



WRIA 14 Watershed Management Plan Kennedy–Goldsborough Watershed

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*Prepared under Grant G0000107
For the WRIA 14 Planning Unit
By Plateau Technical Communication Services*

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Introduction



Watershed Planning In WRIA 14

Watershed planning is essential to ensure that abundant, clean water continues to be available—not only for growing communities, but also for fish and wildlife. Recognizing this need, the Washington State legislature passed the *Watershed Planning Act (Chapter 90.82 RCW)* in 1998. This legislation established a process for preparing watershed plans for 62 Water Resource Inventory Areas (WRIAs), which roughly correspond with physiographic boundaries of drainage basins in Washington. WRIA 14, the Kennedy-Goldsborough watershed, is one of these basins. This largely rural area includes the City of Shelton and lies mostly within Mason County, with an additional 15 percent in Thurston County and less than 1 percent in Grays Harbor County. In accordance with the *Watershed Planning Act*, several governments initiated watershed planning in WRIA 14:

- ▶ Mason County (the lead entity)
- ▶ Thurston County
- ▶ The Squaxin Island Tribe
- ▶ The City of Shelton
- ▶ Mason County Public Utility District (PUD) No. 1
- ▶ Port of Shelton
- ▶ State of Washington

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Representatives of these governments formed a Planning Unit. Participating organizations include the Washington Department of Ecology (Ecology), fisheries, the development community, the shellfish industry, environmental and salmon recovery groups, water providers, the timber industry, recreational groups, and citizens, among others. As a result, the *WRIA 14 Watershed Management Plan* represents a wide range of interests in the local community. Grays Harbor County opted out of the planning process because it contains only a small area within WRIA 14.

Disclaimer

This document is the only component of the WRIA 14 planning process that the Planning Unit has approved for formal consideration by participating Counties as outlined in *RCW 90.82*. Unapproved documents include the *Draft WRIA 14 Watershed Management Plan*, numerous technical reports, and various other products of this planning process. This document is the only product that should be interpreted or used as an approved plan

component; other materials should be considered informational resources that provide a record of the planning process.

This plan only addresses State-issued water rights—not Federal- or Tribal-based rights. It only acknowledges that tribal rights have not been quantified and that, in most cases, they are likely senior to specific state water rights. Nothing in this plan shall be construed by the State as providing grounds for issuing water rights under provisions related to “overriding consideration of the public interest” per *90.82.130 (4) RCW*.

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

Characteristics of WRIA 14



Physiography & Climate

WRIA 14 is divided into five sub-basins—Case Inlet, Goldsborough, Kennedy, Skookum, and South Shore. However, the South Shore Sub-Basin, which runs along Hood Canal, is considered part of WRIA 16 for watershed planning purposes; consequently, it is covered under the *WRIA 16 Watershed Management Plan*. The Goldsborough Sub-Basin is the largest of the four covered under this plan. It includes all of Oakland Bay and Hammersley Inlet, as well as the City of Shelton (the only incorporated area in WRIA 14). The Case Inlet Sub-Basin includes Harstine and Squaxin Islands, as well as Case Inlet. The Kennedy Sub-Basin includes parts of Totten and Eld Inlets. The Skookum Sub-Basin is the smallest; it includes Skookum Inlet.

Like other parts of south Puget Sound, WRIA 14 features an extensive network of streams that issue from springs, wetlands, small lakes, and surface water drainages. These streams empty into shallow bays and inlets. Principal drainages include Cranberry, Goldsborough, Kennedy, Mill, Sherwood, Johns, Deer, and Skookum Creeks. Despite its abundance of creeks, WRIA 14 has no major rivers.

Because of its low elevation, WRIA 14 receives very little snow. However, between 53 and 93 inches of rain falls each year on various parts of

An aquifer is a geologic unit that bears significant quantities of water. It often consists of unconsolidated sediments (such as sand and gravel) or fractured bedrock.

the watershed¹. Part of this rain becomes runoff that flows overland into streams and other water bodies. Another portion, however, percolates into the ground to replenish—or “recharge”—the aquifer system.

Hydrogeology

WRIA 14’s aquifer system consists of layered sediments deposited by glaciers that covered the region up until 10,000–14,000 years ago. These sediments cover most of the watershed’s surface except the Black Hills area, which is located in the southwestern portion of the WRIA 14 at the foothills of the Cascades. In the Black Hills area, a type of volcanic rock known as basalt appears at ground surface. This basalt bedrock also underlies the glacial sediments, forming a hard boundary to the aquifer system. Although most of WRIA 14’s wells tap the glacial sediments, their ability to provide water supplies depends on several factors. First, the sediments must be thick enough to store significant amounts of water. Thickness varies widely throughout the watershed, from a few feet to a few hundred feet. Second, the sediments must be permeable enough to allow water to move easily through the aquifer. Another important factor in determining where future supplies can be developed is the hydraulic continuity between surface water and groundwater. Levels of continuity vary across the watershed. In areas of high hydraulic continuity, pumping a well will reduce the flows in a nearby stream, potentially impairing habitat and conditions for fish and wildlife.

Hydraulic continuity is the degree of connection between two or more aquifers or between an aquifer and a surface water body such as a stream, lake, or wetland.

In some areas, wells may produce a thousand gallons per minute or more; in others, 10 gallons per minute or less. Likewise, in some areas, sediments contain layers of clays and silts, which do not transmit water easily; in other areas, however, a mixture of gravel and sand forms a highly permeable aquifer layer.

Current Conditions



The *Watershed Planning Act* specifies four key elements that Planning Units may consider for their WRIsAs: water quantity, water quality, habitat, and instream flows. Of these, only the water quantity element is required; however, the WRIA 14 Planning Unit elected to address all four in the watershed plan.

¹ Based on PRISM data from University of Oregon

Water Quantity

Related Recommendations

Monitoring & Data Analysis (page 7)

Conservation (page 12)

Public Education & Outreach (page 15)

Compliance & Enforcement (page 17)

To effectively manage our water supplies, we must understand how much water is available and how much we will need to meet future demands. Most of WRIA 14's water comes from wells owned by municipal providers, community systems, and individuals. As part of the watershed planning process, a water balance—that is, an equation describing annual rates of inflow and outflow—was used to estimate the amount of water available in this basin². It is essential to understand that the water balance was developed with preliminary estimates of usage, streamflow, and other parameters. Much more data must be collected before we can really quantify water availability and understand how pumping from WRIA 14's aquifers will affect streamflows and habitat.

Water Budget

According to this analysis, WRIA 14 receives an estimated 1,360,000 acre-feet per year (AF/yr) of water through rainfall³. About 930,000 AF/yr leaves the watershed via natural processes (creek flow and evapotranspiration), not counting the water that flows underground into Puget Sound. Much less water—6,600 AF/yr, according to this analysis—is actually used, suggesting that WRIA 14 has a surplus of about 420,000 AF/yr. However, this number is misleading because many other factors play a role in determining water availability. One is location within the basin; quantities vary significantly from area to area. Another is the impact to streamflows if groundwater supplies are developed in areas of high hydraulic continuity. Streams are especially vulnerable during the summer and early fall, when flows are at their lowest and demands on groundwater supplies are at their highest (so wells are pumping at their highest capacities). Climate trends, short- and long-term, will also continue to influence water supplies.

Water Rights Issues

Washington State requires anyone who diverts surface water or who pumps more than 5,000 gallons per day (gpd) from a well to have either a permit, certificate, or claim. Permits and certificates are valid water rights issued by Ecology and its predecessors since 1917. Claims are based on continuous beneficial use that predates the passage of surface or ground water laws; however, they are not considered valid water rights unless affirmed by a court. Claimants must file with Ecology.

² Details of this water balance appear in the *Level I hydrogeologic assessment* (Golder, 2003).

³ *Level I hydrogeologic assessment* (Golder, 2003).

In WRIA 14, over ten times the amount of water used—68,800 AF/yr—has been allocated in groundwater and surface water rights. Most of this water (about 60 percent) is for commercial-industrial uses, and most use occurs within the Goldsborough Sub-Basin. Residential uses comprises about 25 percent of allocations; *however, this estimate does not consider exempt wells.*

Use	Surface Water		Groundwater		Both	
	AF	%	AF	%	AF	%
Municipal	504	1.7	4034	11.0	4538	7.0
Irrigation	5328	17.7	5363	13.7	10691	15.5
Domestic	579	1.9	9697	24.8	10276	14.9
Commercial-Industrial	22236	74.0	19415	49.7	41651	60.3
Other	1417	4.7	271	0.7	1688	2.4
Total	30064	100.0	38780	100.0	68844	100.0

Of this total amount, about 30,000 AF/yr is from surface water. The remainder—nearly 39,000 AF/yr—has been allocated from groundwater. The large discrepancy between allocations and actual use suggests that many permit and certificate holders are not exercising their rights to their fullest.

Two other types of water rights, instream flows and tribal rights, are also important to watershed planning. Instream flows are discussed on page 7. Tribal water rights are reserved whenever federal lands are set aside for Indian reservations. They also support treaty fishing rights. Each water right has a priority date that corresponds at least to the date the reservation was established, if not earlier. These rights precede all others because the *Medicine Creek Treaty* was signed in 1854.

Related Recommendations

[Monitoring & Data Analysis \(page 7\)](#)

[Sewage Management \(page 8\)](#)

[Stormwater Management \(page 10\)](#)

[Public Education & Outreach \(page 15\)](#)

[Compliance & Enforcement \(page 17\)](#)

Water Quality

The quality of water in many of WRIA 14's streams, lakes, and nearshore areas has been degraded. Five marine areas, including parts of Oakland Bay and Hammersley Inlet, are on the most recent 303(d) list of impaired waters because of high fecal coliform bacteria and/or low stream temperatures. Parts of Oakland Bay and Hammersley Inlet are also closed to shellfish harvesting because of high fecal coliform concentrations. Much of Oakland Bay is conditionally approved.

Likewise, 14 creeks in WRIA 14 have been included on the most recent 303(d) list for fecal coliform, temperature, dissolved oxygen, and/or pH. Water temperatures become elevated in response to a reduction in groundwater inflow to streams, as well as a reduction in shade along stream corridors. Listings and closures have been documented for many years.

The 303(d) list is developed by the state every 2 years to fulfill the requirements specified in Section 303(d) of the 1972 Clean Water Act. Its purpose is to identify polluted waters so we can clean them up.

303(d) Constituent (Category 5 - Impaired)	Creeks
Dissolved Oxygen (3)	Kennedy, Pierre, and Schneider
Fecal Coliform (11)	Burns, Campbell, Goldsborough, Kennedy, Malaney, Perry, Pierre, Schneider, Shelton, Uncle Johns, and Skookum
pH (2)	Burns and Pierre
Temperature (4)	Cranberry, Johns, Mill, and Skookum

Water quality has also degraded some lakes. Island Lake is included on the 303(d) list because of concerns about phosphorous. However, the Category 2 status means that water in this lake is not considered impaired.

Other water quality problems include excessive sediment in streams, which creates unfavorable habitat conditions for salmonids. Sediment originating from erosion along roads and streambanks is carried into streams by stormwater runoff.

Instream Flows

Instream flow rights are established to maintain or safeguard aquatic biota and fish, and to support recreational and other beneficial uses. Minimum instream flows were set on January 23, 1984. Although streamflow data is sparse, it indicates these flow requirements are often unmet. Although the Planning Unit considered how to manage and achieve minimum instream flow values, it made no recommendations on existing administrative flow targets.

Habitat

WRIA 14's streams support two species of salmonids—chum and coho—as well as winter steelhead and coastal cutthroat. These species also use nearshore areas, along with chinook salmon, which have recently been listed under the *Endangered Species Act*. WRIA 14 is also home to many shellfish species. In addition, many of the water quantity and water quality

Related Recommendations

[Habitat \(page 14\)](#)

[Sewage Management \(page 8\)](#)

[Stormwater Management \(page 10\)](#)

[Public Education & Outreach \(page 15\)](#)

issues addressed here have profound implications for fish and shellfish habitat. The limiting factors analysis conducted for WRIA 14 indicates that salmonid habitat has been degraded by land use practices associated with forest management, removal of large woody debris (LWD), development, and agriculture⁴. Other issues include culvert problems, nearshore habitat and riparian degradation, loss of channel complexity, and high sedimentation levels.

Recommendations



Through a collaborative process, the Planning Unit has identified key issues in the areas of water quantity, water quality, and habitat. Options were then researched for addressing these issues through policy and management-based actions. The recommendations presented below are the result of a lengthy process that entailed considering a wide range of options. The Planning Unit developed these recommendations based on their overall benefit to watershed processes and their feasibility of implementation.



Monitoring & Data Analysis

The Planning Unit finds that additional information is necessary to effectively manage water resources in WRIA 14. Ongoing gathering of water quality and quantity data will achieve several objectives. First, it will help us determine where and how to accommodate future growth while achieving and sustaining instream flows. Second, it will improve our understanding of the hydrogeology of each sub-basin.

Key Issues

Current, reliable, long-term data is largely unavailable in WRIA 14 for parameters related to water quality and water quantity. Important water quality parameters include fecal coliform, stream temperatures, and nutrients such as nitrogen. Many entities in WRIA 14 currently monitor surface and marine water quality—Ecology, the Squaxin Island Tribe, and Mason and Thurston Counties, among others. Some of this monitoring is part of efforts to set Total Maximum Daily Loads (TMDLs) for some streams and nearshore areas that fail to meet 303(d) standards⁵. In addition, the first tier of monitoring specified in the *WRIA 14 Surface Water Quality Moni-*

⁴ Kuttel, 2002.

⁵ Ahmed and Sullivan, 2004a, 2004b; Ahmed, 2004

toring Strategy has already been completed⁶. Other monitoring efforts include the WDOH's Shellfish Programs, which ensure that commercial shellfish growing areas meet federal marine water-quality standards. However, no single database currently exists where planners can access monitoring data from a variety of sources. Likewise, we know little about groundwater-quality conditions because no comprehensive analysis has been conducted to date.

Important water-quantity parameters include precipitation, evapotranspiration, aquifer recharge and storage capacity, and use (both current and future). An especially pressing data need is the lack of long-term streamflow data for WRIA 14 creeks.

Recommendations

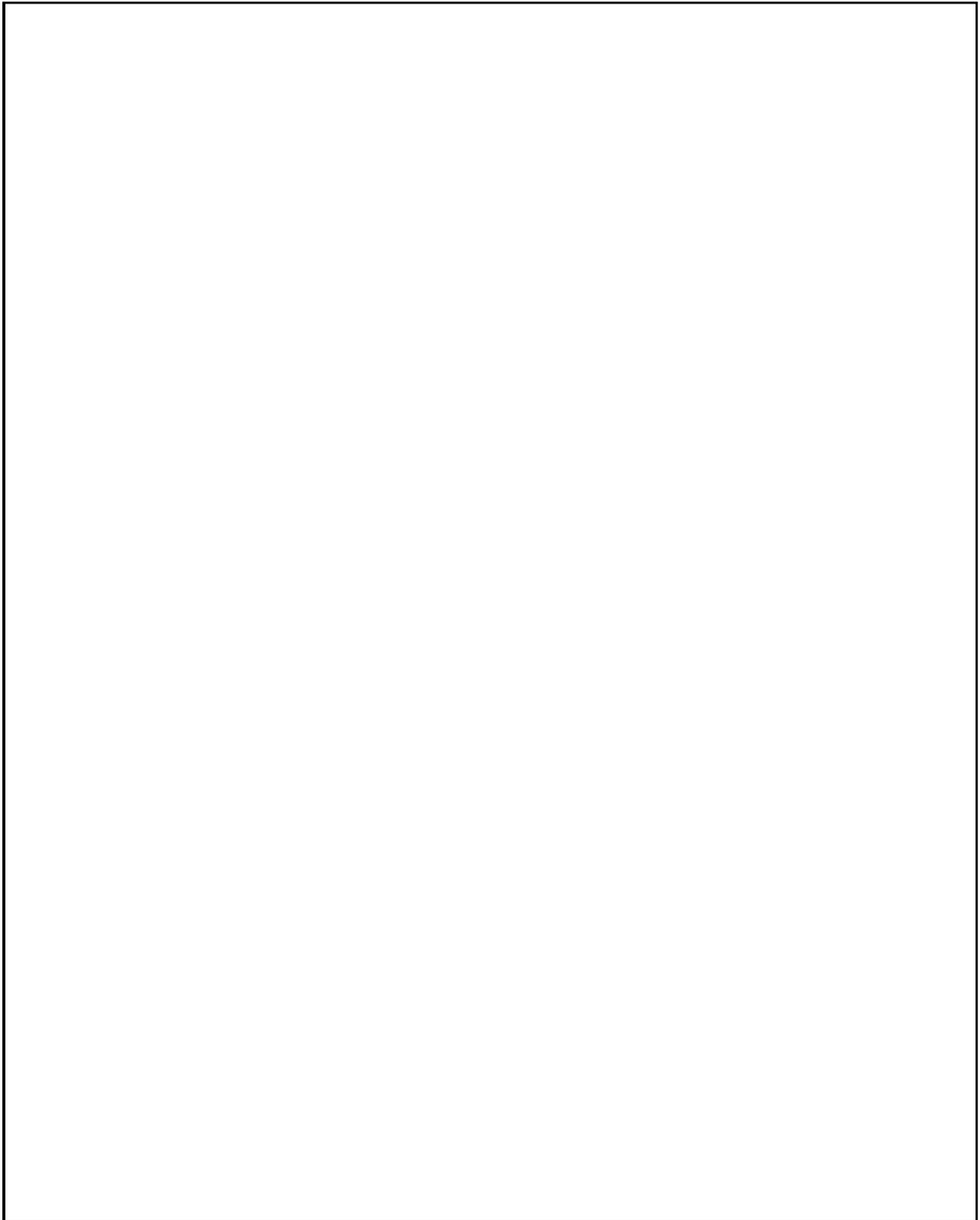
- ◆ The Planning Unit recommends that Mason County, Thurston County, and the State of Washington (Departments of Health and Ecology) support a comprehensive water-resource monitoring program for WRIA 14. This program will address data gaps in the areas of water quality and water quantity. In developing this monitoring program, the Planning Unit faces several important tasks:
 - ▶ Prioritizing sub-basins
 - ▶ Suggesting a schedule for investigation
 - ▶ Identifying lead agencies
 - ▶ Identifying potential funding sources, including Phase IV money

To facilitate the first task, the program should be organized by sub-basin—that is, the drainage areas for major creeks⁷ and for Pickering Passage / Case Inlet and Chapman Cove (see Figure 1, next page).

⁶ *Envirovision, 2003; Kenny, 2004*

⁷ *Creeks should include, but not be limited to, Sherwood, Malaney, Deer, Cranberry, Johns, Goldsborough, Mill, Skookum, Kennedy, Schneider, and Perry.*

Figure 1: Sub-Basins for Water Resource Monitoring (under development)



The program should also integrate an adaptive-management approach that incorporates emerging technologies and new information. Specific data-gathering and analysis tasks should include:

- ▶ Implementing the *WRIA 14 Surface Water Quality Monitoring Strategy*.⁸
- ▶ Developing science-based sub-basin plans that specify management strategies for protecting and restoring natural flow regimes.
- ▶ Developing a detailed current and historical water budget that accounts for precipitation, evapotranspiration, groundwater recharge, aquifer storage, creek flows, nearshore discharge, pumping, and surface-water diversions. In addition, historic trends should be identified in these parameters. Note that streamflow analyses should account for both the runoff component, which originates from precipitation, and the base-flow, which is fed by groundwater.
- ▶ Assessing the impact of changes in streamflow on physical habitat and channel geomorphology; use information on historical climate trends, hydrostratigraphy, fish production, land use, and forestry practices to expand the analysis.



Sewage Management

The Planning Unit finds that the quality of water WRIA 14's creeks, lakes, aquifers, and nearshore areas will continue to degrade unless appropriate actions are taken to control sources of pollution. The Planning Unit believes that inappropriately sited, designed, or maintained septic systems contribute to this problem, along with sewage outfalls from wastewater treatment plants.

Key Issues

Much of WRIA 14's large rural population uses septic systems to manage its wastewater. These systems are designed to treat and remove bacteria, viruses, chemicals, and other contaminants on site. However, failing septic systems can contribute pathogens and fecal coliform to WRIA 14's marine and fresh waters⁹; even properly operating systems can contribute nutrients and pharmaceuticals. The input of excessive nutrients into these waters can accelerate algal blooms that in turn can cause detrimental fluctuations in pH and DO. Compounding the water quality problems are inap-

Fecal coliform originate as organisms in the intestinal tract of warm-blooded animals (and humans). This group of bacteria has long been an indicator of contamination.

Pathogens are the bacteria, protozoa, and viruses that make people sick.

⁸ *Envirovison, 2003.*

⁹ *Bauman and Schafer, 1985; Canter and Knox, 1985; Kimsey, 1992; Satak, 1998*

appropriate land development practices, which often disturb the natural processes that would help prevent nutrient and pathogen pollution. Development has both reduced the amount of riparian vegetation and increased the amount of impervious surfaces, thereby increasing runoff. Consequently, contaminant-laden groundwater and runoff may reach streams and, ultimately, marine waters where shellfish grow.

Other sources of pathogens in WRIA 14 include waste from wildlife, livestock and pets, along with poor stormwater controls. In addition, several wastewater treatment plants currently discharge treated effluent directly into marine water bodies via outfall pipes. The largest of these systems belongs to the City of Shelton, which discharges into Oakland Bay. Harstine Island, Rustlewood, and Carlyon Beach also have wastewater treatment plants that discharge into marine waters. The North Bay / Allyn treatment system relies on upland discharge.

Mason and Thurston Counties are already providing many important services related to managing these sources. For example, the County has expanded its septic operations and maintenance (O&M) program and conducts regular surveys of on-site sewage systems in threatened, sensitive or problem areas. It also offers ongoing public education. The Planning Unit supports continuing these efforts. Many other entities in WRIA 14 are addressing on-site sewage issues. The Planning Unit supports these efforts and encourages entities to continue working cooperatively to develop coordinated strategies and actions. Thurston County's O&M program for the Henderson sub-basin, adopted in November 2005, is one such program for determining the risk level of septic systems.

Recommendations

- ◆ The Planning Unit recommends that Mason and Thurston Counties adopt a risk-based management approach to septic systems, where systems in higher-risk areas require a higher level of management. A phased approach should be used in implementing this recommendation.

Priority	Septic systems that could potentially impact ...
1	... areas included on WDOH's list of threatened commercial shellfish areas.
2	... approved commercial shellfish beds.
3	... areas included on WDOH's list of prohibited commercial shellfish areas.
4	... all other marine and freshwater areas in the watershed.

- ◆ The Planning Unit recommends that...
 - ▶ ... WDOH review existing guidelines and regulations. WDOH should recommend updates to the Washington State Board of Health if needed to address nutrient issues or to incorporate new findings of relevant studies.
 - ▶ ... Mason and Thurston Counties track all septic system waivers and variances and publish this list in an easily accessible format on their websites.
 - ▶ ... all new treatment plants use upland discharge and that existing treatment plants develop a strategy to shift marine discharge to upland discharge, where feasible.
 - ▶ ... Ecology encourage or require denitrification of sewage discharged via marine sewage outfalls.



Stormwater Management

The Planning Unit finds that stormwater is a significant source of water quality problems and habitat degradation¹⁰.

Key Issues

Stormwater carries a range of contaminants—oil, petroleum compounds from roads, and other and fine sediment into fresh and marine water bodies. In the more urbanized parts of WRIA 14, major storm events sometimes tax the capacity of stormwater drainage systems, causing storm sewers and manholes to overflow. The resulting runoff flows into streams and eventually marine water bodies. Runoff also originates from rural parts of the watershed and carries contaminants into downgradient water bodies via streams and subsurface flow. An excess of fine sediment has been identified as a habitat limiting factor for several WRIA 14 streams, including Johns Creek¹¹. Although this sediment originates mostly from eroding streambanks, other contributors include runoff from logging roads, highways, and development.

Recommendations

In many cases, the most effective and economical method to manage stormwater is to allow natural infiltration and recharge by maintaining adequate pervious surfaces and vegetative cover¹². In areas where this is

¹⁰ Satak, 1998

¹¹ Kuttel, 2002

¹² Booth, 2000

not feasible, stormwater runoff should be carefully managed to minimize its impacts to water quality and habitat.

- ◆ The Planning Unit recommends that Mason and Thurston Counties and the City of Shelton develop a comprehensive stormwater program by adopting the current *Western Washington Stormwater Manual* or its equivalent. The Stormwater Program should include:
 - ▶ Stormwater controls for all 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 (LID)
 - ▶ Public education and outreach on stormwater

- ◆ The Planning Unit also recommends that Mason and Thurston Counties and the City of Shelton...
 - ▶ ... consider stormwater impacts and infrastructure improvements (particularly retrofitting aging stormwater systems) a very high priority when they are prioritizing projects for limited capital funds.
 - ▶ ... encourage private landowners to limit the amount of effective impervious surface on their properties and maintain native cover.
 - ▶ ... consider developing ordinances to set minimum standards for limiting effective impervious surfaces.

Conservation



The Planning Unit finds that there are multiple benefits when all users in WRIA 14 conserve water. Many streams in the basin are not meeting in-stream flows and are thus closed to further withdrawals. Conservation may be the optimal method to provide water for growth in the watershed without impacting stream flows.

Key Issues

A number of factors affect the adequacy of future water supplies in WRIA 14—the aquifer system, climate trends, withdrawals from regulated and unregulated wells, and limited conveyance infrastructure, among others. Despite these limitations, the population of WRIA 14 is projected to grow by 30 percent over the next 10 years. As a result, water demands will also

grow—by about 1,560 AF/yr, based on a daily consumption rate of 120 gallons per person and a population increase of 11,600. Conservation should be the first strategy considered to provide water for growth.

Recommendations

- ◆ The Planning Unit recommends that Mason County, Thurston County, and the City of Shelton coordinate closely with the Planning Unit to develop and implement comprehensive water conservation plans for all water users. These plans should be consistent with *WAC 246-290-100* and *WAC 246-291-140*. They should also attempt to maximize conservation in the watershed in order to minimize the need for new water withdrawals. In preparing the plans, Counties should consider all conservation options and not be limited by minimum state standards. The conservation plans should include:

- ▶ Incentives to retrofit existing homes with water-saving devices
- ▶ Incentives or requirements for developers to leave natural vegetation in place in new developments
- ▶ Standards for infrastructure in new developments to allow for water reuse
- ▶ Measures to identify and correct leakage
- ▶ Requirements for new developments to implement conservation measures
- ▶ Tiered-rate structures for water use to encourage conservation
- ▶ Low impact development requirements
- ▶ Financial incentives for water conservation

These plans should also specify conservation measures that should be implemented before a municipality can exercise inchoate rights in closed basins.

- ◆ The Planning Unit also recommends that Mason and Thurston Counties use water quantity and conservation information to develop or revise coordinated water system plans.
- ◆ In addition, the Planning Unit recommends that Ecology or another state agency prepare a model conservation plan for consideration by watershed Planning Units. The plan should identify a wide range of potential strategies, summarize knowledge about how much water can be conserved, and estimate costs for implementation.

- Finally, the Planning Unit recommends that Ecology develop a definition of *di minimus* use of captured rainwater and request that the legislature allow such uses without a permit.



Habitat

The Planning Unit finds that many strong efforts are underway in WRIA 14 to restore and protect aquatic habitat.

Key Issues

A number of factors affect the quality of habitat for salmonids, shellfish, and forage fish in WRIA 14. For optimum survival, salmonids require adequate streamflows, good-quality water, ample gravels that are relatively free of fine sediment, a functional riparian zone, and structures such as large woody debris, riffles, and pools. They also require cool stream temperatures. Some salmonids use WRIA 14's nearshore areas for rearing, feeding, and migration. To transition successfully to the marine environment, these fish require healthy, productive nearshore and estuarine habitats with high salt marshes, eelgrass, and shallow areas. In many areas, these factors have been compromised because of land use practices.

The marine waters of WRIA 14 have historically supported shellfish production. However, water quality in many marine areas has suffered due to high levels of fecal coliform bacteria. Parts of Shelton Harbor, Oakland Bay, and Hammersley Inlet are included on the most recent 303(d) list, which was finalized in 2005, because of fecal coliform. Other areas (Case Inlet and Squaxin, Peale, Pickering Passages) are listed for low dissolved oxygen. Furthermore, WDOH has prohibited, conditionally approved, or restricted shellfish harvesting in much of Oakland Bay and Hammersley Inlets.

Recommendations

The Planning Unit supports ongoing habitat restoration, preservation and recovery activities funded through the Salmon Recovery Funding Board, the National Fish & Wildlife Foundation's Community Salmon Fund, and other sources. These activities include:

- ▶ The Lead Entity process
- ▶ The South Sound Salmon Sustainability Initiative
- ▶ The Shared Strategy for Puget Sound
- ▶ The Puget Sound Conservation and Recovery Plan
- ▶ The Puget Sound Nearshore Ecosystem Restoration Project (PSNERP)
- ▶ Co-manager initiatives (WDFW and Tribes)

Furthermore, the Planning Unit suggests that all entities working on watershed issues use technical resources to guide restoration / preservation activities in WRIA 14. Examples of such resources include technical documents, models, and guidelines:

Type	Resources
Documents	<p><i>Salmonid Habitat Limiting Factors, Water Resource Inventory Area 14</i></p> <p><i>Salmon Habitat Protection and Restoration Plan for Water Resource Inventory Area 14, Kennedy-Goldsborough</i></p> <p><i>Chinook & Bull Trout Recovery Approach for the South Puget Sound Nearshore</i></p> <p>Reports on the nearshore studies</p>
Models	<p>SHIRAZ (a habitat model)</p> <p>Ecosystem Diagnostic and Treatment (“EDT,” an analytical ecosystem model)</p> <p>River history models</p>
Guidelines	<p>WDFW’s aquatic habitat guidelines</p> <p>Integrated streambank protection guidelines</p> <p>Federal stream corridor restoration guidelines</p> <p><i>Design of Road Culverts for Fish Passage</i></p> <p>Stream habitat restoration guidelines</p> <p>Integrated streambank protection guidelines</p>



Public Education & Outreach

The Planning Unit finds that education and outreach is an essential first step in changing our approach to water use and management. Education helps us understand the importance of the issues, the voluntary actions we can take, and the need to enforce water laws to protect our resources.

Key Issues

Many of the recommendations listed in this plan will require residents of WRIA 14 to change their behavior or their thinking. The success of these recommendations, therefore, will depend largely on education efforts. There is also a need for broad public education because, in many cases, residents and landowners are unaware of problems with water quantity and, to some degree, water quality.

Recommendations

- ◆ The Planning Unit recommends that outreach programs should be provided by the local agency or organization best suited to address a particular topic and reach key audiences effectively. Those implementing programs can use a number of methods, including:

- ▶ Volunteer programs (such as Stream Teams or Water Watchers)
- ▶ Mass media
- ▶ Mailings
- ▶ Presentations to specific organizations
- ▶ One-on-one assistance
- ▶ Workshops
- ▶ Outreach at public events

Programs should be designed to:

- ▶ Reach key audiences
- ▶ Ensure that they understand the importance of the issue
- ▶ Provide technical resources to support actions and behavior changes
- ▶ Evaluate effectiveness

- ◆ The Planning Unit recommends that effective education and outreach be consistently provided on the following topics:

Type	Topic
Source control	Septic system operation, maintenance and failure recognition Best management practices for farms (large, small, hobby) Best management practices for pet waste
Landscape management	Landscape management methods that protect water quality and minimize water use The retention and use of native vegetation in the landscape Stewardship practices for riparian areas, wetlands, and lake and marine shorelines Regulations governing development in the vicinity of streams, wetlands, and shorelines (presented as a clear summary for landowners or prospective purchasers) Land management for salmon recovery
Stormwater management	Stormwater management methods that reduce runoff quantity, as well as minimizes contamination of water bodies Low impact development
General	Water conservation methods Protection of groundwater from contamination

- ◆ The Planning Unit recommends that the entities listed below should actively pursue funding. They should also work cooperatively to ensure that audiences receive consistent information and that public education programs minimize overlap between entities and maximize efficiency.
 - ▶ Mason and Thurston Counties
 - ▶ Mason and Thurston Conservation Districts
 - ▶ City of Shelton
 - ▶ Squaxin Island Tribe
 - ▶ WSU Extension
 - ▶ Washington Sea Grant
 - ▶ South Puget Sound Salmon Enhancement Group
 - ▶ Water purveyors



Compliance & Enforcement

The Planning Unit finds that there are many potentially effective laws and regulations in place that govern the management of water.

Key Issues

If people complied fully with existing laws and regulations, many of the problems identified in the watershed plan would be minimized. The Planning Unit believes that increasing compliance through both incentives and enforcement should be a high priority of state and local governments.

Recommendation

- ◆ The Planning Unit recommends that the State, Mason and Thurston Counties, and the City of Shelton give high priority to funding increased compliance and enforcement activities.



Future Planning

The Planning Unit finds that the current WRIA 14 boundaries are not optimal for addressing watershed issues in Hood Canal and Eld Inlet. The Planning Unit also finds that water availability should be considered as part of land use planning activities.

Key Issues

South Shore Sub-Basin. Lands within WRIA 14 drain into one of two marine discrete water bodies: south Puget Sound or Hood Canal. Like much of south Puget Sound, the water in Hood Canal has been degraded.

A variety of measures and studies have been undertaken to address these issues. Water quality cleanup efforts in Hood Canal hinge largely on controlling the pollution sources that originate from land use practices. The efficiency of these efforts could be improved if all the areas that drain into Hood Canal were consolidated. This would mean administering the South Shore Sub-Basin, which borders Hood Canal but lies within WRIA 14, as part of WRIA 16. WRIsAs 14 and 16 have already agreed to include this sub-basin in WRIA 16 under the watershed planning process.

Eld Inlet. Like Hood Canal, Eld Inlet is currently split between two WRIsAs—13 and 14. This water body could be managed more efficiently if it were within a single WRIA.

Planning & Future Water Availability. Future availability is not always considered in land use planning. Although the *Growth Management Act* (GMA) guides planning efforts in Washington State, it does not require governments to consider water availability at a parcel level when determining land use designations. It is important that land use planners consider the information and recommendations provided in watershed plans such as this one. It is also important that planning efforts consider future water demands projected under GMA guidelines for each sub-basin. These demands should be addressed at both the watershed scale and at the local scale, by water purveyors.

Recommendations

- ◆ The Planning Unit recommends that Mason and Thurston Counties and the City of Shelton estimate the anticipated demand for water and then reconcile discrepancies between water demand and availability, using a process consistent with GMA. The water-demand estimates should be based on land use designations, as well as on population projections and allocations in the comprehensive plans.
- ◆ The Planning Unit recommends that the Legislature separate WRIA 14 into two WRIsAs—14A and 14B. The South Shore of Hood Canal (which is included in the WRIA 16 planning process under an agreement between WRIsAs 14 and 16) should be designated “WRIA 14B.” The Planning Unit also recommends that WRIA 14B be administered as part of WRIA 16.
- ◆ The Planning Unit recommends that, in the future, the State consider consolidating all areas that drain into Eld Inlet into the same WRIA.
- ◆ The Planning Unit recommends that Mason and Thurston Counties and the City of Shelton coordinate planning under the GMA with water resource planning.

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