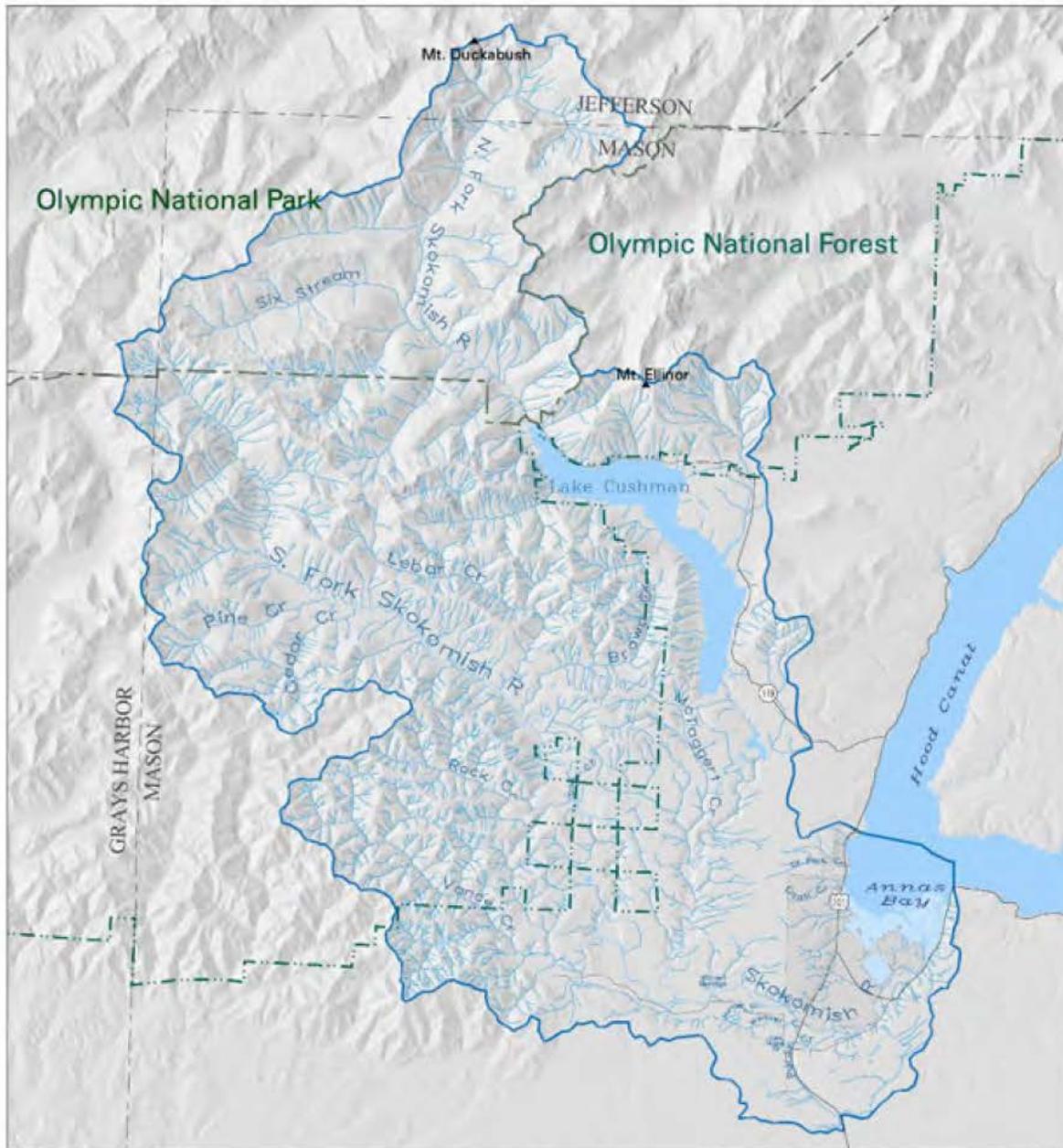
ISSUES

Based on the existing technical information in the Skokomish sub-basin, the following key issues emerge:

- Uncertainties about water quantity and water right allocations make water resource planning in the sub-basin difficult; in particular, significant water allocations, diversion at Cushman Dam, and uncertainty about the quantity of the Skokomish Tribe's federal water right all contribute to the difficulty;
- Water temperature measurements in Lebar Creek and in the South Fork of the Skokomish River have exceeded state water quality standards;
- Fecal coliform is a concern in Hunter Creek; animal waste is one contributor;
- Roads, residential development, and agriculture have degraded and limited fish access to habitat in the estuary and in riparian areas;
- The construction of dikes, channeling of the stream, and removal of large woody debris have led to decreased habitat quality; and
- The South Fork of the Skokomish River experiences significant sediment aggradation; mass wasting and road failures are sources of the excess sediment; and
- Culverts and other structures block fish passage in several creeks.
- Population growth and future development may place further strain on water resources in the sub-basin.

A Sub-basin Summaries

Figure 10. Map of the Skokomish Sub-basin



Skokomish Sub-basin



WASHINGTON STATE
DEPARTMENT OF
ECOLOGY
GIS Technical Services
02/17/06
wria16-4

- | | |
|-------------------------|-------------------|
| Olympic National Forest | US/State Highways |
| Olympic National Park | Secondary Roads |
| Skokomish Tribe | Rivers/Streams |
| Sub-basin Boundary | County |
| Mountain Peak | Population Center |

For current information about shellfish harvesting areas, please see www.doh.wa.gov/ehp/sf/



South Shore Sub-basin

The South Shore sub-basin is located on a narrow strip of land along the southern shore of Hood Canal. Technically part of WRIA 14, the South Shore sub-basin is addressed in this document in order to consolidate planning for areas bordering Hood Canal. The Planning Units of WRIA 14 and WRIA 16 executed a formal agreement that WRIA 16 would undertake watershed planning (under RCW 90.82) for this sub-basin, an agreement that was approved by the Department of Ecology. In WRIA 14, the South Shore sub-basin is known as the North Mason or Upper Mason sub-basin.

The South Shore sub-basin has no major drainages, but contains many small creeks including Twanoh Falls Creek, Twanoh Creek, Alderbrook Creek, and Happy Hollow Creek, as well as some intermittent streams and seeps.

The major communities in the sub-basin are Union on the west side and the outskirts of Belfair on the east side. This narrow strip of land has the highest population density of all of the sub-basins in WRIA 16 with approximately 2,772 people living in the basin in 2000 (EnviroVision, 2003). It is important to note, however, that many of the sub-basin's residents are seasonal and the population can double during summer months.

WATER QUANTITY

Total discharge of water from the South Shore sub-basin, including both surface water (streamflow) and groundwater seepage to Hood Canal, is an estimated 59,550 acre-feet per year (AF/yr), the lowest of any WRIA 16 sub-basin. Of this total, an estimated 1,705 AF/yr are allocated as surface water and groundwater. Some amount of water is also consumed via permit-exempt wells, but the consultants for the *Level 1 Technical Assessment* were not able to estimate it due to lack of data (Golder Associates, 2003). Table 9, below, summarizes the known information on water quantity in the South Shore sub-basin.



A Sub-basin Summaries

Table 9. Summary of Water Quantity Information for the South Shore Sub-basin
(Golder Associates, 2003)

	Annual volume (Acre-feet per year)
Estimated surface water discharge	42,971
Estimated groundwater seepage	16,579
Total estimated discharge	59,550
Surface water allocation	675
Groundwater allocation	1,030
Total allocation	1,705
Estimated permit-exempt well use	Unknown

Of the 1,705 AF/yr of allocated water, approximately 84% is allocated for domestic use. Approximately 2,800 people live in the sub-basin (Census 2000); total estimated residential demand is 360 AF/yr. In 2010, an estimated 633 more people will live in the sub-basin, increasing projected residential demand to 467 AF/yr (Golder Associates, 2003).

Nine applications for groundwater and one application for surface water are currently pending in the South Shore sub-basin (Golder Associates, 2003).

The Mason County Public Utility District No. 1 has conducted some research into the groundwater supply in the Union area from a particular well – Union Well No. 2. The test shows that the aquifer for Union Well No. 2 is subject to saltwater intrusion if pumped at a previously proposed rate of 300 gpm. This is because the aquifer is below sea level; when freshwater is pumped out of the aquifer, saltwater from Hood Canal may intrude. As a result, groundwater supply from the Union Well No. 2 is limited (Rongey, 2002).

WATER QUALITY

Several fresh and marine water bodies in the South Shore sub-basin are listed as impaired water bodies: Happy Hollow Creek, Twanoh Creek, Twanoh Falls Creek, Sunset Beach Creek, and an unnamed creek along the shore of Hood Canal.

According to the Department of Ecology, fecal coliform measurements, likely due to failing septic systems, exceed state standards in all of the creeks measured. More recent water-quality monitoring by Envirovision (Envirovision, 2005) identified fecal coliform exceedances in Big Bend

Creek and Mulberg Creek, but not in Alderbrook Creek, the “Unnamed Creek”, Twanoh Falls Creek, Happy Hollow Creek, Holyoke Creek, Devereaux Creek, or Shady Beach drainage. Measurements in Twanoh Creek were “borderline” (Envirovision, 2005). Given the discrepancy between this more recent data and past measurements, further study is needed to determine to what extent water quality (particularly fecal coliform) is a concern in the South Shore sub-basin.

According to the 303(d) list, the Great Bend and Lynch Cove marine waters are also impaired due to pH fluctuations and low dissolved oxygen.

Saltwater intrusion may impact water quality in the sub-basin’s wells.

HABITAT

The South Shore sub-basin provides habitat for several fish species including chum and coho (Golder Associates, 2003), as well as cutthroat trout and steelhead (Skokomish Tribe, personal communication, December 23, 2004).

Fish habitat in the sub-basin is limited by residential development along the shore of Hood Canal and State Route 106. In addition, culverts and other barriers are a particular concern in Devereaux Creek, Springbrook Creek, Twanoh Falls Creek, and Dalby Creek (WCC, 2003a).

INSTREAM FLOW

Unlike any sub-basin in WRIA 16, the South Shore sub-basin (technically part of WRIA 14) contains two streams that are closed to further appropriation during certain parts of the year. In 1984, WAC 173-514 closed many streams in WRIA 14 to further consumption, including Alderbrook Creek and Twanoh Creek. Minimum instream flows, however, were not set in these creeks.

KEY ISSUES

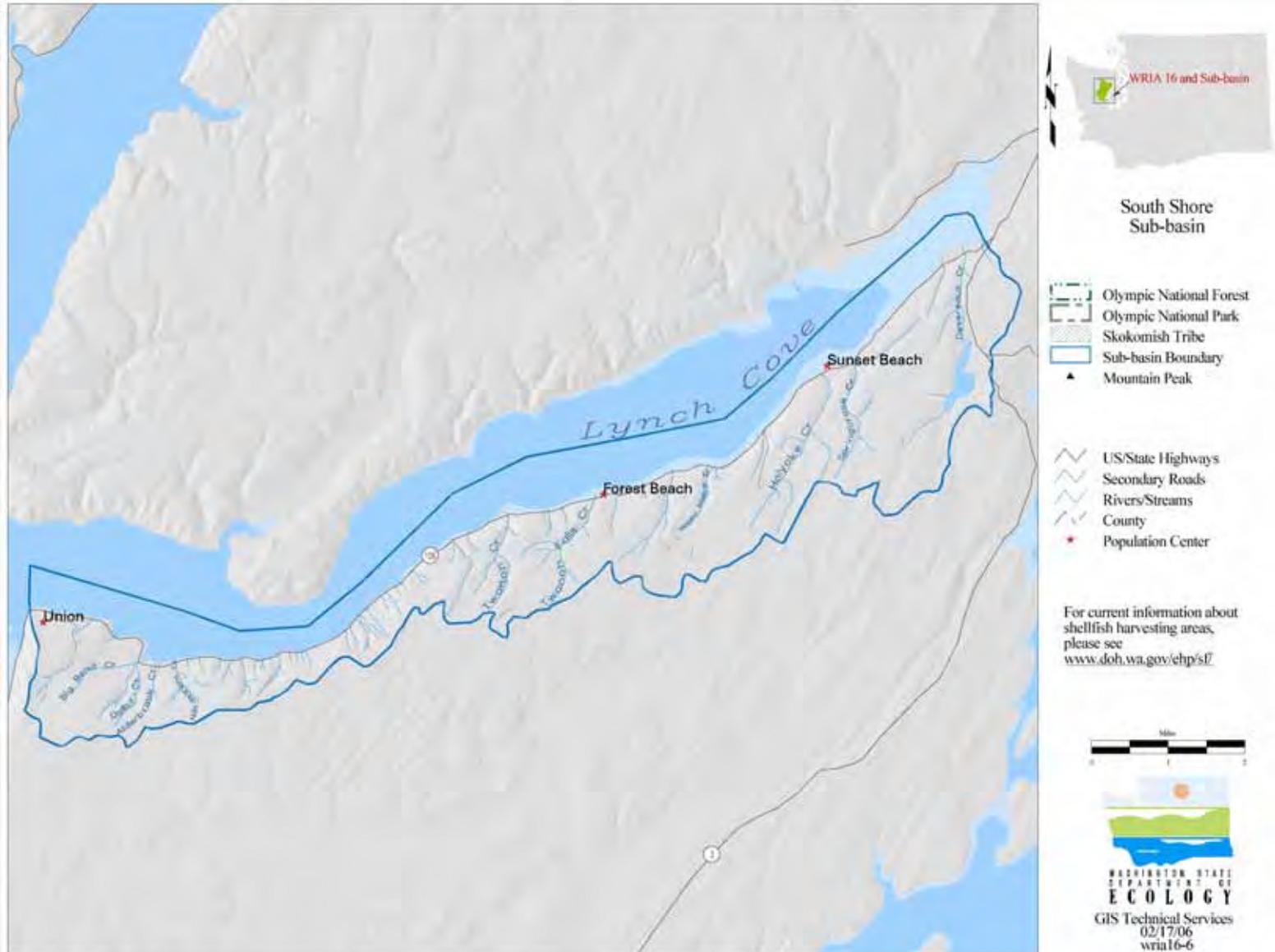
Based on the existing technical information in the South Shore sub-basin, the following key issues emerge:

- Water quantity may be a concern in the South Shore sub-basin in the near future; wells in the sub-basin may be at risk for saltwater intrusion, water allocation is higher (as a percentage of supply) than in any other WRIA 16 sub-basin, several applications for groundwater rights are in outstanding, and the sub-basin is subject to high development pressure;
- Fecal coliform measurements exceed state standards in several creeks and in Great Bend and Lynch Cove, and have led to commercial and recreational shellfish harvesting closures;

A Sub-basin Summaries

- The water quality in the Great Bend and Lynch Cove areas of Hood Canal are impaired due to pH exceedances and low dissolved oxygen levels; and
- Shoreline development and State Route 106 restrict floodplain connectivity, contribute to stormwater, and limit fish habitat in several creeks.
- Population growth and future development may place further strain on water resources in the sub-basin.

Figure 11. Map of the South Shore Sub-basin





Hood Canal and the Nearshore Environment

WRIA 16 is dependent on Hood Canal, and in turn Hood Canal is dependent on WRIA 16. The health of Hood Canal has significant aesthetic, cultural, economic, and recreational importance to WRIA 16 residents. Furthermore, all WRIA 16 streams empty into Hood Canal, carrying with them any pollutants. Any strategy to improve the health of Hood Canal will necessarily involve the rivers of WRIA 16.

Therefore, although Hood Canal is not technically a sub-basin, this chapter will address water quality and habitat issues particular to Hood Canal and the nearshore. Most WRIA 16 residents are likely familiar with the poor water quality of Hood Canal, as recreation, commerce, and industry are all affected when poor water quality impacts WRIA 16's fish, shellfish, and other aquatic resources.

WATER QUANTITY

Hood Canal – a saltwater body – is not a source of fresh water for residential, commercial, or industrial uses. Accordingly, issues of water quantity are not directly relevant to Hood Canal. All water quantity information will be presented and discussed as part of the other sub-basin chapters.

WATER QUALITY

The two most visible and serious concerns with Hood Canal's water quality are low dissolved oxygen and high fecal coliform, both of which can be affected by streamflow and stormwater from WRIA 16's sub-basins.

- **Low concentrations of dissolved oxygen** can be lethal to fish, resulting in “fish kills” of significant frequency and size. Decomposition of large amounts of algae and poor deep circulation have been identified as the primary factors contributing to low concentrations of dissolved oxygen in Hood Canal (USGS, 2004b). Several efforts have been completed to study the causes of the algae growth (LHCWMC, 1994 and PSAT and HCCC, 2004, among others), and there is a consensus that human-related sources of nitrogen are a contributor. In particular, key sources of nitrogen include sewage from failed septic systems; fertilizer from residential, commercial, and agricultural sources; livestock manure; and salmon carcasses. Nitrogen sources are likely transported into the Canal with stormwater drainage; this is a particular concern near Hoodspout.
- **The presence of fecal coliform** and associated pathogens in Hood Canal waters can pose risks to consumers of contaminated shellfish and recreational users of public beaches. The Washington State

Department of Health (DOH) monitors waters of Puget Sound and shellfish tissue to issue closures for public beaches and shellfish harvesting. For example, in August 2005, DOH closed shellfish harvesting in parts of Annas Bay (Washington Department of Health, 2005). The key inputs of fecal coliform to Hood Canal are sewage from failed septic systems, animal manures from farms, stormwater, sewage from boats and marinas, and wildlife (Determan, 2001). The Department of Ecology has listed the Great Bend and Lynch Cove marine water bodies on its 303(d) list due to high fecal coliform measurements.

These concerns have attracted significant political and scientific attention. For example, in March 2005 Governor Christine Gregoire called for “on-the-ground action” to halt pollution sources on the Hood Canal. The Governor called for including \$5 million in additional funding in her 2005-2007 budget to help finance sewer and storm water projects at Belfair and Hoodspport, pay for identification of failing septic systems, provide low-interest loans for property owners to fix failing systems, and other measures to address nitrogen inputs (Office of the Governor, 2005).

Many entities, including government, non-profit groups, and the WRIA 16 Planning Unit, are working on the issue of water quality in the Hood Canal region. In RCW 90.88, the Washington State Legislature directed the Hood Canal Coordinating Council to conduct a regional governance study by December 1, 2007. The Planning Unit has recognized the need for consistent coordination of policy implementation throughout Hood Canal. The Planning Unit represents key interests, is educated on the water-related issues and concerns of local citizens, and should be an essential participant in any regional governance study.

HABITAT

Hood Canal’s aquatic habitat is greatly affected by its water quality; as discussed above, low concentrations of dissolved oxygen have resulted in “fish kills” and other impacts. Habitat quality in the nearshore environment has been significantly altered by shorefront development. As discussed in the individual sub-basin sections, roads, bulkheads, and residential development can destroy or cut off access to key nearshore fish habitat. In addition, derelict (abandoned) fishing gear and boats affect wildlife and people. Lost or abandoned nets, lines, traps, boats, unused dock pilings, anchors, floats, and other equipment can: (1) trap and wound fish, shellfish, seabirds, and marine mammals; (2) entangle swimmers or divers; (3) damage recreational boats or commercial vessels; (4) degrade marine eelgrass beds or other important habitats; and (5) create unpleasant sights.

Please see the individual sub-basin sections for further discussions of fish habitat in each sub-basin’s nearshore environment.

KEY ISSUES

Based on the existing technical information on Hood Canal and WRIA 16's nearshore environment, the following key issues emerge:

- Hood Canal suffers from low dissolved oxygen concentrations that can be lethal to fish;
- High fecal coliform levels and associated pathogens pose risks to users of public beaches and consumers of shellfish;
- Stormwater runoff from roads and development carries pollutants into Hood Canal;
- Highways and shorefront development impair fish access to quality habitat.

Appendix B. Key Issues and Options: Water Quantity

Chapter 2 identified several issues concerning WRIA 16's water quantity. This appendix presents each issue together with options, or possible strategies, that could be pursued. Please note that although the options that follow were assembled by the Planning Unit for consideration, the inclusion of an option in this chapter does not necessarily indicate its endorsement or recommendation by the Planning Unit. Rather, the Planning Unit strove to include and consider a wide variety of options. As a result, any credible option suggested in Planning Unit meetings was included in this plan for consideration and evaluation.

Issue: Too Few Data

As discussed in Chapter 2, considerable data has already been collected by Planning Unit members and other organizations, but in some cases there are still too few streamflow and groundwater-quantity data and analyses to fully support water resources planning and water-right decisions. In particular, more information is needed to understand how and if granting new water rights would impair existing rights, uses, or instream flows needed to support aquatic habitat. Furthermore, opportunities exist to further analyze historical streamflow data and expand current stream gauging to facilitate future study of water availability in WRIA 16. Finally, very few data exist on the quantities and connectivity of groundwater in the watershed.

Following are several options the Planning Unit and its partners could pursue to improve the state of water-quantity data in WRIA 16.

Option 1. Assess the priority of possible water-quantity monitoring studies (including both surface water and groundwater) and develop a tiered action plan

One of the major outcomes of the *Level 1 Technical Assessment* was that additional studies are needed to fill water quantity data gaps and effectively plan for future water supplies. Among the studies recommended by the assessment are:

- Hydrogeology studies of areas where future water supplies will be needed and where current water right applications are pending. In addition, further work is still needed to identify what areas or sub-basins could benefit from hydrogeology studies;
- Statistical analysis of historical streamflow; and

B Key Issues and Options – Water Quantity

- Re-establishment and maintenance of stream gaging stations on major rivers and creeks. Golder Associates recommended the Dosewallips River, Jefferson Creek, and the Hamma Hamma River because of the historical record already collected on these streams.

The Planning Unit has identified other possible studies or actions as well, including upgrading existing short-term water gauges to be long-term gauges, conducting studies on groundwater quantity and aquifer recharge, and compiling existing well-level data from PUDs. The Planning Unit could assess the priority of these various efforts and develop a tiered, long-term action plan.

Option 2. Develop an integrated geographically-referenced database of water-quantity data and maps

A large variety of stream gauge and other water quantity data have been collected in WRIA 16, and many other efforts will occur in the future. In many cases, the resulting data are stored in a variety of formats and locations, making comprehensive summary or analysis challenging. A comprehensive database of data and maps could facilitate water resources planning, especially if such a database was organized geographically and placed on the internet.

Given the variety of data formats and quality, a significant challenge in assembling such a database would be to work with the various data users and providers to develop a consistent and meaningful data format and quality standard.

A Geographic Information System (GIS) is a type of software that allows for organization and analysis of spatial data. GIS systems have become standard in natural resource planning agencies because of their ability to combine and overlay digital map-based data from a variety of sources and databases.

Option 3. Conduct instream flow studies

Instream flow studies are used to recommend minimum or optimum stream flows necessary to support fish habitat or other stream resources. The two most common methods used in Washington include the Instream Flow Incremental Methodology (IFIM) and the toe-width method, although other methods are also used. The IFIM method is generally the preferred method, and it relies on a series of computer models to predict a range of flows necessary to protect habitat resources. The toe-width method, although more narrow in scope, is also often used because it is relatively inexpensive and simpler to conduct. The toe-width method relies on measurements of the width of a stream's water surface at the toe, or base, of its banks.

The departments of Ecology and Fish and Wildlife have conducted several IFIM studies in WRIA 16, and the agencies are willing to help the Planning

Unit update these relatively old studies. Such updates (or new studies) would be beneficial or even necessary to support an instream flow process. The Planning Unit could recommend or commission new or updated instream flow studies to support instream-flow planning and decision-making.

Issue: Low Stream Flows and Uncertainty about Future Water Supplies

In many WRIA 16 streams, low summer stream flows may limit the supplies of clean water for people and fish in summer months. Furthermore, growth increases water demand and raises concern about the watershed's ability to ensure adequate future water supplies. Even where no acute problems exist currently, the competing demands for water – particularly in the summer – indicate that careful planning and early action could help avoid future conflict.

Following are several options the Planning Unit and its partners could pursue to address low summer stream flows and avoid possible future water shortages in WRIA 16.

Option 4. Promote municipal water conservation through education and outreach efforts

Many water-saving practices and products are available that could help residents and businesses conserve water and, in some cases, also save time and money. Accordingly, education, outreach, and promotion efforts could distribute information in an attempt to increase use of water-saving practices and products. Education and outreach are particularly relevant to permit-exempt well users who – since they don't pay a utility for their water – would not be subject to financial incentives such as tiered rates.

Messages to consider include low-water-use gardening and lawn care practices, including the retention of native vegetation and soils, and use of water-efficient appliances and fixtures. Simple strategies such as having homeowners place an empty tuna can in the yard to measure adequate watering can be effective at providing residents the information they need to make a change. Campaigns can also offer free or discounted water-saving products, such as faucet diffusers, low-flow showerheads, rain gauges, soaker hoses, hose timers, and other water-saving devices.

Outreach strategies could involve direct mail; newspaper articles; utility bill inserts (where applicable); seminars, displays, or brochures at local stores or community centers; technical assistance; outreach in schools; or other methods. Utility bills can also display graphs of water use over time to clearly inform ratepayers of their monthly water and offer comparisons to the average household.

B Key Issues and Options – Water Quantity

Option 5. Establish a groundwater reserve to accommodate future wells

The WRIA 16 Planning Unit may be undertaking a process to determine what amount of water (termed *instream flow*) should be preserved in the watershed's streams to protect the resources that those streams provide. Instream flows can then be adopted by rule by the Department of Ecology, and from that point forward the instream flows serve as a means of determining whether new water uses should be allowed in each sub-basin. As part of the instream flow process, the Planning Unit could recommend the establishment of a groundwater reserve to define future groundwater use while still enabling future growth and development. Once a groundwater reserve is established by rule, homeowners would then be able to use this reserve to hook into an existing water system that lacks water rights for additional connections (Bill Graham, Jefferson County PUD #1, comments submitted September 2005).

Option 6. Require that new developments incorporate water-conserving fixtures

New buildings and remodels must be built according to the building codes in each jurisdiction. Among other topics, building codes include guidelines and requirements for plumbing systems and fixtures, and some codes require maximum water consumption for fixtures. The Washington State Building Code, in fact, requires that toilets not consume more than 1.6 gallons per flush and that shower heads and faucets not use more than 2.5 gallons per minute (RCW 19.27.170 – Water Conservation Performance Standards). Local governments are responsible for enforcing the International and State building codes, but they may institute additional requirements if approved by the state Building Code Council under WAC 51-04.

The WRIA 16 Planning Unit could request that local governments enforce the existing state water conservation standards for new development or remodels and/or investigate opportunities to institute additional water-conserving requirements, such as for clothes washers or dishwashers.

Option 7. Enact low-impact development requirements to minimize impervious surface and maximize on-site management of stormwater

Low Impact Development (LID) is an innovative approach to stormwater management that strives to manage stormwater on-site rather than convey and manage it through large, costly infrastructure investments.

Several jurisdictions in the Puget Sound region are implementing Low Impact Development through codes and ordinances. For example, Island County, Pierce County, the City of Issaquah, the City of Lacey, and the City

Key Issues and Options – Water Quantity **B**

of Olympia have all implemented Low Impact Development policies (PSAT, 2005).

The Puget Sound Action Team provides extensive resources for municipalities, developers, and others interested in applying Low Impact Development Resources. The Action Team has published several technical documents on strategies, analyses, and recommendations for local governments in the Puget Sound region. In particular, the Action Team has featured five techniques for Low Impact Development (PSAT, 2004):

- **Bioretention cells**, which are landscaping features (sometimes called “rain gardens”) designed to capture and treat stormwater on site; bioretention cells are typically vegetated depressions with special plants and soils that aid in the retention and attenuation of stormwater;
- **Amended soils** – Soil amendments such as compost and other organic materials improve soil function and water retention; soil amendments are especially helpful in urban areas where development has removed the natural topsoil;
- **Green roofs** are vegetated roofs that absorb rainfall and reduce stormwater runoff while simultaneously offering other benefits such as improved energy efficiency; green roofs can have particularly significant impacts if used on buildings with large roof areas;
- **Dispersion of runoff from impervious surfaces** is a means of spreading out concentrated runoff over a larger area to prevent erosion and maximize infiltration; and
- **Pervious pavement**, which is a type of pavement that allows stormwater to pass through it, reducing runoff.

The WRIA 16 Planning Unit could work with local governments to institute Low Impact Development performance requirements or incentives (such as managing all stormwater on-site), while offering the above techniques, or pursue other means of encouraging or requiring Low Impact Development principles.

Option 8. Adjust water rates to promote conservation

For many goods and services, consumers respond to increased prices by consuming less. This concept has been found to apply to municipal water when usage rates increase above a specified threshold of basic, essential use. For example, a customer could be charged a certain rate for each cubic foot of water up to a certain threshold (such as 400 cubic fee of water per month, or about 100 gallons per day), and a higher rate above that threshold. Alternately, some water suppliers have also experimented with charging customers more during times of peak demand or low supply (such as during summer droughts or even during peak times of the day). Setting

B Key Issues and Options – Water Quantity

water rates to discourage wasteful practices is authorized by RCW 35.92.010.

Mason County PUD #1 and Jefferson County PUD #1 both use tiered water rates (Mason County PUD #1, 2005). Mason County PUD #1 generally has three tiers: a base charge for up to 400 cubic feet of water per month (about 100 gallons per day), a higher charge for 400-1000 cubic feet per month, and its highest tier for over 1000 cubic feet per month (which is about 250 gallons per day). Jefferson County PUD #1 operates several systems with slightly variable base rates, but the tier structure for each is essentially the same, although Jefferson uses gallons as the unit of measurement rather than cubic feet. At Lacy C on the Dosewallips River, the PUD charges a base fee of \$12.00 and \$2.10 per 1000 gallons for the first 11,000 gallons use (or about 367 gallons per day). Between 11,000 and 20,000 the rate is \$3.00 per 1000 gallons and above 20,001 gallons the rate is \$3.30 per 1000 gallons (Bill Graham, Jefferson County PUD #1, comments submitted September 2005).

The Planning Unit could recommend that these existing incentives be increased or implemented by other water providers, or that other methods (such as charging more during the summer) be explored or implemented.

Option 9. Offer rebates for low-flow fixtures and appliances

Ultra-low-flow toilets use 1.6 gallons per flush compared to older toilets which can use 3.5 gallons or greater per flush. Similarly, low-flow shower heads and faucets can offer dramatic water savings, as can other appliances that use minimal water. Although the state building code requires ultra-low-flow toilets and water-conserving faucets and showerheads in new construction and remodels, existing fixtures are not subject to the code. The Planning Unit could work with local governments and water providers to offer rebates on low-flow fixtures and appliances.

Option 10. Encourage or require water meters for all users

Collecting information on water use can be useful both to the water user and to planners. Individual water users can benefit from water meters by understanding how much water they use and then measuring the success of any water conservation efforts. If the information is supplied to planners, water use data can aid in understanding typical use patterns and planning for water supply needs, as well as for measuring the success of water conservation efforts.

Installation of water meters could be pursued either through voluntary or mandatory efforts. The Department of Ecology does have statutory authority to require any water right holder to measure their water use (RCW 90.03.060). The Department also has authority to require any ground water withdrawal, including those from permit-exempt wells, to be measured and the data supplied to the Department (RCW 90.44.050, 90.44.250, and RCW

90.44.450). Voluntary efforts could focus on promoting use of water meters and perhaps offering financial incentives for their installation.

The WRIA 16 Planning Unit could work with local stakeholders to promote water-metering devices or request that the Department of Ecology require them in the watershed.

Option 11. Work with golf courses to implement water conservation strategies

Golf courses require a very large area of turf grass, and golf course managers maintain very high cosmetic and performance standards for the turf. Golf courses also require large amounts of water to irrigate, especially in the very dry summers experienced in the Pacific Northwest. In addition to the potential strain on water resources, golf course irrigation can also be a liability for owners: golf courses are highly visible features in most communities, and can be targets of criticism during drought summers when other residents and businesses may be subject to water use restrictions.

Accordingly, it is likely in the interest of both golf course owners and water resource planners to pursue means of conserving water on golf courses, such as Alderbrook. Strategies to consider include using new grass varieties that use less water or tolerate reclaimed water; new technologies that improve irrigation efficiency; best management practices for irrigation; alternative water sources (such as reclaimed water); and golf course designs that minimize the area planted with grasses that demand significant water.

Option 12. Explore water reclamation from wastewater treatment plants

Water from wastewater treatment plants can be treated to such a high level that it can be reused safely for non-drinking purposes such as irrigation, streamflow augmentation, or aquifer recharge. Reuse has been practiced in various forms since the early days of western settlement. Planned reuse began in the mid-1960s when Colorado Springs, Colorado started irrigating municipal golf courses and other public areas with reused wastewater. During the 1970s, reclamation projects grew in response to federal laws restricting effluent discharge into local streams, and technologies have been improving ever since (Meister, 1995). Municipalities around the country are now reusing highly treated municipal wastewater for nonpotable uses, such as irrigation of parks and golf courses (Water Environment Research Foundation, 2005). Two Washington examples include the Class A water reclamation plants in Lacey (LOTT Alliance, 2005) and Yelm (City of Yelm, 2005).

In Washington, the departments of Ecology and Health have set standards for reclaimed water use and jointly administer the reclaimed water program. The departments have assisted the City of Sequim with a \$3.5 million demonstration project (Cupps and Riley, 2002).

B Key Issues and Options – Water Quantity

The Planning Unit could recommend or partner with local wastewater treatment plants to explore opportunities to develop water reclamation capability in WRIA 16. The reclaimed water may be particularly useful for aquifer recharge if treated to sufficient levels.

Option 13. Assess the benefits and impacts of drilling new wells into deeper aquifers

Where groundwater quantity is limited or threatened by saltwater intrusion – or where groundwater withdrawals affect instream flows – planners could assess the benefits and drawbacks of drilling wells into deeper aquifers, if they exist. Deeper aquifers are not guaranteed to be free of the challenges faced by shallower aquifers, however. Still, withdrawing water from a deeper aquifer could relieve demand on the shallower aquifer and allow for recovery and restoration. Or, in some cases water from deeper aquifers could be used directly to recharge the shallow aquifer. Based on the results of such a study, the Planning Unit could promote the practice of drilling new wells into deeper aquifers.

Option 14. Evaluate the need for the Mason County Water Conservancy Board

Washington water law is complex, and the number of applications for new water rights and water rights adjustments far outpaces the Washington Department of Ecology's ability to process them. Water Conservancy Boards may accept and process applications to change or transfer a water right under RCW 90.80. Because Conservancy Boards can process only water-right change applications, they do not need to wait for new water-right applications to be processed before they can address change applications (Washington Department of Ecology, 1999). As a result, they can process change applications much more quickly than Ecology can. However, Ecology reviews all of the Conservancy Board's decisions, so while this process is helpful, it is not a cure.

Mason County's Water Conservancy Board was founded in 2002. The Planning Unit could recommend that Mason County conduct an independent evaluation of the Board's activities and the need for the Board.

Option 15. Participate in water right trust or banking programs

Water right holders interested in conservation can voluntarily dedicate their rights to maintain stream flows. Organizations such as the Washington Water Trust and the Department of Ecology facilitate these efforts by acquiring water rights and dedicating them to preserving stream flow – essentially by agreeing not to use them. Rights are then held by the Trust Water Rights Program through the Department of Ecology (Washington Water Trust, 2005).

Use of the Trust Water Rights Program could also serve as basis for developing a water bank for both instream and out-of-stream uses. A water bank would provide the opportunity for formalized exchange of water rights in a particular area, such as WRIA 16. Water banking, which was authorized by the Washington State Legislature in 2003 (ESHB 1640), would enable market transfer of all or a portion of a water right to a new buyer or user.

Water right trust and banking programs could be enacted in WRIA 16 to facilitate the preservation of stream flows and transfer of water rights within the watershed. Accordingly, the Planning Unit could either promote the use of the existing water right trust opportunities or could recommend that a more formal water banking system be established.

Option 16. Identify and acquire areas needed to preserve and protect current and future water supplies and habitat

Federal, state, local, and tribal governments and private organizations can acquire land for protection of water supplies and fish and wildlife habitat. Much of the water that exists in streams or groundwater in WRIA 16 originates in the Olympic Mountains, and so preserving this region will help maintain the water flows and quantities currently enjoyed in WRIA 16. Fortunately, much of this area is already preserved as national park or forest, but acquiring additional areas may help provide further stability to WRIA 16's water resources. For example, Jefferson County recently acquired about 75 acres of riparian and floodplain habitat just west of Brinnon, a project funded mostly by state funds administered by the Salmon Recovery Funding Board (IAC, 2005). Please see further discussion of this option under options X-X and Y-Y under the water quality and habitat sections, respectively.

Option 17. Develop a Sustainable Forestry Plan for WRIA 16 Sub-basins

Forestry practices – including the degree, method, and timing of timber harvests – can have dramatic impacts on the health of streams. Excessive timber harvest can release sediment to streams, remove stream shading (thereby increasing temperatures), and alter the hydrologic characteristics of a sub-basin such that high peak flows (even flooding) are more common.

Significant efforts to promote and implement lower-impact forestry practices have been undertaken by the U.S. Forest Service and private companies on the Olympic Peninsula (Ron Gold, RG Forestry Consultants, personal communication March 28, 2005). For example, the Green Diamond Resource Company (formerly Simpson Resource Company) is a supporter of the Sustainable Forestry Initiative (SFI) certification; practices active forest replanting and regeneration; and has produced a habitat conservation plan for its practices (Green Diamond Resource Company,

B Key Issues and Options – Water Quantity

2005). Some sustainable forestry advocates do not think the Sustainable Forest Initiative provides enough protection, however; such advocates often prefer the practices and certification advanced by the Forest Stewardship Council, an international non-profit membership organization.

The WRIA 16 Planning Unit could work with the U.S. Forest Service and local timber companies to define sustainable forestry in WRIA 16, assess how to minimize forestry impacts on WRIA 16's water resources, and develop a plan for each sub-basin.

Option 18. Request that the Department of Ecology Appoint a Water Master for WRIA 16

A water master is a person appointed by the Department of Ecology to oversee water rights and water use in a watershed. The primary responsibilities of a water master include dividing, regulating, and controlling water use in their specified district (RCW 90.03.070). RCW 90.03.060 authorizes the Department of Ecology to assign water masters to WRIsAs that request them in their adopted watershed plans. The Planning Unit could therefore request that a water master be assigned to WRIA 16 to oversee water right rules and requirements within the watershed and to ensure that water right data are comprehensive and up-to-date.

Option 19. Increase enforcement against illegal water use and diversions

According to Washington State law (RCW 90), unauthorized use or waste of water is a misdemeanor. Furthermore, the law provides that the Department of Ecology can assess fines of \$100 to \$5,000 per day for each violation. According to the law (RCW 90.03.065), Ecology is required to educate the general public about water law and compliance. If the department notices a violation, it attempts to achieve voluntary compliance by providing information and technical assistance. If the violator fails to comply, Ecology may issue a notice of violation and levy fines. However, the code also states the Ecology can take immediate action if the violator is causing harm. The Planning Unit could request that the Department of Ecology increase its efforts to identify illegal water use and diversions and pursue compliance through voluntary measures and, if necessary, enforcement.

Option 20. Promote greywater segregation and use in accordance with Department of Health standards

One means of conserving water in the home is to reuse household water. By diverting water from dishwashing, clothes washing, and the bath and shower (collectively, these types of water are called greywater) to other uses, some fraction of a household's clean, potable water use can be avoided. In most cases, efficiency improvements will provide greater and more cost-effective water savings (Seldon Hall, Department of Health, comments

submitted December 2005), but greywater use can be an additional strategy for use in some households.

In recent years, treated greywater has been used with success for landscaping irrigation and toilet flushing. Systems can be set up in the home to segregate greywater from blackwater (i.e., water from toilets and the kitchen sink). Treatment of greywater is then achieved through the installation and operation of a specialized on-site sewage system. Greywater segregation and use is permitted by the Department of Health; interested residents or businesses would need to contact the county office to get a permit, design requirements, and a list of qualified designers and installers (Washington State Dept. of Health, 2001). The Planning Unit could work with the Department of Health and other local stakeholders to promote greywater segregation and use.

Option 21. Explore water desalination technology

Water desalination is the process of turning salt water into fresh, potable water. Although not a new concept, the technologies to desalinate water on a large scale have generally not been cost-effective.

Nevertheless, technology is advancing and with the abundance of salt water adjacent to WRIA 16 in Hood Canal, desalination may be a future possibility. Several methods to desalinate water are currently possible in limited scale, and they generally use either thermal processes (e.g. distillation, freezing) or some form of membrane (i.e., a “filter” process such as reverse osmosis). Some U.S. cities are experimenting with desalination. For example, the City of Honolulu, Hawaii is building a water desalination plant using reverse osmosis (City and County of Honolulu, 2005).

The negative impacts of desalination can include the coastal land use impacts of building a new plant, possible contamination of freshwater aquifers if conveyance pipes leak saltwater, marine water quality impacts where the concentrated brine and effluent is discharged, and noise impacts to local communities. Marine water-quality impacts could be a particular concern in Hood Canal, given the water body’s low rate of circulation and mixing.

The WRIA 16 Planning Unit could explore water desalination technologies and opportunities in its long-range planning.

Issue: Climate Change

The long-term effects of global climate change may greatly affect the timing and magnitude of WRIA 16 streamflows. Research conducted by the University of Washington has indicated that projected temperature and precipitation increases will have the greatest impact on streams that are at least partially fed by snowmelt, such as most WRIA 16 streams.

B Key Issues and Options – Water Quantity

Following are options the Planning Unit and its partners could pursue to better understand and prepare for the likely effects of climate change in WRIA 16.

Option 22. Conduct a modeling and research effort to predict future hydrographs under climate change

Over the next few decades increasing global and regional air temperatures are expected to lead to reduced snowpack and receding glaciers. Due to the dependence of many WRIA 16 streams on snowpack, these changes are expected to lead to increased winter-time flows, as more precipitation will fall as rain rather than snow, and decreased spring and summer-time flows, as snowpack and glaciers are reduced. Furthermore, spring peak flows are predicted to occur two to six weeks earlier in streams fed significantly by snowpack. Changes in quantity and timing of flow of this magnitude can affect the availability of water for all users (particularly agricultural), and could be detrimental to migrating juvenile salmon, which depend on cool and ample flows in the late spring for migration. Understanding how global climate change affects the Pacific Northwest's climate and water resources can help watershed planning units more effectively manage water supplies for current and future water supply needs (UW Climate Impacts Group, 2004).

Accordingly, the WRIA 16 Planning Unit could partner with an appropriate scientific organization to conduct a modeling and research effort to predict more specifically what the streamflow impacts are likely to be. An excellent resource and potential partner for this effort would be the University of Washington Climate Impacts Group, which has developed a streamflow scenario tool to estimate and plan for possible future scenarios (Sniver et al, 2003). The Planning Unit's existing stream gauge date would be the starting point for this effort.

Option 23. Develop adaptive capacity to efficiently manage climate impacts on the water supply

One of the likely effects of climate change on WRIA 16 is that reduced snowpack will lead to lower summer stream flows. In addition, if spring peak flows occur weeks earlier (as predicted), the time between peak spring runoff and fall rains may be even longer, further affecting a basin's ability to meet water demands during the driest time of year. Finally, warmer summers may increase demand for water, even as flows are decreasing.

Water conservation, water banking, and greywater use are three strategies addressed by options presented elsewhere in this plan, but other approaches may also be needed to extend water supplies into the dry summer months. In particular, the Planning Unit could seek to develop adaptive capacity to prepare for and manage climate impacts. For example, increasing usable water storage (both surface water and aquifer storage and recovery) can be an effective means of saving water for summer use. When and if water

storage is centralized, water systems may need to be connected via interties to be able to draw from the stored supply. For example, if water was available from Lake Cushman or from an aquifer in a basin on the west side of Hood Canal, then water systems along the south shore of Hood Canal (the South Shore sub-basin) would need to be connected to this supply.

The WRIA 16 Planning Unit and water suppliers in the watershed could begin developing adaptive capacity to prepare for summer water shortages, events that are likely to increase under climate change. This capacity could include seasonal storage (perhaps including groundwater recharge) and water-system connections, as well as the use of seasonal forecasts to help manage if, when, and how seasonal storage is made available to water suppliers throughout WRIA 16.

Issue: Water Export

As water supply shortages intensify in other Western Washington watersheds, WRIA 16 could face pressure for water export, or providing water to other communities outside the watershed's boundaries.

Following is an option the Planning Unit and its partners could pursue to manage or respond to possible pressure for exporting water from WRIA 16.

Option 24. Create policy prohibiting out-of-basin transfer or export of water from WRIA 16

Most water providers in Washington withdraw water from streams or groundwater sources near the customers they serve. However, as competition for water resources intensifies in the coming years, it is possible that water providers could look to more distant sources. A humorous (and largely impractical) example of such an approach reported in the media has been the idea of towing icebergs to warm climates from the polar regions. While this particular method (i.e. icebergs) is not a concern for WRIA 16, other water providers are – and could continue to be – interested in WRIA 16's water resources for either municipal supplies or bottled water. The Planning Unit may therefore wish to consider adopting a policy prohibiting out-of-basin transfer or export of water from WRIA 16.

Issue: Permit-Exempt Wells

Water-right exemptions (e.g., permit-exempt wells) provide little or no incentive for water conservation. Most notably, groundwater use up to 5,000 gallons per day is exempt for domestic purposes, stock watering, industrial purposes, and watering a lawn to one-half acre in size. There are an estimated 2,460 people served by such "permit-exempt wells" in WRIA 16 (Golder Associates, 2003) that have no legal – and little financial – reason to use less water.

B Key Issues and Options – Water Quantity

Following are options the Planning Unit and its partners could pursue to manage the proliferation of permit-exempt wells in WRIA 16. Please note also that a few (but not all) of the water conservation strategies (such as those discussed in Option 4) would also apply to users of permit-exempt wells.

Option 25. Restrict the construction of new permit-exempt wells in certain areas

Wells that are exempt from water right permitting requirements are protected by state law. Local governments and the Department of Ecology do, however, have some tools to restrict the construction of new permit-exempt wells. Although such measures would not affect current water use, they could help to effectively manage future use. For example, the Department of Ecology has proposed some such restrictions to limit new permit-exempt wells in WRIA 17. The WRIA 16 Planning Unit could consider similar measures, especially in combination with its instream flow process.

Option 26. Extend public supply to areas served by permit-exempt wells

Water users who withdraw from permit-exempt wells have little incentive to conserve water. Users who are connected to the public supply, however, must typically pay water rates and therefore have incentive to use less water. Homeowners may be interested in connecting to the public supply and paying water rates in exchange for the safe, reliable supply offered by public systems.

Accordingly, water providers could extend the public supply into areas served by permit-exempt wells as part of efforts to limit use of permit-exempt well use. Although it is not likely that owners of existing permit-exempt wells could be required to connect to the public water system, well users may find the public supply an affordable and viable alternative. In addition, local planners could prohibit any new permit-exempt wells in areas where a public water system is reasonably available.

One significant barrier to implementing this option would be compatibility with the Growth Management Act, however.

Appendix C. Key Issues and Options: Water Quality

Chapter 2 identified several issues concerning WRIA 16's water quality. This appendix presents each issue together with options, or possible strategies, that could be pursued. Please note that although the options that follow were assembled by the Planning Unit for consideration, the inclusion of an option in this chapter does not necessarily indicate its endorsement or recommendation by the Planning Unit. Rather, the Planning Unit strove to include and consider a wide variety of options. As a result, any credible option suggested in Planning Unit meetings was included in this plan for consideration and evaluation.

Issue: Too Few Data

Too few water-quality data exist in WRIA 16 to fully support some water resources decisions. For example, more data are needed to understand the sources and extent of fecal coliform pollution and to more clearly document and plan for concerns in rapidly-developing areas such as the South Shore sub-basin. Data pertaining to the dissolved oxygen problem in Hood Canal are being collected by the Hood Canal Dissolved Oxygen Program (HCDOP, 2005), but other efforts may be needed, particularly for other parameters within WRIA 16 streams.

Following are several options the WRIA 16 Planning Unit and other stakeholders could pursue to expand water-quality monitoring and more fully integrate water-quality data into water resource planning.

Option 27. Implement the WRIA 16 Surface Water Quality Monitoring Plan As-Is

The WRIA 16 Planning Unit contracted with Envirovision Co. to prepare a *Surface Water Quality Monitoring Strategy* (Envirovision, 2003). The strategy, published in September 2003, presents a recommended approach to gathering, analyzing, and reporting water-quality data in WRIA 16's streams. The Planning Unit could recommend that this plan be implemented in its current form.

Option 28. Implement select, revised, or prioritized recommendations from the WRIA 16 Surface Water Quality Monitoring Plan

WRIA 16's *Surface Water Quality Monitoring Plan* (Envirovision, 2003) recommends an approach to gathering, analyzing, and reporting water-

C Key Issues and Options – Water Quality

quality data in local streams. Given that the plan was finalized in 2003, some data needs or priorities may have shifted. Therefore, the Planning Unit could work with Envirovision to select, revise, or prioritize the recommendations presented in the plan and proceed with implementing a revised plan.

Option 29. Continue existing water-quality monitoring efforts

Numerous organizations are conducting water-quality monitoring in WRIA 16, including Mason and Jefferson counties, the Mason Conservation District, the Skokomish Tribe, and the Hood Canal Dissolved Oxygen Program. The Planning Unit could encourage these organizations to continue their efforts.

Option 30. Encourage the state departments of Ecology and Health to better-coordinate their respective water-quality monitoring efforts

At the state level, the departments of Ecology and Health both monitor and regulate aspects of water quality. The Department of Ecology works to prevent both *point* and *nonpoint* pollution and clean up polluted waters through its numerous programs. The Department of Health focuses on maintaining safe drinking water systems, safe shellfish harvesting areas, and safe recreational beaches. In general, the Department of Health focuses more specifically on pollutants that directly threaten human health than does the Department of Ecology, but there is a high degree of overlap. From a citizen or planner's perspective, the division of responsibility between the organizations can be confusing and the collection and reporting of data could be better coordinated. Accordingly, the WRIA 16 Planning Unit could encourage the departments to streamline or otherwise better coordinate their rule-making, data-sharing, and other regulatory efforts.

Option 31. Prepare a groundwater monitoring strategy

WRIA 16's *Surface Water Quality Monitoring Plan* (Envirovision, 2003) recommends an approach to gathering, analyzing, and reporting water-quality data in local streams. The report does not, however, address monitoring of groundwater. A groundwater monitoring strategy could help guide groundwater monitoring efforts.

Option 32. Identify former and current dump sites or landfills and assess water-quality impacts or compliance

Unpermitted landfills or illegal dumping sites can be major sources of groundwater pollution. In addition, even permitted landfills operated by local governments or private companies can release pollutants if not

designed to modern standards or operated effectively. Accordingly, an inventory of current and former dump sites and landfills and a compilation of water quality data from these sites could enable an assessment of any water quality impacts.

Option 33. Support water-quality monitoring efforts at the Web Hill biosolids application site

The Web Hill biosolids application site is a regional septage and biosolids treatment and land application facility. The facility accepts biosolids produced by small wastewater treatment plants and septage from septic systems. Biorecycling, the company who operates the site, uses a lime stabilization procedure to kill pathogens in the material and then applies the product to its 400 acres of land used for growing hay, timber, and Christmas trees. The facility and procedures are fully permitted by the State Department of Ecology and the Mason County Health Department, and Ecology reports that the Biorecycling is one of the best handlers in the state (Wynn Hoffman, Dept. of Ecology, personal communication, April 8, 2005).

Given the high nutrient content of the biosolids and septage, some local stakeholders have been concerned about the possibility for nutrient inputs (primarily nitrogen) to Hood Canal or other local water bodies. However, both Ecology and Mason County continue to monitor water-quality at the site and work with the site owner/operator to ensure that there are no surface or groundwater impacts of the procedures. Ecology and Mason County are currently developing plans to install a second monitoring well near the site as a precautionary measure (Wynn Hoffman, Dept. of Ecology, personal communication, April 8, 2005).

The WRIA 16 Planning Unit could support continued water-quality monitoring efforts at the site as well as site or process improvements, if any are needed or warranted based on water-quality monitoring.

Option 34. Inventory gravel pits and assess remediation needs

Sand and gravel pits provide needed materials for residential and commercial construction projects. However, runoff from these sites can contain substantial quantities of sediment, which can impair water quality and threaten fish habitat, and oil or fuel used in the heavy equipment can contaminate groundwater. An inventory of sand and gravel pits could be undertaken to assess what upgrades are needed to protect water quality.

Option 35. Promote periodic voluntary measurement of water quality and water depth in individual wells

A water-quality or water-supply problem in an aquifer will often affect any and all water users that withdraw from the aquifer. To ensure that water users receive ample warning of any potential problems, individual well

C Key Issues and Options – Water Quality

owners could be encouraged to periodically monitor the water level in their well and test for certain pollutants. Individual well owners could be encouraged to provide their data to local planners or to otherwise distribute it to the community (perhaps through local bulletin boards).

Issue: Fecal Coliform

Fecal coliform levels exceed state standards in many streams, particularly in Skokomish, South Shore, and Finch/Lilliwaup sub-basins. Fecal coliform and associated pathogens originate from animals and humans, can be a threat to public health, and have resulted in the closure of shellfish harvesting areas. Pollution sources that are high in fecal coliform are usually also high in nitrogen, which can lead to algae blooms, such as those in Hood Canal. According to the Hood Canal Low Dissolved Oxygen Preliminary Assessment and Corrective Action Plan, the biggest single human source of nitrogen in Hood Canal is sewage leaked from septic systems (PSAT and HCCC, 2004).

Following are several options the Planning Unit and its partners could pursue to limit inputs of fecal coliform, associated pathogens, and nitrogen to WRIA 16 water bodies and Hood Canal.

Option 36. Develop and implement a septic system operations and maintenance program in Mason and Jefferson Counties

Local health departments set and administer septic system requirements. In some cases, however, they also offer “Operations and Maintenance” programs to help homeowners keep their systems functioning properly and avoid water-quality impacts. Local jurisdictions vary in how their Operations and Maintenance programs handle inspection, enforcement, and maintenance of septic systems, as well as how they define the role that individual homeowners have in maintaining their systems. Following are three examples of somewhat different approaches currently in use.

- **Jefferson County** has an Onsite Sewage Program that provides educational, advisory, and permitting services for owners of septic systems and certifications for septic system installers, operations, and monitoring specialists. The county’s program is focused on monitoring and inspection of septic systems; individual homeowners, rather than the county, are responsible for maintenance of their systems. The county requires septic inspection upon sale or transfer of property. (Linda Atkins, Jefferson County Public Health, Personal Communication, April 11, 2005).
- **Mason County** uses an on-line database system to manage operations and maintenance of the county septic systems. The database contains roughly 12,000 septic systems in the county and

systems are added to the database as they are installed. The program involves a large amount of public education on maintenance and operation of septic systems. Mason County does not require septic inspection upon sale or transfer of property (Cindy Waite, Public Health Services, Mason County, Personal Communication, April 22, 2005).

- A Citizen's Advisory Committee in Thurston County developed a proposal for a Septic System Operation and Maintenance Program for the Henderson Inlet Watershed (Thurston County Public Health and Social Services Department, 2005). The program includes an education and outreach campaign targeting septic system owners to teach them how to properly maintain and operate their systems. Similar to other county programs, homeowners are responsible for maintaining their systems and for hiring a professional to maintain or inspect their system.

Mason and Jefferson Counties, local utility districts, and other stakeholders could develop and implement a WRIA-wide septic system operations and maintenance program to better address fecal coliform and other water quality issues in the watershed. In fact, new onsite rules adopted by the State Department of Health in July, 2005 require Puget Sound local governments to develop operations and maintenance programs and write plans by July 1, 2007 for how and where septic systems will be used, monitored, and maintained in their jurisdictions (WAC 246-272A). In addition, the Department of Health does have some funding to distribute to local governments to support these efforts (Seldon Hall, comments submitted, September 2005). Developing a WRIA-wide (or, optimally, Hood Canal-wide) operations and maintenance program could include assessment of the feasibility and effectiveness of providing sewer, community septic systems, or centralized operations and maintenance management to individual septic owners in sensitive areas.

Option 37. Assess the feasibility and effectiveness of providing sewer or community septic systems in sensitive areas

Improperly maintained and operated septic systems can contribute to high levels of fecal coliform and other adverse water-quality impacts. In particularly sensitive areas, preventing these adverse impacts is especially important. In such cases, centralized sewer systems or community septic systems would reduce the risk of water pollution from individual septic systems. Mason and Jefferson counties could assess the feasibility and effectiveness of shifting individual septic owners in sensitive areas to more centralized systems such as sewer and community septic systems. Some studies are already underway in the Belfair/Lynch Cove and Hoodspout to Potlach areas (Seldon Hall, comments submitted, September 2005).

C Key Issues and Options – Water Quality

Option 38. Require septic system inspections on a periodic basis

Inspection of septic systems is important to ensure that systems are properly operating. Periodic inspection can also reveal early warning signs of a failing system. Periodic inspection of septic systems is mandatory and is written into both state code (WAC Chapter 246-272 On-Site Sewage Systems) and county code (Jefferson County Code, Chapter 8.15 On-Site Sewage Disposal Systems). In fact, a July, 2005 update to WAC 246-272 requires septic system owners to perform a complete inspection of their systems every three years (as opposed to just the solids), and certain systems will be required to perform annual inspections (WAC 246-272A). Even when inspection is mandatory, however, enforcing inspection requirements can be a significant challenge. Local health departments could develop new procedures or requirements for regular septic inspections to be carried out by county health departments, private companies, or individual homeowners through “do-it-yourself” inspections. Agencies should include these new monitoring procedures or requirements in their required onsite sewage plans as specified under WAC 246-272A.

Option 39. Develop financial and other incentives to encourage septic system inspection, maintenance, replacement, and upgrades

Inspection, maintenance, and needed replacements or upgrades are essential to ensure proper septic system operation and avoid water-quality impacts. Option 38 described mandatory inspections, but an alternate or supplementary approach could be to develop financial or other forms of incentives. Potential incentives could include low-interest loan programs for homeowners who discover failing systems. Another approach could include providing benefits to buyers who purchase homes with upgraded septic systems or who agree to upgrade existing systems. A similar approach is used to encourage energy efficiency through the Energy Efficient Mortgage, a program to benefit homeowners who purchase or sell energy efficient homes. Funding for various incentive programs could perhaps be supported by federal and state sources including the Non-Point Source Implementation Grant (319) Program, State Revolving Loan Fund, or the National Decentralized Water Resource Capacity Development Project (EPA, 2005). Finally, there may be some opportunity to expand the use of stand funds for septic improvements and best management practices on private lands, a practice that is currently limited by WAC 173-95A.

Option 40. Develop and implement a public outreach and education campaign concerning fecal coliform

For the public to be an active partner in improving water quality, they must understand the sources of – and strategies to prevent – water pollution. Therefore, an education and outreach campaign about activities that can

Key Issues and Options – Water Quality **C**

contribute fecal coliform and associated pathogens could lead to increased public awareness and behavior change. The education campaign could focus on three basic topics:

- **Proper septic system maintenance.** Provide residents with basic information about how their septic systems work and how to properly monitor and inspect their systems on a regular basis. Such an education program will be essential to communicate the new onsite sewage system rule adopted in July, 2005 by the State Board of Health (WAC 246-272A).
- **Pet waste management.** Educate pet owners on proper disposal of pet waste around their home and in public places.
- **Human waste disposal.** Educate the community about proper disposal of human waste during recreational activities including fishing, camping, boating, and shellfish collection.

The Planning Unit could work with WSU Cooperative Extension, the Puget Sound Action Team, Washington SeaGrant, schools, health departments, and other organizations to launch a coordinated education and outreach campaign. Outreach could include public workshops, targeted mailings, and public service announcements.

Option 41. Require septic inspection or certification upon the sale or transfer of property

Requiring septic inspection or certification upon the sale or transfer of the property is one way to ensure that a minimal number of septic systems are regularly inspected and maintained. Septic system inspection is currently required upon the sale or transfer of property in Jefferson County (Jefferson County Code Chapter 8.15.150). Mason County, however, does not require inspection or certification of systems during the transfer or sale of property (Cindy Waite, Public Health Services, Mason County, Personal Communication, April 22, 2005). Mason County could consider instituting this requirement.

Option 42. Require community wastewater systems for all new developments of four or more homes

Individual septic systems can be an economical and effective means of wastewater treatment for rural homes. However, when a number of homes are built near each other, other solutions, such as community wastewater systems, can be more cost-effective and reduce the risk of water-quality pollution in the long term. Community wastewater systems collect wastewater from individual homes in close proximity and transfer the wastewater to a larger centralized treatment system. The centralized system is similar to individual septic systems in that wastewater flows into the system and is treated and disposed on-site. Community systems may also offer several advantages over individual septic systems:

Readers interested in further discussion of wastewater alternatives are encouraged to seek out the Hoodspout to Skokomish Wastewater Management Alternatives Analysis.

C Key Issues and Options – Water Quality

- Require less space or land than multiple septic systems;
- Cost-effective; and
- Provide more operational and maintenance control to local jurisdictions and rely less on individual homeowners to maintain the system.

The drawback of community systems that additional effort may be required for local jurisdictions to acquire land for the system and conduct ongoing maintenance and management once the system is in place.

Local governments could require community wastewater systems for all new developments of four or more homes.

Option 43. Evaluate the effectiveness of farm plans and best management practices

The Mason Conservation District works with landowners to create farm plans and implement best management practices (BMPs) for preserving water quality and fish habitat. Such farm plans typically include some combination of the following strategies:

- fencing to exclude animals from waterways;
- maintaining streamside vegetation;
- land application of manure at times and rates that prevent excess from being carried into waterways;
- storing manure so that it's not accessible to rain or flood waters; and
- maintaining pastures and animal keeping areas to minimize run-off.

The Conservation District could partner with a third party to conduct an evaluation of how effectively the farm plans and their BMPs are being implemented, and to what extent they result in protection of water quality in WRIA 16, particularly in the Skokomish Valley.

Option 44. Create or modify farm plans, best management practices, or regulations to avoid water-quality impacts during flooding

When implemented, best management practices such as stream fencing, streamside vegetation, and pasture maintenance (as described under Option 43) reduce water-quality pollution. However, frequent flooding (as is experienced in the Skokomish River) can reduce the effectiveness of these efforts, as flood waters can pick up livestock manure on the floodplain, leading to water pollution. Accordingly, new efforts may be needed to keep manure off the floodplain. In particular,

Key Issues and Options – Water Quality C

- A local ordinance could regulate spreading manure or livestock grazing in a floodplain; Whatcom and Thurston counties have similar ordinances; or
- A local ordinance that would prohibit livestock on the floodplain during winter months; or
- Manure storage structures could be built off the floodplains to contain and digest manure. A recent zoning variance now provides increased flexibility for building new manure-storage structures in the Skokomish sub-basin.

Mason County, the Conservation District, and other stakeholders could pursue changes to farm plans, best management practices, or local ordinances to encourage the above practices.

Option 45. Provide plastic bag dispensers and trash cans at parks and other public areas

Pet waste can contribute to water-quality problems. By providing plastic bag dispensers, trash cans, and instructional signs, local parks and other public areas could help humans control their pets' waste and avoid water-quality impacts.

Option 46. Provide more toilets at problem areas

Outdoor pursuits are popular in WRIA 16. Certain areas are used so heavily, however – or for long enough duration – that new or additional toilets may be necessary to effectively manage human waste. Local stakeholders could work to provide new, additional, or updated toilets at popular fishing, camping, or other highly-used recreation areas.

Option 47. Assess adequacy of current boat-pumping stations

Hood Canal is a popular area for recreational boating. Residents of Mason, Jefferson, and Kitsap counties own an estimated 20,000 boats, and there are 15 boat moorages and launches on Hood Canal. Given the high boating traffic – especially in summer – human waste may be a concern for Hood Canal water quality. Local counties could partner with other stakeholders, such as the State Parks and the Interagency Committee on Outdoor Recreation (IAC), to assess whether the number of pumpouts and shore-side facilities is adequate, whether they are being regularly maintained, and whether current state grants programs are sufficient to ensure that there are sufficient pumpouts and shore-side facilities to accommodate boaters on Hood Canal. Currently, there are four pumpout facilities on or near Hood Canal that accept sewage from boats: Port Ludlow marina (technically north of Hood Canal), Pleasant Harbor Marina, Twanoh State Park, and Alderbrook Inn and Resort (PSAT and HCCC, 2004).

C Key Issues and Options – Water Quality

Option 48. Implement a pollution trading system for fecal coliform or other pollutants

By definition, a TMDL is the amount of a pollutant that a waterbody can receive and still meet water quality standards. A TMDL is in effect in the Skokomish River, and a Detailed Implementation Plan has been completed to guide clean-up efforts (Washington State Department of Ecology, 2003b).

In a pollution trading program, a discharger (such as a factory or wastewater treatment facility) may buy (or trade) for the right to count pollutant reductions from advances made elsewhere in a watershed or drainage basin. In essence, facilities that reduce their pollution gain credits, which they can then sell to companies who have not yet been able to make reductions. Such a system creates financial incentives for facilities to reduce pollution, while allowing local governments control over the total amount of pollution released in the context of a TMDL.

Pollution trading is most applicable when the pollutant in question is primarily coming from point sources, such as discharge pipes. In the case of fecal coliform, all identified sources in the Skokomish sub-basin are nonpoint (Washington State Department of Ecology, 2003b), and so a pollution trading system is not likely applicable. Nevertheless, pollution trading may be a viable and useful tool for future planning efforts for other pollutants. One possibility is to attempt a pollution trading system for nitrogen or fecal coliform inputs into Hood Canal.

Issue: Sewer systems may increase pressure for development

Despite improvements to water quality, the development of sewer systems can increase the pressure on local governments to allow increased future development beyond what was originally planned or permitted. However, along shorelines and in sensitive areas, the water-quality and habitat gains made by replacing septic systems with a sewer may be offset by the impacts of any new development.

Following is an option the Planning Unit and its partners could pursue to limit the impacts of new developments.

Option 49. Develop low-impact development requirements for new developments desiring sewer hook-up.

Installing a sewer system for a new development is a costly endeavor. While impact fees are one means for local governments to recoup some of this cost, other concerns may still remain. In particular, unlike septic systems, sewers do not allow wastewater to infiltrate and be available to other uses; in addition, the presence of sewer service in an area may

increase the pressure on local governments to allow increased future development beyond what was originally planned or permitted. To mitigate these potential risks or environmental disturbances, particularly in sensitive areas, local planners could adopt regulations requiring new developments to employ low-impact development techniques such as the following:

- A “65/35/10” requirement wherein landowners in the new development must retain 65% of their property in native vegetation, clear no more than 35% of their property, and have no more than 10% be impervious surface such as roofs or driveways. Jurisdictions could require new developments to adhere to this standard on a per-parcel or per-development basis. Contra Costa County, California, maintains this standard county-wide, so that no more than 35 percent of the county can be urbanized (Contra Costa County, 2000).
- Requiring a zero-discharge system where all stormwater is managed on-site through low-impact development (see Option 55). This is sometimes referred to as “zero effect drainage discharge,” and the City of Tumwater, Washington as adopted an ordinance that defines a design standard to achieve zero effect drainage discharge (City of Tumwater, 2002).
- Locking in the area’s current zoning when the sewer system is constructed. Jurisdictions can freeze the zoning of areas that might hook up to the new sewer line so that lot sizes and land uses are preserved.

One or more of these requirements could help local governments control development intensity, particularly in sensitive areas.

Issue: Stormwater and Nearshore Water Quality

Stormwater runoff (including from state routes 106, 101 and 119) degrades water quality and carries pollutants into the nearshore environment and Hood Canal. Stormwater contributes nitrogen, exacerbating Hood Canal’s dissolved oxygen problem, and can also contribute other pollutants, such as fecal coliform, excessive sediment, pesticides, and fertilizers.

Following are options the Planning Unit and its partners could pursue to limit the water-quality impacts of stormwater on Hood Canal and the nearshore environment.

Option 50. Request that the DOT retrofit highways to collect and treat stormwater

The 2001 Stormwater Management Manual for Western Washington requires that jurisdictions employ a number of best management practices

C Key Issues and Options – Water Quality

for maintenance of roadside ditches, including regular inspections and cleaning, planting of vegetation, and examination of culverts for evidence of scour. The manual also recommends – but does not require – that jurisdictions install bioswales and filter strips to treat runoff from roads, and to use engineered topsoils when needed to establish and maintain roadside vegetation. Bioswales are ditches ranging from two to ten feet in width that use plants and topsoil to filter pollutants from stormwater. A filter strip is a flat area that performs the same functions as a bioswale. Filter strips consist of a narrow band of gravel that borders a roadway and a wider swath of vegetation adjacent to the gravel (Washington Department of Ecology, 2001).

The Planning Unit could request that the Washington Department of Transportation implement these recommended best management practices for treating stormwater runoff from highways, particularly when highway repairs are conducted.

Option 51. Adopt the most current Stormwater Management Manual for Western Washington or equivalent manual

The Puget Sound Water Quality Action Team’s *Puget Sound Water Quality Management Plan* (2000) calls for cities and counties to adopt a stormwater management manual to guide their water quality efforts. Specifically, the *Management Plan* encourages local governments to adopt the Department of Ecology’s *Stormwater Management Manual for Western Washington*. The most recent version of the manual was released in early 2005 (Washington Department of Ecology, 2005b).

Should a local government opt not to adopt Ecology’s manual, the *Management Plan* recommends adopting an “equivalent” manual (Puget Sound Water Quality Action Team, 2000). Jurisdictions must submit their chosen manuals to Ecology for review and approval. Other manuals developed in Washington State include the 2005 *King County Surface Water Design Manual* (King County Water and Land Resources Division, 2005), and the *Stormwater Manual for Eastern Washington*, published in 2004 (Washington Department of Ecology, 2005c). Although King County is more urbanized than Mason and Jefferson Counties, significant portions of the county are still rural, with agriculture and forestry as primary land uses. Therefore, the King County manual may be useful in WRIA 16. The Eastern Washington manual likely is not appropriate for WRIA 16 because of climatic differences.

The US EPA’s national best management practices for NPDES Stormwater Phase II can be downloaded from their website¹⁴. However, the EPA intends that these best management practices serve as guidance for local

¹⁴ http://cfpub.epa.gov/npdes/stormwater/menuofbmps/bmp_files.cfm

jurisdictions to create their own stormwater management programs, rather than as a manual.

The Planning Unit could encourage local jurisdictions to adopt the updated version of the *Stormwater Management Manual for Western Washington* or an equivalent manual. Mason County adopted the 1992 version of Ecology's manual in 1998 (Mason County Department of Public Works, 2005) and is still using it (Alan Tahja, Mason County, personal communication, April 26, 2005). Jefferson County adopted the 2001 version of the manual in 2002 (Jefferson County Department of Community Development, 2005).

Option 52. Implement local stormwater management programs consistent with the Puget Sound Water Quality Management Plan

The *Puget Sound Water Quality Management Plan* calls for cities and counties to create and implement comprehensive stormwater management programs that contain the following elements (Puget Sound Water Quality Action Team, 2000):

- Ordinances that require the use of best management practices for new development and redevelopment. The Plan recommends that jurisdictions adopt Ecology's *Stormwater Management Manual for Western Washington* or an equivalent manual to meet this program element.
- Reviews of stormwater management designs for new development and redevelopment.
- Regular inspection of construction sites.
- Regular maintenance of permanent stormwater facilities, including those on private property.
- Implementation of a program to eliminate sources of pollution from new development and redevelopment and already developed parcels. This element includes pollution from roadways and landscaping.
- Prohibit illicit discharges and dumping. This element includes spill response.
- Prioritization of areas that negatively affect water quality, aquatic species and their habitat, and hydrology.
- Public education and involvement.
- Adoption of ordinances that foster low impact development practices.
- Participation in watershed or basin planning.
- Provision of local funding for stormwater activities.

C Key Issues and Options – Water Quality

- Regular monitoring of program implementation and water quality trends.
- Development of an implementation schedule.

The Planning Unit could encourage Mason and Jefferson counties to design and implement stormwater management programs that contain these elements.

Option 53. Modify Shoreline Master Programs to protect water quality

Mason and Jefferson counties' Shoreline Master Programs are sets of guidelines that translate the broad policies of the State's 1971 Shoreline Management Act (RCW 90.58.020) into local shoreline use regulations. A Shoreline Master Program is officially part of a county's Comprehensive Plan under the Growth Management Act. Mason County last updated its Comprehensive Plan (including the Shoreline Master Program) in 2005; Jefferson County performed its update in 2004. The next scheduled update for Mason County is 2012; for Jefferson County, it's 2011 (RCW 90.58.080).

Given the rapid development of shoreline in WRIA 16 and the increasing severity of water-quality and habitat concerns in the region, the Planning Unit may wish to encourage Mason and Jefferson Counties to update its Shoreline Master program more frequently than the every-seven-year schedule outlined in the Growth Management Act. Or, the Planning Unit could recommend that counties continuously monitor the sufficiency of the Shoreline Master Program and be prepared to make updates as needed, even if before the next required updates. In either case, the goal of making new updates would be to ensure that the programs protect nearshore water quality and habitat. Mason and Jefferson counties could draft language to ensure that stormwater discharges, construction runoff, and other non-point sources of pollution do not degrade nearshore water quality.

Option 54. Identify and correct stormwater violations

Stormwater management ordinances specify methods of controlling and dissipating water that runs off of impervious surfaces such as roads or roofs. When these methods are improperly used, stormwater can enter rivers and streams, causing flooding, erosion, and decreased water quality, among other problems.

Comprehensive stormwater management programs often include regular inspections of construction sites and existing stormwater facilities to identify and prevent stormwater violations. Citizen complaint lines are another method of identifying violations.

The Planning Unit could recommend that jurisdictions institute or strengthen programs to ensure that stormwater violations are identified and corrected. Currently, Mason County employs one person in its Public

Works Department to handle stormwater management requirements. This staff person responds to complaints but does not have time to perform inspections (Alan Tahja, Mason County, personal communication, April 26, 2005).. Jefferson County requires that a person certified in erosion and sediment control be on-site or on-call at all times at construction sites (Jefferson County Department of Community Development, 2005).

Option 55. Require new developments to manage stormwater on-site using infiltration, where geologically appropriate

Infiltration is when stormwater percolates into the ground rather than running off. Managing stormwater through infiltration helps to protect water quality through reducing the amount of pollutants reaching streams. Developers can use infiltration to help manage stormwater in several ways:

- Infiltration basins are low spots designed to drain within 72 hours where stormwater can collect temporarily and percolate into the ground. Often, these basins are vegetated, which helps remove pollutants from the stormwater.
- Porous pavement systems are hard surfaces that allow stormwater to penetrate through them into the ground. These systems include porous concrete or asphalt, cobble pavers with porous joints or gaps, and perforated concrete blocks.
- Infiltration trenches or wells are gravel-filled ditches designed to allow stormwater to percolate into the ground.

Infiltration cannot be used everywhere, however. Where groundwater is a primary source of drinking water, infiltration may not be appropriate due to the potential for pollutants to enter the aquifer. Soils must be permeable, and frequent maintenance may be necessary to prevent the infiltration area from becoming clogged with sediment (Choi and Engel, 2005).

As described in Water Quantity Option 7, low-impact development techniques encourage developers to manage stormwater on-site through techniques such as infiltration rather than with large conveyances that transport stormwater off-site. Jefferson County requires all new development, including single-family residences, on Marrowstone Island and within a quarter-mile of any marine shoreline to infiltrate all stormwater runoff on-site (Jefferson County Department of Community Development, 2003).

The Planning Unit could recommend that jurisdictions adopt ordinances that require all new developments to manage stormwater using infiltration or other low-impact development techniques, where appropriate.

C Key Issues and Options – Water Quality

Option 56. Redirect stormwater to aquifer recharge areas

One method of controlling stormwater that also has potential water quantity benefits is to redirect stormwater to aquifer recharge areas. This redirection can happen naturally through infiltration, or artificially through capturing and injecting stormwater into a recharge area. The World Health Organization believes that using treated stormwater to recharge aquifers has several benefits, including acting as a barrier to saltwater intrusion, restoring depleted groundwater levels, and storing water during times of high precipitation. The WHO also stipulates that using treated wastewater to recharge aquifers requires the use of carefully evaluated best management practices to protect public health because wastewater can contain a wide range of contaminants (World Health Organization, 2001).

Orange County, California, is building a Groundwater Replenishment System that will generate 72 million gallons of reusable water per day. Scheduled to go online in 2007, the system will use a three-step process to treat wastewater so that it meets drinking-water standards. The reclaimed water will then be used as a barrier against saltwater intrusion and to recharge the aquifer. Considered the largest system of its kind in the nation, construction will cost \$453 million (Melin, 2004).

A system the size of Orange County's likely is not necessary in WRIA 16. However, the Planning Unit could encourage jurisdictions in WRIA 16 to consider conveying stormwater or treated water from wastewater treatment plants to aquifer recharge areas.

Option 57. Adopt a non-point pollution ordinance that maintains buffers along waterways

Thurston County adopted a non-point pollution ordinance that took effect in 1993. That ordinance attempts to protect the county's water quality through mandating proper storage, recycling, and disposal of moderate risk wastes and petroleum products, requiring farmers to prevent livestock wastes from entering water bodies, and limiting the amount of manures or sludge applied to lands. Under the ordinance, one of the ways that farmers may prevent livestock wastes from entering streams is to use vegetative buffers (Thurston County Board of Health, 1992). Jefferson County requires developments to maintain vegetative buffers around wetlands and streams, but for existing agricultural uses the County supports best management practices (BMPs) as part of Agriculture and Fish Wildlife Plans.

The Planning Unit could recommend that jurisdictions in WRIA 16 could adopt similar ordinances that require maintaining buffers along waterways. These buffers would help trap pollutants and absorb runoff, protecting water quality.

Option 58. Have counties institute stormwater management requirements for smaller, individual parcels

Jefferson County adopted the 2001 Stormwater Management Manual for Western Washington in 2002. Under this new manual, all new development and redevelopment in Jefferson County is subject to stormwater standards. The number and type of standards that each project has to meet depends upon its size. “Small” projects are required only to manage stormwater during construction, but “Large” projects must implement comprehensive stormwater management. Most rural residential projects are considered “Medium,” and must prepare stormwater site plans, prevent stormwater pollution during construction, provide source control, preserve natural drainage systems and outfalls, and provide on-site stormwater management (Jefferson County Department of Community Development, 2003).

Mason County uses the 1992 version of Ecology’s Stormwater Management Manual for Western Washington, and they exempt single-family residences and duplexes from stormwater management requirements, even if their impervious area exceeds 5000 square feet. Mason County’s main concern (and review time) is spent on commercial development and parcels of more than 5,000 square feet of impervious surface (Alan Tahja, Mason County, personal communication, April 27, 2005).

The Planning Unit could encourage Mason and Jefferson Counties to require all new development and redevelopment on individual parcels (including single-family houses, duplexes, and parcels under 5,000 square feet) to implement more comprehensive stormwater management controls, even on smaller parcels.

Option 59. Opt in to the Department of Ecology’s NPDES Permitting

Under the Clean Water Act, stormwater discharges from municipalities and certain industries are considered a point source of pollution. As such, they require National Pollutant Discharge Elimination System (NPDES) permits. In Washington, the Department of Ecology manages the NPDES program.

The NPDES program has two phases. Phase I covered municipalities with a population over 100,000, construction sites of over five acres, and certain industries. Phase II applied to all municipalities in census-defined urbanized areas and construction sites between one and five acres in size. Phase II also required Ecology to evaluate cities located outside of urbanized areas that have populations over 10,000 to determine whether they needed NPDES permits. For municipalities, the permits apply to discharges from their storm sewer systems (Washington Department of Ecology, 2005a).

Because of its rural character, WRIA 16 is exempt from NPDES requirements (Washington Department of Ecology, 2005a). However, jurisdictions that own and operate storm sewer systems that discharge to

C Key Issues and Options – Water Quality

surface waters in WRIA 16 could opt to obtain NPDES permits. To do so, jurisdictions would need to adopt and employ a stormwater management program for their storm sewer systems that contains at least the following six elements:

- Public education and outreach
- Public involvement
- Illicit discharge detection and elimination
- Construction site runoff control
- Post-construction stormwater management in new development and redevelopment
- Pollution prevention and good housekeeping of municipal operations (Environmental Protection Agency, 1999).

The Department of Ecology is still working on a permit for Phase II jurisdictions. Once this permit is complete, the Planning Unit could encourage jurisdictions in WRIA 16 to opt into stormwater planning under this permit. Alternately, jurisdictions could develop surface water management programs that address NPDES Phase II elements without formally opting in to the process.

Issue: Pesticides and Fertilizers

Pesticides and fertilizers can all degrade water quality. Pesticides (including herbicides, insecticides, and fungicides) in water bodies have been shown to harm aquatic life (National Academy of Sciences and National Academy of Engineering, 1973). In response to these concerns, especially for salmon, a federal judge banned the use of certain pesticides within 20 yards of salmon-bearing streams (Welch, 2004). In addition, fertilizers degrade water quality by contributing to excessive algae growth, among other factors. The potential for pesticides and fertilizers to affect water quality is particularly high when they are over-applied or used near waterbodies.

Following are a couple options the Planning Unit and its partners could pursue to help transform landscaping practices

Option 60. Conduct a program to promote pesticide and fertilizer reduction and sell least-toxic alternatives

Pesticides, including insecticides and herbicides, in water bodies have been shown to harm aquatic life (National Academy of Sciences and National Academy of Engineering, 1973). In addition, fertilizers can degrade water quality, particularly when they contribute to excessive algae growth. Public education and outreach efforts can be effective, but in some cases their

success is dependent on the availability of comparably-priced and effective alternatives. Comprehensive strategies that include education, incentives, and product availability likely have the most promise:

- **Education and outreach** efforts to pesticide and fertilizer users. Such an approach could involve media and promotion campaigns, workshops, or one-on-one site visits by technical staff to educate users about the impacts of these chemicals, minimization techniques, and the safe, viable alternatives that currently exist. These campaigns could focus on residences, farms, and/or commercial users (such as resorts and golf courses). The WSU Extension of Jefferson County has developed a program to work with nurseries and gardeners to minimize these chemicals and use alternatives.
- **Retail partnerships** to encourage local retailers to stock products that enable least-toxic landscape care.
- **Market incentives** through which safe, viable alternatives are offered at discounts funded by local government, retailer, and manufacturer partnerships.

A successful model for such a comprehensive program is the Northwest Natural Yard Days program in Thurston, Pierce, King, and Snohomish counties.

Option 61. Adopt an Integrated Pest Management framework for maintenance of publicly owned grounds

Cities or counties can adopt pest management policies to guide their own pest management on parks, schools, playfields, roads, and other government properties. For example, Seattle and King County have adopted policies eliminating pesticide use or calling for Integrated Pest Management (IPM), a low-impact management technique. Similarly, the South Kitsap School District has adopted an IPM policy, and Jefferson County has instituted a “no-spray” policy for controlling roadside vegetation. Mason County has a limited “no-spray” policy wherein they will not spray roadside lands if requested not to by the adjacent property owner.

Local governments in WRIA 16 could develop and implement Integrated Pest Management or other pest management policies to limit use of pesticides on publicly owned grounds.

Issue: High Stream Temperatures

Stream temperatures exceed state standards in several streams, including stretches of both the Dosewallips and Skokomish Rivers. Salmon and other aquatic life depend on cool water throughout their life cycle. A

C Key Issues and Options – Water Quality

variety of factors – especially decreased tree cover and shade and low summer flows – can contribute to high stream temperatures.

Option 62. Revegetate riparian areas

Riparian areas are those areas alongside streams, rivers, and nearshore marine waters. Riparian vegetation can help reduce stream temperatures through a variety of mechanisms, including the following:

- Providing shade
- Altering microclimates
- Influencing channel shape
- Altering stream flow
- Changing wind speed, humidity, and soil and air temperature
- Improving infiltration of precipitation
- Affecting thermal radiation (Independent Multidisciplinary Science Team, 2000).

In areas where riparian vegetation has been degraded or eliminated, replanting it could help reduce high stream temperatures. The Planning Unit could work with existing volunteer organizations, private landowners, and government agencies to revegetate these areas.

Option 63. Modify County GMA Comprehensive Plans to protect water quality

RCW 36.70A, the Growth Management Act, requires counties and cities of a certain size or population growth rate to develop comprehensive plans to manage growth. The act also sets out a schedule for updating these comprehensive plans. Under this schedule, Jefferson County updated its plan in 2004, and must update it every seven years thereafter. Mason County must update its plan by December 1, 2005, and every seven years thereafter (RCW 36.70A.130).

The Growth Management Act specifies that Comprehensive Plans must include a variety of elements, including designation of natural areas and critical areas such as wetlands, aquifer recharge areas, fish and wildlife habitat conservation areas, frequently flooded areas, and geological hazard areas. The Act also directs counties to use best available science to draft policies to protect the functions and values of these critical areas (RCW 36.70A.172).

As part of its Comprehensive Plan update, Mason County could review existing language and draft new language if necessary to ensure that riparian areas and buffer areas are large enough to protect water quality, and to control non-point pollution. Jefferson County recently updated its plan, and it does include means to protect water quality, such as zoning

protections and critical areas policies. Nevertheless, the Planning Unit could work with Jefferson County to evaluate the water quality protection language in its plan and recommend any desired changes for the next update cycle.

Option 64. Support implementation of existing habitat plans

A wide variety of stakeholders from around Puget Sound are working together to craft plans to protect salmon habitat. Two of the primary efforts are Shared Strategy, which is developing a plan for all listed salmonid species in Puget Sound, and the Hood Canal Coordinating Council's Summer Chum plan.

Shared Strategy is a cooperative effort in which each Puget Sound watershed develops and agree upon actions to help recover salmon habitat within its own boundaries. These watershed plans are then "rolled up" into the Shared Strategy plan, a complete draft of which was released on June 30, 2005. This plan addresses habitat concerns for chinook, summer chum, and bull trout, but focuses primarily on Chinook (Shared Strategy for Puget Sound, 2005b).

Similarly, the Hood Canal Coordinating Council has been leading an effort to develop a recovery plan for Hood Canal summer chum. Like the Shared Strategy plan, the summer chum plan was due on June 30, 2005 (Hood Canal Coordinating Council, 2005).

Once these plans are published and adopted, the Planning Unit could support implementation of the actions recommended in each plan.

Issue: Low Dissolved Oxygen

Low levels of dissolved-oxygen greatly affect Hood Canal's water quality and fish habitat. Low dissolved oxygen is responsible for the widespread "fish kills" in Hood Canal that have affected thousands of juvenile perch and numerous fish, octopi, and sea cucumbers.

Option 65. Support on-going actions in the region on low dissolved oxygen

Low dissolved oxygen is a major water quality concern in WRIA 16, particularly in Hood Canal. Currently, this issue is receiving considerable attention from a variety of parties, including the governor's office, the twenty-eight parties participating in the Hood Canal Dissolved Oxygen Program (Puget Sound Action Team, 2005b), and the Hood Canal Coordinating Council. For example, the governor proposed \$5 million over the 2005-2007 biennium to help build stormwater and sewer projects in Hoodspout and Belfair, fund grants to clean up salmon carcasses, create low-interest loans to help property owners repair failing septic systems, and help find failing septic systems (Office of the Governor, 2005).

C Key Issues and Options – Water Quality

Similarly, the Puget Sound Action Team gave grants to 14 agencies in the fall of 2004 to begin implementing the corrective actions recommended in the *Hood Canal Low Dissolved Oxygen Preliminary Assessment and Corrective Actions Plan*. These projects include finding alternative uses for salmon carcasses, investigating the best ways to manage sewage along the Hood Canal shoreline in Mason County, evaluating the use of anaerobic digesters to handle livestock waste and salmon carcasses, and addressing failing septic systems (Puget Sound Action Team, 2005c).

The Planning Unit could lend its support to the agencies, organizations, and individuals developing and conducting projects to improve dissolved oxygen levels in Hood Canal.

Option 66. Implement any new state standards on nitrogen reduction in septic systems

The Washington State Board of Health, in its Resolution 04-04, resolved to complete a rule-making process and enact new standards for septic systems in conjunction with the Department of Health, local health jurisdictions, and stakeholders (Washington State Board of Health, 2004). The Board held workshops around the state and developed a Final Draft Rule that would amend Chapter 246-272A WAC. This New Rule was adopted in July, 2005.

The new rule includes nitrogen reduction standards, and it requires the local health officers of marine counties, including Jefferson and Mason, to develop plans to manage on-site septic systems locally. These plans must identify any risks associated with septic systems, including areas where nitrates have been identified as a problem, and establish additional monitoring, operations, and maintenance requirements commensurate with those risks (Rule Development Committee, 2005).

Now that the rule has been adopted, Jefferson and Mason Counties are required to write and adopt on-site septic system management plans. These plans could include more stringent standards on nitrate reduction, or even requirements that nitrate reduction methods be used in septic systems, since nitrates are a major concern in Hood Canal.

Option 67. Continue to track results from existing pilot projects and grant programs

A number of pilot projects are underway to help improve the low dissolved oxygen levels in Hood Canal. For example, the Puget Sound Action Team recently funded 14 projects to address various causes of low dissolved oxygen ranging from failing septic tanks to livestock waste to salmon carcasses (Puget Sound Action Team, 2005c). The Planning Unit could encourage funding agencies and project implementers to monitor and

publish the results of each pilot project. This information will be invaluable to guide future efforts.

Issue: Saltwater Intrusion

Saltwater intrusion is the seeping of saltwater into freshwater aquifers. Saltwater intrusion threatens drinking water along the shores of Hood Canal, especially in WRIA 16's South Shore sub-basin. Areas where freshwater aquifers are at or below the water level of Hood Canal – and where pumping rates are high – are particularly susceptible to saltwater intrusion.

Option 68. Establish zones of possible saltwater intrusion and limit development

Saltwater intrusion into groundwater wells can be the result of pumping too much fresh water out of the well, or of tapping into pockets of salty water trapped naturally underground. Saltwater intrusion is a concern in the South Shore Sub-basin of WRIA 16, but its extent is unknown. The Planning Unit could work to establish the extent of saltwater intrusion in WRIA 16, determine whether excess pumping is the cause, and if so, work with local government agencies and landowners to limit development in those areas. Jefferson County's work could serve as a model that Mason County could apply in the South Shore sub-basin or other areas of concern.

Issue: Invasive Species

Invasive species are plants, animals, or other organisms that are non-native to an area and whose introduction causes economic, environmental, or human harm.

Option 69. Support ongoing activities related to invasive species

Mason and Jefferson counties both have noxious weed control boards that assist landowners with weed identification and control. In addition, state-level agencies are working to address the threats caused by invasive marine animals such as the tunicate. The Planning Unit could support these efforts.

Issue: Derelict Fishing Gear and Boats

Derelict (abandoned) fishing gear and boats affect wildlife and people. Lost or abandoned nets, lines, traps, boats, unused dock pilings, anchors, floats, and other equipment can: (1) trap and wound fish, shellfish, seabirds, and marine mammals; (2) entangle swimmers or divers; (3) damage recreational

C Key Issues and Options – Water Quality

boats or commercial vessels; (4) degrade marine eelgrass beds or other important habitats; and (5) create unpleasant sights.

Option 70. Increase efforts to remove derelict (abandoned) gear

The Planning Unit could work with existing organizations that are already working to remove derelict gear to pursue funding or other solutions to increase efforts to remove abandoned anchors, floats, nets, treated pilings, and other debris from the nearshore environment. These efforts would help restore eelgrass beds and other natural habitat.

Appendix D. Key Issues and Options: Habitat

Chapter 2 identified several issues concerning WRIA 16's fish and shellfish habitat. This appendix reviews each issue together with options, or possible strategies, that could be pursued.

Several other entities and processes are addressing salmon and other fish habitat in Puget Sound. Rather than duplicate these efforts, the WRIA 16 Planning Unit is interested in providing support and encouragement to help build momentum and a regional consensus. Accordingly, this chapter will include options to publicly endorse particular topics or strategies that could be pursued by the entities implementing other habitat plans, particularly Shared Strategy's *Puget Sound Salmon Recovery Plan* (Shared Strategy, 2005a), the Hood Canal Coordinating Council's *Salmon Habitat Recovery Strategy* (HCCC, 2004) and *Summer Chum Recovery Plan* (HCCC, 2005).

Nevertheless, the Planning Unit has also considered some additional options that apply particularly to WRIA 16. These options will also be presented in this appendix.

Please note that as in other options appendices, the inclusion of an option in this chapter does not necessarily indicate its endorsement or recommendation by the Planning Unit. Rather, the Planning Unit strove to include and consider a wide variety of options. As a result, any credible option suggested in Planning Unit meetings was included in this plan for consideration and evaluation.

This appendix begins by discussing two options that apply broadly to all habitat issues identified by the Planning Unit, and then proceeds to discuss options for specific issues. Note that high stream temperatures is an additional issue that affects fish habitat; options to address this issue are discussed in the Water Quality appendix.

Option 71. Support organizations implementing salmon recovery plans

Several entities are implementing recovery plans for salmon and other fish in the region. The Planning Unit could offer broad support and endorsement for the efforts of the various entities, including the Hood Canal Coordinating Council, the implementers of Puget Sound's Shared Strategy, and the Washington Department of Fish and Wildlife.

Option 72. Purchase and restore key properties for habitat.

Riparian habitats can be adversely affected by land use activities associated with transportation, development, forest practices, residential development, and agriculture. Purchasing properties that provide ideal habitat for salmon

D Key Issues and Options – Habitat

and other fish species provides an excellent opportunity to maintain good riparian areas and restore degraded areas. Restoration activities could involve removal of dikes and culverts, planting vegetation, or increasing slope stabilization. The Salmon Recovery Funding Board administers funding for salmon recovery activities, including habitat restoration and acquisition of property. Funding is available to tribal, state, and local government agencies, as well as non profit organizations and private landholders. The Planning Unit could support efforts to identify ideal properties in WRIA 16 for habitat restoration and encourage eligible groups to purchase and restore the properties to support salmon habitat. One approach to habitat and open space protection that may serve as a model for Hood Canal is the Cascade Agenda (www.cascadeagenda.org).

Issue: Floodplain Connectivity, Riparian Degradation, and Channel Complexity

Floodplain connectivity, channel complexity, and riparian conditions have all been degraded by development. In particular, diking, bank armoring, and highway construction have removed streamside habitat and blocked access to side-channels. Riparian areas have been developed for residential or agricultural use, thereby removing vegetation that helped control runoff and sedimentation, provided a source of large woody debris, provided habitat for terrestrial animals, and naturally protected streambanks from erosion.

As discussed above, the WRIA 16 Planning Unit recognizes that other planning efforts are addressing habitat, including issues related to development, and does not intend to duplicate those efforts. Nevertheless, following are a few options that could be pursued in WRIA 16 to advance salmon recovery progress in the watershed.

Option 73. Encourage salmon habitat recovery efforts to address floodplain connectivity, riparian degradation, and channel complexity.

Several entities are implementing recovery plans for salmon and other fish in the region. The Planning Unit could request that these other efforts focus attention on maintaining good riparian areas, restoring degraded areas, and protect streamside forests and vegetation in riparian areas.

Option 74. Revise the critical areas ordinances in Mason and Jefferson Counties to support habitat

Critical Areas Ordinances are a set of development regulations designed to protect particularly sensitive areas such as wetlands, stream corridors, fish and wildlife habitat, areas that recharge groundwater sources used for drinking water, frequently flooded areas, and geological hazards (such as

steep slopes). Every county and city in Washington is required to adopt Critical Areas Ordinances (CAO) according to the Growth Management Act (RCW 36.70A.060), and they are required to use best available science in developing policies and development regulations to protect the functions and values of critical areas (RCW 36.70A.172). All jurisdictions are required to review, evaluate, and, if necessary, revise their critical areas ordinances according to a fixed schedule: Mason County must update its CAO by December 1, 2006; Jefferson County was required to update its CAO by December 1, 2004.

The Planning Unit could recommend that Mason and Jefferson counties review, assess, and potentially revise their CAOs to:

- Provide adequate buffers, or set-backs – buffer set backs restrict how closely development can be to designated critical areas; Mason county and the Planning Unit could review whether the CAO provides big enough setbacks and whether the quality of the buffer is sufficient to protect the critical area;
- Ensure that developments are in compliance with their habitat management plans. The width of buffer set-backs may be decreased if a biologist completes a habitat management plan demonstrating that the development would not harm the stream, but compliance with these plans could be assessed to ensure they are adequately protecting habitat;
- Provide better stormwater treatment and controls, which may be necessary to adequately prevent and treat stormwater runoff, a key contributor to water quality issues, particularly in the nearshore environment; and
- Maintain undeveloped drift cells – a drift cell is a particular reach of marine shore where nearshore sediment processes are not significantly interrupted; undeveloped drift cells are important for habitat.

Mason County could conduct this work as part of its 2006 update process. Jefferson County will not have to update its CAO for several years, but could submit revisions in advance of the deadline.

Issue: Low levels of large woody debris (LWD) in streams

Large woody debris (LWD) has been removed from streams and its sources (forested riparian areas) have been reduced. LWD in streams provides direct salmon habitat through shade and protection; LWD also helps form and maintain pools, which provide a refuge from predators and floods for juvenile salmon (WCC, 2003).

D Key Issues and Options – Habitat

Following are several options the Planning Unit and its partners could pursue to improve the levels of LWD in WRIA 16 streams. Please note that other planning processes are currently underway to address habitat, so a primary option is to encourage these other efforts to include recommendations that would increase LWD in WRIA 16 streams.

Option 75. Encourage salmon habitat recovery efforts to address large woody debris.

Several entities are implementing recovery plans for salmon and other fish in the region. The Planning Unit could request that these other efforts focus attention on improving large woody debris distribution and promoting establishment and protection of log jams.

Option 76. Revise regulations or best practices regarding “danger trees”.

Danger trees are trees that have a structural defect or disease that increases the potential of the tree’s failure in close proximity to people or structures (WAC 222-21-010). Trees located within one and one-half “tree lengths” of homes are also considered danger trees (Ron Gold, R.G. Forestry Consultants, Personal Communication, July 28, 2005). Danger trees located in riparian zones and stream-side buffers require a permit before the tree can be removed. Fallen danger trees may be beneficial if left in the riparian or buffer zone because they add large woody debris to the stream’s habitat. Local counties and DNR could implement regulations requiring that danger trees must remain on site as large woody debris. Local counties could also adopt ordinances to require or encourage vegetative management as the first approach to danger trees.

Option 77. Adopt local regulations to allow for woody debris passage through culverts.

When roads are built over streams, culverts or large pipes are often installed to allow the stream to continue its flow under the road. When culverts are improperly built, they can block both fish migration and passage of woody debris, causing large piles of woody debris to accumulate at the upstream end of (or inside) the culvert. Mason and Jefferson County could adopt local regulations to allow woody debris passage through culverts. This regulation could complement state efforts to improve fish passage (e.g. allowing passage of debris in addition to water and fish when sizing culverts).

Option 78. Encourage implementation of the adaptive management program under the Forests and Fish Law.

The Forests & Fish Law mandates changes in forest practices, statutes, regulations, and management systems to better protect riparian and aquatic

resources on private forest lands in Washington State. The Forests & Fish Report, from which the law was drafted, is the result of collaborative efforts and negotiations among scientists, regulators, and policy makers from Washington State's private forest landowners; federal, state, and county governments; and Native American tribes (Washington Forest Protection Agency, 2005). The Forests and Fish Report provides a series of recommendations for improving and protecting riparian habitat in Washington State (U.S. Fish and Wildlife Service *et al.*, 1999). One such recommendation is to implement an adaptive management program. Adaptive management is the process of gathering and using information to continually evaluate and improve management and policy practices. The goal of the adaptive management program is to affect change when it is necessary or advisable to adjust rules and guidance to achieve the goals of the Forests and Fish Report (Washington State Department of Natural Resources, 2005). The Planning Unit could support and encourage implementation of adaptive management practices for watershed-related activities.

Issue: High Sediment Levels

High levels of fine sediments result from mass wasting events associated with poor forest practices as well as improper forest road construction, maintenance, and abandonment. High levels of fine sediments can reduce the survival of incubating fish eggs in streamside gravel, disrupt the lifecycle of a class of small stream residents known as benthic invertebrates, and in some cases result in so much sediment deposition that stream flows remain below the surface during very low flow periods (WCC, 2003).

Option 79. Adopt road and right-of-way maintenance standards for Mason and Jefferson Counties.

Poor road maintenance practices can be a significant source of sediment input in streams and lead to overall habitat degradation. Studies conducted by the USFS, state agencies, and other organizations may provide a set of possible best management practices for maintaining road and right-of-ways within WRIA 16. Stakeholders and other interested organizations could create and adopt road and right-of-way standards for Mason and Jefferson Counties. A road maintenance strategy or standard should involve setting priorities, involving interested parties (*e.g.*, DNR, USFS, volunteers), include an education component, and identify potential funding sources. The standards could include recommendations or strategies for dealing with new dirt roads and power line corridors on both public and private property, reduction of sediment delivery from roads to stream channels, erosion control measures, road decommissioning, and replacement of culverts with bridges.

D Key Issues and Options – Habitat

Option 80. Revise road design standards and/or practices to decrease sediment production and better protect habitat

Roads and road construction can significantly impact habitat, particularly when built adjacent to streams or when poor road design and maintenance allow for erosion, runoff, and sediment inputs to streams. The Planning Unit could work with local agencies, large landowners, and developers to institute new requirements (where applicable) or standards to decrease the impact of future roads on WRIA 16's water resources and habitat. In particular, desired attributes could of new roads could be that they are not build on stream buffers, unstable slopes, or adjacent to streams. In addition, requirements could be made to address other potential habitat impacts, such as sediment and runoff. Possible places where relevant regulations may be revised include the Mason County Comprehensive Plan (including the Critical Areas Ordinance), Mason County's municipal road design standards (as required under RCW 35.78), the Mason County code and building regulations, and the Forest Practices Act.

Option 81. Support road maintenance, abandonment and planning on private and federal forest lands, as detailed in the Forests & Fish Law.

The Forests and Fish Law requires development of road maintenance and abandonment plans for forest lands in Washington (U.S. Fish and Wildlife Service *et al.*, 1999). The purpose of road maintenance plans are to inventory existing roads and assess the conditions of all roads within a parcel of land. In addition, plans are required to address the on-going maintenance of existing roads, the repair of roads and fish passages in sub-standard condition, and the abandonment of roads. The Planning Unit could support efforts by DNR and other local governments to ensure that private landowners and federal forest managers develop and implement road maintenance and abandonment plans.

Issue: Nearshore habitat degraded

Nearshore habitat is affected by bulkheading and other armoring that lead to direct destruction of habitat and altered sediment dynamics. In particular, bulkheading and other armoring lead to changes in the quantity, size, and composition of sediment and in the strength of the waves – changes that can limit fish ability to spawn and find food and shelter from predators. In addition, docks and boat ramps can have impacts, as can stormwater, a topic addressed in the water quality options appendix (Appendix C).

Option 82. Discourage new bulkheads and armoring.

Bulkheads are retaining wall-like structures whose primary purpose is to hold or prevent sliding of soil caused by wave erosion. The construction of bulkheads in Mason and Jefferson counties is regulated by the Shoreline Management Act, local building codes, and both Mason and Jefferson counties' Shoreline Master Programs (Mason County, 2003 and Jefferson County, 1998).

Anyone wishing to construct a new bulkhead must submit plans to the Mason County Planning Department or the Jefferson County Department of Community Development for review of their consistency with the Shoreline Master Program. Further geological studies may be required to demonstrate that the bulkhead is truly necessary to protect erosion of existing facilities.

As an example of alternatives to bulkheading, Mason County promotes setbacks for proposed construction from the shoreline and/or revegetation of the shoreline. The agency states that it will only permit structural solutions (e.g., bulkhead or rip-rap armoring) if it has been demonstrated that non-structural solutions have been considered.

Mason and Jefferson counties have made strides in discouraging use of bulkheads. Nevertheless, existing regulations could be modified to further limit the use of bulkheads in favor of non-structural solutions such as development setbacks and revegetation efforts.

Option 83. Encourage Mason County to update their Shoreline Master Program prior to the 2012 deadline.

Please see Option 53 on page 122.

Option 84. Offer incentives for removing bulkheads and other shoreline structures and replacing with low impact alternatives

Structures such as bulkheads, docks, seawalls, jetties, revetments, groins, and breakwaters interrupt natural nearshore processes, leading to erosion and habitat loss or degradation. The Hood Canal Coordinating Council's *Summer Chum Recovery Plan* identifies removing bulkheads and restoring nearshore processes as a vital step in recovering summer chum populations.

Landowners install these structures in an effort to protect their property, and building a bulkhead often increases the market value of a waterfront lot. Therefore, incentives are necessary to make removing these structures and replacing them with low impact alternatives attractive and cost-effective for landowners. Incentives could include property tax reductions or grants to offset the cost of bulkhead removal and replacement. Bulkhead owner fees (discussed under Funding Options) would also provide motivation for landowners to remove or reduce the size of their bulkheads.

D Key Issues and Options – Habitat

The Planning Unit could work with state and local governments to develop and implement incentives for removing and replacing bulkheads and other shoreline structures.

Option 85. Inspect bulkheads

Like all structures, bulkheads have a finite lifespan. In many cases, bulkheads do not last as long as planned because they are buffeted by storm waves or pushed from behind by natural landslides. If a government agency such as a county or WDFW inspected bulkheads regularly, the inspectors could identify failing bulkheads and have the opportunity to talk with the landowner about removing the failing bulkhead and replacing it with a low impact alternative such as beach nourishment and large woody debris. The Planning Unit could encourage local or state government agencies to inspect bulkheads regularly.

Option 86. Promote reestablishment of eelgrass meadows and native oysters

Eelgrass meadows are a vital part of the nearshore ecosystem. These plants provide food for fish and other animals, process nutrients, buffer shorelines from waves and currents, and serve as habitat for juvenile salmon and other fish and invertebrates. Shoreline structures such as bulkheads and docks tend to eliminate eelgrass meadows over time through erosion of the fine sediments needed for their survival or directly shading them out.

Government agencies could work to reestablish eelgrass meadows along publicly owned shorelines, or develop incentive programs such as grants to encourage private landowners to do the same. Agencies such as WDFW might require successful establishment of eelgrass as mitigation for installing a dock or other shoreline structure. Previous efforts in Puget Sound have shown that eelgrass meadows can be repaired or reestablished when the underlying human causes of the meadow's decline have been addressed and the area is replanted.

In addition, native, Olympia oysters were in the past a vital component of the nearshore ecosystem, but few populations exist today. The Washington Department of Fish and Wildlife is helping to restore native populations, as are nonprofit organizations such as People for Puget Sound. Native oysters, which are smaller than those commonly harvested for recreational or commercial use, create reefs that provide valuable habitat and they also help clean the water.

Issue: Culverts and Other Barriers

Culverts and other barriers limit fish passage. The most obvious of these barriers are dams and diversions with no passage facilities that prevent adult salmon from accessing historically used spawning grounds. Poorly-

Key Issues and Options – Habitat **D**

designed culverts can also prevent fish passage (particularly coho) from reaching upstream rearing areas (WCC, 2003). One potential resource could be the Washington Department of Fish and Wildlife's Fish Passage Technical Assistance Program, which provides a manual on the design of road culverts for fish passage, among other resources (WDFW, 2003).

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Appendix E. Addressing Cumulative or Cross-Cutting Issues

Impacts to WRIA 16's water resources may have increased affects over time, as individual practices may add up to create much bigger impacts. Collecting and documenting information over time and seeking strategies to take a "big picture" view of water resource planning address water resource issues can both help measure progress and manage effectively. Accordingly, the Planning Unit assembled the following options to address cumulative or cross-cutting issues. Please note that the inclusion of an option in this chapter does not necessarily indicate its endorsement or recommendation by the Planning Unit. Rather, the Planning Unit strove to include and consider a wide variety of options. As a result, any credible option suggested in Planning Unit meetings was included in this plan for consideration and evaluation.

Option 87. Develop a list of environmental indicators and issue a periodic report card

A wide variety of water resource and other environmental data have been and will be collected in WRIA 16. By identifying and compiling some useful environmental indicators, local planners could track local parameters and issues over time and communicate those data to the public. Experience in other areas indicates that indicators can be a powerful tool to inform the public, document changes over time, and motivate action. A variety of resources are available on the internet on how to develop successful indicators. One particularly helpful resource is a guide produced by the Sustainability Institute on attributes of successful indicators (Meadows, 1998). A natural partner for an environmental indicator effort would be Mason Matters, a local group who has already created a water resources report for Mason County (Mason Matters, 2004).

Option 88. Coordinate with other jurisdictions to fully implement WRIA and Nonpoint Source Pollution plans

During the 1990s, watershed planning in the Puget Sound basin focused primarily on water quality and nonpoint source pollution. At that time, watershed planning was defined under the Puget Sound Water Quality Management Plan and a supporting state regulation (Chapter 400-12 WAC). In the lower Hood Canal area, this process was undertaken by the Lower Hood Canal Watershed Implementation Committee, which produced the *Lower Hood Canal Watershed Action Plan*. The Plan included a number of

E Addressing Cumulative or Cross-Cutting Issues

action steps pertaining to water quality, public education, septic systems, groundwater, water-based recreation, agricultural and forestry practices, erosion and stormwater, and landfills. The only area covered by the Plan that is now in WRIA 16 was the area around Union and the South Shore sub-basin.

In 1998, the Watershed Planning Act defined larger-scale Water Resource Inventory Areas (WRIAs) and initiated the current phase of watershed planning in WRIA 16. Once this plan is completed and adopted, stakeholders in WRIA 16 can begin implementation.

In many cases, implementing the recommendations from the planning documents completed under WAC 400-12 and the current watershed planning requires careful and focused coordination across jurisdictions; the WRIA 16 Planning Unit may wish to establish some type of forum for facilitating this necessary coordination.

Option 89. Encourage Mason County to increase its focus on water-quality, perhaps by consolidating its efforts

Water quality is an increasing concern in Hood Canal and WRIA 16. Given heightened local awareness, coupled with increased interest by the Governor and the state government in Hood Canal's low dissolved oxygen, local jurisdictions have an opportunity to take a leadership role in improving local water-quality. In particular, Mason County government is well-positioned to contribute to water-quality improvement, given the variety of water-related efforts it undertakes, including septic system oversight, drinking water management, stormwater management, and water and sewer utilities. Mason County could consolidate these efforts to provide increased focus on water-quality planning, perhaps through department reorganization. Possible models to study include Thurston County, which has a Department of Water and Waste Management; Kitsap County, which has a Department of Surface and Stormwater Management, and King County, which has a Water and Land Resources Division in its Department of Natural Resources.

Option 90. Address cumulative impacts of land use decisions (e.g., habitat fracturing) and develop a method for this to be taken into account by land use decision-makers

Land use decision-makers commonly make assessments and decisions about how individual developments will affect the local environment, including salmon habitat. These decisions, however, are usually based on the individual impact of the particular project – not on how relatively small impacts of that project, combined with those of others, might have a combined or cumulative affect. A prime example of this effect is in logging or development projects that dissect strong habitat areas and leave a

Addressing Cumulative or Cross-Cutting Issues

E

“checkerboard”, or isolated patches, of good habitat. In such circumstances, each individual patch of habitat may be high-quality, but wildlife may not be able to move easily or safely from patch to patch, greatly reducing the health and effectiveness of the ecosystem.

The WRIA 16 Planning Unit could work to convene a group of local stakeholders to study this issue and make recommendations on how land use planning decisions or regulations can be modified to address likely cumulative and combined impacts. A possible venue for such action is in the County Comprehensive Plan, including the Critical Areas Ordinance, or a program organized in cooperation with non-governmental organizations such as the Cascade Agenda.

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Appendix F. Options for Funding New Efforts

Several of the options discussed in the previous appendices would require significant amounts of local government staff time as well as resources to pay for data collection, equipment, studies, new or expanded infrastructure, community-based social marketing, flyers and brochures, and other planning and implementation efforts and expenses. In some of these cases, new initiatives may be accomplished with existing resources, particularly as the Planning Unit and other stakeholders move from planning into implementation. However, it is unlikely that all of the Planning Unit's recommendations could be implemented within existing budgets.

Obtaining the environmental, cultural, recreational, and economic benefits of improved water resources will require an increased commitment from the community. However, not taking action also has costs – both financial and otherwise.

Following are options the Planning Unit and its partners could pursue to secure funding for improving water quantity, water quality, and habitat in WRIA 16. In most instances, dedicated local funding serves as the cornerstone for sustaining long-term water resources programs.

Accordingly, this section will address some such options to help provide long-term sources of revenue from the communities affected or responsible (e.g., impact fees for new development). This section, however, will also address possibilities for shorter-term – but potentially large – sources of funds for new projects (e.g., funding from the State legislature). The options fall under several categories:

- Grants
- Revenues from special districts
- Impact fees
- Private funding sources
- Tax- and other fee-based funding sources; and
- Other funding sources.

Please note that although the options that follow were assembled by the Planning Unit for consideration, the inclusion of an option in this chapter does not necessarily indicate its endorsement or recommendation by the Planning Unit. Rather, the Planning Unit strove to include and consider a wide variety of options. As a result, any credible option suggested in Planning Unit meetings was included in this plan for consideration and evaluation.

F Options for Funding New Efforts

Grants

The grants discussed in this section are only a sample of potential funding sources, and others may be available. In addition, please note that loans should also be taken into consideration, especially when addressing high-cost capital facilities such as sewage treatment plants.

Option 91. Pursue grant sources recommended in EPA's Smart Growth program.

Smart growth is an approach that balances development and environmental protection. It accommodates growth while preserving open space and critical habitat, reusing land, and protecting water supplies and air quality. The EPA has developed a guide of funding resources to help organizations address the varied aspects of smart growth. These are just a few potential resources:

- **Environmental Education Grants Program:** Funding for projects that design, demonstrate, or disseminate environmental education practices, methods, or techniques. This grant program is administered by the EPA Office of Environmental Education. The Mason Conservation District was awarded one of these grants in 2001 for an environmental education program in the Pioneer School District.
- **Watershed Protection and Flood Prevention Program:** Financial assistance for projects related to watershed protection, water supply, water quality, erosion and sediment control, wetland creation and restoration, fish and wildlife habitat enhancement, and public recreation. This program is administered by the USDA's Natural Resource Conservation Service.
- **Bring Back the Natives Grant Program:** Funding to restore degraded riparian habitats and native aquatic species through watershed restoration and improved land management. This program is administered by the National Fish and Wildlife Foundation.
- **Partners for Fish and Wildlife Habitat Restoration Program:** Technical and financial assistance to private landowners who want to voluntarily restore or improve native habitats for fish and wildlife on their lands. This program is administered by the U.S. Fish and Wildlife Service.
- **Five-Star Restoration Program:** Challenge grants for restoration projects that involve multiple and diverse partners, including government agencies, community groups, businesses, schools, and environmental organizations. This program is administered by the EPA. Several Washington Cities and Counties have received funding of \$10,000–\$15,000 in recent years.

- **Wetlands Reserve Program:** Cost-sharing opportunities for landowners to restore and protect wetlands in exchange for retiring marginal agricultural land. This program is administered by the USDA's Natural Resource Conservation Service.

These or other grant opportunities could be pursued to help fund implementation activities in WRIA 16.

Option 92. Pursue funding through Ecology's Water Quality Program.

Ecology administers two major grant programs for water-quality projects in Washington State:

- The Centennial Clean Water Fund
- The Section 319 Nonpoint Source Grants Program

These programs target projects that reduce sources of pollution, including agricultural BMP and water quality monitoring projects. Funding is available to local governments, tribes, special purpose districts, and some nonprofit groups.

Option 93. Pursue funding through the Salmon Recovery Funding Board for habitat improvements or land acquisition

Washington State's Salmon Recovery Funding board funds projects to restore or acquire salmon habitat. Grant requests can be submitted by local governments, tribes, nonprofit organizations, conservation districts, or landowners, among others. In WRIA 16, SRFB projects are overseen and prioritized by the Hood Canal Coordinating Council, who is the "Lead Entity" for salmon recovery in the region. In WRIA 16, SRFB funds have been used for projects such as the Salmonid Refugia Study, acquisition of land in the Dosewallips and Skokomish sub-basins, and restoration activities in the Dosewallips and Skokomish estuaries and uplands (HCCC, 2004). Stakeholders in WRIA 16 could continue to pursue SRFB funding for habitat improvements and land acquisitions.

Option 94. Pursue funding through a variety of other grant or loan mechanisms

Many other grant or loan opportunities may be available through the following (or other) programs:

- Infrastructure Assistance Coordinating Council, Infrastructure Database, www.infracfunding.wa.gov/
- National Agricultural Library, Water Quality Information Center, Funding Sources for Water Quality, www.nal.usda.gov/wqic/funding.html

F Options for Funding New Efforts

- US Environmental Protection Agency, Catalog of Federal Funding Sources for Watershed Protection, <http://cfpub.epa.gov/fedfund/>
- US Environmental Protection Agency, Environmental Finance Program, <http://www.epa.gov/efinpage/>
- Boise State University, Environmental Finance Center, <http://sspa.boisestate.edu/efc/> and funding database <http://efc.boisestate.edu/searchmenu.asp>.
- Puget Sound Action Team, Funding Programs, <http://www.psat.wa.gov/Programs/Funding.htm>

Revenue from Special Districts or Utilities

Following are some examples of how special districts and utilities could be used to raise and administer funds for watershed protection.

Option 95. Establish a surface water management district or utility

A surface water management district or utility would provide a mechanism for assessing fees and managing surface water in unincorporated areas of Mason and Jefferson Counties. Districts or utilities that focus on surface and storm waters can be created or fee-raising power under a variety of laws in Washington, including RCW 36.89, RCW 36.94, RCW 57, and RCW 85. They are relatively common in western Washington, especially in growing counties such as Skagit, Snohomish, King, Pierce, Thurston, and Clark. Currently, Jefferson County has one SWMD, in the North Bay area of Port Ludlow. The City of Port Townsend also collects a utilities fee for stormwater management. Kitsap County has also established a district, an action that some believe will help to proactively manage—or even prevent—the types of water quality impacts seen in urban counties. One option for counties is RCW 36.94.020, which authorizes counties to implement comprehensive water resources programs under a single utility (e.g., activities related to diking, flooding, stormwater, sewerage, lakes, and shellfish).

Surface water management districts and utilities typically raise funds by assessing fees on properties—residential, commercial, government, and, in some cases, agricultural—based on impervious surface coverage. For residential parcels, a standard fee is typically applied based on the average impervious surface of all residential parcels in the district. Fees for commercial properties are based on multiples of the residential fee. Fees are typically collected with property tax billings. In WRIAs 16, the funds generated could be used to collect and manage data, monitor water quality, provide support for technical and educational programs, and implement many other activities.

The Planning Unit could encourage Mason and Jefferson Counties to establish surface water management districts or utilities to fund water quality protection, education, and enforcement activities.

Option 96. Establish one or more shellfish protection districts

Like a local improvement district, a shellfish protection district (also called a “clean water district”) is authorized under RCW 90.72 to protect or restore water quality in areas with shellfish tidelands. This type of district can be created by any county having shellfish tidelands. It should encompass areas that depend on the continuation or restoration of shellfish farming or harvesting. Counties that establish shellfish protection districts are given authority to assess fees for their services in the manner determined by the county legislative authority. Funds raised by shellfish protection districts can be used for water quality programs that prevent or control contamination from nonpoint pollution sources, including activities for inspecting and repairing onsite sewage systems, managing stormwater runoff, ensuring proper livestock grazing and waste management, monitoring water quality, and educating and involving the public. However, shellfish protection districts cannot assess fees to fund programs or services that are substantially similar to those already funded by other charges.

A number of organizations are currently working on water-quality issues in Hood Canal, and any new shellfish protection district would need to be coordinated with these other efforts.

Option 97. Establish an erosion control district

Shoreline armoring, such as bulkheads and seawalls, has many detrimental effects on the nearshore environment. When bulkheads are built, they cover up whatever habitat is beneath them. Bulkheads trap sediment behind them, preventing it from reaching and replenishing beaches. They also reflect wave energy onto the beach in front of them, exacerbating erosion and degrading or destroying habitat.

Unfortunately, many shorelines in Puget Sound and Hood Canal are already bulkheaded, and action is necessary to mitigate their negative effects. One potential option would be to attempt to form an erosion control district, funded with fees assessed to bulkhead owners. An erosion control district could potentially be created in Washington as a type of Special Purpose District. Erosion control districts, however, are not specifically authorized by name in state law, although erosion control could potentially be considered a function of a conservation district, shellfish protection district or surface water management district. Erosion control districts have been implemented to control beach erosion in the eastern U.S., but further research would be needed to determine their applicability in Washington.

F Options for Funding New Efforts

If established, an erosion control district could support design and implementation of beach nourishment on a drift cell basis. Utility staff would identify where drift cells initiate, where access is feasible, and the amount and size of material needed annually. They also would acquire the necessary permits, purchase the material, and place it on the beaches as planned. This nourishment program would keep the beaches at an elevation to support abundant fish life and prevent further retreat, decreasing the need for more bulkheads. Bulkhead owners who remove their bulkheads would no longer have to pay the fee.

The Planning Unit could work with local governments in WRIA 16 to implement an erosion control district.

Option 98. Establish an aquifer protection district

An aquifer protection district is another type of special purpose district created to finance the protection, preservation, and rehabilitation of groundwater quantity and quality. Under RCW 36.36, counties are authorized to create aquifer protection districts and submit a ballot resolution to voters residing in the proposed district. Fees can then be assessed for groundwater withdrawal and on-site sewage disposal on a per-household basis; the fees can either be collected directly by the County or via an existing public utility. Revenues can be used for planning, infrastructure improvements, monitoring, compliance, or education.

Option 99. Establish one or more local improvement districts

Local improvement districts can help communities finance capital improvements by assessing fees on properties within the district. They generate funds that can be used for a variety of public improvement projects, including water, sewer, and storm sewer improvements. For example, a group of homeowners on septic systems could establish a local improvement district to assess fees on themselves so they can build a community septic system or connect to a sewer system. Likewise, a group of shoreline residents could initiate a local improvement district to maintain nearshore areas along Hood Canal. The Municipal Research and Services Center of Washington has written a manual on how to establish local improvement districts in Washington (MRSC & APWA, 2003). Fees can be assessed at a flat rate per parcel, proportional to the physical features of the parcel (such as total area, feet of shoreline, or other metrics), or by select other methods. In all cases, however, the fee assessed may not exceed the increased value the improvement brings to the parcel (MRSC & APWA, 2003).

Impact Fees

Option 100. Require impact fees for new development

Impact fees are charges assessed by local governments against new development projects. The goal is to recover the cost of providing the public facilities required to serve the development and to ensure that existing residents bear only the costs of improving existing services. Consequently, impact fees—which are paid by developers—can only fund facilities that are directly associated with that development. Setting impact fee schedules is a complex process that typically involves rate studies.

Local governments in Washington State may collect impact fees under provisions of the GMA, voluntary agreements, and the State Environmental Policy Act (SEPA). Under the GMA (RCW 82.02), jurisdictions can assess fees but use them only to fund roads, parks, schools, open space, recreational facilities, school facilities, and fire protection. Impact fees generally cannot be used to fund planning activities or services. RCW 82.02.020 authorizes voluntary agreements to collect fees that would be used to mitigate a direct impact of a proposed development. Finally, SEPA (under RCW 43.21C) authorizes local governments to levy mitigation fees to address the environmental impacts of a development. SEPA provides more flexibility than other fee mechanisms. Many local governments use SEPA to require improvements such as turn lanes or traffic signals; some allow developers to pay money in lieu of making the improvement—such as a payment in lieu of dedicating land for open space. The government then uses the money to acquire needed public facilities. Some governments charge these fees without giving developers the option of making the improvement.

No impact fees are currently assessed by either Mason or Jefferson Counties, nor by cities or towns within these counties (MRSC, 2004); however, Mason County does collect some SEPA mitigation fees. Impact fees could be used to fund certain infrastructure investments to benefit water resources in WRIA 16.

Private Funding Sources

Option 101. Pursue funding from private individuals

Fish kills, shellfish area closures, and media attention have led to high public recognition of problems in Hood Canal and other parts of WRIA 16. Accordingly, local residents and other stakeholders may be willing to make donations to support recovery efforts, particularly specific, local, and visible improvements for which donors could receive some recognition or credit in the community. One option for pursuing such funding would be to establish a local foundation dedicated to Hood Canal and watershed improvements and use that foundation as a means of soliciting donations.

F Options for Funding New Efforts

Tax- and Other Fee-based Funding Sources

Option 102. Expand the revenue-raising methods used by the Mason Conservation District

Conservation districts receive funding from tax assessments and grants. Although authorized by the state legislature, they are not state agencies and, as such, do not receive an ongoing operating budget from the General Fund. One option would be to require those farms who want or need farm plans to pay for them directly. Counties also have the power to impose special assessments to fund conservation districts under RCW 89.08.400. In fact, the Mason Conservation district has already done this, and they administer the program and funds jointly with Mason Health Department.

Option 103. Collect a real estate excise tax

Real estate excise taxes apply to those selling real estate. Washington State currently levies a 1.28-percent tax, and both Mason and Jefferson counties levy an additional 0.50 percent, the maximum allowed for local governments. These funds can be used for public works projects as specified in RCW 82.46.010 and RCW 82.46.035, including stormwater infrastructure projects; however, they cannot be used for general program support. In addition to the state and local taxes, counties may submit to voters an additional 1.0-percent real-estate excise tax for acquiring and maintaining conservation areas—open spaces, marshes, aquifer recharge areas, shoreline areas, and other lands and waters that are important to preserve flora and fauna (Municipal Research & Services Center of Washington, 2002). Mason and/or Jefferson Counties could consider introducing ballot propositions for this additional excise tax.

Option 104. Levy a public utility tax.

Public utilities such as water providers are generally exempt from Washington State retail sales and B&O taxes. Instead, they pay separate utility taxes at rates specified in RCW 82.16 and pass this tax on to their customers. Local governments have the ability to raise public utility taxes up to 2 percent without voter approval, although this approach has been largely unpopular east of the Cascades (Washington State Tax Structure Committee, 2002). If this option were implemented, all revenues could be directed to the utility from which they were collected.

Other Funding Sources

Option 105. Pursue funding through the Puget Sound Restoration Fund.

The Puget Sound Restoration Fund aims to fund and implement projects that achieve on-the-ground restoration of habitat and native species in Puget Sound. A particular, recent focus of the fund has been on providing

assistance to community shellfish farms as well as the expanding the habitat for native Olympia oysters (Puget Sound Restoration Fund, 2005).

Option 106. Pursue loans from the State Drinking Water Revolving Fund.

This fund, which is administered by Ecology, offers assistance in the form of very-low-interest loans. It can be used to pay for capital improvements that increase public health protection and compliance with drinking water regulations.

Option 107. Pursue funding from the State Legislature for infrastructure improvements to benefit Hood Canal

Hood Canal's water quality and fish habitat is a subject of broad regional concern. For example, in March 2005 Governor Christine Gregoire make a call to action regarding Hood Canal water quality, and she called for \$5 million in additional funding in her 2005-2007 budget to help finance sewer and storm water projects at Belfair and Hoodport, pay for identification of failing septic systems, provide low-interest loans for property owners to fix failing systems, and other measures to address nitrogen inputs (Office of the Governor, 2005). The governor is expected to release her plan for Puget Sound (including Hood Canal) in autumn, 2005 (McClure, 2005). Accordingly, now may be a particularly opportune time to pursue funding from the State government to address Hood Canal issues.

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Appendix G. Supporting Documents

This appendix contains the following three documents:

- The intergovernmental agreement that created the WRIA 16 Planning Unit;
- Skokomish Tribal Resolution 98-76; and
- Skokomish Tribal Resolution 00-19.

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INTERGOVERNMENTAL AGREEMENT

Formation of the Skokomish - Dosewallips Partnership and Designation of Lead Agency for Watershed Planning

WHEREAS, the environmental, social and economic health of the Skokomish/Dosewallips Watershed Resource Inventory Area (WRIA) Number 16 as identified in WAC 173-500-040, hereinafter called the Skokomish - Dosewallips Watershed, depends upon sound management and stewardship of natural resources; and

WHEREAS, multiple governmental jurisdictions (federal, state, tribal, and local governments) and various, diverse public and private groups share an interest in sound management of the Skokomish - Dosewallips Watershed's water resources; and

WHEREAS, issues affecting the management of these resources transcend jurisdictional and ownership boundaries; and

WHEREAS, cooperative and collaborative approaches offer solutions that are less costly, more responsive to local conditions and needs, and garner greater public support; and

WHEREAS, pursuant to Chapter 39.34 RCW and each party's respective authorities, the parties to the Agreement are authorized to jointly exercise the powers, privileges, and authority described herein; and

WHEREAS, Engrossed Substitute House Bill No. 2514 (Laws of 1998) and Chapter 90.82 RCW have authorized the allocation of certain funds to a WRIA planning unit for purposes of watershed assessment, planning and management, and

WHEREAS, the initiating governments of the Skokomish - Dosewallips Watershed Plan have reached consensus and are interested in forming a WRIA planning unit so that they are eligible to apply for and receive funds pursuant to Engrossed Substitute House Bill No. 2514 (Laws of 1998) and Chapter 90.82 RCW;

NOW, THEREFORE, in consideration of the mutual promises and covenants recited herein, the parties agree and resolve as follows:

1.0 Parties

The parties to this Agreement shall be Mason County; Jefferson County; Grays Harbor County; Mason County PUD 1; the Skokomish Indian Tribe; and the Washington State Department of Ecology.

2.0 Purpose

This Agreement shall designate a lead agency and shall initiate the process for organizing a planning unit for the purposes of assessing the water resources of the Skokomish - Dosewallips Watershed and preparing a plan for the cooperative management of those water resources. In accordance with RCW 90.82.060, the assessment and plan will investigate water quantity elements, water quality elements, habitat elements, and instream flow elements. The plan will identify strategies and actions to implement the goals of the plan. The parties and the Partnership (as defined below) shall also monitor the implementation and effectiveness of the Watershed Plan, should one be prepared, and prepare amendments as desired.

3.0 Goals and Objectives

3.1 The parties share the following goals:

- ensure that an appropriate water quality is maintained or achieved;
- ensure the wise use of the watershed's water resources;
- protect existing water rights and protect instream flows for fish;
- provide for the economic well-being of the watershed's citizenry and communities;
- increase recreational opportunities;
- increase watershed awareness through education;
- examine the relationship of water resources to economic health and sustainability;
- identify water supplies for present and future needs, including reuse, conservation or transfer within the Skokomish - Dosewallips Watershed of water resources ;
- seek certainty that the supplies will be available for those needs in a timely manner;
- ensure that appropriate water-related habitat is available;
- share information about developments in the watershed and identify common problems and opportunities;
- coordinate with other watershed planning groups toward an overall watershed plan for the Hood Canal;
- promote healthy and harvestable runs of salmon;
- coordinate with salmon restoration, protection and enhancement efforts, such as

ESHB 2496;

- provide for the long-term and coordinated management of the water resources; and
- advance the goals, policies and plans of communities that share the watershed.

3.2 Objectives

In order to advance the goals of the parties, the parties share the following objectives:

- begin Phase 1 work with state government, other local governments within the watershed, and affected tribal governments, in developing a planning process, including developing a proposed scope of work and a proposed composition of the Partnership (planning unit);
- through the Partnership, develop a detailed Scope of Work for the development of the Watershed Plan and decide the continuation of the planning process into Phases 2 and 3;
- complete Phase 1 of a watershed plan for the Skokomish - Dosewallips Watershed, including the decision to continue the planning process, prior to December 31, 2000, consistent with the requirements of Chapter 90.82 RCW and Engrossed Substitute House Bill No. 2514 (Laws of 1998);
- if approved by the Partnership, obtain Phase 2 funding for conducting watershed assessments;
- if approved by the Partnership, obtain Phase 3 funding for developing a watershed plan and making recommendations for actions by local, state, and federal agencies, tribes, private property owners, private organizations, and individual citizens, including a recommended list of strategies and projects that would further the purpose of the plan;
- complete the watershed plan and use this agreement for continued monitoring and planning for the watershed.

4.0 Skokomish - Dosewallips Partnership

The parties agree to work cooperatively to establish a planning unit to be called the Skokomish - Dosewallips Partnership (or Partnership) and to seek participation from interested and affected parties. The Skokomish - Dosewallips Partnership will serve as the planning unit authorized under Engrossed Substitute House Bill No. 2514 (Laws of 1998) and Chapter 90.82 RCW. The Partnership will also serve in a continuing advisory and informational capacity. The Partnership shall coordinate efforts focusing on advancing or achieving its goals and responsibilities.

The parties hereby acknowledge the terms and conditions stated within Skokomish Tribal Council Resolution No. 98-76 dated October 14, 1998 for participation by the Skokomish Indian Tribe.

4.1 Composition of Skokomish - Dosewallips Partnership

The Skokomish - Dosewallips Partnership shall include, but is not limited to:

4.1.1 Governmental Members and Tribes

- **Counties:** a representative of each county in the Skokomish - Dosewallips Watershed, appointed by the respective county;
- **Tribes:** a representative from the Skokomish Indian Tribe and a representative from each other tribe/tribal group which have usual and accustomed rights in the Skokomish - Dosewallips Watershed, appointed by the respective tribe/tribal group;
- **Water Supply Utilities:** a representative appointed by Mason County PUD 1;
- **State Departments:** The State of Washington shall be represented during votes by the Department of Ecology, although other Washington State Departments - Fish and Wildlife, Natural Resources, and Agriculture - may be members;

4.1.2 Nongovernmental Members

- **Major Interests:** a minimum of four members representing various major interests in the Skokomish - Dosewallips Watershed, appointed jointly by consensus of the initiating governments. Major interests include but are not limited to timber, agriculture, business, fisheries, port districts, shellfish, flood districts, recreational, and environmental, and industrial water users appointed by consensus of the initiating governments.
- **Private Citizens:** may include one private citizen from each of the counties, appointed by consensus of the initiating governments.

4.1.3 Ex-Officio Members

- **Federal Agencies:** Fish and Wildlife Services, Environmental Protection Agency, National Marine Fisheries Service, Forest Service, and Olympic National Park;
- Hood Canal Coordinating Council; and
- Mason County Conservation District.

4.2 Voting of Skokomish - Dosewallips Partnership

4.2.1 Who has a vote

Except as otherwise provided, each duly appointed representative of a unit of government, tribe, and non-governmental member shall have one vote. Representatives of ex-officio members shall not be entitled to a vote. Approval of any matter by the Partnership shall be by consensus among the members of the planning unit appointed to represent units of government and a majority vote of the nongovernmental members of the planning unit.

4.2.2 Voting Consensus

Interim decisions during the planning process on plan development activities shall be reached by a consensus process. The parties agree that the term "consensus" as used in this agreement means by consensus of quorum present among all the members of the planning unit appointed to represent units of government and tribes and a majority vote of non-governmental members of the planning unit.

4.2.3 Quorum

A quorum of members must be present to conduct official business on behalf of the Partnership. A quorum is 50 percent of the governmental members and 50 percent of the nongovernmental members present.

4.3 Steering Committee

The parties of this agreement shall act as the Steering Committee to implement this agreement, and to assist the Partnership in the performance and completion of its goals. The Steering Committee shall develop the work plan and budget with input from the Partnership, provide input to the lead entity on Partnership staff performance, review contractual or consultant work for quality assurance and performance completion, and develop processes for administrative decision-making for the Partnership.

4.4 Technical and citizen advisory committees

Technical and citizen advisory committees will be formed, as needed, to formulate options for consideration by the Skokomish - Dosewallips Partnership and referral to various government agencies.

4.5 Additional goals and responsibilities of the Partnership

The Partnership may create additional goals and objectives, but those goals will include the goals of the parties stated in section 3.0 above. In addition, the Partnership will develop and agree on any additional procedures to govern the group's activities.

5.0 Skokomish - Dosewallips Partnership Meetings

The Skokomish - Dosewallips Partnership will meet regularly as scheduled by the Partnership or as scheduled by the Steering Committee. Public notice will be provided for the meetings and time will be set aside to receive public comment.

6.0 Lead Agency

For the purposes of this Agreement, Mason County shall be designated as Lead Agency. The Lead Agency shall be responsible for and authorized to perform the following tasks:

- 1) Negotiate and execute agreements with Washington State Department of Ecology (DOE) for Watershed Planning Grant Funds;
- 2) Receive and disburse funds from DOE;
- 3) Solicit Statements of Qualifications, requests for proposals or invitations for bids, negotiate scope of work, and execute contracts to perform the work for projects performed by or on behalf of the parties pursuant to this Agreement;
- 4) The Lead Agency shall not obligate any parties to financial responsibility in performing its tasks under this Agreement without approval of the respective governmental entities;
- 5) Prepare and maintain proper records for accounting and administration of watershed planning grants.

The Lead Agency shall report regularly to the parties to this Agreement and shall provide them with a full accounting on the receipt and expenditure of funds that may be provided pursuant to this Agreement. The Lead Agency shall obtain prior concurrence for the overall budget, the scope of work for contracts, and hiring of consultants.

7.0 DOE Obligations

DOE agrees to provide staff support and technical assistance, and to assist in obtaining staff support and technical assistance from other state agencies, to the Skokomish - Dosewallips Partnership.

8.0 Funding

The activities of the parties or Skokomish - Dosewallips Partnership as

described in this Agreement, and as may be further defined by the parties to achieve the stated goals, shall be funded by the following sources:

- 1) Watershed Management Grants made available by DOE; and/or
- 2) Other public and private funds which are intended for watershed planning and implementation.

Funds or services from the parties may be required for matching or providing local shares for other funding sources that may become available. Any funds or services required shall be shared by all parties and will be agreed upon in writing in advance.

9.0 Duration

This Agreement shall continue until terminated by the parties as provided in Section 11.0.

10.0 Modification

This Agreement may be modified or amended only by written consent of all parties.

11.0 Termination

11.1 An individual party may withdraw from this Agreement upon ten days written notice to the Lead Agency. The Lead Agency may terminate its membership and/or surrender its lead status upon ten days written notice to all other signatories to this Agreement. If the Lead Agency terminates its membership, a new Lead Agency shall be appointed at the next meeting by consensus of quorum present. This Agreement will continue to remain in effect so long as two or more parties remain signatories to this Agreement.

11.2 This Agreement may be terminated only by written consent of all signatories to this Agreement.

12. Effective Date

This Agreement shall become effective and commence upon execution of the Agreement by all parties.

13.0 Non-Binding Agreement

The water resource planning process described in this Agreement is intended to result in a plan and program for the cooperative management of the water resources of the Skokomish - Dosewallips Watershed. The parties agree that participation in the Skokomish - Dosewallips Watershed Partnership shall not bind any member's independent decision-making authority and/or the Treaty-reserved rights of the tribes.

IN WITNESS WHEREOF, the undersigned have executed this Agreement as of 2-8-00, ~~1999~~ 2000
By 2-8-00

**BOARD OF COUNTY COMMISSIONERS
Mason County, Washington**

[Signature]
Chairman

2/8/00

Approved as to form

[Signature]
Commissioner

[Signature]
Commissioner

[Signature] CHIEF DPA
Deputy Prosecuting Attorney

**BOARD OF COUNTY COMMISSIONERS
Jefferson County, Washington**

[Signature] *2/7/00*
Chairman

Approved as to form

[Signature]
Commissioner

[Signature]
Commissioner

[Signature] *2-2-00*
Deputy Prosecuting Attorney

**BOARD OF COUNTY COMMISSIONERS
Grays Harbor County, Washington**

Dick Dixon
Chairman

Approved as to form

Bob Beehners
Commissioner

Quint W. B. G.
Commissioner

James V. Baker
Deputy Prosecuting Attorney

SKOKOMISH TRIBAL COUNCIL

Maria Maling-Kia Chan
Tribal Council Chairman

Approved as to form

Roshanne Reed
Tribal Council Secretary

[Signature]
Skokomish Tribal Attorney

Commissioner

MASON COUNTY PUBLIC UTILITY DISTRICT 1

Eric Blaine
Chairman

Paula Reed
Commissioner

Commissioner

WASHINGTON STATE DEPARTMENT OF ECOLOGY



Secretary *Assistant to the Director*



Skokomish Indian Tribe

Tribal Center (360) 426-4232

N. 80 Tribal Center Road

FAX: (360) 877-5943

Shelton, WA 98584

SKOKOMISH TRIBAL COUNCIL RESOLUTION NO. 98-76

WHEREAS, the Skokomish Tribal Council is the governing body of the Skokomish Indian Tribe, pursuant to the Constitution of the Skokomish Indian Tribe, approved by the Secretary of the Interior, March 17, 1980, and

WHEREAS, pursuant to Article V, Section 1(h) of the Constitution, the Skokomish Tribal Council has the responsibility to manage, develop, protect, and regulate the use of water, fish and wildlife, minerals, timber, and all other natural resources within the Skokomish Tribe's jurisdiction,

WHEREAS, pursuant to Article V, Section 1(m) of the Constitution, the Skokomish Tribal Council has the authority to consult, negotiate, and contract with agencies and officers of Federal, State, local and tribal governments and with private persons and organizations;

WHEREAS, the Skokomish Indian Tribe, through the Skokomish Department of Natural Resources, provides for the management, development, protection, and regulation of water resources, fish and wildlife, minerals, timber, and all other natural resources within the Skokomish Tribe's jurisdiction,

WHEREAS, the Skokomish Tribal Council has been invited by Mason County to participate in watershed planning in WRIA-16, Skokomish-Dosewallips, as an "initiating government" under the provisions of ESHB 2514, the 1998 Watershed Management Act, Chapter 247 Laws of 1998,

WHEREAS, the Skokomish Tribal Council finds that lack of adequate funding will preclude accomplishing the ambitious requirements and goals of ESHB 2514 and believes that instream flows cannot be determined or redetermined within the limits of the financial resources made available by the Act; and

WHEREAS, the Skokomish Tribal Council, by letter dated July 29, 1998, has agreed in principle to participate in watershed planning with the other initiating governments, provided certain limitations and conditions are met, including, but not limited to: (1) the Tribe will not be able to agree that any surface or groundwaters are available in WRIA 16 within the meaning of section 3(1)(b), at least during certain months of the year; (2) the Tribe will not agree to estimate federally reserved rights in WRIA 16; (3) the Tribe believes that since no water is available during at least some portion of the year, the plan will not be able to estimate the water available for further appropriation within the meaning of section

3(1)(g), and (4) the Tribe will not agree to any planning processes which interfere with its position in the current FERC licensing proceeding for Cushman dam.

NOW THEREFORE BE IT RESOLVED, the Skokomish Tribal Council hereby authorizes Jim Park, Director, Skokomish Department of Natural Resources, or his designee; Vic Martino, Skokomish Tribal Consultant, or his designee; and Richard Guest, Skokomish Tribal Attorney, or his designee, to represent the Skokomish Indian Tribe and to participate in watershed planning in WRIA-16, Skokomish-Dosewallips, provided such representation and participation shall be narrowly tailored to protect the interests of the Skokomish Indian Tribe pursuant to the terms and conditions set forth below.

BE IT FURTHER RESOLVED, that the Skokomish Tribal Council approves participation by the Skokomish Indian Tribe as an initiating government in watershed planning in WRIA-16, Skokomish-Dosewallips based on the following terms and conditions:

1 FUNDING

- 1.1 The initiating governments agree to provide initial funding in the amount of \$2,500.00 to the Tribe to offset the initial administrative, technical and legal cost of organizing for the water resource planning process.
- 1.2 The initiating governments agree to identify additional funds on an equitable basis throughout the planning process which can be secured for the Tribe to adequately participate in the planning and implementation of the water resource plans. Such funds would be used to offset administrative, technical and legal costs and travel expenses.
- 1.3 Effective watershed planning cannot take place without sufficient data to support informed decision-making. To achieve this, the initiating governments—with technical assistance from state and federal fish and wildlife agencies—will scope, design, and fund scientific studies which provide an acceptable level of certainty concerning all the surface and ground water quality and quantity requirements of the ecosystems in an affected watershed.
- 1.4 The initiating governments will demonstrate good-faith by supporting the prioritization by the State of initial funding to implement the existing two water resource management plans (Dungeness-Quilcene).
- 1.5 The primary goal of these plans will be to protect and restore the fisheries resources, habitats, and cultures and economies dependent on these resources.
- 1.6 No plan developed under this effort will include out of basin transfers of water.

2 INITIATION OF WATERSHED PLANNING

- 2.1 Effective watershed planning cannot take place without the full participation, as *initiating governments*, of all tribes with a legal interest or history of fish habitat management activities in an affected watershed. To achieve this, the initiating governments will invite such tribes to participate as initiating governments in determining the scope of planning and the composition of the planning unit.

- 2.2 Water resource planning will not be initiated without the concurrence of all affected tribes.
- 2.3 The reserved-rights and interests of the tribes will not be balanced against other competing resource demands. Instream flows will not be compared to or measured as the sum total of Tribal water rights
- 2.4 The scope of the water resource management plans must be comprehensive and include at a minimum: salmon habitat elements and surface and ground water quantity and quality needed to meet all ecosystem and cultural needs to support natural resources relied upon by the tribes.

3 WATER QUANTITY

- 3.1 The responsibilities of the Department of Ecology will be not abrogated or delegated to other agencies or sub-divisions of the State. The Department of Ecology will provide the technical resources to assess water supply and use in the management area.
- 3.2 There will be no planning involving on-reservation water rights. Planning for on-reservation water resources is the sole responsibility of the Tribe for which the reservation is secured under Treaty
- 3.3 This process will not define or identify a specific quantity of water that constitutes the Tribes treaty or legal water rights unless otherwise determined by the affected Tribe. If elected by the tribes, assessment of federal and other treaty-reserved water rights will be conducted exclusively by the affected tribes, in coordination with appropriate federal agencies.
- 3.4 The water quantity component under Section 3 will not estimate Treaty or federally reserved rights to water for fish or for any other purpose. To the extent that the estimate of that water right or right is deemed mandatory under this section, the planning unit agrees that there is not unanimous approval under Section 4 for the determination of Treaty or federally reserved rights to water for fish and agrees that such an estimate creates a prohibited obligation under Section 9(4) such that the plan shall not include such an estimate.
- 3.5 If there is an estimate, upon later agreement of the affected Tribe(s), it shall not be deemed to be an admission by the Tribe as to the quantification of the Tribes' water rights nor shall such estimate relate to, directly or indirectly, any later quantification of the Tribe's water rights.
- 3.6 Recognizing the limitations on the quality and quantity of existing surface and groundwater data, methodologies, and information, the parties agree to collect and utilize the best possible scientific data and methodologies. Such scientific methodologies must be commonly accepted by the scientific community and agreed upon by the affected tribes and appropriate state agencies. Utilization of consultants must also be agreed upon between the affected tribes and appropriate state agencies.
- 3.7 The purpose of the plan will be to develop strategies for increasing water supplies to: (1) satisfy instream flows, (2) meet existing out-of stream water needs consistent with priority rights, and (3) future out-of-stream uses if legally available

4 INSTREAM FLOWS

- 4.1 Existing instream flows will be modified if necessary to meet the requirements of the fish resources.
- 4.2 The planning unit shall not develop recommendations that require lowering instream flows that have been set by regulation.
- 4.3 The priority date for tribal instream flows is time immemorial.
- 4.4 The state will vigorously enforce the law to ensure protection and restoration of instream flow rules.

5 HABITAT & WATER QUALITY

- 5.1 Watershed plan shall be developed to protect, restore, and enhance fish habitat.
- 5.2 The Washington Department of Fish and Wildlife and affected Tribes will provide a technical analysis of fish stocks and habitat and define criteria that deal with watershed processes on a river scale that create habitat, e.g., large woody debris recruitment, channel stability.
- 5.3 The plan will utilize existing and any future studies conducted by tribal governments to the degree water quality standards are met.
- 5.4 No plans adopted by this process will supersede or circumvent either state or tribal water quality standards.

6 PLAN PARAMETERS

- 6.1 Plans shall not contain provisions that are in conflict with existing state statutes, federal laws, or tribal treaty rights, nor will the Tribe agree to any plans that define, alter, or otherwise affect the Tribes' treaty or legal water rights.
- 6.2 The Tribes reserve any and all rights and defenses that they may have with respect to their treaty reserved, judicial, statutory, or equitable water rights pertaining to any other participant in this process, including any such participants' claim to or allocation of water in the watershed.
- 6.3 That the water resource planning process described in this Agreement is not intended to formally determine or resolve any legal dispute about water rights under state or federal law or Indian treaty. Rather, this process is an alternative, voluntarily developed, designed to cooperatively plan and manage the uses of Washington's water resource.
- 6.4 Because this process stands in contrast to judicial determination of conflicting rights or claims to water, it will not result in a quantification or allocation of water among competing interests. This cooperative process will not "quantify" or "allocate" water in this sense. However, implementation of plans developed through this cooperative process should result in the identification of quantities of water available for specific purposes.
- 6.5 Nothing herein shall be a waiver of tribal sovereign immunity for any litigation including but not limited to any general stream adjudication.

6.6 The parties recognize that final agreement is more likely if the parties can freely discuss alternatives and hypotheticals without prejudice to positions they may take in legal proceedings. Therefore, no discussion, plan, proposal, agreement, offer of compromise, proposed agreement, concession, statement, data, material or document, whether oral, written or in electronic or other format, made by or on behalf of the affected tribe in furtherance of the planning process envisioned by this agreement shall be admissible in any legal or administrative proceeding, regardless of whether the tribe is a party to that proceeding.

7 **DECISIONS-HEARINGS-APPROVAL**

7.1 The parties agree the consensus decision-making process defined under this agreement will remain in force notwithstanding any future legislation.

7.2 No amendment or alteration of this agreement shall arise by implication, course of conduct, or change in state law. This agreement may be altered only by a subsequent written document, signed by the parties, expressly stating the parties' intention to amend their agreement.

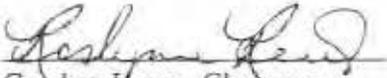
7.3 The parties agree that local decision makers in this community are most likely to forge a lasting and effective agreement if unanimity is required among the **initiating governments** on major decisions. As such, the parties agree that the term "consensus" as used in ESHB 2514 and this agreement means "unanimous agreement," and further agree to use this definition throughout their planning effort notwithstanding any contrary interpretation or definition of the term which may be placed on it by any other person or entity, including the courts or the legislature.

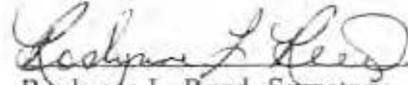
7.4 The parties recognize that ESHB 2514 provides that the planning process shall not contain provisions which conflict with tribal treaty rights or which impose an obligation on any participating tribal government. They therefore agree that tribal participation in this process shall not constitute an admission or agreement by the participating tribe that any estimate of tribal treaty rights are binding on it, unless the affected tribe expressly so agrees in writing at the conclusion of the process, and such tribal agreement is approved in writing by the United States.

*****CERTIFICATION*****

I, Gordon James, Chairman of the Skokomish Tribal Council, do hereby certify that the foregoing Resolution No. 98-76, was adopted at a regular meeting held on October 14, 1998 at which a quorum was present by a vote of 3 FOR 0 AGAINST 0 ABSTAINING.

ATTEST:

for 
Gordon James, Chairman
Skokomish Tribal Council


Roslynne L. Reed, Secretary
Skokomish Tribal Council



Skokomish Indian Tribe

Tribal Center (360) 426-4232

N. 80 Tribal Center Road

FAX: (360) 877-5943

Shelton, WA 98584

SKOKOMISH TRIBAL COUNCIL RESOLUTION NO. 00-19

A RESOLUTION APPROVING AN INTERGOVERNMENTAL AGREEMENT ENTITLED "FORMATION OF THE SKOKOMISH - DOSEWALLIPS PARTNERSHIP AND DESIGNATION OF LEAD AGENCY FOR WATERSHED PLANNING" CONTINGENT UPON THE TERMS AND CONDITIONS SET FORTH IN SKOKOMISH TRIBAL COUNCIL RESOLUTION NO. 98-76

WHEREAS, the Skokomish Tribal Council is the governing body of the Skokomish Indian Tribe, pursuant to the Constitution of the Skokomish Indian Tribe, approved by the Secretary of the Interior, March 17, 1980;

WHEREAS, pursuant to Article V, Section 1(h) of the Constitution, the Skokomish Tribal Council has the responsibility manage, develop, protect, and regulate the use of water, fish and wildlife, minerals, timber, and all other natural resources within the Skokomish Tribe's jurisdiction;

WHEREAS, pursuant to Article V, Section 1(m) of the Constitution, the Skokomish Tribal Council has the authority to consult, negotiate, and contract with agencies and officers of Federal, State, local and tribal governments and with private persons and organizations;

WHEREAS, the Skokomish Indian Tribe, through the Skokomish Department of Natural Resources, provides for the management, development, protection, and regulation of water resources, fish and wildlife, minerals, timber, and all other natural resources within the Skokomish Tribe's jurisdiction;

WHEREAS, the Skokomish Tribal Council, by letter dated July 29, 1998, has agreed in principle to participate in watershed planning with the other initiating governments, provided certain limitations and conditions are met, including, but not limited to: (1) the Tribe will not be able to agree that any surface or groundwaters are available in WRIA 16 within the meaning of section 3(1)(b), at least during certain months of the year; (2) the Tribe will not agree to estimate federally reserved rights in WRIA 16; (3) the Tribe believes that since no water is available during at least some portion of the year, the plan will not be able to estimate the water available for further appropriation within the meaning of section 3(1)(g); and (4) the Tribe will not agree to any planning processes which interfere with its position in the current FERC licensing proceeding for Cushman dam;

ORIGINAL

WHEREAS, pursuant to Resolution No. 98-76, the Skokomish Tribal Council formally approved participation by the Skokomish Indian Tribe as an initiating government in watershed planning in WRIA-16, the Skokomish - Dosewallips Watershed, under the provisions of ESHB 2514, the 1998 Watershed Management Act, Chapter 247 Laws of 1998; and

WHEREAS, representatives from the Tribe have met with representatives from the other initiating governments in WRIA-16, the Skokomish - Dosewallips Watershed, and reached consensus for the formation of the Skokomish - Dosewallips Partnership and the designation of Lead Agency watershed planning;

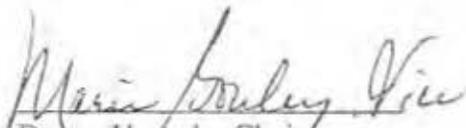
NOW THEREFORE BE IT RESOLVED, the Skokomish Tribal Council hereby approves the Intergovernmental Agreement entitled "Formation of the Skokomish - Dosewallips Partnership and Designation of Lead Agency for Watershed Planning," provided any participation by the Tribe shall be narrowly tailored to protect the interests of the Skokomish Indian Tribe pursuant to the terms and conditions set forth in Resolution No. 98-76.

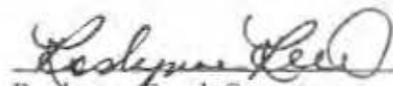
BE IT FURTHER RESOLVED, the Skokomish Tribal Council hereby authorizes Denny Hurtado, Skokomish Tribal Chairman, or his designee, to sign the Intergovernmental Agreement.

CERTIFICATION

I, Denny Hurtado, Chairman of the Skokomish Tribal Council, do hereby certify that the foregoing Resolution No. 00-19, was adopted at a regular meeting held on February 23, 2010 at which a quorum was present by a vote of 3 FOR 0 AGAINST 0 ABSTAINING.

ATTEST:


Denny Hurtado, Chairman
Skokomish Tribal Council


Roslynne Reed, Secretary
Skokomish Tribal Council