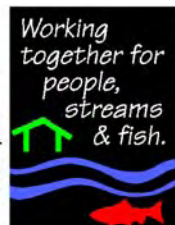
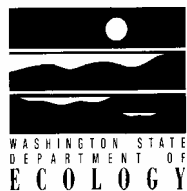


French Creek Watershed Management Plan



December 2004



FRENCH CREEK WATERSHED MANAGEMENT PLAN

Prepared by

French Creek
Watershed Management Committee

December 2004



STATE OF WASHINGTON
DEPARTMENT OF ECOLOGY

Northwest Regional Office • 3190 160th Avenue SE • Bellevue, Washington 98008-5452 • (425) 649-7000

May 23, 2005

French Creek Watershed Management Council
c/o Ms. Janet Carroll
Snohomish County Public Works Department
Surface Water Management Division
2931 Wetmore Ave., Suite 300
Everett, WA 98201

Dear French Creek Watershed Management Council Members:

RE: French Creek Watershed Action Plan – Statement of Approval

The Department of Ecology has conducted a final review of the French Creek Watershed Management Plan, dated December 2004. This version of the document meets the applicable requirements of the law for Local Planning and Management of Nonpoint Source Pollution (chapter 400-12 WAC). The Department of Ecology officially approves the December 2004 version.

With this approval, no changes are required to the final version of the plan. This approval letter will need to be inserted into the front section of the document.

Snohomish County has the responsibility to oversee plan implementation and preparation of annual progress reports. Every five years, they will evaluate the French Creek watershed ranking based on the results of implementation and/or new information, and submit the results to Ecology. In turn, Ecology has the responsibility to conduct an audit of implementation and effectiveness every two years.

Ecology would like to acknowledge the hard work and dedication of both the Management Council and the Snohomish County Surface Water Management staff, especially the effort that Janet Carroll put into the planning process. Her dedication and diligence made an enormous contribution to the completion and quality of the plan.

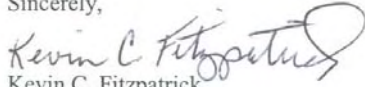
The final plan is comprehensive and well thought out. This plan is an essential tool for the implementation of nonpoint pollution control programs that seek to protect and preserve the water quality in the French Creek watershed. Ecology looks forward to the implementation of this nonpoint action plan and the subsequent water quality improvements that will occur.



Page 2 of 2

If you have any questions about the plan review and approval process please contact Sarah Davenport-Smith at (425)-649-7263.

Sincerely,



Kevin C. Fitzpatrick
Water Quality Section Manager
Northwest Regional Office

KCF:RS:sds

cc: Brad Ack, Director, Puget Sound Water Quality Action Team
Joan Lee, Snohomish County Surface Water Management
Emily Morris, Department of Ecology
Geoff Tallent, Department of Ecology
Ralph Svrjcek, Department of Ecology
Sarah Davenport-Smith, Department of Ecology

PROJECT MANAGER

Janet Carroll
Snohomish County Public Works Department
Surface Water Management Division
2731 Wetmore Avenue, Suite 300
Everett WA 98201
Phone: (425) 388-3464, ext. 4572
Fax: (425) 388-6455
Email: jrcarroll@co.snohomish.wa.us

ACKNOWLEDGMENTS

SNOHOMISH COUNTY EXECUTIVE
Aaron Reardon

SNOHOMISH COUNTY COUNCIL
John Koster, Council District 1
Kirke Sievers, Council District 2
Gary Nelson, Council District 3
Dave Gossett, Council District 4
Jeff Sax, Council District 5

DEPARTMENT OF PUBLIC WORKS
Peter Hahn, Director

SURFACE WATER MANAGEMENT DIVISION
Joan Lee, P.E., Director

FRENCH CREEK WATERSHED MANAGEMENT COMMITTEE
Tony Balk, Monroe City Council
Janet Carroll, Snohomish County Public Works Department
Mike Chamblin, Washington Department of Fish and Wildlife
Dave Demarest, local businessman
Joan Drinkwin, Puget Sound Water Quality Action Team
Robert Fairfax, watershed resident
Robert Heirman, Snohomish County Sportsman's Association
Bobbi Lindemulder, Snohomish Conservation District
Kirk Nelson, The Tulalip Tribes
Mark Meckling, Former Member Monroe City Council

PAST COMMITTEE MEMBERS
Manfred Bartz, watershed resident
Jim Hagar, Former Member Monroe City Council
Andy Loch, The Tulalip Tribes
Charlie Noggle, watershed resident
Mike Noll, watershed resident
Lois Ruskell, Snohomish Conservation District

Nancy Strain, watershed resident

Clark Vellema, watershed resident

FRENCH CREEK TECHNICAL ADVISORY COMMITTEE

Robert Aldrich, Snohomish County Public Works

Kirk Bailey, Snohomish County Public Works

Ryan Bartelheimer, Snohomish Conservation District

Mike Chamblin, Washington Department of Fish and Wildlife

Paul Marczan, Snohomish County Public Works

Kurt Nelson, The Tulalip Tribes Natural Resources Department

Michael Purser, Snohomish County Public Works Department

Kathy Thornburgh, Snohomish County Public Works Department

ADDITIONAL TECHNICAL SUPPORT

Michelle Allen, Snohomish Health District

Jeff Hutchison, Snohomish Health District

Steven Goldstein, Snohomish County Solid Waste Management Division

Karen Kerwin, Snohomish County Public Works Department

Maureen Meehan, Snohomish County Public Works Department

Jim Cahill, Washington State Department of Natural Resources

Kathryn Sobicinsky, Snohomish County Public Works Department

Carolyn Sanden, Snohomish County Planning and Development Services

Ned Zaugg, WSU Cooperative Extension

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EXECUTIVE SUMMARY



Golf Course Creek at Westwick Road

EXECUTIVE SUMMARY

INTRODUCTION

The French Creek Watershed Management Committee (WMC) and Snohomish County Public Works, Surface Water Management Division (SWM) prepared the French Creek Watershed Management Plan. The plan is funded in part by a Centennial Clean Water Fund grant administered by the Washington State Department of Ecology. Local funding for the plan was provided through Watershed Management Area fees collected for the Snohomish watershed by SWM.

The French Creek watershed drains an area of about 28 square miles in south central Snohomish County and is about seven miles long and six miles wide. The watershed is located north and east of the Skykomish River near its confluence with the Snohomish River. French Creek empties into the Snohomish River just south of the city of Snohomish at river mile 14.3. Approximately 12 percent of the watershed is in Monroe; 88 percent is in unincorporated Snohomish County.

The watershed contains about 115 miles of streams and other drainageways that support populations of coho salmon, searun cutthroat trout, and steelhead. A portion of the French Creek system is within the presumed range of bull trout, a species listed as threatened under the Endangered Species Act (ESA). The French Creek watershed once included a 4000-acre scrub-shrub wetland in the Snohomish River floodplain. The wetland, which has been drained for agricultural and urban use, was a rearing area for millions of juvenile coho and Chinook salmon. Chinook salmon are also listed as threatened under ESA.

Through development of this watershed plan, the watershed committee has reached the following major conclusions:

1. Salmonid productivity in the watershed is already low and is likely to decline even further. The projected loss of all but 1100 acres of forest and creation of an average of 14.7 percent total impervious surface at full buildout in and of itself will result in streams that are unlikely to support salmon recovery.
2. Water quality in French Creek in the floodplain is lethal to salmon.
3. Without an improvement in water quality in the floodplain, the watershed will continue to exceed State water quality standards and water quality is likely to degrade further as upper watershed land use changes.
4. The French Creek watershed has attracted more horse and other small farms than most rural areas. For every farm that addresses water quality problems created by livestock waste and poor pasture management, there are many more that do not. The number of animals grows and the water quality problems increase.
5. Current planning for development in the watershed's rural areas has been designed with higher densities in the most sensitive location, the headwaters of French Creek. A Rural 5 Basic designation allows overall site densities of 1 dwelling unit/2.3 acres or higher in this area. This is twice as much as other rural watershed areas.

6. The current level of regulatory enforcement by Snohomish County and Monroe, Snohomish Health District, and state agencies of violations of building, water quality, erosion control, stormwater, dumping, critical areas, hydraulic permits, or forest practice codes is inadequate to protect water quality and water resources. Aquatic habitat loss and degradation continues despite myriad laws intended to protect them.

IMPACTS TO THE WATERSHED'S AQUATIC RESOURCES

Aquatic Habitat

Forests, streams, wetlands, and riparian corridors provide habitat for fish and wildlife in and along French Creek and its tributaries. Coho salmon is the most common anadromous species that spawn in these streams. Resident cutthroat trout is an abundant stream resident all year long. These fish depend on pools and riffles in the streams and off-channel wetlands during their life cycle. In the French Creek watershed forests are diminishing as lawns, pastures and buildings take their place.

Stormwater runoff is water from precipitation that enters streams during storms. The amount, timing, and velocity of runoff are changed as impervious surfaces are constructed, preventing water from infiltrating into the ground. Impacts to watershed hydrology include flooding, streambank erosion, stream channel downcutting, and loss of habitat for fish and wildlife. These problems are significant for the watershed's people and salmon, and they will increase as future developments reduce open space and create more impervious surfaces. Projected increases in impervious surface in all but one watershed subbasin are very likely to make watershed streams unhealthy for salmon.

Removal of streamside vegetation has occurred throughout the watershed. Shrubs and grasses dominate almost half of the riparian area. Only 15 percent of watershed streams have buffers 100 feet or greater that are required today along many stream reaches. Even where regulated buffers have been left along the streams, vegetation is removed to create lawns and openings to streams. Many farmers clear their land to the stream's edge. The result is streambank erosion and fish and wildlife habitat degradation.

Wetlands have been drained and filled or have been degraded by livestock grazing, human trampling and garbage dumping. Wetlands play a very important role in this watershed. They improve water quality, allow for aquifer recharge, provide fish and wildlife habitat, store water, and serve as a source of water for streams. Over 66 percent of the watershed's wetlands are less than an acre in size. These small wetlands are prime candidates for filling, as their importance in providing water quality treatment in the most needed areas is largely ignored.

Water Quality

Clean water is essential to watershed recreation and aquatic habitat. Many children play in the streams. Currently most streams are contaminated, and children are at risk. Pollution in watershed streams is preventing salmon from moving in and out of French Creek. High temperatures and low dissolved oxygen in stream water in lower French Creek are barriers for salmon migrating to and from the Snohomish River.

In rural and agricultural areas, water quality problems include high levels of fecal coliform bacteria and nutrients from livestock waste and failed onsite sewage systems. Water quality testing has found high bacteria and nutrient levels in almost all watershed streams. Bacteria and nutrient levels are highest in floodplain streams. The floodplain streams also have low dissolved oxygen and high temperatures. Residential runoff collects chemicals from fertilizers, herbicides, pesticides, fungicides, petroleum, detergents, and heavy metals and discharges them into stream water. These pollutants can be toxic to aquatic animals and harmful to humans.

One of the most visible and destructive types of pollution affecting watershed salmon habitat and aquatic animals is excess sediment. Sediment fills in spawning gravel, smothers salmon eggs, and can kill young salmon if their gills become clogged. Stream channels slowly become filled with sediment providing a substrate for vegetation to grow and causing flooding and habitat destruction. The major sediment source occurring today is from land clearing and exposing and moving of earth for all types of development related activities. In the winter, heavy rains carry the sediment to the stream. Sediment is filling floodplain streams and ditches causing flooding and necessitating ditch maintenance, a further source of sediment.

Streams along roads and through residential areas are littered with garbage. Streambanks are lined with grass clippings, compost piles, and pet waste that add nutrients and bacteria as rainwater washes them into streams. Members of the Watershed Management Committee cleaned a dumpsite at the French Creek Grange. Among the garbage found was a refrigerator, air conditioner, automobile seats, box springs, dead dogs, engine blocks, tires, great quantities of styrofoam plates and foam rubber, plastic bags of animal feces, piles of metal strips, and asphalt. The day after the cleanup, someone left a washer and dryer.

Water Supply

Drinking water reserves draw on the watershed's water storage capacity. The Lakes Aquifer serves the watershed. Many rural residents depend on the volume and quality of the ground water reserves. Forests and other open lands ensure that water can filter into the ground providing adequate ground water for the watershed. Over the past ten years there has been a one-foot drop in the elevation of the Lakes aquifer. The reason is not currently known.

Flooding and Drainage Problems

Rising river water causes flooding to occur at fairly regular intervals in the floodplain. The French Slough Flood Control District dike, which holds most flood water out, is designed to overtop and allow a certain amount of flood water in, however, the dike has broken several times resulting in flooding on farms and portions of Route 2 and the Snohomish-Monroe Road. In addition, winters with heavy rainfall, like 1996, cause stream flooding. Flooding that year washed out culverts and caused road sloughing in the watershed. Floodwaters carry all the pollutants in their path to rivers and eventually to Puget Sound.

Localized drainage problems result in road and property flooding. The primary causes of drainage problems are loss of wetlands and their storage function; nonexistent drainage systems or systems in need of repair, replacement or upgrading; increased stormwater runoff; and beaver dams. While drainage problems are fairly minor in this watershed, with the residential densities planned for the future drainage problems will increase. Typically drainage problems cause erosion providing a source of sediment to drainageways.

MANAGEMENT RECOMMENDATIONS

The management recommendations in this watershed plan were selected because they are most likely to maintain fish and wildlife habitat, protect water quality, and prevent flooding and drainage problems. These are the water resource issues of most concern to watershed residents.

Enhancing Water Resources

The main strategy to prevent streams, wetlands, and ground water from degradation is by retaining forest and wetlands and improving the quality and width of riparian corridors. These are the watershed components biologists have determined make for a healthy stream system.

Controlling Stormwater Runoff

Controlling stormwater runoff is a major watershed concern. The best way to prevent the increase in stormwater runoff is to maintain watershed forests and wetlands, to design development using low impact techniques, and to limit the creation of impervious surfaces. This plan recommends preserving forests and wetlands in headwater areas by acquisition, easements, and considering changing the Rural 5 Basic designation at the headwaters to the lower density Rural 5 designation. A regulated impervious limit of five to ten percent is suggested for each subbasin. The plan encourages code changes or incentives to reduce impervious surfaces. The plan also recommends that consideration be given to codification of the updated version of Ecology's stormwater manual as soon as possible. The plan calls for monitoring stormwater facilities to determine if they are meeting standards.

Reducing Nonpoint Pollution

There are several recommendations designed to reduce nonpoint pollution from a variety of sources. Reduction in sediment would be obtained through a proposal to have clearing ordinances and dry season limitations on clearing and grading activities for new development. The plan also recommends ways, including training programs, to ensure that appropriate erosion control techniques are used for all types of construction activities.

Reduction of nutrients and fecal coliform bacteria in floodplain stream water is important. The watershed plan suggests that a tide gate be placed in the dike to reconnect the river and French Creek, not only to improve water quality, but to also allow salmon access to French Creek at all times of the year. A campaign to educate residents and businesses on their pollutant contributions is proposed. Maintaining wetlands and buffers that provide water quality functions is important as well to meet water quality objectives.

Preventing Drainage and Flooding Problems

Drainage and flooding issues throughout the watershed are addressed by defining methods to decrease impervious surface and protect forested areas. Proper maintenance of detention, retention, and water quality facilities insures that they function as designed to slow and reduce stormwater runoff and clean the water. The plan calls for actions that ensure routine maintenance procedures by all jurisdictions and individuals.

Enforcing Existing Regulations

Most water resource violations are addressed by the various agencies through “technical assistance and referrals,” without strong enforcement efforts. If ordinances were more strictly enforced, many of the watershed problems could be avoided. This problem has been identified by other watershed plans in Kitsap and Island counties and in WRIA 8, as part of a need to improve water quality and salmon habitat. For now stream water does not meet water quality standards, livestock waste runs off into streams, onsite sewage systems fail and are not corrected, and erosion occurs in the winter. The watershed plan asks that proactive measures be taken to seek out violations, that the hearing process be shortened, and that fines get collected when damage is documented.

IMPLEMENTATION

Agencies, jurisdictions, and groups that will implement individual plan actions, the implementation schedule, and estimated costs are included in the implementation section of this document (Tables 4 and 5, pages 185 and 190). The schedule and cost estimates are preliminary and are included as a planning tool to assist in budgeting.

CONCLUSION

Watershed residents responded to a survey asking which watershed attributes were essential to maintain. They wanted to preserve their quality of life and the fish and wildlife habitat that are important to them, through maintaining forests, wetlands, and riparian areas. These are the same features that biologists have found would maintain a healthy stream system and watershed. Determining how to reverse the degradation trend was a challenge for the WMC, since an assessment of future land use indicates that all but 11 percent of the watershed’s forests will be removed. Wetlands are inevitably mitigated, and studies conducted by King County have found that almost all wetland mitigation projects fail. Riparian buffers continually are diminished; even regulated buffers do not provide full function for all species.

The watershed committee has recommended solutions that would change the way the watershed is developed and would improve the health of the watershed as directed by the watershed citizens. However, each and every watershed resident contributes to these problems. It is up to them to see that individual problems they cause are addressed, and ensure that Snohomish County and Monroe and other agencies with responsibilities in this watershed implement the plan’s recommendations.

The Watershed Plan



Joan Drinkwin, Janet Carroll, Mike Knoll,
Dave Demarest, and Nancy Strain
Cleaning Up at French Creek Grange

THE WATERSHED PLAN

DOCUMENT PREPARATION AND ORGANIZATION

The French Creek Watershed Management Plan presents a program to control nonpoint pollution, protect water resources, and address flooding and drainage problems. This plan has been developed by the French Creek Watershed Management Committee (WMC), which consists of watershed residents, representatives of watershed businesses, and agencies having jurisdiction in the watershed.

The plan has six sections. Section 1 covers the plan, its organization, and the watershed planning process. The planning process describes the formation of the WMC and the committee's work in determining the problems and management strategies, as well as the public involvement efforts conducted in the watershed.

Section 2 introduces the goals and objectives developed by the committee for the plan. Section 3 summarizes the watershed's biological and physical characteristics. The summary was condensed from the French Creek Watershed Characterization (*In Technical Supplement to the French Creek Watershed Plan 2001*).

Section 4 defines the problems in the watershed, and Section 5 presents proposed solutions. The final section addresses plan implementation, including implementation strategy, costs, and potential funding sources.

PLANNING PROCESS

Plan Development

This watershed plan was developed in accordance with the Puget Sound Water Quality Management Plan and Nonpoint Rule (WAC 400-12). Development of the plan was funded through a Centennial Clean Water Fund Grant awarded to Snohomish County Surface Water Management (SWM) and administered by the Washington State Department of Ecology (Ecology).

Watershed planning areas are selected for Centennial Clean Water funds on a priority basis. In Snohomish County, the French Creek watershed was ranked third by the county's Watershed Ranking Committee in 1988. (Watershed plans for the top priority Stillaguamish, North Creek, Swamp Creek and Quilceda/Allen watersheds have been completed.)

The WMC first convened in April 1997. The committee was assembled by SWM, the lead agency, and includes representatives of local governments, Snohomish Conservation District, The Tulalip Tribes, citizen organizations, and watershed residents and businesses. Representation on the WMC balances county, tribal, and city representatives with individuals representing environmental, agricultural, and development interests. A technical advisory committee (TAC) was also established. The TAC's job was to conduct research, review technical documents, and provide advice and information to the WMC.

as requested. The names of WMC and TAC members appear under “Acknowledgments.” Comprehensive watershed information was gathered to provide the WMC with as much information as possible about water pollution and water resource problems. Sources for this information included water quality reports prepared by SWM and The Tulalip Tribes; fish spawning data from Washington Department of Fish and Wildlife; historical information from the Snohomish Conservation District; ground water reports, geologic maps, and watershed well logs; Snohomish County wetland and stream inventory data; Snohomish County watershed plans; comprehensive plans for all jurisdictions; information on rare plants and animals from state agencies, and drainage complaints compiled by SWM. From these sources, a watershed characterization was prepared to present an initial analysis of the watershed and its problems (French Creek Watershed Characterization *In* Technical Supplement to the French Creek Watershed Plan 2001)

It became apparent during preparation of the watershed characterization that additional studies were needed for plan development. Studies were conducted to fill in data gaps as follows: targeted water quality monitoring, stream flow modeling, coho limiting factors study, geology study, wetland inventory, riparian assessment, and a livestock survey. Reports on these studies are included in the Technical Supplement to the French Creek Watershed Plan (2001). In addition, the consulting firm, Otak, conducted an engineering study under a contract with Snohomish County Surface Water Management’s capital group to assess fish blockages, infrastructure, flooding problems, and floodplain water quality and habitat issues.

Development of Management Recommendations

The WMC developed a list of management recommendations to address each watershed problem. These recommendations were given to technical committees consisting of TAC members and other experts in various technical disciplines to choose the best management recommendations for the watershed and to add recommendations if needed. The WMC then decided through consensus which of the recommendations to include in the plan.

Public Involvement

Early in the planning process, the WMC developed a public involvement program for the watershed. The program goals were as follows:

- To inform the public about the watershed planning process
- To identify citizens’ watershed concerns
- To provide public learning opportunities about water resource issues
- To develop a constituency of support for the planning process and plan

To meet these goals, the WMC participated in and organized a number of events and activities. Following are the highlights:

- Three newsletters were sent out to watershed residents informing them about the watershed planning process, asking them to identify problems and solutions to problems, and asking interested residents to review the plan.

- A Watershed Keepers class was held to provide educational information on watershed issues.
- A Stream Habitat Enhancement and Fish Blockage project used volunteers to plant streamside vegetation on three days and to do maintenance and monitoring. A neighborhood newsletter was distributed telling neighbors about the project and asking for their participation.
- Watershed Keepers mugs, French Creek watershed buttons, and a thank you note were personally distributed to individuals responding to a watershed survey.
- A watershed booth was set up at the Snohomish County fair in conjunction with the Snohomish Conservation District.
- Salmon Watchers classes were held in the watershed to enlist residents to count migrating salmon.
- A Watershed Tour was given to the watershed management committee and other residents.
- The watershed management committee conducted a streambank cleanup at the French Creek Grange.
- A presentation was given to the Monroe City Council on plan development.
- Articles were published in local newspapers to inform residents about watershed activities and projects.
- Thirty watershed boundary and stream signs were placed in the watershed.

Goals and Objectives



Children At Play Along French Creek

GOALS AND OBJECTIVES

HABITAT

Goal: Preserve and enhance streams, stream corridors, wetlands, lakes and other habitat for fish and wildlife.

Objectives:

- Protect and restore wetlands and stream corridors that have important plant and aquatic communities and provide fish and wildlife habitat.
- Remove human made barriers to fish migration.
- Support implementation of the French Creek Area Fish and Wildlife Habitat Network
- Work toward restoration of the undeveloped areas of the floodplain to improve historically important habitat.
- Develop baseline habitat data for the entire stream system.

Goal: Provide incentives and strategies for developers, landowners, commercial farm operations and land users to protect streams, wetlands, groundwater and associated habitat.

Objectives:

- Promote using effective tax incentives to protect natural areas.
- Support and organize forums that promote and explain economically beneficial ways to protect watershed resources.
- Prioritize aquatic habitats, including important wetlands, forests, and riparian areas in need of permanent protection and develop strategies to acquire these areas as public lands or otherwise protect their habitat values.
- Encourage developing alternative technologies that turn livestock waste into products with economic value, and funding sources for implementing best management practices that improve waste management.
- Support the use of low impact development.

WATER QUALITY

Goal: Protect and enhance water quality to meet water quality standards and guidelines in the French Creek watershed for public enjoyment, quality of life and a healthy environment for plants, fish and wildlife.

Objectives:

- Identify point and nonpoint sources of pollution.
- Develop actions to correct pollution problems.
- Identify, enhance, and protect wetlands and riparian areas that provide water quality functions.
- Implement public education and enforcement measures programs to prevent water quality problems.
- Prevent human caused sediment from entering waterways.

- Develop a program to replace failed onsite sewage systems, including outreach and funding options.

Goal: Protect and maintain ground water quality.

Objective:

- Establish a ground water quality monitoring program to evaluate problems.

WATER QUANTITY

Goal: Maintain and/or reduce existing winter peak stream flow and maintain and/or restore summer low flows on French Creek and its tributaries.

Objectives:

- Protect wetlands, riparian corridors, and forested areas that provide water storage functions and help attenuate stormwater flows.
- Enhance and protect all wetlands hydraulically connected to streams.
- Monitor stormwater detention ponds for adequate sizing to keep stream flows at their current levels.
- Promote the use of infiltration facilities in the watershed to provide ground water recharge and decrease extreme fluctuations in stream flow and velocity.
- Identify, maintain, and protect important ground water recharge and discharge areas to maintain base flow.
- Promote methods to maintain impervious surface below ten percent in those sub-basins where current total impervious area is below that level.

Goal: Protect and maintain ground water quantity.

Objective:

- Conduct ground water level monitoring program and a five-year analysis to determine trends.

PUBLIC INFORMATION AND EDUCATION

Goal: Provide and encourage public education in nonpoint pollution, water quality and water quantity, and other water resources issues and develop a stewardship ethic in the watershed.

Objectives:

- Develop watershed education outreach programs for all residents, targeting new residents and streamside landowners.
- Increase public knowledge of existing laws that protect water resources.
- Develop programs and provide education on onsite sewage system maintenance and repair.
- Develop programs and provide education on pasture management and animal waste management for noncommercial farms.
- Involve watershed citizens in watershed restoration and watershed research projects.

Goal: Encourage public participation in decision making on watershed issues.

Objectives:

- Provide training to watershed residents on how important decisions affecting water resources are made and how they can participate in the decision making process.
- Publicize opportunities to participate in public processes involving watershed issues, as well as educational classes and workshops that provide training to residents on the public process.

QUALITY OF LIFE, PUBLIC HEALTH AND SAFETY

Goal: Ensure full protection of natural systems in design of roads, public facilities, and residential and commercial development to enhance quality of life and ensure future economic viability.

Objectives:

- Support zoning and land use regulations and development standards that retain and promote open space, forested habitat, natural stream channels, and minimize impervious surfaces.
- Suggest land use options that do not impair the function, form, connectivity or biological quality of the watershed.
- Place utility crossings, roadways, and other infrastructure to avoid streams and wetlands.
- Promote the use of experimental designs to reduce impervious surface.
- Create environmental guidelines for development that provide detailed criteria and methods for protecting natural systems at the regulatory review level.
- Revise planning documents and regulations to reflect the need to minimize impervious surface, reduce stormwater discharge, and protect natural areas that maintain riparian and wetland connectivity in the watershed.

Goal: Resolve localized flooding and drainage problems to protect property, life, and aquatic habitat for fish and wildlife.

Objectives:

- Identify and prioritize all watershed drainage problems.
- Identify and repair, replace, or upgrade existing stormwater facilities (e.g., detention ponds) that are determined to be inadequate or nonfunctional.
- Improve stormwater facility maintenance procedures for proper functioning of stormwater facilities.

Goal: Resolve public health issues related to high levels of bacteria and nitrates in stream water.

Objectives:

- Identify primary sources of pollution in the watershed and implement best management practices to control these sources.

- Reduce agricultural waste input into lower French Creek system to levels that meet water quality standards and implement improved farming practices throughout the watershed to reduce the loading of nitrogen and fecal coliform bacteria to either ground or surface water.
- Strictly enforce water quality laws.

WATERSHED CHARACTERIZATION



Chain Lake

WATERSHED CHARACTERIZATION

This section summarizes the French Creek Watershed Characterization (Carroll and Thornburgh 1997). That document is reprinted in its entirety in the Technical Supplement to the French Creek Watershed Management Plan (2001).

PHYSICAL AND BIOLOGICAL CHARACTERISTICS

Watershed Location

The French Creek watershed covers an area of approximately 28 square miles in south central Snohomish County and is about seven miles long and six miles wide (figure 1). The watershed is located just north of the Skykomish River near its confluence with the Snohomish River, and French Creek empties into the Snohomish River just south of the city of Snohomish. About 12 percent of the watershed is in Monroe; 88 percent is in unincorporated Snohomish County.

French Creek Stream System

French Creek has five major tributaries: Golf Course, Stables, Spada, Chain Lake, and Cripple creeks. Lords Hill and Dutch Hill also contain small tributaries that drain to French Creek (see figure 1). These streams and their tributaries provide spawning and rearing habitat for salmonids and other fish. French Creek is a tributary that enters the right bank (looking downstream) of the Snohomish River about 14.3 miles upstream from the river's mouth. The mainstem of French Creek begins in wetlands above Meadow Lake at approximately 500 feet elevation and is about 19 miles long.

Land Use

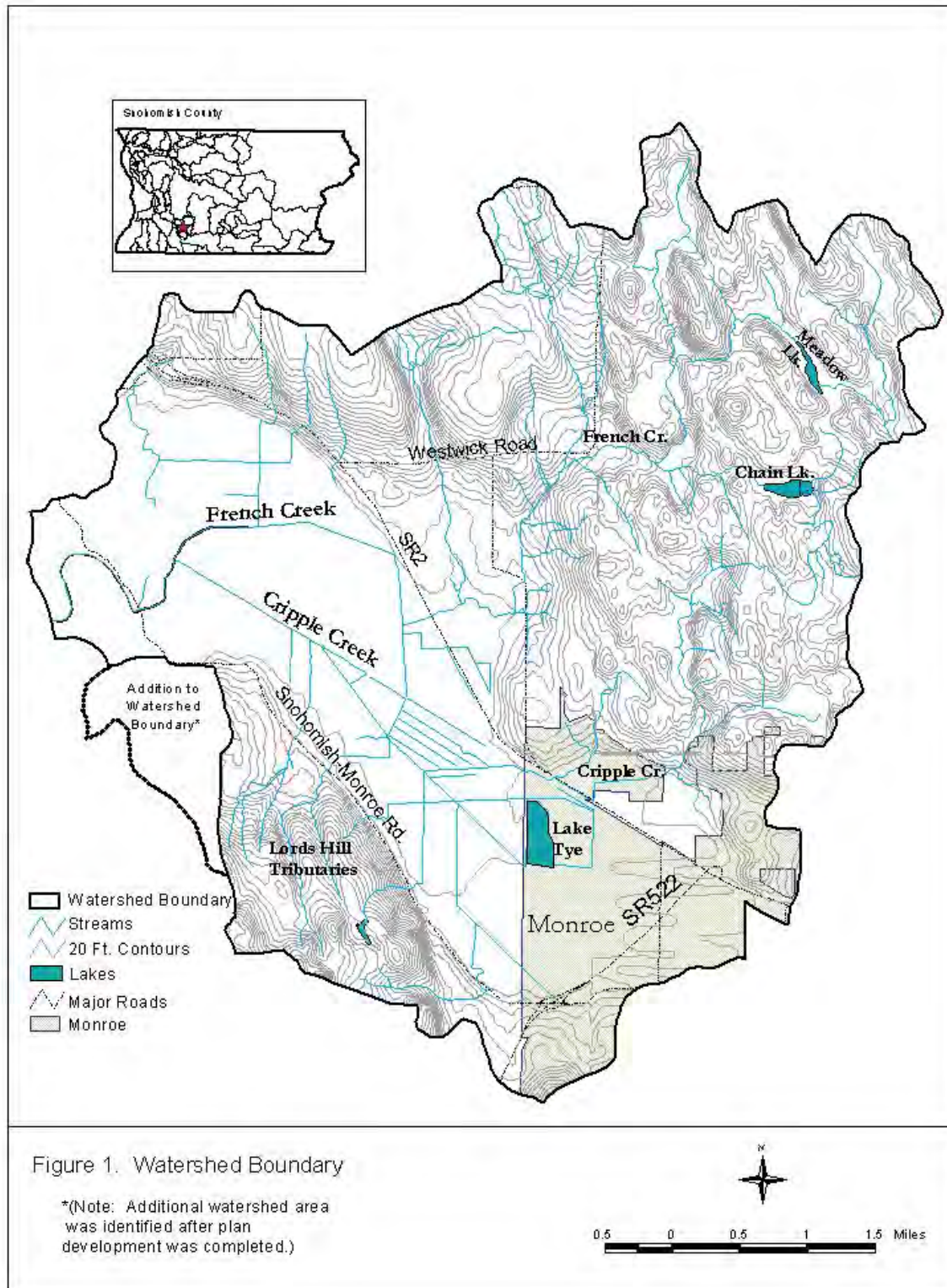
Rural residential and agriculture are the most extensive watershed land uses (figure 2). High-density residential development occurs in Monroe. Commercial activities occur in downtown Monroe and along State Route 2 within the city. Dairy farms, stables, and small farms with horses and beef cattle are the most common farming activities in agricultural and rural areas. Rural lands also contain forestland. Three land use classifications dominate the watershed:

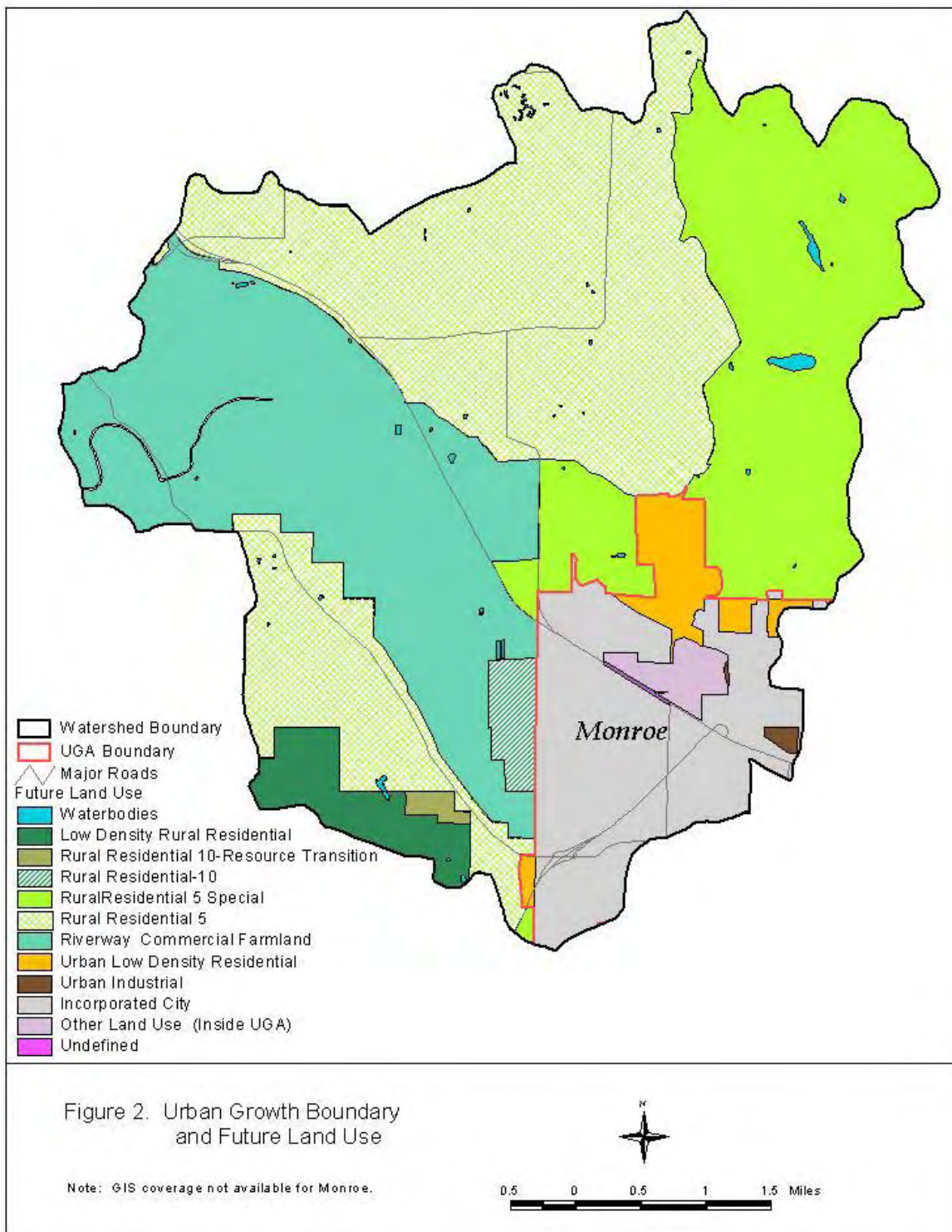
Rural 5-acre (1 dwelling unit (du)/5 acres); west of Trombley Road and on Lords Hill; 37 percent of the watershed.

Rural 5-acre Basic (1 du/5 acres with ability to cluster to at least 1 du/2.3 acres); east of Trombley Road; 15 percent.

Riverway Commercial Farmland (1 du/10 acres) Snohomish floodplain south of Highway 2; 25 percent.

The watershed is undergoing growth and development. The 1996 population was estimated at 10,048; the 2012 population under growth management criteria is forecast to be 13,701, an increase of 36 percent. Proposed residential development will result in loss of much of the forest and an increase in impervious surface.





Climate

The climate of the watershed is greatly influenced by winds from the Pacific Ocean and Puget Sound. Winters are relatively mild and wet with snow and freezing temperatures uncommon. Summers are moderately warm with few hot days and light rainfall.

The average annual precipitation at the Silver Lake gage, the rain gage closest to the watershed, for December 1988 through August 1996 was 37.36 inches. Approximately 68 percent of this precipitation fell from October through March. During this wet season, rainfall was usually of light to moderate intensity. December was typically wettest, with an average rainfall of 5.63 inches, and July driest with an average rainfall of 1.10 inches. The most recent period of high rainfall in 1996 washed out culverts, inundated property, and caused roadside sloughing.

Topography

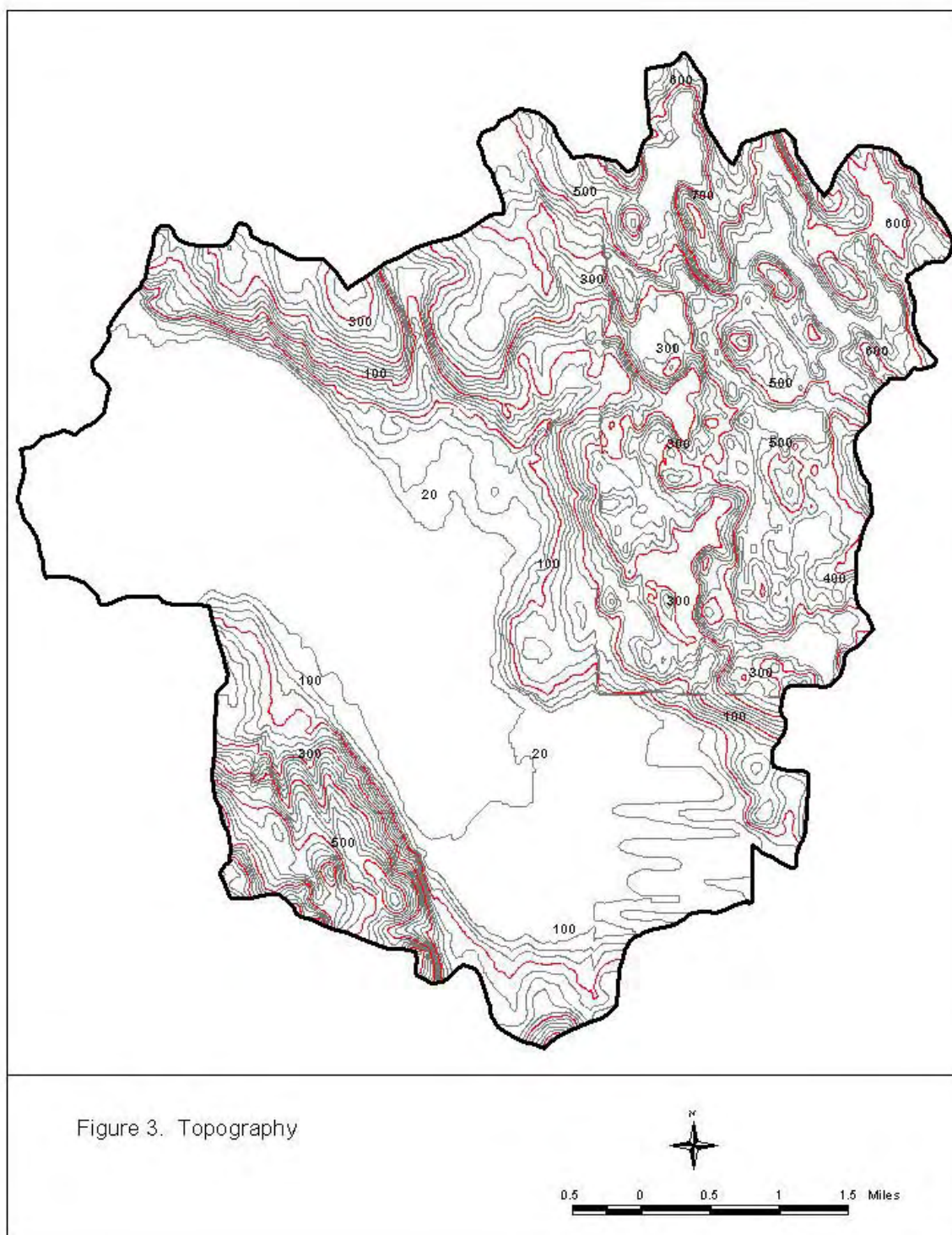
The flow of surface water in a watershed is guided by topography (figure 3). The French Creek watershed is characterized by a broad east west trending valley (part of the Snohomish River floodplain) bordered by rolling hills to the north and steep slopes to the south. The streams in the upper watershed generally flow in a southwesterly or southerly direction meeting the mainstem French Creek just outside the floodplain. French Creek flows through the low gradient floodplain in a westerly direction being pumped out to the Snohomish at the pump station located near the river. Cripple Creek flows southerly off the hillside, and then flows through the floodplain meeting French Creek near the pump station. The Lords Hill tributaries flow in a northerly direction off the hillside meeting Cripple Creek as it flows in a westerly direction through the floodplain. Approximately one third of the watershed is in the floodplain, which extends from the Snohomish River to the Skykomish River and is generally flat.

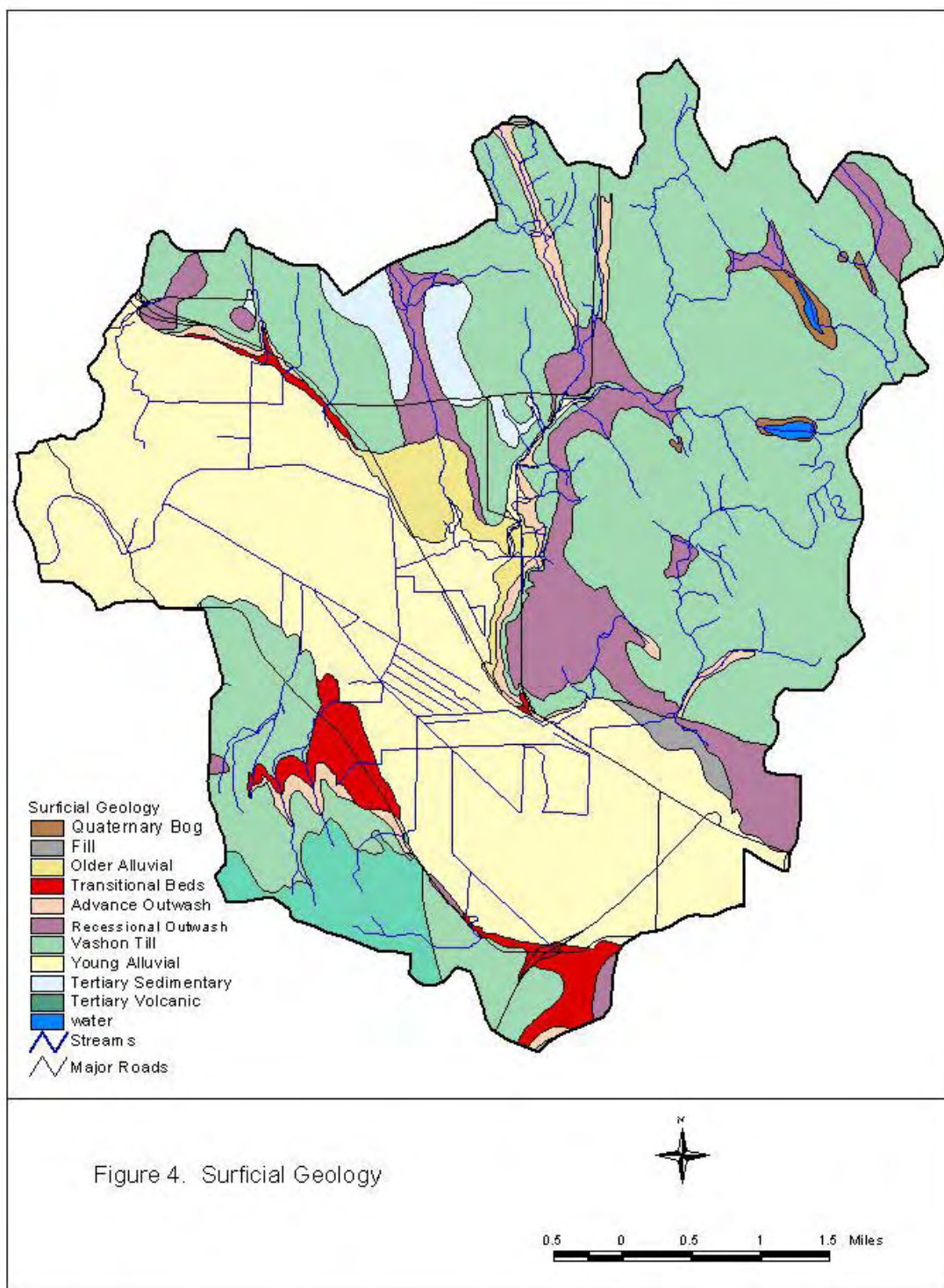
Geology

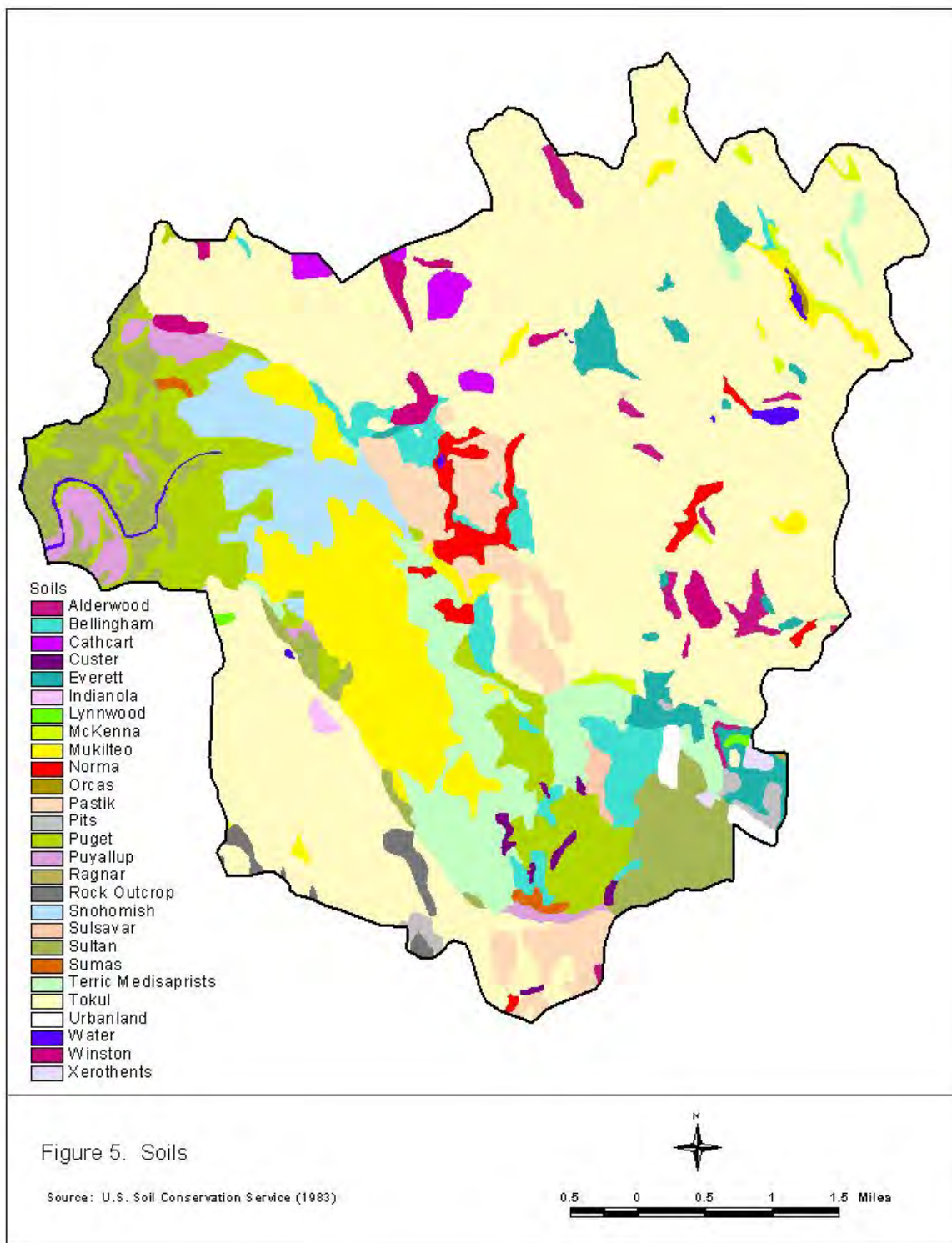
Much of the watershed is covered with glacial till, a strong, stable structural geologic material (figure 4). However, some streams lie in unstable advance and recessional outwash material. These streams include Lords Hill tributaries, Golf Course Creek, Stables Creek, and lower French and Cripple creeks. The floodplain is formed of alluvial materials. Alluvial deposits are the youngest geologic deposits that occur in the watershed. They are found in the Snohomish River floodplain sometimes occurring as alluvial fans. These materials consist of sand, gravel, and silt carried by the streams down the hillside and deposited in the valley.

Soils

The major watershed soils include Mukilteo, Puget, Snohomish, Sultan, and Terric Medisaprists in the floodplain and Tokul soils upland (figure 5). Most of the soils in the watershed's upland areas are gravelly, while the floodplain soils are muck or alluvial loam. Tokul gravelly soils are considered to be the most readily developable although they often have a perched water table that causes drainage problems and makes them unsuitable for traditional onsite sewage systems. Till soils are slow to percolate water and have a high runoff potential. They are also the source of fine silts that are carried by







surface water runoff to streams when the soils are disturbed. Some of the soils, particularly in the Lords Hill and Cripple Creek drainages are susceptible to erosion.

Approximately 34 percent of the watershed consists of hydric (wetland) soils--the majority is in the floodplain. Other watershed soils each cover less than two percent of the area. Information on soils is taken from U.S. Soil Conservation Service (1983).

Tokul

Tokul gravelly loam soils are found both north and south of the floodplain and makes up about 53 percent of the watershed area. These soils are generally moderately deep and moderately well drained. They occur on nearly level areas to very steep slopes on till plains. The surface layer and subsoil are gravelly loam. The deeper soils are gravelly fine sandy loam. A hardpan (impervious layer) is formed at a depth of about 30 inches.

Mukilteo

Mukilteo muck soils are very deep, poorly drained soils found in depressions. They are formed in organic material derived predominantly from sedges. These soils are found in the floodplain and cover 7.7 percent of the watershed. Mukilteo muck soils are hydric (wetland) soils.

Puget

Puget silty clay loam soils are either undrained or artificially drained wetland soils. These soils are very deep and formed in alluvium. The surface layers are generally dark silty clay loam with a thick underlying layer of olive gray and gray silty clay loam. These soils are found in the floodplain and cover about 7.3 percent of the watershed.

Snohomish

Snohomish silt loams are very deep wetland soils found in the floodplain. They are formed in alluvium underlain by peat and muck. The soils have been artificially drained. The surface layer is silt loam to about 6 inches and the subsoil silty clay loam underlain by organic material. These soils cover 3.6 percent of the watershed area.

Sultan

Sultan silt loam soils are very deep, moderately well drained soils on the floodplain. The city of Monroe is built on these soils. They are formed in alluvium and the permeability is low. The surface is silt loam underlain by silty clay loam and fine sandy loam and sand. These soils cover 5.9 percent of the watershed area.

Terric Medisaprists

Terric Medisaprists are very deep, very poorly drained wetland soils found in depressions on till plains. They are formed in organic material and alluvium. The upper soil layer is organic material underlain by gravelly loamy sand. They occur in the floodplain and cover 5.8 percent of the watershed area.

Ground Water

Ground water plays an important role in the watershed providing drinking water and supporting year round stream flow. Ground water makes a significant contribution to streamflow by maintaining summer flows and cooling stream temperatures.

Impacts to ground water are long term and difficult to correct with current technology. Threats to ground water quality include failing onsite sewage systems, leaking sewage pipes, phosphates and nitrates from livestock waste and fertilizers, toxic chemicals from pesticides, herbicides and fungicides, and spills of petroleum products and toxic chemicals at industrial and commercial sites. Ground water depletion can be caused by over allocation of water supplies and creation of impervious surface, which interferes with ground water recharge.

Aquifers are a subsurface zone of soil or porous stone that, when tapped, yield usable amounts of water. Wells in the French Creek watershed tap these aquifers and have been constructed in all geologic materials present. Portions of two large aquifer systems (Lakes and Skykomish) are in the French Creek watershed (figure 6).

Lakes Aquifer

The Lakes Aquifer underlies most of the watershed's northern area. It occurs in advance outwash deposits between Granite Falls and Monroe. The aquifer is from 50 to several hundred feet deep (Economic & Engineering Services 1991). Ground water flow from the Lakes aquifer is generally to the southeast (USGS 1997).

Skykomish Aquifer

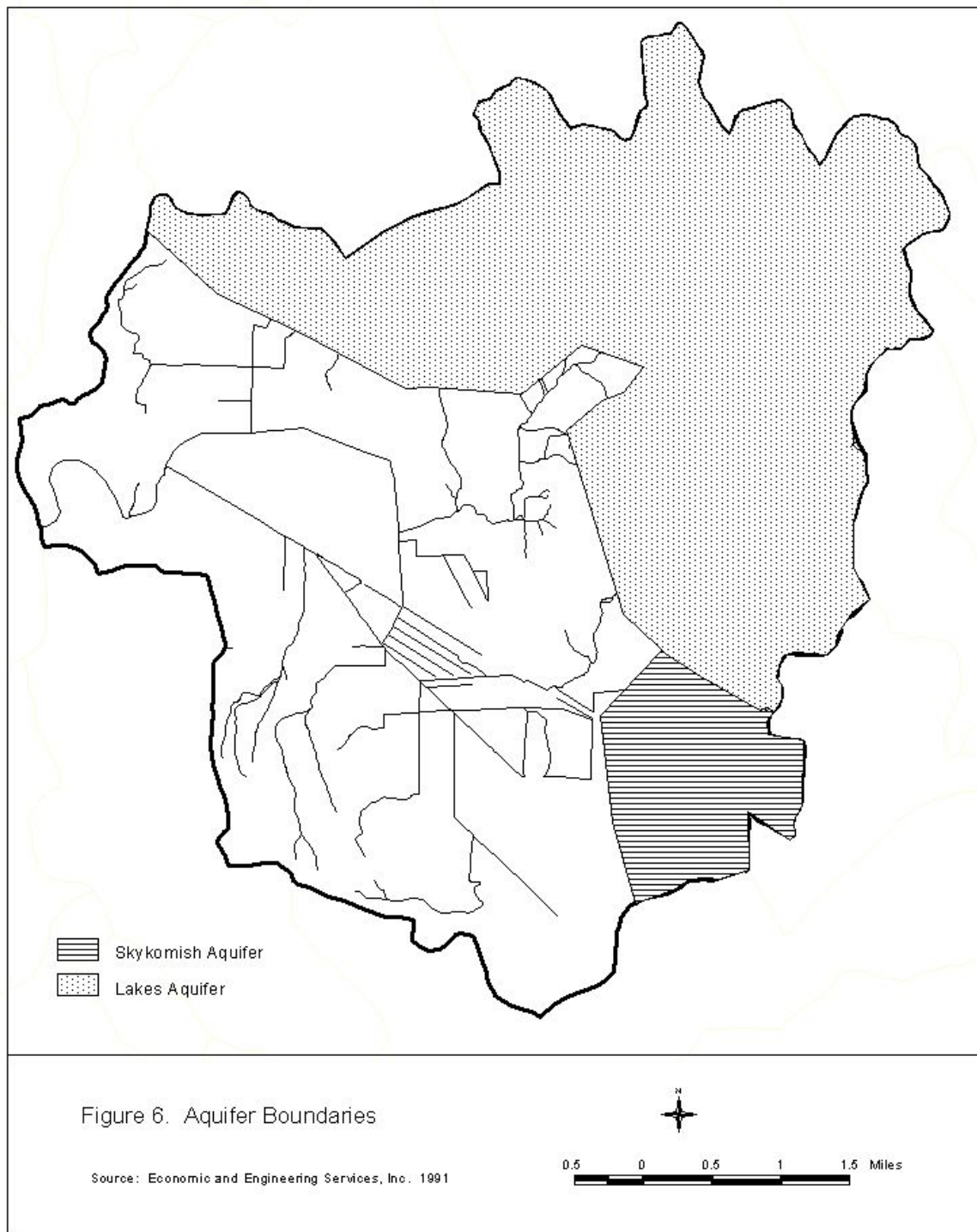
The Skykomish Aquifer extends from Monroe to Goldbar. It occurs in alluvial deposits that are from 10 to 100 feet thick. Ground water flow is generally toward the Skykomish River, discharging flow to the river (Economic & Engineering Services 1991). Because the aquifer is shallow, it is vulnerable to contamination (USGS 1997).

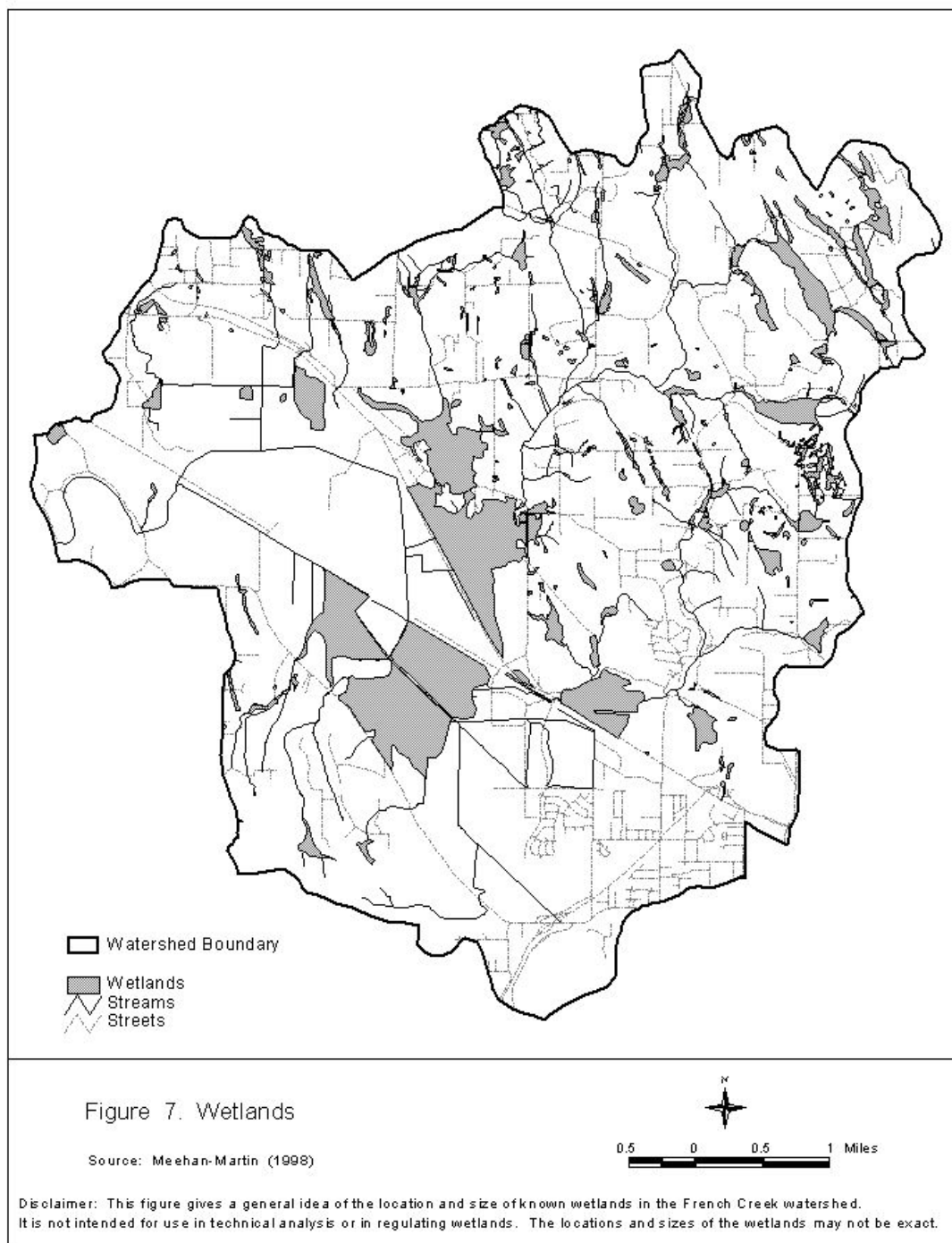
Wetlands

Most of the original wetlands in the French Creek watershed were in the floodplain; however, about 90 percent of the floodplain wetlands have been drained for agriculture and filled for urban development. The wetlands outside the floodplain are mainly either emergent or forested wetlands. Beautiful forested wetlands, a unique fen wetland, and important headwater wetlands remain.

An inventory of wetlands in the French Creek watershed was conducted in 1997. A total of 441 wetlands consisting of 1825 acres were mapped (figure 7). This represents less than 11 percent of the total watershed acreage (17,888 acres).

The U.S. Fish and Wildlife Service's (USFWS) "Classification of Wetlands and Deepwater Habitats in the United States" was used to classify wetland types for inventory purposes (Cowardin et al. 1979). Three categories of wetlands were found in the watershed: riverine, palustrine, and lacustrine. Riverine wetlands include wetlands associated with rivers and streams; palustrine wetlands include marshes, bogs, swamps, and ponds; and lacustrine wetlands include wetlands associated with lakes.





Either emergent or forest vegetation dominated most of the watershed's inventoried wetlands, and most of the wetlands had more than one vegetation type. Emergent wetlands are dominated by nonwoody plants that emerge out of the soil or water, unlike aquatic plants that float in or on the water. Forested wetlands are dominated by woody vegetation (trees and tall shrubs) over 20 feet in height.

Watershed wetlands range in size from less than an acre to over 230 acres. About 66 percent are less than one acre in area; 20 percent are between 1.01 and 5 acres, seven percent are between 5.01 and 10 acres; four percent are from 10.01 to 100 acres, and one percent is more than 100 acres. Size does not always correspond to importance; small wetlands can be of high value. In some cases, many small wetlands together can provide the same or greater benefits than one large wetland. The predominance of small wetlands is due to watershed topography, which has few depressions.

Meadow Lake is a bog wetland community characterized by a floating mat of sphagnum moss and dominated by Labrador tea. Other unusual plants include bog laurel and sundew. This is a unique plant community in the watershed. Chain Lake is a small, shallow bog lake fed by seasonal streams.

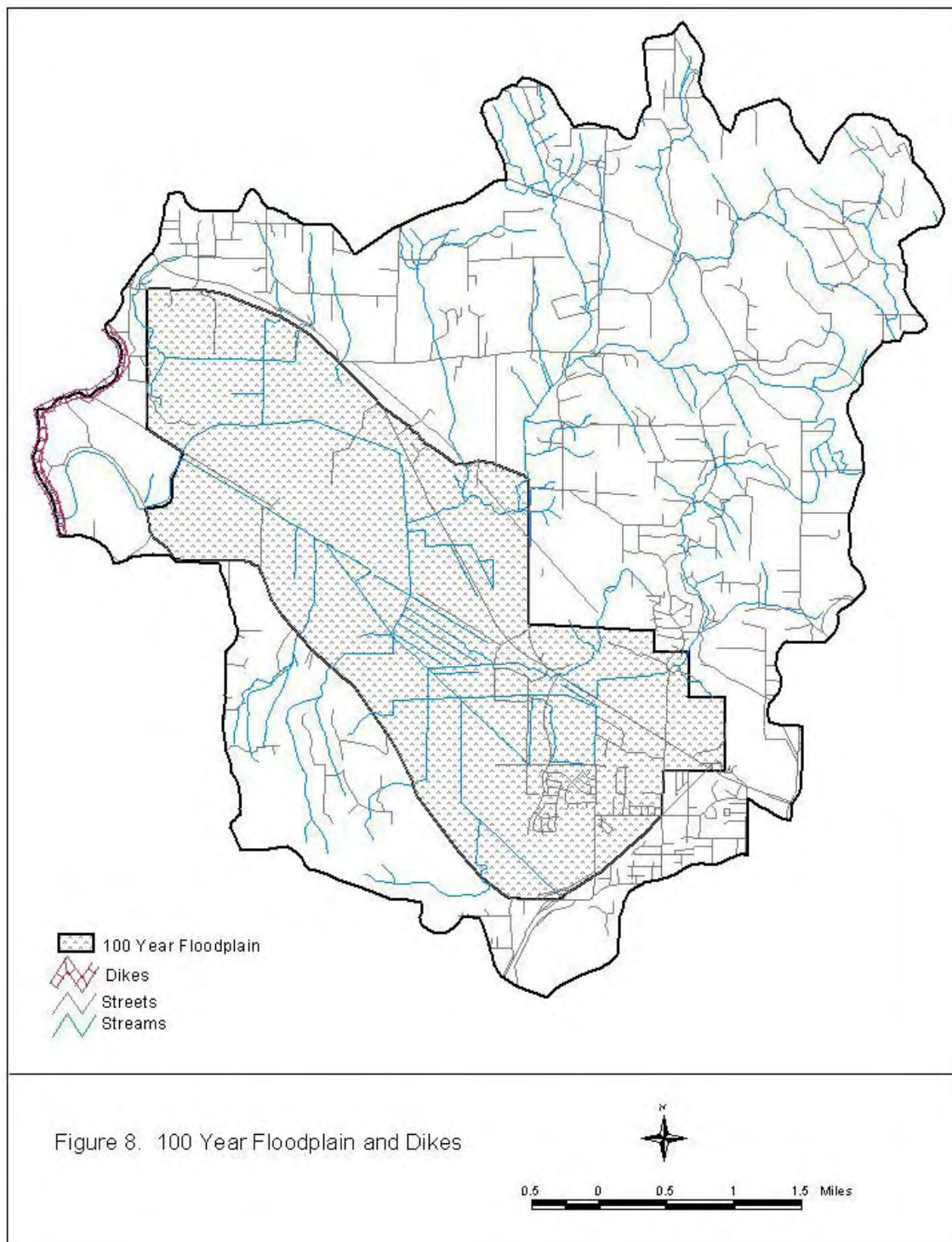
Many of the watershed's wetlands are within the ravines of French Creek and its tributaries. These wetlands and other off-channel wetlands are important rearing habitat for juvenile salmon. Because the floodplain rearing habitat for salmon in this watershed has been eliminated, upstream wetland rearing habitat becomes more important for overwintering juvenile salmon. The headwaters of French Creek and some of its tributaries are wetlands fed by seeps, springs, and perched water tables.

Floodplain

The 100-year floodplain of the Snohomish River extends through a portion of the southern half of the watershed from the Snohomish River to Monroe (figure 8). A 100-year floodplain is an area that has a one percent chance of flooding in any one year. The 100-year floodplain has been defined for regulatory purposes.

Historically, nearly the entire Snohomish River floodplain (19 square miles) was wetlands (Pentac 1996). The biological character of the floodplain and adjacent riparian plant and animal communities were influenced by the flow and tide of the river. Much of the floodplain was forested swamp vegetated with Sitka spruce, western red cedar, lodgepole pine, black cottonwood, red alder, and various species of willow. However, the French Creek and Marshland floodplains were shrub-scrub wetlands, with hardhack spirea dominating and Sitka spruce scattered throughout (Haas and Collins 2001).

Flooding of the Snohomish River has historically occurred at two times of the year. The most severe floods generally occur in winter between November and February. In the spring or early summer, high water results from rising temperatures and mountain snow melt. In 1990 the French Creek floodplain experienced extensive flooding from a November storm (Ruskell 1995). Four hours after the floodwater began flowing over the



dikes, the Snohomish River gage at Snohomish was at 33 feet (eight feet above flood stage) for 20 hours. The entire floodplain eventually filled with up to 20 feet of water. The dike sustained considerable damage but did not fail. Eventually, the pump station and floodgates at the mouth of French Creek pumped and discharged the floodwater back into the river. In December 1995, another flood hit the Snohomish River. This time two major dike breaks occurred flooding the entire valley once again. The dikes have since been repaired, and the dike elevation raised to meet a negotiated overtopping level (Snohomish County 1991).

Lakes

The watershed has one artificial lake, Lake Tye, and two natural lakes, Meadow Lake and Chain Lake (figure 9). Lake Tye is about 30 acres and was created during construction of the Fryelands subdivision in the floodplain west of Monroe. Although Lake Tye was originally intended to be a detention pond, during construction an impervious till layer was punctured filling the pond with water, probably from the Skykomish aquifer.

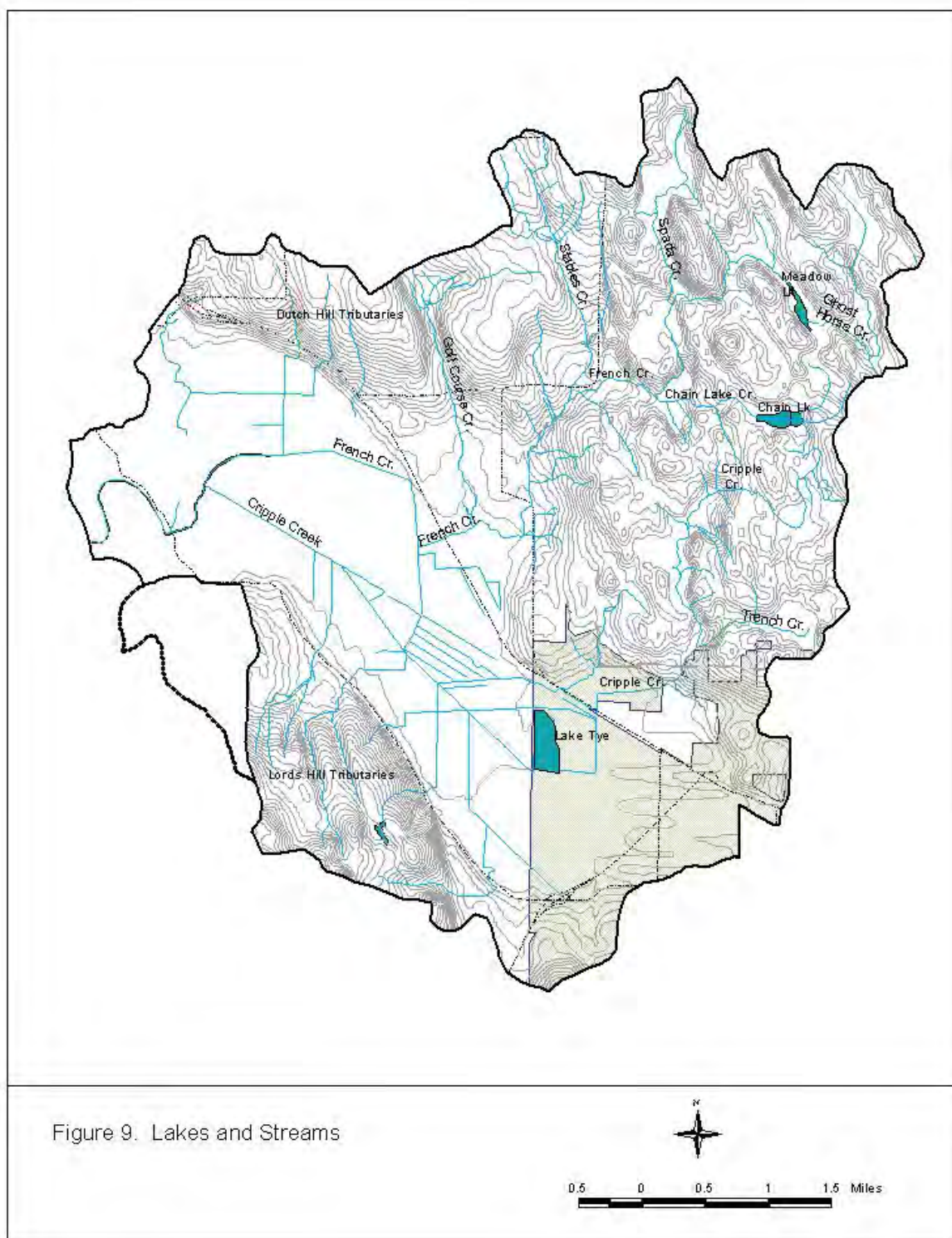
The other two lakes are both in the northeast area of the watershed. Meadow Lake is 13.8 acres, and the Meadow Lake Homeowners Association privately owns a portion. A reach of the mainstem French Creek, called Ghost Horse Creek, feeds Meadow Lake and its associated wetlands. Ghost Horse Creek originates in a wetland northeast of Meadow Lake. The creek enters Meadow Lake at its southeast corner and leaves at the northwest end. This complex of wetland, stream and lake form the headwaters of French Creek. As discussed in the wetland section, Meadow Lake has an associated bog plant community that makes it unique in the watershed and county.

Chain Lake is about one-half mile south of Meadow Lake. The watershed of 23-acre Chain Lake is currently sparsely developed, but there are plans for additional development. A boat launch and public fishing access are on the south side of the lake with access from Chain Lake Road. The outlet stream, referred to as Chain Lake Creek, drains west to French Creek.

Fish and Fish Habitat

Four species of salmonids are found in the stream system, including coho salmon and steelhead, searun and resident cutthroat trout (see figure 9). Coho salmon spawning habitat occurs in mainstem French Creek, as well as in Stables, Golf Course, Spada and a tributary to Cripple creek. Searun cutthroat are less common than coho and occur in the smaller streams. Steelhead are fairly rare in the watershed, but occur in mainstem French Creek to its confluence with Stables Creek. Resident cutthroat trout are found in most watershed streams.

- Coho salmon have access to all of mainstem French Creek and are expected to occur throughout. Steelhead are expected to occur to just south of Westwick Road. Searun cutthroat were observed in mainstem French Creek below Simon Road.



- Coho salmon are not known to occur in Cripple Creek, but have been observed in the tributary just west of Cripple Creek. Steelhead have been observed near Cripple Creek's headwaters (The Tulalip Tribes 1997).
- Coho salmon have been observed in Golf Course Creek just above Westwick Road and in wetlands south of Westwick Road.
- A culvert that was blocking fish passage up Chain Lake Creek was replaced, and coho have access to this entire stream.
- Coho salmon occur in Stables Creek and have access to most of the stream system. A culvert blocking fish passage along the Everett water line is being repaired.
- Culverts that were blocking fish passage in Spada Creek were replaced, and coho could be using the entire stream system to the watershed's northern edge.
- Coho salmon have been planted in the lower reaches of two Lords Hill tributaries.

French Creek is within the presumed distribution of the bull trout. The bull trout is listed as "threatened" under the Endangered Species Act. Special protection is provided some streams in the French Creek watershed under the county's Administrative Rule because they are designated bull trout habitat.

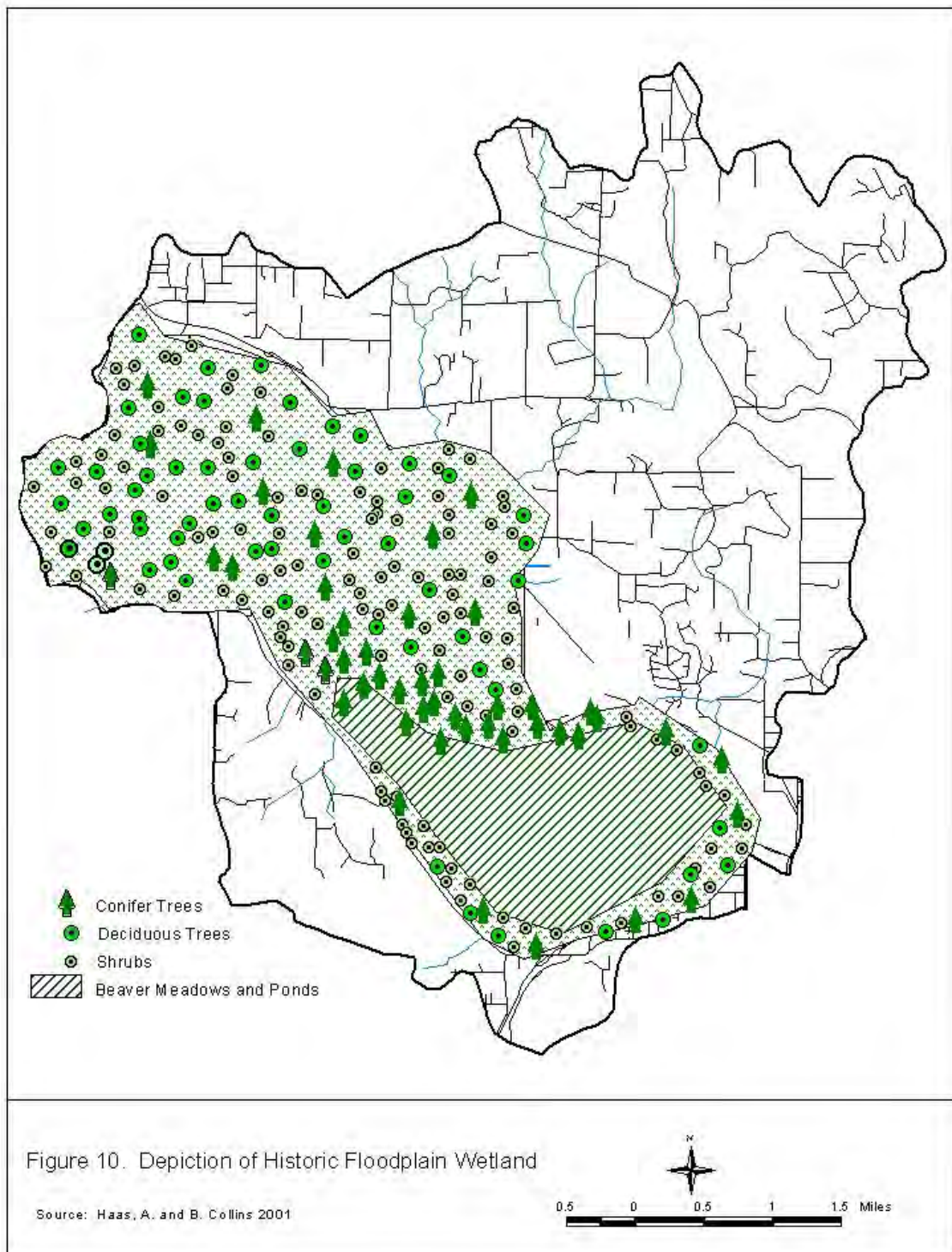
Other fish observed in watershed streams include smallmouth bass, longnose sucker, brown bullhead (The Tulalip Tribes 1997) and brook lamprey, sculpins, and stickleback (Snohomish County 1993b).

Fish live in watershed lakes and ponds; many have been planted. The Snohomish Sportsman's Association regularly planted Chain and Meadow lakes with cutthroat and rainbow trout. Other parties planted bass, which now dominate these two lakes, and trout are no longer planted. On Lords Hill, rainbow, cutthroat, and eastern brook trout were planted in English Pond until 1995, and cutthroat are still being planted in the pipeline ponds (Heirman 1997).

Vegetation

Historically, the French Creek watershed was scrub/shrub wetland and a forested upland. Approximately 3800 floodplain acres were dominated by hardhack spirea with willow and crabapple dominant in numbers, and Sitka spruce dominant by basal area (Haas and Collins 2001). A swath of Sitka spruce and western red cedar cut the marsh almost in half. The eastern end of the marsh was a large beaver meadow-wetland complex (figure 10).

Mature and old growth stands of western hemlock and Douglas fir grew on the drier upland areas and mixed coniferous-deciduous along the streams (Franklin and Dyrness 1973). Much of the watershed was logged around the turn of the century, and some of the land was cleared in the mid to late 1800s for agricultural purposes. The remaining watershed forested areas are found along Lords Hill and in patches north of the floodplain, consisting of second and third growth forests. Western red cedar, western hemlock, and Douglas fir typically dominate these forests, with red alder and big



leaf and vine maples scattered throughout. The dense understory vegetation in forested areas is dominated by salmonberry, sword ferns, and salal. Forested swamps with an understory of skunk cabbage, salmonberry, and red-osier dogwood occur as well.

Within the upper French Creek drainages, the riparian vegetation is mainly mixed deciduous/coniferous including red alder, vine maple, black cottonwood, western hemlock, and western red cedar. The floodplain riparian areas are dominated (Himalayan blackberries), and trees that do occur are mainly black cottonwood and red alder.

In addition to providing wildlife habitat, the remaining forested land stabilizes slopes, minimizes erosion, reduces sediment input to streams, and maintains temperature and flow of stream water. Forested buffers within the stream ravines have protected some stream reaches from some development impacts.

Wildlife

There is considerable diversity of wildlife species in the watershed. Forests, wetlands, forested stream ravines, other riparian areas, and the floodplain itself all provide habitat for a variety of wildlife species. Several species/categories of species identified as priority by the Washington Department of Wildlife have been observed, including bald eagle, great blue heron, pileated woodpecker, red-tailed hawk, cavity-nesting ducks, trumpeter swans, and waterfowl concentrations. Priority species are those species listed by federal and/or state governments as endangered, threatened, sensitive, candidate, or monitor and some game species. Species are listed as priority because of concern regarding their population status and sensitivity to habitat alteration or because of their high value for recreation. Priority habitats found in the watershed include freshwater wetlands and riparian areas.

Constructed Drainage System

The French Creek stormwater drainage system consists of detention and retention ponds, biofiltration swales, infiltration systems, storm drains, catchbasins, ditches, and pipes that collect runoff from paved and unpaved areas, eventually discharging runoff to streams.

WATER QUALITY

Introduction

The French Creek system shows characteristics of streams with multiple land uses in an area of rapid population growth. The agricultural activities in the floodplain and upper watershed result in water quality degradation from animal access, manure, herbicides, and pesticides. Rapid residential development has resulted in more cars on roads, more runoff from lawns and driveways, and more onsite sewage systems. Measurements of water quality in the French Creek system have shown that federal and state standards have been violated and that beneficial uses of the waters have been impaired. The primary sources of water quality data for French Creek are monitoring studies conducted by The Tulalip Tribes (Thornburgh et al 1991) and Snohomish County (Thornburgh 1996, 1997). The Tulalip sites were on Cripple Creek and lower French Creek in the floodplain and were monitored during the period August 1987 to November 1990. In

September 1993, long-term monthly monitoring was begun at two sites on French Creek by Snohomish County. The county monitored an additional seven sites out of the floodplain from 1994 to 1995.

Floodplain water quality problems, including high temperatures, high levels of fecal coliform bacteria and nitrates, and low dissolved oxygen are contributed mainly by farming activities. The pump station at the mouth of French Creek, the channeled streams, and the flat gradient all create conditions that worsen water quality problems. At times salmon are unable to pass through the floodplain area to and from the river because of high water temperatures and/or low dissolved oxygen.

Fecal Coliform Bacteria

High fecal coliform bacteria levels in violation of state standards were found in the watershed, both upland and in the floodplain. High bacteria levels can limit the uses of water for wading and swimming or contaminate drinking water in ground water wells.

Nitrates and Phosphorus

High nitrate and phosphorus levels were found throughout both upland and agricultural watershed monitoring sites. High nutrient levels lead to excessive vegetation growth and decay that depletes dissolved oxygen needed by fish and invertebrates. Nutrients in surface water can come from many sources, including commercial and small farm waste, onsite sewage systems, pet waste, and residential lawn fertilizers. With many onsite sewage systems in the watershed, and the proximity of homes, lawns and farms to creeks, these sources could contribute significantly to pollution.

Temperatures

Temperatures recorded in streams indicate that high temperatures are a serious problem in the floodplain, but not in the uplands. Low levels of dissolved oxygen were recorded in slow moving streams in the floodplain. Organic agricultural wastes use oxygen as bacteria decompose them. Oxygen depletion can have serious consequences for local fish populations and other biological communities.

Metals and Organics

Metals and organic pollutants accumulate in watershed streams through many nonpoint sources. Metals can be directly toxic to humans and result in long-term accumulation and toxic effects on aquatic life. Automobile parts, paints, and industrial activities are sources of chromium. Copper comes from pipes, appliances, wood preservatives, and algicides. Lead and zinc are present in paints, auto emission, and tires. Metals have been found consistently in watershed water samples. Levels of zinc, lead, and copper were often found to be in violation of state water quality standards. As watershed residential and commercial land uses increase, metal concentrations would be expected to increase unless best management practices are implemented as growth occurs. (Best management practices are techniques to prevent or reduce pollution.)

Hazardous Substance Sites

Three hazardous substance sites were identified contaminating ground and surface water. These sites are being monitored and some cleanup has been completed.

Problem Definition



Fish Blocking Culverts Being Replaced at Simon Road

PROBLEM DEFINITION

INTRODUCTION

This section documents water quality, water resource, and water quantity issues in the French Creek watershed. The problem definition includes a discussion of the general problems, the extent of the problems in the watershed, and the regulations meant to address the problem or resource. (See Appendix 1 for beneficial uses impaired by pollution problems.)

The problems were identified using results of watershed studies, including a wetland inventory, hydrologic modeling, geology report, coho limiting factors study, water quality monitoring, and various other types of data analysis. They were also formulated through knowledge of watershed committee and technical team members.

The problems were prioritized as follows and appear in this order in the document although they are considered of equal importance under each category:

High Priority

Aquatic Habitat Degradation

Wetland Loss and Degradation

Increased Stormwater Runoff from Conversion of Forest to Development

Pollution and Habitat Degradation from Agricultural Practices

Sediment from Land Clearing and Grading

Regulatory Enforcement

Medium Priority

Ground Water Depletion and Contamination

Fecal Coliform Bacteria and Nitrates from On-Site Sewage Systems

Pollution from Urban/Rural Stormwater and Direct Discharges

Sediment from Ditch Maintenance

Sediment and Other Problems from Forest Management

Low Priority

Pathogens and Nutrients from Household Pet Waste

Illegal Dumping and Stream Garbage

Toxic Chemicals from Hazardous Materials

Drainage Problems

Aquatic Habitat Degradation

(Problem Summary and Management Recommendations, pages 137-142)

PROBLEM DESCRIPTION

There are 82 species of fish in Washington that live in freshwater at some point in their lives; 49 indigenous species and 33 introduced species. Of these, seven species of salmonids are found in the Snohomish River basin. Two species, Chinook salmon and bull trout have been listed as “threatened” under the Endangered Species Act.

Most salmon biologists believe a loss of healthy habitat is the primary threat to all salmon species because these species depend on freshwater for rearing and spawning. An unhealthy river or stream will not support a strong run of salmon for very long. Salmon in freshwater face a wide variety of hazards. Those hazards include increased stormwater runoff, improperly designed culverts and other hazards that block migration, loss of riparian habitat, loss of instream diversity for rearing, poor water quality, low summer flows, high water temperature, and a lack of macroinvertebrates.

Degraded streams also negatively affect macroinvertebrates. Macroinvertebrate species composition and numbers change because of poor water quality and loss of habitat.

EXTENT OF AQUATIC HABITAT DEGRADATION

There are over 117 miles of stream and floodplain drainages in the French Creek watershed. Almost all sections of stream outside the floodplain provide habitat for anadromous salmon and trout or resident trout and other fish. The French Creek stream system was historically a productive salmon spawning stream. Today the number of salmon in that stream system has declined dramatically. Over harvest, natural oceanic conditions, and habitat degradation are responsible for low salmon numbers in the Snohomish River basin. In addition, there is no natural flow between the river and French Creek. The dike and pump station prevent river water from coming in to French Creek and the water from French Creek is pumped to the river. Some salmon can access French Creek through the pump station via a fish ladder. The limited access caused by the pump station, poor water quality, draining of the floodplain wetlands, and channeling of the lower stream reaches are all causes of reduction in salmon numbers.

The lower channels of the French Creek system formerly flowed through a scrub-shrub wetland that provided excellent rearing habitat for salmon (Haas and Collins 2001). Only a small remnant of this plant community remains near the Monroe Airport. Chinook, pink and chum salmon do not negotiate the fish ladder constructed in the pump station. The anadromous fish that do get into the system include coho salmon, steelhead, and searun cutthroat trout.

The upper reaches of French Creek have been degraded from past land use practices and continue to be degraded by development and farming activities causing increased stormwater runoff, sediment from logging, land clearing and grading, and loss of riparian

and instream habitat. Figure 11 shows anecdotal information regarding the potential distribution of coho, searun cutthroat, and steelhead.

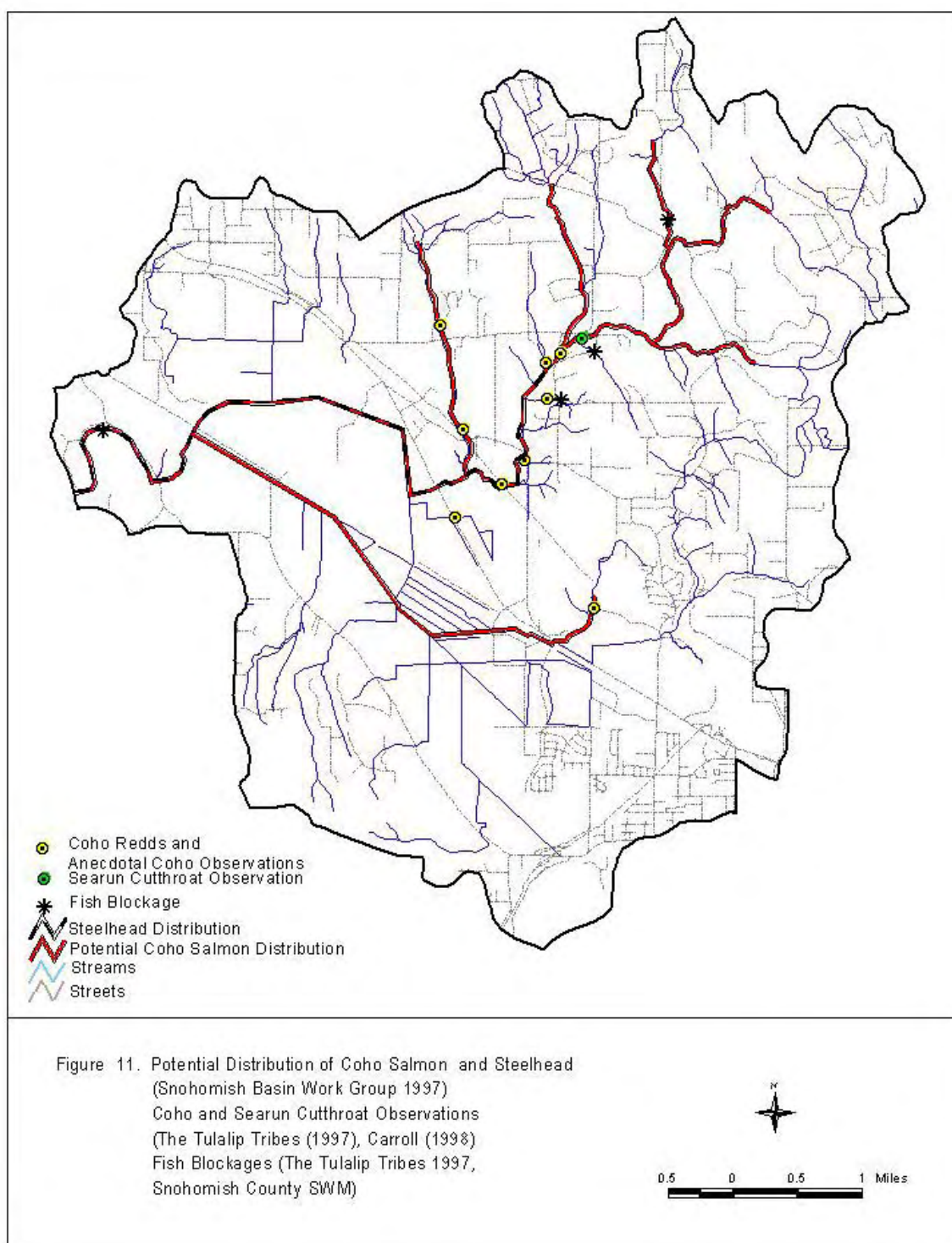
Although the total number of salmon using the French Creek stream system is unknown, a fish counter was placed along the pump station fish ladder. The fish ladder pump was turned on October 1, and the counter was operational from October 9 through November 13, 1998. During that period 188 anadromous fish passed through the counter. The counter was operational again from December 10 to the 16th when another 14 fish passed through the fish ladder. The counter was not operational at other times because of freezing and flooding. During high river levels, the fish ladder does not work properly, so the fish ladder pump is stopped. Coho numbers in the French Creek system are likely to be fairly low, and are certainly well below historic numbers.

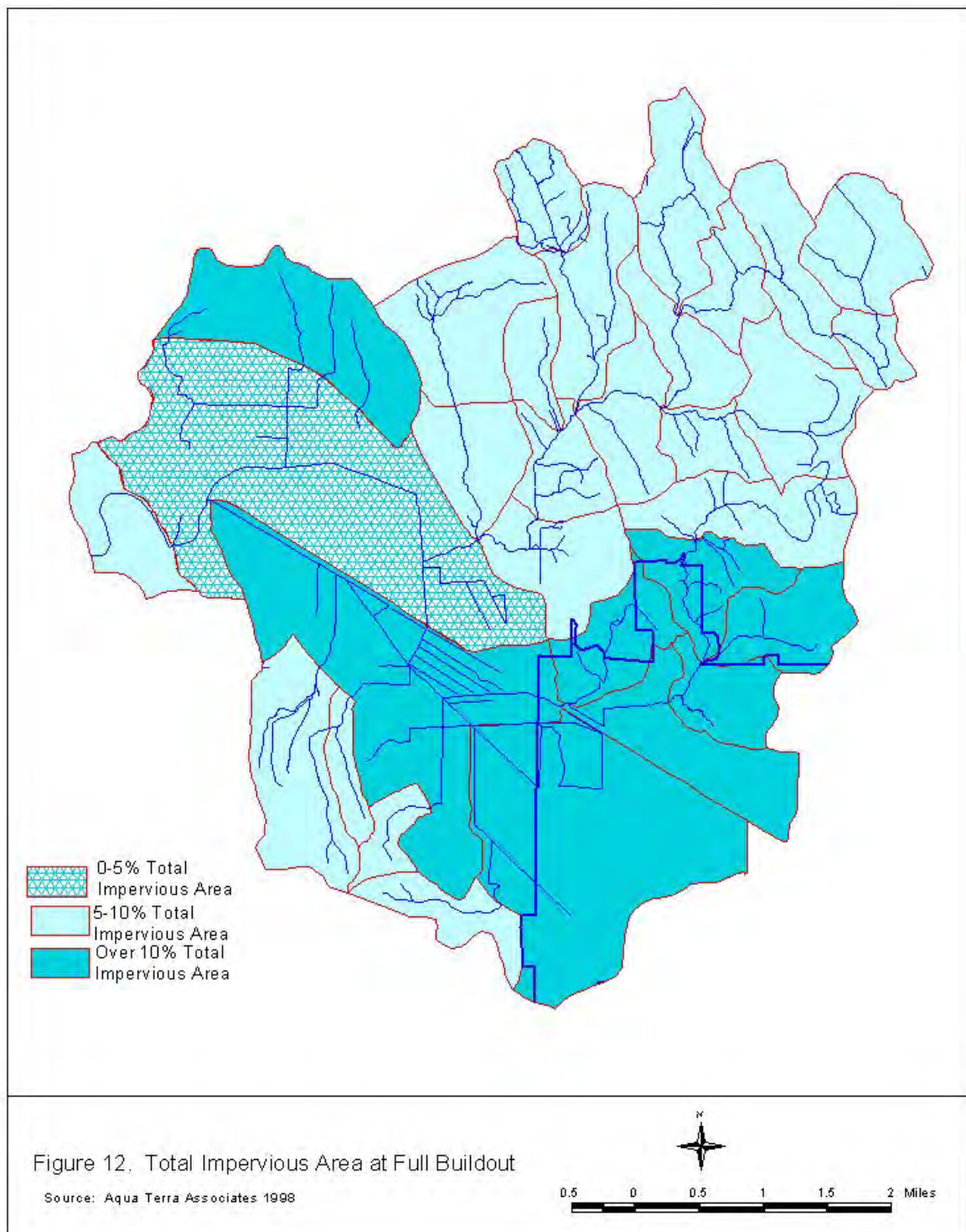
Streams in rural areas like French Creek are affected by land uses that are often different from urban areas, with different problems. The upper French Creek watershed was historically forest that has been logged, probably more than once. This early clearing of forest through logging affected the stream system by increasing runoff, causing downcutting of stream channels, and bringing sediment into the stream channel. While logging activity has diminished in the watershed, land clearing to create homes for rural residents continues. This development is mainly small farms or lot clustering, with high density urban, industrial and, commercial development occurring in Monroe and planned for within the urban growth area (see figure 2, page 18). While hydrologic problems of rural residential development are reduced because of larger lot sizes and lot clustering, this type of development still takes its toll on streams.

Increased Stormwater Runoff

The French Creek watershed is in transition from forest to urban and rural densities. In this transition, creation of impervious surfaces and removal of forest will be the major impacts on stream flow. Effective impervious area (EIA) is used to describe the area where there is no opportunity for surface runoff from an impervious site to infiltrate into the soil before it reaches a conveyance system. Watershed computer modeling evaluated effective impervious area in determining the amount of runoff that would occur from development and the resulting increased stream flows (Aqua Terra 1998).

Because most studies of habitat degradation used total impervious area (TIA), the figures for EIA determined by Aqua Terra (1998) have been converted to TIA. The watershed currently has an average total impervious area of 13 percent (6.6% EIA). Based on projected development, the average TIA will increase to 14.7 percent (8.7% EIA). Studies conducted in the Puget Sound area indicated that at approximately five percent TIA a loss of aquatic system function occurs. This loss includes changes in channel morphology and fish populations (Booth and Reinelt 1993, May, et al. 1997). The following shows the number of watershed subbasins below and above five and ten percent at current and future buildout (figure 12). There are 30 subbasins.





Current Buildout		Future Buildout	
Subbasins below 5% TIA	18	Subbasins below 5% TIA	1
Subbasins below 10% TIA	27	Subbasins below 10% TIA	21
Subbasins over 5% TIA	22	Subbasins over 5% TIA	29
Subbasins over 10% TIA	3	Subbasins over 10% TIA	9

(For additional information on stormwater runoff, see the section entitled “Hydraulic Impacts from Stormwater Runoff,” page 72.)

Fish Blockages

In the lower watershed, adult fish moving upstream to spawn and juvenile salmonids moving out to the Snohomish River have to pass through the French Creek pump station. Although the pump system was designed to facilitate passage for coho salmon, it is an impediment to movement of other fish in and out of French Creek. During an attempt to count fish coming through the pump station fish ladder, it was found that during high river flows, the fish ladder is inundated by backwater from the river so that few salmon could use the ladder. The flow through the fish ladder increases, overtopping the sides of the flume that moves fish out into French Creek.

Dissolved oxygen (DO) concentrations have been very low (less than 5.0 mg/l, a level that is lethal to fish) in the lower 5.5 mile reach of French Creek. These low oxygen levels create a biological barrier to upstream and downstream migration of adult and juvenile salmon. Aquatic life cannot survive without adequate oxygen in the water, and young salmon can be harmed by even small decreases in dissolved oxygen. Although DO is low throughout the year, it is lowest during the summer, when water levels are low, nutrients concentrated, and water temperatures high. Lack of vegetation to shade the channeled floodplain streams allows water temperatures to increase to levels that also can be lethal to juvenile salmon.

In the upper watershed, several instream structures and culverts were full or partial barriers to upstream fish movement (Snohomish County 1993b, Loch 1997). Although coho salmon are known for the ability to jump, culverts become a blockage to adults if the following conditions exist:

- If the pool in front of the culvert is not long enough or deep enough to give salmon room to start the jump,
- If the culvert is too high above stream water,
- If there is not enough water coming through the culvert, or
- If the water velocity flowing through the culvert is too high.

Loss of Streamside Vegetation

Removal of riparian vegetation along watershed streams is fairly common. Undisturbed corridors of natural streamside vegetation are important. Streamside trees and shrubs provide shade, nutrients, woody debris, and cover needed for spawning and rearing salmon. They filter pollutants and provide streambank stability as well. Many intact

riparian areas in the watershed have only deciduous trees, mainly red alder. While red alder trees provide good shade for streams in the summer, they do not provide the large woody debris needed for creating instream habitat diversity because they are generally not big enough; they break up quickly, and decompose rapidly. Conifer trees are a source of long lasting, large instream wood. A mixture of both deciduous and coniferous trees is most desirable along riparian areas. Trees and shrubs along the bank and large woody debris in the channel also prevent erosion.

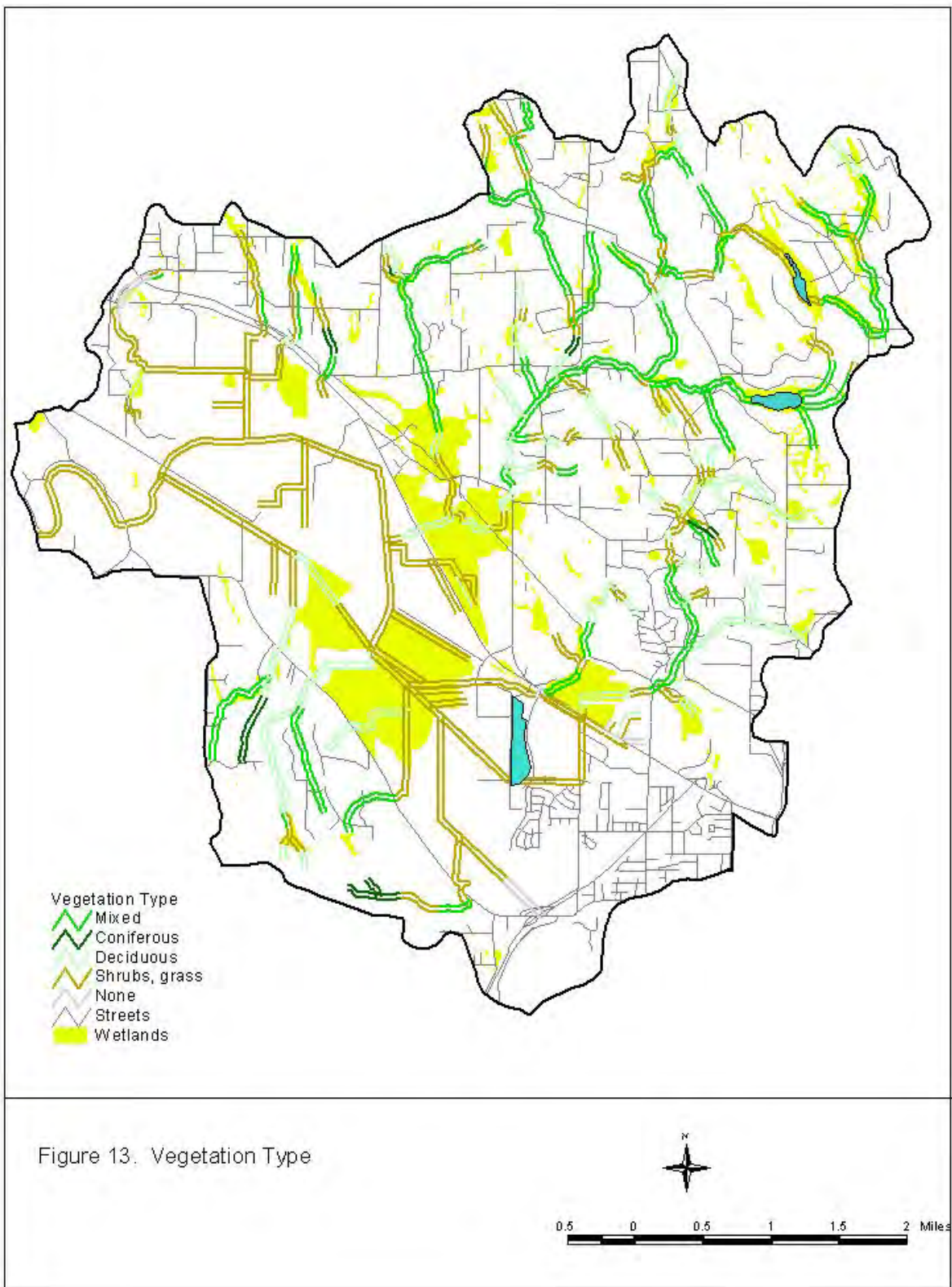
A riparian function assessment of the French Creek watershed was conducted to determine the current condition of the riparian areas (Carroll and Jacobson 2000). The functions assessed included short-term large woody debris recruitment, shading, streambank stability, and pollutant filtration. Parameters used to determine function included vegetation type, tree size, proximity of trees to the stream, tree density, buffer width, land use, clearing width, and barriers to restoration.

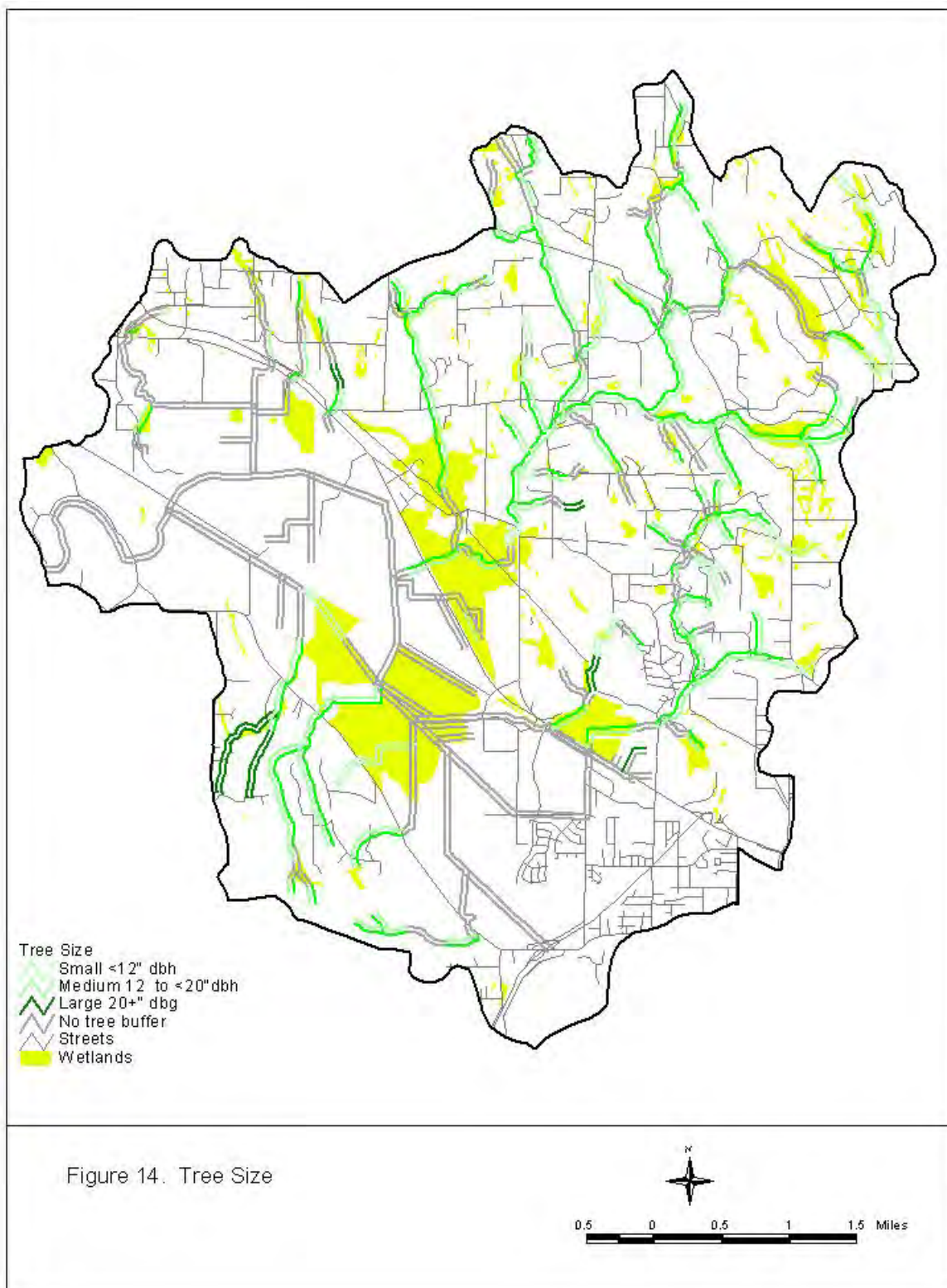
The assessment showed that shrubs and grass dominated almost half of the riparian area (figure 13). Shrubs and grasses occurring in agricultural areas include blackberries or pasture grasses. About 71 percent of the floodplain had a shrub and grass dominated buffer. The predominance of small farms and stables with pastures resulted in a high percentage of the upper watershed riparian area (28%) in shrubs or grasses as well. Only three percent of the watershed had a riparian area dominated by conifer trees. The dominant tree vegetation in the floodplain was deciduous, and in the upper watershed it was mixed coniferous/deciduous.

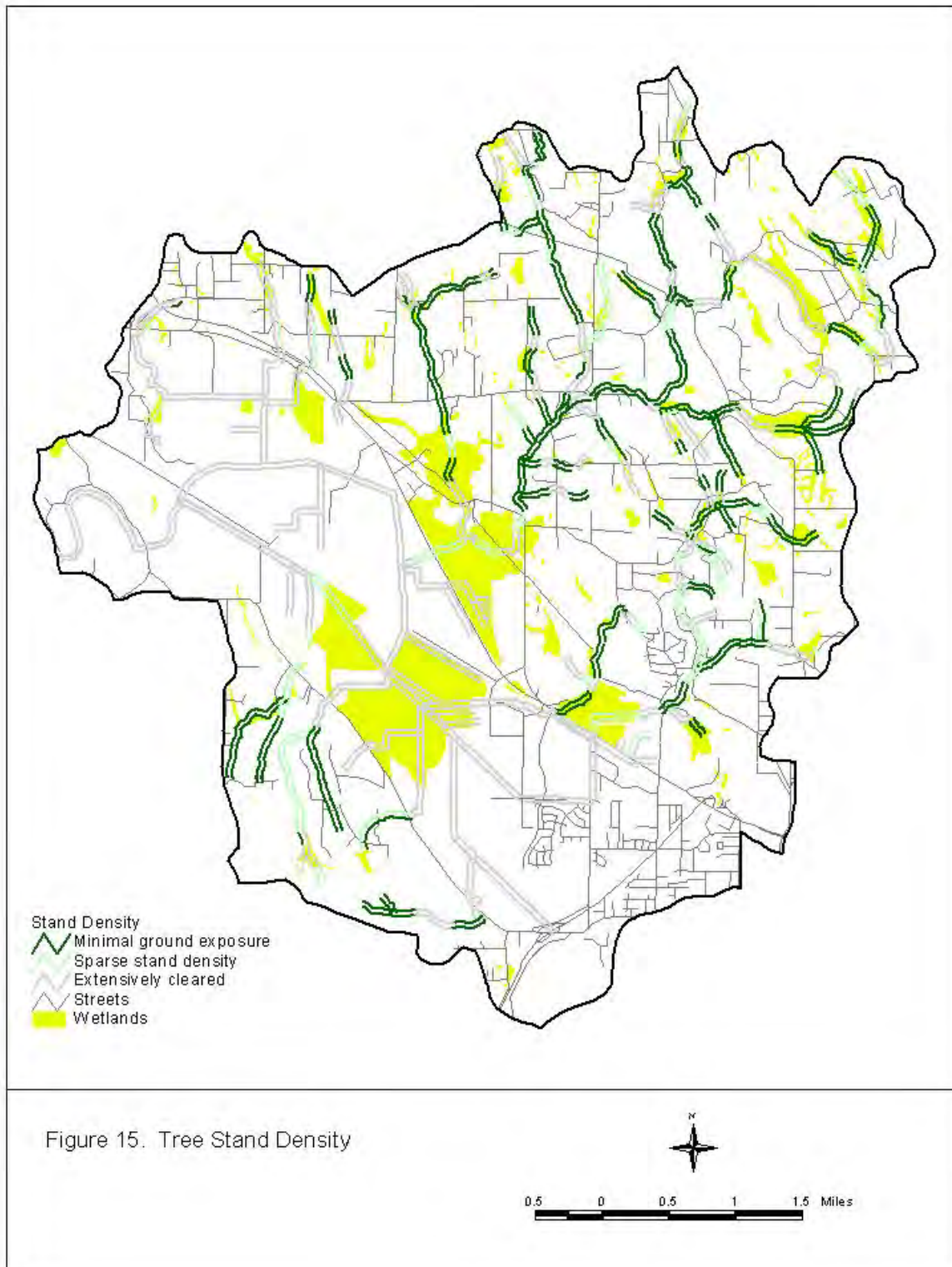
The size of the trees within the buffer indicates the size of the wood available to be recruited to the stream (figure 14). Trees with a diameter at breast height (dbh) of over 20 inches were considered “large” for recruitment in the near term. Because of the historic characteristics of the floodplain and its conversion to agriculture and urban uses and because most of the upland area has been logged several times, stands of mature trees along the stream were lacking. Only three percent of the buffer trees were greater than 20 inches dbh. Those trees were mainly the conifer dominated stream reaches. Where there were trees along the stream the majority were from 12 to 19 inches dbh.

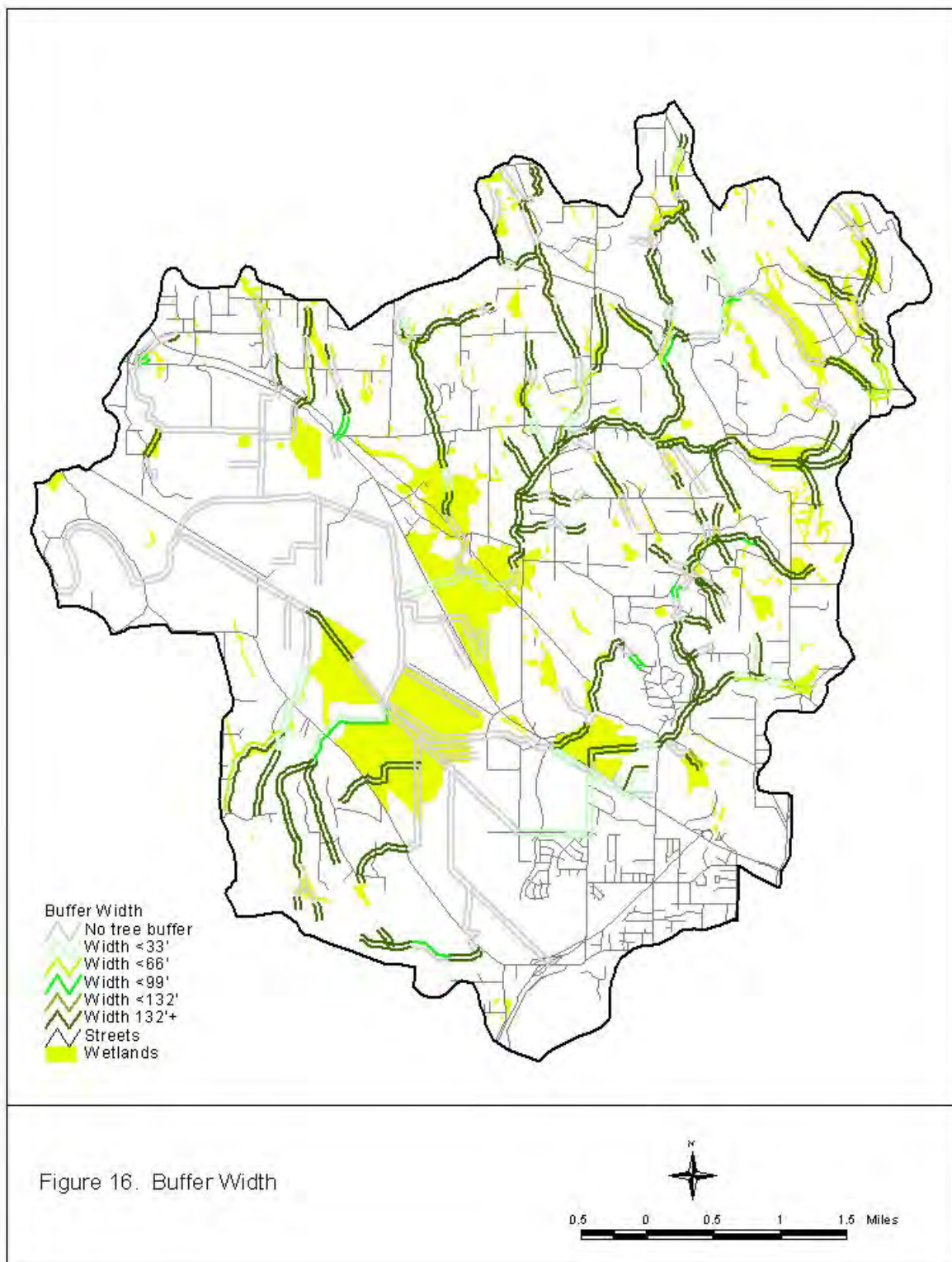
The density of trees within the riparian area indicated how well the buffer filters pollutants (figure 15). Denser stands of trees will also provide more wood for recruitment to the stream particularly if the trees are in the large age class. Watershed riparian trees have been extensively cleared or are sparse. Only 37 percent of the watershed riparian corridor had dense stands of trees within the buffer. Most of the area identified as cleared lay within the floodplain agricultural areas. About 55 percent of the upper watershed had dense stands of trees. The impacts of development and agriculture in the upper watershed account for the clearing.

The width of the tree buffer is important for streambank stability, recruitment of woody debris, and filtration of pollutants (figure 16). The Administrative Rule adopted by the Snohomish County Council in 2000 to protect the Chinook salmon and bull trout requires









a 150-foot no touch buffer on all stream with habitat for Chinook salmon and bull trout, and 300 feet of total buffer with no new impervious area. Most watershed streams are considered bull trout habitat. Other salmon bearing streams regulated under the 1998 Critical Areas Regulations require a 100-foot buffer. Within the watershed only 15 percent of the reaches had tree buffers that were 100 feet or greater. However, along about 37 linear miles of stream in the upper watershed a large buffer area remained; much of the upper watershed has not yet been developed.

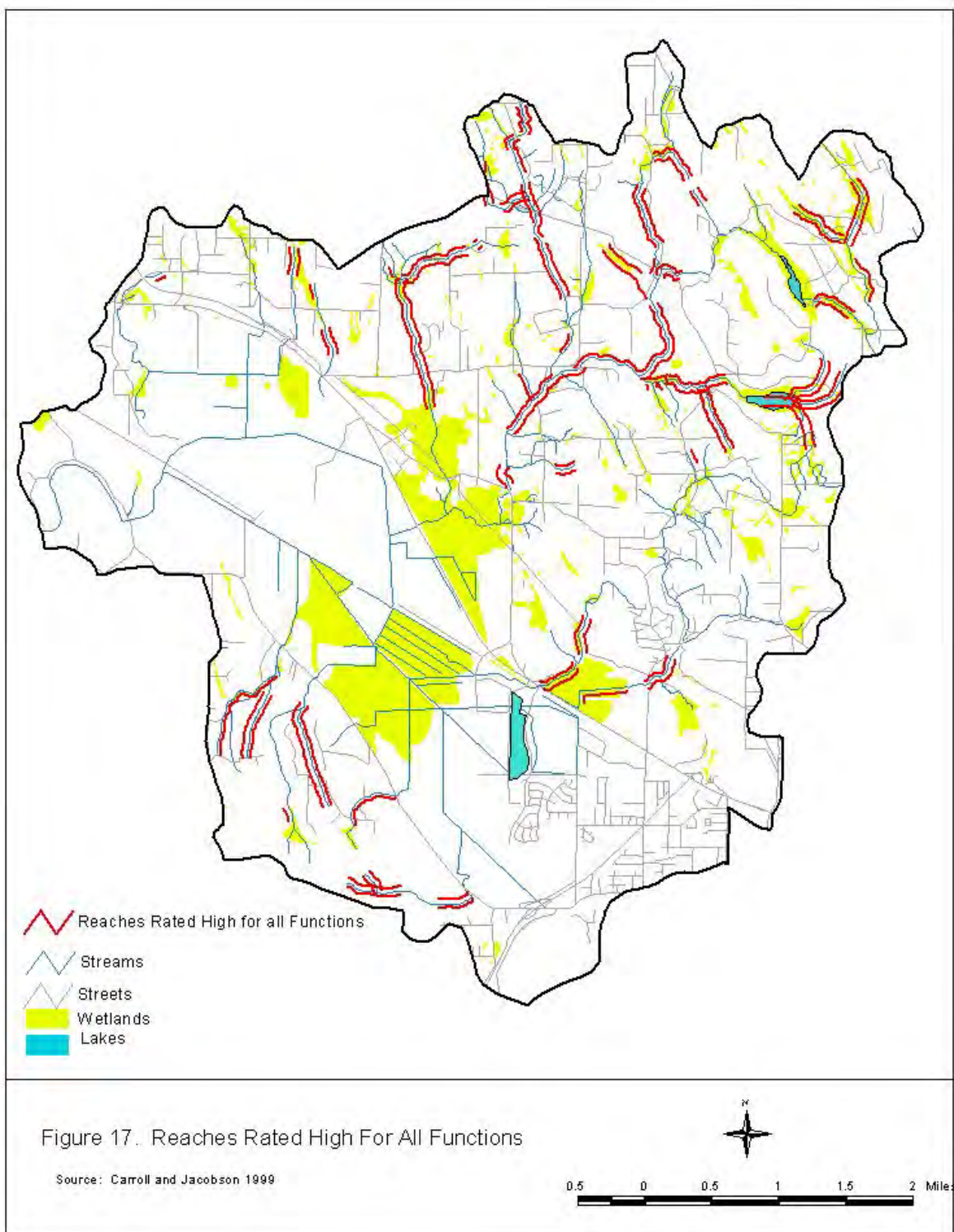
The "landuse adjacent to stream" parameter was intended to measure the effects of forestry and agriculture and did not look at residential development. Since very little logging for timber production occurs in the watershed (Brock 1998), the most relevant data collected was the agricultural land use. Approximately 40 percent of the watershed streams are adjacent to an agricultural area of some type; 73 percent of the floodplain streams and 16 percent of the upland streams adjoin agricultural land.

A riparian function rating determined how each reach functioned for shading, pollutant filtering, streambank stability, and recruitment of large wood. Figure 17 shows reaches rated high for all functions. Approximately 26 linear miles (22% of the total stream miles) of streamside riparian areas had this rating. Most were in upper stream reaches.

High Stream Water Temperatures

For purposes of this report, preferred stream water temperatures for salmon life stages are considered to be less than 13°C, moderately stressful temperatures are from 13 to 20°C, and extremely stressful temperatures are greater than 20°C. However, mortality can occur at 13 to 16°C for salmon embryos (Spence et al. 1996). An analysis of four water quality monitoring sites to assess temperature stress on fish was done for the period May through September 1995 (figure 18). At two monitoring sites, the upper mainstem site at 167th Avenue NE near Westwick Road and lower Cripple Creek where it crosses SR2, temperatures of streams flowing off the upper watershed were measured. At the upper mainstem French Creek site temperatures were in the preferred range for salmon only 25 percent of the time, moderately stressful 75 percent, and extremely stressful 0.5 percent. Temperatures at the Cripple Creek site were in the preferred range for salmon 63 percent of the time, moderately stressful 37 percent, and never extremely stressful. The major cause of high stream temperatures is loss of riparian shade and low stream flows. With few wetlands supporting stream flow in the summer, riparian vegetation and ground water are very important.

As French Creek enters the floodplain reaches are straightened, the riparian areas are mainly grassy, and water temperatures increase. Temperatures at the lower mainstem site were in the preferred range only seven percent of the time and exceeded 20°C for three percent of the time. Temperatures in the lower mainstem reached a maximum of 24.8°C and remained above 20°C for as long as nine hours per day during warm periods. Temperatures near the mouth of French Creek at the pumping station were the highest in the watershed. Temperatures at the pumping station were in the preferred range only two percent of the time. The maximum temperature recorded at the pump station was 27.4°C,



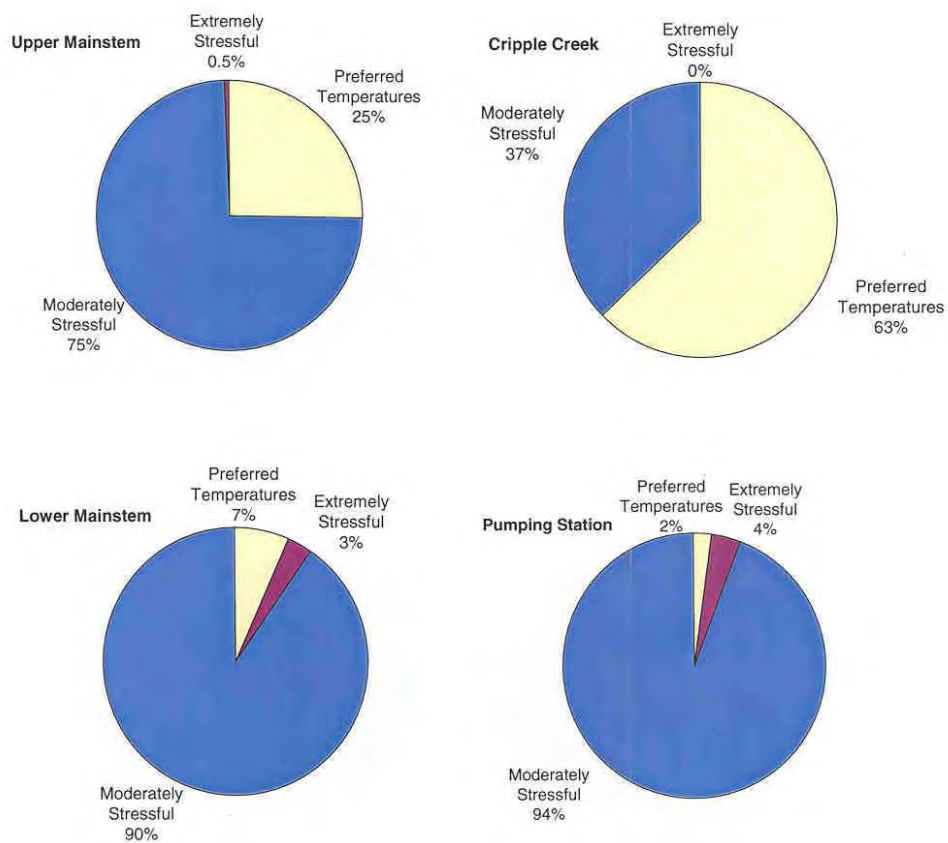


Figure 18. Temperature Stress on Salmon at Four Water Quality Monitoring Sites

Source: Thornburgh 1997

and during a five-day period in July, temperatures exceeded 20°C from six to 24 hours per day. During low flow periods, the pumps run less frequently than during the wet season. When the pumps are not running, the water near the mouth does not flow, and the water stagnates in the hot summer sun causing temperatures to rise and oxygen to drop. These conditions are lethal to salmonids, particularly juveniles.

Loss of Floodplain, Upland Instream and Off Channel Rearing Habitat

As previously mentioned, about 3800 acres of floodplain wetland rearing habitat has been lost through diking and draining. This habitat, including a large beaver pond complex, would have supported thousands (perhaps millions) of coho and Chinook smolts based on the total amount of habitat available. French and Cripple creeks have been channeled in the floodplain, and most streamside vegetation removed.

Approximately five miles of lower French Creek have been straightened and deepened. Cripple Creek has been rerouted and channeled from its original connection to French Creek near river mile 5 to its current discharge point at about river mile 2. In order to keep these stream channels cleared of vegetation and sediment so that they adequately convey water, they are cleaned out about every three years, removing instream habitat, both rearing and spawning.

According to a coho limiting factors study, most streams in the upper watershed are lacking in good pool habitat; pools are small and shallow (Aldrich 1999). Large woody debris, a feature of salmon habitat that creates pools, is absent from many stream reaches. This lack of wood could have been the result of high stream flows flushing out the wood, cleaning streams during logging activities, removal of riparian trees or cleaning out streams by current residents. Large woody debris creates habitat diversity within the stream channel, including pools, and also provides protective cover for fish.

Poor Water Quality

Hillside and streamside grading or other construction activities provide a sediment source that has resulted in stream channel siltation. Sediments move downstream with each storm, adding fine silt to streambed gravels, eventually depositing the sediment load in floodplain stream channels. Fine silt deposited in upstream channels covers spawning gravel and smothers salmon eggs. Silt in the water clogs the gills of young fish. Because of its topography, French Creek has a complex stream system, and sediment from almost any land clearing activity will end up in watershed streams. High turbidity levels were found in Stables Creek, probably from pasture runoff and animal access to the stream and Cripple Creek, which may have been contributed by a slide on Trench Creek, a tributary to Cripple Creek. In addition, the Lords Hill streams that flow through ravines with erodable soils and Fryelands streams where home construction was occurring also had high turbidity levels. Much of the muddy water observed in the northern watershed hillsides can be attributed to clearing and grading from development related activities and also from ditch maintenance.

The highest nitrate levels were found in floodplain streams. However, several upper tributaries had high nitrates (levels that exceeded 1.0 mg/l) during the winter including

streams flowing through the Fryelands, Lords Hill, Upper Cripple, Lower Cripple, and Lower Stables creeks. Upper French, Trench Creek, and Upper Stables have nitrate levels from 0.91 to 0.99 mg/l. Fryelands and Lords Hill streams had high nitrates during the summer as well. High nitrates contribute to the vegetation and algae growth in streams. Plant decay depletes instream oxygen, which becomes unavailable to fish. Nitrates are contributed to stream water by chemical fertilizers, human and livestock wastes.

Streambank Erosion

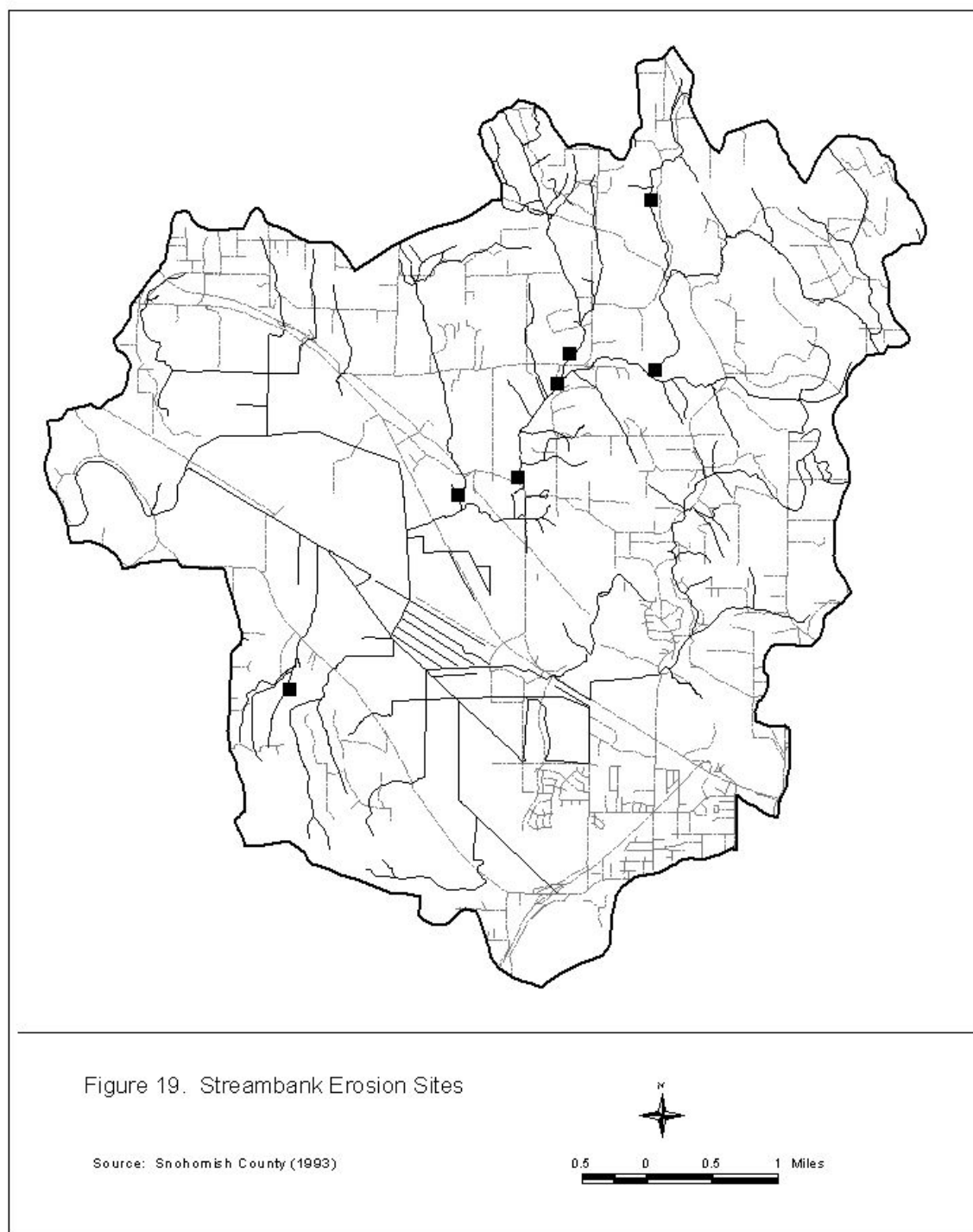
Erosion from flowing water within stream channels is an ongoing process. Streams with sandy beds are found in the Lords Hill area and small reaches in other areas. These areas have advance and recessional outwash soils exposed at the surface or shallow or slight stream gradients resulting in deposition of fine-grained materials from stream transport. All streambed materials in sand bed streams and drainages can be readily moved at almost all streamflow rates above a very low level.

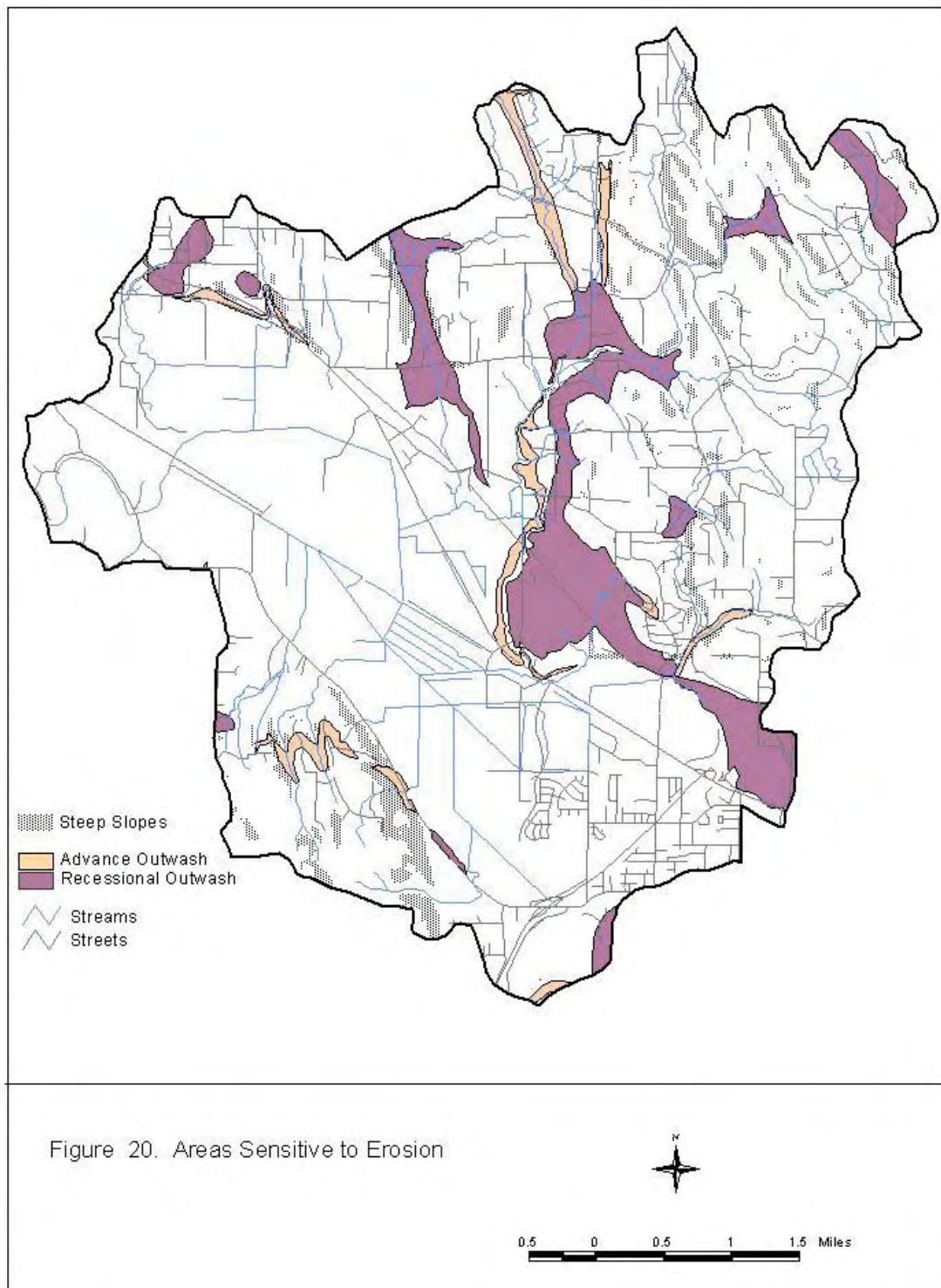
Gravel bed streams are found throughout most of watershed. Sediment loads carried by stream flow are categorized as either suspended load or bed load. The suspended load consists of particles lifted up by eddies in the main flow and moved long distances downstream before settling on the bed. Most (85-95%) of the sediment load carried by stream flow is suspended load and consists of clays, silts and sands. Bed load represents larger particles that roll, slide, skip, or saltate (hopping out of the bed into the flow), making periodic or continuous contact with the bed. Increases in stream flows during storm events increase movement of both suspended and bed loads downstream.

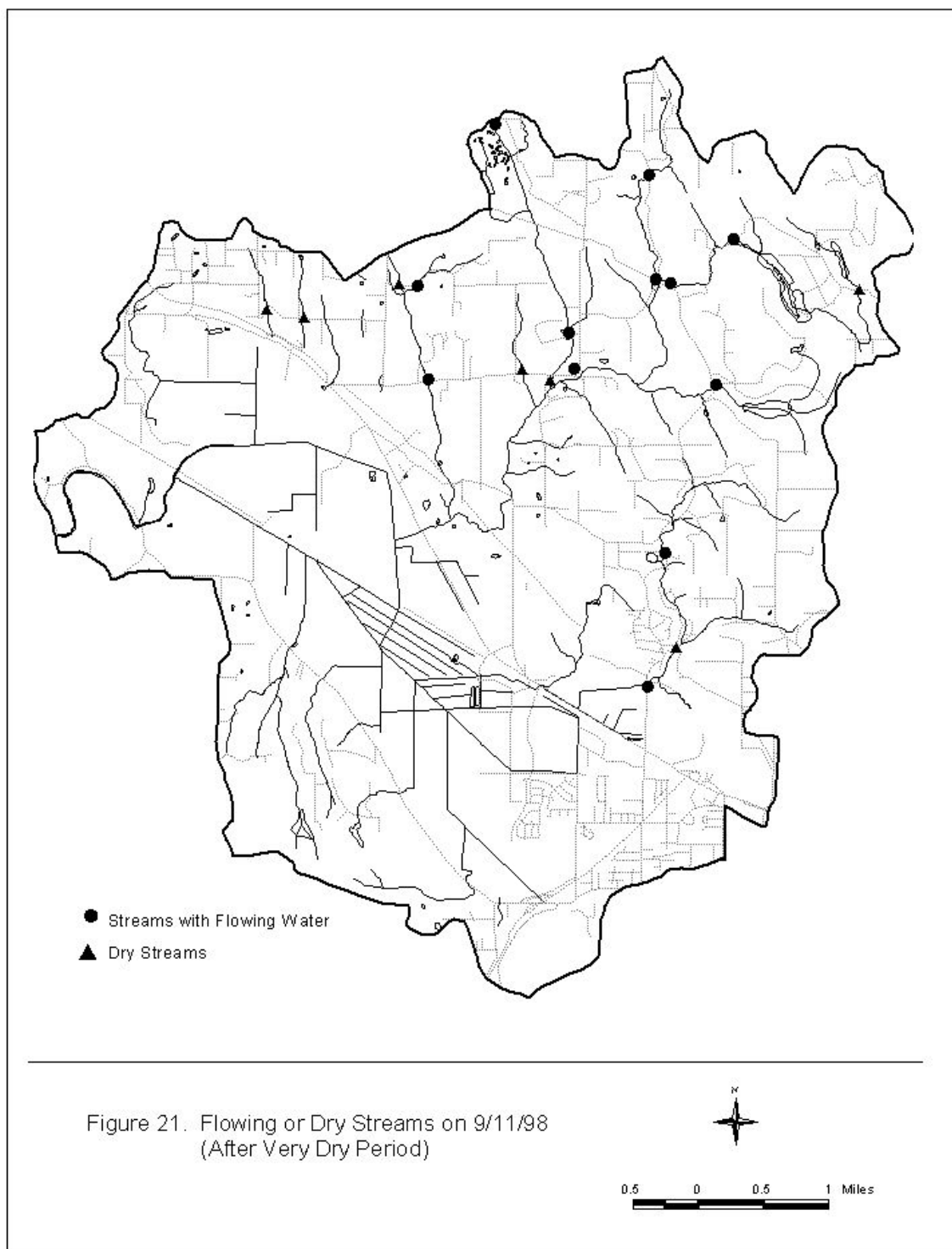
Erosion from increased peak flows has caused downcutting and scouring of the stream channels, cut away streambanks, and degraded fish and wildlife habitat. Accelerated bed lowering and bank erosion can cause destruction of aquatic habitat and excavation or dewatering of riparian zones. Serious erosion and bank failures have occurred on Lords Hill and Cripple and Trench creeks caused by increased stormwater runoff from development, discharges of piped water to streambanks, and breaking of beaver dams. Figure 19 illustrates sites where a 1993 Surface Water Management study found erosion problems. Golf Course and Stables creeks, lower French and Cripple creeks, and the Lords Hill tributaries all lie in geologic deposits that are highly susceptible to erosion (figure 20). Animals pastured along unfenced streams contribute to streambank erosion and instream sedimentation as well.

Low Summer Flows

Low stream flows affect salmon productivity by reducing the amount of rearing habitat. Stream flow can be reduced by over allocation of ground water for drinking water and irrigation and by creation of impervious surface. Both lower the water table reducing ground water discharge into streams. The HSPF model looked at the potential for stream low flows to affect instream habitat during the summer. The study assumed that a base flow of at least one cubic feet per second occurring at least 50 percent of the time was necessary for fish stream use. The model predicted that at future development the following eight streams reaches would not meet this baseflow threshold and would likely go dry in the summer: Upper Spada, Upper Stables, Ghost Horse Creek, Chain Lake Creek, Upper Cripple Creek, tributary to Cripple Creek, Trench Creek, and the Lords Hill







tributaries. Portions of Cripple Creek, Alston, Stables, and all of Trench Creek already dry up during summer months (figure 21).

Ground water is an important source of stream water, particularly in this watershed where wetlands are small in size and number. Figure 22 shows areas of ground water recharge, discharge, and wetlands. Wetlands also provide base flow support to streams.

Landowner Stream and Wetland Alterations

Headwater wetlands are important to streams for their ability to store water and discharge it at a slow rate maintaining stream base flow during the summer. Residents are altering headwater wetlands on both Ghost Horse and Stables creeks, changing the hydrology of these important areas through ditching and creating areas of open water removing important wetland functions. Ditching alters hydrology and open water has a higher evaporation rate and does not perform the same functions as vegetated wetlands.

Incorrect Typing of Streams

Protection for streams under Critical Areas Regulations and other regulations, including Forest Practice Rules, is based on stream typing. The Washington Department of Natural Resources (DNR) originally typed streams. Evaluation of the stream typing indicated that many streams are incorrectly typed. In 1997, The Tulalip Tribes retyped many streams in the French Creek watershed. Figure 23 shows the original and new watershed stream typing. At this time, neither the DNR, the county, nor Monroe uses the new stream types determined by The Tulalip Tribes. The DNR and county usually type streams during the permit process.

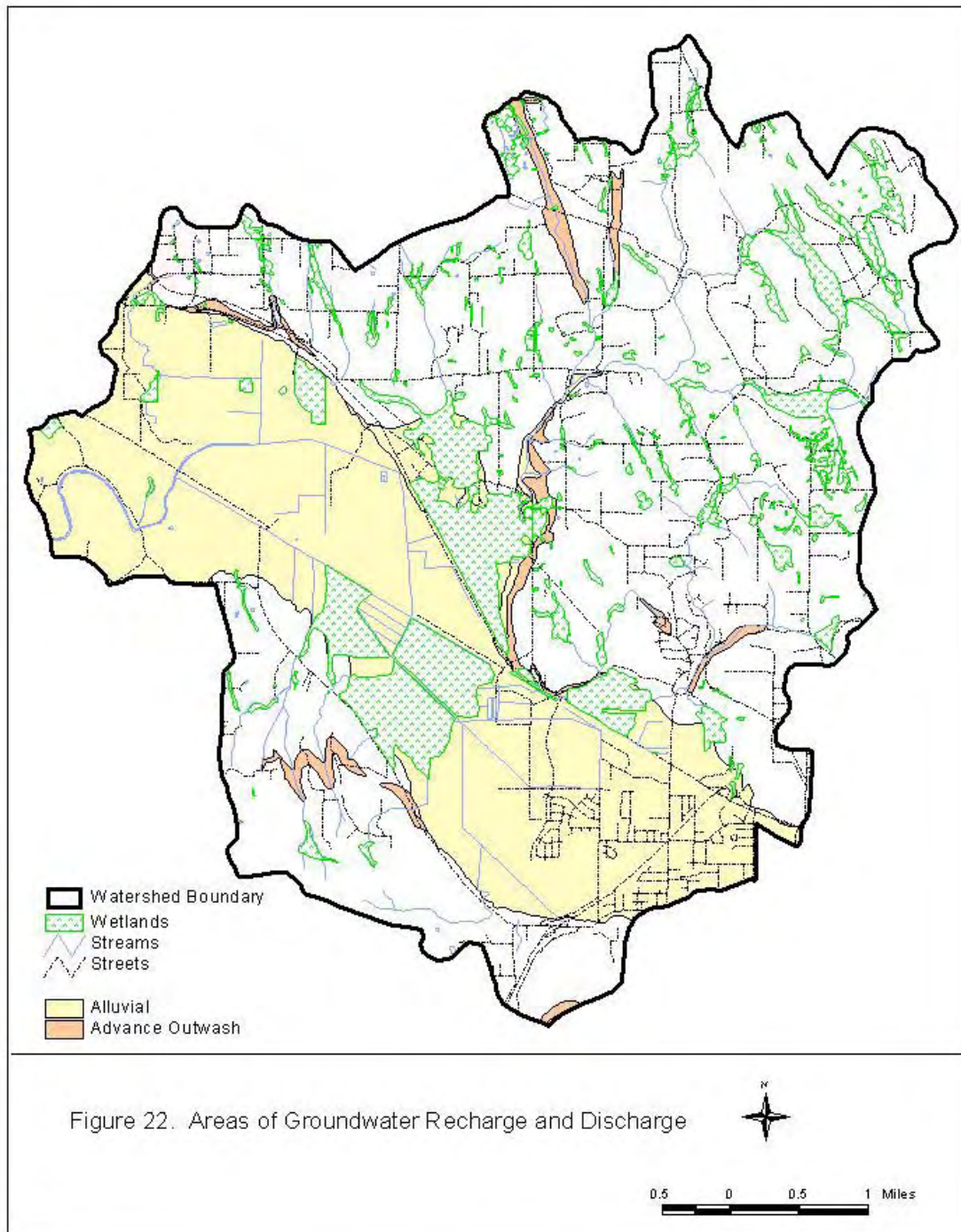
Stream Restoration and Monitoring Costs

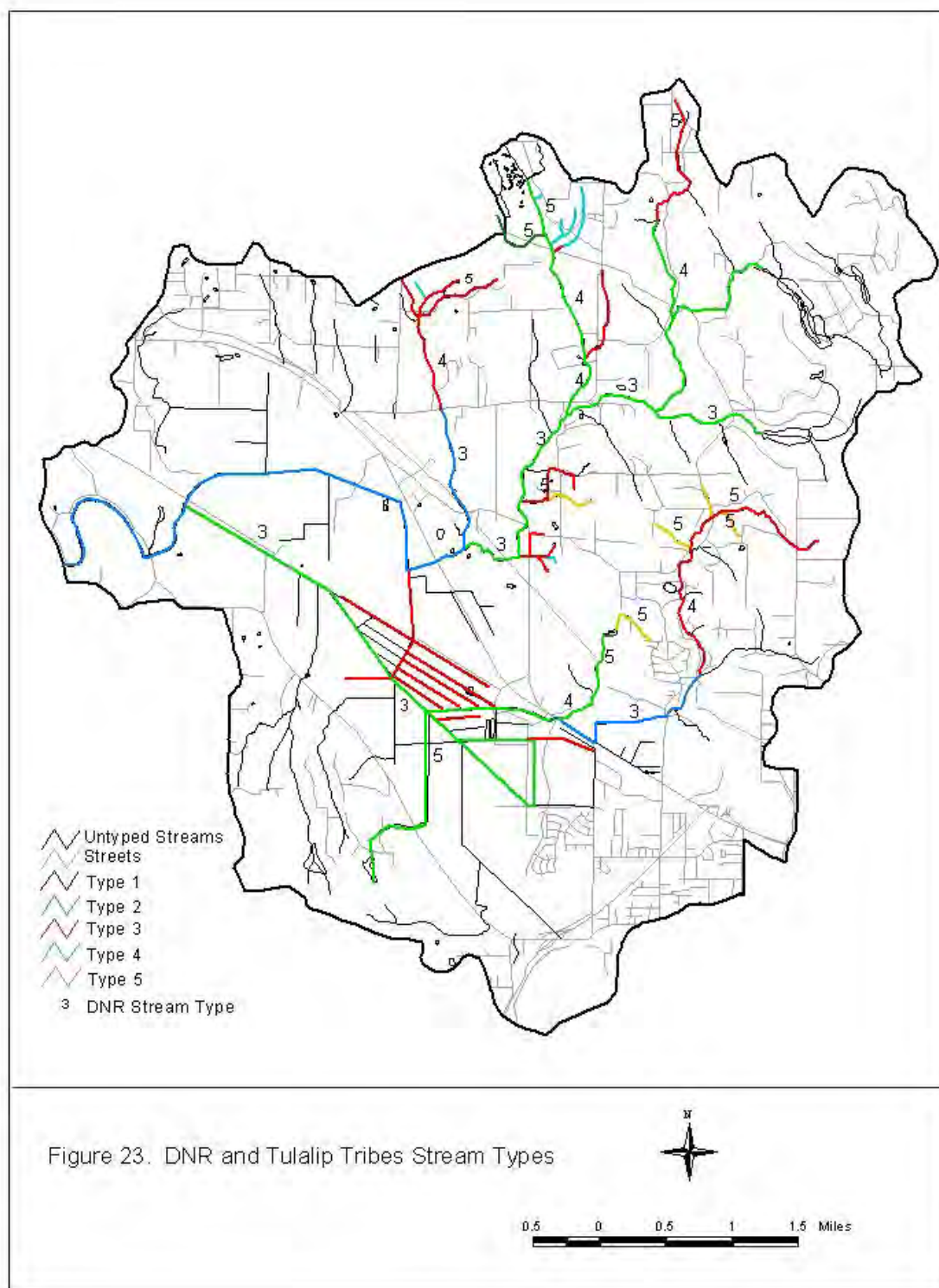
The cost of stream rehabilitation ranges from about \$10,000 to \$500,000 per mile, depending upon stream types, conditions, and project objectives (The Tulalip Tribes 1990). Little maintenance and monitoring of construction projects affecting streams are performed. As development continues, problems grow and accumulate, and the costs of repair to damaged systems increase.

Regulatory Impediments

In Snohomish County, various types of local, state and federal permits, fees, applications, and inspections discourage residents who want to improve habitat on their property. Often landowners do not know the proper procedures, costs, and steps involved in doing habitat enhancement projects. This has resulted in many landowners either abandoning projects, or if they do follow through, getting into trouble with agencies for not following procedures. Residents who get financial, technical, and administrative assistance are probably more likely to attempt habitat restoration.

Because of the Endangered Species Act, new rules for development and restoration projects on streams providing habitat for bull trout and Chinook salmon are in place. Much more documentation must be prepared and the review process is lengthy.





FRAMEWORK FOR PROTECTING STREAMS

Regulatory and Policy Programs

Significant state regulatory programs protecting streams include hydraulic project approvals (HPAs) issued under the Hydraulic Code of 1949 (RCW 75.20.70C), the Puget Sound Water Quality Plan, Shoreline Management Act (Chapter 173-26 WAC), State Environmental Policy Act (Chapter 43.21C RCW), Endangered Species Act, local comprehensive plans, and critical areas regulations. (Stormwater regulations and the Stormwater Manual are covered on page 80.)

Hydraulic Project Approvals

HPAs protect fish habitat through requirements placed on construction and other activities within stream channels or activities that would affect stream channels. The Washington Department of Fish and Wildlife establishes these requirements on a project-by-project basis for individual development proposals. While larger streams are protected under this permit, small, intermittent and ephemeral streams can still be -moved and channeled for development.

Puget Sound Water Quality Plan

The Puget Sound Water Quality Action Team implements the Puget Sound Water Quality Plan. State and local jurisdictions must evaluate and incorporate applicable plan provisions into their own regulatory framework and policies. The plan addresses protection of streams and riparian areas by encouraging all jurisdictions to be proactive in the short term in protecting fish and wildlife habitat so that there is no net loss. In the long term, regulations and programs of the various agencies are coordinated to provide solutions for habitat protection. The goal is a net gain of aquatic and riparian habitats of importance to water quality protection. This is to be accomplished by long-range educational programs, habitat enhancement programs, public forums to discuss the hydraulic permit standards, and research.

Shoreline Management Act (the following information is taken from Ecology's web site)

The Shoreline Management Act (SMA) was adopted through a citizen referendum in 1972 and is administered by the Washington Department of Ecology (Ecology). The Act applies to marine waters, submerged tidelands, lakes over 20 acres, and all streams with a mean annual flow greater than 20 cubic feet per second. Marshes, bogs, and swamps associated with these waters are also included, as is a 200-foot wide shoreline area inland from the water's edge.

The primary intent of the Act is to ensure that development of the shorelines is in the public's best interest. This goal is attained through the protection of natural shorelines, and encouragement of water-related and water-dependent uses. The underlying goal is to find a balance between uses that allow reasonable development and economic activity while affording preservation of the public's access and enjoyment of the shorelines.

The SMA regulates activity through local shoreline master programs. Local governments develop these programs with policy guidance from Ecology. Each local master program

combines planning and regulation. Master programs classify land areas for intended uses, including designations such as urban, rural, natural, and conservancy. Local master program policies are implemented through the "shoreline substantial development permit" process. Local governments issue permits, with review by Ecology.

In November of 2000, Ecology updated the state's shoreline management guidelines for the first time since 1972. However, a coalition of business groups and local governments challenged the guidelines, and the Shoreline Hearings Board subsequently invalidated them. Mediation talks were begun to reach a legal settlement to update the guidelines. The outcome of the negotiations is the draft shoreline management guidelines up for public comments in 2003.

In the French Creek watershed stream flows greater than 20 cubic feet per second (cfs) occur in the following reaches: Mainstem French Creek from the mouth to its confluence with Golf Course Creek and lower Cripple Creek from Route 2 to its confluence with French Creek. The county and city SMMPs designate the French Creek floodplain as rural environment to "protect agricultural land from urban expansion, restrict intensive development along undeveloped shorelines, function as a buffer between urban areas, and maintain open spaces and opportunities for recreational and other uses compatible with agricultural activities."

SEPA

Environmental reviews are to be used by all of the watershed jurisdictions to reduce harmful effects on local water resources. Most of these reviews are conducted under the State Environmental Policy Act (SEPA) and the local ordinances that describe county and city roles in administering SEPA requirements. Under SEPA, development project proponents are required to disclose probable negative effects of projects on aquatic resources and propose ways to reduce those effects. Local governments usually have authority to conduct these reviews and insure that negative effects are avoided or reduced. However, state law prohibits local governments from using SEPA's substantive authority to protect critical areas if the local government adequately addresses the impacts of a project.

Endangered Species Act, 4d Rule

The Secretaries of Commerce and Interior are required to adopt protective rules that are deemed necessary and advisable for the conservation of species listed as threatened under the Endangered Species Act (ESA). Both Chinook salmon and bull trout are listed as "threatened" in the Snohomish River basin. The National Marine Fisheries Service, an agency of the Commerce Department, has jurisdiction for the Chinook salmon in the Snohomish River, and the U.S. Fish and Wildlife Service, an agency of the Interior Department, has jurisdiction for the bull trout. The French Creek floodplain provided historic habitat for Chinook salmon, and a portion of the French Creek stream system is presumed habitat for bull trout.

Under section 4(d) of the Endangered Species Act, harming, killing, capturing, or injuring protected species without specific authorization is prohibited. To harm includes modifying or degrading habitat where it kills or injures a protected species by impairing

its ability to breed, spawn, rear, migrate, feed, or find shelter. The 4(d) rule protects listed fish until recovery plans that account for local conditions and circumstances are developed. The 4(d) rule offers state, tribal, and local jurisdictions an option for assuring that their programs meet the species' biological requirements, and so comply with ESA.

In addition to the blanket protection, the rules also contain a series of exceptions to the take prohibitions, called "take limits," for several general categories of activities that the agency may exempt in the future, if the state or local entities submit a specific proposal for approval. The rule describes the categories of activities that may be exempted, such as recreational fishing, hatchery operation, scientific research, routine road maintenance, water diversions and municipal development activities. It also specifies the criteria that would be used to evaluate any proposal.

Comprehensive Plans

New comprehensive plans have been developed for both the county and Monroe. The comprehensive plan is one of the major policy tools used to protect surface waters.

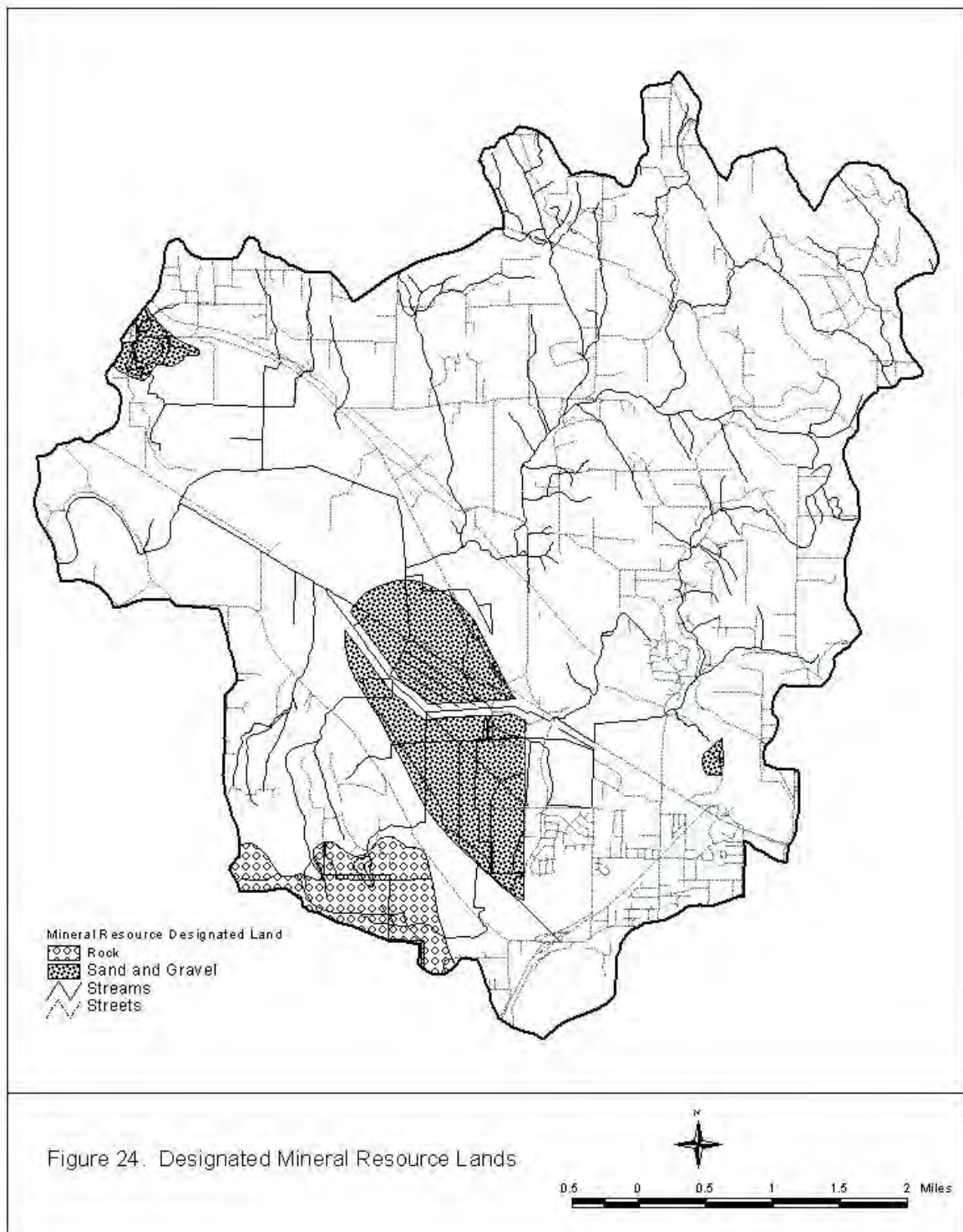
Snohomish County Comprehensive Plan

Snohomish County has adopted four documents that represent the comprehensive plan. The General Policy Plan (GPP) sets forth policies that address land use, urban growth areas, housing, transportation, capital facilities, utilities, economic development, natural environment, interjurisdictional coordination, and private property rights. Three additional more specific functional plans have been developed: the Comprehensive Park and Recreation Plan, the Transportation Element, and the Capital Plan. Together these documents represent the comprehensive plan and are the means to meet Growth Management Act requirements.

Of particular importance to water resources in the French Creek watershed are the policies in the GPP. There are a number of policies that provide a framework for protecting water resources.

Although the county General Policy Plan (GPP) establishes an umbrella of policies for all unincorporated areas, older subarea comprehensive plans are still used in determining area specific policy and land use as long as they are consistent with the GPP. Such is the case for the land in the French Creek watershed. It is included in the county's Skykomish Valley and Snohomish/Lake Stevens Area Comprehensive Plans. These plans were adopted in the early 1980s and are implemented through rezone actions, permit conditions, and SEPA review. More detailed planning for several Urban Growth Areas (UGAs) is currently underway. Urban growth area planning has not begun for the Monroe UGA.

Snohomish County has applied a mineral resource overlay to a portion of the floodplain area west of Monroe (figure 24). This overlay was adopted by the County Council and included as the mineral resource designation in the 1995 General Policy Plan. This overlay was in response to a landowner request to mine the area. Snohomish County will



be reconsidering mineral resource designations in the 10 year update of the GMA comprehensive plan scheduled for County Council adoption in 2005.

The typical reclamation design for floodplain mines is to create lakes. Because the water in these created lakes is generally warm, there is a potential for causing further temperature problems in floodplain streams to which the lakes would discharge. In addition mining could preclude restoration projects in the floodplain that would restore floodplain wetlands. Lakes used as restoration for mining sites become anoxic and are not beneficial as aquatic habitat or for recreation.

Monroe Comprehensive Plan

The Monroe Comprehensive Plan addresses the city's growth for the next 20 years as required in the Growth Management Act. The planning area consists of the current city limits and the urban growth area.

The comprehensive plan discusses the following elements as required by the Growth Management Act: Natural Features, Land Use, Housing, Capital Facilities, Economic Development, Transportation, Utilities, Parks and Recreation.

The goals of the Natural Features element are "to achieve a harmonious relationship between the built and natural environments; to promote communitywide stewardship of the natural environment for future generations; and to protect, to preserve and enhance natural features most sensitive to human activities and most critical to fish and wildlife survival and propagation." The Land Use element describes the way growth will occur by designating preferred land uses for planning areas within the city and its urban growth boundary. It also includes policies to implement the other elements of the comprehensive plan. The Capital Facilities element addresses existing stormwater facilities and future needs. The city has adopted a Stormwater Management Ordinance based on Ecology's Stormwater Management Manual for the Puget Sound Basin.

Critical Areas Regulations

Snohomish County

The county's Critical Areas Regulations designates and adopts regulations to protect critical areas--fish and wildlife habitats, geological hazard areas, and wetlands (Snohomish County Code Chapter 32.10). The regulation is currently being revised. General objectives include the following:

- Protecting unique, fragile, and important elements of the natural environment.
- Informing county residents of the importance of, and hazards from, critical areas.
- Balancing private rights of individual property owners with the need to protect public health and safety and to preserve environmentally sensitive areas.
- Preventing or reducing damage to property and injury to people resulting from development activities in or near critical areas.
- Providing review procedures and criteria for compliance with both the State Environmental Policy Act, RCW 43.21C and the Snohomish County Comprehensive Plan policies concerning critical areas.

Protective measures required by this ordinance are considered by county law to constitute adequate mitigation of adverse impacts on critical areas under SEPA. This ordinance will supersede all policies in the Snohomish County Comprehensive Plan (subarea plans). For lands not meeting the critical areas definition, subarea plan policies will remain in effect.

Stream and wetland buffers are distinguished between urban (portions of streams and wetlands contained within a county designated urban growth boundary) and rural (portions lying outside the urban growth boundary). Buffer widths range from ten feet for type 5 urban streams to 100 feet for type 3 rural and all type 1 and 2 streams.

Construction of a single-family residence on an existing legal lot can be allowed within a stream buffer under certain circumstances. If application of critical area regulations concerning streams will prevent economically viable use of property, a reasonable use allowance may be requested.

Other regulation provisions include requirements for critical area studies and mitigation plans for any loss of stream and buffer area. Restoration is required when a stream or buffer is altered prior to project approval, unless the alteration was legally authorized.

Snohomish County recently enacted a Salmonid Habitat Management Plan Administrative Rule (32.10.310 and 32.10.320 SCC) in response to the listing of the Chinook salmon. This rule applies to bull trout as well. The rule establishes a 150-foot buffer for all streams designated as Chinook and bull trout habitat. No effective impervious surface without infiltration is allowed within 300 feet of the listed fish bearing waterbody.

City of Monroe

Monroe's Critical Areas Guidelines were developed instead of critical area regulations. These guidelines are to be used upon submission of a development proposal and their intent is to:

- Protect and restore sensitive areas and/or mitigate impacts to sensitive areas by regulating their development
- Prevent adverse impacts to water quality, wetlands and streams
- Alert developers to limitations imposed by sensitive areas
- Provide city officials with information to approve, condition or deny development proposals
- Protect unique, fragile and valuable elements of the environment
- Implement policies of SEPA and the Monroe Comprehensive Plan

All proposed development activities (except for specific exemptions) within sensitive areas must be reviewed by the city, which will approve, condition or deny proposals based on the extent to which impacts can be mitigated.

Buffer requirements for streams consist of an undisturbed area of native vegetation usually placed in native growth protection easements. Measurement of buffers is from the

ordinary high water mark. Buffers are 25 feet for class 3 streams, 50 feet for class 2 streams and 100 feet for class 1 streams.

Additionally, streams that have adjacent wetlands would apply the wetland buffers. Streams located within 25 feet of steep slopes could have different buffer widths; the size depends on slope steepness. The buffer width may be modified with an approved mitigation plan.

Nonregulatory Programs

Open Space Taxation Program

Programs that offer property tax reductions on sensitive lands are incentives available through local governments. The county's Open Space Taxation Program (Chapter 4.28SCC) allows property owners to pay reduced taxes on lands that are maintained for at least seven years in open space, agriculture, or forest. Property owners can also reduce property taxes by selling or donating conservation easements authorized under state law (WAC458-16-290) to local governments or private land trusts.

Education

Snohomish County Surface Water Management has educational programs that involve watershed citizens. The 11-week (47 hour) Watershed Keeper class motivates citizens to take watershed and fish friendly actions. Several workshops are offered each year, some designed for all watershed residents and others targeted at educators, providing information about water quality and salmon. The Native Plant Program teaches volunteers to use native plants to restore riparian areas. Salmon Watchers is a countywide monitoring program that helps residents count adult salmon moving into stream systems to spawn.

Restoration

A number of groups in the county are doing stream restoration projects in all three major basins. In the Snohomish River basin, the following organizations are examples:

- Spencer Island was a multi agency restoration project.
- The Tulalip Tribes, Snohomish Conservation District, and Washington Department of Fish and Wildlife have all done fencing and revegetation projects.
- Snohomish County Surface Water Management has removed a number of fish blockages and done stream restoration projects, including at Stables Creek in partnership with the Snohomish Conservation District.
- Adopt-A-Stream Foundation has done some repair work on the French Creek fish ladder, as well as stream restoration in other areas.
- Chinook, Inc., Trout Unlimited, and other agencies are working cooperatively to restore habitat at Haskell Slough.

Wetland Loss and Degradation

(Problem Summary and Management Recommendations, pages 143-145)

PROBLEM DESCRIPTION

Wetlands provide a wide variety of vitally important ecological and cultural benefits that are referred to as wetland functions and values. These functions and values include improving water quality, storing water, maintaining stream base flow, providing fish and wildlife habitat, and recharging ground water. Wetland functions and values are reduced or lost when wetlands are used as pasture, drained for crops, receive polluted stormwater or when they are filled to accommodate development. Logging in and around wetlands reduces habitat, results in erosion and alters hydrology. Creating impervious surface results in a decline of wetland biological functions.

Wetland buffers are required through regulations. Vegetated buffers reduce soil erosion and sediment input into wetlands, moderate water level fluctuations that can damage wetlands, moderate temperatures, provide additional wildlife habitat, and create a barrier that limits human disturbance to wetlands. Wetlands and wetland buffers in developed and agricultural areas generally receive their greatest impact from the actions of adjacent residents who remove the buffer vegetation, dump garbage and yard debris into the wetland, and attempt to drain wetlands.

EXTENT OF WETLAND IMPACTS

An inventory of the French Creek watershed identified 440 wetlands consisting of about 1,825 acres (Meehan-Martin 1998) (see figure 7, page 26). This represents about ten percent of the total watershed acreage (17,888 acres). The inventory was done using aerial photo interpretation, examination of wetlands delineated through the permit process, and mapping wetlands that were visible from public land.

Most of the watershed's inventoried wetlands are emergent. Emergent wetlands are dominated by nonwoody plants that emerge out of soil or water, unlike aquatic plants that float in or on water. This dominance of emergent wetlands is a result of past clearing and wetland conversion to pasture and cropland.

Watershed wetlands range in size from less than an acre to more than 230 acres. About 66 percent are less than one acre in area; 20 percent between 1.01 and 5 acres, seven percent between 5.01 and 10 acres; four percent from 10.01 to 100 acres, and one percent is over 100 acres. Size does not always correspond to importance; small wetlands can be of higher value than a larger wetland. In some cases, many small wetlands together can provide the same or greater benefits than one large wetland provides. The predominance of small wetlands in the upland portions of the watershed is due in large part to the rolling topography and limited depressions.

Most of the remaining larger wetlands are located either at stream headwaters or in floodplain alluvial soils. Small wetlands are interspersed at an intermediate level in the watershed uplands. Many small wetlands are associated with streams in outwash soils

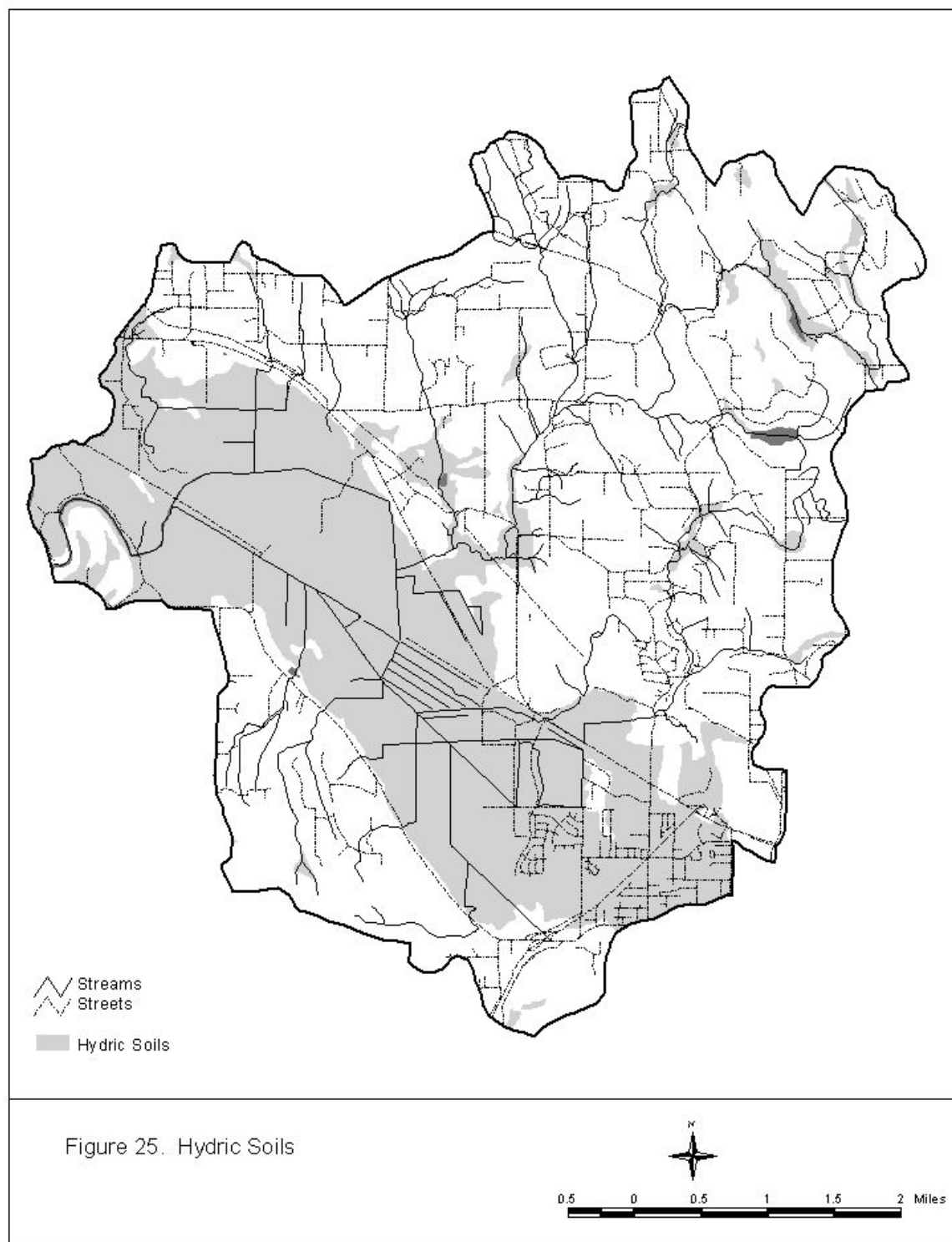
where they recharge ground water or provide ground water discharge to a stream. These wetlands also provide important salmon rearing habitat and baseflow. Other wetlands occur away from streams on glacial till soils. Because of their location in the watershed these wetlands improve water quality by capturing and storing nutrients, sediments, and fecal coliform bacteria. They act as water quality treatment systems in areas where this function is most beneficial.

Historically the amount of wetland acreage was considerably greater. The historic record indicated that approximately 3800 floodplain acres were once a large wetland system (Haas and Collins 2001). Hydric soils mapped by the Soil Conservation Service indicate that approximately 4100 floodplain acres were originally wetland (figure 25). According to Haas and Collins, the wetland was a scrub-shrub wetland dominated by hardhack spirea with willow and crabapple the tree species dominant in numbers, but Sitka spruce was dominant by basal area. A swath of Sitka spruce and western red cedar cut the marsh almost in half. The trees ran from the northern end of Lords Hill across to where Route 2 nears Monroe. The eastern end of the marsh was a large beaver meadow-wetland complex (see figure 10, page 32). The only other wetland of this type historically existing along the Snohomish River was at Marshland, formerly a 4000-acre scrub-shrub wetland. This type of wetland no longer exists in the Snohomish River floodplain. These floodplain scrub-shrub wetlands were valuable as summer rearing habitat for juvenile coho salmon produced in the French Creek system, as well as juvenile coho and Chinook salmon from the Snohomish River system. Even though a few hundred acres of wetland remain, the wetlands are inaccessible to salmon and the rearing function is lost.

Wetlands were often drained throughout the watershed to keep agricultural land dry and to eliminate wetlands on property to be developed. Draining activities within the floodplain include excavation of ditches and installation of drain tiles. Effective draining leads to elimination of wetland habitat, because the hydrology is altered such that it will not support wetland species. Draining wetlands is a reversible process--drain tiles can be removed, or drainage ditches can be filled in, but it would take many years for the wetlands to return to their pre-existing conditions.

Livestock graze on watershed wetlands. Livestock trample and damage vegetation, damage soil structure, eliminate wildlife habitat, and contribute additional nutrients (from fecal material) to wetlands. Grazed wetlands usually support invasive plant species such as soft rush, creeping buttercup, and reed canarygrass. Grazed wetlands are also compacted by the animals causing water to pond rather than infiltrate. The agricultural survey conducted for the French Creek watershed (Bartelheimer 1997) identified 20 farms where wet pastures were used for grazing.

Throughout the French Creek watershed, wetlands have been permanently lost as a result of conversion of the landscape to development. This has occurred in the Robinhood Lane area along Cripple Creek, at the Foothills development, the fairgrounds and airfield, and the City of Monroe. The outcomes of wetland loss are an increased rate and volume of



surface water runoff resulting in increased flooding, increased siltation and sedimentation in streams and wetlands, and decreases in water quality. All adversely affect wildlife and fish resources.

Stormwater impacts can be very damaging to wetland plant and animal communities (Azous and Richter 1995). Water level fluctuation in a wetland can alter wetland community composition benefiting nonnative, invasive species. Water level fluctuations may affect amphibians by thwarting successful hatching of egg masses. Changes or losses of plant and animal species caused by stormwater impacts can reduce the diversity of native wetlands. According to Horner et al. (1996), urbanization of a subbasin that results in removal of forest and increased impervious areas caused a decline in biological function that can be mitigated by protecting wetlands and their buffers. Based on projected future land use/land cover, all wetlands must be protected to support the biological function of the watershed.

Logging occurs in and around wetlands in the watershed. This logging can result in habitat loss, introduction of nonnative species, and changes in the hydroperiod. Significant loss of tree cover alters the rate and volume of water entering a wetland; in addition, exposed soil may be eroded. In logged areas, because of the lack of vegetated cover and disruption of the soil integrity, surface water runoff can cause erosion. This erosion can lead to problems such as increased sedimentation in downstream wetlands and streams, blockage of downstream conveyance culverts, and slope failure. Debris piles left from logging activities in wetlands can create dams that alter natural water movement through the wetland.

Although logging for timber management in the watershed has diminished, logging still occurs when development is anticipated in the future. The county does not have a clearing ordinance to restrict the percentage of a site that can be cleared during development. Critical Areas Regulations that would protect wetlands are not applied under Forest Practice Rules unless the permit application is a conversion from forest to development. Wetlands that are logged under class II and III Forest Practice permits may be developed after the six-year moratorium and restoration is not required when future conversion takes place. (See page 118 for further information on Forest Practice Permits.)

Meadow Lake is a bog wetland community characterized by a floating mat of sphagnum moss and dominated by Labrador tea. Other unusual plants include bog laurel and sundew. This is an irreplaceable plant community. This bog is fed at least in part by ground water. Meadow Lake is surrounded by homes; runoff and shoreline modifications from these residences plus new development have already damaged this unique wetland system.

The degree of development surrounding a wetland appears to have a direct correlation with the amount and types of disturbances affecting the wetland (WA Dept. of Ecology 1992). The currently planned future buildout will continue to adversely impact wetland functions and water quality. Many wetland sites in residential and agricultural areas

become highly altered and show degraded water quality. Even where vegetative buffers have been left to protect wetlands, their effectiveness is reduced as residents alter the buffers by removing vegetation and planting grass.

Under state and local regulations, almost all wetland loss can be mitigated. Mitigation projects almost never function properly nor do they adequately replace the wetland functions that were lost as a result of development projects (Mockler 1998).

Acquisition funds for palustrine wetland preservation are seldom available. Any funding that is available to government agencies for land acquisition generally goes to important floodplain habitat. It is almost impossible to protect through acquisition forested wetlands or headwater wetlands that are extremely valuable to watershed hydrology and are of primary importance to salmon survival (Pess 2000).

FRAMEWORK FOR PROTECTING WETLANDS

Clean Water Act

At the federal level, one of the significant regulatory programs is administered by the U.S. Army Corps of Engineers under section 404 of the Clean Water Act. This program requires a permit for dredging or placing dredge or fill material in waters of the U.S. and wetlands. Section 404 permits, which are required for many construction projects in the watershed, were developed to protect water quality and reduce damage to rivers, streams, and wetlands. In the watershed, Section 404 permits are most commonly used to regulate wetlands. While the regulations do prevent wetland filling, almost all wetland impacts can be mitigated, and the regulations do not prevent draining of wetlands. Federal wetland regulations continually change; in the latest version of the regulations, wetland impacts greater than one-third acre trigger a requirement that mitigation be provided.

Shoreline Management Master Plans and SEPA

Filling of wetlands is also regulated through the city and county Shoreline Management Master Plans (SMMPs) and the State Environmental Policy Act (SEPA). The SMMP protects wetlands within 200 feet of “shorelines of the state” through restrictions on filling of wetlands and mitigation requirements for most permitted wetland filling. A SEPA review is required unless the project is exempt when grading will impact any sensitive areas, including wetlands. Both Monroe and Snohomish County use environmental reviews to evaluate harmful effects to wetlands. Many of these reviews are conducted under SEPA and the local ordinances that describe county and city roles in administering SEPA requirements. Under SEPA, development project proponents are required to disclose probably adverse environmental effects of their projects and propose ways to reduce those effects. Local governments usually have authority to conduct these reviews, which are intended to identify adverse impacts of proposed projects.

Comprehensive Plan Policies

The county and cities have established general wetland protection policies through comprehensive plans. Comprehensive plans are implemented through individual rezone

actions and other land use decisions that are subject to SEPA review. The policies themselves protect wetlands only in a limited way.

County Critical Areas Regulation

The County Critical Areas Regulations (32.10 SCC) designates and adopts regulations to protect wetlands. General objectives include the following:

- Protecting unique, fragile, and important elements of the natural environment.
- Informing county residents of the importance of, and hazards from, critical areas.
- Balancing private rights of individual property owners with the need to protect public health and safety and to preserve environmentally sensitive areas.
- Preventing or reducing damage to property and injury to people resulting from development activities in or near critical areas.
- Providing review procedures and criteria for compliance with both the State Environmental Policy Act, RCW 43.21C (see SEPA, State Regulations) and the Snohomish County Comprehensive Plan policies concerning critical areas.

Protective measures required by this ordinance will be considered by county law to constitute adequate mitigation of adverse impacts on critical areas. This ordinance supersedes all policies in the Snohomish County Comprehensive Plan and subarea plans. For lands not meeting the critical areas definition, subarea plan policies will remain in effect.

Wetland buffers are distinguished between urban (wetlands contained within a county designated urban growth boundary) and rural (wetlands outside the urban growth boundary). Buffer widths range from 25 feet for category 4 urban and rural wetlands, 75 feet for category 1 urban wetlands, and 100 feet for category 1 rural wetlands.

Wetland categories are as follows:

Category 1: Wetlands that are estuarine, bogs 1+ acre, mature forests 10+ acres, have priority species, wetlands 10 acres with three wetland types including open water.

Category 2: Bogs less than 1 acre, mature forests less than 10 acres, wetlands 5 to 10 acres with three wetland types including open water.

Category 3: Wetlands that are not categories 1, 2, or 4.

Category 4: Wetlands not along streams, less than 1 acre and 1 type mainly dominated by exotic plants.

Single-family residences on existing legal lots can be built within wetlands or wetland buffers under certain circumstances. If application of the critical area regulations protecting wetlands will prevent economically viable use of property, a reasonable use allowance may be requested.

Other provisions of the regulation include requirements for critical area studies and mitigation plans for any loss of area of wetlands and their buffers. Restoration is required

when a wetland or buffer is altered prior to project approval, unless the alteration was legally authorized.

Some of the allowed activities within wetlands and their buffers include maintenance and repair of roads and most construction activities related to utilities. All development activities are allowed in nonriparian Category 2 and 3 wetlands that are smaller than 5000 square feet, and nonriparian Category 4 wetlands smaller than 10,000 square feet.

Monroe Critical Areas Guidelines

Monroe developed Critical Areas Guidelines instead of regulations. The guidelines are used only upon the submission of a project proposal. Their intent is to:

- Protect and restore sensitive areas, and/or mitigate impacts to sensitive areas by regulating their development.
- Prevent adverse impacts to water quality, wetland, and streams.
- Alert developers to limitations imposed by sensitive areas.
- Provide city officials with information to approve, condition or deny development proposals.
- Protect unique, fragile and valuable elements of the environment.
- Implement policies of SEPA and the Monroe Comprehensive Plan.

All proposed development activities (except for specific exemptions) within these sensitive areas must be reviewed by the city, which will approve, condition, or deny proposals based on the extent to which impacts can be mitigated.

Buffer guidelines for wetlands consist of an undisturbed area of native vegetation usually placed in native growth protection easements. Measurement of buffers is from the ordinary high water mark. Buffer widths range from 25 feet for class 3 wetlands, 35 feet for class 2 wetlands, and 75 feet for class 1 wetlands.

Wetland mitigation actions include restoration or rehabilitation and compensation. Restoration or rehabilitation must have approved plans. Minimum performance standards have been set for all wetland compensation activities.

Hydraulic Impacts from Stormwater Runoff

(Problem Summary and Management Recommendations, pages 146-149)

PROBLEM DESCRIPTION

Before development, the land surface produced runoff at a much lower rate than today. Different portions of a watershed had different natural runoff tendencies, depending on a number of factors--slope steepness, soil type, and number, size, and location of natural wetlands. Before development in the county, the vegetation was primarily forest cover.

Forests protect watersheds by stabilizing slopes, minimizing erosion, reducing sediment input to streams, maintaining the quality and temperature of the water, and maintaining the natural hydrologic patterns under which the streams and their inhabitants evolved. These forested conditions tended to minimize the amount of runoff from precipitation. Much of the rainfall was intercepted by the forest canopy and evaporated back to the atmosphere or infiltrated into the soil and moved to the stream as subsurface flow. As a result of this slow movement of water to the stream channel, the occurrence of flows large enough to alter channels and move sediment occurred much less frequently than today. Still, floods did occur, and when flows filled channels and flooded valleys, erosion resulted. The system was 'dynamically stable' in that the streams adapted over time to the forested flow regime.

Stormwater runoff is generated when rainfall is in excess of the soil's infiltration capacity. Infiltration capacity is a function of soil type, soil disturbance, and prerainfall soil moisture content. Once trees are removed from the land surface, infiltration capacity decreases and stormwater runoff increases.

The amount of impervious cover in a watershed is an indicator of how severe increases in stormwater runoff will be. Impervious cover not only includes roads, parking lots, and houses; compacted soils and grasses act as an impervious cover as well. Although runoff is greater from a parking lot than grass, grass cover produces more runoff than forest because it intercepts and stores less rainfall. The forest also transpires more soil moisture to the atmosphere than grass. In addition, forest soils tend to be less compacted than soils that have been stripped of their forest cover and duff and altered by development activities.

Impervious cover directly influences the stream by dramatically increasing runoff during storm events. Depending on the degree of watershed imperviousness, the annual volume of stormwater runoff can increase only a little or a great deal over its predevelopment rate with proportional reductions in groundwater recharge.

Increased stormwater runoff causes erosion, downcutting of channels, scouring of spawning habitat, and flooding. The hydrologic regime that defined the forested stream channel geometry irreversibly changes, producing more frequent and higher flow rates. The higher flows can move more sediment than before and cause erosion, widening the channel to accommodate higher flows. Streambed downcutting or stream bank widening,

or both, results. The amount of widening or downcutting depends on the soil types and the amount of impervious surface.

Since impervious cover and compacted soils prevents rainfall from infiltrating into the soil, less flow is available to recharge ground water, reducing subsurface flow to the streams. During extended periods without rain, stream baseflow levels are often reduced. Under high and low flow conditions, the channel increases, while baseflow declines. The wetted perimeter width of a stream (the area covered by flowing water during the dry season) becomes smaller. The result is a shallow low flow channel that moves across a wide streambed, often making position changes during storm events.

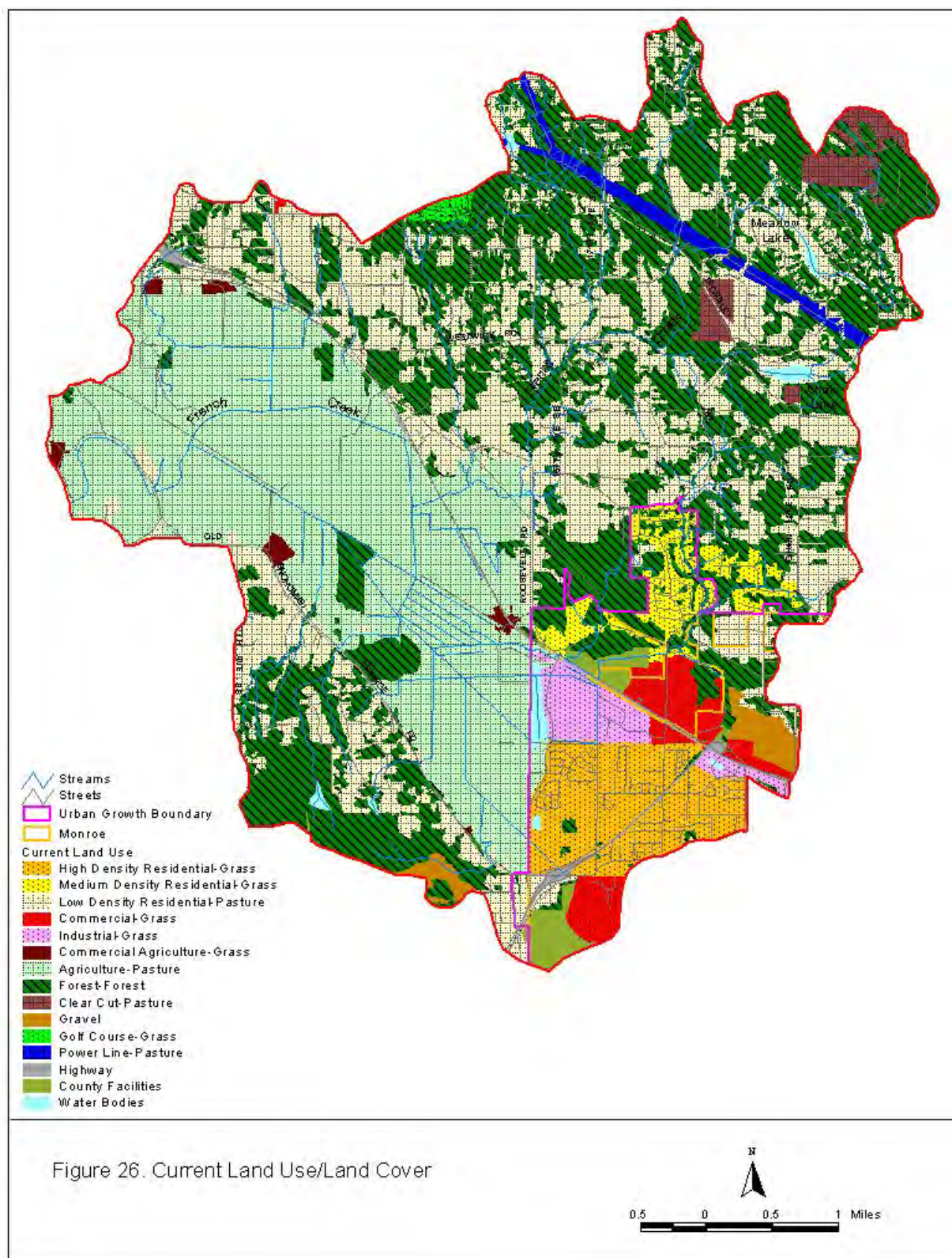
In Western Washington, May et al (1997) found that three to five percent watershed total impervious cover has been linked to stream degradation, with degradation becoming more severe as impervious cover increases. (Other studies indicated a 5 to 10 percent threshold.)

EXTENT OF THE STORMWATER RUNOFF PROBLEM

The French Creek watershed is in transition from forest to urban and rural densities. In this transition, creation of impervious surfaces and removal of forest are the major impacts on stream flow volume and velocity and the resulting changes in aquatic habitat and flooding frequency.

Changes in watershed hydrology were projected through use of a hydrologic model, Hydrologic Simulation Program - Fortran (HSPF) (Aqua Terra 1998). The HSPF model used French Creek recorded streamflow data, rainfall data, and land use and channel geometry information to make long-term hydrologic simulations. Forested, current, future, and mitigated future land use scenarios were modeled to evaluate the effects of land use changes on watershed hydrologic conditions in the watershed. In particular, the model looked at impervious area in determining runoff amounts that would occur from development and increased stream peak flows and velocities that would result.

In preparing data for hydrologic modeling, a current land cover map was developed using 1996 color digital orthophotos (figure 26). A future land cover map was prepared projecting how land would be developed as defined by both the Monroe and county comprehensive plans (figure 27). The future land cover map was also based on current watershed land conversion. An analysis of how land cover changes with development found that on average 70 percent of the forest would be removed on a site and replaced by homes, lawns, and pastures. Table 1 indicates the amount of forest projected to be lost in each watershed subbasin at full buildout based on this scenario. Of 5911 acres of forest existing in the watershed, only 2054 acres would remain in small patches scattered outside the floodplain.



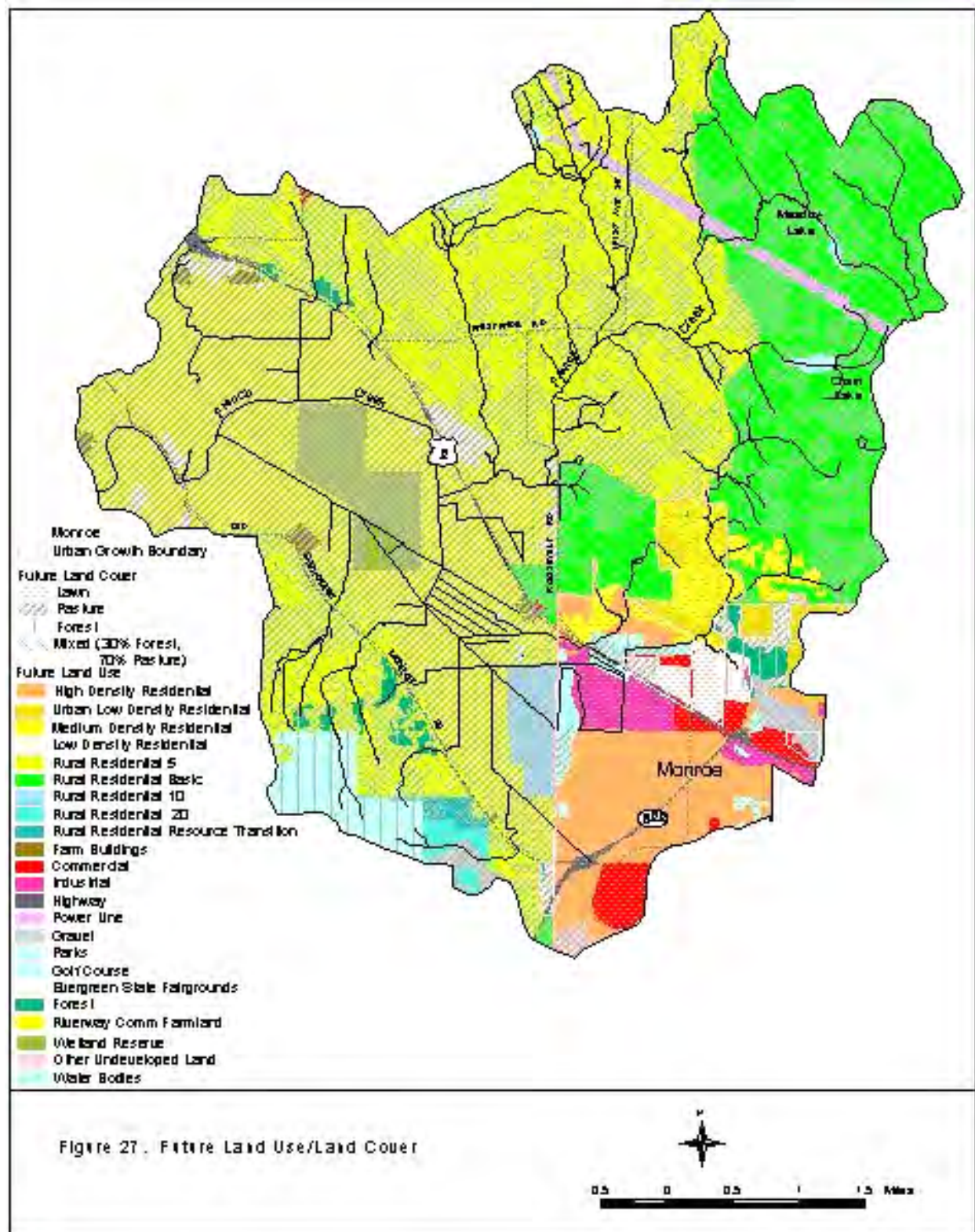


Table 1. Current and Future Forest Acres by Subbasin			
Subbasin*	Current Forest Acres	Future Forest Acres	% Loss
Dutch Hill (10)	267	92	66
Upper Golf Course (8)	425	125	71
Lower Golf Course (16)	168	49	71
Upper Stables (3)	168	59	65
Lower Stables (6)	298	90	60
Spada (2)	313	103	66
Alston Creek (11)	100	29	71
French Creek Headwaters (5)	286	83	71
French Creek Above Meadow Lake (13)	108	31	72
Meadow Lake (4)	241	69	72
French Creek Above Spada (7)	145	42	71
French Creek Below Spada (9)	176	51	71
French Creek Below Chain Lake (14)	172	50	71
French Creek at the Gage (18)	152	49	68
French Creek Below Roosevelt (21)	131	37	72
French Creek in the Floodplain (15)	75	5	98
French Creek Pump Station (19)	5	0	100
Chain Lake (12)	249	81	67
Lower Chain Lake (17)	143	41	71
Upper Cripple Creek (20)	282	81	71
Middle Cripple Creek (23)	212	44	79
Cripple Creek North of Fairgrounds (26)	141	93	65
Cripple Creek at Fairgrounds (28)	81	25	69
Cripple/Lords Hill (22)	356	125	65
Trench Creek (25)	169	44	74
Tributary to Cripple Creek (24)	267	52	81
Lords Hill No. 1 (27)	441	331	25
Lords Hill No. 2 (29)	74	39	53
Lords Hill No. 3 (31)	85	63	25
Lords Hill No. (32)	152	70	54
Fryelands (30)	32	3	91
	5911	2054	65
*See also Figure 28, page 78 (Watershed area is 17,888 acres.)			

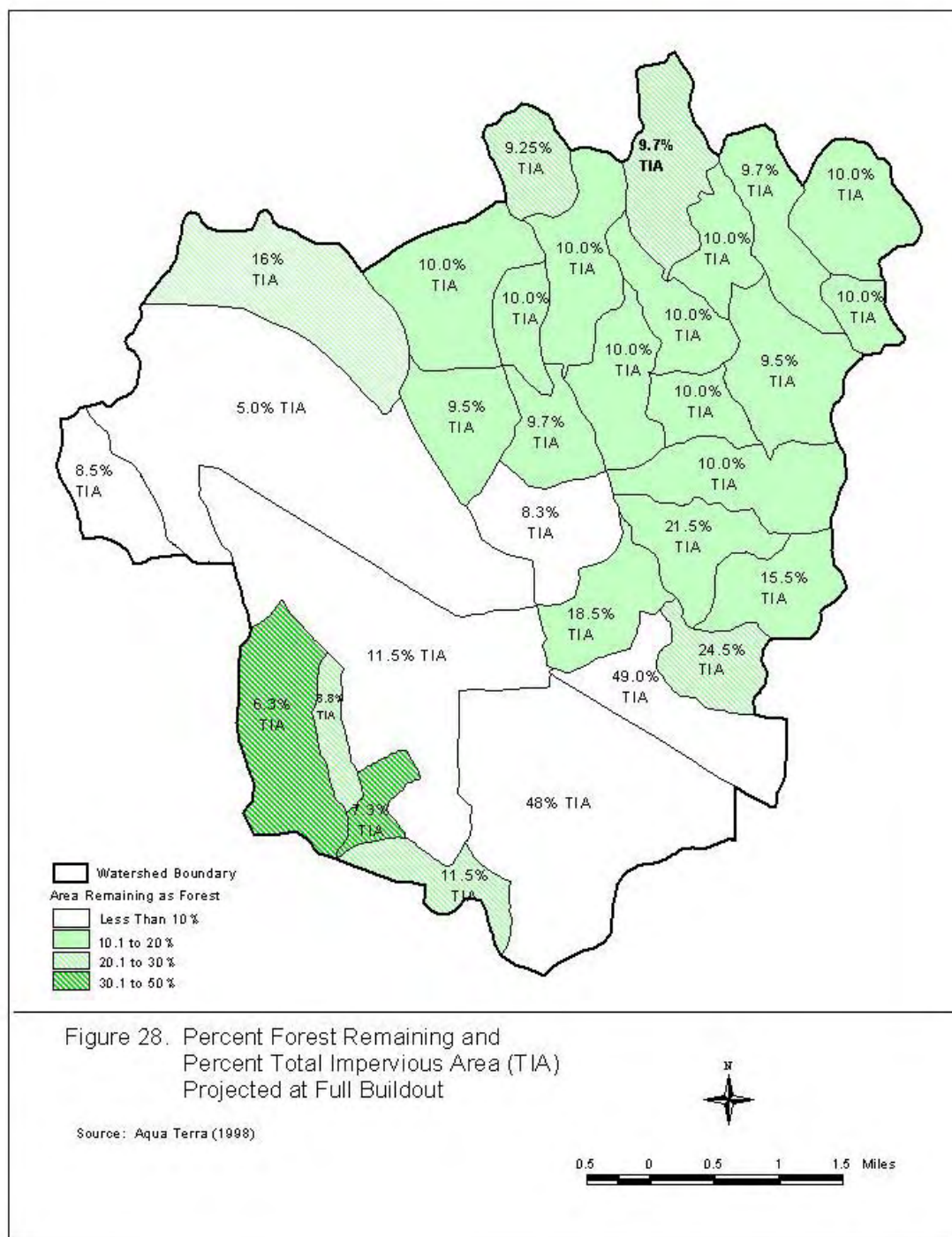
The standard pattern of land clearing for development for plats and subdivisions in the French Creek watershed and elsewhere in the county is to cut all trees to clear the site. The trees sometimes can be sold for considerable profit. The only areas where trees are left are in open space tracts and designated critical areas. Fill material used on the site generally has low permeability and the combination of impermeable fill and turf, creates lawns that do not infiltrate water.

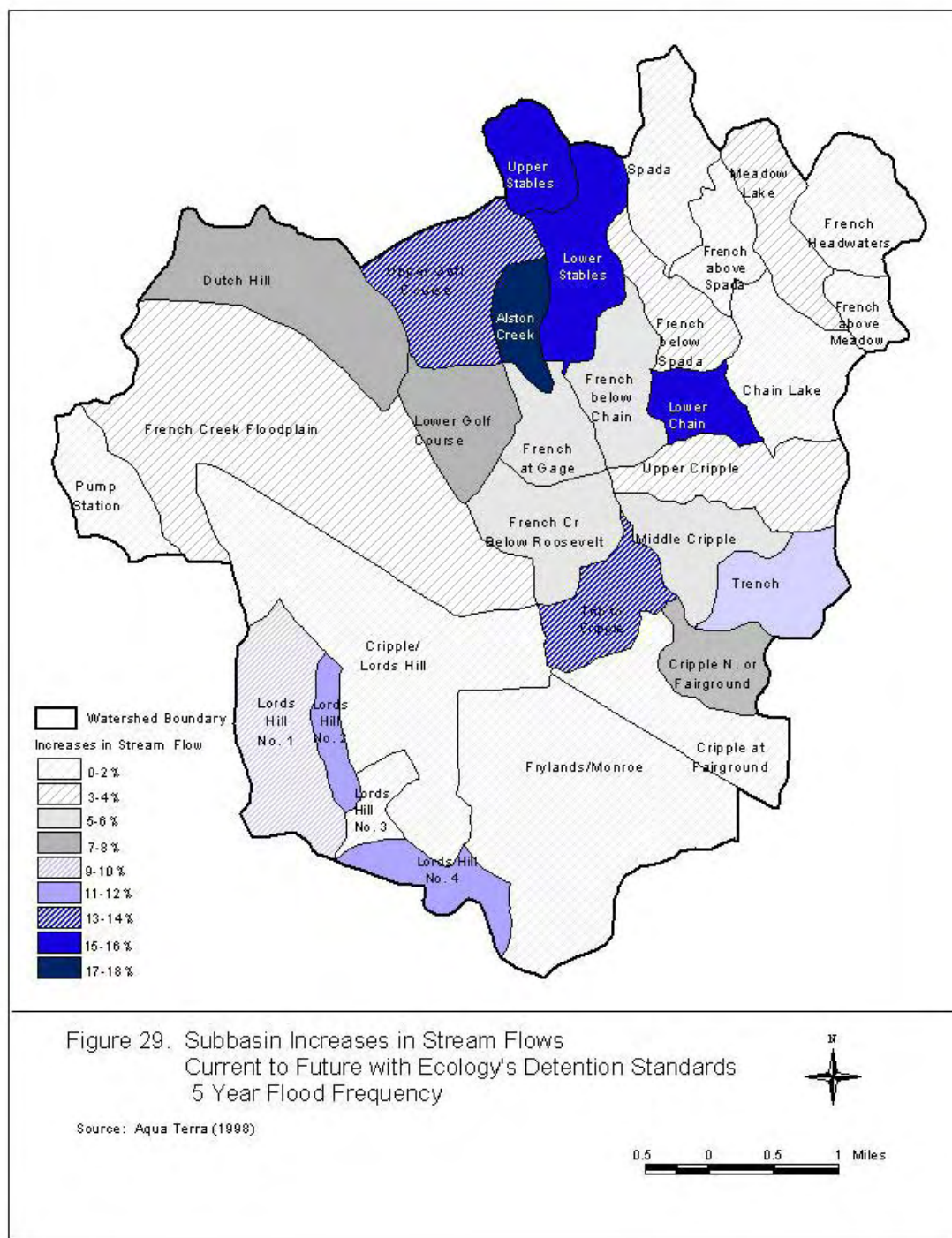
Studies conducted by May et al. (1997) indicated that if aquatic resources are to flourish, more than 30 percent of watershed forests must be preserved, the total watershed impervious area cannot exceed five percent, and headwater riparian areas must be intact. Figure 28 shows the projected percentage of forest remaining in each subbasin. Only 11.5 percent of forested land will remain in the watershed. The projected total impervious area (TIA) was calculated by converting the effective impervious area (EIA) as determined by Aqua Terra (1998). These calculations are based on the future land cover at full buildout. (EIA describes the area where there is no opportunity for surface runoff from an impervious site to infiltrate into the soil before it reaches a conveyance system. TIA includes all impervious surfaces.) In French Creek, only one subbasin is projected to have a total impervious area of five percent or less; only two of the Lords Hill subbasins will have forest of greater than 30 percent. The impacts that will occur as a result of proposed development are cause for concern.

Development activities to date have changed the hydrologic conditions in the French Creek watershed. Effective impervious area has increased from zero percent under forested conditions to a basinwide average of 6.6 percent under current conditions (TIA 13 percent). Most of this impervious surface is in the city of Monroe, the fairgrounds and commercial areas along State Route 2 and the Robinhood Lane residential area. Lawn cover has increased from zero to six percent. The watershed is still one third forested; 18 percent is saturated soils (including the floodplain).

The HSPF model has shown that stream flows and flood flows have significantly increased from forested conditions to now. Flooding and sediment deposition in the valley and erosion in some sections of stream has already occurred. The historic forested two-year flood at the mouth of French Creek was 359 cubic feet per second (cfs). Today, that has risen to 404 cfs, an increase of 12 percent. At the French Creek gage site at the culvert under 167th Avenue SE, the historic forested 100-year flood was 318 cfs; today it is 354 cfs, an increase of 11 percent. The historic 100-year flood of 318 cfs approximately equals the current 50-year flood (315 cfs). The watershed forest has held flood frequency to a lower level than can be expected with removal of that forest for future development.

The model also looked at how stream flows would increase under a 5-year storm based on future land use using Ecology's detention standards where required (figure 29). According to projected future land use, at full buildout 11.5 percent of the watershed's forest will be retained, 6.6 percent will become effective impervious area (14.7% TIA), five percent will be grass, and 53 percent will be pasture. The remaining 18 percent is saturated soils. The subbasins that will benefit most from using Ecology's detention





standards are Tributary to Cripple Creek, Trench Creek, and Ghost Horse Creek; all would experience decreases in flows of 12 to 28 percent. However, applying the standards in the model did not bring flows in these subbasins to their current levels. In the Tributary to Cripple Creek subbasin, even with detention, the flow increased by 13 percent above current levels. At the gage site along French Creek, flow would increase seven percent with detention. The use of stormwater detention ponds as mitigation for development shows some benefit to all subbasins where detention would be required. However, this type of mitigation does not always maintain flows at current levels. (Note that in the land use designated Rural 5, the HSPF model assumed the land would be developed as individual 5-acre home sites and that no detention would be required.) It is likely that most of the area will include subdivisions or lot clustering and that detention in those subbasins would lower stream flows similar to the Rural 5 basic land use (see figure 2, page 18).

Even though more stringent detention and retention standards have been imposed by local jurisdictions, the only way to simulate predevelopment runoff on a site is to infiltrate the water back into the soil. About 53 percent of the watershed soils are till soils that do not infiltrate well. This means that without innovative development standards to limit impervious surfaces, detention ponds that collect water and slowly release it to surface waters will be the only way to handle runoff. However, the ponds built to current standards do not always mimic predevelopment runoff conditions and manage peak flow volume rather than duration. In addition, the types of computer models used to determine detention pond size are not always accurate.

By modeling flow duration, HSPF was able to determine the amount of stormwater storage required to replace one acre of forest. Converting one acre of forest to pasture requires 0.02 acre-feet of storage to maintain the same flow duration. Converting one acre of forest to lawn requires 0.13 acre-feet of storage for each acre of forest. The real key to keeping stream flows at their current levels in the French Creek watershed depends on maintaining forest cover, reducing impervious surface and designing the development using strategies that reduce runoff. According to Booth and Jackson (1997), if 65 to 75 percent of the trees are left on a site, then developing the site will have minimal impacts on runoff and streamflow. If the forest is converted to either pasture or lawn without using other methods to maintain hydrologic functions then the opposite is true.

FRAMEWORK FOR ADDRESSING INCREASES IN STORMWATER RUNOFF

Regulations

The control of increased stormwater runoff lies mainly with local regulations. Standards that require new development to build flow control, drainage, and water quality treatment facilities are set forth in 30.63A SCC, the Snohomish County Drainage Code and in the Monroe Stormwater Management Program.

In 1998, the county revised Title 24 to meet the minimum requirements of Ecology's Stormwater Management Manual. The manual, entitled Stormwater Management Manual for the Puget Sound Basin (WAC 173-275, WAC 400-20) established stormwater runoff standards to protect streams and wetlands. Title 24 now requires detention designed in accordance with the stormwater manual. This means for major development that stormwater runoff from the 2-year, 24-hour design storm will be infiltrated as long as ground water quality is not impaired. If infiltration cannot be used, runoff will be detained and released at a rate of no more than 50 percent of the peak discharge for the existing site. Stormwater runoff from the 10-year, 24-hour storm and 100-year, 24-hour storm will be detained and released at a rate no more than the current peak discharge. Flow calculation procedures have been updated. The County Drainage Code also requires that treatment systems be designed for new development and "redevelopment." This was not required in the past version of this title. (See page 95 and 114 for a further discussion of the Drainage and Grading Codes' water quality and erosion control provisions.) The county has also developed and adopted its own stormwater manual that is equivalent to Ecology's stormwater manual.

Monroe's stormwater management program adopts Ecology's stormwater manual requirements by reference. Regulated activities are to be conducted only after the city has approved a Stormwater Site Plan. The ordinance specifically prohibits illicit discharges to stormwater drainage systems. Regulated activities include both new development and redevelopment.

PROGRAM

Reduced Drainage Discharge Demonstration Program

Snohomish Code 30.34B has established a temporary demonstration program with a goal of encouraging innovative design and development techniques that will significantly reduce drainage discharge from a site after development. The housing demonstration program was created:

- "(1) to provide housing developers the opportunity to demonstrate the environmental benefits of alternative forms of site development which significantly reduce offsite drainage discharge;
- (2) to improve the conditions of habitat and ground and surface waters within a watershed with innovative urban residential design and development techniques;
- (3) to foster broad community acceptance of the use of significantly less impervious surface and greater natural habitat conservation on housing sites;
- (4) to allow some flexibility within the development standards in county code through a demonstration program to allow development which reduces drainage discharge while maintaining necessary safety features; and
- (5) to provide the opportunity to identify and evaluate potential substantive changes to land use development regulations which support and improve natural functions of watersheds."

Techniques that could be used by developers to achieve the requirements of this program include a concept called "Low Impact Development"(LID). LID refers to site planning

that allows for development of a site, while protecting water resources and watershed function. Minimizing hydrologic impacts through site design and then providing controls to mitigate or restore unavoidable disturbances to the hydrologic regime accomplish this. The following concepts would be integrated into site planning:

- Using hydrology as the integrating framework
- Thinking micromanagement - using small subcatchments, lots, and common areas to distribute stormwater throughout the entire site.
- Controlling stormwater at the source
- Using simplistic, nonstructural methods like native plants, soil, and gravel to provide hydrologic benefits
- Creating a multifunctional landscape

This strategy results in the creation of hydrologically functional landscapes that will preserve and maintain the essential hydrologic functions of the development site and the local watershed.

The Housing Demonstration Program has been in existence since April 2000 and because of the difficulty in meeting the criteria to participate in the program, and because it is new, there have been no projects initiated.

Pollution and Habitat Degradation from Agricultural Practices (Problem Summary and Management Recommendations on pages 150-153)

PROBLEM DESCRIPTION

Nonpoint pollution from agricultural activities results from improper waste management, inadequate runoff systems, animal access to streams and wetlands, and overgrazing of pastures. Improper application of fertilizers, pesticides, and herbicides cause pollution problems as well.

The pollutants associated with these activities include bacteria and other pathogens from animal waste; nutrients including nitrates, phosphates, and potassium from animal waste and fertilizers; sediments from animals trampling streambanks and overgrazing; and chemicals from pesticides and herbicides that can be toxic to aquatic organisms. These pollutants are some of the contaminants found in French Creek and its tributaries.

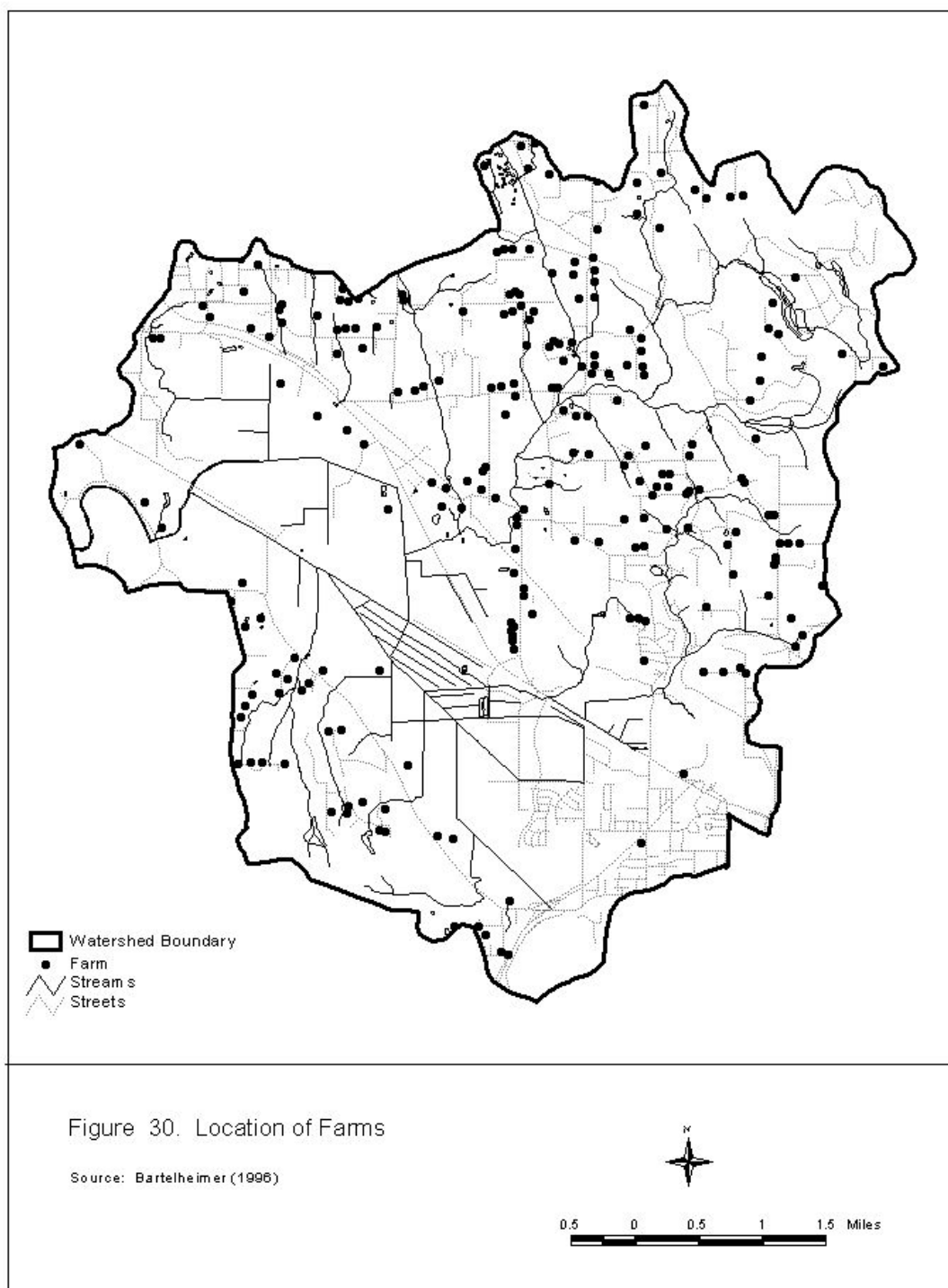
EXTENT OF AGRICULTURAL IMPACTS

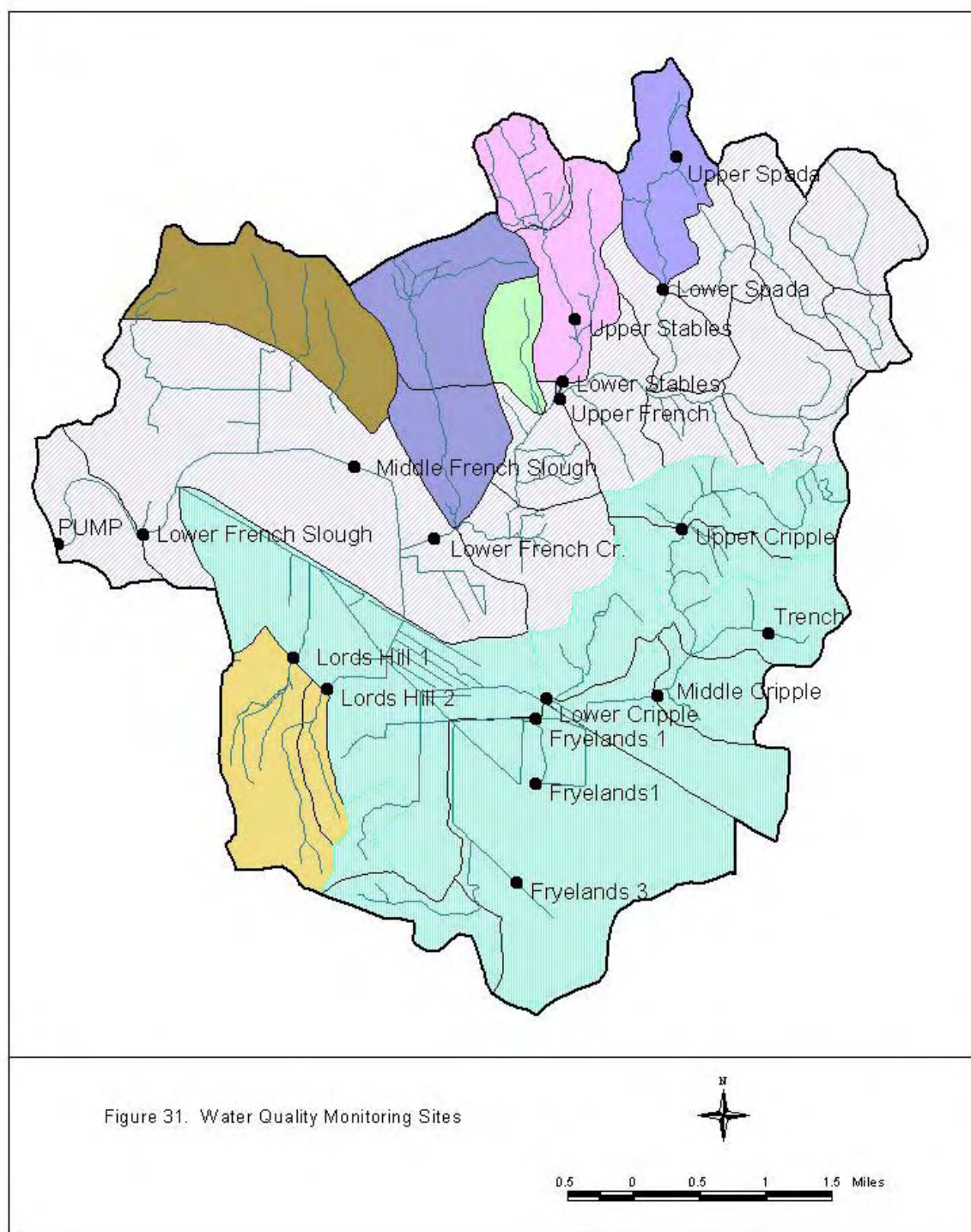
A large portion of the watershed is devoted to agricultural use, both large and small commercial and noncommercial farms (Bartelheimer 1997). The floodplain has approximately 4000 acres of farmland, including four dairy farms, cropland, and pasture. In total, there are over 240 farms in the watershed with the dairy farms having the highest number of animals per farm. Each of three dairy farms is estimated to have from 800 to over 1000 dairy cows; the other farm has approximately 150. The majority (66%) of the nondairy farms raises horses, 20 percent raise beef cattle, and eight percent raise other animals like llamas and sheep. There are seven commercial stables in the watershed (figure 30).

Water samples taken by both The Tulalip Tribes and Snohomish County over the past several years indicated that bacteria concentrations are a problem throughout the watershed. Fecal coliform is an indicator of the potential presence of bacteria and other pathogens in water. Fecal coliform bacteria levels violated state standards during dry periods at seven out of ten water quality monitoring sites. Samples taken at the pump station showed bacteria loads were 75 to 92 percent greater than at sites in the upper watershed. Figure 31 shows the location of water quality monitoring sites.

Levels of over 1.0 mg/liter, a threshold guideline for nitrogen in streams, were recorded in upper and lower Cripple Creek, lower Stables Creek, and in the floodplain. Floodplain nitrogen loads were much higher than in the upper streams. The highest nitrogen level was recorded at the pump station water quality sampling site.

Dissolved oxygen levels were often very low and water temperatures high at floodplain water quality monitoring sites. Lack of riparian cover along the channeled reaches of French Creek contributes to this problem. In the French Creek system, according to state water quality standards, the temperature shall not exceed 18 degrees C for a two week period. The optimal range for salmon species is 12 to 14 degrees C, and lethal





levels for adults are generally in the range of 20 to 25 degrees C (MacDonald et al. 1991). The temperature in the floodplain exceeded state standards much of the time, while in the upper watershed temperature standards were met much of the time. The flow from the lower creek to the river is altered by the pump station regime. Water is pumped out of the French Creek system and the dikes keep river water out of French Creek. During much of the summer the water in lower French Creek becomes stagnant. Oxygen demand from animal waste in stream water reduces dissolved oxygen. The low gradient of the floodplain streams contributes to low oxygen problems as well. Without enough oxygen in the water, fish and aquatic organisms cannot survive. Low dissolved oxygen levels and high temperatures are preventing salmon from migrating in and out of watershed streams to the Snohomish River.

Floodplain

Dairy cows produce most of the animal waste in the watershed. Most of the dairy farms are located in the floodplain. Bartelheimer (1997) estimated that dairy livestock produced about 200 million pounds of manure annually, while the livestock on other farms produced about 28.9 million pounds annually. Dairy animal waste produces approximately 800,000 pounds of nitrogen, 64,000 pounds of phosphates, and 480,000 pounds of potassium. Animal waste outside the floodplain produces approximately 155,000 pounds of nitrogen, 42,000 pounds of phosphorous, and 109,000 pounds of potassium.

The major nonpoint pollution problem resulting from raising dairy cows arises from the difficulty in managing large amounts of waste. Dairy animals are kept in confinement. In the process of cleaning the barns both liquid and solid wastes are collected. The liquid waste is pumped to holding ponds on the farm. Manure in the ponds is applied to growing crops as fertilizer. The solid waste is kept in piles also for use as fertilizer.

Pollution problems from dairy waste are significant because of the volume of manure present. On some dairy farms, the holding ponds are too small or are in disrepair. Ponds that cannot hold enough manure and precipitation have to be emptied more frequently, and the result is that too much manure is applied to the fields. If the manure ponds fill to capacity during the winter, the manure must be used, and heavy rains wash the applied manure into ditches or streams. Often during the spraying process, manure is sprayed into streams or drainage ditches. Waste stored in piles comes in contact with rainwater and runoff. Contaminated water eventually is carried to streams.

Although the dairy cows are kept in the barns for most of the year, floodplain pastures are used for beef cattle and heifers. In many cases, these animals graze up to the streams or ditches and enter the streams to get water. Waste from these animals also contributes fecal coliform bacteria and nutrients to stream water.

Several floodplain farms grow crops including hybrid poplars. Chemicals like fertilizers, herbicides, and pesticides are used on these crops. The floodplain has a high water table

and is vulnerable to ground water contamination (figure 32). No studies have been done to assess the effects of the chemicals on ground water in the watershed.

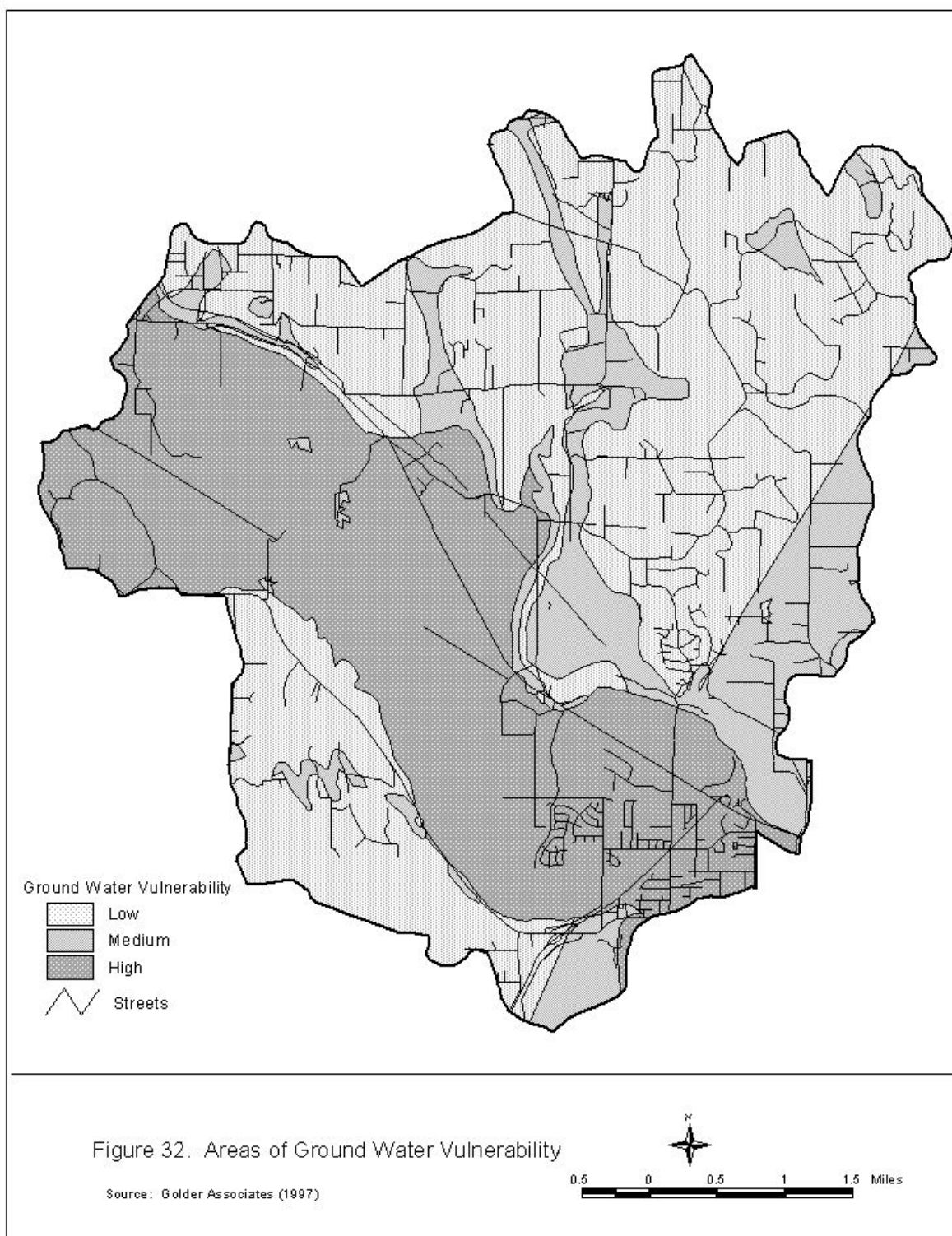
Upper Watershed

The following information is taken from “Inventory and Evaluation of Livestock Operations in the French Creek Watershed” (Bartelheimer 1997). The inventory was done to assess the potential impacts of 236 farms on water quality, and each of the farms was ranked for its potential to cause water quality or water resource problems. The factors that influenced ranking included seriousness and number of problems, number and animal types, size and condition of pastures, proximity to wetlands or surface water, and topography. More than 41 percent of the observed farms in the upper watershed have a high or moderate potential for impacting water quality (Figure 33). (Sites rated 'high' "had a strong likelihood of causing pollution problems," and sites rated 'moderate' "had a likelihood of causing some pollution problems.")

The inventory found that the major problems on watershed farms were overgrazing, roof runoff, slope erosion, contaminated runoff, livestock access to wetlands and surface water, improper waste storage, and inadequate waste collection. Overgrazing reduces production of grass and the ability of grass to filter sediment and manure off the pasture before it reaches streams or wetlands. Pastures were considered overgrazed if the grasses were grazed to within two inches of the ground. In severe cases, large bare areas of ground were exposed. Roof runoff is a problem when the water becomes contaminated by contact with animal manure and enters surface water. Animals using hillside slopes to get to and from water, feed, and shelter are the source of slope erosion. Water running off the slope carries eroded soil to surface water.

Runoff that contacts manure carries bacteria and nutrients to receiving waters. When rain falls directly onto manure piles, the runoff has the potential of polluting surface and ground water, especially when manure piles are located close to water bodies or wetlands. When manure is applied during wet conditions, runoff becomes contaminated. Animals on 20 farms had access to a creek or other water body. In addition to adding bacteria and nutrients to streams, erosion from trampled streambanks causes sediment in the streams and degrades fish habitat. Animal manure was stockpiled but not completely contained on 17 farms. Some manure piles were stored in pastures where they were spread around by animals. Some piles were stored in wetlands. Manure was allowed to flow off the site from uncollected waste on 15 farms. At some sites, barns were present so that animals could be kept off pasture during wet weather, but the barn manure was not being collected. Improperly stored manure allows nutrients and bacteria to get into streams.

Water quality monitoring sites in the upper watershed with the highest levels of fecal coliform bacteria and nutrients included Lower Cripple Creek, Upper Cripple, Trench, Lower Stables, Upper Stables, Upper Spada, Lords Hill #1, and Lords Hill #2. Table 2 shows the number of farms that drain to water quality monitoring sites, the number



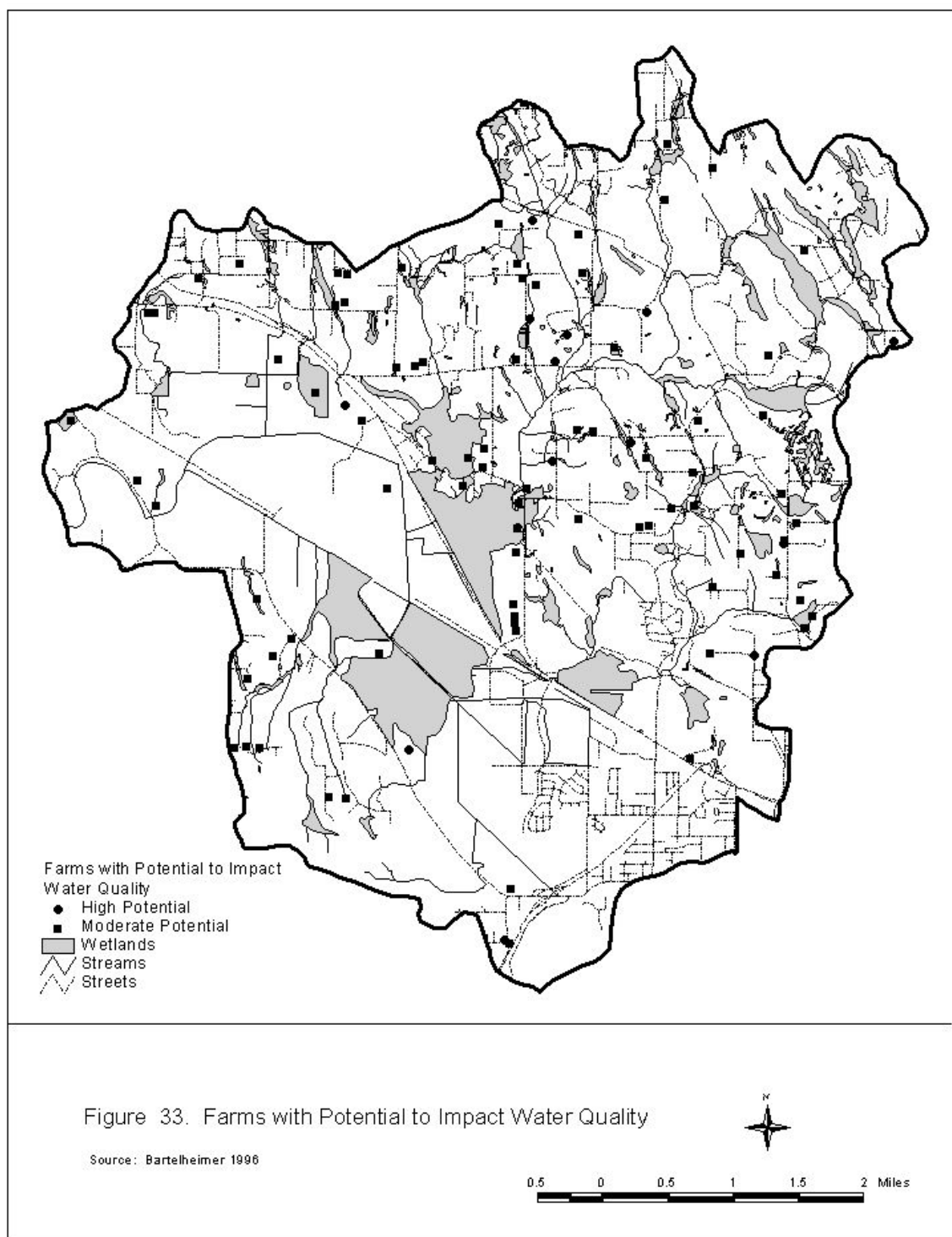


Table 2. Numbers of Farms and Impact Potentials (Bartelheimer 1996)

Sampling Sites	# of farms/ animals	Moderate Potential	High Potential	Animals with Stream Access
Lower Cripple* (Nitrates 1.21, fecal coliform 394)	35/64+	11	2	50
Trench 5/8 (Nitrates 0.92)	4	0	10	
Upper Cripple (Nitrates 1.22)	21/21+	5	0	15
Lower Stables (Nitrates 1.17, fecal coliform 136)	25/76+	5	3	60
Upper Stables (Nitrates 0.99, fecal coliform 267)	13/18+	5	1	25
Upper Spada (Fecal coliform 234)	2/3	1	0	0
Upper French** (Nitrates 0.91, fecal coliform 394)	69/200+	14	5	87
Lords Hill No. 1 (Nitrates 2.58, fecal coliform 561)	12/31+	6	0	13
Lords Hill No. 2 (Nitrates 2.83, fecal coliform 249)	5/9+	2	0	9
*Collects drainage from Trench and Upper Cripple Creek subbasins (see figure 31, page 85).				
**Collects drainage from Upper and Lower Spada, Upper and Lower Stables subbasins. (Thornburgh 1997)				

ranked moderate and high for potential to cause water quality problems, and the number of animals with close access to streams.

There are five farms in the Cripple Creek subbasin that appear to be having the greatest impacts to water quality, 12 in the French Creek subbasin, and 13 farms in other subbasins. Most of these farms or stables have horses; a few have beef cows.

A number of farms in the upper watershed have no streamside vegetation to provide shade or to stabilize streambanks.

FRAMEWORK FOR CONTROLLING AGRICULTURAL POLLUTION

Regulations

The Dairy Nutrient Management Plan (DNMP) Act was signed into law April 1, 1998. All dairies must have a DNMP prepared and on file by July 1, 2002, and fully implemented by December 31, 2003.

A statewide dairy waste discharge permit program became effective in September 1994, and is administered by Ecology under provisions of the State Water Pollution Control Act and Federal Clean Water Act. The permit addresses nonpoint pollution from dairy farms. A dairy farmer is required to get a permit if a complaint is filed for polluting streams or rivers and if the complaint is validated through water quality testing and other evidence. Ecology requires that a farm plan be developed and implemented within a defined timeline where chronic pollution is confirmed. However, there is no reporting required as a result of the permit issuance.

Control of other agricultural nonpoint pollution is also currently carried out under the Clean Water Act and state water quality laws. Ecology responds to water quality complaints and can cite a farmer for polluting stream water if there is sufficient evidence. Any farm where pollution has been confirmed is referred to the Snohomish Conservation District, which will assist the farmer in developing farm plans to resolve water quality problems. As a result of limited enforcement of the act by the state, the U.S. Environmental Protection Agency conducted unannounced inspections of dairies throughout Washington. One floodplain farm received a commendation letter for its farm management.

Snohomish County has a water pollution ordinance that addresses water quality impacts from all sources, including agricultural practices. Ordinance enforcement is through county code enforcement officers. However, county code enforcement seeks compliance from farms through referrals to the Snohomish Conservation District, which provides technical assistance in correcting the problem.

Programs

The Snohomish Conservation District (SCD) provides technical assistance to any farmer to develop a farm management plan. The plan suggests pasture improvements and grazing management, finds ways to decrease waste and sediment runoff in animal confinement areas, uses fencing to exclude livestock from streams and wetlands, and assists with development of a complete waste management system. Through a grant program with the Washington Department of Ecology, SCD enrolled seven farms in the farm plan program in 1998, including three stables in the French and adjacent Woods Creek watersheds. The three major impediments to implementing farm best management practices are lack of awareness of individual impacts, lack of information on available options, and cost of improvements.

Snohomish County Solid Waste Management Division has implemented an on-farm training program that provided 100 farmers one day of training in onsite livestock waste composting. Ten farms received additional composting assistance.

SCD, Washington State University (WSU) Cooperative Extension, Natural Resource Conservation Service (NRCS), and Farm Service Agency (FSA) all have programs to reduce nonpoint pollution from agriculture. In addition to providing technical assistance to farmers, SCD and WSU Cooperative Extension also provide educational information.

The NRCS and FSA, agencies of the U.S. Department of Agriculture, provide technical and financial assistance to farmers through the following programs:

Environmental Quality Incentive Programs: Established in the 1996 Farm Bill, this program focuses assistance to locally identified conservation priority areas or areas where agricultural improvement will help meet water quality goals. Funds will pay for technical assistance and cost sharing on best management practices. Fifty percent of the funds are dedicated to conservation associated with livestock operations.

Wetland Reserve Program: Authorized under the Food Security Act of 1985 and amended in the 1990 and 1996 Farm Bills, landowners can sell a permanent or 30 year conservation easement or enter into a cost share restoration agreement with the USDA to restore and protect wetlands. The landowner voluntarily limits future land use yet retains private ownership. The landowner and the NRCS develop a plan for wetland restoration and maintenance. There is one wetland reserve in the floodplain.

Conservation Reserve Program: This program was established under the Food Security Act of 1985, as amended, and is implemented through the Commodity Credit Corporation. This voluntary program offers annual rental payments and cost share assistance to establish long-term resource conserving grass, trees, and other long term cover on eligible land. The Commodity Credit Corporation makes annual rental payments based on the rental value of the land. It provides cost share assistance in an amount equal to not more than 50 percent of the participant's costs in establishing approved practices. Up to 36.4 million acres of farmland can be enrolled.

Wildlife Habitat Incentives Program: This voluntary program is for people who want to develop and improve wildlife habitat on private land. It provides both technical assistance and cost share payments to help establish and improve fish and wildlife habitat. Participants who own or control land agree to prepare and implement a wildlife habitat development plan. NRCS offers technical and financial assistance for establishment of wildlife habitat development practices.

Small Farm Cost Share Program: This Washington Conservation Commission program targets water quality improvement on small farms. The program provides up to \$25,000 to install compost bins; gutters and downspouts on outbuildings; fencing; pasture pumps; heavy use area protection; stream and wetland planting; and limited access sites/livestock crossings.

Sediment and Erosion from Land Clearing and Grading (Problem Summary and Management Recommendations on pages 154-155)

PROBLEM DESCRIPTION

Sediment from land clearing and grading is a major pollutant in growing areas like the French Creek watershed where rural land is being converted to residential uses. In addition to land clearing for home construction, there are a number of other activities associated with development that are sources of sediment, including road construction, placing of water and sewer lines, and culvert placement or replacement.

During the period of intense construction, numerous detrimental impacts on water quality occur. Impacts from construction are usually associated with land clearing and site preparation. Areas denuded of vegetation are prone to erosion and can significantly increase sediment loading of nearby streams and wetlands. Although soil erosion is the most visible source of construction related nonpoint pollution, building activities can also generate other pollutants. These include pesticides, fertilizers, petroleum products, cleaning solvents, paints, asphalt, acids, and salts.

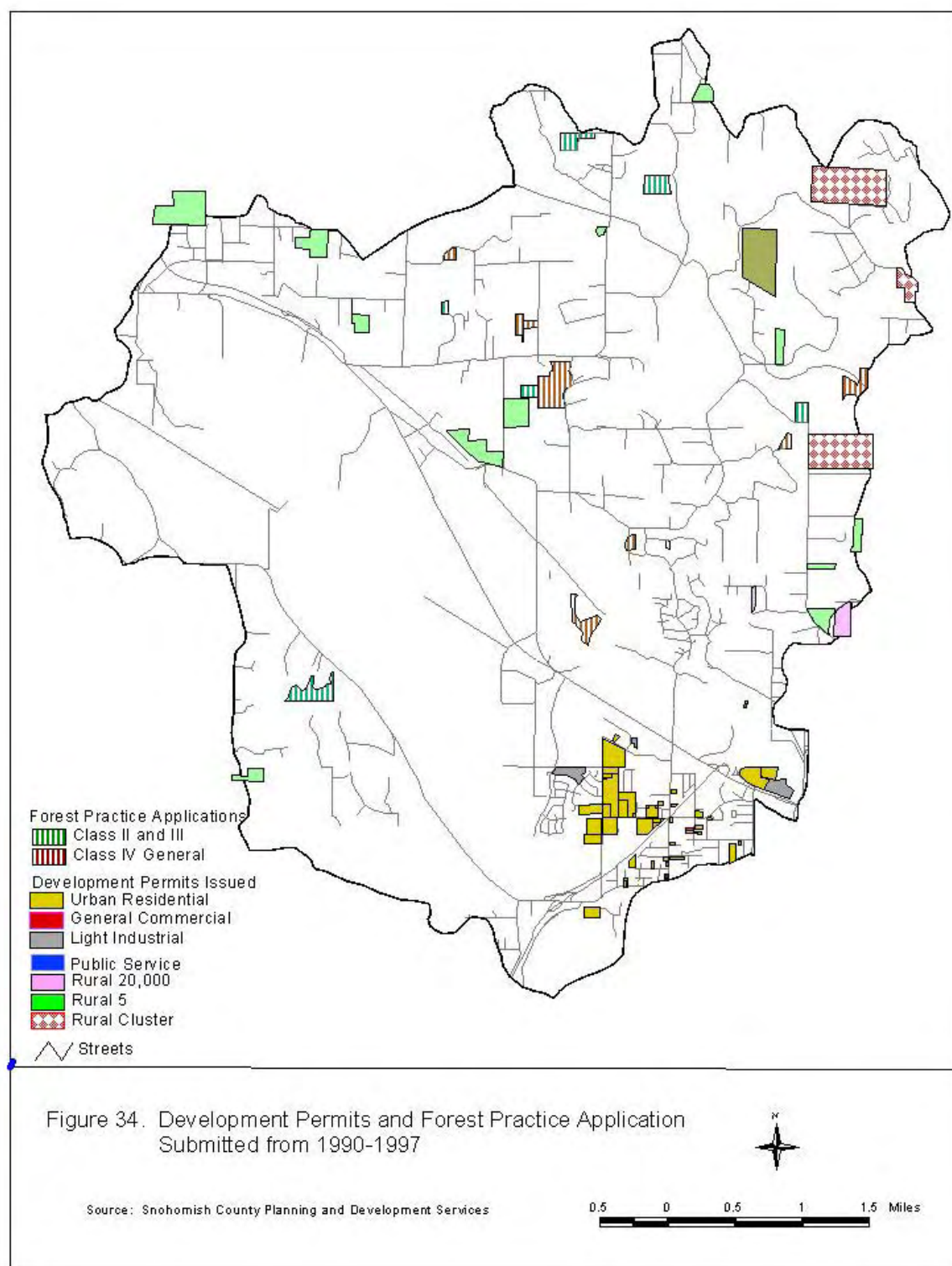
EXTENT OF THE LAND CLEARING AND GRADING PROBLEM

Approximately 5911 acres of forest were identified in the watershed using 1996 digital aerial photos (Aqua Terra 1998). Approximately 19 Forest Practice Applications were submitted from January 1990 to February 1997 to log a total of 261 forest acres. Conversion to development will have occurred on 178 acres, and 83 acres were to be replanted. Additionally, as of February 1997, development permits were issued or are pending for the same period for 534 acres of land in Snohomish County and 605 acres in Monroe (figure 34).

Water quality monitoring of Spada Creek, the Fryelands' streams, and upper Cripple Creek identified high sediment loads. At the time of the water quality study, construction was occurring along these streams.

Failure to use erosion control best management practices, improper installation of erosion control techniques, failure to use appropriate erosion control for the site, failure to provide continued maintenance, and uneven enforcement are the major reasons for construction related sediment problems. In addition, when it rains it is almost impossible to prevent sediment (resulting from land clearing and grading activities) from washing into streams and wetlands. Water quality violations of turbidity were observed at several sites where sediment was coming off sites that had been covered with straw to prevent this runoff. The straw was having little positive effect during the storm event.

Development related land clearing and grading activities have already resulted in a large contribution of sediment to stream water. The following are some observations of muddy water reported to Surface Water Management by citizens: Lords Hill tributaries, in ditches along Trombley Road and 167th, Golf Course Creek along Roosevelt Road,



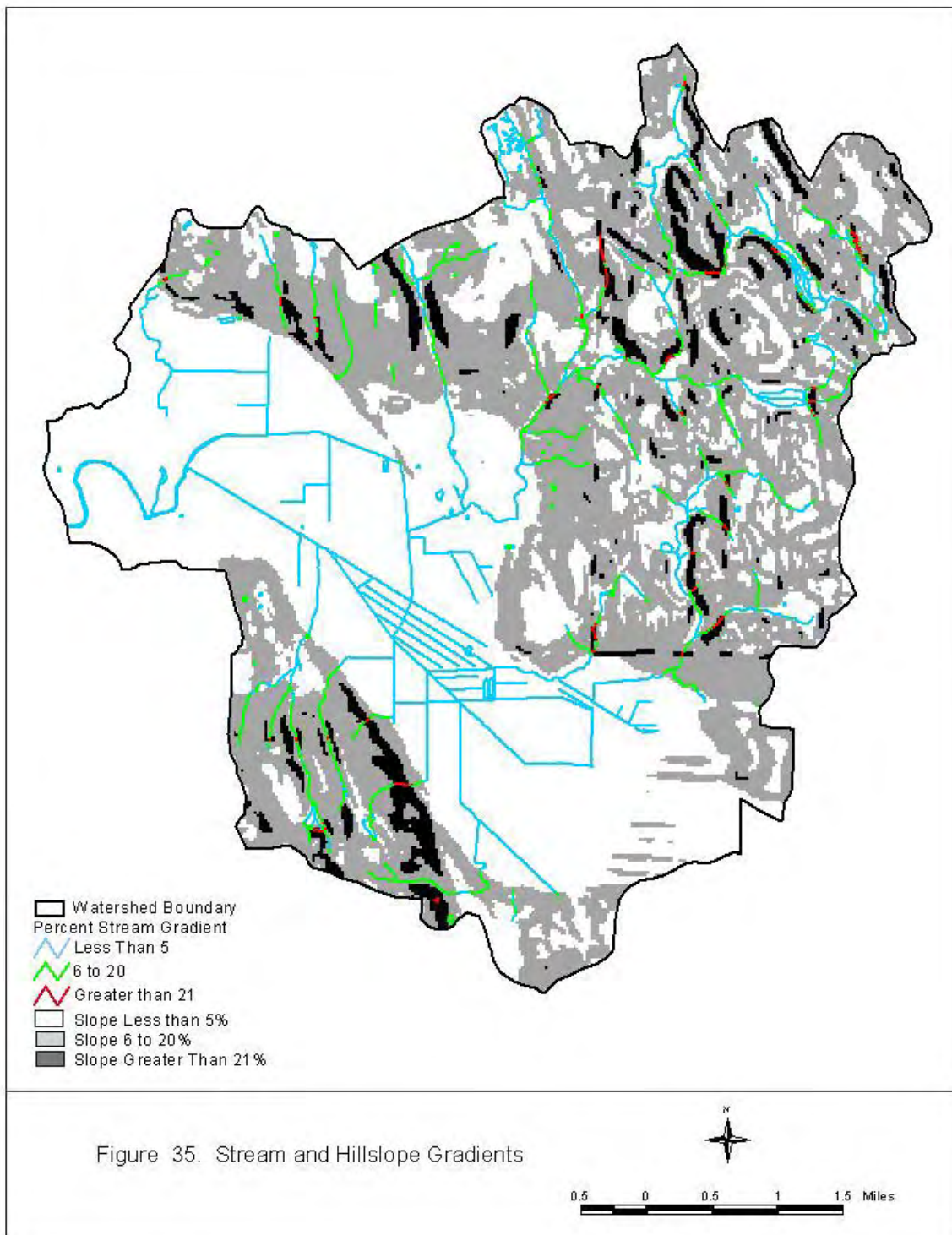
French Creek near Roosevelt Road where wingwalls were being constructed, drainages along Meadow Lake Road north of Trombley Road where retaining walls were being constructed, tributary to French Creek at Westwick Road from a new culvert, and a plume of sediment being directed into wetland from new development and erosion off new development along State Route 2 in Monroe. The sediment sources were traced to various construction activities. These examples show the variety of construction activities that have the potential to cause sediment pollution in streams.

Areas with high erosion potential are shown in figure 20 (page 53) including recessional outwash, advance outwash, and bog glacial deposits, as well as steep slopes. The glacial materials are generally exposed near stream channels or around lakes and wetlands. Recessional outwash is also exposed along hillsides and other areas. These materials are easily altered and respond rapidly to changed conditions. Small alterations in drainage patterns, stream velocities, or slope steepness as a result of development, logging, or other changes will readily affect these materials. Glacial till which comprises about 45 percent of the watershed area, is less susceptible to erosion. However, very fine grained silts and sands can be removed from the glacial till when it is directly exposed to water during land clearing and grading. These sediments are readily transported to streams or other drainageways during storms. A landslide has occurred on Trench Creek causing major amounts of sediment to wash into Cripple Creek. The landslide may have been caused by development along the steep ravine through which Trench Creek flows.

Sediment from the steep hillsides is carried away downstream. When the stream gradient changes in the flat areas, the stream can no longer carry the excess sediment loads, and sediment is deposited in the streambed and floodplain areas along the streams. Channel and wetland sedimentation reduces stream water conveyance capacity, and it clogs ditches, culverts, pipes, and detention facilities. Sediment also transports other pollutants downstream. High stream gradients are found throughout the watershed as streams drop down from the hills into valleys or ravines (figure 35).

FRAMEWORK FOR CONTROLLING SEDIMENTATION AND EROSION FROM LAND CLEARING AND GRADING

Grading is regulated through the Uniform Building Code in Snohomish County and in Monroe and in the county also under the grading code (30.63B SCC.). A grading permit is required to move earth for most kinds of development. An environmental review under SEPA is triggered when more than 500 cubic yards of earth are to be moved or when there is more than 50 cubic yards of earth that could impact sensitive areas. Erosion and sedimentation control are also addressed under the county drainage code (30.63A SCC). Standards are set for all erosion and sedimentation control for any major development. The standards are to be met through use of best management practices as provided in the Snohomish County Drainage Manual and the engineering Design and Development Standards.



Sediment from land clearing activities is a water quality problem. Any sediment entering waterways sufficient to cause a violation of state water quality standards is a violation of the county water quality ordinance (7.53 SCC).

Many lot owners do not know that they need a permit for moving earth. Some who do know may choose to ignore the permit process. Grading permits are costly to obtain, and the cost may be a deterrent. The grading fees in Snohomish County are as follows:

Preapplication Site Review Fee	\$250
Site Review Fee	\$100
Base Fee	\$200
Plan Review and Inspection Fee	\$0.33/cubic yard, not to exceed \$23,000
Critical Area Review Fee	\$250 for 500 cubic yards or less
Investigation Fee (Grading without permits)	\$200 plus \$.033/cubic yard of earth moved
Permit Renewal Fee	50% of normal permit fee

Erosion and sedimentation problems can be controlled somewhat by construction best management practices (BMPs) and adequate detention and retention standards. However, BMPs to control erosion are not always used, or they do not work usually because of improper installation. The erosion control and detention/retention standards required by the Drainage Code (30.63A SCC) and the Monroe stormwater regulation include the equivalent of the minimum requirements in Ecology's Stormwater Management Manual. These standards are insufficient to prevent increased peak flows in some subbasins (Aqua Terra 1998), potentially causing ongoing erosion and sedimentation.

The Washington Department of Natural Resources (DNR) regulates land clearing under RCW 76.09 and WAC 222. Land clearing on less than two acres is usually not regulated. However, the DNR does regulate land clearing on land that is less than two acres of contiguous ownership (including multiple parcels totaling less than two acres) to the extent that the activity qualifies as a "forest practice." Land clearing activities such as removing merchantable timber, and road construction to facilitate timber removal, are forest practices activities and would be regulated by the DNR no matter how large or small the property might be even if a Forest Practice Application (FPA) was not required. An FPA would be required on small acreages if there were a potential for impact to public resources like salmon. Land clearing on more than two acres or any clearing within the Shoreline of the State, within forest Riparian Management Zones, or within the ordinary high water mark of a stream requires a Forest Practices Permit. The extent of clearing small areas has increased recently because of the high prices paid for timber.

Regulatory Enforcement

(Problem Summary and Management Recommendations, pages 156-157)

PROBLEM DESCRIPTION

Due to human activities, streams and wetlands have changed substantially in recent times. Wetlands are dredged, filled, or drained; streams are piped or channeled, and water is polluted. Sediment from poorly managed construction sites fills stream channels. Many of the activities that cause these adverse impacts continue unchecked, despite numerous local, state, and federal laws.

EXTENT OF ENFORCEMENT PROBLEMS

Ecology and Snohomish County are the major enforcers of water quality, development related, water resource, and shoreline regulations; Monroe has limited enforcement for these types of problems. The Snohomish Health District has enforcement authority over failed onsite sewage systems, hazardous waste containment, illegal dumping, and illegal landfills. Snohomish County inspectors can issue stop work orders on projects where there are water quality and drainage violations. Ecology is responsible for investigating and cleaning up hazardous spills. It is not always clear to citizens and even to agency representatives which agency has regulatory authority over a particular activity.

The county water quality ordinance, intended to prevent water quality problems, cannot by itself ensure compliance. One contributing factor is the difficulty with assessing fines. From 1998 when the county water quality ordinance was passed through December 1999, 41 water quality ordinance violations were reported; no fines had been imposed. The low likelihood of punishment may encourage lax erosion control measures. When the necessary siltation devices and sediment ponds are installed, they sometimes go unmonitored and can eventually lose their effectiveness.

The reporting of violations, both on permitted and unpermitted sites, is usually dependent on citizen-based complaints. The lack of consistent, visible complaint resolution is a disincentive for citizens wishing to take action and some have commented to Watershed Management Committee members that they no longer report violations.

Many illegal or unacceptable practices by landowners continue because the process for obtaining permits is laborious and costly for citizens, or citizens are unaware of the laws. Those individuals who experience problems going through the permit process become discouraged and do not want to repeat the experience. They pass on their frustrations to neighbors and friends. In Snohomish County the cost of grading permits is high and is a disincentive for landowners to get permits. Those who do act responsibly are frustrated when they observe others who do not and who are not penalized.

During a rainstorm in late 1999, Surface Water Management staff reported six turbidity violations on sites where development was occurring. Of those problems, none were addressed. Although they were investigated by Surface Water Management water quality staff, because of a work backlog, the investigation occurred during a dry period when no

violation could be documented. One of the problems was not only a water quality violation, but also a violation of the state's hydraulic project approval code. The Washington Department of Fish and Wildlife investigated the problem, found a violation, but because WDFW can only pursue matters as criminal cases, it infrequently takes actions on these types of violations.

Illegal activities observed in the watershed include filling and draining wetlands, filling streambanks, grading without a permit, removal of vegetation in Native Growth Protection Areas, and lack of or misuse of erosion control best management practices. Illegal dumping occurs throughout the watershed. Hazardous materials are not always contained or disposed of properly. Agricultural practices and failing onsite sewage systems that cause pathogens to enter stream water often go uncorrected, even though ordinances are violated. Nonpoint pollution is not being well addressed, and most watershed streams exceed state standards for fecal coliform bacteria, temperature, dissolved oxygen, metals, and turbidity (Thornburgh 1997). Nitrates and phosphates are also high in watershed streams.

One contributing factor is limited enforcement resources. Ecology has limited staff monitoring six counties, including Snohomish, for water quality violations except those related to agriculture. The Department of Agriculture is assuming the responsibility for agricultural water quality violations. Snohomish County has eight code enforcement officers. They are responsible for enforcing land use, zoning, building, noise, grading, water quality, and drainage violations. City engineers and a code enforcement staff person located within the Police Department share Monroe's code enforcement duties. Neither jurisdiction actively searches out code violations. Because of these institutional constraints, the agencies or jurisdictions in Snohomish County do not aggressively enforce existing regulations to protect aquatic resources and water quality.

Ground Water Depletion and Contamination

(Problem Summary and Management Recommendations pages 158-159)

PROBLEM DESCRIPTION

Ground water is a limited and variable resource and plays an important role in the French Creek watershed. Discharge of ground water to streams supports year round flow, and ground water provides drinking water to many watershed residents.

Ground water contamination is a serious problem and one that cannot economically be reversed. Threats to ground water quality include bacteria, nitrates and phosphates from failing onsite sewage systems, leaking sewage pipes, and livestock waste. Other contaminant sources include underground storage tanks, fertilizers, pesticides, herbicides and fungicides, and accidental spills or dumping of hazardous materials.

Maintaining ground water quantity depends on maintaining the balance between recharge, outflow, and withdrawal. Ground water depletion can be caused by over allocation of water supplies and creation of impervious surface, which block ground water recharge. Without water for aquifer recharge, ground water can be depleted affecting not only drinking water supplies, but also the amount of water available to maintain summer stream flows. Ground water that discharges into streams does so at a much slower rate than surface water runoff and has the ability to maintain base flows during dry months. In dry summer months ground water may be the only source of water for some watershed streams, particularly the upper reaches of French Creek. Ground water also supplies water to Meadow and Chain lakes. If recharge is lost, summer stream flows may become inadequate to provide aquatic habitat.

EXTENT OF GROUND WATER QUALITY AND QUANTITY PROBLEMS

Ground Water Quality

A ground water management plan has been developed for portions of the county, including the French Creek watershed. In developing the plan, the USGS (1997) defined areas where ground water is highly vulnerable to contamination (see figure 32, page 88). Within the French Creek watershed, the floodplain, the wetland system at the confluence of Golf Course Creek with French Creek, and the Meadow Lake area received that designation. In addition, the watershed geologic study (Bailey 1998) identified Stables Creek, Chain Lake, and portions of the Lords Hill tributaries as ground water resources vulnerable to impact from both surficial and/or migrating contamination sources. Additional vulnerable areas have surface exposures of younger alluvium, older alluvium, recessional outwash, and advance outwash materials.

The land uses overlying the watershed's vulnerable aquifers that were identified as potential sources of contamination included industrial, commercial, and agricultural. In addition, major roads and railroad lines transport hazardous materials through the watershed in areas of high ground water vulnerability (Golder 1996).

In their study, the USGS sampled 17 watershed wells. The results of this sampling found four wells with elevated nitrates, and one with relatively high concentrations of septage related and nitrogen compounds (figure 36).

Underground storage tanks containing gasoline, toxic chemicals, process chemicals, heating oil, chemical wastes, and other liquids are often stored above or below ground, and they may leak, contaminating ground water.

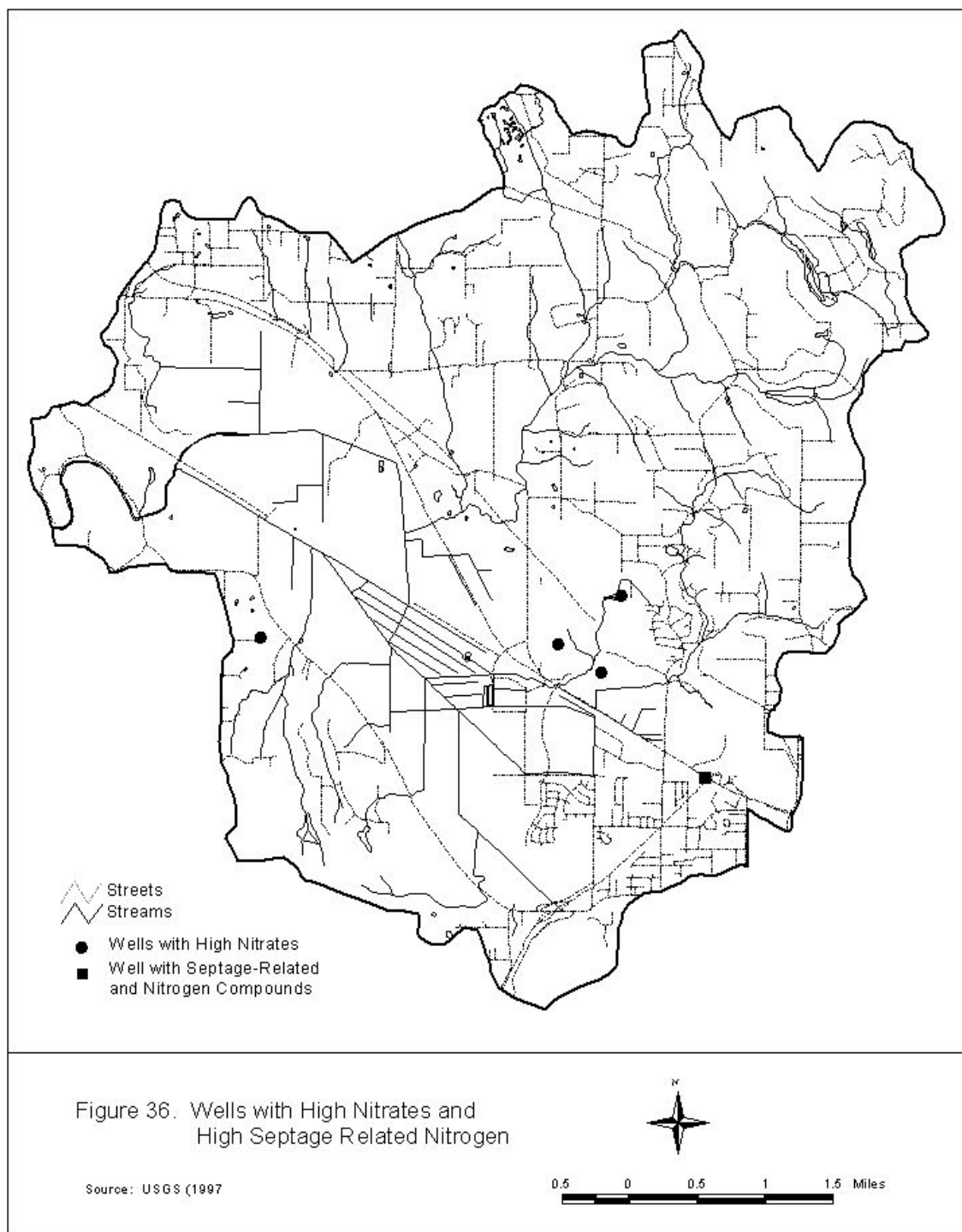
Ground Water Quantity

The primary source of recharge to ground water is precipitation that infiltrates and percolates to the water table through the soil. Ground water recharge is approximately 50 percent higher in areas overlain by outwash/alluvium derived soils than in areas overlain by till, bedrock, or organic derived soils. Approximately 47 percent of the watershed surface area consists of outwash/alluvium soils; the other 53 percent is till.

Ground water resources will be directly impacted as development occurs throughout the watershed. When impervious surfaces are created, recharge to ground water is physically blocked. Ground water levels will lower if runoff is discharged to surface water rather than infiltrated. Lowering of ground water levels could result in lower base flows to streams during dry months. In western Snohomish County it has been estimated that ground water levels are reduced an equivalent amount through impervious surface as through current consumptive use (Golder Associates 1996).

The USGS ground water study found no evidence of regional depletion of ground water from over allocation. However, this study did not look at localized effects of ground water use on streams.

The USGS did find that a median drop of one foot in the overall ground water elevation appears to have occurred during the last ten years within the Lakes Aquifer. The Lakes Aquifer is an unconfined aquifer lying in advance outwash. The Lakes Aquifer underlies about 47 percent of the watershed area (figure 6, page 22). As development increases further drops in the elevation of the ground water table may result from the decreased amount of water available to recharge the aquifer because of impervious surfaces and from ground water withdrawal from the aquifer as the population increases. A drop in the ground water table elevation would eventually impact base stream flows in some of the tributaries. In addition wells would have to be deepened for continued use. Impacts may occur to the quality and quantity of groundwater available to Chain and Meadow lakes and the tributaries in the northern portion of the watershed that depend on groundwater as their major source of flow. The areas most sensitive to immediate impacts to the water table will be found at ground water discharge/recharge points (see figure 22, page 54).



FRAMEWORK FOR PROTECTING GROUND WATER

Regulatory

Ground water is protected through state and federal water quality standards. The state standards address health issues and the EPA standards address hazardous substances and carcinogens. The Snohomish Health District is the agency that administers rules protecting drinking water, investigates potential contamination sites, and tests drinking water quality.

Washington water law requires all prospective water users to obtain a water right permit from Ecology before constructing a well or withdrawing any ground water from a well for amounts exceeding 5,000 gallons of water per day. This applies to withdrawals used for livestock watering, domestic water supply, industrial purposes, or irrigation of no more than a half acre of lawn or noncommercial garden.

Most ground water regulations in force today have to do with water withdrawal and protection of drinking water in wells. The county is participating in the State Ground Water Management Program administered by Ecology. Under this program, the county received a grant to collect ground water quality and quantity data. A county Ground Water Management Plan has been completed identifying policies and management strategies to protect ground water.

As part of the Ground Water Management Program, the county adopted an interim ground water ordinance. The ordinance requires that studies be done for certain types of activities that could potentially affect ground water quality. If studies indicated that there could be significant impacts to important ground water resources, alternatives to address those impacts must be presented, and conditions could be placed on the activity to prevent or mitigate those impacts.

The Snohomish County Council has also adopted a County Policy for Protection of Groundwater Resources (Motion No. 90-249). The motion recognizes ground water as a valuable and vulnerable resource and adopts policies that are meant to protect ground water supply and quality. Monroe's codes or policies do not address ground water.

Nonregulatory Programs

Snohomish County Public Utility District (PUD) is the major organization that provides public education on ground water resources. PUD has several educational programs, one of which is the Conservation Education Program. This program provides assistance and materials to local schools. PUD promotes the program to school principals and teachers.

Water Districts, municipalities, and Ecology created the Water Conservation Coalition of Puget Sound. This coalition of water suppliers has a public education program that targets education at both youth and adult levels at general and specific industries. The coalition offers technical assistance and has projects that promote outdoor water

conservation such as model codes for irrigation and landscaping and demonstrations of native plant gardens.

The Department of Health has many brochures available to the public on various aspects of conservation. The brochures are available to purveyors for distribution to customers. Snohomish Health District (SHD) offers technical assistance to well owners regarding the proper construction, sealing, and decommissioning of wells.

The Snohomish County Ground Water Management Committee has produced brochures, a ground water exhibit to display at public events, and a slide presentation.

Fecal Coliform Bacteria and Nitrates from Onsite Sewage Systems (Problem Summary and Management Recommendations, pages 160-163)

PROBLEM DESCRIPTION

Human waste is a source of harmful bacteria, viruses, and excess nutrients in streams and ground water. Human waste in streams usually comes from onsite sewage systems that do not work properly. Onsite sewage systems provide initial wastewater treatment and settling of solids before soil purification occurs. With adequate maintenance an onsite sewage system can operate properly from 20 to 40 years, or beyond, if the system has been properly designed, installed, and maintained. Human waste in streams is also contributed by sanitary sewer systems that occasionally malfunction and by sewage illegally piped to a stream.

The ability to treat and absorb sewage effluent depends on the depth and type of drainfield soil. The Washington Department of Health has determined that a vertical separation (minimum distance between the drainfield bottom and restrictive layers, like the water table or hardpan) of three feet is needed to assure adequate effluent treatment. New onsite sewage systems constructed where soils are highly permeable and/or where the water table is high must meet regulations by using enhanced treatment systems such as sand filters or mounds. Watershed areas that are likely to be wetlands or have highly permeable soils include areas of alluvial and outwash soils. Onsite sewage systems may not be constructed in hardpan, the compacted material underlying till soils, because hardpan prevents infiltration.

Onsite sewage system problems generally result from improper siting, sizing the system too small, improper construction, insufficient maintenance, excessive water use, use of chemicals, physical damage, homeowner abuse, and aging systems. Water quality treatment in onsite sewage systems built prior to 1970 was not as stringent as that required of today's systems. During that time, most systems were designed and constructed by certified designers and professional engineers, but all were not inspected.

Onsite sewage system failure results when waste volume exceeds the soil capacity to absorb waste causing backup in the plumbing system or where effluent containing high levels of bacteria and nitrates seep into the ground water. A lush vegetation growth over the drainfield, wet or swampy areas adjacent to or in the drainfield, and/or profuse growth of wetland plants over the drainfield can indicate onsite sewage system malfunction.

EXTENT OF ONSITE SEWAGE SYSTEM POLLUTION

Approximately 85 percent of the watershed is outside the Monroe urban growth boundary (figure 2, page 18). Areas outside this boundary are not likely to have public sewer service in the near future. Onsite sewage systems well constructed and properly maintained are a viable alternative to sewer. A well-tended onsite sewage system can last as long as the life of the home for which it was originally constructed.

According to SHD, in the French Creek watershed the most common onsite sewage system problems are likely to be old, undersized systems and lack of maintenance pumping. To determine potential locations of older onsite sewage systems in the watershed, Metroscan data were used to determine the locations of homes constructed prior to 1970, when systems may not have been inspected and between 1971 and 1978, assuming that onsite sewage systems were constructed at the same time. The inventory results indicated that 560 watershed homes with onsite sewage systems were more than 20 years old, and two thirds of those were constructed prior to 1970. While the following discussion focuses on older systems because there is a higher potential for onsite sewage system failure or malfunction, newer systems do not always function well if they were not properly installed or maintained. SHD has recorded 20 repaired onsite sewage systems in the watershed since 1988; only half were systems more than 20 years old. New systems that fail usually do so within the first six months because of improper construction.

The potential distribution of older onsite sewage systems is shown on figure 37. Older onsite sewage systems are concentrated along Cripple Creek in the area of Trombley Road and 117th Street SE and along French Creek in the French Creek Trails subdivision. Clusters of older homes occur along Lords Hill Tributary No. 1. Some of the homes in the floodplain, upper Spada Creek, and French Creek just north of State Route 2 appear to be constructed on land that has wetland soils. Wetland soils are generally not appropriate soils for onsite sewage systems because they have a high water table and would not meet vertical separation criteria.

Table 3 shows water quality sampling sites with high fecal coliform bacteria levels (those that exceed state standards) and high nitrate levels (those near or above 1 mg/l) with potential contribution by improperly sited and older onsite sewage systems. The table is intended to indicate areas where there is a potential for onsite sewage systems to be a source of pollution, but it is not intended to exclude other sources. (High fecal coliform bacteria counts during the wet season are an important indicator of onsite sewage system failure. In the upper French Creek stream system, wet season fecal coliform counts met water quality standards at all but the Lords Hill No. 1 water quality monitoring site.)

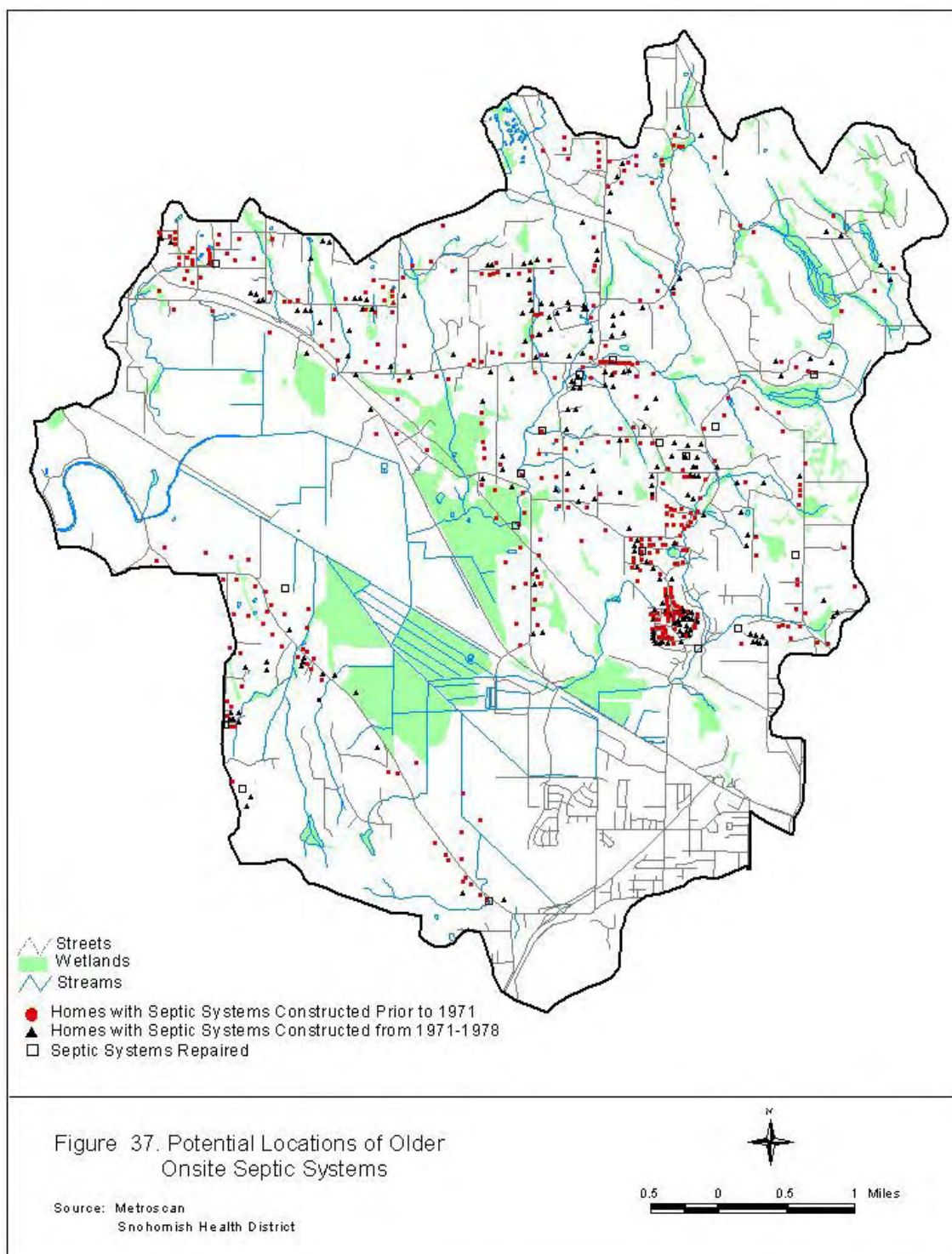


Table 3. Sampling Sites with High Pollutant Levels and Potential Onsite Sewage System Problem Areas

<u>Sampling Site</u>	<u>Fecal Bacteria</u>	<u>Nitrates</u>	Homes Constructed on <u>Wetland Soils</u>	# of Older Homes Near Streams
Upper Cripple Creek	Low	High	Yes	5
Lower Cripple Creek*	High	Low	Yes	18
Trench	Low	High	No	4
Upper Spada	High	Low	Yes	0
Lower Spada	Low	Low	No	4
Upper Stables	Low	High	No	0
Lower Stables	High	High	No	6
Upper French**	High	High	Yes	31
Lords Hill 1	High (wet)	High	No	10
Lords Hill 2	High	High	No	2

*Collects drainage from Trench and Upper Cripple Creek subbasins (see figure 31, page 84).

**Collects drainage from Upper and Lower Spada, Upper and Lower Stables subbasins. (Thornburg 1998)

The highest fecal coliform and nitrate levels are in the floodplain. However, there are few homes in the floodplain, and the major of source pollution there is livestock waste.

Much of the upper watershed consists of Tokul soils, which are soils on till plains. When the depth to hardpan (till layer) does not meet the vertical separation requirement, alternative onsite sewage systems or waste removal is required. Chain Lake Elementary School was constructed in this till plain area. Because of the land area needed for the system and the hardpan layer on the site, the waste is collected in a tank, pumped every ten days, and taken to the Monroe sewage treatment facility.

Onsite sewage system design inadequacies occur; the most common is lack of effective removal of nitrates. Most conventional systems are not effective at removing nitrogen. In areas like the French Creek watershed where nitrogen is a problem pollutant, denitrification should be a consideration in the onsite sewage system type used.

The overuse of water can prevent effluent from being effectively broken down, resulting in contaminated effluent leaving the system. The use of additives to “clean” onsite sewage systems can actually exterminate useful microbes that break down waste materials with the result being an increased discharge of pollutants. Often the additives contain chemicals that can contaminate receiving water.

The use of garbage disposals can significantly increase the loading of suspended solids, nutrients, and biological oxygen demand to onsite sewage systems. The build up of solids in sewage tanks also increases, requiring more frequent pumping.

FRAMEWORK FOR CONTROLLING POLLUTION FROM FAILED ONSITE SEWAGE SYSTEMS

Regulations

Under the federal Clean Water Act, it is illegal to allow organic material such as onsite sewage system effluent to seep into streams and wetlands. The Snohomish Health District (SHD) regulates installation and operation of all onsite sewage systems with capacities under 3500 gallons per day. The Washington State Department of Health regulates systems with capacities of more than 3500 gallons per day and fewer than 14,500 gallons per day. Large sewage systems (14,500+ capacity) and industrial onsite systems are regulated by Ecology. These administrative responsibilities have been assigned in Onsite Sewage System Regulations (WAC 246-272).

In January 1995, SHD adopted revised State Board of Health onsite sewage system regulations. These regulations emphasize high standards for treatment and professional and personal responsibilities in siting, design, installation, inspection, operation, and maintenance. The new regulations required local health departments to develop and implement plans for periodic monitoring of onsite sewage systems and dissemination of operation and maintenance information to homeowners by January 1, 2000.

Programs

SHD has programs in place to reduce nonpoint pollution from onsite sewage systems. SHD licenses sewage pumping companies to make sure they are using proper pumping techniques. It also has public education programs. Educational brochures are available to help the public locate their onsite sewage systems and show proper septic tank and drainfield maintenance. Staff members are available to speak to community groups about onsite sewage maintenance. In addition, a video has been prepared about onsite sewage systems and proper maintenance for use by citizens. SHD has prepared a database of all onsite sewage systems, which enables them to mail reminders to households about getting the septic tank pumped, along with information on pumping and maintenance.

Some jurisdictions are using State Revolving Fund loan money to repair failing systems. Snohomish County has tried to set up such a program, but has been unsuccessful because of the inability to get the program to work.

Pollution from Urban/Rural Stormwater and Direct Discharges (Problem Summary and Management Recommendations, pages 164-166)

PROBLEM DESCRIPTION

Stormwater is water that washes off the land into streams, lakes, rivers, and in Snohomish County it eventually goes into Puget Sound. On its way to the streams, stormwater picks up all types of particles, chemicals and other substances. Prior to modern land development, plants and soils absorbed most precipitation. Rain and snow slowly filtered down to recharge ground water and eventually was discharged into nearby streams. In developed areas, rain that flows over impervious surfaces such as streets, parking lots, and buildings, compacted soils, and construction sites carries sediment, metals, organic matter, oils, landscaping chemicals, and other pollutants. Contaminated stormwater then pollutes the streams, lakes, or ground water that receives the runoff.

Everyday activities are responsible for degraded stormwater runoff. Cars drip or rain washes petroleum, hydrocarbons, and metals such as arsenic, cadmium, chromium, copper, lead, and zinc off cars onto streets and from there the runoff flows to streams. Detergents used for car washing and other types of washing are sources of phosphates and other chemicals.

Fertilizers, pesticides, herbicides, and fungicides are washed off the land during storms and contribute nutrients, metals, and other toxic substances to streams and lakes. Many homesites in developing areas have lawns and yards that have compacted, nutrient poor soils. Since it is difficult to establish vegetation on these sites, many homeowners may overapply or incorrectly use soil amendments, fertilizers, pesticides and other chemicals. A joint study of 15 Puget Sound Basin streams conducted by Ecology and EPA reported 18 different chemicals in stream water (Bortelson and Davis 1997). Urban use of pesticides totaled approximately 1.1 million pounds per year, which is three times greater than agricultural use. The report noted that pesticides are commonly used around urban households, businesses, parks, school playgrounds and golf courses. Household residents often do not apply landscaping chemicals correctly. They may spray their yards on a regular schedule rather than when it is needed, they may believe that more is better, and they may apply the chemicals just before it rains. In addition, package instructions may encourage overuse of a product. It is likely that residential homeowners are the major source of pollution from landscaping chemicals.

In most county areas, large numbers of pipes and other drainage devices discharge runoff or wastewater directly into streams. The pollutants associated with direct discharges are similar to those in urban stormwater: fertilizers, pesticides, herbicides and detergents. Roof runoff and other piped and ditched water can also cause erosion. In rural areas, onsite sewage systems and plumbing fixtures are sometimes piped to streams illegally.

EXTENT OF URBAN/RURAL RUNOFF POLLUTION/DIRECT DISCHARGE PROBLEM

Increases in watershed population and traffic are resulting in greater water quality problems. More residential areas are being constructed, as well as more roads and more businesses. Water quality monitoring indicated that there are high nutrient levels coming from residential areas. In the French Creek watershed lead, zinc, and copper were detected at all water quality monitoring sites and exceeded state standards with the fewest violations occurring at the Lords Hill sampling sites and the most occurring at the Frylands/Monroe sampling sites.

Fertilizer is a source of nitrates. There are two golf courses and a nursery in the watershed. Fertilizer use for these types of activities, in addition to fertilizer use on farms and lawns, contributes nutrients to streams. Golf Course Creek appears to originate as ground water underlying one of the golf courses. Although there were no water quality monitoring sites in Golf Course Creek, there was no evidence of excess algae or plant growth in the creek below the golf course to indicate high nutrient levels. The floodplain nursery is located on hydric soils where the ground water is vulnerable to contamination. No water quality monitoring has been conducted at this nursery.

Fertilizer and other landscaping chemicals like pesticides, herbicides, and fungicides are sources of nitrates, metals, and human toxins. These chemicals are abused to the greatest extent by homeowners. Herbicides are used for agricultural purposes, in nurseries, and to kill roadside vegetation. Only the Washington Department of Transportation uses herbicides along watershed roads. The department annually sprays along state road shoulders one to two feet adjacent to the pavement, but they avoid spraying near any watercourses. Application is timed to light rain, as the chemicals need moisture to bind with the soil. The potential exists for migration of chemicals to the stream if a heavy rainfall occurs unexpectedly.

The Burlington Northern railroad line passes through the floodplain where the ground water is vulnerable to contamination (see figure 32, page 88). Herbicides are used along the railroad tracks to control unwanted vegetation. Annual spraying is done of both of the train track bed and brush along the track right-of-way. Spot spraying is used for the brush. There is a buffer area along streams where spraying is not done.

A transmission line runs through the northern portion of the watershed. Bonneville Power Authority uses an herbicide for spot spraying within the transmission line corridors. Trees over four feet and blackberry bushes are manually cut. A 25-foot buffer along streams and wetlands is not sprayed.

State Route 2 is the only major roadway passing through the watershed. Runoff from this road is directed into French and Cripple creeks. Roads and streets throughout the watershed cross over streams in at least 155 locations, and stream sections are channeled along the road in several areas (figure 38). Untreated runoff from all these roads carries metals and other pollutants to roadside streams.

Transportation related businesses are sources of metals and petroleum in streams. There are approximately 20 auto related businesses; most are located south of or along State Route 2. Metals also come from residences that use copper drainpipes and tubing and buildings with galvanized roofs. A floodplain junkyard is a source of metals and petroleum. During the 1990 flood, petroleum was observed in water floating over the junkyard.

The quarry on 168th Street SE produces large quantities of sediment during its operation. This sediment is being washed into surrounding streams and wetlands. The sediment pond on the site is not maintained and when the sediment fills the pond, the pond loses its ability to attenuate flood flows, and the downstream channels are flooded.

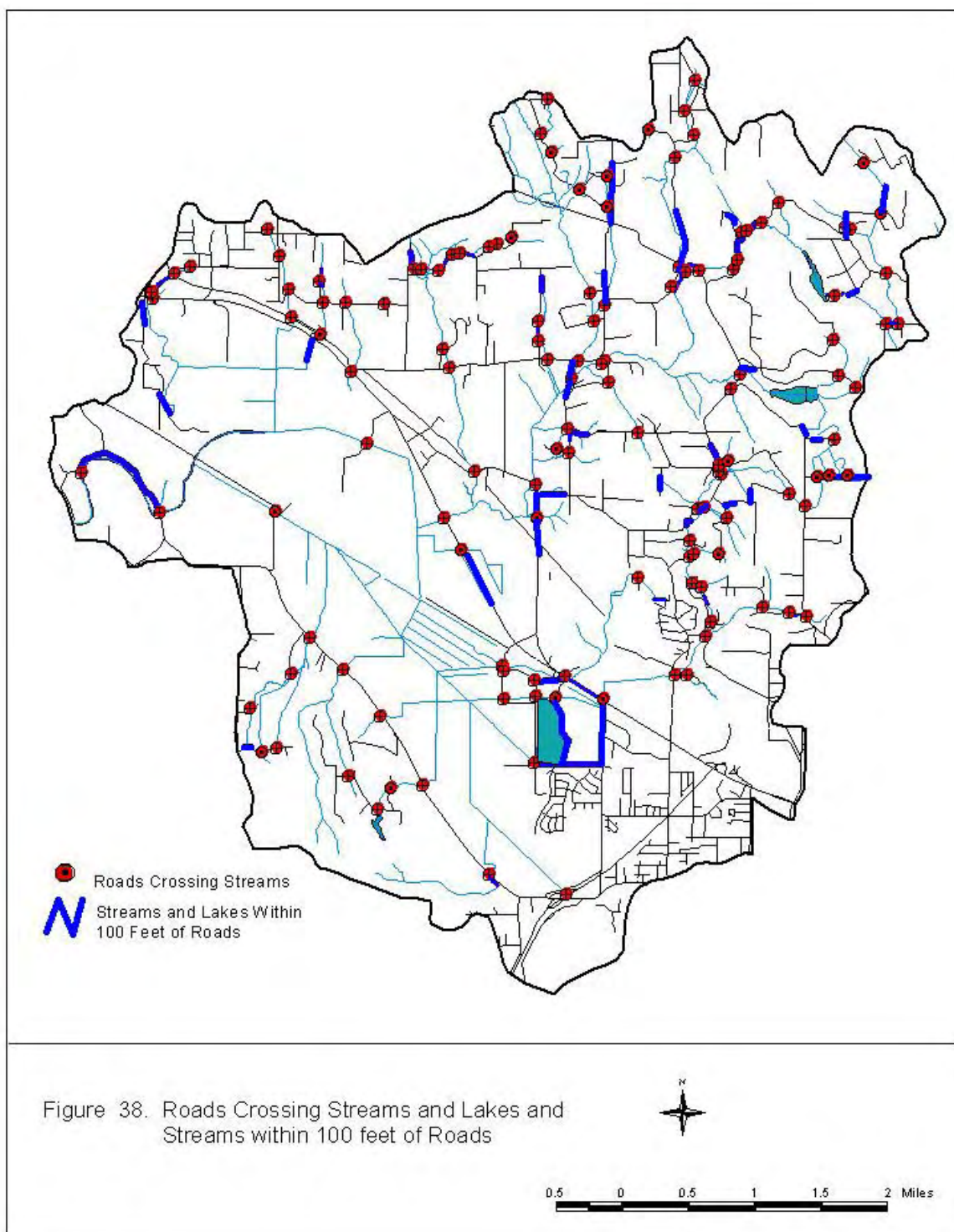
There has been no inventory of direct discharges in the watershed, but an inventory of the Quilceda/Allen watershed indicated that the types of direct discharges that are likely to occur include storm drains, agricultural and other drainage ditches, road drains, and drainage pipes. Visible pollution from direct discharges generally includes sediment from erosion and animal waste. Types of pollutants normally associated with residential drainage include fertilizers, pesticides, and other soluble materials.

FRAMEWORK FOR CONTROLLING POLLUTION FROM URBAN/RURAL RUNOFF

Under the federal Clean Water Act and under RCW 90.48, the directive is to maintain the highest possible standards to insure purity of all waters of the state and to make illegal the discharge of any matter that causes pollution. RCW90.48 gives Ecology the authority to set water quality standards, to require the use of all known available and reasonable methods to prevent pollution, and to impose fines for polluting.

Also under these regulations, point or nonpoint source pollution discharges to surface water must be under a Nonpoint Pollution Discharge Elimination System (NPDES) permit. Ecology has been delegated responsibility for issuing NPDES permits in Washington. State discharge permits, also issued by Ecology, are required for discharges to the ground or to publicly owned treatment plants. General permits are issued to entire groups of similar discharges, such as sand and gravel operation, boat yards, and shipyards. In addition, certain industrial categories likely to cause polluted stormwater runoff are required to obtain a Baseline Stormwater Permit. The stormwater permit requires development and implementation of stormwater pollution prevention plans specifying best management practices (BMPs) intended to minimize stormwater pollution. A stormwater permit requiring planning and implementation of construction site BMPs must also cover construction projects affecting five acres or more.

Under Snohomish County's NPDES permit, the county is required to identify and correct existing stormwater pollution problems and to establish preventative stormwater



programs for the county stormwater drainage system. Snohomish County is monitoring water quality in its storm drainage system and is working with businesses and industries to resolve water quality problems. Most of the work currently is being done in South County. The county has developed a water quality ordinance (7.53 SCC) that makes it illegal to pollute water in any county waterway. Surface Water Management Division staff investigates potential water quality problems. If there is a violation, a warning notice is issued, and an inspection made by Snohomish County Code Enforcement staff. Fines are generally not imposed.

Both the county and Monroe have ordinances that address stormwater management. The county amended its stormwater and erosion control ordinances in September 1998. The amended codes contain the 14 minimum erosion control requirements of Ecology's Manual. These range from a two day limit on exposed soil during the rainy season to keeping eroded soil out of storm drains and off streets. The new code requires water quality treatment of all runoff up to the quantity of the six-month, 24-hour design storm. Treatment can be accomplished through a combination of best management practices, including infiltration, biofiltration swales, and wet detention ponds. The revised code is similar to the ordinance adopted by Monroe. The Monroe stormwater ordinance addresses water quality problems through the use of BMPs as specified in Ecology's Stormwater Management Manual and prohibits illicit discharges to stormwater drainage systems. Specific techniques of erosion control are required for various land development types. All development projects must provide stormwater treatment as specified in Ecology's manual and must not create streambank erosion. Stormwater discharged into wetlands must meet water quality standards.

The Washington Department of Transportation (WSDOT) has also developed a similar stormwater program for highway runoff, including a stormwater manual for construction and maintenance of facilities to control stormwater runoff. WSDOT will incorporate methods for controlling water quantity and improving water quality in all new highway construction. WSDOT is also developing a vegetation management program that addresses integrated pest management, pesticide use, and protection of water quality. State highways will be ranked by WSDOT based on water quality concerns to determine where appropriate stormwater BMPs should be installed first. All roads are required to have BMPs by December 31, 2015.

Sediment from Ditch Maintenance

(Problem Summary and Management Recommendations, pages 167-168)

PROBLEM DESCRIPTION

Ditches fill with sediment and unwanted vegetation that are periodically removed to maximize the hydraulic conveyance capacity. Regular ditch maintenance prevents flooding and property damage. In addition to providing conveyance, vegetated ditches filter pollutants.

Some ditch maintenance practices are harmful to water quality. Dredging ditches and cleaning during the rainy season causes sedimentation and erosion within ditches and allows sediment to enter streams. Dredging can also kill fish in ditched streams. Herbicide used in ditch maintenance contributes toxic chemicals to stream water.

Ditches can present problems for local residents, many of whom do not understand the water quality and hydrologic benefits of open ditches, preferring to see them piped. Many requests come into Snohomish County Surface Water Management Division asking to pipe ditches because residents do not like the way they look or so that lawns can be planted to extend yards.

The city, county, and state maintain roadside drainage systems. The French Slough Flood Control District maintains many of the agricultural drainage ditches. The Washington Department of Transportation cleans roadside drainage ditches as needed using a backhoe or drought (big backhoe). Snohomish County uses a backhoe or ditchmaster, does mowing and brush cutting, or excavates to maintain ditches along county roads.

EXTENT OF THE DITCH MAINTENANCE PROBLEM

The sediment from ditch maintenance throughout the watershed causes turbidity in the water. In maintaining ditches, the sources of the sediment are rarely investigated. Opportunities are not taken to reduce erosion by changing the ditch geometry or isolating sources of sediment.

The frequency of county ditch maintenance is based on the following and may not reflect actual need:

- Ditches are cleaned on a ten-year cycle.
- Ditches are cleaned prior to asphalt overlay or bituminous surface treatment.
- Ditches are cleaned in response to citizen complaints or service requests.
- Known problem ditches are cleaned on the frequency required to maintain drainage.

Homeowners often landscape ditches with rock or beauty bark making it difficult or impossible to maintain, and they manage vegetation with herbicides. Homeowners are likely unaware of the value of vegetated ditches.

Floodplain streams in particular are deposition sites for sediment from upstream and from the floodplain itself. There are many drainage ditches in the floodplain. These drainage ditches and both French and Cripple creeks are dredged on a regular basis to maintain the capacity of the stream channels to transport water. Although the French Slough Flood Control District is responsible for maintaining some of the floodplain drainage system, dredging by private floodplain landowners and landowners outside the floodplain is often done without consideration for sediment created.

Roadside ditches are maintained either by the county or Monroe. Many ditches along roads like Spada, Meadow Lake and others are actually streams (see figure 38, page 113).

FRAMEWORK FOR CONTROLLING SEDIMENTATION FROM DITCH MAINTENANCE

A Hydraulic Project Permit from the Washington Department of Fish and Wildlife is required for all ditch maintenance in streams that have been converted to ditches or ditches that provide habitat for salmon. In addition a grading permit may be required. (See page 58.)

The county's NPDES permit requires development and implementation of ditch maintenance standards for both public and private facilities. Snohomish County will be working on these standards in 2001/2002. (See page 114.)

Maintenance of all ditched waterways is addressed under the 4d Rule of the Endangered Species Act to decrease impacts to the Chinook salmon. (See page 59.)

Sediment and other Problems from Forest Management (Problem Summary and Management Recommendations on pages 169-170)

PROBLEM DESCRIPTION

This problem definition discusses problems associated with timber management and the logging impacts for conversion to development. Other impacts of forest loss and conversion are found under the problem, “Hydraulic Impacts from Stormwater Runoff.”

Logging can degrade water quality in many ways. Logging affects stream by introducing organic material and sediment. Fertilizer application to replanted areas is a nutrient source. Pesticides and herbicides are used to control undesired plants and animals. These chemicals can be applied directly or by aerial spraying. Chemicals can be transported to streams during storms or from overspraying, or by drift in the case of aerial spraying. Clearing of trees along the water’s edge leads to increased stream water temperature and decreased large woody debris available to streams to form instream habitat. Removal of trees increases stormwater runoff. Although there are Forest Practice Rules to reduce some of these impacts, they do not prevent them from occurring. Many individuals do not get permits, and not all logging is regulated.

Sediment and turbidity (cloudiness) are created during yarding and logging activities and construction and use of haul roads and skid trails. The amount of sediment contributed to streams depends upon the extent of the logging activities, the intensity of the disturbance, the proximity of the logging activity to the stream, and the amount of precipitation occurring during logging.

EXTENT OF THE FOREST MANAGEMENT PROBLEM

Forest is the dominant land cover out of the floodplain. There are currently about 6000 acres of forest, including forested wetlands, in the watershed. This represents one third of the total watershed area. There is no forest reserve land use designated under either the comprehensive plans of the county or Monroe. Logging as part of forest management has diminished considerably in the watershed, with a concomitant increase in logging for land use conversion. Nineteen forest practice applications were submitted in the watershed from 1990 through 1997 involving logging 261.45 acres (see figure 34, page 94). Approximately 83 acres of that forestland is scheduled for replanting and 178 acres will be developed.

Erosion and sedimentation can be a serious problem when logging activities are in close proximity to streams. In a watershed analysis of adjacent Woods Creek watershed (Washington Department of Natural Resources [DNR] 1993), ground based skidder yarding was found to have the greatest potential to contribute fine sediment to streams from surface erosion on flat ground regardless of soil erosion potential. Skidder yarding creates large areas of exposed soil. Skid road networks, inadequate water bars on skid trails, skid trails in close proximity to stream channels, and soil compaction all result in overland flow generation. Since the French Creek system has a highly developed drainage network with till soils, fine sediment in streams is likely to be a problem from

yarding activities. Erosion will also be a problem when logging occurs on the watershed's steep slopes. Erosion control is required for some logging activities, including road building. The DNR may require erosion control measures to prevent continuation of or avoid material damage to public resources. Erosion control is required on sites being cleared for development.

Logging causes increased stormwater runoff through reduced evaporation, reduced retention, reduced infiltration, and reduced soil moisture capacity. There are no requirements to detain runoff and downstream reaches are scoured, channels eroded, and downstream culverts are overwhelmed. Logging done where seeps and springs occur exposes these areas at the surface and increases runoff by volumes. Logging in the French Creek watershed may be responsible for some of the damage to stream channels there. Logging has been replaced by land clearing for developing and similar problems are still occurring as a result of increased stormwater runoff.

According to the DNR, fertilizers are used infrequently in forest management in western Washington, although herbicides are used regularly to control unwanted vegetation.

Many landowners do not realize that they need a permit to log areas or do know but do not get permits. In addition logging on land area of less than two acres is not regulated under Forest Practice Rules. Some of the water quality impacts in the watershed result from both of these sources.

FRAMEWORK FOR CONTROLLING POLLUTION FROM FOREST MANAGEMENT ACTIVITIES

Logging is regulated through the Washington Forest Practices Rules and Regulations (WAC 222), administered by the DNR. Logging and replanting require either Class II or Class III permits. Forest management activities under Class II permits "have less than ordinary potential to damage public resources." That is, there are no critical areas on the site. Under Class III permits the activities would have the potential to impact streams and wetlands or would involve aerial application of pesticides, herbicides, and fertilizers. Individuals who receive a Class II or Class III permit with a conversion option harvest plan agreed to by local government are not subject to any moratorium on development unless the harvest plan agreement is not honored. Those issued without the harvest plan cannot convert their land to other uses for a period of six years.

Class IV permits consist of the categories General and Special. Class IV Special permits must have an environmental review or other extensive supplemental report. Class IV General permits involve forest practices on platted lands or on lands being converted to another use within three years. Recent changes to the Forest Practices Rules have placed Class IV General permits under the jurisdiction Snohomish County. Snohomish County has agreed to assume jurisdiction and in doing so it must adopt regulations and administrative practices that meet or exceed the standards of the Forest practice Rules for Class IV General permits. This change has resulted in submittal of some Forest Practice Applications to the county and review under the county's permit process. The DNR

retains some jurisdiction and may condition the activity under forest practices permit requirements. Ideally all agencies with jurisdiction are coordinating permit requirements during the SEPA process.

This change to permit review is experienced by many as time consuming and costly. Landowners are charged \$50 for the permit, and permit applications must go through an extensive review process. Some landowners obtain Class II or Class III permits to avoid dealing with the county even though there may be a moratorium on development under those permits. The regulations for critical areas generally are not as stringent under Forest Practice Rules as county Critical Areas Regulations. Under Forest Practice Rules a certain portion of trees left in the riparian management zone can be cut, and forested wetlands can be logged. Under the Emergency Rule recently enacted as a result of listing of the Chinook salmon under the Endangered Species Act, harvesting, road construction, and other activities must maintain a 100-200 foot buffer from type 1, 2 and 3 waterbodies. Forest practice activity that would occur within 100 feet of such a waterbody would trigger a Class IV Special permit, requiring an extensive supplemental report. Under the Class IV General permit, county Critical Areas Regulations would apply. Under the Administrative Rule adopted by the county for streams with endangered species, the first 150 feet along a stream is a no touch zone, while within the adjacent 150 feet, runoff must be infiltrated.

A Class IV Special Permit is required when harvesting occurs within critical habitats and when application of aerial pesticides would cause specific adverse impacts to the environment.

The amount of logging activities allowed along streams is dependent upon the stream type. The Department of Natural Resources (DNR) did the original stream types and must approve all retyping of streams. Many watershed streams were initially incorrectly typed by the DNR because of the methods used, and some streams are not mapped or are not routed properly. Incorrectly typed streams generally are typed lower than their actual type, potentially providing lesser protection under critical areas regulations. Both the DNR and the county evaluate stream types when a permit is requested. The Tulalip Tribes retyped most of the streams in the French Creek watershed. The retyping has not been officially sanctioned (see figure 23, page 57). (See also the discussion of stream types on page 55.) The DNR only deals with streams on forested land.

The riparian management zone requirements of the Forest Practice Rules and Regulations are designed to protect water quality and fish and wildlife habitat. The regulations are meant to insure that large organic debris for streams, snags, canopy cover, and a multi storied, diverse forest remains adjacent to Type 1, 2 and 3 waters.

A specified minimum number of trees that meet certain structural criteria are left within riparian management zones to provide shade, streambank integrity, and wildlife and fish habitat. The number, size, species, and ratio of deciduous to coniferous leave trees vary depending on stream type and size, channel characteristics and desired outcome.

Since March 20, 2000, a new emergency rule has been enacted that has changed how riparian management zones (RMZ) on streams are calculated. In many cases, buffers on type 1, 2, and 3 streams can range from 100 to 200 feet depending on the impacts to salmon bearing streams. (Landowners who own less than 80 acres of forest land and who are going to log less than 200 contiguous acres are exempted from the wider RMZs.)

Forest Practice Rules require specific buffers that are designed to protect streams and wetlands, depending on the type of pesticide application (hand, ground based power equipment, or aerial) and water or wetland type.

Forest Practices Rules address sediment problems through implementation of the Ecology stormwater manual for road building and maintenance. Forest Practice Rules do not address many water quality problems related to logging and do not address increased flows from stormwater runoff.

Pathogens and Nutrients from Household Pet Waste (Problem Summary and Management Recommendations, page 171)

PROBLEM DESCRIPTION

Waste from household pets is a source of harmful bacteria, viruses, and nutrients in streams. Pet waste gets into streams when residents deposit waste material along streambanks and when animals eliminate waste along a stream corridor. Runoff from rain carries the waste into streams.

There is evidence that pet waste is a contributor of bacteria in residential areas. A study of water quality in the North and Swamp Creek watersheds found that there was a trend for higher bacteria levels in residential areas as opposed to areas with hobby farms. The residential sites were served by municipal sewer systems so the major contributor of bacteria was believed to have been pet waste (Thornburgh 1996). DNA testing of bacteria in a stream in the city of Everett indicated that pet waste was a significant source of fecal coliform bacteria there.

EXTENT OF THE PET WASTE POLLUTION PROBLEM

There has been no inventory of pets in the watershed; however, it can be assumed that the greatest problem with pets will be in the densely developed areas along streams. Approximately one mile of Cripple Creek flows through the densely developed Robinhood Lane area. Another subdivision is being constructed along a tributary to Cripple Creek. Cripple Creek was identified as having high dry season bacteria concentrations. Pet waste was considered a potential source (Thornburgh 1997). In the northeast portion of the watershed some land is being developed using lot clustering, which will increase the number and concentration of homes in that area. The major population center in the watershed is in Monroe. A number of its drainageways discharge into Cripple Creek in the floodplain.

FRAMEWORK FOR CONTROLLING WASTE FROM HOUSEHOLD PETS

Regulations

A common way to control pet waste is through laws requiring pet owners to pick up and dispose of pet waste. Neither Snohomish County nor Monroe has such a regulation.

Educational Material

Snohomish County Solid Waste Management Division has a brochure asking pet owners to collect animal waste and explains how to dispose of the waste properly. The Snohomish Health District also distributes information on disposal of pet waste.

Illegal Dumping and Stream Garbage

(Problem Summary and Management Recommendations pages 172-173)

PROBLEM DESCRIPTION

Streams that are aesthetically unpleasant are difficult for the public to conceive as a resource to be protected. Conversely, increasing the natural beauty of streams helps to foster appreciation and public stewardship. The public's perception of natural beauty in a stream corridor is most significantly affected by the presence of litter washed in from the streets and larger trash items dumped in and along streambanks.

Stream garbage--including organic material such as yard clippings and inorganic material such as tires, bottles and cans, appliances, cars and car parts--is a common problem in both urban and rural areas. Because of the rising costs of disposing of solid waste, people often dump household garbage on streambanks and in streams and wetlands. Garbage tossed out of motor vehicles lands in streams and wetlands along roads. Forested streamside and wetland buffers often provide out of the way places to put all kinds of unwanted material.

EXTENT OF THE ILLEGAL DUMPING AND GARBAGE PROBLEM

Solid waste and garbage can be readily observed in the watershed. Watershed citizens indicated that dumping occurred or debris was observed at the following sites: French Creek by the grange, Golf Course Creek at Westwick Road, Fryelands area, along 140th and 123rd streets SE on Lords Hill, near beaver ponds on Meadow Lake Road, and 88th Street SE near Stables Creek.

The Watershed Management Committee conducted a stream cleanup at the French Creek Grange in August 1998. Volunteers found the results of years of garbage dumping, including a refrigerator, air conditioner, automobile seats, box springs, dead dogs, engine blocks, tires, great quantities of styrofoam plates and foam rubber, plastic bags of animal feces, piles of metal strips, asphalt, etc. The day after the cleanup, someone left a washer and dryer there. A fence now blocks access to this dumping site.

Dumping of yard debris along backyard streams and in wetlands is another problem. Nutrients leach out of these piles of debris when it rains and contaminated water ends up in creeks.

FRAMEWORK FOR CONTROLLING ILLEGAL DUMPING AND GARBAGE

Regulation

Most waste disposal is regulated through RCW 70.96, the state's Solid Waste Management Code, and implemented in Snohomish County through SCC 7.35.120. This code states that it is against the law for anyone "...to dump or deposit or permit the dumping or depositing of any solid waste onto or under the surface of the ground or into the waters of this state..." unless they have a permit. When illegal dump sites are found and contain at least three items with the name of one individual, that person is presumed

to have done the illegal dumping and can be cited for a code violation. Dump sites on private property become illegal only when they violate hazardous materials laws or create a nuisance. The Snohomish Health District (SHD) administers and enforces illegal dumping regulations.

One of the common water quality complaints called into Surface Water Management is illegal dumping along and in streams. Because illegal dumping is usually not a serious water pollution problem, there is currently no agency willing to take responsibility for cleaning up illegal dumpsites when they occur on private property. Generally if hazardous material or other nuisance materials are found, the Department of Ecology Hazardous Spills group will be called to remove the material. According to the SHD, enforcement of illegal dumping is not a high priority because of limited staffing.

Programs

The cost to homeowners of disposing of yard debris and other types of garbage is high and many people do not realize there are ways to cut costs in disposing of these materials. For example, by pooling all yard debris in a neighborhood and taking it in one truck to a composting facility, individuals can save money. Many of the items in illegal dumps are recyclable like lead acid batteries. Some metal can actually be sold for recycling. Certain items cannot be taken to the transfer station, including refrigerators, tires, hazardous materials, and dead animals. These items are often found in illegal dumpsites.

Conducting stream cleanups is an important way to get rid of stream garbage, but the amount of garbage collected can be very large and disposing of the garbage at a transfer station can be expensive. It is hard to persuade people to do stream cleanups if they end up having to pay for disposing of other people's garbage. Snohomish County Solid Waste Management Division (SWMD) has a program to help reduce expenses incurred by disposing of illegally dumped garbage. Disposal fee reduction is available by applying to the SWMD. The program has a limited amount of money available to offset disposal fees by reducing costs from \$89/ton to \$25/ton.

There is a cost to the homeowner for disposing of yard debris. SWMD, through a number of programs, helps to insure the availability of techniques for homeowners to reduce or reuse their yard debris instead of paying for disposal. Master Recycler Composter volunteers train homeowners in composting methods at demonstration sites and workshops. Mulching lawnmowers and compost bins have been made available to homeowners at reduced prices.

Metal appliances such as stoves, washing machines, and dryers (white goods) can be recycled for free at Snohomish County transfer stations. These white goods are still frequently illegally dumped throughout the county.

Other items that can be recycled for free include car batteries, aluminum cans, glass bottles, and other recyclable materials that are often dumped in streams and wetlands.

SWMD is working on a program to provide cleanup of illegal dumpsites. It will be forming an interagency committee to try to address the problem. Although the county and Snohomish Health District have authority to clean up illegal dump sites on public lands, they do not have that authority on private land. On public land the county has used grant funding to clean up some illegal dumpsites.

Monroe has mandatory fees for pickup of solid waste. Because residents have to pay for garbage disposal, there is no incentive to dump garbage elsewhere. Monroe also holds twice yearly free garbage pickup. City residents can dispose of items like mattresses, old appliances and other items that are often found along streambanks or other out of the way places in the county.

Toxic Chemicals from Hazardous Materials (Problem Summary and Management Recommendations, pages 174-175)

PROBLEM DESCRIPTION

Hazardous materials are a source of point and nonpoint pollution. Increased use of chemicals in industry, small businesses, and households has resulted in growing amounts of hazardous waste entering the environment.

Hazardous substance sites are contaminated sites that have been found by Ecology to pose a threat to human health or the environment. Hazardous waste can migrate through soil into ground water, contaminating drinking water or stream water. Hazardous wastes can be carried in stormwater runoff to streams, potentially killing fish and other aquatic organisms. Hazardous substance sites come to the attention of Ecology or the Snohomish Health District from complaint calls, inspections, or self-reporting by businesses. If the sites are found to be contaminating ground water, surface water, or soil, they will be placed on Ecology's hazardous substance site list, and the sites must be cleaned up to the point where there is no further contamination. However, when the land is transferred the lending institution may require the property to be completely cleaned.

Underground storage tanks have been identified as potential sources of nonpoint pollution. These tanks are used to store petroleum and other regulated substances. If these materials leak into ground water, contamination results. Deterioration of the tank, improper installation, pipe failures, spills, or overfills may all contribute to tank leakage. Water contamination will remain a threat until all storage tank locations are identified, and storage tanks found leaking are replaced.

Moderate risk waste is hazardous waste that is generated by businesses in smaller quantities (less than 220 pounds per month) and household waste such as paint, lawn care, and automotive products, cosmetics, and pharmaceuticals. Auto service and repair shops, print shops, dry cleaners, beauty salons, medical and dental facilities, and school shops are some of the potential small quantity hazardous waste generators. Some problems associated with these businesses are improper management of hazardous wastes by unlicensed and other businesses, lack of secondary containment to prevent contamination, draining of wastewater to the storm drain, and lack of knowledge to reduce the use of hazardous materials.

The increased use of chemicals in homes adds to hazardous waste contamination of surface water runoff. Household products such as paints, solvents, and cleaning fluids and auto related products such as oil and oil filters, lead acid batteries and antifreeze can end up in surface water or are dumped into storm drains or onsite sewage systems.

EXTENT OF THE HAZARDOUS WASTE PROBLEM

Hazardous Sites

Three watershed sites are listed by Ecology as a hazardous site. A five-acre residential area is on the list for petroleum, metals, halogenated organics, and non-halogenated solvents in ground water. The Monroe Salvage Company in the floodplain is listed for metals and petroleum in ground water. Northwest Pipeline Company along SR 2 is listed for metals (mercury) in the soil. None of these sites have been cleaned up even though they have been on the hazardous site list for several years.

Leaking Underground Storage Tank

There are no known leaking underground storage tanks in the watershed. Leaking underground storage tanks are generally reported to Ecology. Probably the greatest potential for leaking tanks in the watershed is from underground fuel storage tanks.

Moderate Risk Waste

Many households use paints, solvents, and other toxic chemicals on a regular basis. As of 1992, the county's 177,500 households and 2000 minor and major commercial generators were generating about 11.1 million pounds of moderate risk waste annually in both liquid and solid forms (Snohomish County 1993a). These materials have the potential to harm surface and ground water. When the materials are no longer useable or wanted, disposal becomes a problem. Some of this waste is flushed into sanitary sewers, dumped on the ground, or poured into storm drains. If the waste material is improperly stored, it can leak into the ground. More than 10,000 people live in this watershed, and that number is expected to increase in the next 20 years, increasing the problem of household hazardous wastes.

Monroe issued licenses to a number of businesses that would potentially use hazardous materials including the following types: auto service stations, auto repair, auto salvage, paint and body shops, carpet cleaning, wood products, machine shops, aviation related businesses, and small manufacturing. Many of these businesses are concentrated just south of State Route 2 and east of Monroe's city center. In May 1998, Ecology's Hazardous Waste Technical Resource Team and the Snohomish Health District visited 75 businesses in the Monroe Valley Industrial Center and the Fryelands Industrial Park. The team's purpose was to educate business owners on proper dangerous waste and stormwater management. Problems found included open containers, lack of labeling, no secondary containment, and unauthorized discharges to the sewer. There was one truck and large equipment repair facility that had used oil management problems and some stained soils from pulling engines and parts out without providing drip pans for fluids. This was the worst problem observed. Some businesses were not visited because of problems already reported. Ecology is working with these businesses to correct the problems.

FRAMEWORK FOR CONTROLLING HAZARDOUS WASTE

Hazardous Substances

Hazardous waste sites are regulated under RCW Chapter 70.105, Hazardous Waste Management and Chapter 173-303 WAC, Dangerous Waste Regulations. The Model Toxics Control Act regulates treatment of contaminated sites. The Act is designed to insure that sites identified as potentially dangerous to the state's citizens or environment are decontaminated.

Hazardous substance sites are listed not only to categorize various types of sites and their impacts, but also to provide information to individuals interested in purchasing land. Both the person(s) who caused the problem and the landowner are notified that the property is contaminated and must be cleaned. The state has established cleanup standards that identify acceptable levels for particular hazardous substances where cleanup must occur.

Leaking Underground Storage Tanks

Ecology has regulatory authority over all hazardous substances identified from major contributors of dangerous hazardous waste, including underground storage tanks. The regulations require all tanks to be registered before they can be filled. To receive a permit, underground storage tanks must comply with state rules and owners must pay annual tank fees. Additionally, all tanks installed prior to December 22, 1988, must be upgraded to include leak detection devices (WAC 173-360). The deadline for upgrading existing tanks is based on tank age. Ecology has implemented a program to identify and register unregistered underground storage tanks and to enforce construction upgrades and monitoring systems.

There is no registration, regulations, or tracking of homeowner fuel tanks that may leak or spill pollutants into surface and ground water. Home heating oil tanks are exempt from underground storage tank regulations, but are not exempt from the Washington State Model Toxics Control Act. If a home heating oil tank has a leak, homeowners may be responsible for remediation of contaminated soil and water.

Snohomish County Fire Code, Title 16, requires permits for decommissioning home heating oil tanks. Once a tank has been removed, the county Fire Marshall's office records on the property title that a tank has been removed. For tanks that are decommissioned and left on the site, the Fire Marshall's office recommends that tanks with a capacity of 750 gallons or greater be capped and not filled, and that tanks greater than 750 gallons be filled with sand.

Moderate Risk Waste

Moderate Risk waste is defined by RCW Chapter 70.105.010(17) as hazardous waste generated in smaller quantities per month than those regulated under the state's dangerous waste and/or household-generated hazardous waste such as paints, solvents, thinners, pesticides, herbicides, battery acids, cleaners, polishes, auto maintenance products, cosmetics, and pharmaceuticals. The Snohomish Health District (SHD) is the

agency that enforces most of the regulations with respect to moderate risk waste. The Snohomish County Solid Waste Management Division (SWMD) must comply with regulations relating to the handling and disposal of hazardous waste at their transfer stations.

With input from SHD, SWMD has developed a Moderate Risk Waste Management Plan. The plan recommends and prioritizes programs that address waste disposal problems and has been adopted by Monroe and the county.

Some programs are in place in Snohomish County Solid Waste Division to reduce nonpoint pollution from household generated hazardous waste. Household hazardous material can be brought to a facility in Everett. Snohomish County provides safe disposal of various types of products including paint thinners, glues, sealants, oil based paints, herbicides, pesticides, household cleaners, and bleach. Some of these materials are recycled, some are sent to hazardous waste transfer stations, and some are chemically neutralized and discharged into the sanitary sewer system. Free paint made from a mixture of latex paints is also provided. The county has a recycling program for antifreeze, motor oil, oil filters, and lead acid batteries.

Other programs in Snohomish County include:

SHD is coordinating a hazardous waste regulators group through the Interagency Regulatory Assessment Committee. This committee's goal is to produce a hazardous waste management guide that outlines the various regulatory requirements of these agencies. This guide will also help businesses contact the appropriate agency to obtain information on hazardous waste management.

SHD responds to complaints regarding improper storage, handling, and disposal of hazardous waste.

Snohomish County Surface Water Management Division conducts investigations in commercial and industrial areas to identify and eliminate illicit discharges that are polluting or have the potential to pollute surface water, ground water, or the storm drainage system. Businesses are provided technical assistance to correct problems. Uncooperative businesses causing pollution will be referred to the County's code enforcement group.

SWMD provides technical assistance to businesses through telephone consultation and through dissemination of informational brochures and a biannual newsletter.

Snohomish County Solid Waste Management Division coordinates a program called EnviroStars that recognizes businesses who handle wastes and chemicals in an environmentally safe manner.

SHD and SWMD operate the Moderate Risk Waste Management Program. This program offers presentations to trade groups and small business owners on proper management

and disposal of hazardous waste. The county also sponsors free, twice yearly training on hazardous waste through their Master Recycler Composter Program.

The Washington Department of Agriculture collects agricultural hazardous waste in Snohomish County every six years. The Department is considering having a collection site at a fixed location.

Drainage Problems

(Problem Summary and Management Recommendations, pages 176-179)

PROBLEM DESCRIPTION

Drainage problems are typically localized flooding related to the constructed drainage system. Drainage problems occur during short, high intensity rainfall that produces runoff. Cleared areas and impervious surfaces in upstream development increase the amount of runoff beyond that which would naturally occur. As a result, natural surface drainageways are insufficient to handle the volume and rate of runoff or ditches, pipes, and culverts are inadequate to handle additional runoff. Increases in runoff cause erosion and scouring of stream channels adding sediment to the stream and degrading fish habitat.

Properties in low areas, or areas built on filled depressions, especially wetlands, are likely to flood from runoff received from higher surrounding areas. Low areas adjacent to drainage systems flood as a result of excess water spilling out of drainageways. Damage from these types of flooding is relatively minor and public facilities like roads and bridges rarely have structural damage from these drainage problems. Most drainage problems in the county occur near areas that have high development densities.

Drainage problems also occur due to lack of maintenance of stormwater facilities, either by local jurisdictions or by private individuals or homeowners associations. Drainage problems are also caused from old pipes and culverts that are rusting out, have been damaged, are too small, or are simply falling apart from age. Many of these conditions cause scouring behind the culverts and increase stream channel erosion.

Other road flooding problems result from beaver dams. Beaver dams back up water and can break causing property, road flooding, erosion, and sediment problems.

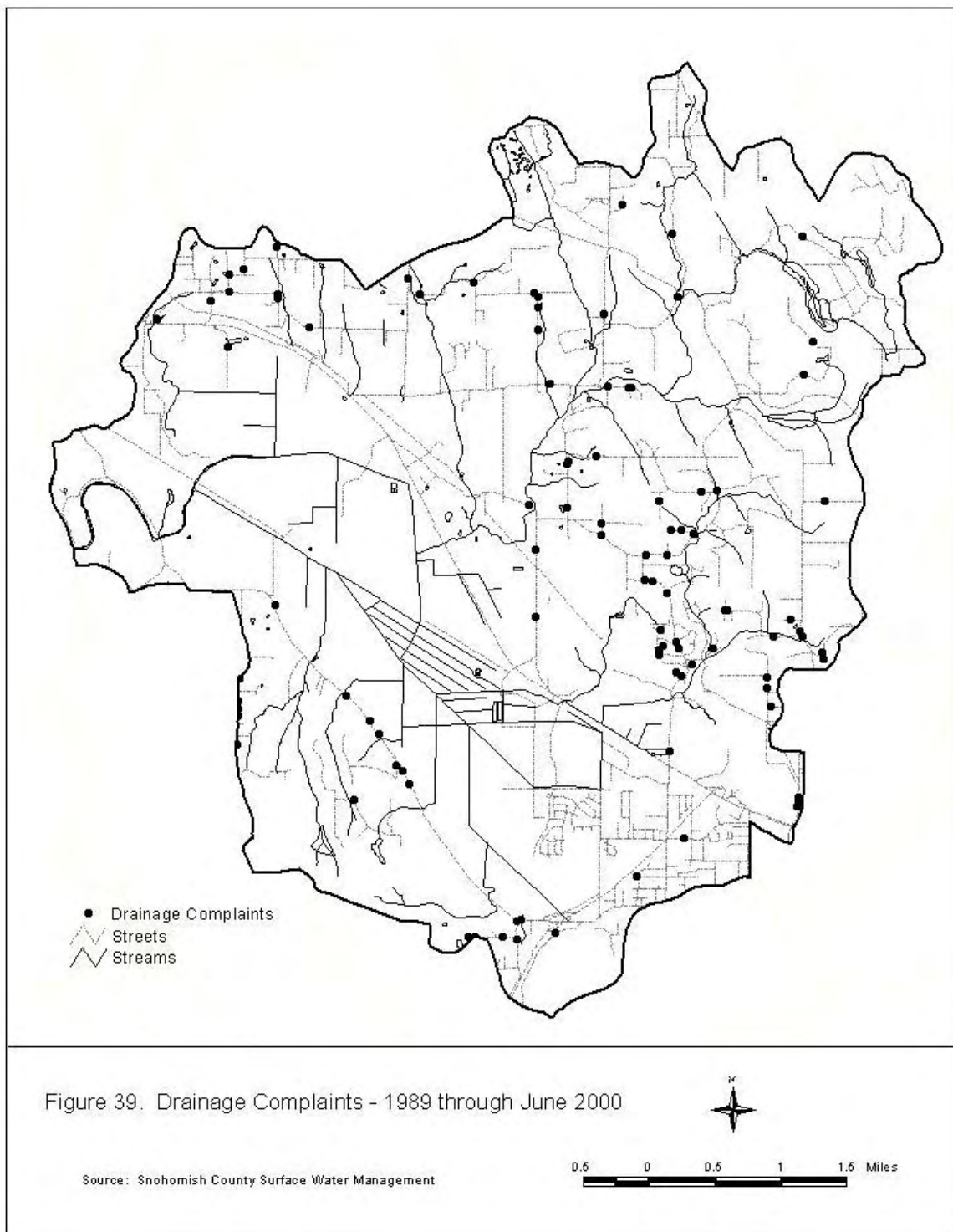
EXTENT OF DRAINAGE PROBLEMS

Drainage Problems

From 1989 through June 2000, there were 94 drainage complaints handled by Snohomish County Surface Water Management within unincorporated areas of the watershed (figure 39). The complaints were mainly from the most densely developed areas, and many were complaints of road flooding.

Road Flooding

In a survey of watershed residents asking whether they have flooding or drainage problems, road flooding was described in several areas. These areas included Trombley and Badke Road (corrected), Nevers Road and 127th SE, 167th between Trombley and Westwick, Old Snohomish Monroe Highway (one problem corrected), 147th and Oil Well Road (being corrected in 2002). These flooding problems resulted mainly from inadequate upstream detention and undersized or clogged downstream culverts. Some of these culverts also block fish passage. Another known drainage problem occurs in the Robinhood Lane subdivision where steep slopes and inadequate



ditches/stormwater conveyance systems have resulted in property flooding and erosion. These types of problems will increase as watershed development increases.

Beaver Dams

Beaver dams also cause property and road flooding. Generally beaver dams are left alone since beaver ponds create excellent rearing habitat for fish. Intervention only occurs if there is property damage from flooding. In that case, a variety of methods are used ranging from tearing out the dam and sucking up the dam materials using a vac truck to installing trickle tubes (tubing that is placed in the dam itself to keep ponded water at a level low enough to prevent flooding) or other similar devices.

A large volume of water is impounded behind a series of beaver dams on French Creek and Lords Hill. Below the dams near the outlet of Meadow Lake, French Creek makes a 90-degree turn along and under Meadow Lake Road. Removal or breakage of these dams could wash out the road, cause downstream flooding, and scour French Creek to hardpan. Some of the area's residents have expressed concern about the beavers destroying habitat, and it is not unusual for individuals to break beaver dams.

Beaver dams have broken on Beaver Lake in Lords Hill Park. The tributary at the lake outlet flows down a steep slope, and then takes a sharp turn to the east where it was routed through a culvert over a gas pipeline. It daylights again and flows through a pond and under the Old Snohomish Monroe Road. During the most recent dam break, the stream was severely damaged, the culvert washed out, and large amounts of sediment washed into the pond, over the road and into the stream below the road. Work on stream channel restoration was begun in 1998.

Stormwater Runoff

An analysis of increases in stream flows that would occur as a result of future watershed development was conducted using hydrologic modeling. The modeling results indicated areas where increases in stream flows may cause future flooding problems because of inadequate drainage facilities downstream. These increased flows will degrade aquatic habitat and cause downcutting of channels from erosion.

Construction of stormwater facilities to mitigate increases in stormwater runoff and downstream flooding is required for new development throughout much of the watershed. Typically, one single family home constructed on a five-acre lot would not be required to build a detention facility. However, generally all subdivisions would be required to have detention.

The hydrologic model was used to determine whether stormwater facilities constructed to standards in Ecology's 1992 stormwater manual would prevent downstream flooding. The model assumed that all areas designated Rural 5 basic would use lot clustering in subdivision development, but areas zoned Rural 5 are not required to use detention. In areas where detention was required, the use of Ecology's detention standards was successful in maintaining stream flows at or near their current levels in many subbasins. However, that mitigation was not sufficient to handle increased flows in the subbasin

with the Foothills development, where flows increased by 15 percent, and the subbasin in lower French Creek just out of the floodplain where flows increased by seven percent. The high density of development, removal of forest, and creation of impervious surface were the problems. Additional mitigation including increasing detention standards or maintaining trees in the subbasin would be necessary in those areas to prevent flooding downstream.

Although most new development will have to construct detention or infiltration facilities, there will be areas where single family, five acre lots will be built. In those areas, increased stream flows of 10 to 20 percent can be expected. This type of increase could be sufficient to overwhelm some downstream drainage structures and overtop streambanks in certain areas. In order to maintain stream flows at current levels in these areas it would be necessary to maintain existing forest. The subbasins that would benefit most by forest preservation include those subbasins at the headwaters of the various tributaries where much of the forest is still intact.

Stormwater Facility Maintenance

Drainage and water quality facilities that are not properly inspected and maintained do not effectively reduce water pollution or peak stream flows. For example, retention/detention ponds and roadside ditch drainage systems often fill with sediment that must be periodically removed. Vegetation in water quality facilities also may need periodic cutting or replanting. Responsibility for this maintenance varies. Snohomish County Maintenance and Operations Division and City of Monroe maintain county and city road related drainage facilities. However, Snohomish County Surface Water Management Division (SWM) and Monroe have authority to inspect and maintain private facilities through easement provisions and, within budget constraints, maintain detention facilities on a regular basis. There are five public detention ponds in the unincorporated portion of the watershed maintained by SWM. Most recent new development, including commercial and multifamily homes, is required to have detention as well, but these stormwater facilities are maintained by private parties, generally homeowners' associations or the property owner. Maintenance is also required for water quality swales. Inadequate maintenance is generally a problem throughout the county.

Costs of Addressing Flooding and Drainage Problems

The costs associated with solving drainage and flooding problems in the watershed are high and are paid for either by homeowners or by fees paid by residents in the Watershed Management Areas. The cost of investigating one drainage complaint without taking any action is about \$200.00.

FRAMEWORK FOR CONTROLLING DRAINAGE PROBLEMS

In 1987 Snohomish County adopted Title 25 of the county code that authorizes service charges for surface water activities within areas called Watershed Management Areas (WMAs). The French Creek watershed is within the Snohomish Watershed Management Area. The county began collecting WMA fees in 1991. The WMA fee is \$33.01 per year for residential homes. Commercial and industrial properties are assessed on a sliding scale, depending on the percentage of impervious surfaces on the property. SWM

administers this program. In 2000 the Snohomish WMA generated approximately \$1,400,000. The funds are used to address drainage problems and other water related programs.

The control of development related surface water is regulated mostly at the local level. In 1979, Snohomish County adopted standards that require new developments to build flow control and drainage facilities as part of Title 24. These regulations were an important step in controlling runoff related property damage. In 1998, Title 24 was amended to meet the minimum requirements of Ecology's stormwater standards, established in 1993 (Stormwater Management Manual for the Puget Sound Basin WAC 173-275, WAC 400-20). In 1999, the county adopted a new stormwater manual with detailed engineering guidelines related to construction of stormwater facilities. The city of Monroe has adopted similar standards. In Snohomish County, the amended Title 24 regulations went into effect in September of 1998.

Management Recommendations



Lupine Meadows Residential Development

MANAGEMENT RECOMMENDATIONS

The following pages include recommendations to address the problems identified in the watershed. Many existing programs that address watershed impacts have been described in the preceding pages of this plan. These programs are of value to continue and play an important role in addressing watershed problems and warrant implementation funding.



Pasture Fenced and Streamside Planted

Aquatic Habitat Degradation

Problem Summary

(See Detailed Problem Definition Pages 37-64)

Priority

High

1. The lower channels of the French Creek system formerly flowed through a 3800-acre scrub-shrub wetland, which provided excellent rearing habitat for coho and Chinook salmon (Haas and Collins 2001). Only a small remnant of that wetland is left near the Monroe Airport.
2. The early logging of forests increased runoff, which deepened the stream channels and carried sediment into the streams. While logging has slowed in the watershed, land clearing to create homes for rural residents continues.
3. The upper reaches of French Creek are being degraded by increased stormwater runoff from development, sediment from logging, land clearing, and grading, and loss of streamside and instream habitat.
4. Studies have indicated that in basins where impervious area covers from three to five or five to ten percent of the landscape, there is loss of some aquatic system functions, including changes in channel morphology and fish populations. Twenty-two subbasins currently exceed five percent total impervious area (TIA); six subbasins currently exceed ten percent TIA.
5. With future development, all but one subbasin is expected to exceed five percent TIA; 11 subbasins are expected to exceed ten percent TIA. The greatest density of development will occur in these subbasins, and the greatest impacts to stream flow and habitat will follow.
6. The pump station is an impediment to the movement of salmon in and out of the French Creek system.
7. Many riparian areas in the watershed are limited in their ability to provide riparian functions to maintain a healthy stream. About 75 percent of the watershed has no riparian vegetation, is shrubs or grasses, or is only deciduous vegetation.
8. According to the coho limiting factors study, the system lacks wood, structure, complexity, and pools of significant depth for winter rearing.
9. The lack of vegetation to shade the streams in the floodplain is one factor allowing water temperatures to increase to levels that can be lethal to juvenile salmon. As temperatures increase, oxygen levels decrease. Oxygen concentrations lethal to fish (less than 5.0mg/l) have been recorded in the lower five and a half miles of French Creek.

10. At the upper mainstem French Creek water quality monitoring site, the water temperature was stressful to fish 75% of the time. The temperature at the Cripple Creek site was stressful 37% of the time. In lower French Creek the temperature was in the stressful range 93% of the time. The temperature at the pump station was in the stressful range 98% of the time.
11. High levels of nitrates were measured in floodplain streams and some upper tributaries. Nitrates spur plant growth; plant decomposition depletes oxygen needed by fish.
12. About five miles of lower French Creek have been straightened and deepened, destroying instream and streamside habitat. To keep stream channels cleared of sediment deposits and vegetation so they adequately move and drain water, channels are cleaned out about every three years.
13. In the upper watershed, several instream structures and culverts were found to be total or partial barriers to salmon moving upstream.
14. Because of French Creek's rolling topography and extensive stream system, sediment from almost any land clearing activity ends up in its streams.
15. Erosion from high peak flows caused by creation of impervious surface has scoured and deepened stream channels, cut away streambanks, and degraded fish and wildlife habitat. Serious erosion and bank failures have occurred on Lords Hill and Cripple and Trench creeks from development related increases in flows.
16. Farm animals pastured along unfenced streams and tributaries trample the banks and stir up sediment in the water.
17. Portions of Cripple, Alston, and Stables creeks and all of Trench Creek currently dry up during summer months, providing no fish habitat. Computer simulation predicted that eight more streams would likely dry up in the summer with future creation of impervious surface.
18. Residents are creating areas of open water at the headwaters of both Ghost Horse and Stables creeks changing their function.
19. Recent evaluations of the state's stream typing system revealed that many streams were incorrectly typed. In 1997, The Tulalip Tribes retyped many of the streams in the French Creek watershed. At this time, neither the county nor the City of Monroe uses the stream types established by The Tulalip Tribes.
20. Little maintenance and monitoring of construction projects affecting streams are performed.

21. Current research indicated that the county's regulatory buffers do not provide full function for all species.
22. There is little coordination between groups and agencies working on habitat projects within a watershed.
23. A mineral resource land use overlay is applied to the floodplain. Mining operations in the floodplain would remove opportunities for floodplain restoration and would degrade water quality.

Management Recommendations

REGULATIONS AND POLICIES

FC1. Increase Buffer Requirements (High Priority)

Snohomish County should consider amending the buffer requirements in the Critical Areas Regulations to the minimum recommended by the Washington Department of Fish and Wildlife in Appendix 2 (Knutson and Naef 1997).

FC2. City of Monroe to Replace Critical Areas Guidelines with Ordinance (High Priority)

Monroe should replace its Critical Area Guidelines with a regulation to include requiring stream buffers recommended by the Washington Department of Fish and Wildlife.

FC3. Establish Process to Upgrade Stream Typing (Priority)

Uniform and accurate typing of all watershed streams should be achieved. Snohomish County and Monroe should consider developing a process to upgrade stream typing as new information becomes available.

FC4. Adopt 1996 Emergency Rule (Priority)

Snohomish County and Monroe should adopt the 1996 Forest Practices Board Emergency Rule, which provides guidelines for determining fish use for typing waters under WAC 222 16-030 (see Appendix 3).

FC5. Eliminate Mineral Overlay

A mineral resource overlay has been proposed for the French Slough Floodplain. Mining is not an appropriate use of floodplain and consideration should be given to removing that area.

MONITORING AND INVENTORY

FC6. Monitor Hydraulic Permits For Compliance

Snohomish County Surface Water Management's (SWM) Snohomish Watershed Steward should assist the Department of Fish and Wildlife in monitoring hydraulic permits for compliance.

FC7. Identify and Replace Fish Blockages (High Priority)

SWM, Monroe, and Adopt-A-Stream should identify fish blockages and correct them on a regular basis. (Early Action)

PROJECTS (SEE FIGURE 41, PAGE 179 FOR PROJECT LOCATIONS)

FC8. Restore Floodplain if Dike Breaks

If the dikes at French Creek break during a future flood event, opportunities should be taken by local restoration groups to acquire all available parcels in the floodplain for restoration.

(See FC49. Reconnect French Creek with the Snohomish River through Construction of a Tidegate or Other Feasible Option)

FC9. Restore Lower French Creek and Lower Cripple Creek, including Remlinger Wetland Reserve (High Priority)

SWM, Natural Resource Conservation Service (NRCS), Snohomish Conservation District (SCD), and French Slough Flood Control District should work toward improving fish passage and water quality in the stream system in the floodplain, as well as using the Wetland Reserve for flood storage and rearing habitat. This recommendation should be done in conjunction with reconnecting the river to French Creek.

FC10. Resolve Fish Blockage and Flooding Problems at Golf Course Creek and Oil Well Road (High Priority)

SWM should replace the culverts that are blocking fish passage and causing flooding problems.

FC11. Address Fish Blockage at Spada Creek near Trombley Road (Priority)

Adopt-A-Stream Foundation or SWM should replace the driveway culvert that is blocking fish passage up Spada Creek.

FC12. Reduce Velocity of Water Going Through Fishway on 167th.

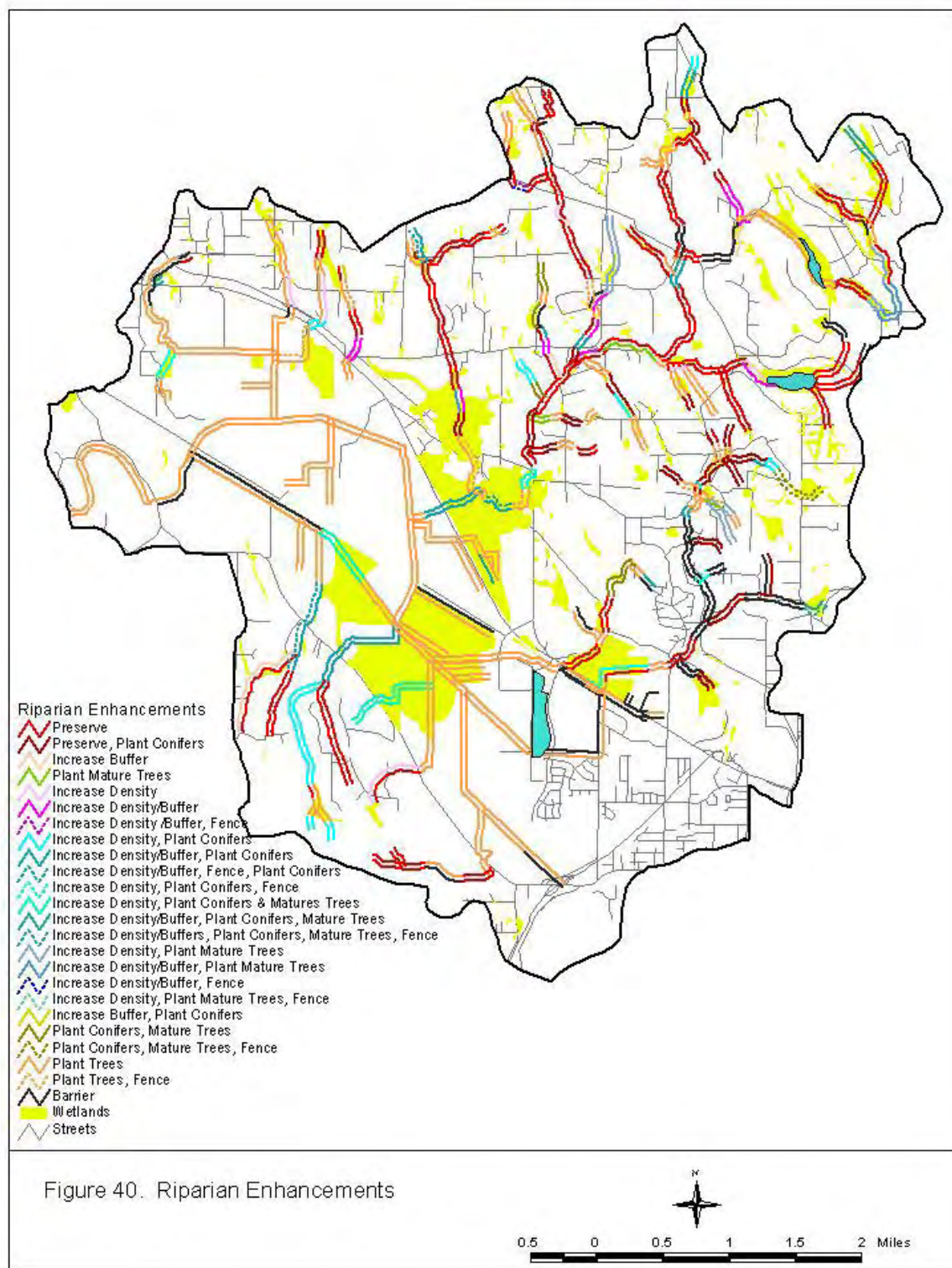
Adopt-A-Stream Foundation should determine whether the velocity of water going through the fishway is a barrier to salmon and correct the problem if it is.

FC13. Remove Fish Blockages on Tributary at 167th Avenue and Butler Road Intersection

SWM or Adopt-A-Stream should determine how to resolve the fish blockage problems at the culvert under Butler Road.

FC14. Prioritize Stream Reaches for Enhancement (High Priority)

Watershed groups, including Snohomish County, Monroe, The Tulalip Tribes, Adopt-A-Stream Foundation, the Stilly/Snohomish Fisheries Enhancement Task Force (Task Force), and SCD should work together to carry out habitat enhancement projects prioritized using the riparian assessment management prescriptions (figure 40) and/or other technical data.



FC15. Determine and Correct the Cause of the Landslide on Trench Creek

SWM and Monroe should investigate the landslide on Trench Creek, determine the cause, and develop and implement a strategy to address this problem.

ACQUISITION

FC16. Protect Important Stream Reaches (High Priority)

Using the results of the riparian assessment (see figure 17, page 48) and other technical data, SWM and other restoration groups should initiate an effort to identify and protect important stream reaches through regulation, acquisition and conservation easements.

FC17. Acquire Floodplain Land along French and Cripple Creeks (Priority)

Jurisdictions and groups should take opportunities to purchase floodplain land as it becomes for sale.

EDUCATION

FC18. Install Watershed and Stream Signs

SWM should post watershed boundaries and streams with signs. Streams without names should be named. (Early Action)

FC19. Conduct Volunteer Stream Cleanup and Restoration Programs (High Priority)

Snohomish County, Monroe, the Adopt-A-Stream Foundation, SCD, and the Task Force should organize various types of stream projects, including cleanups, plantings, bank stabilization, and monitoring using volunteers to assist with the projects.

FC20. Volunteer Salvage Work by Watershed Groups

SWM and the Task Force should identify watershed groups to look for potential sites to salvage native plants for use in riparian restoration projects.

FC21. Implement French Creek Area Habitat Network

SWM's Snohomish Watershed Steward should work with other groups to implement the French Creek Area Habitat Network.

Wetland Loss and Degradation Problem Summary

(See Detailed Problem Definition Pages 65-71)

Priority
High

1. The historic record indicates that about 3800 acres of the floodplain was once a large scrub-shrub wetland system consisting mainly of hardhack spirea with scattered Sitka spruce, cedars and other deciduous trees. Even though a few hundred acres of emergent wetlands remain in the floodplain, the wetlands are inaccessible to salmon.
2. Livestock cause compaction of wetland soil, eat wetland plants, and add unneeded nutrients to wetlands. Grazing activities change the hydrology and plant species composition of the wetland. The agricultural survey conducted in the watershed by the Snohomish Conservation District identified 20 farms where wet pastures were used for grazing.
3. Throughout the French Creek watershed, wetlands have been permanently lost when filled and/or drained for development and agricultural activities. When this occurs, the wetland's function of storing water, filtering pollutants, and providing base flow to streams is lost to the watershed.
4. Water level fluctuations in a wetland from increased stormwater can change the composition of wetland plant communities, benefiting nonnative, invasive species. Water level fluctuations can hurt amphibians by thwarting successful hatching of egg masses.
5. Logging occurring in and around wetlands results in habitat loss, introduction of nonnative plant species that quickly colonize disturbed areas, and changes in the hydroperiod. Significant loss of tree cover alters the rate and volume of water entering a wetland.
6. In logged areas, because of the lack of vegetated cover and disruption of the soil integrity, surface water runoff can cause erosion. This erosion can increase sedimentation in downstream wetlands.
7. Critical Areas Regulations that would protect wetlands do not apply under Forest Practice Rules (unless the land is being converted from forest to development). Wetlands logged under class II and III Forest Practice permits and developed after a six year moratorium do not have to be restored when future development takes place.
8. Meadow Lake is a bog wetland surrounded by homes. Runoff and shoreline modifications have altered shoreline vegetation and increased the potential for phosphates and other nutrients to enter the lake.
9. Clearing trees to create lawns and landscaped areas has reduced the effectiveness of vegetative wetland buffers.

Management Recommendations

REGULATIONS AND POLICIES

FC22. Adopt Ecology's Model Wetland Ordinance Standards (High Priority)

Snohomish County and Monroe should consider revising their Critical Areas Regulations/Guidelines to meet or exceed the standards in the Department of Ecology's Model Wetland Ordinance (see Appendix 4) and/or to use best available science to protect the functions and values of wetlands.

FC23. Prohibit Wetland Filling and Draining (High Priority)

Snohomish County and Monroe should consider prohibiting the filling and draining of wetlands to prevent the loss of a significant number of small watershed wetlands that serve water quality and other functions.

FC24. Wetland Protection Designation (High Priority)

Snohomish County and Monroe should consider creating a special wetland protection designation for the Meadow Lake bog and other wetlands of significance in the county and city. This designation should recognize the uniqueness of these wetlands, as well as their historical and ecological significance. The designation should include restricting the ability to obtain exemptions or waivers to critical areas regulations. The community should be involved in protecting a designated wetland.

(See FC2. City of Monroe to Replace Critical Areas Guidelines with Ordinance)

PROJECTS

FC25. Restore Wetlands (Priority)

The Snohomish Conservation District (SCD) should expand its wetland restoration program into the Snohomish watershed and pursue restoration projects on farmland in the French Creek watershed.

(See also FC8. Restore Floodplain if Dike Breaks, FC49. Reconnect French Creek with the Snohomish River through Construction of a Tidegate or Other Feasible Option, FC55. Eliminate Wetland Grazing, FC113. Amend Forest Practice Rules to Include Runoff Reduction, FC116. Encourage Low Impact Logging)

EDUCATION, TRAINING AND TECHNICAL ASSISTANCE

FC26. Publicize Open Space Taxation Program

Snohomish County Planning and Development Services (PDS) should work cooperatively with local groups [e.g. Pilchuck Audubon Society, Adopt-A-Stream Foundation, The Land Conservancy, Association of Realtors, and Surface Water Management Division (SWM)] to publicize the Open Space Taxation Program. Such an effort could be modeled after Seattle Audubon's Wetnet program (which publicized King

County's Open Space Taxation Program) by holding meetings of property owners and assisting individuals in setting aside wetlands on their property. An information packet should be developed to hand out to citizens.

FC27. Initiate Adopt-A-Wetland School Program (High Priority)

SWM and SCD's education programs should help area schools adopt specific wetlands of significance to serve as outdoor classrooms and restoration sites.

FC28. Place Wetland Buffer and Native Growth Protection Area Signs on Parcels

Snohomish County and Monroe should sign all Native Growth Protection Areas on each parcel to inform landowners of the protected area. Homeowners or homeowners associations in subdivisions with wetlands should be provided information on the values of wetland buffers and the importance of keeping them intact. The information should also include the specific regulation and requirements.

FC29. Map and Monitor Native Growth Protection Areas (High Priority)

SWM and Monroe should map all Native Growth Protection Areas and monitor them regularly to insure that the buffer is left intact.

ACQUISITION

FC30. Acquire Important Wetlands (High Priority)

SWM's Snohomish Watershed Steward should work with other watershed groups and individuals to identify and prioritize the protection and acquisition of headwater wetlands and wetlands adjacent to fish bearing streams.

FC31. Purchase Wetland Easements (High Priority)

Both governmental and nongovernmental groups should work toward purchasing easements from wetland landowners.

(See also Recommendations to Hydraulic Impacts from Stormwater Runoff, page 147)

Hydraulic Impacts from Stormwater Runoff Problem Summary

Priority
High

(See Detailed Problem Definition Pages 72-82)

1. Creating impervious surfaces, damaging soils, and removing forests are the main factors that increase stormwater runoff, thereby increasing stream flow volume, velocity, and the frequency of floods.
2. Of the 5911 forested acres left in the watershed, a watershed analysis indicated that only 1223 acres will remain in small patches scattered outside the floodplain after the maximum allowable development under the county and Monroe comprehensive plans occurs.
3. Studies conducted by May et al (1997) indicated that if aquatic resources are to be preserved, more than 30 percent of watershed forests must be preserved, the total watershed impervious area cannot exceed five percent, and headwater riparian areas must be intact. In the French Creek watershed, only two of the Lords Hill subbasins are projected to keep more than 30 percent in forest. (About half of the subbasins currently have a total impervious area of less than 5 percent). The likely removal of more than 4000 forested acres in the watershed will dramatically increase stormwater runoff and flooding problems.
4. To maintain aquatic habitat and function, studies indicate that a watershed should be less than five percent total impervious surface. The projected watershed total impervious area at full buildout is eight and a half percent.
5. The hydrologic simulation model shows that stream flows and flood flows have significantly increased from past forested conditions to now. Flooding and sediment deposition in the valley and erosion in some stream sections have already occurred. The volume of the current 2-year and 100-year floods has increased 11 to 12 percent; the current 50-year flood equals the historic 100-year flood.
6. Using the Washington Department of Ecology's 1992 detention pond standards for holding stormwater runoff, in five years some subbasins are projected to experience peak flows 7 to 13 percent higher than current levels, due to increasing development.
7. Stormwater detention ponds built to current standards do not always mimic predevelopment runoff conditions, as they manage peak flow volume rather than flow duration.
8. Hydraulic computer models used to determine the proper size of detention ponds do not always accurately project runoff and the ponds may be incorrectly sized.

Management Recommendations

REGULATIONS AND POLICIES

FC32. Expedite Use of Updated Stormwater Manual (High Priority)

Snohomish County and Monroe should consider methods to expedite the use of the modifications in the updated Stormwater Manual being prepared by Ecology and update as new science is available.

FC33. Develop Impervious Area Limits for Subbasins (High Priority)

Snohomish County and Monroe should consider modifying their comprehensive plans to seek to maintain impervious areas of five and no greater than ten percent for each subbasin using innovative approaches, including low impact development techniques. Where impervious areas of 5 to 10 percent have already been exceeded opportunities to reduce runoff should be explored, e.g. retrofitting parking lots and other impervious areas to include areas of vegetation and using composted soil designed to infiltrate and clean water.

FC34. Change Land Use Designation (High Priority)

The land use designation for the headwaters of the French Creek system allows higher densities than elsewhere in the watershed outside the urban growth boundary. Snohomish County should consider changing the land use designation to Rural 5 rather than Rural 5 Basic through the docketing process.

FC35. Change Rural Cluster and Planned Residential Development Codes to Reduce Density (High Priority)

Snohomish County should consider amending the rural cluster and planned residential development (PRD) codes to include only the land outside critical areas in determining densities on those lands similar to the Monroe's PRD regulations. This would reduce impervious surfaces.

FC36. Reduce Impervious Areas and Improve Stormwater Management through Low Impact Development Strategies (High Priority)

Snohomish County and Monroe should consider amending codes to reduce impervious surfaces and meet stormwater management goals by changing design standards to facilitate the development of sites plans that are adapted to natural topographic constraints, maintain the total number of lots within the development, maintain site hydrologic function, and provide for aesthetically pleasing and often less expensive storm water management controls (Puget Sound Water Quality Action Team 2001). Examples of strategies used to achieve these goals include allowing for narrower streets, graveled parking shoulders, smaller building footprint with taller buildings, onsite infiltration, dispersed nonstructural infiltration techniques, grading limits, underground parking garages for all but single family homes, and vegetative best management practices.

FC37. Review Site Design to Reduce Impervious Surface (High Priority)

Snohomish County and Monroe should consider providing technical assistance at the predesign stage of a development application to identify opportunities to reduce impervious surface.

FC38. Amend Code to Require Use of Flow Duration in Hydrologic Modeling (High Priority)

Snohomish County should consider amending the stormwater code to require use of flow duration in hydrologic modeling and establish both a maximum peak flow and duration.

FC39. Amend Stormwater Code to Require Use of Infiltration (High Priority)

Where soil and ground water conditions are suitable or could be made suitable by soil amendments, Snohomish County and Monroe should consider amending stormwater regulations to require the use of infiltration to maintain predevelopment hydrological regime to the maximum degree possible.

FC40. Adopt Clearing Ordinance (High Priority)

Snohomish County and Monroe should consider adopting clearing ordinances that would require trees to remain on 65 percent of each site and should address a required depth and quality of soil that remains after development.

FC41. Establish Stormwater Program for Monroe (High Priority)

Monroe should develop a stormwater program that would include use of Ecology's new stormwater manual; development of a water quality ordinance; education; and a plan to inventory, monitor and maintain stormwater facilities. A funding mechanism should be developed to support this program.

EDUCATION AND TRAINING

FC42. Provide Training on Controlling and Infiltrating Runoff (High Priority)

SWM and Monroe should be proactive in providing information to residential, commercial, and industrial landowners on controlling and infiltrating runoff through low impact development techniques.

FC43. Educate Citizens on Development Process (High Priority)

SWM should provide more training opportunities to educate the general public on the development process.

FC44. Conduct Workshops on Reducing Impervious Surface (High Priority)

PDS, SWM, and Monroe should conduct ongoing workshops on methods to reduce impervious surface and improve the hydrologic functions of pervious landscapes.

ACQUISITION

FC45. Acquire Forested Sites (High Priority)

SWM should work with other groups and agencies in the Snohomish Watershed to identify, prioritize and seek funding to acquire forested areas. Sites to acquire include headwater wetlands and forests associated with Chain Lake, Ghost Horse, Spada, and Cripple creeks.

Pollution and Habitat Degradation from Agricultural Practices

Problem Summary

Priority
High

(See Detailed Problem Definition Pages 83-92)

1. Water samples taken the past several years by both The Tulalip Tribes and Snohomish County show that fecal coliform bacteria levels violated state standards at seven out of ten monitoring sites. Pump station site bacteria loads are 75 to 92 percent greater than upper watershed monitoring sites.
2. Nitrogen levels of more than 1.0 mg/liter (a threshold for nitrogen in streams) were found in upper and lower Cripple Creek, lower Stables Creek, and in the floodplain. Nitrogen loads are much higher in the floodplain than in upper streams, with the highest level at the pump station sampling site.
3. On some dairy farms, ponds that hold waste are too small or are in disrepair, allowing overflow or leaks.
4. Often when manure is applied to fields, it is also sprayed into streams or drainage ditches, polluting the water.
5. Waste stored in piles is exposed to rain and surface water runoff and is eventually carried to streams.
6. In many cases, beef cattle using floodplain pastures graze up to the stream or ditches and enter these waterways to drink. Waste from these animals contributes fecal coliform bacteria and nutrients to stream water. The animals destabilize the streambanks and contribute to erosion.
7. Fertilizers, herbicides, and pesticides are used on hybrid poplars and other crops grown on the floodplain. The floodplain's high water table makes the ground water vulnerable to contamination.
8. Animals on at least 20 upper watershed farms have direct access to a creek or other water body. There are no local ordinances to prevent animal access to streams.
9. Animal manure is stockpiled, but not completely contained, on at least 17 upper watershed farms. Some of the manure piles are stored in pastures where they are trampled and spread around by animals. Some piles are stored in wetlands.
10. Manure is allowed to flow off site from uncollected waste on at least 15 upper watershed farms.
11. On some farms, animals are kept in barns during wet weather, but the manure in the barns is not being collected, nor is it properly stored.

12. Outside the floodplain, five farms in the Cripple Creek subbasin, 12 in the French Creek subbasin, and 13 in other subbasins appear to have the most serious water quality problems.
13. Streamside vegetation has been removed on many farms in both the floodplain and upper watershed. There is little or no vegetation to filter pollutants, provide shade, or to stabilize streambanks.
14. There is no ordinance in Snohomish County to limit livestock numbers on any property. Livestock densities are often greater than the land base can support.

Management Recommendations

REGULATIONS

FC46. Track Farm Water Quality Referrals

Snohomish County refers farmers who violate the water quality ordinance to the Snohomish Conservation District (SCD). SCD should assess these referrals to determine whether or not a farm plan is needed and if the landowner will cooperate in making water quality improvements. (Early Action)

FC47. Adopt Ordinance to Limit Livestock Numbers on Property (High Priority)

Snohomish County Planning and Development Services (PDS) should work with the SCD, and the Snohomish County Agricultural Advisory Board to prepare a countywide livestock ordinance for consideration by the County Council to address animal densities and best management practice implementation that would include waste management and fencing animals away from streams and wetland.

FC48. Clarify Land Use Regulations Concerning On-Farm Composting

PDS should consider clarifying land use permits related to on-farm composting and, if needed, propose revisions to the County Code to encourage such practices.

PROJECTS

FC49. Reconnect French Creek with the Snohomish River through Construction of a Tidegate or Other Feasible Option (**Highest Priority**)

SWM, SCD, and the Natural Resources Conservation Service should work together to design and construct a tidegate on French Slough Flood Control District land near the pump station. This would reconnect French Creek to the Snohomish River, improving water quality and increasing fish use of watershed streams. In addition, salmon habitat along floodplain streams should be improved. If the tidegate is not a feasible option, other methods to achieve the same goals should be assessed and implemented.

BEST MANAGEMENT PRACTICES

FC50. Develop and Implement Farm Plans for Dairies (High Priority)

SCD should work with dairy farmers to develop and implement farm plans in accordance with new regulations.

FC51. Develop and Implement Farm Plans for Commercial and Noncommercial Farms and Stables (High Priority)

SCD should encourage farmers to request assistance to develop farm plans for small commercial and noncommercial farms and stables to reduce pollutants from livestock waste and other management practices. Priority should be given to those farms identified as having high or medium impacts to water resources by the farm survey.

FC52. Notify Farm Owners of Water Quality Impacts

The French Creek Watershed Management Committee sent letters to those farms and stables identified as having high or medium impacts to water resources asking them to contact SCD for assistance in developing farm plans. There was only one response to the letters. (Early action)

FC53. Prevent Animal Access to Streams (High Priority)

SCD should work with watershed farm operators to eliminate or limit animal access to streams and wetlands. This should include educational information for using alternate methods of obtaining water and revegetation of stream banks. Those farms identified in the farm survey with animal access to streams should be targeted.

FC54. Restore Streams Damaged by Animal Access (High Priority)

SCD should promote the use of local, state, and federal programs to improve those areas that have sustained erosion damage or loss of streamside vegetation due to livestock access to streams. The use of cost share programs should be promoted to encourage this restoration work.

FC55. Eliminate Wetland Grazing (Priority)

SCD should work with livestock owners to manage animals grazing on wet pastures and eliminate livestock access to wetlands.

FC56. Provide Technical Assistance to Livestock Owners on Managing Animal Waste (High Priority)

SCD should provide watershed residents with assistance on the proper storage and management of animal wastes.

FC57. Encourage New Waste Handling Techniques

SCD and Snohomish County Solid Waste Management Division should work together to establish new waste composting options, including manure collection for off-site composting.

EDUCATION

FC58. Conduct Workshops for Small Farm Owners (High Priority)

SCD should continue to provide workshops for small farm owners that will teach basic farm principles such as pasture management, rotational grazing, riparian management, animal waste management, and structural BMPs necessary for protecting water quality.

FC59. Provide Farm Owners with New Technology (High Priority)

Washington State University Cooperative Extension should work with landowners to provide education on new technologies available to limit water quality impacts.

FC60. Install Water Quality Signs based on Water Quality Sampling Results (Priority)

SWM should install signs along streams in the watershed indicating where state standards for fecal coliform bacteria are not met explaining the potential sources.

FC61. Contact Farmers Annually Regarding Manure Applications

SCD should send out a brochure annually to dairy farmers and pumping companies to remind them not to spread or pump manure along streams and ditches in the floodplain. The distance of spraying from the stream will be specified through the Agriculture, Fish and Water process of the Endangered Species planning work.

INCENTIVES

FC62. Fund Riparian Restoration on Farms and Other Private Land (Priority)

The Washington State Conservation Commission should seek funds for the Snohomish Conservation District to work with private landowners. Snohomish Conservation District will use such funds to assist private landowners in implementing their commitments to this watershed plan.

Sediment and Erosion from Land Clearing and Grading Problem Summary

**Priority
High**

(See Detailed Problem Definition Pages 93-97)

1. Water quality monitoring of Spada Creek, the Fryelands streams, and upper Cripple Creek identified high sediment loads most likely due to construction activities occurring along these streams.
2. The major reasons for construction related sediment problems are: failure to use erosion control best management practices, improper installation of erosion control techniques, failure to use the appropriate erosion control mechanisms for the site, failure to provide continued maintenance, and the lack of enforcement.
3. When it rains, it is almost impossible to prevent disturbed soils (generated by land clearing and grading activities) from washing into streams and wetlands.
4. Areas with highly erodible soils are easily altered and respond rapidly to changes. Erosion occurs when earth-moving activities even slightly alter drainage patterns, stream velocities, or slope steepness.
5. Although glacial till, which covers about 45 percent of the watershed, is less susceptible to erosion, very fine-grained silts and sand can be washed from the till when it rains during land clearing and grading activities. These sediments are readily transported to streams and other drainageways during storms.
6. In level sections of streams, sediments carried from upstream settle on the stream bottom and in adjacent floodplain areas. This reduces the amount of water that streams can move, and clogs culverts, pipes, and detention facilities.
7. Sediments transport other pollutants downstream.

Management Recommendations

REGULATIONS

FC63. Adopt Tree Retention Ordinance (High Priority)

Snohomish County and Monroe should consider adopting a tree retention ordinance that would provide for leaving a percentage of trees above a certain diameter on sites being developed and would encourage minimizing disturbance of native vegetation and soils.

FC64. Prohibit Clearing and Grading during Rainy Season (High Priority)

Snohomish County and Monroe should consider adopting a regulation to prohibit clearing and grading from October 1 through April 1.

(See also FC40. Adopt Clearing Ordinance)

INCENTIVES

FC65. Provide Incentives to Encourage Clearing and Grading During Dry Season

Snohomish County Planning and Development Services (PDS) and Monroe should establish an incentive program for developers to complete land clearing and grading during the dry season and to have temporary and/or permanent revegetation before the wet season. These incentives could include rebates on permit fees or inclusion on a 'Preferred' list.

FC66. Revegetate Cleared Sites within One Year or One Growing Season (High Priority)

Snohomish County and Monroe should consider requiring the permanent revegetation of sites within one year or one growing season. When revegetation cannot be completed during the construction season, erosion control best management practices should be used and monitored to prevent erosion.

BEST MANAGEMENT PRACTICES

FC67. Monitor Erosion Control in Areas having High Erosion Potential

PDS and Monroe should develop an overlay map showing areas having a high potential for erosion based on geology and hydrology. When construction permits are issued in those areas, erosion control should be closely monitored.

TRAINING

FC68. Conduct Training Program for Contractors and Staff on Erosion Control (High Priority)

PDS and Monroe should work together to develop an ongoing training program for contractors and staff on proper installation, monitoring and maintenance of erosion control technology.

Regulatory Enforcement Problem Summary

(See Detailed Problem Definition Pages 98-99)

Priority
High

1. Very few departments with jurisdiction over watershed regulations actively search out code violations.
2. Many illegal or unacceptable practices by landowners continue because there is insufficient staff to enforce regulations, obtaining permits is laborious and sometimes frustrating, the enforcement of regulations may not be emphasized, and people are unaware of the laws.
3. In Snohomish County the cost of grading permits is high and is a deterrent to landowners that need permits. Additionally, the processing time is so lengthy that landowners who may have wanted to get grading done during the summer must do it in the rainy season.
4. It is not always clear to citizens and other agency representatives which agency has regulatory authority over a particular activity and who citizens should contact to report violations.
5. Individuals who experience problems going through the permit process often become discouraged, and do not want to repeat the experience to obtain other permits.
6. In many new developments, enforcing best management practices to control construction erosion is often lacking. Water quality violators rarely, if ever, are fined by any of the agencies, and the community sees no disincentives for violations.
7. When new developments install the necessary siltation containing devices and sediment ponds, they often go unmonitored and eventually lose their effectiveness.

Management Recommendations

REGULATIONS AND POLICIES

FC69. Lower Grading Permit Fees (High Priority)

Snohomish County should consider assessing grading permit fees that reflect the costs of processing the permit, and reducing the processing time to allow work to be done during the dry season.

FC70. Increase Enforcement Staffing (High Priority)

The Department of Ecology, City of Monroe, Washington Department of Natural Resources, Washington Department of Fish and Wildlife, and the Snohomish Health District should increase their staff to handle complaints and identify problems. Snohomish County Planning and Development Services should assess future needs for

additional staff after improving support to their current staff in addressing water quality and erosion control violations.

FC71. Monroe to Hire Erosion Control Code Enforcement Officer (High Priority)

Monroe is strongly encouraged to enforce its stormwater ordinance and should hire a code enforcement officer to deal with stormwater and erosion control violations.

FC72. Code Enforcement to Search out Code Violators (High Priority)

Snohomish County and the city of Monroe should actively monitor areas under their jurisdiction to identify and correct violations.

FC73. Add Fines to 'Stop Work' and 'Cease and Desist' Orders (High Priority)

Snohomish County and Monroe should consider revising codes to impose fines with Stop Work and Cease and Desist Orders.

FC74. Broader Use of Infractions and/or Citation with Penalties that Accrue during Appeal Period (High Priority)

Snohomish County and Monroe should consider code revisions to allow for broader use of infractions and/or citations where there are penalties, and placing stop work orders on projects until infractions and/or citations are settled.

FC75. Simplify and Streamline Enforcement Process (High Priority)

Code revisions should be considered by Snohomish County to simplify and streamline the process for erosion control and water quality infractions.

EDUCATION AND TRAINING

FC76. Facilitate Interagency Communication

Ecology and the Puget Sound Water Quality Action Team should facilitate interagency communication of regulatory staff through regular meetings and joint field visits.

FC77. Provide Education on New Laws and Regulations to Public (High Priority)

Snohomish County Planning and Development Services (PDS) and Snohomish County Surface Water Management staff should continue to work together to include in their educational programs instruction on new laws and regulations to protect water resources and water quality and how to report code violations. This information should be included on the county web site.

FC78. Highlight Enforcement Phone Numbers in Phone Book (High Priority)

SWM should contact GTE and Verizon to determine a way to include an enforcement section in their phone books that lists all the enforcement phone numbers and other important numbers to call for violations.

Ground Water Depletion and Contamination Problem Summary

Priority
High

(See Detailed Problem Definition Pages 100-104)

1. Within the French Creek watershed, the floodplain, the wetland system at the confluence of Golf Course Creek with French Creek, and the Meadow Lake area were all designated vulnerable to contamination. In addition, the watershed geologic study identified Stables Creek, Chain Lake, and portions of the Lords Hill tributaries as ground water resources vulnerable to impact from both surficial and/or migrating contamination sources. Additional vulnerable areas have surface exposures of younger alluvium, older alluvium, recessional outwash, and advance outwash materials (see figure 32, page 88).
2. Industrial, commercial, and agricultural land uses that are constructed above vulnerable underground aquifers are potential sources of contamination.
3. Major roads and railroad lines transport hazardous materials through the watershed where the ground water is highly vulnerable to contamination.
4. Of 17 water wells sampled in the watershed, the water in four contained elevated nitrates, and one contained relatively high concentrations of onsite sewage system related compounds and nitrogen compounds.
5. When impervious surfaces are built, the ability of rain or snow to seep into the ground to recharge ground water is physically blocked. Ground water levels may be lowered further if surface water runoff is discharged to streams and lakes rather than infiltrated.
6. A 1997 U.S. Geologic Survey study found that an average drop of one foot in the overall ground water elevation appears to have occurred during the last ten years within the Lakes Aquifer. The Lakes Aquifer lies underneath most of the French Creek watershed. As development increases over the aquifer, further drops in the ground water table may result from the decreased amount of water available for recharge (because of increased impervious surfaces), and from increased ground water withdrawal as the human population grows.

Management Recommendations

POLICIES AND REGULATIONS

FC79. Protect Areas Vulnerable to Contamination (High Priority)

Snohomish County and Monroe should consider developing a plan for protecting those watershed areas identified as vulnerable to contamination. The plan should include prohibiting commercial, industrial, and agricultural types of development in those areas if their activities include using substances that have the potential to pollute ground water.

FC80. Protect Recharge and Discharge Areas (High Priority)

Snohomish County and Monroe should consider designating recharge and discharge areas as critical areas under county and Monroe ordinances.

(See also recommendations to reduce impervious surfaces, e.g. FC33, 35, 36 and 37, pages 147 and 148)

MONITORING

FC81. Monitor Ground Water Elevation (High Priority)

A ground water monitoring program should be developed by Snohomish County Surface Water Management (SWM) to assess the fluctuations in the Lakes Aquifer water table to evaluate ongoing trends in ground water elevation.

FC82. Monitor Ground Water Quality

SWM should evaluate and test potential areas in the floodplain where ground water contamination could be occurring including areas where manure is spread, where chemicals are used, and at the junkyard.

FC83. Evaluate Emergency Spill Response Plan (Priority)

The Snohomish County Department of Emergency Management, the Washington Department of Ecology, the Fire District, and other response agencies should review the emergency spill response plan for the floodplain and make any changes deemed necessary to improve the plan.

Fecal Coliform Bacteria and Nitrates from Onsite Onsite Sewage Systems

Priority
Medium

Problem Summary

(See Detailed Problem Definition Pages 105-109)

1. The operation and maintenance program of the Snohomish Health District (SHD) could be improved and updated to better address the problems with improperly functioning onsite sewage systems that cause surface and ground water quality problems.
2. According to SHD, in the French Creek watershed the three most common onsite sewage system problems are likely to be old systems, undersized systems, and a lack of maintenance pumping.
3. Approximately 560 watershed homes with onsite sewage systems are more than 20 years old; two thirds of those were built prior to 1970.
4. Older onsite sewage systems are concentrated along Cripple Creek (Trombley Road and 117th Street SE) and French Creek (the French Creek Trails subdivision). Clusters of older homes also occur along Lords Hill Tributary No. 1. All of these streams have high levels of fecal coliform bacteria and nutrients.
5. Some homes in the floodplain, upper Spada Creek, and French Creek just north of State Route 2, appear to be built on wetland soils, which are not appropriate for onsite sewage systems.
6. If new onsite sewage systems are improperly constructed, they generally fail within six months.
7. The most common design problem in properly functioning onsite sewage systems is the lack of effectively removing nitrates.
8. Overuse or concentrated use of water prevents human wastes from effectively decomposing in the septic tank, so that contaminated wastewater leaves the onsite sewage system instead.
9. Using additives to “clean” onsite sewage systems actually kills the useful microbes in the tank that eat the waste, so more human waste leaves the system before it is decomposed. Often the additives themselves contain chemicals that contaminate ground water or streams.
10. Garbage disposals significantly increase the amount of suspended solids and nutrients in the onsite sewage system and use up oxygen needed by good microbes. They also increase the amount of solids left in septic tanks, triggering the need for more frequent pumping for the system to work properly.

Management Recommendations

REGULATIONS AND POLICIES

FC84. Work Group to Develop Proactive Approach to Manage Onsite Sewage Systems (High Priority)

The Snohomish Health District (SHD) should adopt a more proactive approach to protecting water quality where onsite sewage systems are installed and formulate a strategy to develop and implement a more comprehensive Operation and Maintenance (O&M) program to include the management recommendations in this plan.

FC85. Inspect and Pump Existing Onsite Sewage Systems (High Priority)

SHD should send out annual notices to all system owners advising them to have their systems inspected by professional inspectors and maintenance specialists registered with the District. Maintenance contracts between new onsite sewage owners with certified professionals should be on file within six months of occupancy or change of ownership. The inspection and maintenance professionals should be required to report all inspections and pumping to SHD.

FC86. Inspect New Onsite Sewage Systems (High Priority)

All new systems, regardless of design, should be inspected after the first six months of operation to ensure proper function. SHD should continue to track inspections and repairs.

FC87. Designate Areas Vulnerable to Contamination as Areas of Special Concern (High Priority)

SHD should identify and protect areas of special concern within the county. An area of special concern could include the watershed of a particularly vulnerable or valuable natural resource, such as shellfish beds, bog wetlands and recreational swimming areas. In the French Creek watershed, areas of concern would include areas where high bacteria and nitrates are measured in streams, Meadow Lake, areas where older systems occur in hydric soils or along streams. These areas should be prioritized first for implementation of the proactive O&M program. In addition, SHD should consider more stringent operation and maintenance requirements in areas of special concern.

FC88. Develop Health District Assessment Fee (High Priority)

SHD should consider developing an assessment using the authority granted in Chapter 447 WAC (Water Quality Utilities) to pay for staff to implement the comprehensive Operation and Maintenance Program. SHD should also work with the Water Districts to determine water use related to onsite sewage systems to factor that value in the assessment.

EDUCATION AND TRAINING

FC89. Send Onsite Sewage System Information to Owners (High Priority)

SHD has educational materials that describe how onsite sewage systems work, ways to monitor onsite sewage system function, and how to care for onsite sewage systems. It also has a list of businesses that pump onsite sewage systems and a video, “Understanding and Maintaining your Onsite Septic System.” SHD should mail this information to residents with onsite sewage systems.

FC90. Conduct Onsite Sewage System Operation and Maintenance Workshops (High Priority)

SHD should hold regular operation and maintenance workshops in the watershed, perhaps in conjunction with small farm workshops. SHD could also contract out educational workshops to existing nonprofit groups or other agencies such as WSU Cooperative Extension or the Padilla Bay National Estuarine Research Reserve. Workshops should emphasize the need for regular inspections and pumping when necessary. It should also include simple training on how owners of gravity flow systems can do their own inspections.

FC91. Distribute Educational Video to New Homeowners (High Priority)

Realtors doing business in the watershed should provide the video, “Understanding and Maintaining Your On-Site Septic System” to new homeowners who purchase homes with onsite sewage systems.

FC92. Provide Fact Sheets about Additives to Onsite Sewage System Owners (High Priority)

SHD should prepare a fact sheet regarding additives and send them to homeowners with onsite sewage systems.

(See FC60. Install Water Quality Signs based on Water Quality Sampling Results)

INCENTIVES

FC93. Develop Program to Manage Revolving Loan Fund (High Priority)

SHD and/or Snohomish County Surface Water Management (SWM) should work with an appropriate lending institution to develop a low interest loan fund for system owners who need repairs. These funds would be obtained from the State Revolving Loan Fund and could be interest free if repaid in five years.

MONITORING

FC94. Monitor Streams with High Potential for Onsite Sewage System Problems

SWM should conduct site-specific water quality monitoring for fecal coliform bacteria and nitrates at identified areas of special concern. Areas testing high for fecal bacteria

and nitrates should be surveyed by the Health District to determine if failed or improperly sited onsite sewage systems are the problem source.

Pollution from Urban/Rural Stormwater and Direct Discharges

Priority
Medium

Problem Summary

(See Detailed Problem Definition Pages 110-113)

1. Lead, zinc, and copper are detected at all water quality monitoring sites and exceed state standards. The fewest violations occur at the Lords Hill sampling sites; the most at the Fryelands/Monroe sampling sites. Road runoff is the major source.
2. Fertilizer (a source of nitrates) is used on golf courses, nurseries, farms, and lawns in the watershed. Nitrates that do not become absorbed by the soil and plants are washed off during storms into streams and wetlands, polluting the water.
3. Fertilizer, pesticides, herbicides, and fungicides (sources of nitrates and metals) are abused to the greatest extent by homeowners through overuse, improper use, improper storage, or disposal. Excess fertilizers and pesticides are washed by rainwater into the stormdrain system or into streams. Damaged, compacted soils and areas where topsoil has been stripped do not function properly and cannot capture and biodegrade these chemicals. In addition, package instructions for these chemicals may encourage overuse.
4. Detergents used for car washing and other types of washing are sources of phosphates and other chemicals.
5. The Washington Department of Transportation uses herbicides to kill roadside vegetation. The potential exists for herbicides to be carried into streams if heavy rains occur after application.
6. The Burlington Northern railroad line passes through the floodplain where the ground water is easily contaminated. Herbicides are used to control unwanted vegetation.
7. A Bonneville Power Authority transmission line runs through the northern portion of the watershed. Spot treatment of herbicides is used within the transmission line corridors. A 25 foot buffer along streams and wetland is not treated
8. Stormwater runoff from State Route 2 is directed into French and Cripple creeks without being treated. Untreated runoff from roads along streams and streets crossing streams carries metals, oils, gasoline, and other vehicular pollutants into roadside streams.
9. About 20 autos related businesses are a potential source of metals and petroleum in streams; most are located south of or along State Route 2.
10. A quarry on 168th Street SE is a source of sediment to streams and wetlands.

11. There has been no inventory of direct discharges in the watershed, but direct discharges come from storm drains, agricultural and other drainage ditches, road drains, and drainage pipes.

Management Recommendations

BEST MANAGEMENT PRACTICES

FC95. Treatment of Road Discharges to Improve Water Quality (Priority)

Snohomish County Surface Water Management (SWM) staff should prioritize streets and roads for improvements to water quality treatment to guide both the county and the Washington State Department of Transportation. Such treatment could include stormwater ponds, filter strips, and bioswales.

FC96. Improve Sediment Management at the Rock Quarry (Priority)

The Washington Departments of Natural Resources and Ecology should require the rock quarry operators on 168th Street SE to provide regular maintenance of the sediment pond on the site, and require that runoff be maintained on the site.

MONITORING

FC97. Monitor Water Quality Sites (Priority)

SWM water quality staff should conduct water quality site monitoring at golf courses, cropland, and nurseries to determine if landscaping chemicals are leaching into surface water. In addition, a determination should be made whether or not source control best management practices for storage of chemicals are in place at these facilities.

FC98. Locate Direct Discharges (Priority)

SWM is required to locate unpermitted discharges in the county. Watershed staff from SWM, the Washington Department of Fish and Wildlife, and city of Monroe should report any direct discharges observed to SWM's water quality staff.

EDUCATION

FC99. Install "No Herbicide Spraying" Signs along Streams and Wetlands (Priority)

The Stilly-Snohomish Fisheries Enhancement Task Force should work with the French Creek Flood Control District, and other property owners to put up "No Spraying" signs within 100 feet of streams and wetlands along roads and railroads in the floodplain. The Department of Transportation, Bonneville Power Authority, and Burlington Northern Railroad should be notified of the sign placement and the reasons for them. (This action does not apply to normal agricultural practices.)

FC100. Conduct Landscaper Training and Education Program (High Priority)

Washington State University (WSU) Cooperative Extension, or some other qualified entity, should conduct a training and education program to reduce the amount of chemicals used by professional landscapers and residential landowners and to provide information about restoring soil quality and depth so that the soil regains functionality.

FC101. Develop Multimedia Education Program on Chemical Pollutants (High Priority)

SWM, Snohomish County Solid Waste Management Division (SWMD) and WSU Cooperative Extension should work together to design and implement programs to educate the public about the proper use of landscaping chemicals and alternatives to chemical use in the garden and home through native plantings, low phosphate detergents, and adjustments in car care techniques.

FC102. Establish Educational Website on Water Quality (High Priority)

An educational website should be developed by SWM and SWMD divisions to provide educational information to the public and professionals on water quality issues of importance to homeowners.

FC103. Develop Car Washing Incentive Program (Priority)

Educational material should be produced to encourage car owners to wash their cars at washing facilities. SWM should provide schools and other organizations and businesses that have charity car washes with storm drain inserts and pumps to protect stormwater from pollution from soap. An alternative to charity car washes would be for schools to sell coupons for car washes in exchange for a portion for the receipts. These programs should be promoted locally.

FC104. Provide Technical Assistance to Businesses that Cause Pollution (High Priority)

SWM, SWMD, and Snohomish Health District should continue to provide technical assistance to those businesses that have the potential to contaminate stormwater, like auto related businesses and others in Monroe and make sure that best management practices are in place to address potential pollution problems.

FC105. Create Business Partners for Clean Water Program (High Priority)

Snohomish County and Monroe should sponsor or work with nongovernmental organizations (e.g. Puget Soundkeeper Alliance) to create a Business Partners for Clean Water program modeled after the City of Bellevue's program. It would target businesses with a high probability of polluting either directly or selling products that customers might use in a polluting way. Businesses might include automotive repair and part shops, paint stores and garden centers. They would receive technical assistance, as well as recognition and incentives to practice good housekeeping on site and educate their customers about the proper use and disposal of their products.

Sediment from Ditch Maintenance
Problem Summary
(See Detailed Problem Definition Pages 114-116)

Priority
Medium

1. Clearing out roadside drainage ditches stirs up any eroded soils that have settled on the bottom, making the water turbid with suspended sediment. The sources of erosion and sediment are rarely investigated during ditch maintenance. Opportunities are not taken to reduce erosion by changing the ditch geometry or isolating sources of sediment.
2. In the county, ditches are generally cleaned on a cyclic basis, on request, or because of a problem and may be cleaned whether the ditch needs it or not.
3. Homeowners often landscape ditches with rock or beauty bark making it difficult or impossible to maintain, and they manage vegetation with herbicides. Homeowners are likely unaware of the value of vegetated ditches.
4. Sediments settle out in floodplain drainage ditches and in both French and Cripple creeks. The French Slough Flood Control District dredges many of the ditches to maintain their capacity to transport water, creating sediment transport each time. All dredging done by the Flood Control District is accomplished under a hydraulic permit issued by the Washington Department of Wildlife. A Hydraulic Permit is required for cleaning ditches that provide habitat for salmon.
5. Dredging by some landowners in and outside the floodplain is often done without consideration for the sediment created.
6. It is sometimes difficult to determine which ditches are actually streams.

Management Recommendations

POLICY

FC106. Set Maintenance Standards for Roadside Waterways (High Priority)

The county and Monroe should develop ditch maintenance standards for both salmon bearing and nonsalmon bearing streams that include:

- Restricting ditch maintenance to the period July through September 15 (except for defined emergency situations).
- Correcting the causes of sedimentation.
- Erosion control.
- Disposal of ditch waste material.
- Vegetation management.
- Regular training programs to keep ditch maintenance staff up to date on standards.

FC107. Classify and Establish Maintenance Criteria for Floodplain Waterways (High Priority)

Standards for maintaining ditches in agricultural areas should be developed by the Agriculture, Fish, and Water Endangered Species process to provide for adequate drainage of productive agricultural lands while protecting valuable fishery resources. The standards should include a waterway classification system, and should address sediment and erosion control, fish removal, excavation, and habitat enhancement. Timing of ditch maintenance in the floodplain should be determined based on limiting impacts to salmonids and other fish.

PROJECTS

FC108. Investigate Culverts Under the Old Snohomish Monroe Road
SWM and French Slough Flood Control District should examine the culverts under the Old Snohomish Monroe Road to determine if any need to be replaced and if in the short term solutions could be found to address the sediment deposition problem so that ditch maintenance is minimized. To address this problem in the long term, upstream sediment sources should be identified and corrected.

FC109. Install Stream Signs along Ditched Streams (High Priority)

The Stilly-Snohomish Fisheries Enhancement Task Force should work with SWM's Snohomish Watershed Steward to sign watershed streams to identify the ditches that are streams.

FC110. Provide Dredging Services to Floodplain Landowners (Priority)

The French Slough Flood Control District should identify floodplain landowners who dredge their own ditches and offer dredging and/or permitting services to them.

EDUCATION

FC111. Conduct Pilot Ditch Education Project

SWM's Snohomish Watershed Steward should conduct a pilot project for Lupine Meadows subdivision homeowners to determine whether ditches are properly constructed and designed for maximum improvement of water quality. Homeowners should be involved in the project to learn about ditches, their functions, and why human actions to landscape ditches can harm water quality.

Sediment and Other Impacts of Forest Management Problem Summary

**Priority
Medium**

(See Detailed Problem Definition Pages 117-120)

1. Because the French Creek watershed has a highly developed drainage network with till soils, yarding activities can cause fine sediment in streams.
2. Erosion is a problem when logging occurs on the watershed's steep slopes. Controlling erosion is not usually required during logging activities, except when building roads.
3. Logging causes increased stormwater runoff. Forest Practice Rules (except for those administered by the county) do not address runoff quantity.
4. Herbicides are used regularly to control unwanted vegetation.
5. County forest practice permit review is experienced as time consuming and costly. Some landowners obtain Class II or III permits to avoid dealing with the county, as well as the county's critical areas ordinance, which is stricter than the Forest Practice Rules.

Management Recommendations

REGULATIONS AND POLICIES

FC112. Adopt Forest Conversion Ordinance (Priority)

Snohomish County should consider adopting an ordinance setting forth the restrictions placed on lands that have been logged under a Class II or III permit, the instances when a property may be exempted from the six year moratorium, the conditions under which this exemption may occur, and the procedures by which a landowner applies for and obtains a Class IV "Conversion Permit."

FC113. Amend Forest Practice Rules to Include Runoff Reduction (High Priority)

The Washington Department of Natural Resources (DNR) should consider amending the Forest Practice Rules to include methods to reduce runoff from logged areas.

FC114. Create "Special Watershed Area" Designation (Priority)

Snohomish County and the DNR should consider the adoption of 'Special Watershed Area' rules that would allow for wider buffers on streams and wetlands and restrict logging in those areas.

FC115. Adopt Stringent Requirements for Logging on Steep Slopes (High Priority)

The DNR should consider amending Forest Practice Rules to require erosion control when logging occurs on steep slopes and in areas with high erosion potential where there are streams and wetlands nearby.

INCENTIVES

FC116. Encourage Low Impact Logging (High Priority)

The DNR should develop programs to encourage logging practices that are less damaging to the environment. Such programs could include longer permit periods in exchange for phased logging operations (multi year or caps on timber removal in a given year), alternatives skidding operations (no wheeled skidders), and selective cutting instead of clearcutting.

Pathogens and Nutrients from Household Pet Waste Problem Summary

Priority
Low

(See Detailed Problem Definition Page 121)

1. While there has been no inventory of pets in the watershed, the greatest pet waste problem is probably in densely developed areas along streams, including in the City of Monroe.
2. Neither Monroe, nor the county has pet waste ordinances that would require pet owners to pick up and properly dispose of pet waste.

Management Recommendations

REGULATION

FC117. Adopt Pet Waste Ordinance (Priority)

Snohomish County and Monroe should consider adopting a pet waste ordinance that would require pet owners to pick up pet waste. Leaflets regarding the ordinance should be given to homeowners associations.

EDUCATION

FC118. Provide Pet Waste Receptacles (High Priority)

Snohomish County Parks and Recreation and Monroe Parks Department should place pet waste receptacles in public parks and other areas where dogs are walked to provide a place for dog owners to deposit pet waste.

FC119. Distribute Pet Waste Brochure (Priority)

Snohomish County Solid Waste Management Division should ask local community groups to distribute its Pet Waste brochures in high-density residential areas. The city of Monroe and the county should distribute the brochure with pet license fee renewals. Brochures should be placed in veterinary clinics, pet stores, farm supply stores, and other places that provide services to pet owners. The brochures should also be available at the dog and cat barns at the Snohomish County Fair. 4-H groups could be asked to distribute and keep the brochures supplied.

Illegal Dumping and Stream Garbage Problem Summary

Priority
Low

(See Detailed Problem Definition Pages 122-124)

1. Illegal dumping was reported by citizens along French Creek at the grange, Golf Course Creek at Westwick Road, Frylands area, along 140th Street SE and 123rd Street SE on Lords Hill, near beaver ponds on Meadow Lake Road, and 88th Street SE near Stables Creek.
2. Illegal dumping is at least in part related to the cost of having waste and recycling pickup and the cost of taking unwanted material to the transfer station.
3. One of the complaints reported to Surface Water Management is illegal dumping along and in streams. Illegal dumping is a water quality problem when the materials dumped contain toxic materials or other materials like yard debris that leach into stream water.
4. There is currently no agency that will aggressively take responsibility for cleaning up illegal dumpsites.
5. When illegal dumping is observed or established, enforcement is not a high priority and the penalties are minimal.

Management Recommendations

REGULATIONS AND POLICIES

FC120. Develop Long Term Strategy to Address Illegal Dumping (High Priority)

The Snohomish Health District (SHD) and Solid Waste Management Division (SWMD) should work with other agencies that deal with illegal dumping and garbage to develop a long-term strategy to address this problem. The strategy should include the following:

- Promoting the use of composting, special hauler rates, and reduction in price for mulching mowers for landowners living along streams to reduce the amount of yard debris dumped along and in streams
- Developing private/public partnerships to help pay for cleanup costs
- Developing a packet for community groups to provide them with information encouraging them to initiate and participate in cleanup projects
- Providing contact information for illegal dumping so citizens will know who to call
- Discussing approaches to increased enforcement by Sheriff's office of illegal dumping complaints

FC121. Adopt Mandatory Waste Pickup Regulations (Priority)

Snohomish County should consider mandatory waste pickup and recycling for all Snohomish County residents.

FC122. Sponsor Community Cleanup Events (High Priority)

SWMD should consider having twice annual community cleanup events providing dumpsters at sites free of charge for large items such as furniture, mattresses, and equipment.

FC123. Increase Penalties for Illegal Dumping (High Priority)

SHD should enforce illegal dumping laws and consider making penalties higher. The financial penalty for illegal dumping should be included on all 'no dumping' signs.

FC124. Block Off Known Dump Sites (Priority)

SHD and SWMD should identify dumpsites and work with landowners to block off the sites so they cannot be used.

EDUCATION

FC125. Conduct Waste Reduction/Assessment Workshops for Businesses (High Priority)

SWMD should conduct waste reduction and assessment workshops to teach businesses to analyze their business's processes and material flow to find out if materials are used efficiently. Waste reduction awards should be given to those businesses with outstanding achievements in waste reduction.

FC126. Develop Residential Composting Demonstration Programs (High Priority)

Snohomish County Solid Waste Management Division (SWMD) and Master Composter Recycler volunteers should encourage composting. SWMD should encourage composting by measures such as conducting composting workshops for the public in Monroe and other cities providing educational handouts, and sponsoring at cost or subsidized compost bins or worm bins.

FC127. Publish Waste Prevention Newsletters and Newspaper Articles (High Priority)

SWMD should prepare articles for newsletters and newspapers on general waste prevention at home and at work, composting and grass recycling, and other waste reduction topics. These articles should be submitted to newsletters and local newspapers as a regular series to keep this issue before the public eye.

Toxic Chemicals from Hazardous Materials Problem Summary

Priority
Low

(See Detailed Problem Definition Pages 125-129)

1. Three locations in this watershed are on the hazardous site list and have not been fully decontaminated. Northwest Pipeline had mercury leaking into the soil from a manometer, a device that measures gas or liquid pressure. A five-acre parcel off of 171st Street had petroleum, metals, solvents, and other pollutants leaching into the soil and ground water. The junkyard in the floodplain has contaminated the ground water with petroleum and metals.
2. Because hazardous substance sites are reported through complaints or voluntarily by the business itself, it is likely that other contaminated sites in the watershed exist, unknown to government agencies.
3. Many households use paints, solvents, and other toxic chemicals on a regular basis. Some of this waste is flushed into sanitary sewers, dumped on the ground, or poured into storm drains. If the waste material is improperly stored, it can also leak into the ground.
4. More than 10,000 people live in the watershed. That number is expected to increase substantially in the next 20 years, increasing the problem of proper household hazardous waste usage, storage, and disposal.
5. The problems Ecology found when interviewing businesses that used hazardous materials included open containers, lack of labeling, no secondary containment, and unauthorized discharges to the sewer.
6. One truck/large equipment repair facility has been identified as having some contaminated soils (from pulling engines and parts out without providing drip pans for fluids) and significant problems safely containing used motor oil.

Management Recommendations

MONITORING

FC128. Monitor Hazardous Materials Storage Disposal Practices at Industrial and Business Sites

The Snohomish Health District (SHD) should conduct regular monitoring and education of businesses that use toxic chemicals to make sure the chemicals are stored, used, and disposed of properly. Follow up on problem sites should be conducted until the site has been cleaned up and problems corrected.

FC129 Hazardous Site Cleanup

Ecology should be proactive in insuring that the hazardous sites in the watershed are cleaned up. PDS should review the conditions of the permit of the junkyard in the floodplain to determine if they are being followed.

EDUCATION

FC130. Designate Household Hazardous Waste Education Week (Priority)

Washington Department of Ecology, Snohomish County Solid Waste Division (SWMD), Snohomish County Surface Water Management (SWM), and the Snohomish Health District (SHD) should designate a special household hazardous waste week to target education on proper use of household hazardous materials, recycling, and reducing the use of household hazardous wastes. This could include public service announcements and newspaper articles.

FC131. Initiate Storm Drain Waste Reduction Program (Priority)

SWM should initiate an educational program in neighborhoods throughout the watershed to focus on toxic materials deposited in storm drains, including antifreeze, motor oil, paint thinners, and paint. Youth organizations could stencil storm drains with the slogan “Dump No Waste, Drains to Salmon Stream,” throughout the watershed.

FC132. Conduct Household Hazardous Waste Survey (High Priority)

SWM's Watershed Keepers Classes should include a household hazardous waste session with assistance from SHD. Class members could participate in a household hazardous waste survey.

FC133. Establish Household Hazardous Waste Web Site (High Priority)

SWMD should develop a household hazardous waste web site. The site could include information on alternatives to household hazardous products, what makes a product hazardous, labeling, categories of hazardous products, how to buy hazardous products, how to safely use hazardous products, how to store hazardous products, how to clean up spills, and disposal, with links to other educational and informational sites. The website should provide a form for citizens to report improper household hazardous waste disposal.

PROGRAMS

FC134. Provide Battery Bags for Battery Recycling (High Priority)

SWMD should provide battery bags to residents for recycling of household batteries.

FC135. Hazardous Waste Salvage Program (Priority)

SWMD should promote and expand their salvage program that offers usable products to the public free of charge.

(See also FC105. Create Business Partners for Clean Water Program)

Drainage Problems

Problem Summary

(See Detailed Problem Definition Pages 130-135)

Priority

Low

1. Flooding over roads is the most common watershed drainage problem. Flooding over roads results mainly from inadequate upstream detention pond size and undersized or clogged culverts. Old pipes also cause drainage problems, as well as culverts that are rusting, damaged, too small or simply falling apart from age. These problems result in damage to aquatic habitat and erosion.
2. Steep slopes and inadequate ditches/stormwater systems in the Robinhood Lane subdivision have caused property flooding and stream channel downcutting adding sediment to the Cripple Creek stream system.
3. A large volume of water is impounded behind a series of beaver dams on French Creek near the outlet of Meadow Lake. Some dam breaking has occurred and there is concern that further dam breakage would wash out the road, cause downstream flooding, carry sediment downstream, and scour French Creek down to hardpan. Such a dam breakage has occurred on Lords Hill causing major erosion of the creek and depositing sediment all along the stream path.
4. Flooding and drainage problems and their associated water quality problems will increase as development increases in the watershed.
5. In the subbasin containing the Foothills development, flows are projected to increase by 15 percent. In the subbasin in the lower portion of French Creek just outside the floodplain, flows are projected to increase by seven percent. These increases will result from forest removal, and creating impervious surfaces--in spite of using detention ponds to decrease stormwater runoff.
6. In areas where no detention ponds are required, stream flows are expected to increase 10 to 20 percent, enough to overwhelm some downstream drainage structures, overtop some streambanks, and scour stream channels.
7. Bioswales that are used to clean stormwater often do not work properly over the long term because of lack of maintenance or poor design.
8. Drainage and water quality facilities are not inspected and maintained frequently enough to effectively reduce water pollution and peak stream flows. Inadequate maintenance of stormwater facilities is a problem throughout the county.

Management Recommendations

REGULATIONS AND POLICIES

FC136. Increase Watershed Management Area Service Charges (High Priority)

Snohomish County's watershed management area service charges should be increased to cover costs of drainage maintenance, outreach and educational activities, and implementation of this and other watershed plans. (See page 189 for a comparison of Snohomish County fees with other jurisdictions.)

(See also Management Recommendations in Hydraulic Impacts from Stormwater Runoff [page 147] and Aquatic Habitat [page 139] that address the potential increase in stormwater runoff identified under this problem, including provisions for rewriting the stormwater manual, adopting continuous simulation modeling, higher standards in areas where stream flow increases as a result of future development, and exemptions for single family homes.)

INVENTORY AND MONITORING

FC137. Study Beaver Dams on Meadow Lake (Priority)

Snohomish County Surface Water Management (SWM) should initiate a study of the beaver dams at Meadow Lake to determine if there are actions that could be or should be taken to prevent dams from breaking or to prevent people from breaking them.

FC138. Analyze Robinhood Lane Drainage System (Priority)

An analysis of the Robinhood Lane stormwater drainage system should be made by the city of Monroe to identify a plan to correct the system to eliminate drainage problems.

FC139. Analyze Function of Bioswales (High Priority)

An analysis of the design and functioning of bioswales used for pretreating stormwater should be made by SWM and Ecology, and standards developed to insure that bioswales are designed and function at a level that insures protection of water quality.

STORMWATER FACILITY MAINTENANCE

FC140. Develop Stormwater Education and Training Program for Homeowners Associations (High Priority)

SWM should develop a program for homeowners associations responsible for stormwater facility maintenance that includes hands on training and supplying a list of private companies that provide maintenance services. The program should require that a plan for maintenance be in place (whether done by members of the association or a professional service) including a provision for regular inspection by SWM staff. If homeowners associations do not maintain their facilities, SWM should hire private companies and bill the homeowners associations for the cost.

FC141. Retrofit Stormwater Facilities (High Priority)

For subbasins that have already exceeded five percent total impervious area, Snohomish County and Monroe should consider retrofitting stormwater facilities, creating areas of vegetation to infiltrate and clean runoff, and taking other actions to reduce runoff and its pollutants.

PROJECTS (SEE FIGURE 41, PAGE 179 FOR PROJECT LOCATIONS)

FC142. 127th Avenue SE Drainage Improvement (Priority)

SWM should design and implement improvements to the drainage system to eliminate flooding and erosion problems.

FC143. Golf Course Creek at Roosevelt Road Flooding and Erosion Problems

Snohomish County Maintenance and Operations Division and SWM should address road flooding during large storms and downstream erosion by raising the road grade and using bioengineering to eliminate streambank erosion.

FC144. Replace the Ghost Horse Creek Culvert Under Meadow Lake Road (High Priority)

SWM should replace this culvert, which is completely rusted and in danger of collapsing along with the road.

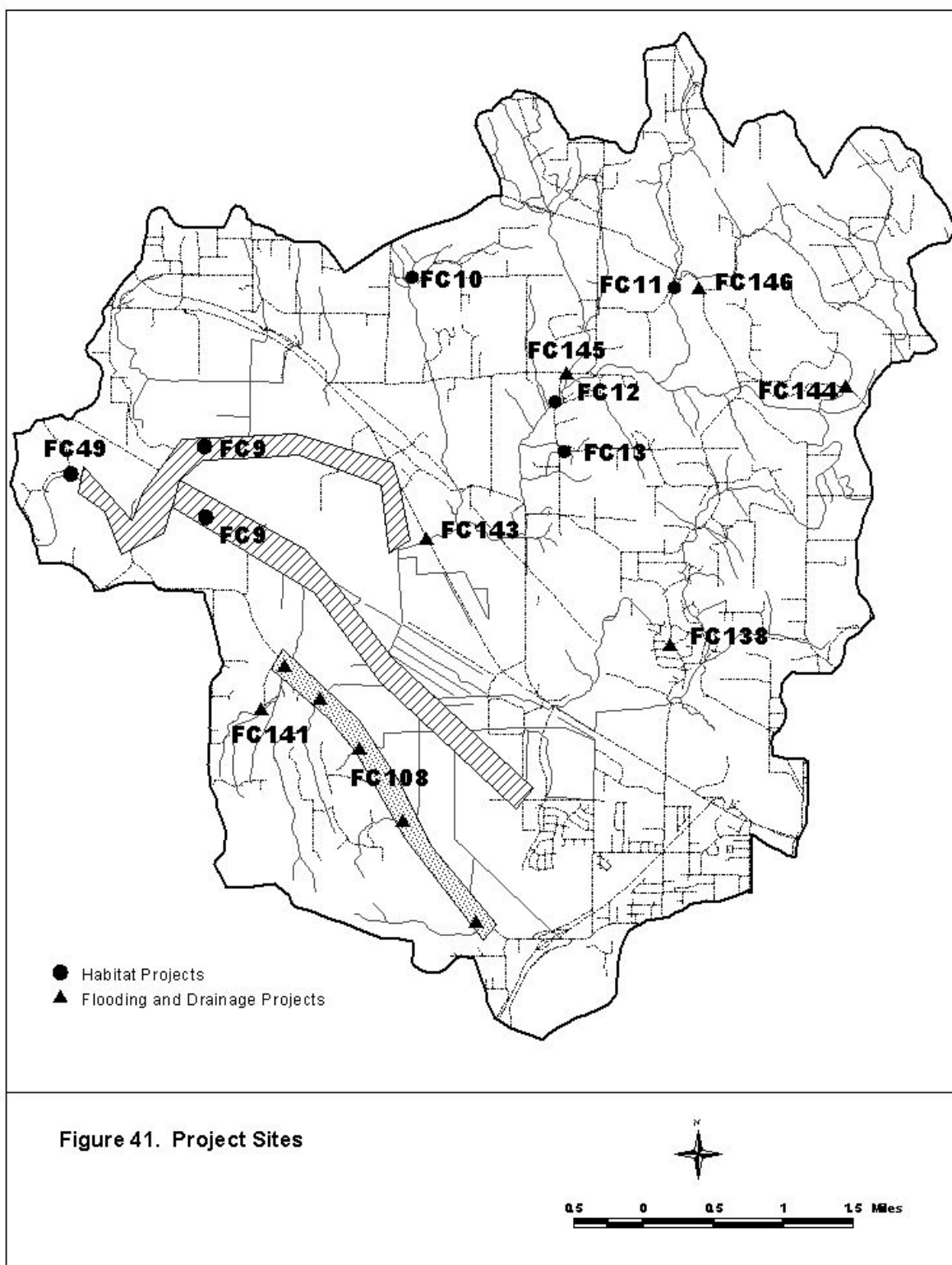
FC145. Erosion Problem at Stables Creek Culvert Under Westwick Road

Stables Creek is eroding behind the wingwall on the upstream side of the culvert. In addition, there is considerable erosion downstream of the culvert. These problems should be assessed and corrected by SWM.

FC146. French Creek at Trombley Road Seepage and Erosion Problem

SWM should assess the water seepage that is washing out the road shoulder and the downstream erosion that is washing out the toe of a steep streambank reach.

[See also FC10. Resolve Fish Blockage and Flooding Problems at Golf Course Creek and Oil Well Road (High Priority)]



Long Term Water Quality Monitoring Strategy



Water Quality Monitoring

LONG TERM WATER QUALITY MONITORING STRATEGY

AMBIENT MONITORING

The county's Ambient Water Quality Monitoring Program was designed to establish baseline conditions for Snohomish County surface waters, to identify problem areas for nonpoint pollutants, to correlate nonpoint pollution with land use, and to determine long term water quality trends. Beginning in 1994, the Snohomish County Surface Water Management (SWM) water quality program began monthly water quality monitoring in the French Creek watershed. This monitoring was conducted at two sites in the watershed: Lower French Creek in the floodplain and Upper French Creek near the Grange. Sampling continues in the watershed, and should show improvements in water quality as management recommendations are implemented.

A temperature logger has been placed by SWM with a flow gage in the watershed to monitor stream water temperature at 15-minute intervals. Temperature data is downloaded monthly

SITE MONITORING

Site monitoring assesses the impacts of a particular site's land use or activity on water quality. A number of sites have been identified as areas where site monitoring could be used to further isolate sources of problems and identify if there are water quality problems resulting from certain land uses. The following management recommendations include site monitoring:

FC94. Monitor Streams with High Potential for Onsite sewage System Problems. The problem areas were identified through an analysis of age and soil type. Other areas where onsite sewage system problems may be identified or suspected would also be monitored.

FC97. Monitor Water Quality Sites. The problems areas in this recommendation were identified as those activities that have been know to use polluting chemicals. The monitoring should be prioritized by those areas with high potential to impact critical areas and ground water.

EFFECTIVENESS MONITORING

Effectiveness monitoring assesses whether activities were carried out as planned and determines whether Best Management Practices were implemented as specified. Snohomish County Surface Water Management has established water quality monitoring protocols for projects where water quality improvement is an intended outcome of the project. For example, one goal of the stream restoration project at Stables Creek in the watershed, a joint project of SWM and the Snohomish Conservation District, was to reduce the impacts of livestock waste runoff and animal access to Stables Creek. Before the project was initiated, a biological assessment was made of the invertebrate population in the creek using standard SWM protocols. The invertebrates collected were sent to a lab for identification and were analyzed in accordance with their tolerance for pollution. Samples were taken the summer of 1999 and 2000. The stream rating improved by 10

points over the previous year, indicating that fencing the livestock from the creek and removing animals from an area along the creek were having a positive affect on the biological conditions of the stream. This method is being used for many restoration projects where this same type of impact is being addressed.

The Snohomish Conservation District also monitors water quality using temperature loggers and by taking water quality samples for chemical analysis. Most of the projects conducted by SCD are designed to address impacts from livestock.

Implementation



Planting at Stables Creek

IMPLEMENTATION

INTRODUCTION

This plan recommends 146 actions to address nonpoint pollution, water resource issues, and flooding problems in the French Creek watershed. Several management recommendations have already been completed; some are currently underway. Many will be implemented over the next several years. In accordance with Chapter 400-12-535, the following are included in the implementation strategy:

- Management strategies to be implemented by each entity.
- Implementation schedule with annual milestones.
- Cost of management programs.
- Funding sources.
- Provision for public involvement.
- Timeframe for achieving plan objectives.
- Method for evaluating overall effectiveness of the plan.
- Process for annual review.

Plan implementation will include improved cost estimates on all action and final decisions on funding options. Progress on the plan will be tracked and evaluated, and the plan revised when needed. These issues are discussed in more detail in the following sections.

Preliminary costs for planned one-time management actions are about \$14-58 million. Preliminary costs for annual actions range from about \$6.85 million. These projected costs currently exceed the revenue sources that local jurisdictions now dedicate to these types of problems in the watershed and funding opportunities will be sought to finance the plan recommendations.

IMPLEMENTATION STRATEGY

Implementation Entities And Schedule

Snohomish County Public Works, Surface Water Management Division (SWM) will be the lead agency responsible for coordinating implementation of the management recommendations. Other key agencies involved include the City of Monroe, The Tulalip Tribes, the Snohomish Health District, and the Snohomish Conservation District. In all, seven different agencies and local governments are identified as having some part in implementing the plan recommendations. Table 4 lists the recommended actions for key implementing agencies, with a proposed schedule for implementation during the five-year period.

Implementation Costs

Cost estimates are included as a planning tool to assist in budgeting. Costs are categorized as one time or annual costs; many have both. One time costs are typically

Table 4 Implementation Schedule

ID No.	Year	Management Recommendations	Implementing Entity (Abbreviations see page 188)
High Priority - Ongoing			
FC7	Ongoing	Identify and Replace Fish Blockages	SWM, Monroe, Adopt A Stream
FC19	Ongoing	Conduct Volunteer Stream Cleanup and Restoration Programs	SWM, Task Force, SCD, Adopt A Stream, Monroe
FC32	Ongoing	Expedite Use of Updated Stormwater Manual	Snohomish Co., Monroe
FC43	Ongoing	Educate Citizens on Development Process	SWM
FC46	Ongoing	Track Farm Water Quality Referrals	SWM, SCD
FC49 Highest Priority	Ongoing	Reconnect French Creek with the River through Construction of a Tidegate or other Feasible Option	SWM, SCD, NRCS, Flood Cont Dist.
FC50	Ongoing	Develop and Implement Farm Plans for Dairies	SCD
FC51	Ongoing	Develop/Implement Plans for Commercial/Noncommercial Farms/Stables	SCD
FC53	Ongoing	Prevent Animal Access to Streams	SCD
FC54	Ongoing	Restore Streams Damaged by Animal Access	SCD
FC56	Ongoing	Provide Technical Assistance to Livestock Owners on Managing Waste	SCD
FC58	Ongoing	Conduct Workshops for Small Farm Owners	SCD
FC63	Ongoing	Adopt Tree Retention Ordinance	Snohomish Co., Monroe
FC64	Ongoing	Prohibit Clearing and Grading During the Rainy Season	Snohomish Co., Monroe
FC68	Ongoing	Conduct Training Program for Contractors and Staff on Erosion Control	PDS, Monroe
FC100	Ongoing	Conduct Landscaper Training and Education Program	WSU Cooperative Extension
FC102	Ongoing	Establish Educational Website on Water Quality	SWM, SWMD
FC104	Ongoing	Provide Technical Assistance to Businesses that Cause Pollution	SWM, SWMD, SHD, Monroe
High Priority – 2004			
FC10	2004	Resolve Fish Blockage and Flooding Problems at Golf Course Creek and Oil Well Road	SWM Completed in 2003
FC14	2004	Prioritize Stream Reaches for Enhancement	SWM, Monroe, Tulalip Tribes, Adopt A Stream, Task Force, SCD
FC15	2004	Determine and Correct the Cause of the Landslide on Trench Creek	SWM, Monroe
FC16	2004	Protect Important Stream Reaches	SWM, Watershed Restoration Groups
FC23	2004	Prohibit Wetland Filling and Draining	Snohomish Co., Monroe
FC29	2004	Map and Monitor Native Growth Protection Areas	SWM, Monroe
FC30	2004	Acquire Important Wetlands	SWM, Task Force, SCD, Adopt A Stream
FC31	2004	Purchase Wetland Easements	SWM, Task Force, Adopt A Stream
FC37	2004	Review Site Design to Reduce Impervious Surface	Snohomish Co., Monroe
FC40	2004	Adopt Clearing Ordinance	Snohomish Co., Monroe
FC44	2004	Conduct Workshops on Reducing Impervious Surface	PDS, SWM, Monroe
FC45	2004	Acquire Forested Sites	SWM
FC63	2004	Adopt Tree Retention Ordinance	Snohomish Co., Monroe
FC64	2004	Prohibit Clearing and Grading During the Rainy Season	Snohomish Co., Monroe
FC73	2004	Add Fines to "Stop Work" and "Cease and Desist" Orders	Snohomish Co., Monroe
FC74	2004	Broader Use of Infractions/Citation with Penalties that Accrue	Snohomish Co., Monroe
FC77	2004	Provide Education on New Laws and Regulations to Public	PDS, SWM
FC78	2004	Highlight Enforcement Phone Numbers in Phone Book	PDS
FC79	2004	Protect Areas Vulnerable to Contamination	Snohomish Co., Monroe
FC81	2004	Monitor Ground Water Elevation	SWM

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ID No.	Year	Management Recommendations	Implementing Entity (Abbreviations see page 188)
FC109	2004	Install Stream Signs Along Ditched Streams	Task Force, SWM
FC116	2004	Encourage Low Impact Logging	DNR*
FC136	2004	Increase Watershed Management Area Fees	Snohomish Co.
FC139	2004	Analyze Function of Bioswales	SWM, Ecology
FC140	2004	Develop Stormwater Education/Training for Homeowners Associations	SWM
High Priority - 2005			
FC1	2005	Increase Buffer Requirements	Snohomish Co.
FC12	2005	Reduce Velocity of Water Going Through Fishway on 167 th	Adopt A Stream
FC22	2005	Adopt Ecology's Model Wetland Ordinance Standards	Snohomish Co., Monroe
FC24	2005	Wetland Protection Designation	Snohomish Co., Monroe
FC27	2005	Initiate Adopt-A-Wetland School Program	SWM, SCD
FC32	2005	Expedite Use of Updated Stormwater Manual	Snohomish Co., Monroe
FC33	2005	Develop Impervious Area Limits for Subbasins	Snohomish Co., Monroe
FC34	2005	Change Land Use Designation	Snohomish Co.
FC35	2005	Change Rural Cluster and Planned Residential Development Codes to Reduce Density	Snohomish Co.
FC36	2005	Reduce Impervious Areas and Improve Stormwater Management through Low Impact Development Strategies	Snohomish Co., Monroe
FC38	2005	Amend Code to Require Use of Flow Duration in Hydrologic Modeling	Snohomish Co.
FC39	2005	Amend Stormwater Code to Require Use of Infiltration	Snohomish Co., Monroe
FC66	2005	Revegetate Cleared Sites within One Year or One Growing Season	Snohomish Co., Monroe
FC80	2005	Protect Recharge and Discharge Areas	Snohomish Co., Monroe
FC87	2005	Designate Areas Vulnerable to Contamination as Areas of Special Concern	SHD
FC93	2005	Develop Program to Manage Revolving Loan Fund	SHD, SWM
FC107	2005	Classify and Establish Maintenance Criteria for Flood Plain Waterways	French Slough Flood Control Dist.
FC113	2005	Amend Forest Practice Rules to Include Runoff Reduction	DNR
FC115	2005	Adopt Stringent Requirements for Logging on Steep Slopes	DNR
FC142	2005	127th Avenue SE Drainage Improvement	Snohomish Co., Monroe
High Priority – 2006			
FC41	2006	Establish Stormwater Program for Monroe	Monroe
FC42	2006	Provide Training on Controlling and Infiltrating Runoff	SWM, Monroe
FC57	2006	Encourage New Waste Handling Techniques	SC, SWMD
FC59	2006	Provide Farm Owners with Information on New Technology	WSU Cooperative Extension
FC69	2006	Lower Grading Permit Fees	Snohomish Co.
FC71	2006	Monroe to Hire Erosion Control Code Enforcement Officer	Monroe
FC72	2006	Code Enforcement to Search Out Code Violators	Monroe
FC85	2006	Inspect and Pump Existing Onsite Sewage Systems	SHD
FC86	2006	Inspect New Onsite Sewage Systems	SHD
FC89	2006	Send Onsite Sewage System Information to Owners	SHD
FC91	2006	Distribute Educational Video to New Homeowners	Watershed Realtors
FC92	2006	Provide Fact Sheets about Additives to Onsite Sewage System Owners	SHD
FC120	2006	Develop Long Term Strategy to Address Illegal Dumping	SHD, SWMD
FC122	2006	Sponsor Community Cleanup Events	SWMD

French Creek Watershed Management Plan

ID No.	Year	Management Recommendations	Implementing Entity (Abbreviations see page 188)
FC123	2006	Increase Penalties for Illegal Dumping	SHD
FC125	2006	Conduct Waste Reduction/Assessment Workshops for Businesses	SWMD
FC126	2006	Develop Residential Composting Demonstration Programs	SWMD, Master Composters & Recyclers
FC127	2006	Publish Waste Prevention Newsletters and Newspaper Articles	SWMD
FC133	2006	Establish Household Hazardous Waste Web Site	SWMD
FC134	2006	Provide Battery Bags for Battery Recycling	SWMD
High Priority – 2007			
FC9	2007	Restoration of Lower French Creek and Lower Cripple Creek, including Remlinger Wetland Reserve	SWM, SCD, NRCS, Flood Cont Dist.
FC62	2007	Fund Riparian Restoration on Farms and Other Private Land	State Conservation Commission
FC70	2007	Increase Enforcement Staffing	All Regulatory Agencies
FC75	2007	Simplify and Streamline Hearing Process	Ecology, Monroe, DNR, DFW, SHD
FC84	2007	Develop Proactive Approach to Manage Onsite Sewage Systems	SHD
FC88	2007	Develop Health District Assessment Fee	SHD
FC90	2007	Conduct Onsite Sewage System Operation and Maintenance Workshops	SHD
FC105	2007	Create Business Partners for Clean Water Program	Snohomish Co., Monroe
High Priority – 2008			
FC2	2008	City of Monroe to Replace Critical Areas Guidelines with Ordinance	Monroe
FC47	2008	Adopt Ordinance to Limit Livestock Numbers on Property	PDS, SCD, County Ag Advisory Board.
FC101	2008	Develop Multimedia Homeowner Education on Chemical Pollutants	WSU Cooperative Extension
FC106	2008	Set Maintenance Standards for Roadside Waterways	Snohomish Co., Monroe
FC111	2008	Conduct Pilot Ditch Education Project	SWM
FC120	2008	Develop Long Term Strategy to Address Illegal Dumping	SHD, SWMD
Priority – 2004			
FC3	2004	Establish Process to Upgrade Stream Typing	Snohomish Co., Monroe
FC4	2004	Adopt 1996 Emergency Rule	Snohomish Co., Monroe
FC11	2004	Address Fish Blockage at Spada Creek near Trombley Road	SWM, Adopt A Stream Project Designed in 2003
FC17	2004	Acquire Floodplain Land along French and Cripple creeks	Jurisdictions and Groups
FC48	2004	Clarify Land Use Regulations Concerning On-Farm Composting	PDS
FC60	2004	Install Water Quality Signs Based on Water Quality Sampling Results	SWM
FC95	2004	Treatment of Road Discharges to Improve Water Quality	SWM, WSDOT
FC96	2004	Improve Sediment Management at Rock Quarry	DNR
FC99	2004	Install "No Herbicide Spraying" Signs along Streams and Wetlands	Task Force
FC105	2004	Create Business Partners for Clean Water Program	Snohomish Co., Monroe
Priority – 2005			
FC12	2005	Reduce Velocity of Water Going Through Fishway on 167th	Adopt A Stream
FC13	2005	Remove Fish Blockages on Tributary at 167th Avenue and Butler Road Intersection	SWM
FC55	2005	Eliminate Wetland Grazing	SCD
FC83	2005	Evaluate Emergency Spill Response Plan	Snohomish DEM, Ecology, Fire Dist.
FC97	2005	Monitor Water Quality Sites	SWM
FC98	2005	Locate Direct Discharges	SWM

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ID No.	Year	Management Recommendations	Implementing Entity (Abbreviations see page 188)
FC103	2005	Develop Car Washing Incentive Program	SWM
FC107	2005	Classify and Establish Maintenance Criteria for Flood Plain Waterways	French Slough Flood Control Dist.
FC114	2005	Create "Special Watershed Area" Designation	Snohomish Co., DNR
FC117	2005	Adopt Pet Waste Ordinance	Snohomish Co., Monroe
FC125	2005	Conduct Waste Reduction/Assessment Workshops for Businesses	SWMD
FC128	2005	Monitor Hazardous Materials Storage/Disposal at Industrial/Business Sites	SHD
Priority – 2006			
FC25	2006	Restore Wetlands	SWM, SCD, Task Force
FC103	2006	Develop Car Washing Incentive Program	SWM
FC110	2006	Provide Dredging Services to Floodplain Landowners	French Slough Flood Control Dist.
FC112	2006	Adopt Forest Conversion Ordinance	Snohomish Co.
FC123	2006	Increase Penalties for Illegal Dumping	SHD
FC124	2006	Block Off Known Dump Sites	SHD, SWMD
FC130	2006	Designate Household Hazardous Waste Education Week	WDE, SWMD, SWM, SHD
Other – Ongoing			
FC18	Ongoing	Install Watershed and Stream Signs (Early Action)	SWM
FC20	Ongoing	Volunteer Salvage Work by Watershed Groups	SWM, Task Force
FC52	Ongoing	Notify Farmers of Water Quality Impacts (Early Action)	WMC
Other – 2006			
FC5	2006	Eliminate Mineral Overlay	Snohomish Co.
FC6	2006	Monitor Hydraulic Permits for Compliance	SWM, Dept. Fish and Wildlife
FC8	2006	Restore Floodplain if Dike Breaks	SWM, SCD, NRCS, Flood Cont Dist.
FC26	2006	Publicize Open Space Taxation Program	PDS, SWM, Task Force, Adopt A Stream
FC28	2006	Place Wetland Buffer and Native Growth Protection Area Signs on Parcels	Snohomish Co., Monroe
FC61	2006	Contact Farmers Annually Regarding Manure Applications	SCD
FC65	2006	Provide Incentives to Encourage Clearing and Grading During Dry Season	Snohomish Co., Monroe
FC67	2006	Monitor Erosion Control in Areas Having High Erosion Potential	PDS, Monroe
FC94	2006	Monitor Streams with High Potential for Onsite Sewage System Problems	SWM
Other – 2007			
FC21	2007	Implement French Creek Area Habitat Network	SWM
FC77	2007	Provide Education on New Laws and Regulations to Public	PDS, SWM
FC82	2007	Monitor Ground Water Quality	SWM
FC107	2007	Classify and Establish Maintenance Criteria for Flood Plain Waterways	French Slough Flood Control Dist.
Other – 2008			
FC76	2008	Establish Interagency Communication	Ecology, PSWQAT
FC104	2008	Provide Technical Assistance to Businesses that Cause Pollution	SWM, SWMD, SHD, Monroe
FC122	2008	Sponsor Community Cleanup Events	SWMD
FC131	2008	Initiate Storm Drain Waste Reduction Program	SWM

***Bold = Lead or Leads** **Abbreviations:** County: SWM (Surface Water Management); SWMD (Solid Waste Management Division); PDS (Planning and Development Services); DEM (Department of Emergency Management). Districts: Flood Cont. Dist. (French Creek Flood Control District); SCD (Snohomish Conservation District); SHD (Snohomish Health District). State: DNR (Department of Natural Resources); Ecology (Department of Ecology); WSU (Washington State University Cooperative Extension Service), PSWQAC (Puget Sound Water Quality Action Team), WSDOT (Department of Transportation). Federal: NRCS (Natural Resources Conservation Service). Other: WMC (French Creek Watershed Management Committee); Monroe (City of Monroe), Task Force (Stilly-Snohomish Fisheries Enhancement Task Force, Adopt-A-Stream (Adopt-A-Stream Foundation)).

associated with specific construction projects but may also be associated with new programs. Such actions can be prioritized and phased into the corresponding jurisdiction's capital improvement or planning program over a period of years. An example of a one-time cost would be stream restoration, land acquisition, or culvert replacement projects. Annual costs reflect operating costs including additional staff, maintenance, public involvement and education programs, storm system maintenance, and new programs. Table 5 identifies estimated costs for actions included in the plan.

Potential Revenue Sources

The implementation of plan actions is contingent on available funding and the ability of individual implementing agencies to incorporate and prioritize these actions into their existing programs and budgets. The total projected costs for plan implementation exceed the revenue sources of the major implementing entities. Possible revenue sources are listed below to help fund implementation of the French Creek Watershed Management Plan.

Watershed Management Areas

In 1987, Snohomish County adopted Title 25 of the county code that authorizes service charges for surface water activities within areas called Watershed Management Areas (WMAs). The county began collecting WMA fees for part of the French Creek watershed in 1990. The WMA fee is \$33.01 per year for residential homes. Commercial and industrial property is assessed on a sliding scale, depending on the percentage of impervious surfaces on the property. The WMA program is administered by SWM.

For comparison, the following are annual surface water fees charged by other jurisdictions:

Auburn	\$108.84	Bellevue	\$157.05
Bellingham	60.00	Bothell	66.72
Des Moines	77.04	Edmonds	44.40
Everett	45.00	Issaquah	131.40
King County	85.02	Lake Stevens	60.00
Lynnwood	30.00	Marysville	33.01
Montlake Terrace	60.00	Mukilteo	64.80
Redmond	138.00	Seattle	99.00
Shoreline	85.02	Skagit County	25.80
Stanwood	72.00	Tacoma	120.00
Whatcom County	70.00		

Current WMA fees generated from the French Creek watershed are incorporated into the Snohomish Watershed Management Area and are dedicated to existing SWM programs and projects occurring within the WMA. As a result, there are only limited WMA funds available to implement the actions in this watershed plan.

The city of Monroe does not have this type of fee to pay for surface water management, although proposals for such fees for Monroe are pending.

Table 5 Estimated Plan Implementation Costs

ID No.	Management Recommendation	Implementing Entities (See abbreviations page 191)	Rank	One Time Cost	Ongoing Cost/yr
for Aquatic Habitat Degradation:					
FC1	Increase Buffer Requirements	Snohomish Co.	High Priority	\$20,000	
FC2	City of Monroe to Replace Critical Areas Guidelines with Ordinance	Monroe	High Priority	\$40,000	
FC3	Establish Process to Upgrade Stream Typing	Snohomish Co., Monroe	Priority	\$10,000	
FC4	Adopt 1996 Emergency Rule	Snohomish Co., Monroe	Priority	\$20,000	
FC5	Eliminate Mineral Overlay	Snohomish Co.	Other	\$10,000	
FC6	Monitor Hydraulic Permits for Compliance	SWM, Dept. Fish and Wildlife	Other		\$1,200
FC7	Identify and Replace Fish Blockages	SWM, Monroe, Adopt A Stream	High Priority	\$40,000- \$100,000	
FC8	Restore Floodplain if Dike Breaks	SWM, SCD, NRCS, Flood Cont Dist.	Other	\$1 - \$4 Million	
FC9	Restore Lower French Creek and Lower Cripple Creek, including Remlinger Wetland Reserve	SWM, SCD, NRCS, Flood Cont Dist.	High Priority	\$250,000- \$ Million	
FC10	Resolve Fish Blockage and Flooding Problems at Golf Course Creek and Oil Well Road	SWM	High Priority	60,000- \$90,000	
FC11	Address Fish Blockage at Spada Creek near Trombley Road	SWM, Adopt A Stream	Priority	\$40,000- \$60,000	
FC12	Reduce Velocity of Water Going Through Fishway on 167th	Adopt A Stream	Other	\$10,000- \$30,000	
FC13	Remove Fish Blockages on Tributary at 167th Avenue and Butler Road Intersection	SWM, Adopt A Stream	Other	\$35,000- \$60,000	
FC14	Prioritize Stream Reaches for Enhancement	SWM, Monroe, Task Force	High Priority	\$2,000	
FC15	Determine and Correct the Cause of the Landslide on Trench Creek	SWM, Monroe	Other	\$15,000- 50,000	
FC16	Protect Important Stream Reaches	SWM, Task Force, Adopt A Stream, SCD	High Priority	\$1 - \$5 Million	
FC17	Acquire Floodplain Land along French and Cripple creeks	Jurisdictions & Groups	Priority	\$1 - \$3 Million	
FC18	Install Watershed and Stream Signs	SWM	Other		\$40-100
FC19	Conduct Volunteer Stream Cleanup and Restoration Programs	Snohomish. Co., Monroe, Adopt A Stream, SCD, Task Force	High Priority		\$2,500
FC20	Volunteer Salvage Work by Watershed Groups	SWM, Task Force	Other		\$2,000
FC21	Implement French Creek Area Habitat Network	SWM	Other	\$5 Million	
for Wetland Loss and Degradation:					
FC22	Adopt Ecology's Model Wetland Ordinance Standards	Snohomish Co., Monroe	High Priority	\$20,000	
FC23	Prohibit Wetland Filling and Draining	Snohomish Co., Monroe	High Priority	\$0	\$6,500
FC24	Wetland Protection Designation	Snohomish Co., Monroe	High Priority	\$5,000- \$15,000	
FC25	Restore Wetlands	SWM, SCD, Task Force	Priority		\$3,000
FC26	Publicize Open Space Taxation Program	PDS, SWM, Task Force, Adopt A Stream	Other	\$5,000	\$2,000
FC27	Initiate Adopt-A-Wetland School Program	SWM, SCD	High Priority	\$0	\$6,000
FC28	Place Wetland Buffer/Native Growth Protection Areas Signs on Parcels	Snohomish Co., Monroe	Other		\$40-100
FC29	Map and Monitor Native Growth Protection Areas	SWM	High Priority	\$10,000	\$5,000
FC30	Acquire Important Wetlands	SWM	High Priority	\$1 - \$10 Million	\$1 Million

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ID No.	Management Recommendation	Implementing Entities (See abbreviations page 191)	Rank	One Time Cost	Ongoing Cost/yr
FC31	Purchase Wetland Easements	SWM, Task Force, Adopt A Stream	High Priority	\$50,000-\$300,000	\$35,000
for Increased Stormwater Runoff:					
FC32	Expedite Use of Updated Stormwater Manual	Snohomish Co., Monroe	High Priority	\$5,000	
FC33	Develop Impervious Area Limits for Subbasins	Snohomish Co., Monroe	High Priority	\$10,000-\$30,000	
FC34	Change Land Use Designation	Snohomish Co.	High Priority	\$2,500	
FC35	Change Rural Cluster and Planned Residential Development Codes to Reduce Density	Snohomish Co.	High Priority	\$3,000	
FC36	Reduce Impervious Areas and Improve Stormwater Management through Low Impact Development Strategies	Snohomish Co., Monroe	High Priority	\$3,000-\$5,000	
FC37	Review Site Design to Reduce Impervious Surface	Snohomish Co., Monroe	High Priority	\$3,000	\$3,000
FC38	Amend Code to Require Use of Flow Duration in Hydrologic Modeling	Snohomish Co.	High Priority	\$3,000	\$20,000
FC39	Amend Stormwater Code to Require Use of Infiltration	Snohomish Co., Monroe	High Priority	\$10,000	
FC40	Adopt Clearing Ordinance	Snohomish Co., Monroe	High Priority	\$20,000	
FC41	Establish Stormwater Program for Monroe	Monroe	High Priority		\$120,000
FC42	Provide Training on Controlling and Infiltrating Runoff	SWM, Monroe	High Priority		\$10,000
FC43	Educate Citizens on Development Process	SWM	High Priority		\$10,000
FC44	Conduct Workshops on Reducing Impervious Surface	PDS, SWM, Monroe	High Priority		see FC43
FC45	Acquire Forested Sites	SWM	High Priority	\$5 - \$20 Million	\$5 Million
For Pollution from Agricultural Practices:					
FC46	Track Farm Water Quality Referrals (Early Action)	SWM, SCD	Other		\$5,000
FC43	Adopt Ordinance to Limit Livestock Numbers on Property	PDS, SCD, County Ag Advisory Board.	High Priority	\$20,000	
FC48	Clarify Land Use Regulations Concerning On-Farm Composting	PDS	High Priority	\$3,000	
FC49	Reconnect French Creek with the Snohomish River through Construction of a Tidegate or other Feasible Option (Highest Priority)	SWM, SCD, NRCS, Flood Cont Dist.	Highest	\$100,000-\$500,000	
FC50	Develop and Implement Farm Plans for Dairies	SCD	High Priority		\$20,000-\$30,000
FC51	Develop/Implement Farm Plans for Commercial/Noncommercial Farms/Stables	SCD	High Priority	\$2,000	\$5,000
FC52	Notify Farm Owners of Water Quality Impacts (Early Action)	WMC	Other		\$200
FC53	Prevent Animal Access to Streams	SCD	High Priority	\$3,000	\$8,000
FC54	Restore Streams Damaged by Animal Access	SCD	High Priority		\$5,000-\$10,000
FC55	Eliminate Wetland Grazing	SCD	Priority		covered in FC 47
FC56	Provide Technical Assistance to Livestock Owners on Managing Animal Waste	SCD	High Priority		\$5,000
FC57	Encourage New Waste Handling Techniques	SCD, SWMD	Other	\$1,000	\$200
FC58	Conduct Workshops for Small Farm Owners	SCD	High Priority		\$10,000
FC59	Provide Farm Owners with New Technology	WSU Cooperative Extension	High Priority		\$6,500

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ID No.	Management Recommendation	Implementing Entities (See abbreviations page 191)	Rank	One Time Cost	Ongoing Cost/yr
FC60	Install Water Quality Signs Based on Water Quality Sampling Results	SWM	Priority		\$40-\$100
FC61	Contact Farmers Annually Regarding Manure Applications	SCD	Other		\$500
FC62	Fund Riparian Restoration on Farms and Other Private Land	State Conservation Commission	Priority	\$3,000	\$5,000
<i>For Sediment and Erosion from Land Clearing and Grading:</i>					
FC63	Adopt Tree Retention Ordinance	Snohomish Co., Monroe	High Priority	\$20,000	
FC64	Prohibit Clearing and Grading During Rainy Season	Snohomish Co., Monroe	High Priority	\$5,000	\$1,500
FC65	Provide Incentives to Encourage Clearing and Grading During Dry Season	Snohomish Co., Monroe	Other	\$2,000	\$5,000
FC66	Revegetate Cleared Sites within One Year or One Growing Season	Snohomish Co., Monroe	High Priority	\$3,000	\$5,000
FC67	Monitor Erosion Control in Areas having High Erosion Potential	PDS, Monroe	High Priority	\$1,000	\$5,000
FC68	Conduct Training Program for Contractors and Staff on Erosion Control	PDS, Monroe	High Priority	\$3,000	\$1,000
<i>for Regulatory Enforcement:</i>					
FC69	Lower Grading Permit Fees	Snohomish Co.	High Priority	\$1,000	\$100
FC70	Increase Enforcement Staffing	All Regulatory Agencies	High Priority		\$240,000
FC71	Monroe to Hire Erosion Control Code Enforcement Officer	Monroe	High Priority		\$60,000
FC72	Code Enforcement to Search Out Code Violators	Snohomish Co., Monroe	High Priority		\$20,000
FC73	Add Fines to "Stop Work" and "Cease and Desist" Orders	Snohomish Co., Monroe	High Priority	\$3,000	
FC74	Broader Use of Infractions/Citation with Penalties that Accrue during Appeal Period	Snohomish Co., Monroe	High Priority	\$2,000	
FC75	Simplify and Streamline Hearing Process	Snohomish Co.	High Priority	\$5,000-\$15,000	
FC76	Facilitate Interagency Communication	Ecology, PSWQAT	Other		\$200
FC77	Provide Education on New Laws and Regulations to Public	PDS, SWM	High Priority	\$500	\$500
FC78	Highlight Enforcement Phone Numbers in Phone Book	PDS	High Priority		\$100
<i>for Ground Water Depletion and Contamination:</i>					
FC79	Protect Areas Vulnerable to Contamination	Snohomish Co., Monroe	High Priority	\$10,000	
FC80	Protect Recharge and Discharge Areas	Snohomish Co., Monroe	High Priority	\$15,000	
FC81	Monitor Ground Water Elevation	SWM	High Priority	\$10,000	\$3,000
FC82	Monitor Ground Water Quality	SWM	Other	\$5,000	\$1,000
FC83	Evaluate Emergency Spill Response Plan	Snohomish DEM, Ecology, Fire Dist.	Priority	\$10,000	
<i>for Fecal Coliform Bacteria and Nitrates from Onsite Septic System:</i>					
FC84	Work Groups Develop Proactive Approach to Manage Onsite Sewage Systems	SHD	High Priority	\$15,000	
FC85	Inspect and Pump Existing Onsite Sewage Systems	SHD	High Priority		\$2,000
FC86	Inspect New Onsite Sewage Systems	SHD	High Priority		\$3,000
FC87	Designate Areas Vulnerable to Contamination as Areas of Special Concern	SHD	High Priority	\$1,000	

French Creek Watershed Management Plan

ID No.	Management Recommendation	Implementing Entities (See abbreviations page 191)	Rank	One Time Cost	Ongoing Cost/yr
FC88	Develop Health District Assessment Fee	SHD	High Priority	\$10,000	
FC89	Send Onsite Sewage System Information to Owners	SHD	High Priority		\$1,000
FC90	Conduct Onsite Sewage System Operation and Maintenance Workshops	SHD	High Priority	\$2,000	\$5,000
FC91	Distribute Educational Video to New Homeowners	Watershed Realtors	High Priority		\$2,000
FC92	Provide Fact Sheets about Additives to Onsite Sewage System Owners	SHD	High Priority	\$1,500	\$500
FC93	Develop Program to Manage Revolving Loan Fund	SHD, SWM	High Priority	\$3,000	\$1,000
FC94	Monitor Streams with High Potential for Onsite Sewage System Problems	SWM	Other		\$5,000
for Pollution from Urban/Rural Stormwater and Direct Discharges:					
FC95	Treatment of Road Discharges to Improve Water Quality	SWM, WSDOT	Priority	\$10,000-\$50,000	
FC96	Improve Sediment Management at Rock Quarry	DNR	Priority		
FC97	Monitor Water Quality Sites	SWM	Priority		\$6,500
FC98	Locate Direct Discharges	SWM	Priority		\$1,500
FC99	Install "No Herbicide Spraying" Signs along Streams and Wetlands	Task Force	Priority		\$40-\$100
FC100	Conduct Landscaper Training and Education Program	WSU Cooperative Extension	High Priority	\$2,000	\$2,000
FC101	Develop Multimedia Education on Chemical Pollutants	SWM, SWMD, WSU Cooperative Extension	High Priority	\$4,000	\$2,000
FC102	Establish Educational Website on Water Quality	SWM, SWMD	High Priority	\$5,000	\$1,000
FC103	Develop Car Washing Incentive Program	SWM	Priority	\$5,000	\$1,000
FC104	Provide Technical Assistance to Businesses that Cause Pollution	SWM, SWMD, SHD, Monroe	High Priority		\$20,000
FC105	Create Business Partners for Clean Water Program	Snohomish Co., Monroe	High Priority	\$15,000	\$5,000
for Sediment from Ditch Maintenance:					
FC106	Set Maintenance Standards for Roadside Waterways	Snohomish Co., Monroe	High Priority	\$5,000	\$15,000
FC107	Classify and Establish Maintenance Criteria for Floodplain Waterways	French Slough Flood Control Dist.	High Priority	\$5,000	\$15,000
FC108	Investigate Culverts under the Old Snohomish Monroe Road	SWM, French Slough Flood Control District	Other	\$1,000	\$500
FC109	Install Stream Signs along Ditched Streams	Task Force, SWM	High Priority		\$40-\$100
FC110	Provide Dredging Services to Floodplain Landowners	French Slough Flood Control Dist.	Priority	\$1,000	\$10,000-\$50,000
FC111	Conduct Pilot Ditch Education Project	SWM	Other	\$5,000	
for Sediment and Other Problems from Forest Management:					
FC112	Adopt Forest Conversion Ordinance	Snohomish Co.	Priority	\$20,000	
FC113	Amend Forest Practice Rules to Include Runoff Reduction	DNR	High Priority	\$20,000	
FC114	Create "Special Watershed Area" Designation	Snohomish Co., DNR	Priority	\$10,000	
FC115	Adopt Stringent Requirements for Logging on Steep Slopes	DNR	High Priority	\$20,000	
FC116	Encourage Low Impact Logging	DNR	High Priority	\$2,000	
for Pathogens and Nutrients from Household Pet Waste:					
FC117	Adopt Pet Waste Ordinance	Snohomish Co., Monroe	Priority	\$6,000	\$500
FC118	Provide Pet Waste Receptacles	Snohomish Co. Parks, Monroe	High	\$3,000-	\$1,000

French Creek Watershed Management Plan

ID No.	Management Recommendation	Implementing Entities (See abbreviations page 191)	Rank	One Time Cost	Ongoing Cost/yr
			Priority	\$7,000	
FC119	Distribute Pet Waste Brochure	SWMD	Priority		\$500
for Illegal Dumping and Stream Garbage:					
FC120	Develop Long Term Strategy to Address Illegal Dumping	SHD, SWMD	High Priority	\$10,000	\$3,000-\$5,000
FC121	Adopt Mandatory Waste Pickup Regulations	Snohomish Co.	Priority	\$20,000	
FC122	Sponsor Community Cleanup Events	SWMD	High Priority		\$30,000
FC123	Increase Penalties for Illegal Dumping	SHD	High Priority	\$2,000	
FC124	Block Off Known Dump Sites	SHD, SWMD	Priority		\$5,000
FC125	Conduct Waste Reduction/Assessment Workshops for Businesses	SWMD	High Priority	\$2,000	\$10,000
FC126	Develop Residential Composting Demonstration Programs	SWMD	High Priority	\$4,000	\$20,000
FC127	Publish Waste Prevention Newsletters and Newspaper Articles	SWMD	High Priority		\$20,000
FC128	Monitor Hazardous Materials Storage Disposal at Industrial/Business Sites	SHD	Other		\$5,000
FC129	Hazardous Site Cleanup	Ecology, PDS	Other		\$5,000
FC130	Designate Household Hazardous Waste Education Week	Ecology, SWMD, SWM, SHD	Priority		\$10,000
FC131	Initiate Storm Drain Waste Reduction Program	SWM	Priority		\$3,000
FC132	Conduct Household Hazardous Waste Survey	SWM, SHD	High		\$2,000
FC133	Establish Household Hazardous Waste Web Site	SWMD	High Priority	\$5,000	\$1,000
FC134	Provide Battery Bags for Battery Recycling	SWMD	High Priority	\$5,000	\$2,000
FC135	Hazardous Waste Salvage Program	SWMD	Priority		\$5,000
for Drainage Problems:					
FC136	Increase Watershed Management Area Fees	Snohomish Co.	High Priority	\$15,000	
FC137	Study Beaver Dams on Meadow Lake	SWM	Priority	\$35,000	
FC138	Analyze Robinhood Lane Drainage System	Monroe	Priority	\$20,000-\$50,000	
FC139	Analyze Function of Bioswales	SWM, Ecology	High Priority	\$10,000-\$30,000	
FC140	Develop Stormwater Education/Training for Homeowners Associations	SWM	High Priority	\$5,000	\$5,000-\$10,000
FC141	Retrofit Stormwater Facilities	Snohomish Co., Monroe	High Priority	\$10,000-\$50,000	
FC142	127th Avenue SE Drainage Improvement	Snohomish Co., Monroe	Priority	\$50,000-150,000	
FC143	Golf Course Creek at Roosevelt Road Flooding and Erosion Problems	SWM, Road Maintenance	Other	\$50,000-\$80,000	
FC144	Replace the Ghost Horse Creek Culvert Under Meadow Lake Road	SWM	High Priority	\$50,000-75,000	
FC145	Erosion Problem at Stables Creek Culvert Under Westwick Road	SWM	Other	\$10,000-\$25,000	
FC146	French Creek at Trombley Road Seepage and Erosion Problem	SWM	Other	\$25,000-\$50,000	
FC146	French Creek at Trombley Road Seepage and Erosion Problem	SWM	Other	\$25,000-\$50,000	

Grants and State Loan Programs

Federal and state grant programs can be utilized to help fund implementation of selected watershed actions. State grant sources include the Centennial Clean Water Fund administered by the Department of Ecology and the Salmon Recovery Fund Board funding administered by the IAC. Centennial grants will fund up to 75 percent of the total costs of some water quality projects. Centennial grants require a minimum of a 25 percent match from local funds.

The State Revolving Loan Program, also administered by the Department of Ecology, could be used to help implement selected plan actions, as well.

Intergovernmental Cost Sharing

Implementation of the French Creek Watershed Management Plan will require cooperation between Snohomish County and the City of Monroe, both in terms of funding and responsibility. Snohomish County, Monroe, the Snohomish Health District and the Snohomish Conservation District should explore interlocal agreements as a way to help fund selected plan actions.

Summary of Funding Alternatives

The French Creek Watershed Management Committee recognizes that funding to implement this watershed plan is limited. The committee is willing to work at refining and prioritizing actions for the limited implementation funds available. A variety of alternatives should be explored to help fund plan implementation, including:

- Aggressively pursuing Centennial Grants, State Revolving Loans, and other funding programs to fund planning, design, and construction of water quality related facilities in the watershed.
- Seeking additional county general funds, grant funding, or interlocal agreements with the county and cities, Snohomish Health District and Snohomish Conservation District to fund activities in the watershed.
- Seeking private donations and volunteer assistance to implement selected actions.
- Raising WMA rates.
- Using existing statutory authority to obtain a permanent funding source for the Snohomish Conservation District and Snohomish Health District.
- Delaying implementation of some actions for an extended period of time.

Public Involvement Provision

Public involvement in implementing this plan will evolve through several processes. As ordinances are amended or proposed, public hearings will be held. The plan recommends many ongoing educational programs in the watershed. Annual meetings will be held (as discussed below) to assess plan progress and public input will be sought at that time.

Implementation Review and Evaluation

As the lead agency for overall coordination and implementation of the plan, SWM will work with all implementing agencies to evaluate the effectiveness of the proposed actions

in controlling nonpoint pollution, and water resource and flooding problems in the watershed. To assess the effectiveness of the plan, SWM will hold an annual plan evaluation meeting on implementation of the French Creek Watershed Management Plan. SWM will also continue to monitor water quality and habitat over the years to determine the success of plan implementation to help guide implementation and priorities. The purpose of the annual plan meeting will be twofold: for implementing agencies to present progress on plan implementation, and for the public and agencies to comment on ongoing and proposed implementation activities.

The annual evaluation meetings will provide a forum to encourage implementing agencies to continue work on the plan and to track its progress. The first plan evaluation meeting will be within one year after the Department of Ecology's final approval of the French Creek Watershed Management Plan.

Plan Revisions

Watershed plans such as the French Creek plan are meant to be adaptive as new information or methods to control nonpoint pollution and address water resource issues and flooding and drainage problems become available. There are three actions that can trigger revisions to the French Creek Watershed Management Plan. All efforts to revise the plan will incorporate public involvement and education.

SWM Division Five-Year Update. To accommodate changes over time, the French Creek Watershed Management Plan should be assessed for potential revision in five years from the date of approval by the Department of Ecology. At that time, a Watershed Management Committee will convene to revise the plan.

Annual Evaluation. If the annual evaluation meeting or annual report identifies a need to revise the plan, then SWM has the option to reconvene the WMC sooner than five years.

Department of Ecology Request. The Washington State Department of Ecology, upon review of the annual report, has the option to request that the plan be revised sooner than five years.

Implementation Sequence

Implementation of some actions has already begun, as the following examples show:

- A stream enhancement project by SWM and the Conservation District along Stables Creek is completed.
- SWM has replaced a fish blockage culvert at Simon Road.
- The Conservation District has conducted workshops for small farms.
- SWM is working with the French Slough Flood Control District to evaluate the option of constructing a tide gate to connect the Snohomish River with French Creek.
- The French Creek Watershed Management Committee has sent farmers letters describing practices that harm water quality and aquatic habitat, asking farmers to work with the Conservation District to address problems.
- SWM has put up signs at watershed boundaries and along streams.

The sequence of events for implementation of the plan will be as follows:

- The county will pursue adoption and implementation of the watershed plan.
- The county will pursue interlocal agreements with other jurisdictions on actions requiring cost sharing, financial support, or extensive technical support.
- The Snohomish Watershed Steward will monitor implementation of the plan.
- Jurisdictions will seek grant funding for as many source control actions as possible.
- Jurisdictions will incorporate capital improvements in the plan into their CIP programs.
- Jurisdictions will implement actions as funds become available, using priorities, realizing that funding may become available for lower priority actions before highest priority actions.
- SWM will annually review the implementation of the plan and encourage local jurisdictions to fund actions in the plan.
- A Watershed Management Committee will revise the plan after five years, or earlier if needed.

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ABBREVIATIONS & ACRONYMS

BNR	Burlington Northern Railroad
BMP	Best Management Practices
BPA	Bonneville Power Authority
CAR	Critical Areas Regulation
CIP	Capital Improvement Program
DEM	Snohomish County Department of Emergency Management
DNR	Washington State Department of Natural Resources
Ecology	Washington State Department of Ecology
GMA	Growth Management Act
HPA	Hydraulic Permit Approval
NPDES	Nonpoint Pollution Discharge Elimination System
PDS	Snohomish County Planning and Development Services
Pers. comm.	Personal communications
PSWQA	Puget Sound Water Quality Authority
PSWQAC	Puget Sound Water Quality Action Team
RCW	Revised Code of Washington
RM	River Mile
RMZ	Riparian Management Zone
SAO	Sensitive Areas Ordinance
SCC	Snohomish County Code
SCD	Snohomish Conservation District
SEPA	State Environmental Policy Act
SHD	Snohomish Health District
SWM	Snohomish County Public Works Surface Water Management Division
SWMD	Snohomish County Public Works Solid Waste Management Division
TAC	Technical Advisory Committee
USACE	U.S. Army Corps of Engineers
USFWS	U.S. Fish and Wildlife Service
USGS	U.S. Geological Survey
WAC	Washington Administrative Code
WDFW	Washington State Department of Fish and Wildlife
WIC	Watershed Implementation Committee
WMA	Watershed Management Area
WMC	Watershed Management Committee
WMZ	Wetland Management Zone
WRIA	Water Resource Inventory Area
WSDOT	Washington State Department of Transportation
WSU	Washington State University

Appendices



French Creek in the Floodplain

APPENDIX 1.

BENEFICIAL USES AFFECTED BY POLLUTION PROBLEMS IN THE FRENCH CREEK WATERSHED

Beneficial Uses Affected By Pollution Problems In The French Creek Watershed

Beneficial Uses Impaired - Agricultural Practices

The high bacteria levels documented in stream water could cause health problems such as gastrointestinal and upper respiratory disorders, rashes and hepatitis A for residents swimming and wading in streams. Nutrients from animal waste and fertilizer going directly to streams and wetlands affect the amount of dissolved oxygen available to fish and other aquatic organisms. Low dissolved oxygen levels and high temperatures act as barriers to fish passage in the floodplain. Streambank erosion from animals trampling the banks degrades fish habitat and affects salmon productivity.

Beneficial Uses Impaired - Sediment From Land Clearing, Grading and Ditch Maintenance

Sediment in streams obliterates riffle-pool sequences and simplifies bottom type reducing fish habitat values. Sediment reduces photosynthesis disrupting the food chain of aquatic life. Sediment covers and destroys fish spawning beds and suffocates small salmon that have not emerged from the beds and damages fish gills. Sediments in wetlands change the vegetation community and carry contaminants into the wetland system. Sediments deposited in the lower stream system causes floodplain flooding.

Beneficial Uses Impaired - Failing Septic Systems

Failed septic systems can result in drinking water and stream water contamination. Fecal coliform bacteria is an indicator of pathogens that can affect public health. Elevated nitrate levels in drinking water can cause blue baby syndrome in infants. Streams containing effluent from failed septic systems can be unhealthy for people swimming or wading causing rashes, gastrointestinal illness, upper respiratory infection and hepatitis A. High nutrient levels cause excessive vegetation growth in streams and reduce the amount of oxygen for fish.

Beneficial Uses Impaired - Urban/Rural Runoff

Runoff from roadways and parking lots adds metals, petroleum, and other pollutants to streams. The pollutants can negatively affect drinking water and are sometimes toxic to fish. Fertilizer use by nurseries, golf courses, landscaped areas, and residential lawns contributes nutrients to streams. Fungicides can be toxic to fish and aquatic organisms. Nutrients use dissolved oxygen and over fertilize stream plants affecting both fish and fish habitat. Some watershed streams are clogged with vegetation and algae. Pesticides and herbicides are used along state roadways. These chemicals can be toxic to aquatic organisms and affect the quality of the water supply.

All sources of discharge represent a potential pollution problem since runoff flowing through pipes or ditches bypasses vegetation and soil filtration and enters streams directly. By bypassing soil filtration, direct discharges increase the rate of runoff, volume of discharge, and concentration of pollutants entering streams. Livestock waste in ditches or piped water from barn areas introduces bacteria and viruses into streams and increases nutrients. High bacteria levels in streams make the water unsuitable for contact recreation. Nutrients affect plant growth and lower dissolved oxygen affects all

stream biota, including fish. Other pollutants from direct discharges into surface water include metals from roof drainage, detergents from household use, fertilizers and sediment from lot drainage, and petroleum and metals from driveways, parking lots, and roads--all of which can be harmful either directly or indirectly to fish.

Beneficial Uses Impaired - Forest Practices

Logging forest land causes changes in the watershed's hydrology, increasing peak stream flows and reducing low flows. However, timber management is a diminishing watershed activity, and most increases in peak flows will come from conversion of forestland to residential and commercial uses.

Sediments have adverse impacts on aquatic organisms, including salmon reproduction and growth. Dissolved oxygen levels are reduced when gravel spaces are filled in with fine sediment, affecting hatchability of salmon eggs. Sediments can entrap salmon alevins or fry. Suspended sediments and turbidity in stream water were found to reduce the ability of coho salmon fingerlings to capture prey. Turbidity reduces light penetration and productivity of algae and plants in a stream. Turbidity can also impair growth and damage the gill tissue of fish.

Herbicides and pesticides can adversely affect drinking water by leaching into ground water. Chemical breakdown products can be adsorbed by the soil and fine sediment particles becoming persistent in an area. Aerial spraying affecting riparian corridors can kill riparian vegetation and insects, reducing the food supply for aquatic animals.

Beneficial Uses Impaired - Pet Waste

Streams containing pet waste can be unhealthy for people swimming or wading. Pet waste contains pathogens that are harmful to people. Pet waste in streams also results in elevated nutrient levels. Nutrients cause excessive plant growth and decomposition of these plants uses oxygen needed by fish.

Beneficial Uses Impaired - Illegal Dumping And Garbage

Stream garbage and dump sites are sources for many types of pollutants. Organic material such as grass clippings and other yard and lawn debris add nutrients to the stream water. Excessive nutrients provided to instream plants cause excessive plant growth depriving fish and other aquatic organisms of oxygen needed to survive in the stream. Metal, battery acid, and other toxic substances leaching from dump sites can harm fish and make streams unsafe for recreation.

Beneficial Uses Impaired - Hazardous Materials

Toxic chemicals from hazardous materials leaching into ground water contaminate drinking and migrate to stream water. Hazardous materials entering the storm drain system contaminates stream water and can kill fish and other aquatic organisms and make stream water unsuitable for swimming and wading. Certain types of chemical reactions in stream water can deplete the water of oxygen. Toxic substances discharged to septic systems can cause system failure and surface and ground water contamination.

APPENDIX 2.

WASHINGTON DEPARTMENT OF FISH AND WILDLIFE'S RIPARIAN BUFFER MANAGEMENT RECOMMENDATIONS

Management Recommendations for Washington's Priority Habitats:

RIPARIAN

K. Lea Knutson and Virginia L. Naef

December 1997

Washington Department of Fish and Wildlife
600 Capitol Way N
Olympia, WA 98501-1091

Management Recommendations for Washington's Priority Habitats: Riparian

Executive Summary

By virtue of its high productivity, diversity, continuity, and critical contributions to both aquatic and upland ecosystems, riparian habitat provides a rich and vital resource to Washington's fish and wildlife. Riparian habitat occurs as an area adjacent to rivers, perennial or intermittent streams, seeps, and springs throughout Washington. Because it is generally a narrow band, riparian habitat covers a relatively small portion of the state. Riparian areas contain elements of both aquatic and terrestrial ecosystems which mutually influence each other and occur as transitions between aquatic and upland habitats.

Seventy-seven species of fish inhabit freshwater in Washington. Riparian habitat performs many functions that are essential to fish survival and productivity, and it is critical in supporting suitable instream conditions necessary for the recovery of imperiled native salmon stocks. Vegetation in riparian areas shades streams maintaining cool temperatures needed by most fish. Plant roots stabilize stream banks and control erosion and sedimentation, and vegetation creates overhanging cover for fish. Riparian habitat contributes leaves, twigs, and insects to streams, thereby providing basic food and nutrients that support fish and aquatic wildlife. Large trees that fall into streams create pools, riffles, backwater, small dams, and off-channel habitat that are necessary to fish for cover, spawning, rearing, and protection from predators. Pools help maintain riffles where gravel essential for spawning accumulates. Riparian vegetation, litter layers, and soils filter incoming sediments and pollutants thereby assisting in the maintenance of high water quality needed for healthy fish populations. Riparian habitat moderates stream volumes by reducing peak flows during flooding periods and by storing and slowly releasing water into streams during low flows.

Approximately 85% of Washington's terrestrial vertebrate species use riparian habitat for essential life activities and the density of wildlife in riparian areas is comparatively high. Forested riparian habitat has an abundance of snags that are critical to cavity-nesting birds and mammals and to many insectivorous birds. Downed logs are common and provide cover and resting habitat for amphibians, reptiles, and small mammals. Intact riparian habitat has well-developed vegetation, usually with multiple canopy layers. Each layer consists of unique habitat niches that together support a diversity of bird and mammal species. The relatively mild microclimate of riparian areas offers relief from hot, dry summers and cold, snowy winters which is especially important to deer, elk, and moose. Riparian habitat forms natural corridors that are important travel routes between foraging areas, breeding areas, and seasonal ranges, and provides protected dispersal routes for young. Protected access to water is also an essential attribute of intact riparian habitat.

Riparian habitat is limited geographically, however, and is vulnerable to loss and degradation through human activities and land uses. Since the arrival of settlers in the early 1800s, at least 50% and as much as 90% of riparian habitat in Washington has been lost or extensively modified. Protecting riparian habitat may yield the greatest gains for fish and wildlife across the landscape while involving the least amount of area.

The Washington Department of Fish and Wildlife (WDFW) has developed statewide riparian management recommendations based on the best available science. Nearly 1,500 pieces of literature on the importance of riparian areas to fish and wildlife were evaluated, and land use recommendations designed to accommodate riparian-associated fish and wildlife were

developed. These recommendations consolidate existing scientific literature and provide information on the relationship of riparian habitat to fish and wildlife and to adjacent aquatic and upland ecosystems. These recommendations have been subject to numerous review processes.

Recommendations on major land use activities commonly conducted within or adjacent to riparian areas are provided, including those relative to agriculture, chemical treatments, grazing, watershed management, roads, stream crossings and utilities, recreational use, forest practices, urbanization, comprehensive planning, restoration, and enhancement. Management recommendations for riparian areas are generalized for predictable application across the Washington landscape and include the following standard riparian habitat area (RHA) widths.

Standard recommended Riparian Habitat Area (RHA) widths for areas with typed and non-typed streams. If the 100-year floodplain exceeds these widths, the RHA width should extend to the outer edge of the 100-year floodplain.

Stream Type	Recommended RHA widths in meters (feet)
Type 1 and 2 streams; or Shorelines of the State, Shorelines of Statewide Significance	76 (250)
Type 3 streams; or other perennial or fish bearing streams 1.5-6.1 m (5-20 ft) wide	61 (200)
Type 3 streams; or other perennial or fish bearing streams <1.5 m (5 ft) wide	46 (150)
Type 4 and 5 streams; or intermittent streams and washes with low mass wasting* potential	46 (150)
Type 4 and 5 streams; or intermittent streams and washes with high mass wasting* potential	69 (225)
*Mass wasting is a general term for a variety of processes by which large masses of rock or earth material are moved downslope by gravity, either slowly or quickly.	

Management recommendations for riparian habitat are developed to meet the goal of maintaining or enhancing the structural and functional integrity of riparian habitat and associated aquatic systems needed to perpetually support fish and wildlife populations on both site and landscape levels. Riparian habitat characteristics required by fish and wildlife include habitat connectivity; vegetation diversity in terms of age, plant species composition, and vegetation layers; vegetation vigor; abundance of snags and woody debris; unimpeded occurrences of natural disturbances and minimization of human-induced disturbances; an irregular shape; and a width that is adequate to retain riparian habitat functions. Although generalized for use across the landscape, these same characteristics can serve as performance guidelines if alternative site-specific management activities are pursued. Ideally, planning for riparian areas should be done from the perspective of an entire watershed.

It is expected that these management recommendations will contribute to the scientific component of planning, protection, and restoration efforts for fish and wildlife. These efforts include the Growth Management Act; habitat conservation plans (e.g., the Department of Natural Resources Habitat Conservation Plan); the WDFW Hydraulic Code; the Puget Sound

Action Plan; the Timber, Fish, and Wildlife Agreement; individual landowner farm and forest plans; and restoration projects conducted through the Jobs for the Environment Program, Regional Fisheries Enhancement Groups, State Conservation Commission, For the Sake of the Salmon, and other efforts. Habitat requirements for salmon recovery outlined in WDFW's Wild Salmonid Policy were derived, in part, from these management recommendations. These recommendations may provide a basis for WDFW participation in other planning processes that address riparian management strategies; however, WDFW will defer to negotiated agreements (e.g., the TFW Forestry Module) regarding riparian management that may result from our participation in those planning processes.

To view the entire document go to <http://wdfw.wa.gov/hab/phsrecs.htm>

APPENDIX 3.

GUIDELINES FOR DETERMINING FISH USE FOR THE PURPOSE OF
TYPING WATERS FOREST PRACTICES BOARD MANUAL SECTION 13 AND
INTERIM WATER TYPING SYSTEM, WAC 222-16-31

Forest Practices Board Manual Section 13

Guidelines for Determining Fish Use for the Purpose of Typing Waters

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Until the fish habitat water typing maps are available, as per **WAC 222-16-030**, the following methods are for use with implementing the interim water typing system (**WAC 222-16-031(3) Type 3 Water**) in the forest practices rules.

PART 1. INTRODUCTION

The rules allow for the opportunity to determine fish use for water typing (**WAC 222-16-031(3)**). The purpose of this section of the Forest Practices Board Manual (manual) is to provide guidelines for making this determination. A uniform stream survey protocol is provided so data may be collected such that affected landowners and other interested parties can provide information necessary to refute the presumption of fish presence (Type 3 Water) or the presumption of fish absence (Type 4 or 5 Water).

Relating to fish use, Type 3 Waters are segments of natural waters that have fish use. At present, a number of fish use waters are not identified on water classification maps or have been misclassified as non-fish use (Type 4 or 5 Water). Likewise, a number of non-fish use waters may be misclassified as having fish use based on physical criteria.

These guidelines are intended to be used only in the following conditions:

1. Verification that DNR mapped breaks between Type 3 Waters and non-fish use waters (Type 4 or 5 Waters) are accurate;
2. Determination whether an unmapped water should be treated as a Type 3 Water, or non-fish use water (Type 4 or 5 Water);

3. Determination that a mapped Type 3 Water can be changed to a non-fish use water (Type 4 or 5 Water);
4. Determination that a mapped non-fish use water (Type 4 or 5 Water) can be changed to a Type 3 Water.

These guidelines cannot be used to determine the break between a Type 4 and 5 Water (see **WAC 222-16-031 (4) and (5)**), or for use on changing the designation of Type 1 or 2 Waters. Data collected using this manual may not be suitable for building or validating the water type model described in **WAC 222-16-030**.

PART 2. CONSIDERATIONS REQUIRED FOR WATER TYPE CHANGE PROPOSALS

Stream Features

The electroshocking protocol in this manual was developed primarily for small width streams (generally streams less than 5 feet bankfull width). Beginning in 2002, landowners who wish to survey for fish in streams larger than 5 feet bankfull width are required to consult with Washington Department of Fish and Wildlife (WDFW) area habitat biologists (as per requirements of WDFW's Scientific Collection Permit) and affected tribes prior to the survey effort. The purpose of the consultation is to preview survey plans with those who will be asked to review the results and cooperatively determine if there are parts of the plans that should be modified to improve the quality of the surveys.

Ponds, spring sources and wetlands are often examples of important non-channel fish habitats that when located in the upper reaches of small streams can provide refuge and rearing areas for anadromous and resident fish populations. Surveyors should attempt to locate such stream features and potential habitats in pre-field reconnaissance of aerial or ortho-photos and local knowledge and insure that these habitats are sampled for fish presence. The presence of fish species at these locations, or in other upstream reaches, is indicative of downstream fish use. Determining fish use in water bodies such as ponds and wetlands can be difficult. Landowners should consult with WDFW area habitat biologists for survey techniques.

Drought Conditions and Other Factors Affecting Population Distribution

Many factors can influence the extent and distribution of fish species in the watershed. Depressed stocks will fail to fill all the available habitat niches. Likewise, drought or flood years may alter how species occupy the habitat or fish access into the habitat. Fish populations may be locally or temporarily extirpated from stream channels due to mass wasting and downstream scouring that can require years before even partial recovery begins. Fish use surveyors must document how such factors if present affect fish distribution in the stream system.

By February 1st of each year, the Washington Department of Natural Resources (DNR), in consultation with the WDFW, will release information forecasting statewide water abundance for the coming fish survey season. This information will be provided to landowners and interested parties who may be conducting fish surveys to allow for appropriate attention to potential drought conditions. If drought conditions exist within the state during the fish survey season, then proponents of a water type change will be required to provide information demonstrating how stream flows and fish use determinations were unaffected by drought conditions. If such information is not provided, or not deemed adequate during the review process, then the proposed water type change will be rejected.

Scientific Collection Permits

Prior to conducting any surveys that may incidentally harm fish, e.g. electroshocking, WDFW regulations require that the landowner or surveyor obtain a current Scientific Collection Permit for stream surveys from WDFW. In addition, an appropriate federal permit is necessary for electrofishing in waters

containing bull trout. Resource managers of affected tribes (within their usual and accustomed areas) are not required to apply for a Scientific Collection Permit.

Blockages to Fish Passage

The Forest Practices Rules allow for a stream survey protocol to determine fish use. However, determinations of fish absence using this protocol generally can be applied only to streams where human-made fish blockages, such as impassable culverts, do not exist below the proposed survey reach. The process used to determine absence or presence of blockages to fish passage must be documented. Above human-made fish blockages, physical criteria are used to determine the presumption of fish use unless otherwise approved by the DNR in consultation with the WDFW, Washington Department of Ecology (DOE) and affected tribes.

Natural barriers consisting of waterfalls greater than twelve feet in vertical height or long, steep cascades without fish resting areas generally block upstream migration of anadromous fish. Such features and other potential natural barriers, e.g. beaver dams, present likely sites from which to begin fish use surveys. Resident fish frequently exist upstream of such blockages so the mere presence of a natural barrier is not proof of fish absence.

PART 3. SURVEY TIMING

Survey information collected to determine fish use or the maximum upstream extent of habitat utilization must be collected during the time window when the fish species in question are likely to be present. The spring period through early summer at which time fry are emerged from the gravels and distributing to rearing areas is the most appropriate time. In most cases, this period extends from March 1st to July 15th when water is most likely to be present in the channel. Due to the complexities in anticipating when fish will be seasonally active, survey timing should be determined in consultation with WDFW and affected tribes prior to conducting a survey.

PART 4. SURVEY EFFORT

There are many visual methods such as walking the stream bank and visually observing fish, snorkeling, feeding, and hook and line sampling to show presence at a particular site along a stream segment. Projecting the extent of fish utilization upstream based on observed stream habitat parameters may be as dependent on professional judgment as on measurable physical criteria. Providing evidence that strongly suggests the absence of fish use requires a different methodology than visual observation. The absence of fish use must be supported by stream survey information collected using a backpack electroshocker to electrofish the stream segment in question. Electroshocking stream survey information may only be collected by qualified or trained staff (see **Part 5. Qualified and Trained Staff**) of state or tribal entities, landowners, consultants or conservation organizations. Injury or mortality to fish can occur from electroshocking and it should be used minimally for this effort.

In special circumstances such as in critical stream reaches of threatened and endangered species such as bull trout and other severely depressed populations, WDFW may reject Scientific Collection Permits for electroshocking in those streams. In such cases WDFW, landowners and tribal representatives will recommend and approve alternate methods of collecting data for determining fish use. Snorkeling or trapping may be two such examples.

If fish use is not detected using this manual, then survey data submitted must confirm that the survey effort included electroshocking a minimum of 12 of the reaches highest quality pools, three square feet in surface area and one foot residual pool depth or larger. Documentation of stream characteristics is

required where the minimum number of pools do not exist in the stream segment. The survey effort shall also cover at least 1/4 mile of stream length upstream from the point of last known fish use unless the stream gradient increases and remains above the 20% gradient threshold and fish are not being found by the survey.

The survey effort for forest practice application specific efforts begins at the down stream end of the unit and continues upstream for the length of the proposed forest practice unit or 1/4 mile, which ever is the greater, to include at least the minimum shocking effort of 12 pools as described above. If the survey begins somewhere above the point of last known fish use or on a unmapped/untyped stream, then the waters below the survey effort down stream to the point of last known fish use will be typed by physical characteristics (see **WAC 222-16-031(3)(b)(i)**).

Waters downstream of a known fish location are assumed to have fish use, therefore, determinations of fish absence are not applicable in these cases. For safety reasons and effectiveness in detecting fish, two person crews, one of which is a down stream netter, should be used for surveying most streams.

PART 5. QUALIFIED AND TRAINED STAFF

“Qualified” staff means persons with at least a Bachelor of Science degree in a natural resource field with at least 12 credit hours in fish science course work and hands-on experience with backpack electroshockers and electrofishing. “Trained” staff means any personnel working under the direction or supervision of “qualified” staff who have also attended the survey training previously offered by Timber, Fish & Wildlife (TFW) cooperators.

PART 6. ALTERNATIVES FOR MAKING FISH USE DETERMINATIONS

Where field surveys for determining fish use have not been done, water type is determined by applying the physical characteristics contained in **WAC 222-16-031(3)**. The DNR, in consultation with the WDFW, DOE, and affected Indian tribes may waive or modify these characteristics where evidence provides relative certainty that such waters do not support fish life. A list of such examples includes but may not be limited to:

1. Streams that have previously been surveyed and typing verified by projects sponsored or conducted by landowner, state, tribal and conservation groups. Project sponsors can define and map areas where water type confirmation has been substantially completed.
2. Waters with confirmed, long term, naturally occurring water quality parameters incapable of supporting fish life.
3. Snow melt/ice melt streams that have short flow cycles and are characteristic of east side sites. These streams typically have no flow in winter months and discontinue flow by June 1st.
4. Sufficient information about a geographic region or ownership is available to support a departure from the characteristics as determined by the DNR in consultation with the WDFW, DOE, and affected Indian tribes.

WAC 222-16-031 Interim water typing system.

Until the fish habitat water type maps mentioned above are available, waters will be classified according to the interim water typing system described below. If a dispute arises concerning a water type, the department shall make available informal conferences, which shall include the departments of fish and wildlife, ecology, and affected Indian tribes and those contesting the adopted water types. These conferences shall be established under procedures established in WAC 222-46-020.

For the purposes of this interim water typing system see the following table:

16-20 Definitions – 7/2001 Chapter 222-16

- *(1) “Type 1 Water” means all waters, within their ordinary high-water mark, as inventoried as “shorelines of the state” under chapter 90.58 RCW and the rules promulgated pursuant to chapter 90.58 RCW, but not including those waters’ associated wetlands as defined in chapter 90.58 RCW.
- *(2) “Type 2 Water” means segments of natural waters which are not classified as Type 1 Water and have a high fish, wildlife, or human use. These are segments of natural waters and periodically inundated areas of their associated wetlands, which:
 - (a) Are diverted for domestic use by more than 100 residential or camping units or by a public accommodation facility licensed to serve more than 10 persons, where such diversion is determined by the department to be a valid appropriation of water and only considered Type 2 Water upstream from the point of such diversion for 1,500 feet or until the drainage area is reduced by 50 percent, whichever is less;
 - (b) Are diverted for use by federal, state, tribal or private fish hatcheries. Such waters shall be considered Type 2 Water upstream from the point of diversion for 1,500 feet, including tributaries if highly significant for protection of downstream water quality. The department may allow additional harvest beyond the requirements of Type 2 Water designation provided by the department of fish and wildlife, department of ecology, the affected tribes and interested parties that:
 - (i) The management practices proposed by the landowner will adequately protect water quality for the fish hatchery; and
 - (ii) Such additional harvest meets the requirements of the water type designation that would apply in the absence of the hatchery;
 - (c) Are within a federal, state, local or private campground having more than 30 camping units: Provided, That the water shall not be considered to enter a campground until it reaches the boundary of the park lands available for public use and comes within 100 feet of a camping unit.
 - (d) Are used by fish for spawning, rearing or migration. Waters having the following characteristics are presumed to have highly significant fish populations:
 - (i) Stream segments having a defined channel 20 feet or greater within the bankfull width and having a gradient of less than 4 percent.
 - (ii) Lakes, ponds, or impoundments having a surface area of 1 acre or greater at seasonal low water; or
 - (e) Are used by fish for off-channel habitat. These areas are critical to the maintenance of optimum survival of fish. This habitat shall be identified based on the following criteria:
 - (i) The site must be connected to a fish bearing stream and be accessible during some period of the year; and

(ii) The off-channel water must be accessible to fish through a drainage with less than a 5% gradient.

- * (3) “Type 3 Water” means segments of natural waters which are not classified as Type 1 or 2 Waters and have a moderate to slight fish, wildlife, and human use. These are segments of natural waters and periodically inundated areas of their associated wetlands which:
- (a) Are diverted for domestic use by more than 10 residential or camping units or by a public accommodation facility licensed to serve more than 10 persons, where such diversion is determined by the department to be a valid appropriation of water and the only practical water source for such users. Such waters shall be considered to be Type 3 Water upstream from the point of such diversion for 1,500 feet or until the drainage area is reduced by 50 percent, whichever is less;
 - (b) Are used by fish for spawning, rearing or migration. The requirements for determining fish use are described in the board manual section 13. If fish use has not been determined:
 - (i) Waters having the following characteristics are presumed to have fish use:
 - (A) Stream segments having a defined channel of 2 feet or greater within the bankfull width in Western Washington; or 3 feet or greater in width in Eastern Washington; and having a gradient of 16 percent or less.
 - (B) Stream segments having a defined channel or 2 feet or greater within the bankfull width in Western Washington; or 3 feet or greater within the bankfull width in Eastern Washington, and having a gradient greater than 16 percent and less than or equal to 20 percent, and having greater than 50 acres in contributing basin size in Western Washington or greater than 175 acres contributing basin size in Eastern Washington, based on hydrographic boundaries;
 - (C) Ponds or impoundments having a surface area of less than 1 acre at seasonal low water and having an outlet to a fish stream;
 - (D) Ponds of impoundments having a surface area greater than 0.5 acre at seasonal low water.
 - (ii) The department shall waive or modify the characteristics in (i) of this subsection where:
 - (A) Waters have confirmed, long term, naturally occurring water quality parameters incapable of supporting fish;
 - (B) Snowmelt streams have short flow cycles that do not support successful life history phases of fish. These streams typically have no flow in the winter months and discontinue flow by June 1; or
 - (C) Sufficient information about a geomorphic region is available to support a departure from the characteristics in (i) of this subsection, as determined in consultation with the department of fish and wildlife, department of ecology, affected tribes and interested parties.
- * (4) “Type 4 Water” means all segments of natural waters within the bankfull width of defined channels that are perennial nonfish habitat streams. Perennial streams are waters that do not go dry any time of a year of normal rainfall. However, for the purpose of water

typing, Type 4 Waters include the intermittent dry portions of the perennial channel below the uppermost point of perennial flow. If the uppermost point of perennial flow cannot be identified with simple, nontechnical observations (see board manual, section 23), then Type 4 Waters begin at a point along the channel where the contributing basin area is:

- (a) At least 13 acres in the Western Washington coastal zone (which corresponds to the Sitka spruce zone defined in Franklin and Dyrness, 1973);
- (b) At least 52 acres in other locations in Western Washington;
- (c) At least 300 acres in Eastern Washington.

*(5) “Type 5 Waters” means all segments of natural waters within the bankfull width of the defined channels that are not Type 1, 2, 3, or 4 Waters. These are seasonal, nonfish habitat streams in which surface flow is not present for at least some portion of the year and are not located downstream from any stream reach that is a Type 4 Water. Type 5 Waters must be physically connected by an above-ground channel system to Type 1, 2, 3, or 4 Waters.

*(6) For purposes of this section:

- (a) “Residential unit” means a home, apartment, residential condominium unit or mobile home, serving as the principal place of residence.
- (b) “Camping unit” means an area intended and used for:
 - (i) Overnight camping or picnicking by the public containing at least a fireplace, picnic table and access to water and sanitary facilities; or
 - (ii) A permanent home or condominium unit or mobile home not qualifying as a “residential unit” because of part time occupancy.
- (c) “Public accommodation facility” means a business establishment open to and licensed to serve the public, such as a restaurant, tavern, motel or hotel.
- (d) “Natural waters” only excludes water conveyance systems which are artificially constructed and actively maintained for irrigation.
- (e) “Seasonal low flow” and “seasonal low water” mean the conditions of the 7-day, 2-year low water situation, as measured or estimated by accepted hydrologic techniques recognized by the department.
- (f) “Channel width and gradient” means a measurement over a representative section of at least 500 linear feet with at least 10 evenly spaced measurement points along the normal stream channel but excluding unusually wide areas of negligible gradient such as marshy or swampy areas, beaver ponds and impoundments. Channel gradient may be determined utilizing stream profiles plotted from United States geological survey topographic maps. (See board manual section 23.)

APPENDIX 4.

ECOLOGY'S MODEL WETLAND PROTECTION ORDINANCE

Note: While this Model Ordinance is out of date, the WMC has recommended including the document's Standards as part of the plan. A new model ordinance which includes best available science is being prepared.

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Section 7: Standards for Permit Decisions

- a. A permit shall only be granted if the permit, as conditioned, is consistent with the provisions of this chapter. Additionally, permits shall only be granted if:
 - 1) A proposed action avoids adverse impacts to regulated wetlands or their buffers or takes affirmative and appropriate measures to minimize and compensate for unavoidable impacts;
 - 2) The proposed activity results in no net loss; or
 - 3) Denial of a permit would cause an extraordinary hardship on the applicant.
- b. Wetlands permits shall not be effective and no activity thereunder shall be allowed during the time provided to file a permit appeal.

7.1 Wetland Buffers

- a. Standard Buffer Zone Widths
Wetland buffer zones shall be required for all regulated activities adjacent to regulated wetlands. Any wetland created, restored or enhanced as compensation for approved wetland alterations shall also include the standard buffer required for the category of the created, restored, or enhanced wetland. All buffers shall be measured from the wetland boundary as surveyed in the field pursuant to the requirements of Section 2. The width of the wetland buffer zone shall be determined according to wetland category and the proposed land use.
 - 1) Category I
 - High intensity 300 feet
 - Low intensity 200 feet
 - 2) Category II
 - High intensity 200 feet
 - Low intensity 100 feet
 - 3) Category III
 - High intensity 100 feet
 - Low intensity 50 feet
 - 4) Category IV
 - High intensity 50 feet
 - Low intensity 25 feet

(NOTE: These buffer ranges have been established to reflect the impact of intense and uses on wetland functions and values. If local jurisdictions choose to adopt a single standard buffer width from within these ranges additional criteria should be added which will result in a reduction or increase in the standard based on landuse intensity and its impact on existing habitat values.)

b. Increased Wetland Buffers Zone Width

The [Approval Authority] shall require increased standard buffer zone widths on a case-by-case basis when a larger buffer is necessary to protect wetlands functions and values based on local conditions. This determination shall be supported by appropriate documentation showing that it is reasonably related to protection of the functions and values of the regulated wetland. Such determination shall be attached as a permit condition and shall demonstrate that:

- 1) a larger buffer is necessary to maintain viable populations of existing species; or
- 2) the wetland is used by species proposed or listed by the federal government or the state as endangered, threatened, rare, sensitive or monitor, critical or outstanding potential habitat for those species or has unusual nesting or resting sites such as heron rookeries or raptor nesting trees; or
- 3) the adjacent land is susceptible to severe erosion and erosion control measures will not effectively prevent adverse wetland impacts; or
- 4) the adjacent land has minimal vegetative cover or slopes greater than 15 percent.

c. Reduction of Standard Wetland Buffer Zone Width

The [Approval Authority] may reduce the standard wetland buffer zone widths on a case-by-case basis where it can be demonstrated that:

- 1) the adjacent land is extensively vegetated and has less than 15 percent slopes and that no direct or indirect, short-term or long-term, adverse impacts to regulated wetlands, as determined by the [Approval Authority], will result from a regulated activity. The [Approval Authority] may require long-term monitoring of the project and subsequent corrective actions if adverse impacts to regulated wetlands are discovered; or
- 2) the project includes a buffer enhancement plan using native vegetation which substantiates that an enhanced buffer will improve the functional attributes of the buffer to provide additional protection for wetlands functions and values. An enhanced buffer shall not result in greater than a 25 percent reduction in the buffer width, and the reduced buffer shall not be less than 25 feet.

d. Standard Wetland Buffer Width Averaging

Standard wetland buffer zones may be modified by averaging buffer widths. Wetland buffer width averaging shall be allowed only where the applicant demonstrates all of the following:

- 1) that averaging is necessary to avoid an extraordinary hardship to the applicant caused by circumstances peculiar to the property;
- 2) that the wetland contains variations in sensitivity due to existing physical characteristics;
- 3) that low intensity land uses would be located adjacent to

areas where buffer width is reduced, and that such low intensity land uses are guaranteed in perpetuity by covenant, deed restriction, easement, or other legally binding mechanism;

4) that width averaging will not adversely impact the wetland functional values; and

5) that the total area contained within the wetland buffer after averaging is no less than that contained within the standard buffer prior to averaging. In no instance shall the buffer width be reduced by more than 50% of the standard buffer or be less than 25 feet.

- e. Except as otherwise specified, wetland buffer zones shall be retained in their natural condition. Where buffer disturbance has occurred during construction, revegetation with native vegetation may be required.
- f. Permitted Uses in a Wetland Buffer Zone
Regulated activities shall not be allowed in a buffer zone except for the following:
 - 1) activities having minimal adverse impacts on buffers and no adverse impacts on regulated wetlands. These may include low intensity, passive recreational activities such as pervious trails, nonpermanent wildlife watching blinds, short term scientific or educational activities, and sports fishing or hunting;
 - 2) with respect to category III and IV wetlands, stormwater management facilities having no reasonable alternative on-site location; or
 - 3) with respect to category III and IV wetlands, development having no feasible alternative location.
- g. Building Setback Lines.
A building setback line of 15 feet is required from the edge of any wetland buffer. Minor structural intrusions into the area of the building setback may be allowed if the [Approval Authority] determines that such intrusions will not negatively impact the wetland. The setback shall be identified on a site plan which is filed as an attachment to the notice on title required by section 6.2.f.

7.2 Avoiding Wetland Impacts

- a. Regulated activities shall not be authorized in a regulated wetland except where it can be demonstrated that the impact is both unavoidable and necessary or that all reasonable economic uses are denied.
- b. With respect to category I wetlands, an applicant must demonstrate that denial of the permit would impose an extraordinary hardship on the part of the applicant brought about by circumstances peculiar to the subject property.

- c. With respect to category II and III wetlands, the following provisions shall apply:
 - 1) For water-dependent activities, unavoidable and necessary impacts can be demonstrated where there are no practicable alternatives which would not involve a wetland or which would not have less adverse impact on a wetland, and would not have other significant adverse environmental consequences.
 - 2) Where nonwater-dependent activities are proposed, it shall be presumed that adverse impacts are avoidable. This presumption may be rebutted upon a demonstration that:
 - A. the basic project purpose cannot reasonably be accomplished utilizing one or more other sites in the general region that would avoid, or result in less, adverse impact on a regulated wetland; and
 - B. a reduction in the size, scope, configuration, or density of the project as proposed and all alternative designs of the project as proposed that would avoid, or result in less, adverse impact on a regulated wetland or its buffer will not accomplish the basic purpose of the project; and
 - C. in cases where the applicant has rejected alternatives to the project as proposed due to constraints such as zoning, deficiencies of infrastructure, or parcel size, the applicant has made reasonable attempt to remove or accommodate such constraints.
- d. With respect to category IV wetlands, unavoidable and necessary impacts can be demonstrated where the proposed activity is the only reasonable alternative which will accomplish the applicant's objectives.
- e. Reasonable Use

If an applicant for a development proposal demonstrates to the satisfaction of the [Approval Authority] that application of these standards would deny all reasonable economic use of the property, development as conditioned shall be allowed if the applicant also demonstrates all of the following to the satisfaction of the [Approval Authority]:

 - i. that the proposed project is water-dependent or requires access to the wetland as a central element of its basic function, or is not water-dependent but has no practicable alternative pursuant to Section 7.2;
 - ii. that no reasonable use with less impact on the wetland and its buffer is possible (e.g., agriculture, aquaculture, transfer or sale of development rights or credits, sale of open space easements, etc.);
 - iii. that there is no feasible on-site alternative to the proposed activities, including reduction in density, phasing of project implementation, change in timing of

activities, revision of road and lot layout, and/or related site planning considerations, that would allow a reasonable economic use with less adverse impacts to wetlands and wetland buffers;

iv. that the proposed activities will result in minimum feasible alteration or impairment to the wetland's functional characteristics and its existing contours, vegetation, fish and wildlife resources, and hydrological conditions;

v. that disturbance of wetlands has been minimized by locating any necessary alteration in wetland buffers to the extent possible;

vi. that the proposed activities will not jeopardize the continued existence of endangered, threatened, rare, sensitive, or monitor species as listed by the federal government or the State of Washington;

vii. that the proposed activities will not cause significant degradation of groundwater or surface-water quality;

viii. that the proposed activities comply with all state, local and federal laws, including those related to sediment control, pollution control, floodplain restrictions, and on-site wastewater disposal;

ix. that any and all alterations to wetlands and wetland buffers will be mitigated as provided in Section 7.5.g.

x. that there will be no damage to nearby public or private property and no threat to the health or safety of people on or off the property; and

xi. that the inability to derive reasonable economic use of the property is not the result of actions by the applicant in segregating or dividing the property and creating the undevelopable condition after the effective date of this chapter.

If the [Approval Authority] determines that alteration of a wetland and/or wetland buffer is necessary and unavoidable, the [Approval Authority] shall set forth in writing in the file it maintains regarding a permit application its findings with respect to each of the items listed in this subsection.

4) With respect to category IV wetlands, unavoidable and necessary impacts can be demonstrated where the proposed activity is the only reasonable alternative which will accomplish the applicant's objectives.

7.3 Minimizing Wetlands Impacts

- a. After it has been determined by the [Approval Authority] pursuant to Section 7.2 that losses of wetland are necessary and unavoidable or that all reasonable economic use has been denied, the applicant shall take deliberate measures to minimize wetland impacts.
- b. Minimizing impacts to wetlands shall include but is not limited to:
 - 1) limiting the degree or magnitude of the regulated activity;
 - 2) limiting the implementation of the regulated activity;
 - 3) using appropriate and best available technology;
 - 4) taking affirmative steps to avoid or reduce impacts;
 - 5) sensitive site design and siting of facilities and construction staging areas away from regulated wetlands and their buffers;
 - 6) involving resource agencies early in site planning; and
 - 7) providing protective measures such as siltation curtains, hay bales and other siltation prevention measures, scheduling the regulated activity to avoid interference with wildlife and fisheries rearing, resting, nesting or spawning activities.

7.4 Limited Density Transfer

For development proposals on lands containing wetland buffers, the [Approval Authority] shall determine allowable dwelling units for residential development proposals based on the formulas below.

The following formula for density calculations is designed to provide incentives for the preservation of wetlands and wetland buffers, flexibility in design, and consistent treatment of different types of development proposals. The formula shall apply to all properties within existing residential zones on which wetlands and wetland buffers are located.

The maximum number of dwelling units (DU) for a lot or parcel which contains wetlands and wetland buffers shall be equal to:
 $(\text{Acres in Wetland Buffer}) (\text{DU/Acre}) (\text{Density Credit})$

The density credit figure is derived from the following table:

<u>Percentage of site in buffers</u>	<u>Density Credit</u>
1-10%	100%
11-20%	90%
21-30%	80%
31-40%	70%
41-50%	60%
51-60%	50%
61-70%	40%

71-80%	30%
81-90%	20%
91-99%	10%

The density credit can only be transferred within the development proposal site. To the extent that application of the formula may result in lot sizes less than the minimum allowed by the underlying district, they are hereby authorized provided that the resultant lot is of sufficient size for a on-site waste disposal system if no sanitary sewer system exists.

The [Approval Authority] shall not allow credit for density for the portions of the site occupied by wetlands.

7.5 Acting on the Application

a. Special Use Permit Conditions

1) Sensitive Area Tracts

As a condition of any permit issued pursuant to this chapter, the permit holder shall be required to create a separate sensitive area tract or tracts containing the areas determined to be wetland and/or wetland buffer in field investigations performed pursuant to Section 4.3 Sensitive area tracts are legally created tracts containing wetlands and their buffers that shall remain undeveloped in perpetuity. Sensitive area tracts are an integral part of the lot in which they are created, are not intended for sale, lease or transfer, and shall be included if the area of the parent lot for purposes of subdivision method and minimum lot size.

A. Protection of Sensitive Area Tracts

The [Approval Authority] shall require, as a condition of any permit issued pursuant to this chapter, that the sensitive area tract or tracts created pursuant to Section 7.5.a be protected by one of the following methods:

- i. The permit holder shall convey an irrevocable offer to dedicate to the [local unit of government] or other public or non-profit entity specified by the [Approval Authority] an easement for the protection of native vegetation within a wetland and/or its buffer or
- ii. The permit holder shall establish and record a permanent and irrevocable deed restriction on the property title of all lots containing a sensitive area tract or tracts created as a condition of this permit. such deed restriction(s) shall prohibit in Perpetuity the development, alteration, or disturbance of vegetation within the sensitive area tract except for purposes of habitat enhancement as part of an enhancement project which has received prior written

approval from [local unit of government], and any other agency with jurisdiction over such activity.

(NOTE: The following is is suggested language)

2) The deed restriction shall also contain the following language:

- A. "Before beginning and during the course of any grading, building construction, or other development activity on a lot or development site subject to this deed restriction, the common boundary between the area subject to the deed restriction and the area of development activity must be fenced or otherwise marked to the satisfaction of [local unit of government]."
- B. Regardless of the legal method of protection chosen by the [Approval Authority], responsibility for maintaining tracts shall be held by a homeowners association, adjacent lot owners, the permit applicant or designee, or other appropriate entity as approved by the [Approval Authority].
- C. The following note shall appear on the face of all plats, short plats, PUDS, or other approved site plans containing separate sensitive area tracts, and shall be recorded on the title of record for all affected lots:

NOTE: All lots adjoining separate sensitive area tracts identified as Native Vegetation Protection Easements or protected by deed restriction are responsible for maintenance and protection of the tracts. Maintenance includes insuring that no alterations occur within the separate tract and that all vegetation remains undisturbed unless the express written authorization of the [local unit of government] has been received.

The common boundary between a separate sensitive area tract and the adjacent land must be permanently identified. This identification shall include permanent wood or metal signs on treated or metal posts. Signs shall be worded as follows:

"Protection of this natural area is in your care. Alteration or disturbance is prohibited by law. Please call the [Approval Authority] for more information."

Sign locations and size specifications shall be approved by the [Approval Authority]. The [Approval Authority] shall require permanent fencing of the sensitive area tract or tracts when there is a substantial likelihood of the presence of domestic grazing animals within the

development proposal. The [Approval Authority] shall also require as a permit condition that such fencing be provided if, subsequent to approval of the development proposal, domestic grazing animals are in fact introduced.

3) Additional Conditions

- A. The location of the outer extent of the wetland buffer and the areas to be disturbed pursuant to an approved permit shall be marked in the field, and such field marking shall be approved by the [Approval Authority] prior to the commencement of permitted activities. Such field markings shall be maintained throughout the duration of the permit.
- B. The [Approval Authority] may attach such additional conditions to the granting of a special use permit as deemed necessary to assure the preservation and protection of affected wetlands and to assure compliance with the purposes and requirements of this chapter.

b. Bonding

1) Performance Bonds

The [Approval Authority] shall require the applicant of a development proposal to post a cash performance bond or other security acceptable to the [Approval Authority] in an amount and with surety and conditions sufficient to fulfill the requirements of Section 7.5.f and, in addition, to secure compliance with other conditions and limitations set forth in the permit. The amount and the conditions of the bond shall be consistent with the purposes of this chapter. In the event of a breach of any condition of any such bond, the [Approval Authority] may institute an action in a court of competent jurisdiction upon such bond and prosecute the same to judgement and execution. The [Approval Authority] shall release the bond upon determining that:

- A. all activities, including any required compensatory mitigation, have been completed in compliance with the terms and conditions of the permit and the requirements of this chapter;
- B. upon the posting by the applicant of a maintenance bond.

Until such written release of the bond, the principal or surety cannot be terminated or canceled.

2) Maintenance Bonds

The [approval Authority] shall require the holder of a development permit issued pursuant to this chapter to post a cash performance bond or other security acceptable to the

[Approval Authority] in an amount and with surety and conditions sufficient to guarantee that structures, improvements, and mitigation required by the permit or by this chapter perform satisfactorily for a minimum of two (2) years after they have been completed. The [Approval Authority] shall release the maintenance bond upon determining that performance standards established for evaluating the effectiveness and success of the structures, improvements, and/or compensatory mitigation have been satisfactorily met for the required period. For compensation projects, the performance standards shall be those contained in the mitigation plan developed and approved during the permit review process pursuant to Section 7.5.g. The maintenance bond applicable to a compensation project shall not be released until the [Approval Authority] determines that performance standards established for evaluating the effect and success of the project have been met.

c. Other Laws and Regulations

No permit granted pursuant to this chapter shall remove an applicant's obligation to comply in all respects with the applicable provisions of any other Federal, State, or local law or regulation, including but not limited to the acquisition of any other required permit or approval.

d. Suspension, Revocation

In addition to other penalties provided for elsewhere, the [Approval Authority] may suspend or revoke a permit if it finds that the applicant or permittee has not complied with any or all of the conditions or limitations set forth in the permit, has exceeded the scope of work set forth in the permit, or has failed to undertake the project in the manner set forth in the approved application.

e. Publication of Notice

The [Approval Authority] shall cause notice of its denial, issuance, conditional issuance, revocation, or suspension of a permit to be published in a daily newspaper having a broad circulation in the area wherein the wetland lies. Such notice shall be published within five (5) working days of the decision or order and shall include at least the following:

- 1) A brief description of the project, including location;
- 2) The decision or order of the [Approval Authority] with respect to the project;
- 3) Notification that the permit file is open for public inspection during regular business hours, and the address where such file may be inspected; and
- 4) A statement of the procedures regarding appeal or judicial review of the decision, if applicable.

f. Compensating for Wetlands Impacts.

As a condition of any permit allowing alteration of wetlands and/or wetland buffers, or as an enforcement action pursuant to Section 8.2, the [Approval Authority] shall require that the applicant engage in the restoration, creation or enhancement of wetlands and their buffers in order to offset the impacts resulting from the applicant's or violator's actions. The Applicant shall develop a plan that provides for land acquisition, construction, maintenance and monitoring of replacement wetlands that recreate as nearly as possible the original wetlands in terms of acreage, function, geographic location and setting, and that are larger than the original wetlands. The overall goal of any compensatory project shall be no net loss of wetlands function and acreage and to strive for a net resource gain in wetlands over present conditions. Compensation shall be completed prior to wetland destruction, where possible.

Compensatory mitigation shall follow an approved mitigation plan pursuant to Section 7.5.g and shall meet the following minimum performance standards:

1) Given the uncertainties in scientific knowledge and the need for expertise and monitoring, wetland compensatory projects may be permitted only when the [Approval Authority] finds that the compensation project is associated with an activity or development otherwise permitted and that the restored, created, or enhanced wetland will be as persistent as the wetland it replaces. Additionally, Applicants shall:

- A. demonstrate sufficient scientific expertise, supervisory capability, and financial resources to carry out the project;
- B. demonstrate the capability for monitoring the site and to make corrections during this period if the project fails to meet projected goals; and
- C. protect and manage or provide for the protection and management of the compensation area to avoid further development or degradation and to provide for long-term persistence of the compensation area.

2) Wetlands Restoration and Creation.

- A. Any person who alters regulated wetlands shall restore or create equivalent areas or greater areas of wetlands than those altered in order to compensate for wetland losses.
- B. Where feasible, restored or created wetlands shall be a higher category than the altered wetland.
- C. Compensation areas shall be determined according to function, acreage, type, location, time factors, ability to be self sustaining and projected success. Wetland functions and values shall be calculated using the best

professional judgement of a qualified wetland ecologist using the best available techniques. Multiple compensation projects may be proposed for one project in order to best achieve the goal of no net loss.

- D. Acreage replacement ratio. The following ratios apply to creation or restoration which is in-kind, onsite, timed prior to or concurrent with alteration, and has a high probability of success. These ratios do not apply to remedial actions resulting from illegal alterations. The first number specifies the acreage of wetlands requiring replacement and the second specifies the acreage of wetlands altered.

Category I	6:1
Category II or III	
Forested	3:1
Scrub-shrub	2:1
Emergent	1.5:1
Category IV	1.25:1

i. Increased Replacement Ratio.

The [Approval Authority] may increase the ratios under the following circumstances:

- uncertainty as to the probable success of the proposed restoration or creation;
- significant period of time between destruction and replication of wetland functions;
- projected losses in functional value; or
- offsite compensation.

ii. Decreased Replacement Ratio.

The [Approval Authority] may decrease these ratios under the following circumstance:

- findings of special studies coordinated with agencies with expertise which demonstrate that no net loss of wetland function or value is attained under the decreased ratio.

iii. In all cases, a minimum acreage replacement ratio of 1:1 shall be required.

3) Wetlands Enhancement.

- A. Any Applicant proposing to alter wetlands may propose to enhance existing significantly degraded wetlands in order to compensate for wetland losses. Applicants proposing to enhance wetlands shall identify how enhancement conforms to the overall goals and requirements of the local wetlands protection program and established regional goals.

- B. A wetlands enhancement compensation project shall be determined pursuant to Sections 7.5.f, provided that enhancement for one function and value will not degrade another function or value and that acreage replacement

ratios shall be doubled to recognize existing functional values and, provided further, that category I wetlands shall not be enhanced.

4) Wetland Type

- A. In-kind compensation shall be provided except where the applicant can demonstrate that:
 - i. the wetland system is already significantly degraded and out-of-kind replacement will result in a wetland with greater functional value;
 - ii. scientific problems such as exotic vegetation and changes in watershed hydrology make implementation of in-kind compensation impossible; or
 - iii. out-of-kind replacement will best meet identified regional goals (eg., replacement of historically diminished wetland types).
 - iv. where out-of-kind replacement is accepted, greater acreage replacement ratios may be required to compensate for lost functional values.

5) Location.

- A. On-site compensation shall be provided except where the applicant can demonstrate that:
 - i. the hydrology and ecosystem of the original wetland and those who benefit from the hydrology and ecosystem will not be substantially damaged by the onsite loss; and
 - ii. onsite compensation is not scientifically feasible due to problems with hydrology, soils, waves, or other factors; or
 - iii. compensation is not practical due to potentially adverse impact from surrounding land uses; or
 - iv. existing functional values at the site of the proposed restoration are significantly greater than lost wetland functional values; or
 - v. that established regional goals for flood storage, flood conveyance, habitat or other wetland functions have been established and strongly justify location of compensatory measures at another site.
- B. Offsite compensation shall occur within the same watershed as the wetland loss occurred, provided that category IV wetlands may be replaced outside of the watershed when there is no reasonable alternative.
- C. In selecting compensation sites, applicants shall pursue siting in the following order of preference:
 - i. upland sites which were formerly wetlands;
 - ii. idled upland sites generally having bare ground or vegetative cover consisting primarily of exotic introduced species, weeds, or emergent vegetation;
 - iii. other disturbed upland.

6) Timing.

- A. Where feasible, compensatory projects shall be completed prior to activities that will disturb wetlands, and immediately after activities that will temporarily disturb wetlands. In all other cases, except for category I wetlands, compensatory projects should be completed prior to use or occupancy of the activity or development which was conditioned upon such compensation. Construction of compensation projects shall be timed to reduce impacts to existing wildlife and flora.

7) Cooperative Restoration, Creation or Enhancement Projects.

- A. The [Approval authority] may encourage, facilitate, and approve cooperative projects wherein a single applicant or other organization with demonstrated capability may undertake a compensation project with funding from other applicants under the following circumstances:
 - i. restoration, creation or enhancement at a particular site may be scientifically difficult or impossible; or
 - ii. creation of one or several larger wetlands may be preferable to many small wetlands.
- B. Persons proposing cooperative compensation projects shall:
 - i. submit a joint permit application;
 - ii. demonstrate compliance with all standards;
 - iii. demonstrate the organizational and fiscal capability to act cooperatively; and
 - iv. demonstrate that long term management can and will be provided.

g. Mitigation Plans

All wetland restoration, creation and/or enhancement projects required pursuant to this chapter either as a permit condition or as the result of an enforcement action shall follow a mitigation plan prepared by qualified wetland professionals approved by the [Approval Authority]. The applicant or violator shall receive written approval of the mitigation plan by the Approval Authority prior to commencement of any wetland restoration, creation or enhancement activity. Unless the [Approval Authority], in consultation with qualified wetland professionals, determines, based on the size and nature of the development proposal, the nature of the impacted wetland, and the degree of cumulative impacts on the wetland from other development proposals, that the scope and specific requirements of the mitigation plan may be reduced from what is listed below, the mitigation plan shall contain at least the following components:

- 1) Baseline Information. A written assessment and accompanying maps of the:
 - impacted wetland including, at a minimum, wetland delineation; existing wetland acreage; vegetative, faunal

and hydrologic characteristics; soil and substrate conditions; topographic elevations and -compensation site, if different from the impacted wetland site, including at a minimum: existing acreage; vegetative, faunal and hydrologic conditions; relationship within watershed and to existing waterbodies; soil and substrate conditions, topographic elevations; existing and proposed adjacent site conditions; buffers; and ownership.

- 2) Environmental Goals and Objectives. A written report shall be provided identifying goals and objectives and describing:
 - the purposes of the compensation measures including a description of site selection criteria, identification of compensation goals; identification of target evaluation species and resource functions, dates for beginning and completion, and a complete description of the structure and functional relationships sought in the new wetland. The goals and objectives shall be related to the functions and values of the original wetland or if out-of-kind, the type of wetland to be emulated; and
 - A review of the available literature and/or experience to date in restoring or creating the type of wetland proposed shall be provided. An analysis of the likelihood of success of the compensation project at duplicating the original wetland shall be provided based on the experiences of comparable projects, if any. An analysis of the likelihood of persistence of the created or restored wetland shall be provided based on such factors as surface and ground water supply and flow patterns, dynamics of the wetland ecosystem; sediment or pollutant influx and/or erosion, periodic flooding and drought, etc., presence of invasive flora or fauna, potential human or animal disturbance, and previous comparable projects, if any.
- 3) Performance Standards. Specific criteria shall be provided for evaluating whether or not the goals and objectives of the project and for beginning remedial action or contingency measures. Such criteria may include water quality standards, survival rates of planted vegetation, species abundance and , diversity targets, habitat diversity indices, or other ecological, geological or hydrological criteria.
- 4) Detailed Construction Plans. Written specifications and descriptions of compensation techniques shall be provided including the proposed construction sequence, grading and excavation details, erosion and sediment control features needed for wetland construction and long-term survival, a planting plan specifying plant species, quantities, locations, size, spacing, and density; source of plant materials,

propagules, or seeds; water and nutrient requirements for planting; where appropriate, measures to protect plants from predation; specification of substrate stockpiling techniques and planting instructions; descriptions of water control structures and water-level maintenance practices needed to achieve the necessary hydrocycle/hydroperiod characteristics; etc. These written specifications shall be accompanied by detailed site diagrams, scaled cross-sectional drawings, topographic maps showing slope percentage and final grade elevations, and any other drawings appropriate to show construction techniques or anticipated final outcome. The plan shall provide for elevations which are appropriate for the desired habitat type(s) and which provide sufficient tidal prism and circulation data.

5) Monitoring Program. A program outlining the approach for monitoring construction of the compensation project and for assessing a completed project shall be provided. Monitoring may include, but is not limited to:

- A. Establishing vegetation plots to track changes in plant species composition and density over time;
- B. using photo stations to evaluate vegetation community response;
- C. sampling surface and subsurface waters to determine pollutant loading, and changes from the natural variability of background conditions (pH, nutrients, heavy metals);
- D. measuring base flow rates and storm water runoff to model and evaluate water quality predictions, if appropriate;
- E. measuring sedimentation rates, if applicable; and
- F. sampling fish and wildlife populations to determine habitat utilization, species abundance and diversity.

A protocol shall be included outlining how the monitoring data will be evaluated by agencies that are tracking the progress of the compensation project. A monitoring report shall be submitted annually, at a minimum, documenting milestones, successes, problems, and contingency actions of the compensation project. The compensation project shall be monitored for a period necessary to establish that performance standards have been met, but not for a period less than five years.

6) Contingency Plan. Identification of potential courses of action, and any corrective measures to be taken when monitoring or evaluation indicates project performance standards are not being met.

7) Permit Conditions. Any compensation project prepared pursuant to this section and approved by the [Approval Authority] shall become part of the application for the permit.

8) Performance Bonds and Demonstration of Competence.

A demonstration of financial resources, administrative, supervisory, and technical competence and scientific expertise of sufficient standing to successfully execute the compensation project shall be provided. A compensation project manager shall be named and the qualifications of each team member involved in preparing the mitigation plan and implementing and supervising the project shall be provided, including educational background and areas of expertise, training and experience with comparable projects. In addition, bonds ensuring fulfillment of the compensation project, monitoring program, and any contingency measure shall be posted pursuant to Section 7.5 in the amount of one hundred twenty (120) percent of the expected cost of compensation.

9) Regulatory authorities are encouraged to consult with and solicit comments of any federal, state, regional, or local agency, including tribes, having any special expertise with respect to any environmental impact prior to approving a mitigation proposal which includes wetlands compensation. The compensation project proponents should provide sufficient information on plan design and implementation in order for such agencies to comment on the overall adequacy of the mitigation proposal.

10) Compensatory mitigation is not required for regulated activities:

- A. For which a permit has been obtained that occur only in the buffer or expanded buffer and which have not adverse impacts to regulated wetlands; or
- B. allowed activities pursuant to Section 5.2 provided such activities utilize best management practices to protect the functions and values of regulated wetlands.

7.6 Appeals

Any decision of the [Approval Authority] in the administration of this chapter may be appealed to [hearing body]. The [hearing body] shall give substantial weight to any discretionary decision of the [Approval Authority] rendered pursuant to this Chapter.

7.7 Modification of Wetland Permits

A Wetland Permit holder may request and the [Approval Authority] may approve modification of a previously issued Wetland Permit.

7.8 Resubmittal of Denied Permit Applications

A Wetland Permit application which has been denied may be modified and resubmitted no earlier than one hundred eighty (180) days following action on the original application. A permit application shall be considered a resubmittal if the site proposed for development was the subject of a Wetland Permit application within the previous one hundred eighty (180) days.

Appendix 5.

Comments on The French Creek Watershed Management Plan and Response

Comments:

Post Office Box 2278
Snohomish, Wa 98291-2278
August 14, 2004

Janet Carroll
Snohomish County Public Works Department
Surface Water Management Division
2731 Wetmore Avenue, Suite 300
Everett, WA 98201

RE: French Creek Watershed Management Plan

Dear Ms. Carroll:

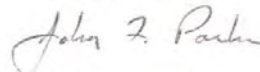
Recently I have reviewed the draft of the French Creek Watershed Management Plan. It is my hope that my comments don't arrive too late.

You, your staff, and all of the other contributors to the review draft are to be heartily commended for producing a thorough, readable, and well organized piece of work. Because it is a rather lengthy document it isn't likely to be read at one sitting, and I would suggest that either in the front or back of the document a listing of the alpha abbreviations and the organizations represented be provided.

I have a twenty acre parcel in the North Stables Creek area. My intent is to preserve our wooded areas and be a good steward of the property; after all, I drink the water and don't want it to run out or become contaminated.

Please keep me apprised of future developments and if I can be of some small assistance.

Respectfully,



John F. Parks

Response:

The Watershed Management Committee appreciates your comments and your desire to be a good steward of the watershed. We will keep you informed of other developments in the watershed.

Appendix 6.

Concurrence from the Implementing Agencies

City of Monroe

Community Development

July 29, 2004

Ms. Janet Carroll
Snohomish County Public Works
Surface Water Management Division
2930 Wetmore Avenue
Everett, WA 98201

Subject: Statement of Concurrence – French Creek Watershed Management Plan

Dear Ms. Carroll:

The City of Monroe Community Development Department has reviewed the French Creek Watershed Management Plan. This letter serves as our formal Statement of Concurrence with action plan recommendations that require specific action by the City of Monroe.

The ability of the City of Monroe to concur with the action plan recommendations is limited by our legal mandate, the availability of funding, and other priorities affecting city operations and budget. The city has already implemented or is implementing many of the recommended management actions identified in the French Creek Watershed Management Plan.

Sincerely,

Kate Galloway, AICP
Planner

cc: Mayor Walser
Jim Southworth, City Administrator
Hiller West, Community Development Director
Brad Feilberg, City Engineer
Gene Brazel, Public Works Director

French Slough Flood Control
Neil Wheeler, Manager
8807 131st Ave SE
Snohomish, WA. 98290
360-568-5383 425-308-9854

November 4, 2004

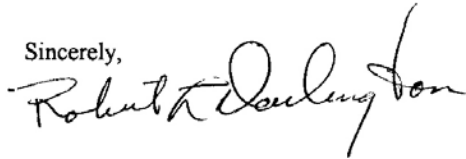
French Creek Watershed Management Committee
c/o Janet Carroll
Snohomish County Surface Water Management
2731 Wetmore Ave.
Everett, WA. 98201

Dear French Creek Watershed Committee Members:

The French Slough Flood Control District has reviewed the French Creek Watershed Management Plan. This letter serves as our formal letter of concurrence with the plans recommendations that require specific actions by the Flood Control District.

The ability of French Slough Flood Control District to implement plan actions is limited by the following: 1) availability of funding. 2) our legal mandates 3) other priorities not included in the plan.

Sincerely,





Snohomish Conservation District

528 - 91st Ave. NE, Suite C - Everett, WA 98205 - 1535- 425.335.5634 Fax: 425.335.5024

September 17, 2004

French Creek Watershed Management Committee
C/O Janet Carroll
Snohomish County Surface Water Management
2731 Wetmore Avenue
Everett, WA 98201

Subject: Statement of Concurrence – French Creek Watershed Management Plan

Dear Ms. Carroll,

Snohomish Conservation District (SCD) has reviewed the French Creek Watershed Management Plan. This letter serves as our formal letter of concurrence with plan recommendations that require specific actions by SCD. The ability of SCD to implement plan actions is limited by the availability of funding and other priorities affecting the district's operations and budget.

We wish to thank you and all of the agencies and citizens who put forth so much time and effort to develop this plan. We look forward to working with these partners to improve the French Creek watershed for future generations.

Sincerely,

A handwritten signature in blue ink, appearing to read 'Kim Levesque', is written over a light blue horizontal line.

Kim Levesque
District Manager

Cc: SCD Board



SNOHOMISH COUNTY
DEPARTMENT OF EMERGENCY MANAGEMENT

3509 109th Street S.W., Everett, WA 98204 • (425) 423-7635 • Fax (425) 423-9152

July 27, 2004

French Creek Watershed Management Committee
c/o Janet Carroll
Snohomish County Surface Water Management
2731 Wetmore Avenue
Everett WA 98201

Dear French Creek Watershed Committee Members:

The Snohomish County Department of Emergency Management has reviewed the French Creek Watershed Management Plan. This letter serves as our formal letter of concurrence with plan recommendation that require specific actions by DEM.

The ability of DEM to implement plan actions is limited by availability of funding, our legal mandate, and other priorities not included in the plan.

Sincerely,



Roger O. Serra
Director

SNOHOMISH COUNTY COUNCIL
SNOHOMISH COUNTY, WASHINGTON

MOTION NO. 04-398

FRENCH CREEK WATERSHED MANAGEMENT PLAN

WHEREAS, Snohomish County as lead agency received a grant from the Department of Ecology to undertake the French Creek Watershed Management Plan under the provisions of WAC 400-12; and

WHEREAS, the County as lead agency formed and staffed a Watershed Management Committee in accordance with WAC 400-12; and

WHEREAS, the Committee has prepared the "Public Review Draft of the French Creek Watershed Management Plan"; and,

WHEREAS, the County wishes to thank the Committee for its dedication and efforts to prepare the plan; and,

WHEREAS, the County is currently involved in updates of the Critical Area Regulations, the Shorelines Regulations, and the Comprehensive Plan and all of these regulatory efforts, while providing opportunities to consider, will supercede any recommendation of the French Creek Watershed Management Plan; and,

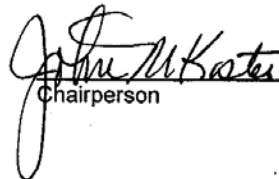
WHEREAS, the County Council intends to consider the content and recommendations of the Plan but not consider them as binding; and

WHEREAS, the County Council requests that the County Executive direct his staff to consider the recommendations of the plan as related work is undertaken;

NOW, THEREFORE ON MOTION, the County Council requests the Council Chair to sign a letter commending the Committee for their efforts and committing to the consideration of the French Creek Watershed Management Plan as a part of County staff development of future project, regulatory, and other recommendations for subsequent prioritization by the County Executive and County Council.

PASSED this 27th day of October, 2004.

SNOHOMISH COUNTY COUNCIL
Snohomish County, Washington


Chairperson

ATTEST:


Asst. Clerk of the Council



Snohomish County

County Council

Dave Gossett
John Koster
Gary Nelson
Jeff Sax
Kirke Sievers

October 28, 2004

French Creek Watershed Management Committee
c/o Janet Carroll
Snohomish County Surface Water Management Division
2731 Wetmore Avenue
Everett WA 98201

M/S #609
3000 Rockefeller Avenue
Everett, WA 98201-4046
(425) 388-3494
FAX (425) 388-3496
TTY/TDD (425) 388-3700

Subject: French Creek Watershed Management Plan

Dear Committee Members:

As you know, Snohomish County is designated as lead implementing agency pursuant to WAC 400-12 with respect to the French Creek Watershed Management Plan. We would like to recognize the thoughtful dedication of the Committee in bringing this body of information and ideas together towards the health of the French Creek watershed. The effort, ideas, and substance of the report represent a tremendous amount of work that advances our understanding of the state of the French Creek Watershed. The report will be an important tool as the County continues the work of comprehensive watershed management in the context of its full array of responsibilities.

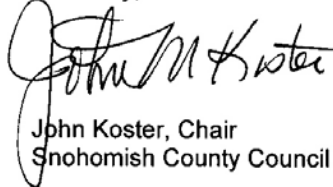
The County has previously provided comments to the committee regarding its areas of continuing concern prior to the finalization of the plan. Having reviewed the final plan, Snohomish County still has some areas of disagreement with certain assumptions and assertions set forth in the plan, some of which form the basis of plan recommendations. However, our primary interest at this point is to move the plan forward to conclusion so that we may use it to provide another viewpoint for consideration in our immediate and pressing work discussed below.

We note that Snohomish County is subject to the requirements of the Clean Water Act's industrial, construction and municipal NPDES permits. Many of the goals of WAC 400-12 process have been superseded by the requirements of this federal law, and are presently being met by this County through the implementation of and compliance with its NPDES permits, as well as the requirements of Growth Management Act.

However, Snohomish County will consider recommended actions in the report within the context of the County's adopted policies and priorities. These policies and priorities are driven by federal and state legal mandates and are established in the County's GMA Comprehensive Plan, development regulations and numerous County programs designed to improve the quality of our natural environment, many of which will be updated in the next two years.

As you know, this is a season of difficult budget times in government and the County is in the process of making difficult choices with limited funding. The County is further restricted by our legal mandates and other priorities that are not reflected in the French Creek Watershed Plan. We will continue to work with the National Marine Fisheries Service, U.S. Fish and Wildlife Service, State Department of Ecology, Department of Fish and Wildlife, Tribes, and community groups to improve the health of our watersheds. We appreciate your work as it provides further thinking of ways to improve the overall stewardship of watersheds in our community as we plan for long-term growth and development.

Sincerely,

A handwritten signature in black ink, appearing to read "John M. Koster". The signature is written in a cursive, flowing style. Below the signature, the name and title are printed in a standard sans-serif font.

John Koster, Chair
Snohomish County Council

cc: Surface Water Management



**SNOHOMISH
HEALTH
DISTRICT**

ENVIRONMENTAL HEALTH DIVISION
3020 Rucker Avenue, Suite 104
Everett, WA 98201-3900
425.339.5250 FAX: 425.339.5254
Deaf/Hard of Hearing: 425.339.5252 (TT)

Healthy Lifestyles, Healthy Communities

August 2, 2004

Ms. Janet Carroll, Senior Planner
Snohomish County Surface Water Mgmt
2731 Wetmore Ave
Everett WA 98201-3581

Subject: French Creek Watershed Management Plan

Dear Ms. Carroll:

I want to take this opportunity to congratulate you and the French Creek Watershed Management Plan Committee on the completion of the French Creek Watershed Management Plan.

As the local jurisdictional public health agency, the Health District has a mandate to enforce *Chapter 246-272, the State Board of Health Rules and Regulations for Onsite Sewage Disposal Systems; Chapter 173-350 Solid Waste Handling Standards; and the Snohomish Health District Sanitary Code*. Consequently, the District is the logical and legitimate agency to be charged with the recommendations in the plan that deal with onsite sewage disposal and solid waste. It is in this light that the related recommendations contained in the plan have been reviewed and given our general acceptance and concurrence.

With regard to the specific recommendations put forth in the plan's *List of Management Recommendations*, the following comments are provided:

FC70 Increase Enforcement Staffing

The Snohomish Health District (SHD) currently handles complaints in a timely manner. Complaints are investigated with appropriate action and correction upon verification of a public health hazard/violation. The ability to "identify problems" would require additional funding along with the political will. Amount of funding would depend on extent of corrective action determined to be appropriate.

FC84 Work Group to Develop Proactive Approach to Manage Onsite Sewage Systems (High Priority)

I disagree with this statement. It implies that current regulations and SHD administering of same is lacking in public health protection. The SHD reviews every onsite application for compliance with the rules and has a comprehensive Operation & Maintenance (O & M) program along with educational materials designed for the homeowner. Current requests for investigations (complaints) handled by SHD provide corrections to existing public health hazards.

FC85 Inspect and Pump Existing Onsite Sewage Systems (High Priority)

The SHD is now entering all onsite sewage records/as-builts into a computer system capable of generating current mailing labels and printing out the onsite sewage information specific for each property within Snohomish County. Mailing of "homeowner packets" which include licensed pumper lists, operation and maintenance information, and the as-built drawing of the septic system, can be done on a regular basis. When all records of properties located within Snohomish County have been entered into the database, routine mailings of homeowner packets will take place.

Janet Carroll, Senior Planner
August 2, 2004
Page 2

Subject: French Creek Watershed Management Plan

Homeowners currently get a system package six months after system final. The SHD currently requires O & M personnel to maintain records for SHD review when requested. I see no need for the SHD to store all these records.

The septic tank pumping business is extremely competitive and there is not a large profit margin in pumping residential septic tanks. Therefore, it is highly unlikely that the individual pumping business would offer discounts and incentives for homeowner routine septic system maintenance unless an outside source of funds for these discounts is provided.

FC86 Inspect New Onsite Sewage Systems (High Priority)

All new alternative systems currently require O & M from a private O & M service provider. The SHD also does inspection for the first two years of operation. The rest is already being done through the normal permit process for repairs and operation checks.

FC87 Designate Areas Vulnerable to Contamination as Areas of Special Concern (High Priority)

Water quality sampling is already undertaken by other agencies i.e. Surface Water with County and the Department of Health shellfish program. Currently neither program has identified areas of consistent and high contaminant levels associated with septic systems. A more stringent O & M program that has been undertaken in other jurisdictions has not proved to be effective.

FC88 Develop Health District Assessment Fee (High Priority)

This is currently being done by the SHD.

FC90 Conduct Onsite Sewage System Operation and Maintenance Workshops (High Priority)

SHD personnel are currently available to participate in workshops as suggested. If interest by the public demanded a greater involvement, funding of this activity would be necessary.

FC92 Provide Fact Sheets About Additives to Onsite Sewage System Owners (High Priority)

The Department of Health already produces fact sheets and are available if requested.

FC93 Develop Program to Manage Revolving Loan Fund (High Priority)

This has been attempted without a successful outcome.

The SHD is in agreement that financial assistance in the repair of failed onsite systems is an important tool in decreasing nonpoint pollution from failed systems. In 1996 SHD was involved in the initial planning of the Snohomish County Onsite System Repair Loan Program, in conjunction with the Department of Ecology, Snohomish County, and the Stilligumish Clean Water District. However, due to circumstances outside of the District's control, the program was never established. In the future, if funds become available for similar loan programs, the SHD would be willing to participate in the planning and establishment of such a loan program. However the SHD is neither willing nor able to take lead responsibility for this task.

Janet Carroll, Senior Planner
August 2, 2004
Page 3

Subject: French Creek Watershed Management Plan

FC123 Increase Penalties for Illegal Dumping (High Priority)

The Health District is mandated to enforce illegal dumping laws in RCW 70.95.240 and 250. The Health District investigated 350 illegal dumping complaints in 2003 and resolved 95% of the cases. Compliance was achieved mainly through Health District enforcement proceedings.

Illegal dumping penalties are authorized under RCW 70.95.240 and must be changed through the state legislature.

FC124 Block Off Known Dump Sites (Priority)

Although blocking off access to known illegal dumping sites would reduce illegal dumping at those sites, it will not prevent dumping at new sites. In fact, it may increase dumping at new sites. The Health District has committed limited resources to other priorities so additional resources are needed to implement this recommendation.

Recommendations addressing Moderate Risk Waste Issues (Household Hazardous Waste and Small Quantity Hazardous Waste Generators)

FC128 Monitor Hazardous Materials Storage Disposal Practices at Industrial and Business Sites

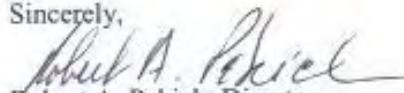
The Health District is mandated to enforce the *Sanitary Code Chapter 3.1* and *Chapter 173-350 WAC Solid Waste Handling Standards*. These regulations contain language that governs storage and disposal of household hazardous waste and small quantity business generated hazardous waste. The regulations do not regulate the use of the hazardous waste except in cases where misuse threatens public health or the environment.

The Health District provides technical assistance to businesses upon request. Surveys of businesses in certain critical ground water recharge areas and urban areas are being conducted. However, the Health District does not monitor hazardous materials use, storage, or disposal practices at industrial or business sites. Additional resources are needed to implement this recommendation.

FC132 Conduct Household Hazardous Waste survey (High Priority)

If Snohomish County Surface Water Management organizes events or surveys that educate the public on storage and disposal of household hazardous waste, the Health District is willing to participate. Also the Health District would consider a lead role if resources were made available.

Sincerely,



Robert A. Pekich, Director
Environmental Health Division

RAP/je



STATE OF WASHINGTON
CONSERVATION COMMISSION

PO Box 47721 • Olympia, Washington 98504-7721 • (360) 407-6200 • FAX (360) 407-6215

December 7, 2004

French Creek Watershed Management Committee
c/o Janet Carroll
Snohomish County Surface Water Management
2731 Wetmore Avenue
Everett WA 98201

Dear French Creek Watershed Committee Members:

The applicable Washington Conservation Commission staff has reviewed the French Creek Watershed Management Plan. This letter serves as our formal letter of concurrence with plan recommendations that we have committed to perform.

The ability of the Conservation Commission to implement plan actions and, more importantly the Snohomish Conservation District to which we provide service, is limited by availability of funding, legal mandates, and other priorities not included in the plan.

Sincerely,

A handwritten signature in blue ink, appearing to read "Stu Trefry".

Stu Trefry
Puget Sound Field Service Manager

Cc: Kim Levesque
Mark Clark



Stilly-Snohomish Fisheries Enhancement Task Force

To ensure the future of salmon in the Stillaguamish and Snohomish watersheds

P.O. Box 5006, Everett, WA 98206

Phone 425-252-6686 – Fax 425-252-6686 – Email info@stillysnofish.org

June 30, 2004

French Creek Watershed Management Committee
C/O Janet Carroll
Snohomish County Surface Water Management
2731 Wetmore Avenue
Everett, WA 98201

Dear French Creek Watershed Committee Members:

The Stilly-Snohomish Fisheries Enhancement Task Force is very interested in helping with the implementation of the French Creek Watershed Management Plan. This letter serves as our formal letter of concurrence with the plan recommendations that require specific actions by the Task Force.

The ability of the Task force to implement plan actions is limited by the availability of funding and other priorities not included in the plan. Thank you for including our organization in this process of salmon habitat restoration implementation.

Sincerely,

A handwritten signature in dark ink, appearing to read "Ann Boyce". The signature is fluid and cursive, written over a light-colored background.

Ann Boyce
Executive Director



STATE OF WASHINGTON
DEPARTMENT OF ECOLOGY

Northwest Regional Office • 3190 160th Avenue SE • Bellevue, Washington 98008-3452 • (425) 649-7000

July 29, 2004

French Creek Watershed Management Committee
c/o Janet Carroll
Snohomish County Surface Water Management
2731 Wetmore Avenue
Everett, WA 98201

Dear Ms. Carroll:

RE: Letter of Concurrence on the French Creek Watershed Management Plan

The Department of Ecology (Ecology) is responding to Snohomish County's request for concurrence on a number of nonpoint action strategies for which the County has identified Ecology as a participating implementing agency. Four different Ecology programs will be responsible for the identified actions. The agency's responses are summarized by program and action.

Water Quality

FC70. Increase enforcement staffing (High Priority):

Ecology cannot fully concur with this action at this time. Ecology currently has staff available to perform technical assistance and enforcement at facilities that are covered under our industrial and construction stormwater permits. In 2005, Ecology will begin Phase II of state's stormwater permit program. We are currently assessing our staffing needs and will be requesting resources from the Washington State Legislature to properly administer this additional effort to protect water quality across the state. Ecology does concur that local governments should have adequate ordinances and enforcement capabilities in place to protect surface waters within their jurisdictions. Snohomish County will be contacted if additional resources are allocated to water quality enforcement activities in the French Creek basin.

FC76. Facilitate interagency communication:

Ecology partially concurs with this action. Ecology's Snohomish Basin TMDL staff regularly communicates with the Puget Sound Action Team on basin issues. Currently regular meetings do not take place but we will consider such meetings in the future based on need. Given the many watersheds Ecology must help oversee, it is not practical for our staff to organize regulatory staff meetings on a basin-by-basin basis. However, Ecology will continue to participate in current regulatory forums such as the Tri-county Stormwater Inspectors Meetings and will assist in sharing information with watershed groups such as

French Creek Watershed Management Committee
July 29, 2004
Page 2

the Allen/Quilceda Action Team, Woods Creek Coalition, and North Creek Coalition. Ecology encourages the County to facilitate a French Creek specific workgroup to implement the French Creek Watershed Management Plan and will be pleased to participate on a regular basis.

FC96. Improve sediment management at the Rock Quarry (Priority):

Ecology concurs with this action. The rock quarry in question is managed by AAA Monroe Rock. This facility is currently under a site specific individual water quality permit which includes a stormwater management plan. Stormwater management issues such as the regular maintenance of their sediment pond are addressed within the permit.

The permit also addresses this action as follows:

The effluent limitations in permit condition S1. for turbidity of the receiving water, turbidity of the discharge, total petroleum hydrocarbons and pH together with the monitoring, recording and reporting requirements in S2. and S3, ensure protection of state waters from AAA Monroe Rock discharges. This includes erosion which would be picked up as turbidity during their monitoring. The monitoring must be conducted shortly after a heavy rainfall when erosion is maximized.

FC139. Analyze Function of Bioswales (High Priority)

Ecology concurs with this action as stated. Ecology's Stormwater Management Manual for Western Washington (August 2001) discusses the design and function of bioswales for stormwater treatment in volume 5 (runoff treatment for BMP's) section 7.3.4. The use of bioswales for stormwater treatment beyond what is outlined in the manual is not recommended.

Solid Waste & Financial Assistance Program

FC130. Designate household hazardous waste education week (Priority):

The lead educators for this action are local governments. Ecology is willing to work with Snohomish County and the City of Monroe if they desire our participation/assistance. Ecology cannot concur at this time to take the lead on this project. We no longer have the education resources to do this kind of direct involvement. However, this type of activity is eligible for funding under our Coordinated Prevention Grants Program. If there are available monies at the local level, they could be reassigned to this task.

Toxics Clean up Program

FC 129. Hazardous Site Cleanup:

Ecology's Toxics Cleanup Program (TCP) responds to complaints and reports concerning known/potential Model Toxics Control Act sites ("hazardous site"), but does not pro-actively seek out or pursue new sites, nor require actions at low to medium priority sites. Once a site is brought to the attention of TCP the threat to human health and the environment will be evaluated and a level of priority assigned. As a result, TCP cannot

French Creek Watershed Management Committee
July 29, 2004
Page 3

concur with management recommendation FC129 (Hazardous Site Cleanup) as submitted, as it does not provide a realistic approach to assure remediation of Model Toxics Control Act sites (if any exist) within the basin.

Spill Response Program

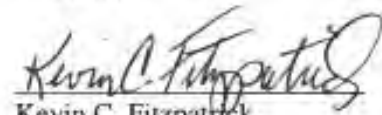
FC83 Evaluate Emergency Spill Response Plan (Priority):

Ecology concurs with its spill response role related to this strategy. Clarification is needed though on the existence of an emergency spill response plan for the basin floodplain.

Ecology would like to commend Snohomish County for its efforts in improving water quality through the concurrence and implementation of this watershed action plan.

If you have any questions please contact David Pater at (425) 649-7093.

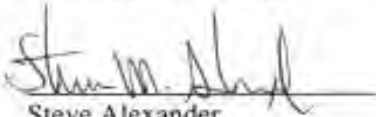
Sincerely,



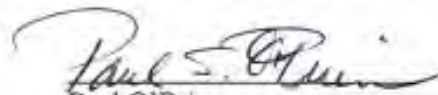
Kevin C. Fitzpatrick
Water Quality Manager



Peter Christiansen
Solid Waste Financial Assistance Manager



Steve Alexander
Toxics Clean up Manager



Paul O'Brien
Spills Response Manager

DP:dh



WASHINGTON STATE DEPARTMENT OF
Natural Resources

DOUG SUTHERLAND
Commissioner of Public Lands

July 30, 2004

Janet Carroll, Senior Planner, Surface Water Manager
Snohomish County, Public Works
2930 Wetmore Avenue
Everett, WA 98201

Dear Ms. Carroll,

Re: State of Concurrence—French Creek Watershed Management Plan

The Department of Natural Resources (DNR) has reviewed the French Creek Watershed Management Plan. This letter serves as our Statement of Concurrence with the action plan recommendations with the reservations as noted below.

The ability of the DNR to concur with the action plan recommendations is limited by our legal mandate, availability of funding, and other priorities not included in the plan. To implement some of the recommendations would require changes in statute and/or rules and budgetary appropriations approved by the Washington State legislature.

Many of the recommendations related to forestlands have already been implemented by the Forest Practices Board in March, 2000, as part of the "Forests and Fish Rules". This legislation added to the forest practices rules an increased focus on protection of streams, fish habitat, and public safety:

- New rules for forest road construction and maintenance have resulted in the reduction in the contribution of sediment to streams from forest roads. Road Maintenance and Abandonment Plans require most forestland owners to submit a plan and schedule for short and long-term road maintenance and culvert replacement where blockages to fish passage are present.
- Treed buffers to remain along most streams after logging operations were increased. These buffers protect fish habitat for all fish at all stages of life, maintain cool waters needed for fish and protect areas inhabited by amphibians.
- Unstable slopes were redefined to include a broader definition of "potentially" unstable slopes. This change has increased the number and depth of reviews under the guidelines for potentially unstable slopes. The increased review includes an environmental review under the State Environmental Policy Act (SEPA), a geotechnical report by a licensed engineering geologist submitted by applicant, and a field review by professionals from the DNR and other agencies. These more restrictive requirements have led to a significant decrease in forest practices conducted on those features.

We would also like to take this opportunity to congratulate you, the members of the Watershed Management Committee, and county staff on all the hard work it took to produce this plan.

Thank you for the opportunity to review this management plan and for incorporating some of the recommended changes that Jim Cahill has suggested in our prior comments into the final draft of the plan.

Sincerely,

Nancy M. Joseph
Assistant Region Manager, Resource Protection

NORTHWEST REGION ■ 519 N TOWNSHIP ST ■ SEDRO WOOLLEY, WA 98284-9584

FAX: (360) 856-2150 ■ TTY: (360) 856-1371 ■ TEL: (360) 856-3500

Equal Opportunity/Affirmative Action Employer



RECYCLED PAPER



July 29, 2004

Janet Carroll
Snohomish County Public Works
Surface Water Management Division
2731 Wetmore Avenue
Everett, WA 98201-3581

RE: French Creek Watershed Management Plan

Dear Ms. Carroll:

Holly Kennell, Ned Zaugg and I have reviewed the list of Management Recommendations developed by the French Creek Watershed Committee for Extension's work plan. This letter serves as WSU/Snohomish County Extension's formal Statement of Concurrence with the action plan recommendations. Specifically these include:

- **FC59. Provide Farm Owners with New Technology.** WSU Extension should work with farm landowners to provide education on new technologies available to limit water impacts. Our agriculture team along with industry, university and Conservation District specialists will continue to bring new technologies to local farm landowners as they are developed.
- **FC90. Conduct Onsite Sewage System Operation and Maintenance Workshops.** Snohomish Health District should hold regular operation and maintenance workshops in the watershed, perhaps in conjunction with small farm workshops. SHD could also contract out educational workshops to existing nonprofit groups or other agencies such as WSU Extension... WSU Extension has the expertise to develop, organize and present community workshops. It also regularly conducts workshops for farm landowners. WSU Extension is willing to contract with SHD to present the necessary workshops.
- **FC100. Conduct Landscaper Training and Education Program.** Washington State University (WSU) Extension, or some other qualified entity, should conduct a training and education program to reduce the amount of chemicals used by professional landscapers and residential landowners and to provide information about restoring soil quality and depth so that the soil regains functionality.
- **FC101. Develop Multimedia Education Program on Chemical Pollutants.** SWM, Snohomish County Solid Waste Management Division (SWMD) and WSU Extension should work together to design and implement programs to educate the public about the proper use of landscaping chemicals and alternatives to chemical use in the garden and home through native plantings, low phosphate detergents, and adjustments in car care techniques. WSU Extension provides education to professional landscapers and home

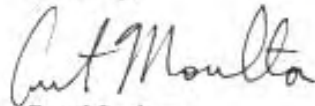
600 E 28th Street SE, Everett, WA 98208-6353
425-338-2400 • Fax: 425-338-3994 • T: 425-337-6044 • Master Gardeners: 425-352-6010 • TDD: 425-338-6100
<http://snohomish.wsu.edu/>

Cooperating agencies: Washington State University, Department of Agronomy, and Snohomish County Cooperative Extension offices are
implying no liability for any use of the information provided by the department. The department is not responsible for any errors or omissions.

gardeners through its Community Horticulture Program. Landscapers are generally directly assisted as they request assistance on specific problems. Monthly gardening columns, web-based information and collaborations on regional workshops reach additional professionals. Resources are lacking for a more proactive program. Residential gardeners are generally served with the Master Gardener volunteer-based outreach program. We will continue our messages of using native and adapted plants to reduce chemical and water use in landscapes; alternative methods of pest control; and soil building through composting and erosion prevention. We are open to contracts and collaborations on developing more proactive landscaper education programs and additional multi-media resources that encourage less-polluting pest control and landscaping methods.

WSU Extension is committed to accomplishing these actions and open to collaborations that bring more resources to bare on these important issues..

Sincerely,

A handwritten signature in black ink, appearing to read "Curt Moulton". The signature is fluid and cursive, with the first name "Curt" and last name "Moulton" clearly distinguishable.

Curt Moulton
County Director

cc: Holly Kennell
Ned Zaugg
Mike Hackett

Appendix 7.

SEPA Determination of Nonsignificance



Snohomish County Public Works

D N S

Determination of Non-Significance

July 29, 2004

PROJECT NAME:

French Creek Watershed Plan

DESCRIPTION OF PROPOSAL:

The French Creek Watershed Management Plan (the Plan) was developed in accordance with the Puget Sound Water Quality Management Plan and Nonpoint Rule (WAC 400-12), and was prepared by the French Creek Watershed Management Committee (WMC) and Snohomish County Public Works, Surface Water Management Division (SWM). The WMC was assembled by SWM, the lead agency, and includes representatives of local governments, Snohomish Conservation District, the Tulalip Tribes, citizen organizations, and watershed residents and businesses. Representation on the WMC balances county, tribal, and city representatives with individuals representing environmental, agricultural, and development interests. The plan is funded in part by a Centennial Clean Water Fund grant administered by the Washington State Department of Ecology. Local funding for the plan was provided through Watershed Management Area fees collected for the Snohomish watershed by SWM.

The 28 square mile watershed contains about 115 miles of streams and other watercourses that support populations of Coho salmon, sea run cutthroat trout, and steelhead. A portion of the French Creek system is within the presumed range of bull trout, a species listed as threatened under the Endangered Species Act (ESA). The Plan identifies issues associated with these aquatic resources, including salmon habitat degradation and non-point source pollution. In addition, the Plan proposes goals, objectives, and actions to address those issues. The 146 recommended watershed actions are grouped into the following categories:

- 1) regulations and policies
- 2) monitoring and inventory
- 3) education, training and technical assistance
- 4) land acquisition
- 5) maintenance and operation
- 6) best management practices
- 7) incentives
- 8) regulatory/enforcement (R/E)
- 9) on-the-ground projects

LOCATION OF PROPOSAL:

The French Creek Watershed is located in south-central Snohomish County, north of the City of Monroe and southeast of the City of Snohomish (within sections of Townships 27 and 28 North,

and Ranges 6 and 7 East). The watershed is also located north and east of the Skykomish River near its confluence with the Snohomish River. It is about seven miles long and six miles wide and encompasses approximately 28 square miles. French Creek empties into the Snohomish River just south of the city of Snohomish. The urbanized City of Monroe accounts for about 12 percent of the area. The remaining watershed is primarily rural land in unincorporated Snohomish County.

PROPONENT AND LEAD AGENCY:

Snohomish County Department of Public Works
Wall Street Building
2930 Wetmore Avenue
Everett, WA 98201

CONTACT:

For further information contact Scott White, Senior Environmental Planner, Department of Public Works, 388-3488, extension 4518.

THRESHOLD DETERMINATION:

The lead agency for this proposal has determined that it does not have a probable significant adverse impact on the environment. An Environmental Impact Statement (EIS) is not required under RCW 43.21C.030(2)(c). This decision was made after review of a completed environmental checklist and other information on file with this agency. This information is available for public review on request.

The issuance of this DNS should not be interpreted as acceptance or approval of the subject proposals presented. Snohomish County reserves the right to deny or approve said proposal subject to conditions if it is determined to be in the best interests of the County and/or necessary to the general health, safety, and welfare of the public to do so.

This DNS is issued under 197-11-340(2); the lead agency will not act on this proposal for at least 14 days from the date below. Written comments may be submitted to the lead agency, to the attention of Scott White, Senior Environmental Planner, at the above address.

This DNS along with the subsequent decision by the County Council to pursue the described action may be appealed in the Superior Court of Snohomish County, at Everett, Washington. A Notice of Action of the final decision by the county to pursue or not pursue the described course of action will be mailed and published in the paper of record (The Herald) for two consecutive weeks. The notice of intent to commence a judicial appeal shall be filed with the clerk of the Superior Court, 3000 Rockefeller Avenue, MS 605, Everett, WA 98201-4046 (phone 425-388-3466) within 21 days following the last week of publication in the paper.

COMMENTS DUE: Comments must be received by AUGUST 25, 2004.

RESPONSIBLE OFFICIAL: Peter E. Hahn
POSITION/TITLE: Public Works Director

DATE: 7-29-04

SIGNATURE: 

DISTRIBUTION LIST:

Federal Agencies:

- U.S. Army Corps of Engineers
- NOAA Fisheries
- USFWS

State Agencies:

- Department of Ecology
- Department of Fish and Wildlife
- Department of Natural Resources

County Departments:

- Planning and Development Services
- Parks and Recreation
- Engineering Services – Roads
- Emergency Management
- Public Works:
 - Surface Water Management

Tribal Authorities:

- Tulalip Tribes

News Media:

- The Herald
- The Monroe Monitor

Other Organizations:

- Puget Sound Water Quality Action Team