CITY OF MONROE
GRANT NO. GO300022

CITY OF MONROE

SHORELINE MASTER PROGRAM

Prepared by

City of Monroe
Department of Community Development
806 West Main Street
Monroe, Washington 98272-2125

With Assistance From

THE WATERSHED COMPANY
750 Sixth Street South
Kirkland WA 98033

and

MAKERS architecture + urban design
1904 Third Avenue, Suite 725
Seattle, Washington 98101

This report was funded in part through a grant from the Washington Department of Ecology.

This report was funded in part through a cooperative agreement with the National Oceanic and Atmospheric Administration. The views expressed herein are those of the authors and do not necessarily reflect the views of NOAA or any of its subagencies.

August 2008

Table of Contents

LIST OF FIGURES

APPENDIX A: CRITICAL AREAS REGULATIONS

APPENDIX B: FINAL SHORELINE MASTER PROGRAM INVENTORY FOR THE CITY OF MONROE'S SHORELINES: SKYKOMISH RIVER AND WOODS CREEK

APPENDIX C: SHORELINE MASTER PROGRAM INVENTORY ADDENDUM: TYE STORMWATER FACILITY

Chapter 1: Introduction

A. Requirements of the Shoreline Management Act

In 1971, the State of Washington legislature enacted the Shoreline Management Act (SMA) in order to address growing concern about the quality of the state's shoreline environments. The Act (RCW 90.58) recognizes that "shorelines are among the most valuable and fragile" of the state's resources. The Act, and the City of Monroe, recognize and protect private property rights along the shorelines, while aiming to preserve the quality of this unique resource for all state residents.

The primary purpose of the Act is to provide the management and protection of the state's shoreline resources by planning for their reasonable and appropriate use. A citizen's initiative in 1972 designated the area to be regulated under the Act, and includes lands within two hundred (200) feet of the shoreline.

B. The City of Monroe's Role in Implementing the Shoreline Management Act

In order to protect the public interest in the preservation of the shorelines of the state, the Shoreline Management Act establishes a planning program coordinated between the state and local jurisdictions to address the types and effects of development occurring along the state's shorelines. By law, the City is responsible for the following:

1. Development of an inventory and analysis of the natural characteristics and land use patterns along shorelines covered by the Act. This inventory provides the foundation for development of a system that classifies the shoreline into distinct environments. These environments provide the framework for implementing shoreline policies and regulatory measures.

2. Preparation of a "Master Program" to determine the future of the shorelines. This future is defined through the goals developed for the following land and water use elements: economic development, public access, circulation, recreation, shoreline use, conservation, historical/cultural protection, and floodplain management. Local government is encouraged to adopt goals for any other elements, which, because of present uses or future needs, are deemed appropriate and necessary to implement the intent of the Shoreline Management Act.

In addition, policy statements are developed to provide a bridge between the goals of the Master Program and the use activity regulations developed to address different types of development along the shoreline. Master Program regulations are developed and adopted, as appropriate, for various types of shoreline development, including the following: commercial development, industry, in-stream structures, mining, recreational development, residential development, transportation and parking, and utilities.

3. A shoreline restoration chapter (see Chapter 7) has also been included in the Master Program for the first time, as directed under WAC 173-26.

4. Development of a permit system to further the goals and policies of both the Act and Master Program.

Local governments have the prime responsibility for initiating the planning program and administrating the regulatory requirements. The Washington Department of Ecology (DOE) must approve the Shoreline Master Program before it becomes effective. The City of Monroe must develop a Shoreline Master Program that is consistent with the guidance and intent provided in the Shoreline Management Act. The role of the DOE is to provide support and review of the Shoreline Master Program and subsequent shoreline permit requests.

C. Purpose of the Shoreline Master Program

The Shoreline Management Act defines a Master Program as a "comprehensive use plan for a described area." The shoreline planning process differs from the more traditional planning process in that the emphasis is on protecting the shoreline environment and utilizing the shoreline appropriately for preferred uses through management of uses, rather than trying to maximize development potential.

The purposes of the Monroe Shoreline Master Program are:

1. To carry out the responsibilities assigned to the City of Monroe by the Washington State Shoreline Management Act (RCW 90.58).

2. To promote the public health, safety, and general welfare by providing a guide to regulations for the future development of the shoreline resources of the City of Monroe.

3. To further, by adoption, the policies of RCW 90.58, and the goals of this Master Program, both described in this document.

1. Legislative Findings and Washington Shoreline Management Act Policies

According to the Revised Code of Washington (RCW) 90.58.020, the Washington State legislature finds the shorelines of the state are among the most valuable and fragile of the state's natural resources and that there is great concern throughout the state relating to their utilization, protection, restoration, and preservation. In addition, it finds that ever-increasing pressures of additional uses are being placed in the shorelines, necessitating an increase in the coordination in the management and development of the shorelines of the state. The legislature further finds that many of the shorelines of the state and uplands adjacent thereto are in private ownership and that unrestricted construction on the privately owned or publicly owned shorelines of the state is not in the best public interest associated with the shorelines which, at the same time, shall be consistent with public interest; therefore, coordinated planning is necessary in order to protect the public interest associated with the shorelines of the state. There is, therefore, a clear and urgent demand for a planned, rational, and concerted effort, jointly performed by federal, state, and local governments, to prevent the inherent harm in an uncoordinated and piecemeal development of the state's shorelines.

It is the policy of the state to provide for the management of the shorelines of the state by planning for and fostering all reasonable and appropriate uses. This policy is designed to ensure the development of these shorelines in a manner that, while allowing for limited reduction of rights of the public navigable water, will promote and enhance the public interest. This policy is intended to protect against adverse effects to the public health, the land and its vegetation and wildlife, and the waters of the state and their aquatic life, while generally protecting public rights of navigation and its associated activities.

2. Shorelines of the State and Shorelines of Statewide Significance – the Skykomish River

The Shoreline Management Act defines "shorelines of the state" as the total of all "shorelines" and "shorelines of statewide significance" within the state. The Washington Administrative Code (WAC) further specifies certain streams as shorelines of the state, WAC 173-18-350 (Snohomish County. Streams). The Skykomish River and Woods Creek are both identified as shorelines of the state. In addition, lakes larger than 20 acres are considered "shorelines of the state." Although the Tye Stormwater Facility is not a natural lake and was constructed for the purpose of detaining stormwater generated by development of the Fryelands area of Monroe, DOE determined in June 2007 that it meets the State definition of a "shoreline of the state." Accordingly, this updated SMP will for the first time regulate the Tye Stormwater Facility as a shoreline.

Shorelines of statewide significance in Western Washington, as defined by RCW 90.58.030, include "natural rivers or segments" of rivers that are "downstream of a point where the annual flow is measured at one thousand cubic feet per second or more" and "those shorelands associated with" these waters. The legislature determined that the Skykomish River met the criteria, and in WAC 173-18, designated this river as a shoreline of statewide significance.

Shorelines thus designated are important to the entire state. Because the shorelines of the Skykomish River are a major source of benefit for all people in the state, the Monroe Shoreline Master Program gives preference to the shoreline uses that favor public and long range goals. Accordingly, this Master Program gives preference to uses that meet the principles outlined below, listed in the order of preference. These principles, defined in RCW 90.58.020, are incorporated into the City of Monroe Shoreline Master Program:

1. Recognize and protect the statewide interest over local interest.
2. Preserve the natural character of the shoreline.
3. Result in long-term over short-term benefit.
4. Protect the resources and ecology of shorelines.
5. Increase public access to publicly owned areas of the shoreline.
6. Increase recreational opportunities for the public on the shoreline.

In the implementation of this policy, the public's opportunity to enjoy the physical and aesthetic qualities of natural shorelines of the state shall be preserved to the greatest extent feasible, consistent with the overall best interests of the state and the people. To this end, uses shall be preferred that are consistent with control of pollution and prevention of damage to the natural environment or are unique to, or dependent on use of, the state's shorelines. Alteration of the natural condition of the shorelines of the state, in those limited instances when authorized, shall be given priority for single-family residences, parks, and other improvements facilitating public access to shorelines of the state, industrial and commercial developments which are particularly dependent on their location on or use of the shorelines of the state, and other development that will provide an opportunity for substantial numbers of people to enjoy the shorelines of the state.

Permitted uses in the shorelines of the state shall be designated and conducted in a manner to minimize, insofar as practical, any resultant damage to the ecology and environment of the shoreline areas, and any interference with the public's use of the water.

D. The Monroe Shoreline Master Program

1. Amendment History

1975 Shoreline Master Program

The City of Monroe adopted its first Shoreline Master Program (SMP), prepared by Snohomish County (County), on May 28, 1975. The County prepared the SMP for the unincorporated areas of Snohomish County as well as the municipalities of Arlington, Brier, Gold Bar, Granite Falls, Index, Lake Stevens, Monroe, Mountlake Terrace, Sultan, and Woodway.

Snohomish County had extensive public involvement for the development of the SMP. The County made a concerted effort to implement the approach for citizen participation as outlined in the Washington Administrative Code (WAC) 173-16-040(1) (Final Guidelines). The County Board of Commissioners established a Citizens Advisory Committee (CAC) that served as the primary vehicle for gathering public input during the planning process. The CAC was composed of 50 citizens, of which 36 were "citizens at large."

In addition to gathering information, the CAC was also responsible for formulating the draft SMP, including the submission of findings and recommendations to the Snohomish County Planning Commission.

The County also established a Technical Advisory Panel (TAP) to advise the CAC. The TAP consisted of representatives of various public and private agencies having the information and expertise related to shoreline management problems and use activities.

Snohomish County worked on their master program between 1973 and 1974, with final adoption by the Snohomish County Board of County Commissioners on September 25, 1974. Their process included the citizen committee, field trips, four public hearings before the Snohomish County Planning Commission, and three public hearings before the County Board of County Commissioners before the final adoption.

1981 Shoreline Master Program Amendments

Between 1980 and 1981, City staff worked with the Planning Commission and City Council to make the City of Monroe SMP more consistent with the actual zoning within the City and the Comprehensive Plan land use designations. The revisions included three changes to the shoreline designations and various text amendments to elements, goals, and policies.

The map amendments were as follows: the western boundary of the City along the southern boundary of State Route 2 from Rural to Urban, Woods Creek south of State Route 2 from Rural to Conservancy, and Woods Creek north of State Route 2 from Rural to Urban. Text amendments were made to three sections of the SMP: Master Program Elements, Shoreline Planning Elements, and Shoreline Use Activities.

The Planning Commission reviewed these amendments at six public meetings, including one public hearing prior to forwarding a recommendation to the City Council. The City Council held an additional workshop before a public hearing to consider the amendments. The City Council adopted the final revision on October 14, 1981.

1982 Shoreline Master Program Amendments

In 1982 the City of Monroe further revised the 1980 amendments to reflect the recommendations made by the Washington State Department of Ecology (DOE). The additional amendments affected the 100-year floodplain boundary and two of the shoreline designations. The DOE requested that the City's 100-year floodplain be consistent with the U.S. Army Corps of Engineers study results.

The DOE also requested the northern Woods Creek shoreline designation be removed because the area was outside the City's jurisdiction and that the southern portion of Woods Creek

shoreline designation remain Rural, with an allowance for the lumber mill as a non-conforming use. The City Council adopted the subject amendments on October 27, 1982.

1989/1990 Shoreline Master Program Amendments

In 1989 the City considered two separate amendments to the Shoreline Master Program. The first amendment changed the shoreline designation for nine (9) lots along Terrace Street from Rural to Suburban. This change was made to better reflect the actual use of land within the shoreline jurisdiction. The City Council took final action on this amendment on July 26, 1989.

The second set of amendments included changes to various shoreline designations along Woods Creek, a revision to the shoreline boundary along the western corporate boundary of the City, and a revision to the wetland definition. The shoreline boundary and definition changes were made for compliance with changes in state law.

The Woods Creek amendments focused on the west bank of the creek. The 1975 Shoreline Master Program designated the entire area around Woods Creek as "Conservancy," which did not reflect the actual land uses along the west bank and outside of the 100-year floodplain. The proposed amendments recommended the designations along the west bank of Woods Creek, north of Ferry Street be changed from Conservancy to Urban, and the area south of Ferry Street was recommended to change from Conservancy to Suburban. The "Urban" designation allowed for commercial and industrial activities, and the "Suburban" designation allowed for residential uses.

In 1985 the State modified the language of the Shoreline Management Act to allow local jurisdictions to reduce the area of influence the Act has authority over. The City considered amendments removing the property in the northwest corner of the City, in the area currently known as the Fryelands Industrial Park and Monroe Valley Industrial Park. This amendment was proposed since the subject area did not flood frequently and was not generally associated with the shoreline of the Skykomish River. It was additionally argued that there were already several layers of permitting that protected development in the subject area, including a floodplain permit, the State Environmental Policy Act, and forthcoming sensitive areas regulations.

The Planning Commission reviewed these changes between February and May 1989, and held one public hearing on May 15, 1989. The City Council reviewed these amendments between April 1989 and January 1990. The Council took final action to approve the above amendments on January 10, 1990.

1998 Comprehensive Plan – Shoreline Element

Between 1997 and 1998, the City of Monroe worked on significant amendments to the 1994 City of Monroe Comprehensive Plan. The amendments included the establishment of a Shoreline Element, in compliance with Washington State House Bill 1724 (Regulatory Reform Act). The Regulatory Reform Act, passed in 1995, was adopted to improve government efficiency and required cities to incorporate their SMP into their comprehensive plans, as an element.

The Shoreline Element of the City of Monroe Comprehensive Plan includes the goal and policy statements of the SMP, a description of the applicable shoreline environments, a description of shoreline use activities, and a brief discussion on shorelines of statewide significance. This

element was not sent to the DOE for review since the existing SMP remained in place and was not amended.

The Monroe Planning Commission reviewed the proposed Shoreline Element between August and September 1997. After holding a public hearing, the Planning Commission forwarded a recommendation to the City Council to approve the proposed element. The City Council reviewed the proposed element and the Planning Commission's recommendation in January and February 1998. The City Council took final action to adopt the proposed element on February 11, 1998.

2002-2008 Shoreline Master Program Update

In November 2000, DOE adopted new Shoreline Master Program Guidelines. This was the first time the State had significantly updated the guidelines since their original adoption in 1971. The new guidelines incorporated the "best available science" criteria into the recommended policy and regulatory framework. The new guidelines also provided jurisdictions with the opportunity to pursue one of two "paths." One path (Path A) required a general level of shoreline inventory information, and similar general policies and regulations. The second path (Path B) required jurisdictions to provide a more detailed inventory of shoreline conditions, as well as more specific policy and regulatory language addressing protection and restoration of the shoreline. The two-path option was intended to offer jurisdictions, through adoption of a "Path B" Shoreline Master Program, the opportunity to seek protection from "takings" allegations resulting from recent listings under the Endangered Species Act.

The City of Monroe opted to pursue the higher level of legal protection offered under the Path B option and began an update of its 1975 Shoreline Master Program, as revised between 1979 and 1999. The City began with a shoreline inventory to collect scientific data on the existing conditions of the shoreline within the City of Monroe and the associated Urban Growth Areas (UGA).

The City applied for and received a grant from the Washington State DOE to complete a shoreline inventory in June 2001 (Appendix B). While the inventory was being compiled, the State's guidelines were appealed by various parties, and in August 2001, the Shorelines Hearings Board invalidated Parts III and IV of the new Shoreline Master Program guidelines, leaving only Parts I and II (procedural rules for Shoreline Master Program amendments). Because the City had already entered into an agreement with DOE, the City continued its work on the shoreline inventory, eventually completing it in November 2002.

Although new shoreline guidelines were not in place for the City to follow, the City of Monroe applied for and was awarded a second grant by the DOE to update the Shoreline Master Program (SMP) and shoreline regulations in June 2002. The City had already completed the inventory and intended on establishing a new master program that would provide some protection against a Takings claim under Endangered Species Act. During the same time the City was considering proceeding with the SMP update, there was discussion at the state level that the various groups who appealed the shoreline guidelines were willing to negotiate a settlement. In the summer of 2003, DOE issued new draft shoreline management guidelines for review. The new guidelines provide additional clarity for local governments and businesses and are simpler, by eliminating the two-path approach, than the 2000 version of the guidelines and they provide for private property protections. DOE adopted this new rule in December 2003.

The City began its review efforts in December 2002, by presenting the City of Monroe Planning Commission with a copy of the existing Shoreline Element of the City of Monroe Comprehensive Plan and Title 19 (Shoreline Management) of the Monroe Municipal Code. Between December 2002 and April 2007, the Planning Commission has held numerous public workshops to review proposed shoreline designations and a Shoreline Master Program template.

The City notified residents and property owners within the shoreline jurisdiction of the Shoreline Master Program update process and invited them to attend Planning Commission meetings and provide comment. In addition to the affected property owners, the City also notified parties of interest including the Tulalip Tribes of Washington, 1000 Friends of Washington, the Pilchuck Audubon Society, and The Stilly- Snohomish Fisheries Enhancement Task Force of the Shoreline Master Program update process. A public hearing before the Monroe Planning Commission on the Draft Shoreline Master Program was held on January 22, 2007, and continued to April 9, 2007. On May 14, 2007, the Planning Commission made its final recommendation to City Council to adopt the updated Shoreline Master Program. City Council held its first study session on the draft SMP on June 12, 2007. In June 2007, DOE determined that the Tye Stormwater Facility (TSF) must be regulated as a shoreline of the state. Accordingly, staff prepared additional analysis of TSF (Appendix C), noticed the newly affected property owners, and held a combined public hearing/Planning Commission meeting on August 13, 2007. The revised draft SMP was then returned to City Council for additional consideration at an August 28, 2007 study session and a final public hearing. City Council adopted the SMP on October 23, 2007.

City staff sent the Draft Plan to the State Office of Community, Trade and Economic Development (CTED) and other state agencies on May 16, 2006, for the required 60-day review period. In a letter dated May 18, 2006, CTED indicated that it had received the document and requested that the final document be sent to CTED following adoption. The staff also sent the document to the DOE for their review and approval.

In March 2008 the Department of Ecology held a public hearing on the draft document in Monroe. Testimony in support of the document was provided by Robin Hansen, representing Cadman Inc. Ecology also received three letters of comment: one each from the Snohomish County Department of Public Works, Cadman, Inc. and Welcome Four. Responses to the letters of comment were provided by the City of Monroe to Ecology. The Washington Office of the Attorney General also reviewed the revised draft on behalf of Ecology. Further revisions to the shoreline designations map were made to reflect local information concerning the precise boundary of the 100-year floodplain and to remove from shoreline jurisdiction those parcels that are already fully developed within the floodplain, but are otherwise not required to be regulated under the SMA. Contingent on incorporation of minor required edits, the Department of Ecology approved the SMP on July 28, 2008. These changes and minor editorial revisions were finalized on August 13, 2008.

This 2008 Shoreline Master Program includes the following sections of this document:

- Chapter 1 – Introduction
- Chapter 2 – Environment Designation Provisions
- Chapter 3 – General Provisions
- Chapter 4 – Shoreline Modification Provisions

- Chapter 5 – Shoreline Use Provisions
- Chapter 6 – Administration Provisions
- Chapter 7 – Shoreline Restoration Plan
- Chapter 8 - Definitions
- Appendix A – Critical Areas Regulations

2. Monroe Setting

Monroe is located in Snohomish County, approximately seventeen miles east of Everett and approximately seven miles north of the King/Snohomish County line, at the confluence of the Skykomish River and Woods Creek. The Skykomish River and Woods Creek are both designated as shorelines of the state (WAC 173-18-350 Snohomish County. Streams); the Skykomish River is also designated as a river of statewide significance. Both streams are fish bearing with native runs of chinook salmon and bull trout. The Tye Stormwater Facility is also regulated as a shoreline of the state as a lake exceeding 20 acres. See Figure 1 for a map of the City's regulated shorelines.

3. Monroe Shoreline Jurisdiction

The City of Monroe's former shoreline boundary appeared to have been based partially on the floodway and partially on the floodplain as mapped by the Federal Emergency Management Agency (FEMA). As part of initial Shoreline Inventory development (Appendix B), the shoreline boundary associated with the Skykomish River and Woods Creek was re-evaluated and updated. As stated in RCW 90.58.030, the upland extent of shoreline jurisdiction "means those lands extending landward for two hundred feet in all directions as measured on a horizontal plane from the ordinary high water mark; floodways and contiguous floodplain areas landward two hundred feet from such floodways; and all wetlands and river deltas associated with the streams, lakes, and tidal waters…." The section goes on to say that local government "may determine that portion of a one-hundred-year-flood plain to be included in its master program as long as such portion includes, as a minimum, the floodway and the adjacent land extending landward two hundred feet therefrom." The City has used its discretion to designate as regulated shoreline the larger of the 100-year floodplain or those areas landward 200 feet from the ordinary high water mark along the Skykomish River and Woods Creek shorelines where the waterbody is continuous with the City limits, and associated wetlands. The floodplain projection is based on 2006 FEMA data. For the purposes of the Shoreline Master Program, the City has locally modified the shoreline boundary to exclude portions of the floodplain to correct for local topography and site-specific conditions not available to FEMA. The Snohomish River floodplain as it extends into the Fryelands area is not part of shoreline jurisdiction, nor is the Skykomish River floodplain area west of Cadman and east of Al Borlin Park. Finally, the optional inclusion of areas up to the 100-year floodplain into shoreline jurisdiction was not extended to cover fully developed parcels, including the City's Wastewater Treatment Plant.

Within City limits, the Tye Stormwater Facility and shorelands 200 feet from its ordinary high water mark are also regulated by this SMP. The majority of the Tye Stormwater Facility and its associated shorelands are in the 100-year floodplain of the Snohomish River.

City of Monroe
Shoreline Environment Designations

Boundaries

- Monroe City Limits
- Shoreline Boundary

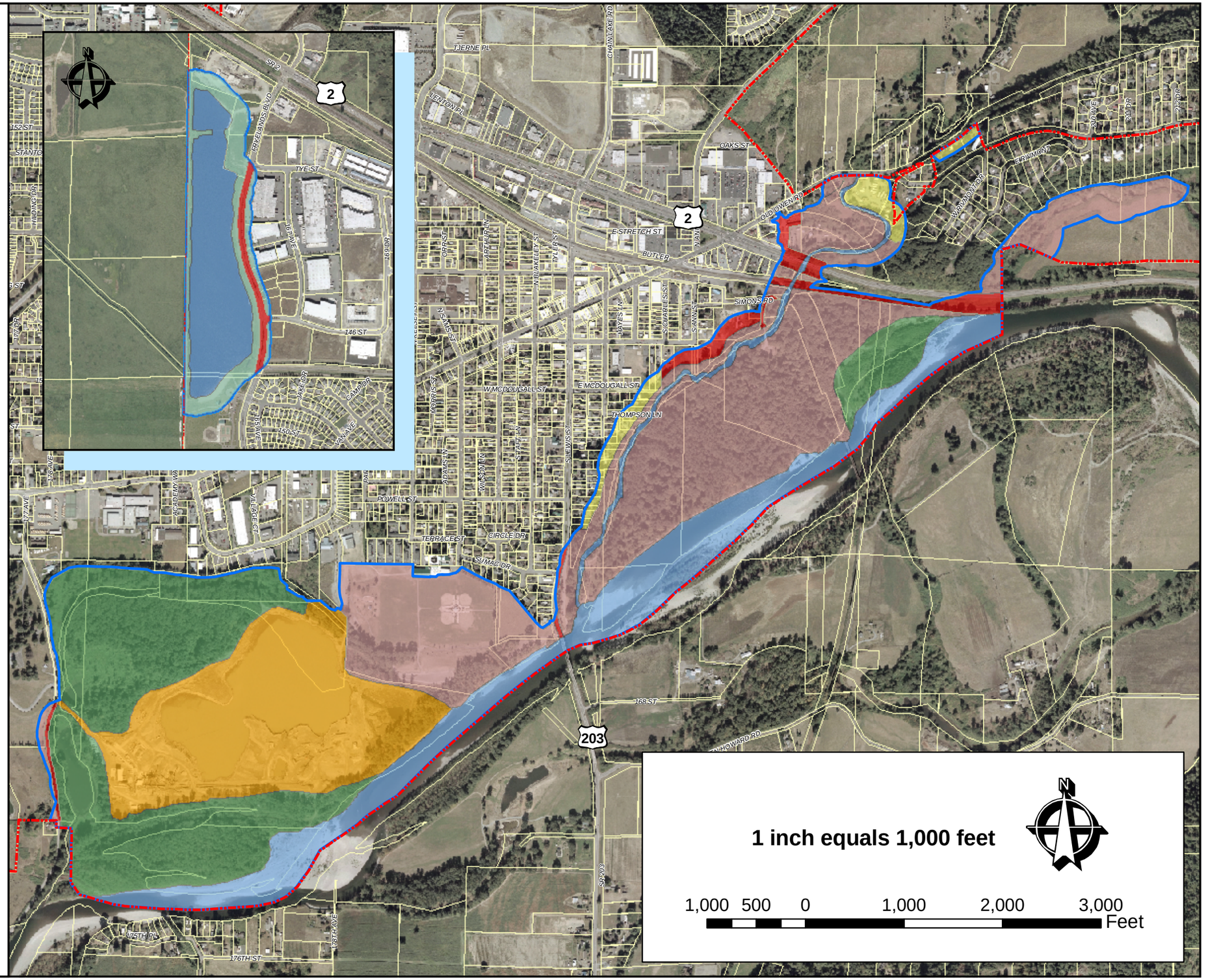
Shoreline Designations

- (A) - Aquatic
- (HI) - High Intensity
- (N) - Natural
- (SR) - Shoreline Residential
- (TSW) - Tye Stormwater Facility
- (UC) - Urban Conservancy
- (UCM) - Urban Conservancy Mining

Shoreline jurisdiction boundaries depicted on this map are approximate. They have not been formally delineated or surveyed and are intended for planning purposes only. Additional site-specific evaluation may be needed to confirm/verify information shown on this map.

Map data shown is the property of the City of Monroe. Inaccuracies may exist. The City of Monroe implies no warranties or guaranties regarding any aspect of data depiction. No real estate decisions are to be made using this map. Please contact the City of Monroe Community Development Department to verify the designation(s).

Project: Shoreline Environment Designations
Y:\GIS\Departments\CD\Shorelines\Shoreline Environment Designations (4-07-08).mxd
Source: City of Monroe 2008; Snohomish County 2008, Watershed Company 2002; FEMA 2006
Revised: 04-30-08
Author: R. Wright



As allowed by RCW 90.58.030, the City has chosen not to include in its Master Program critical area buffers lying outside shoreline jurisdiction. All shoreline jurisdiction boundaries depicted on Figure 1 are approximate. They have not been formally delineated or surveyed and are intended for planning purposes only. Additional site-specific evaluation will be needed at the project level to confirm/verify information shown on this map, particularly with respect to the actual location of the ordinary high water mark, the edges of wetlands, and the determination that a wetland is associated with a shoreline waterbody.

Wetlands within the City of Monroe shoreline planning area are depicted on Figure 9 of the *Shoreline Master Program Inventory for the City of Monroe's Shorelines: Skykomish River and Woods Creek* (The Watershed Company 2002) and on the more recently updated Critical Areas map (City of Monroe 2004). Wetlands that are located within the floodplain of the Skykomish River, Snohomish River, and Woods Creek are also "associated." Wetlands located outside the 100-year floodplain *may* be associated. In order to determine if such wetlands do influence, or are influenced by, the Skykomish River, Snohomish River or Woods Creek, a site-specific determination must be made to determine if they should be included within shoreline jurisdiction.

There are additional floodplain areas within the City limits that are not contiguous with the shoreline waterbody: 1) portions of the Fryelands are in the Snohomish River floodplain, 2) a small isolated section of the reformatory property west of Cadman is in the Skykomish River floodplain, and 3) Skykomish River floodplain area east of Al Borlin Park and north of SR 2. These shoreline areas within the City are separated from their respective waterbodies by Snohomish County jurisdiction. All areas are beyond 200 feet of the river's ordinary high water mark and are not designated as floodway; they are outside of the minimum area required to be designated as shoreline jurisdiction. Inclusion of these areas in the City's shoreline jurisdiction based on their occurrence in the floodplain would increase the regulatory burden on already developed areas and/or would not provide any meaningful protection to the waterbodies in question beyond that provided by the City's Critical Areas Regulations. In distant floodplain areas (and throughout the entire City), the primary potential affect of any development is limited to water quality and stormwater impacts which are regulated during and after construction by the City's stormwater manual (which is based on the latest Ecology stormwater manual) and after construction by individual property owner's land management practices that are not regulated by the SMP (such as car washing and herbicide applications).

The shoreline inventory information (Appendices B and C) provides the basis for designating the shoreline environments and management policies that will affect each part of the shoreline. Factors such as existing development patterns, biophysical capabilities and limitations, and the aspirations of the local citizenry all play a part in the shoreline environment designation categories selected. The management policies developed for each shoreline environment determine the uses and activities that can be permitted within each environment, and support the specific development standards that are also established. The City of Monroe has established seven (7) shoreline environments: Natural, Aquatic, High Intensity, Urban Conservancy, Urban Conservancy – Mining, Shoreline Residential, and Tye Stormwater Facility. These environments are discussed in Chapter 2: Environment Designations Provisions.

E. How the Shoreline Master Program is Used

The City of Monroe Shoreline Master Program is a planning document that outlines goals and policies for the shoreline of the City and it also establishes regulations for development occurring within the shoreline jurisdiction. The goals and policies of the Shoreline Master Program are included in the Shoreline Element of the City of Monroe Comprehensive Plan. The development regulations are adopted in Title 19 (Shoreline Management) of the Monroe Municipal Code.

In order to preserve and enhance the shorelines of the City of Monroe, it is important that all development proposals relating to the shoreline are evaluated in terms of the City's Shoreline Master Program, and the City Shoreline Administrator be consulted. The City Shoreline Administrator for the City of Monroe is the Community Development Director.

Some developments may be exempt from permits, while others may need to stay within established guidelines, or may require Substantial Development Permit and/or a Conditional Use Permit or Variance; **ALL** new development and uses must comply with the policies and regulations established by the state Shoreline Management Act as expressed through this local Shoreline Master Program adopted by the City of Monroe and DOE.

The Shoreline Management Act (SMA) defines for local jurisdictions the content and goals that should be represented in the Shoreline Master Programs developed by each community; within these guidelines, it is left to each community to develop the specific regulations appropriate to that community. Under the SMA, all shorelines of the state meeting the criteria established receive a given shoreline environmental designation. The purpose of the shoreline designation system is to ensure that all land use, development, or other activity occurring within the designated shoreline jurisdiction is appropriate for that area and provides consideration for the special requirements of that environment.

The Monroe Shoreline Master Program addresses a broad range of uses that could be proposed in the shoreline area. This thoroughness is intended to ensure that the Monroe shoreline area is protected from activities and uses that, if unmonitored, could be developed inappropriately and could cause damage to the ecological system of the shoreline, displace "preferred uses" as identified in Chapter 90.58 RCW, or cause the degradation of the aesthetic values of the shoreline that the community enjoys. The Shoreline Master Program provides the regulatory parameters within which development can occur, or it states that the community considers a certain type of use or activity is unacceptable within the City's shoreline jurisdiction, or it states that a use or activity may be considered when a discretionary permit is applied (such as a Conditional Use Permit or shoreline Variance), but that the community should be able to ensure that the development is carried out in such a way that the public's interest protecting the shoreline is retained.

1. When Is a Permit Required?

The Shoreline Master Program regulates "development," and further defines what is considered "substantial development" and would, therefore, require a Shoreline Substantial Development

Permit (SSDP), unless the development/activity is exempt. Some development may require a Conditional Use Permit or a shoreline Variance from the provisions of the Master Program. Review under the State Environmental Policy Act (SEPA) may also be required.

"Development," is defined by the Shoreline Management Act of 1971 as:

> A use consisting of the construction or exterior alteration of structures; dredging, drilling; dumping; filling; removal or any sand, gravel, or minerals; bulkheading; driving of piling; placing of obstructions; or any project of a permanent or temporary nature which interferes with the normal public use of the surface of the waters of the state subject to Chapter 90.58 RCW at any state of water level (RCW 90.58.030(3d)).

This definition indicates that the "development" regulated by the Shoreline Management Act includes not only those activities that most people recognize as "development," but also those activities that citizens may do around their own home. While the impact of these potential "developments" may seem inconsequential at first, they may have unwanted and damaging effects on the river ecology, the property of others, and the shoreline aesthetics.

Projects that are identified as "developments," but not "substantial developments," do not require a Shoreline Substantial Development Permit; however, they must still comply with all applicable regulations in the City's Shoreline Master Program, including critical areas regulations. In addition, some developments may require a Conditional Use Permit or shoreline Variance from the Shoreline Master Program's provisions, although they do not meet the definition of a "substantial development."

"Substantial development" is any "development" where the total cost or fair market value exceeds five thousand dollars ($5,000), or any development that materially interferes with the normal public use of the water or shoreline of the state. The five thousand dollar ($5,000) threshold will be adjusted for inflation by the Office of Financial Management every five years, beginning July 1, 2007, based upon changes in the consumer price index during that time period. Under the Shoreline Management Act, some types of development are exempt from the requirement to apply for and receive a permit before beginning work per RCW 90.58.030(3)(e). A complete list of developments and uses that are not considered "substantial development" is found in Chapter 8: Definitions under "substantial development."

2. The Permit Process

The City's Shoreline Administrator can help determine if a project is classified as a substantial development, determine if a permit is necessary or if a project is exempt from permit requirements, and identify which regulations in the SMP may apply to the proposed project. The Administrator can also provide information on the permit application process and how the SMP process relates to, and can coordinate with, the State Environmental Policy Act (SEPA) process. The permitting process can be divided into three phases: pre-application, submittal, and review.

3. The Shoreline Permit

There are three types of permits: the Substantial Development Permit, the shoreline Conditional Use Permit, and the shoreline Variance permit. All of these permits use the same application form; however, they are processed slightly differently and have different criteria for approval.

Requests for a shoreline Substantial Development Permit, Variance, or a Conditional Use Permit require review by the City of Monroe Hearing Examiner (per Monroe Municipal Code, Chapter 21.20.050). There may be instances where a Conditional Use Permit or shoreline Variance may be approved without the need for a Substantial Development Permit. The Hearing Examiner will hold a public hearing on the proposal and approve, approve with conditions, or deny the application. The Hearing Examiner's decision is final, unless an appeal is applied for consistent with the criteria established in the Monroe Municipal Code Chapter 21.60 (Appeals). Requests for Conditional Use Permits and shoreline Variances require final approval by DOE. A description of shoreline application procedures and review criteria are discussed in Chapter 6, Administrative Provisions and in Title 19 of the Monroe Municipal Code.

A map of the shoreline jurisdiction and a description of the various shoreline designations are presented in Chapter 2 (Environment Designation Provisions).

4. Relationship of this Shoreline Master Program to Other Plans

In addition to compliance with the provisions of the Shoreline Management Act of 1971, the Monroe Shoreline Master Program (SMP) must be mutually consistent with local plans and policy documents, specifically, the Monroe Comprehensive Plan and the City's Critical Areas Regulations (MMC Chapter 20.05), as incorporated herein (Appendix A). The Monroe SMP must also be mutually consistent with the regulations developed by the City to implement its plans, such as the zoning code and subdivision regulations, as well as building construction and safety requirements. When there is a conflict, the most restrictive regulations, as determined by the City, should apply.

Submitting an application for a shoreline development or use does not exempt an applicant from complying with any other local, county, state, regional, or federal statutes or regulation, which may also be applicable to such development or use.

Chapter 2: Environment Designation Provisions

A. Introduction

Seven environment designations have been adopted for the City's shoreline areas: Aquatic, Natural, Urban Conservancy, Urban Conservancy-Mining, Shoreline Residential, High Intensity, and Tye Stormwater Facility. The criteria for assigning a specific designation to a particular section of shoreline are outlined in Ecology's Shoreline Master Program Guidelines, WAC 173-26-211(5). The most important differences between the City's proposed environment designations and the criteria provided in the WAC are the absence of a "Rural Residential" environment and the inclusion of "Urban Conservancy-Mining" and "Tye Stormwater Facility" environments. The reasons for these differences are that Monroe is an Urban Growth Area under GMA and therefore not appropriate for a "Rural Residential" designation, and there is a need for an environment that recognizes the specific characteristics of the existing permitted aggregate extraction operations on the Skykomish River and the created stormwater detention pond in Lake Tye Park.

Figure 1 illustrates the shoreline designations, as described below.

Any area not explicitly assigned an environment designation shall be designated "Urban Conservancy."

B. Designations

1. "Natural" Environment

Purpose

The purpose of the "Natural" environment is to protect and restore those shoreline areas that are relatively free of human influence or that include intact or minimally degraded shoreline functions intolerant of human use. These systems require that only very low-intensity uses be allowed in order to maintain the ecological functions and ecosystem-wide processes.

Designation Criteria

A "Natural" environment designation will be assigned to shoreline areas with any of the following characteristics:

- The shoreline is ecologically intact and therefore currently performing an important, irreplaceable function or ecosystem-wide process that would be damaged by human activity;
- The shoreline is considered to represent ecosystems and geologic types that are of particular scientific and educational interest;
- The shoreline is unable to support new development or uses without significant ecological impacts to ecological functions or risk to human safety;
- The shoreland is especially sensitive to human disturbance and important for the conservation and recovery of priority species;
- The shoreland is relatively far from human development and provides food or habitat for a priority, threatened, or endangered species; or
- The shoreland has unique recreational and scenic value that would be degraded by human development

In the City of Monroe, the following areas are designated "Natural":

1. Lands within shoreline jurisdiction adjacent to, and west of, the "Aquatic" environment along Al Borlin Park, between the main channel of the Skykomish River and the side channel as it meanders over time;

2. Wetlands and forested upland habitat to the north, west and south of the Cadman operations area, located generally east of 177th Avenue SE, south of the Park Place Elementary school playing fields, and north of the "Aquatic" environment along the Skykomish River. The boundary between the forested/wetland areas and the active mining site are established in Figure 2 of this SMP.

Rationale: The highest quality, relatively intact, Category I wetlands and some areas of forested buffer located within shoreline jurisdiction were selected to receive the Natural designation. These areas fringe the active Cadman operation at the south end of the City (which will ultimately be transferred to the City for management as a park) and an area at the east end of Al Borlin Park. Both of these areas have high wildlife value, frequently interact with the Skykomish River, and have some level of current protection as they are designated as Parks/Open Space. The narrow Category I wetland fringe along Woods Creek and the narrow strips of Category I wetland through Al Borlin Park flanking railroad beds were not selected for designation as Natural because of their close proximity to residential, industrial, commercial, or active park development. The narrow, linear nature of these other Category I wetlands also reduces their wildlife value relative to the selected wetlands.

Management Policies

1. Any use that would substantially degrade the ecological functions or natural character of the shoreline area should be prohibited.

2. The following new uses should not be allowed in the "Natural" environment:

    - Commercial uses.

- Industrial uses.
- Nonwater-oriented recreation.
- Roads, utility corridors, and parking areas that can be located outside of "Natural"-designated shorelines.

3. Single-family residential development is prohibited within the "Natural" environment.

4. Scientific, historical, cultural, educational research uses, and low-intensity water-oriented recreational access uses may be allowed provided that no significant ecological impact on the area will result.

5. New development or significant vegetation removal that would reduce the capability of vegetation to perform normal ecological functions should not be allowed. The subdivision of property in a configuration that, to achieve its intended purpose, will require significant vegetation removal or shoreline modification that adversely impacts ecological functions should not be allowed. That is, each new parcel must be able to support its intended development without significant ecological impacts to the shoreline ecological functions or to the vegetation necessary to maintain ecological functions.

6. Uses that are consumptive of physical, visual, and biological resources should be prohibited.

7. Physical alterations should only be considered when they serve to protect a significant, unique, or highly valued feature that might otherwise be degraded or destroyed or for public access where no significant ecological impacts would occur.

8. Uses and activities permitted in locations adjacent to shorelines designated "Natural" should be compatible and should ensure that the integrity of the "Natural" environment will not be compromised.

2. "Aquatic" Environment

Purpose

The purpose of the "Aquatic" environment is to protect, restore, and manage the unique characteristics and resources of the areas waterward of the ordinary high water mark.

Designation Criteria

An "Aquatic" environment designation will be assigned to shoreline areas waterward of the ordinary high water mark.

Management Policies

1. Allow new over-water structures only for water-dependent uses, public access, or ecological restoration.

2. The size of new over-water structures should be limited to the minimum necessary to support the structure's intended use.

3. In order to reduce the impacts of shoreline development and increase effective use of water resources, multiple use of over-water facilities should be encouraged.

4. Provisions for the "Aquatic" environment should be directed towards maintaining and restoring habitat for priority aquatic species.

5. All developments and uses on navigable waters or their beds should be located and designed to minimize interference with surface navigation, to consider impacts to public views, and to allow for the safe, unobstructed passage of fish and wildlife, particularly those species dependent on migration.

6. Uses that adversely impact the ecological functions of critical aquatic habitats should not be allowed except where necessary to achieve the objectives of RCW 90.58.020, and then only when their impacts are mitigated according to the sequence defined in Chapter 3, Section E.3.

7. Shoreline uses and modifications should be designed and managed to prevent degradation of water quality and alteration of natural hydrographic conditions.

8. In appropriate areas, where there is not unavoidable conflict with commercial navigation, fishing and recreational uses of the water should be protected against competing uses that would interfere with these activities.

9. Development of underwater pipelines and cables in the aquatic environment should be discouraged except where adverse environmental impacts can be shown to be less than the impact of upland alternatives; when permitted, such facilities should include adequate provisions to ensure against substantial or irrevocable damage to the environment.

10. Abandoned and neglected structures that cause adverse visual impacts or are a hazard to public health, safety, and welfare should be removed or, if conforming with respect to use and location, restored to a usable condition consistent with the provision of this program.

11. The above policies apply to the Aquatic environment associated with the Tye Stormwater Facility environment only as they are consistent with maintaining the primary purpose of the human-made Tye Stormwater Facility, collecting and treating stormwater runoff from existing and future developments within its catchment area. However, any loss of shoreline ecological functions must be mitigated.

3. "High Intensity" Environment

Purpose

The purpose of the "High Intensity" environment is to accommodate high-intensity water-oriented and nonwater-oriented commercial, transportation and industrial uses while protecting existing ecological functions and restoring ecological functions in areas that have been previously degraded.

Designation Criteria

A "High Intensity" environment designation will be assigned to shoreline areas within incorporated municipalities if they currently support high-intensity uses related to commerce, transportation or navigation; or are suitable and planned for high-intensity water-oriented uses.

In the City of Monroe, the following areas are designated "High Intensity":

1. Lands within shoreline jurisdiction situated landward of the top of bluff as determined by the City above Woods Creek, between Charles Street and Simons Road;

2. Lands within shoreline jurisdiction in commercial development on the south side of Old Owen Road, west of Woods Creek and upstream of US-2; and

3. Rights-of-way of active transportation corridors, including SR 2, SR 203, 177th Avenue SE, Fryelands Boulevard, and the active Burlington Northern Santa Fe railroad lines.

Rationale: Areas that currently support high-intensity commercial, industrial or transportation uses were designated as High Intensity. These areas are also zoned Commercial, Light Industrial, or General Industrial. Except for road and railroad corridors, none of the areas designated as High Intensity abut the OHWM of Woods Creek, the Skykomish River, or the Tye Stormwater Facility.

Management Policies

1. In regulating uses in the "High Intensity" environment, first priority should be given to water-dependent uses. Second priority should be given to water-related and water-enjoyment uses. Nonwater-oriented uses may also be allowed in limited situations where they do not conflict with or limit opportunities for water-oriented uses or on sites where there is no direct access to the shoreline. Such specific situations should be identified in shoreline use analysis or special area planning.

   If an analysis of water-dependent use needs as described in WAC 173-26-201(3)(d)(ii) demonstrates the needs of existing and envisioned water-dependent uses for the planning period are met, then provisions allowing for a mix of water-dependent and nonwater-dependent uses may be established. If those shoreline areas also provide ecological functions, apply standards to assure no net loss of those functions.

2. Full utilization of existing urban areas should be achieved before further expansion of intensive development is allowed. Reasonable long-range projections of regional economic need should guide the amount of shoreline designated "high-intensity." However, consideration should be given to the potential for displacement of nonwater-oriented uses with water-oriented uses when analyzing full utilization of urban waterfronts and before considering expansion of such areas.

3. In order to make maximum use of available shorelines and to accommodate future uses, the redevelopment of shoreline areas with existing substandard or obsolete development should be encouraged.

4. Policies and regulations shall assure no net loss of shoreline ecological functions as a result of new development. Where applicable, new development shall include environmental cleanup and restoration of the shoreline to comply with any relevant state and federal law.

5. The City will encourage conservation and/or restoration projects, such as conserving and enhancing riparian forest and vegetation or recreating off-channel habitat for salmonids.

6. Where feasible, visual and physical public access should be required as provided for in the Public Access Element.

7. Link, where practical, public access points with transportation routes such as bicycle and hiking paths.

4. "Urban Conservancy" Environment

Purpose

The purpose of the "Urban Conservancy" environment is to protect and restore ecological functions of open space, floodplain and other sensitive lands where they exist in urban and developed settings, while allowing a variety of compatible uses.

Designation Criteria

An "Urban Conservancy" environment designation will be assigned to shoreline areas appropriate and planned for development that is compatible with maintaining or restoring the ecological functions of the area, that are not generally suitable for water-dependent uses and that lie in incorporated municipalities or urban growth areas if any of the following characteristics apply:

- They are suitable for water-related or water-enjoyment uses;
- They are open space, floodplain or other sensitive areas that should not be more intensively developed;
- They have potential for ecological restoration;
- They retain important ecological functions, even though partially developed; or
- They have the potential for development that incorporates ecological restoration.

In the City of Monroe, the following areas are designated as "Urban Conservancy:"

1. Lands within shoreline jurisdiction along Woods Creek, upstream of US 2, with the exception of lands designated Shoreline Residential and High Intensity;

2. South of US 2, the entire shoreline of Woods Creek extending to the bottom of the bluff on the west side, and to the Skykomish River on the east side, with the exception of lands designated Natural upstream of the old railroad trestle, lands designated Shoreline Residential and High Intensity upland of the top of the bluff on the west side of Woods Creek, railroad and roadway lands designated High Intensity, and areas within shoreline jurisdiction designated Aquatic waterward of the Skykomish River OHWM;

3. West of the Skykomish River bridge, lands within shoreline jurisdiction lying generally south of the City's wastewater treatment plant and encompassing the City's Skykomish River Park (Sky River Park), east of the Cadman mining operations area;

4. Associated wetlands north of SR 2 and south and east of the Rivmont neighborhood, extending up an old side-channel of the Skykomish River; and

5. Lands between the western boundary of shoreline jurisdiction on the Reformatory property and 177th Avenue SE.

Rationale: Monroe's shoreline parks (Al Borlin Park, Skykomish River Centennial Park, and Lewis Street Park) each meet at least three of the five designation criteria, and Al Borlin Park meets all five. They are zoned as Parks/Open Space, retain varying levels of ecological function, have high potential for restoration, and are not suitable for more intensive water-dependent uses. The remaining areas selected for Urban Conservancy either have a moderate level of function as relatively undisturbed floodplain that has some development, but still retains ecological function (e.g., west side of Woods Creek upstream of SR 2), and/or are zoned for commercial or residential development and have other biological characteristics and a landscape position that make the more protective designation of Natural inappropriate.

Management Policies

1. Uses that preserve the natural character of the area or promote preservation of open space, floodplain or sensitive lands either directly or over the long term should be the primary allowed uses. Uses that result in restoration of ecological functions should be allowed if the use is otherwise compatible with the purpose of the environment and the setting.

2. During development and redevelopment, all reasonable efforts should be taken to restore ecological functions. Where feasible, restoration and public access should be required of all nonwater-dependent development.

3. Standards should be established for shoreline stabilization measures, vegetation conservation, water quality, and shoreline modifications within the "Urban Conservancy" designation. These standards shall ensure that new development does not result in a net loss of shoreline ecological functions or further degrade other shoreline values.

4. Public access and public recreation objectives should be implemented whenever feasible and significant ecological impacts can be mitigated.

5. Water-oriented uses should be given priority over nonwater-oriented uses. For shoreline areas adjacent to commercially navigable waters, water-dependent uses should be given highest priority.

5. "Urban Conservancy – Mining" Environment

Purpose

The purpose of the "Urban Conservancy - Mining" environment is to protect and restore ecological functions in settings where aggregate mining activities have historically been conducted and/or are currently being conducted under approved permits. All other uses allowed

under the "Urban Conservancy" designation should be permitted within the "Urban Conservancy - Mining" designation, subject to the appropriate management policies under both designations.

Designation Criteria

An "Urban Conservancy - Mining" environment designation will be assigned to shoreline areas appropriate and planned for continued aggregate mining activities, and that lie within the incorporated boundary of the City of Monroe or its urban growth area.

In the City of Monroe, the following areas are designated "Urban Conservancy - Mining":

1. Lands within shoreline jurisdiction containing the area of existing mining operations as indicated on Figure 2 of this SMP, approved under Shoreline Substantial Development Permit, and described generally as lying east of 177th Street SE, south of Village Way, west of the City's Skykomish River Park, and north of the Skykomish River.

Management Policies

1. Restoration of ecological functions must be implemented as part of the reclamation process at the end of a mining operation.

2. Aggregate mining operations within the "Urban Conservancy – Mining" designation shall comply with established standards for shoreline stabilization, vegetation conservation, water quality, and shoreline modifications to ensure that new mining operations do not further degrade the shoreline and are consistent with an overall goal to improve ecological functions and habitat for priority species. See Chapter 5, Section E – Mining, Regulations 25-30 for regulations about reclamation.

3. Public access and public recreation objectives should be implemented whenever feasible and significant ecological impacts mitigated.

6. "Shoreline Residential" Environment

Purpose

The purpose of the "Shoreline Residential" environment is to accommodate residential development and appurtenant structures that are consistent with this chapter. An additional purpose is to provide appropriate public access and recreational uses.

Designation Criteria

A "Shoreline Residential" environment designation will be assigned to shoreline areas that are predominantly single-family or multifamily residential development or are planned and platted for residential development.

In the City of Monroe, the following areas are designated "Shoreline Residential":

1. Lands within shoreline jurisdiction on the three existing residential parcels east of Woods Creek and immediately south of Old Owen Road;

2. Portions of residential parcels within shoreline jurisdiction along the top of the bluff west of Woods Creek, between Lewis Street and Charles Street; and

3. The area within shoreline jurisdiction of two residential parcels located between Old Owen Road and Calhoun Road, approximately five hundred (500) feet east of the intersection of the two roads.

Rationale: Areas zoned/planned for and areas containing single- or multifamily residential development were mapped as Shoreline Residential. On the west side of Woods Creek, just upstream of Lewis Street Park, the residential parcels that extend to the creek were split into Shoreline Residential landward of the top of bank, and Urban Conservancy waterward of the top of bank.

Management Policies

1. Development should be permitted only in those shoreline areas where adequate setbacks or buffers are possible to protect ecological functions; there are adequate access, water, sewage disposal, utilities systems, and public services available; and where the environment can support the proposed use in a manner which protects or restores the ecological functions.

2. Standards for density or minimum frontage width, setbacks, lot coverage limitations, buffers, shoreline stabilization, vegetation conservation, critical area protection, and water quality shall be set to assure no net loss of shoreline ecological functions, taking into account the environmental limitations and sensitivity of the shoreline area, the level of infrastructure and services available, and other comprehensive planning considerations.

3. Multi-family and multi-lot residential and recreational developments should provide public access and joint use for community recreational facilities.

4. Access, utilities, and public services should be available and adequate to serve existing needs and/or planned future development.

5. Commercial development should be limited to water-oriented uses.

6. Water-oriented recreational uses should be allowed, where impacts to ecological functions and residential properties can be prevented.

7. "Tye Stormwater Facility" Environment

Purpose

The purpose of the "Tye Stormwater Facility" environment is to encourage and enhance recreational uses, public access, and appropriate development while accomplishing the water body's primary function: storing and treating storm water runoff from nearby lands.

Designation Criteria

A "Tye Stormwater Facility" environment designation will be assigned to shoreline areas if they are human-made stormwater detention facilities with recreational and/or public access opportunities.

In the City of Monroe, the following areas are designated "Tye Stormwater Facility:"

1. Lands within shoreline jurisdiction (200 feet from the ordinary high water mark) surrounding "Lake Tye," located south of State Route 2, with the exception of the Fryelands Boulevard right-of-way designated High Intensity.

Rationale: "Lake Tye" is a human-made stormwater detention pond, originally excavated to provide fill to elevate the Fryelands development above the 100-year floodplain. Since its construction in the early 1990s, a walking path, swimming beach, informal gravel boat launch, skateboard park, and commercial development have been installed around the pond. The development houses water-enjoyment uses as well as nonwater-oriented uses. The area is planned for an additional commercial development. Additional parcels partially within shoreline jurisdiction house light industrial uses.

Management Policies

1. In regulating uses in the "Tye Stormwater Facility" environment, first priority should be given to water-dependent uses. Second priority should be given to water-related and water-enjoyment uses. Nonwater-oriented uses may also be allowed.

2. Policies and regulations shall assure no net loss of shoreline ecological functions relevant to the facility's primary purpose of holding and treating stormwater as a result of new development. Any loss of ecological functions as a result of maintaining the facility's primary purpose, expanding and improving recreational and public access uses, or constructing new developments shall be mitigated.

3. The City will encourage conservation and/or restoration projects, such as conserving and enhancing shoreline vegetation.

4. The City will encourage water-oriented recreational activities, such as swimming, angling, strolling, and small, non-motorized and electric motor boating.

5. Where feasible, visual and/or physical public access should be required.

C. Shoreline Use and Modification Matrix

The following matrices indicate the allowable uses and shoreline modifications and some of the standards applicable to those uses and modifications. Where there is a conflict between the chart and the written provisions in Chapters 3, 4, or 5 of this Shoreline Master Program, the written provisions shall apply.

Any use, development or substantial development not classified elsewhere in this Shoreline Master Program or listed below shall require a Conditional Use Permit (CUP).

The chart is coded according to the following legend. P = May be permitted C = May be permitted as a conditional use only X = Prohibited; the use is not eligible for a Variance or Conditional Use Permit N/A = Not applicable	Natural	High Intensity	Urban Conservancy	Urban Cons. - Mining	Shoreline Residential	Tye Stormwater Facility	Aquatic [1]
SHORELINE USE							
Agriculture	X	X	X	X	X	X	X
Aquaculture	X	X	X	X	X	X	X
Boating facilities	X	X	X[6]	C[12]	X	P[9]	P
Commercial:							
Water-dependent	X	P	C	X	X	P	X
Water-related, water-enjoyment	X	P	C	X	X	P	X
Nonwater-oriented	X	C	X	X	X	P	X
Flood hazard management	C[4]	P	P	P	P	P	X
Forest practices[7]	X	P	P	P	P	P	X
In-stream structures	X	C	C	C	C	C	C
Industrial:							
Water-dependent	X	P	X	C[5]	X	X	X
Water-related, water-enjoyment	X	P	X	C[5]	X	X	X
Nonwater-oriented	X	C	X	C[5]	X	P	X
Mining	X	X	X	C[5]	X	X	X
Parking (accessory)	X	P	P	C	P	P	X
Parking (primary, including paid)	X	X	X	X	X	X	X
Recreation:							
Water-dependent	C	P	P	P	P	P	C
Water-related, water-enjoyment	C	P	P	P	P	P	C
Nonwater-oriented	X	C	C[2]	C[2]	C	P	X
Single-family residential	X	X	X	X	P	X	X
Multifamily residential	X	P	X	X	P	X	X
Land division (See Section 6.B.7.)	X	P	X	X	P	P	X
Signs:							
On premises	X	P	X	X	X	P	X
Off premises	X	X	X	X	X	P	X
Public, highway	P	P	P	P	X	P	X
Solid waste disposal	X	X	X	X	X	X	X

The chart is coded according to the following legend. P = May be permitted C = May be permitted as a conditional use only X = Prohibited; the use is not eligible for a Variance or Conditional Use Permit N/A = Not applicable	**Natural**	**High Intensity**	**Urban Conservancy**	**Urban Cons. - Mining**	**Shoreline Residential**	**Tye Stormwater Facility**	**Aquatic [1]**
Transportation:							
Water-dependent	X	P	P	P	P	P	C
Nonwater-oriented	X	P[3]	C[3]	C[3]	C[3]	P	C
Roads, railroads	X	P[3]	C[3]	C[3]	P[3]	P	C
Utilities (primary)	X	P[3]	C[3]	C[3]	P[3]	P	C
SHORELINE MODIFICATIONS							
Shoreline stabilization:							
Beach restoration/enhancement	C[4]	P	P[4]	P[4]	P	P	See adjacent upland environment
Bioengineering	C[4]	P	P[4]	P[4]	P	P	
Revetments	X	C[4]	C[4]	C[4]	C[4]	C	
Bulkheads	X	C[4]	C[4]	C[4]	C[4]	C	
Breakwaters/jetties/rock weirs/groins	X	X	X	X	X	X	
Dikes, levees	X	X	X	X	X	P	
Dredging	X	X	X	X	X	P[10]	
Hazardous waste cleanup[8]	P	P	P	P	P	P	
Fill	X	X	X	C[4]	X	P	
Piers, docks	X	X	X	X	X	X[11]	

Notes to Matrix:

1. *The use or shoreline modification may be allowed in the Aquatic Environment if, and only if, permitted in the adjacent upland environment.*
2. *Public access, as approved by the City, is a condition of nonwater-dependent development on properties with shoreline waterbody frontage.*
3. *The use may be allowed provided there is no other feasible route or location.*
4. *The shoreline modification may be allowed for environmental restoration or if the City determines that there will be a net increase in desired shoreline ecological functions.*
5. *Continued aggregate washing, crushing and screening, and continued concrete batching facilities or concrete ready-mix facilities are permitted, together with accessory uses such as truck scales, office trailers, maintenance shops, equipment sheds, aggregate depots, and facilities for fueling equipment, provided that these facilities and activities are not expanded. See Section 5.E. Mining for conditions.*
6. *The existing boat launch at the Washington State Department of Fish and Wildlife Lewis Street Access Site may be modified and improved consistent with state and federal regulatory agency permits that must be obtained prior to Conditional Use Permit approval. No new boating facilities are allowed in the Urban Conservancy environment.*

7. *All forest practices subject to the Washington State Forest Practices Act (Title 222 WAC; Chapters 76.09 and 76.13 RCW) must conform to the provisions of that Act, this Shoreline Master Program, and any other applicable City requirements. See Section 3.L Vegetation Conservation and Appendix A Critical Areas Regulations of this Master Program for other conditions.*
8. *Any cleanup activities must be coordinated with approval and oversight by the Department of Ecology, or conducted under Ecology's Voluntary Cleanup Program.*
9. *New boating facilities may be constructed to provide improved access for non-motorized and small electric boats (≤1.5 hp). All facilities, including boat launches or piers and docks, will be designed in consultation with Washington Department of Fish and Wildlife. No facilities will be constructed to provide long-term moorage.*
10. *Dredging may only be conducted as necessary to maintain the stormwater detention function of the pond. Dredging must be conducted in a way that minimizes impacts to ecological functions and any impacts must be mitigated.*
11. *The prohibition on piers and docks does not apply to public recreational facilities, which are addressed under Boating Facilities.*
12. *The only new boating facility that may be permitted in the Urban Conservancy – Mining environment is a boat launch. A new boat launch or future improvements to a boat launch will be designed in consultation with Washington Department of Fish and Wildlife.*

D. Site Development Standards

Shoreline Environment	Natural/ Urban Conservancy/ UC - Mining	Tye Stormwater Facility	High Intensity	UC	Shoreline Residential

Land Use Zone[a]	LOS	PS	SC	LI	GC	GI	UR	MR
Setback/ buffer from the OHWM	200 ft[b]	200 ft[b, c]	25 ft	200 ft[b, c]	200 ft[b]	200 ft[b]	200 ft[b]	200 ft[b]
Height of Building[d]	35 ft	35 ft	35 ft	35 ft	35 ft	50 ft	35 ft	35 ft
Maximum lot coverage, as a percentage of total lot area[e]	10%	Same as the closest most restrictive zone	None[f]	75%	None[f]	75%	50%	60%
Side yard setbacks from the property line	25 ft	Same as the closest most restrictive zone	Based on the IBC/ IFC[g]	Based on the IBC/ IFC	Based on the IBC/ IFC[g]	Based on the IBC/ IFC[g]	5 ft for single-story, and 2 ft for each additional story	5 ft for single-story, and 2 ft for each additional story
Rear yard setbacks from the property line	25 ft	Same as the closest most restrictive zone	Based on the IBC/ IFC[g]	Based on the IBC/ IFC[g]	Based on the IBC/ IFC[g]	Based on the IBC/ IFC[g]	5 ft for single-story, and 2 ft for each additional story	5 ft
Front yard setbacks from the property line	50 ft from an arterial 25 ft from other streets	Same as the closest most restrictive zone	25 ft from arterial 20 ft from all other streets	25 ft from arterial 20 ft from all other streets	25 ft from arterial 20 ft from all other streets	25 ft from arterial 20 ft from all other streets	10 ft living portion 20 ft garage	20 ft from all street rights-of-way
Minimum shoreline frontage[h]	500 ft	200 ft	50 ft	50 ft	50 ft	50 ft	75 ft	50 ft

Notes:

a. *Land Use Zone Key: LOS=limited open space, PS=Public Open Space, SC=Service Commercial, LI=Light Industrial, GC=General Commercial, GI=General Industrial, UR=Urban Residential, MR=Multifamily Residential*

b. *Setback/buffer reduction shall require approval of a shoreline Variance. See Critical Areas Regulations adopted as part of this Shoreline Master Program in Appendix A for information regarding criteria and standards for setback/buffer reduction.*

c. *In the Tye Stormwater Facility environment designation, the OHWM setback/buffer is 25 feet.*

d. *"Height of building" means the vertical distance from the finished average grade level to the highest point of the roof surface of a flat roof, to the deck line of a mansard roof, and to the average height level between the eaves and ridge for a gable, hip or gambrel roof.*
e. *As defined in MMC 18.02.220, "Maximum Lot coverage" means the total impervious area to be covered by buildings, driveways, parking areas, sidewalks, pools, and similar impervious surface areas."*
f. *No established maximum lot coverage, except as required by the landscape and parking district requirements found in the Monroe Municipal Code.*
g. *IBC and IFC refer to International Building Code and International Fire Code.*
h. *Only applies when parcel abuts the shoreline waterbody.*
i. *Proposals that include structures taller than 35 feet must submit a view analysis based on the definition for "height" found in WAC 173-27-030(9).*

Chapter 3: General Provisions

A. Introduction

General policies and regulations are applicable to all uses and activities (regardless of Shoreline Master Program environment designation) that may occur along a jurisdiction's shorelines.

This chapter is broken up into different topic headings and is arranged alphabetically. Each topic begins with a discussion of background master program issues and considerations, followed by an applicability statement, general policy statements and regulations. The intent of these provisions is to be inclusive, making them applicable over a wide range of environments as well as particular uses and activities.

B. General

1. Applicability

The following regulations describe the requirements for all shoreline uses and modifications in all environment designation.

2. Policies

1. The City will periodically review conditions on the shoreline and conduct appropriate analysis to determine whether or not other actions are necessary to protect and restore the ecology, protect human health and safety, upgrade the visual qualities, and enhance residential and recreational uses on the City's shorelines. Specific issues to address in such evaluation include, but are not limited to:

    a. Water quality.

    b. Conservation of aquatic vegetation (control of noxious weeds and enhancement of vegetation that supports more desirable ecological and recreational conditions).

    c. Upland vegetation.

    d. Changing visual character as a result of new residential development, including additions, and individual vegetation conservation practices.

    e. Shoreline stabilization and modifications.

2. The City will keep records of all project review actions within shoreline jurisdiction, including shoreline permits, letters of exemption, and building permits.

3. Where appropriate, the City will pursue the policies of this Shoreline Master Program in other land use, development permitting, public construction, and public health and safety activities. Specifically, such activities include, but are not limited to:

    a. Water quality and storm water management activities, including those outside shoreline jurisdiction but affecting the shorelines of the state.

    b. Aquatic vegetation management.

    c. Health and safety activities, especially those related to sanitary sewage.

    d. Public works and utilities development.

4. Involve affected federal, state, and tribal governments in the review process of shoreline applications.

3. Regulations

1. All proposed uses and developments, including those that do not require a shoreline permit, occurring within shoreline jurisdiction, must conform to Chapter 90.58 RCW Shoreline Management Act and this Shoreline Master Program.

2. Shoreline uses, modifications, and conditions listed as "prohibited" shall not be eligible for consideration as a shoreline Variance or shoreline Conditional Use Permit.

3. The "policies" listed in this Shoreline Master Program will provide broad guidance and direction and will be used by the City in applying the "regulations."

4. Where provisions of this Shoreline Master Program conflict, the provisions most directly implementing the objectives of the Shoreline Management Act, as determined by the City, shall apply unless specifically stated otherwise.

5. All uses and development shall result in no net loss of ecological functions to the greatest extent feasible.

C. Archaeological and Historic Resources

1. Applicability

The following provisions apply to archaeological and historic resources that are either recorded at the State Historic Preservation Office and/or by local jurisdictions or have been inadvertently uncovered. Archaeological sites located both in and outside shoreline jurisdiction are subject to Chapter 27.44 RCW (Indian graves and records) and Chapter 27.53 RCW (Archaeological sites and records) and shall comply with Chapter 25-48 WAC (Archeological excavation and removal permit) as well as the provisions of this chapter.

2. Policies

1. Due to the limited and irreplaceable nature of the resource, public or private uses, activities, and development should be prevented from destroying or damaging any site having historic, cultural, scientific or educational value as identified by the appropriate authorities.

3. Regulations

1. Archaeological sites located both in and outside the shoreline jurisdiction are subject to RCW 27.44 (Indian Graves and Records) and RCW 27.53 (Archaeological Sites and Resources) and shall comply with WAC 25-48 as well as the provisions of this Shoreline Master Program.

2. The City shall notify the Tulalip Tribes upon receipt of application for work in shoreline areas. The property owner shall allow the Tulalip Tribes to examine the site at a mutually agreed upon time.

3. All shoreline permits shall contain provisions which require developers to immediately stop work and notify the City, affected tribes and the Washington State Office of Archaeology if any phenomena of possible archaeological interest are uncovered during excavations. In such cases, the developer shall be required to provide for a site inspection and evaluation by a professional archaeologist to ensure that all possible valuable archaeological data are properly salvaged.

4. Permits issued in areas known to contain archaeological artifacts and data shall include a requirement that the developer provide for a site inspection and evaluation by a professional archaeologist in coordination with affected Native American tribes. The permit shall require approval by the City before work can begin on a project following inspection. Significant archaeological data or artifacts shall be recovered before work begins or resumes on a project.

5. Significant archaeological and historic resources shall be permanently preserved for scientific study, education and public observation. Significant archaeological and historic resources shall be handled in conformance with the federal Native American Graves Protection and Repatriation Act. When the City determines that a site has significant archaeological, natural, scientific or historical value, a Substantial Development Permit shall not be issued for activities which would pose a threat to the site. The City may require that development be postponed in such areas to allow investigation of public acquisition potential and/or retrieval and preservation of significant artifacts.

6. In the event that unforeseen factors constituting an emergency as defined in RCW 90.58.030 necessitate rapid action to retrieve or preserve artifacts or data identified above, the project may be exempted from the permit requirement of these regulations. The City shall notify the State Department of Ecology, the State Attorney General's Office, and the State Historic Preservation Office of such a waiver in a timely manner.

7. Archaeological excavations may be permitted subject to the provisions of this program.

8. Identified historical or archaeological resources shall be considered in park, open space, public access and site planning, with access to such areas designed and managed so as to give maximum protection to the resource and surrounding environment.

9. Clear interpretation of historical and archaeological features and natural areas shall be provided when appropriate.

D. Critical Areas

1. Applicability

The following policies and regulations must be considered when making decisions affecting critical areas within Monroe's shoreline jurisdiction. In addition, specific policies and regulations are provided in Chapter 4, Shoreline Modification Provisions. This Shoreline Master Program adopts all regulations for critical areas as adopted by Ordinance 019/2003 in Monroe Municipal Code Chapter 20.05, except for the following:

- 20.05.050(B), Exemptions.
- 20.05.050(C), Exceptions.
- 20.05.055, Nonconforming uses.
- 20.05.080(A1), public agency and utility and reasonable use exception language.

Appendix A contains the adopted Critical Areas Regulations.

Critical areas are those lands especially vulnerable to development because of fragile biophysical characteristics and/or important resource values. The Growth Management Act (RCW 36.70A) defines critical areas as the following ecosystems:

- Critical aquifer recharge areas,
- Fish and wildlife conservation areas,
- Frequently flooded areas,
- Geologically hazardous areas, and
- Wetlands.

2. Policies

1. Unique, rare, and fragile and manmade features as well as scenic vistas, and wildlife habitats should be preserved and protected.

2. The diversity of aquatic life, wildlife, and habitat within the shoreline should be enhanced.

3. Conserve and maintain designated open spaces for ecological reasons and for educational and recreational purposes.

4. Recognize that the interest and concern of the public is essential to the improvement of the environment and sponsor and support public information programs to that end.

5. The level of public access should be appropriate to the degree of uniqueness or fragility of the geological and biological characteristics of the shoreline (e.g., wetlands, spawning areas).

6. Intensive development of shoreline areas that are identified as hazardous or environmentally sensitive to development should be discouraged.

3. Regulations

In September 2003, the City of Monroe adopted critical areas regulations in compliance with the Growth Management Act (GMA), and using the best available science. The Critical Areas Regulations, Monroe Municipal Code 20.05 (Critical Areas Regulations), except for the following, are incorporated into the Shoreline Master Program:

- 20.05.050(B), Exemptions.
- 20.05.050(C), Exceptions.
- 20.05.055, Nonconforming uses.
- 20.05.080(A1), public agency and utility and reasonable use exception language.

The Critical Areas Regulations as adopted in this SMP are included in Appendix A. In the event of a contradiction between this SMP and the Critical Areas Regulations in Appendix A, the provision more protective of the environment shall apply, as determined by the City.

Section 20.05.090 (Stream Development Standards) of the Critical Areas Regulations as adopted in Appendix A requires a minimum buffer of two hundred (200) feet from Type 1 streams. The Skykomish River and Woods Creek are both classified as Type 1 streams. The Critical Areas Regulations also include provisions for increasing the stream buffer as necessary to protect streams when either the stream is particularly sensitive to disturbances or the development poses unusual impacts.

The Critical Areas Regulations also have minimum buffer requirements and development standards for the various wetlands within the City of Monroe. The Shoreline Inventory (Appendix B), completed by The Watershed Company in 2002, found that the majority of wetlands within shoreline jurisdiction are Category I, Category II, and Category III, based on the Washington State Department of Ecology Wetland Typing System.

In accordance with statute, wetlands associated with waters of the state fall within Shoreline Management Act jurisdiction. Critical areas whose buffers otherwise fall outside of the boundary of shoreline jurisdiction are regulated under the City of Monroe Critical Areas Ordinance (MMC 20.05) and not under the version adopted as part of this Shoreline Master Program (Appendix A). In addition to the Critical Areas Regulations, the City has adopted flood hazard area regulations, Monroe Municipal Code 14.01, which are administered by the City engineer. In accordance with WAC 173-26-221(3)(c), new structural flood hazard reduction measures should be allowed "only when it can be demonstrated by a scientific and engineering analysis that they are necessary to protect existing development, that nonstructural measures are

not feasible, that impacts to ecological function and priority species and habitat can be successfully mitigated so as to assure no net loss and that appropriate vegetation conservation actions are undertaken."

Note: Wetlands that have developed around the edges of the Tye Stormwater Facility must be delineated and protected as outlined in Appendix A. However, the buffer from any Tye Stormwater Facility-fringe wetland will only extend to the waterward edge of paved roads or gravel parking areas greater than 50 feet in width. Water-dependent uses, such as docks, may be permitted in wetlands that have developed adjacent to the Tye Stormwater Facility, provided that any impacts are mitigated.

E. Environmental Impacts

1. Applicability

The following policies and regulations apply to all uses and development in shoreline jurisdiction.

2. Policies

1. In implementing this Shoreline Master Program, the City will take necessary steps to ensure compliance with Chapter 43.21 RCW, the Washington State Environmental Policy Act of 1971, and its implementing guidelines.

2. All significant adverse impacts to the shoreline should be avoided or, if that is not possible, minimized to the extent feasible, according to the sequence described under regulation number 4 of this section.

3. It is the policy of the City of Monroe to achieve "no net loss" of ecological functions consistent with WAC 173-26-201(2)(c).

3. Regulations

1. All project proposals within shoreline jurisdiction, including those for which a shoreline permit is not required, shall comply with Chapter 43.21c RCW, the Washington State Environmental Policy Act.

2. Projects that cause significant ecological impacts, as defined in Chapter 8 (Definitions), are not allowed unless mitigated according to the sequence in Item 4 below to avoid reduction or damage to ecosystem-wide processes and ecological functions.

3. Projects that cause significant adverse impacts, other than significant ecological impacts, shall be mitigated according to the sequence in Item 4 below.

4. When applying mitigation to avoid or minimize significant adverse effects and significant ecological impacts, the City will apply the following sequence of steps in order of priority, with (a) being top priority:

    a. Avoiding the impact altogether by not taking a certain action or parts of an action;

    b. Minimizing impacts by limiting the degree or magnitude of the action and its implementation by using appropriate technology or by taking affirmative steps to avoid or reduce impacts;

    c. Rectifying the impact by repairing, rehabilitating, or restoring the affected environment;

    d. Reducing or eliminating the impact over time by preservation and maintenance operations;

    e. Compensating for the impact by replacing, enhancing, or providing substitute resources or environments; and

    f. Monitoring the impact and the compensation projects and taking appropriate corrective measures.

5. The City will set mitigation requirements or permit conditions based on impacts identified. In determining appropriate mitigation measures, avoidance of impacts by means such as relocating or redesigning the proposed development will be applied first. Lower priority measures will be applied only after higher priority measures are demonstrated to be not feasible or not applicable. When critical areas are impacted, mitigation will be designed consistent with the Critical Areas Regulations, MMC 20.05, as adapted as part of this Shoreline Master Program and included in Appendix A.

6. All shoreline development shall be located and constructed to avoid significant adverse impacts to human health and safety.

7. Application of the mitigation sequence shall achieve no net loss of ecological functions for each new development and will not result in required mitigation in excess of that necessary to assure that development will result in no net loss of shoreline ecological functions and not have a significant adverse impact on other shoreline functions fostered by the policy of the act.

8. When compensatory measures are appropriate pursuant to the mitigation priority sequence above, preferential consideration shall be given to measures that replace the impacted functions directly and in the immediate vicinity of the impact. However, alternative compensatory mitigation within the watershed that addresses limiting factors or identified critical needs for shoreline resource conservation based on watershed or comprehensive resource management plans applicable to the area of impact may be authorized. Authorization of compensatory mitigation measures may require appropriate safeguards, terms or conditions as necessary to ensure no net loss of ecological functions.

F. Riparian Corridor Management and Flood Hazard Reduction

1. Applicability

The provisions in this section apply to those areas within shoreline jurisdiction lying along riparian corridors, including rivers, streams, associated wetlands in the floodplain, and river deltas. The 100-year floodplain includes channel migration zones (CMZ) and floodways (see Figure 8 of the *Shoreline Master Program Inventory for the City of Monroe's Shorelines: Skykomish River and Woods Creek* [(The Watershed Company 2002] [Appendix B] and Figure 9 of the *Tye Stormwater Facility Addendum* [Appendix C]).

The provisions in this section are intended to address two concerns especially relevant to river shorelines:

1. Protecting human safety and minimizing flood hazard to human activities and development.

2. Protecting and contributing to the restoration of ecosystem-wide processes and ecological functions found in the applicable watershed or sub-basin, and

In additional to the critical areas regulations, the City has adopted flood hazard area regulations, Monroe Municipal Code 14.01, which are administered by the City Engineer and are not adopted as part of this SMP. In accordance with WAC 173-26-221(3)(c), new structural flood hazard reduction measures should be allowed "only when it can be demonstrated by a scientific and engineering analysis that they are necessary to protect existing development, that nonstructural measures are not feasible, that impacts to ecological function and priority species and habitat can be successfully mitigated so as to assure no net loss and that appropriate vegetation conservation actions are undertaken."

2. Policies

1. The City will implement a comprehensive program to manage the City's riparian corridors that integrates the following City ordinances and activities:

    a. Regulations in this Shoreline Master Program.

    b. The City's Critical Areas Regulations (as revised in Appendix A).

    c. The City's zoning ordinance.

    d. The City's stormwater management plan and implementing regulations.

    e. The City's participation in flood hazard reduction programs, including the Federal Emergency Management Act and the Washington State Flood Control Assistance Account Program.

    f. The construction or improvement of new public facilities, including roads, dikes, utilities, bridges, and other structures.

    g. The ecological restoration of selected shoreline areas.

2. In regulating development on shorelines within SMA jurisdiction. The City will endeavor to achieve the following:

    a. Maintenance of human safety.

    b. Protection and, where appropriate, the restoration of the physical integrity of the ecological system processes, including water and sediment transport and natural channel movement.

    c. Protection of water quality and natural groundwater movement.

    d. Protection of fish, vegetation, and other life forms and their habitat vital to the aquatic food chain.

    e. Protection of existing legal uses and legal development unless the City determines relocation or abandonment of a use or structure is the only feasible option or that there is a compelling reason to the contrary based on public concern and the provisions of the SMA.

    f. Protection of recreation resources and aesthetic values, such as point and channel bars, islands, and other shore features and scenery.

3. The City will undertake flood hazard planning, where practical, in a coordinated manner among affected property owners and public agencies and consider entire drainage systems or sizable stretches of rivers. This planning should consider the off-site erosion and accretion or flood damage that might occur as a result of stabilization or protection structures or activities. Flood hazard management planning should fully employ nonstructural approaches to minimizing flood hazard to the extent feasible.

4. The City will give preference to and use nonstructural solutions over structural flood control devices wherever feasible, including prohibiting or limiting development in historically flood-prone areas, regulating structural design and limiting increases in peak stormwater runoff from new upland development, public education, and land acquisition for additional flood storage. Structural solutions to reduce shoreline hazard should be allowed only after it is demonstrated that nonstructural solutions would not be able to reduce the hazard.

5. The City will discourage substantial stream channel modification, realignment, and straightening, and gravel removal as a means of flood protection.

6. Structural flood control works should not be allowed where they will result in any of the following:

    a. Intrusion into the channel migration zone (CMZ).

    b. Increased residential, commercial, or industrial development in undeveloped 100-year floodplains.

    c. Loss of flood storage capacity in undeveloped 100-year floodplains, unless authorized by a flood hazard management plan and all applicable government agencies.

    d. Deflecting or constricting flood flows to a degree that will result in significantly increased flood heights.

7. In designing publicly financed or subsidized works, the City will give consideration to providing public pedestrian access to the shoreline for low-impact outdoor recreation.

8. The City will protect wetlands to maintain their capacity to store flood waters and recharge groundwater and protect natural drainage ways, creeks, streams, and rivers to maintain their capacity to convey stormwater and flood water. Where feasible, the City will protect and restore hydrological connections between water bodies, watercourses, and associated wetlands.

9. Discourage those uses that pose a threat to groundwater quality or the quantity or quality of flow in the hyporheic zone (see Chapter 8, Definitions).

10. Discourage residential, commercial, and industrial uses within undeveloped floodplain areas unless scientific and technical information shows that ecological processes and functions can be protected or restored.

11. The City will encourage uses that are less likely to be damaged by flooding in undeveloped floodplains. These uses include parks, open space, overflow parking, and recreational uses that do not require substantial buildings. These uses should be encouraged only if done in a manner that protects or restores ecological processes and functions.

3. Regulations

1. The applicant shall provide the following information as part of a shoreline permit application.

    a. Location of the 100-year floodplain, channel migration zone (CMZ) or, if there is no CMZ, the bank full width boundary, and ordinary high water mark.

    b. Existing shoreline stabilization and flood-protection works on the site.

    c. Physical, geological, and soil characteristics of the area.

    d. Predicted impacts upon area shore and ecological processes, adjacent properties, and shoreline and water uses.

    e. Analysis of alternative construction methods, development options, or flood protection measures, both structural and nonstructural.

    f. Description of existing shoreline vegetation and measures to protect existing vegetation and to re-establish vegetation.

2. New development must be consistent with items (a) through (e) below in addition to the provisions of this Shoreline Master Program. In cases of inconsistency, the provisions most protective of shoreline ecological functions and processes shall apply:

    a. The City's comprehensive flood hazard reduction plan.

    b. The applicable provisions of the City floodplain regulations adopted under Chapter 86.16 RCW.

    c. A State-approved comprehensive flood control management plan, when available, and in accordance with Chapter 86.16 RCW and the National Flood Insurance Program.

d. The City stormwater management program.

e. Conditions of Hydraulic Project Approval, issued by Washington Department of Fish and Wildlife, may be incorporated into permits issued for flood protection.

3. New development, including significant vegetation removal and shoreline stabilization, is not allowed within the CMZ except for:

   a. Protection and restoration actions that increase the ecosystem-wide processes or ecological functions.

   b. Bridges, utility lines, and other public utility and transportation structures where no other feasible alternative exists. Where such structures are allowed, mitigation shall be required that protects or restores impacted functions and processes in the affected portion of the watershed.

   c. Repair and maintenance of an existing legal structure, provided that such actions do not create significant ecological impacts.

   d. Development on a previously altered site where it is demonstrated that the development restores ecological processes and functions of the applicable portion of the watershed to a more natural condition.

   e. Modifications or additions to an existing legal development, provided that channel migration is not further limited and that the new development includes appropriate ecological restoration. The City will set requirements based on the type of proposed use and the biophysical condition of the site. In this case, the new development must not adversely affect hydrological conditions and must include appropriate restoration measures as determined by the City.

   f. Measures to reduce shoreline erosion, provided that it is demonstrated that the erosion rate exceeds that which would normally occur in a natural condition, that the measure does not interfere with fluvial hydrological and geomorphologic processes normally acting in natural conditions, and that the measure increases habitat for priority species associated with the river or stream. It is the intent of this provision to allow measures that protect property at the same time as restoring ecosystem-wide processes and functions where scientific and technical information demonstrate that this may be accomplished.

4. The City shall determine whether or not the previous exceptions apply to the development proposal in question. The City may require the project proponent to submit documentation or analysis based on scientific and technical information demonstrating that the development proposal meets the exception criteria (a) through (f) above. Further, such exceptions will be allowed only where it can be shown that these activities, along with mitigation measures associated with the development, will not increase flood elevations, decrease storage capacity, or restrict the natural erosion and accretion processes associated with channel migration.

5. Significant ecological impacts of all development in the CMZ and structural hazard reduction measures shall be mitigated according to the priorities listed under “mitigation,” Chapter 3, Section E.

6. Otherwise allowed development in the CMZ and flood hazard reduction measures shall employ the type of construction or measure that causes the least significant ecological impacts. When authorizing development within the CMZ, the City will require that the construction method with the least negative significant ecological impacts be used.

7. Existing hydrological connections into and between water bodies, such as streams, tributaries, wetlands, and dry channels, shall be maintained. Where feasible, obstructed channels shall be re-established as a condition of nonwater-dependent uses, development in the CMZ, and structural flood hazard reduction measures.

8. Re-establishment of native vegetation waterward of a new structure is required where feasible. The City may require re-establishment of vegetation landward of the structure if it determines such vegetation is necessary to protect and restore ecological functions.

9. Designs for flood hazard reduction measures and shoreline stabilization measures in river corridors must be prepared by qualified professional engineers (or geologists or hydrologists) who have expertise in local riverine processes.

10. Structural flood hazard reduction projects that are continuous in nature, such as dikes or levees, shall provide for public access unless the City determines that such access is not feasible or desirable according to the criteria in the Public Access section.

11. Refer to the use, shoreline modification and development standards table in Chapter 2 for allowable uses and modification and development standards such as setbacks and clearing and grading within each environment designation.

12. All shoreline development must conform to the General Provisions and the Environment Designation Provisions stated in this Shoreline Master Program. See also provisions for vegetation conservation and shoreline stabilization.

13. Residential, commercial, and industrial uses that may be damaged by flooding are prohibited in 100-year floodplains. In determining whether a use may be damaged, the local government should consider its location, its design, the extent to which development has occurred in the floodplain, and whether access will be available to the use during flood events.

14. Hospitals, health care facilities, nursing homes, and retirement homes are prohibited within 100-year floodplains.

15. Residential, commercial, and industrial subdivisions and short subdivisions shall be designed so that each lot will have a building site outside the 100-year floodplain. The subdivision's internal street system should be laid out to provide access to each lot that is passable by passenger car during a 100-year flood event.

16. Bridges, culverts, and other river, stream, and waterway crossings shall be designed and constructed so they do not restrict flood flows such that flood elevations are increased. Where a bridge, culvert, or other waterway crossing replaces an existing crossing, the replacement structure shall not increase flood heights over those caused by the original structure.

17. Removal of gravel for flood management purposes must be consistent with an adopted flood hazard reduction plan and with this Chapter and be allowed only after a biological and geomorphological study shows that extraction has a long-term benefit to flood hazard reduction, does not result in a net loss of ecological functions, and is part of a comprehensive flood management solution.

G. Parking

1. Applicability

Parking is the temporary storage of automobiles or other motorized vehicles. Except as noted the following provisions apply only to parking that is "accessory" to a permitted shoreline use. Parking as a "primary" use and parking which serves a use not permitted in the shoreline jurisdiction is prohibited.

2. Policies

1. Parking in shoreline areas should be allowed only if it directly serves a permitted shoreline use.

2. Parking facilities should be located and designed to minimize adverse impacts including those related to stormwater runoff, water quality, visual qualities, public access and vegetation and habitat maintenance.

3. Parking should be planned to achieve optimum use. Where possible, parking should serve more than one use (e.g. serving recreational use on weekends, commercial uses on weekdays).

4. Where feasible, parking for shoreline uses should be provided in areas outside shoreline jurisdiction.

3. Regulations

1. Parking as a primary use shall be prohibited within the shoreline jurisdiction.

2. Parking in shoreline jurisdiction shall directly serve a permitted shoreline use.

3. Parking facilities shall be designed and landscaped to minimize adverse impacts upon adjacent shoreline and abutting properties. Landscaping shall consist of native vegetation and plant materials approved by the City and be planted before completion of the parking area in such a manner that plantings provide effective screening within three years of project completion.

4. Parking facilities serving individual buildings located on parcels that are contiguous with shoreline waterbodies shall be located landward from the principal building being served, EXCEPT when the parking facility is within or beneath the structure and adequately

screened, or in cases when an alternate location would have less environmental impact on the shoreline.

5. Parking facilities for shoreline activities shall provide safe and convenient pedestrian circulation within the parking area and to the shorelines.

6. Parking facilities shall provide adequate facilities to prevent surface water runoff from contaminating water bodies, using best available technologies and include a maintenance program that will assure proper functioning of such facilities over time.

H. Public Access (including Visual Access)

1. Applicability

Shoreline public access is the physical ability of the general public to reach and touch the water's edge and/or the ability to have a view of the water and the shoreline from upland locations. Public access facilities may include picnic areas, pathways and trails, floats and docks, promenades, viewing towers, bridges, boat launches, and improved street ends.

On Monroe's shorelines, public access is provided primarily by Al Borlin Park, Skykomish River Centennial Park and boat launch, Lewis Street Park, Lake Tye Park, and the Cadman mining site on the Skykomish River. Figure 2 identifies existing and proposed public access opportunities in the City of Monroe's shoreline jurisdiction.

2. Policies

1. Development, uses, and activities on or near the shoreline should not impair or detract from the public's visual access to the water.

2. Public views from the shoreline and upland areas should be enhanced and preserved. Enhancement of views should not be construed to mean excessive removal of vegetation that partially impairs views.

3. Visual access should be maintained, enhanced, and preserved on shoreline street ends, public utilities, and rights-of-way.

4. Public access should be provided as indicated in the City of Monroe Parks, Recreation and Open Space Plan (as amended) as long as those public access and park development measures are consistent with the provisions of this Shoreline Master Program.

5. Through capital improvements and other measures, the City will continue to enhance opportunities for the public to enjoy the shorelines within Shoreline Management Act jurisdiction.

City of Monroe
Public Access Map

Boundaries

- Monroe City Limits
- Shoreline Boundary
- City Parks

Public Access Types

- Vehicle
- Boat
- Pedestrian
- Public Access
- Proposed Centennial Trail*

* Final alignment to be determined in the future

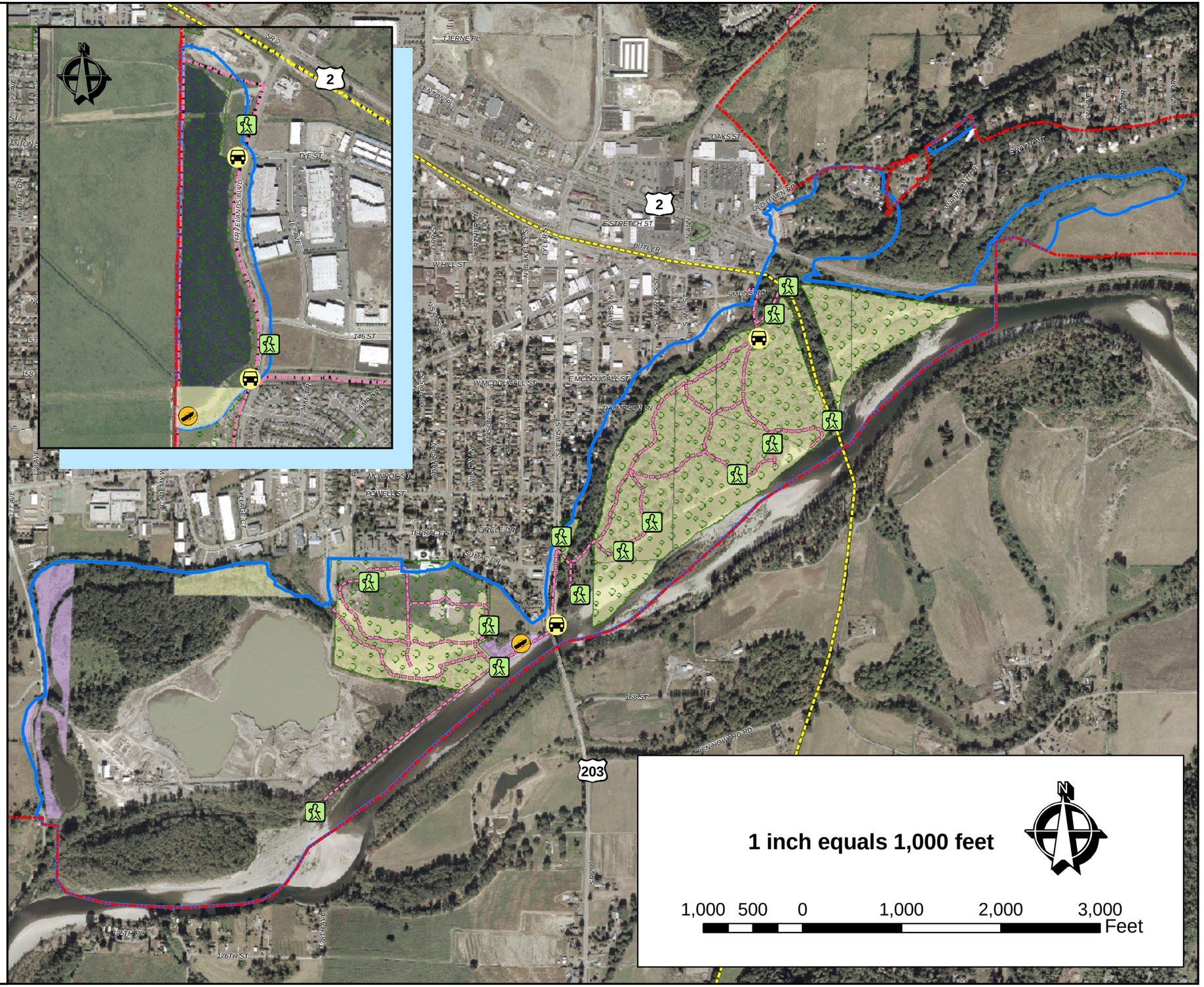
Public Properties

- City of Monroe Property
- WA State Property

Shoreline jurisdiction boundaries depicted on this map are approximate. They have not been formally delineated or surveyed and are intended for planning purposes only. Additional site-specific evaluation may be needed to confirm/ verify information shown on this map.

Map data shown is the property of the City of Monroe. Inaccuracies may exist. The City of Monroe imply no warranties or guaranties regarding any aspect of data depiction. No real estate decisions are to be made using this map. Please contact the City of Monroe Community Development Department to verify the designation(s).

Project: Shoreline Public Access
Y:\GIS\Departments\CD\Shorelines\Shoreline Public Access (04-07-08).mxd
Source: City of Monroe 2008; Snohomish County 2008, Watershed Company 2002, FEMA 2006
Revised: 04-30-08
Author: R. Wright



6. The City will take measures to preserve and enhance the public access to the Skykomish River, Woods Creek and the Tye Stormwater Facility and provide public access to all Monroe shorelines, where appropriate.

7. The City will encourage inclusion of Monroe shoreline public access points in the City's non-motorized transportation plan.

8. The City will require that new public areas have adequate parking, located outside shoreline jurisdiction, where feasible.

9. Public access should be considered in the review of all private and public developments (including land division) with the exception of single lot development and short plats.

10. Public access should be provided as close as possible to the water's edge without causing significant ecological impacts and should be designed in accordance with the Americans with Disabilities Act.

11. The public's opportunities to enjoy the physical and aesthetic qualities of the shorelines should be enhanced on public properties.

12. Public informational and educational displays to enhance the public's appreciation and enjoyment of the shorelines are encouraged.

3. Regulations

1. Development, uses and activities on public lands shall be designed and operated to avoid blocking, reducing or adversely interfering with the public's physical access to the water and shorelines, unless such access would cause ecological impacts.

2. Public access provided by shoreline street ends, public utilities, rights-of-way, and other public lands shall not be diminished. RCW 35.79.035 and RCW 36.87.130 restrict the City from vacating right-of-way which abuts on a body of fresh water unless the purpose of the vacation is to enable the public authority to acquire the vacated property for boat launching sites, or for park, viewpoint, recreational, and educational or other public purposes.

3. Shoreline development, uses and activities shall be designed and operated to avoid blocking, reducing, or adversely interfering with the public's visual access to the water and shorelines, except that vegetation conservation and shoreline restoration activities may intrude into view corridors where necessary to protect or restore ecological functions. The City may require the development proposal to be relocated or reconfigured to reduce view blockage.

4. Public lands, such as street ends, rights-of-way, and utilities, shall provide, maintain, enhance, and preserve visual access to the water and shoreline in accordance with RCW 35.79.035 and RCW 36.87.130 (*see above).*

5. Development on the water shall be constructed of non-reflective materials that are compatible in terms of color and texture with the surrounding area.

6. The dedication and improvement of public access shall be required as part of developments for water-enjoyment, water-related, and nonwater-dependent uses and for the subdivision of land into more than four parcels. In these cases, public access is required except:

    a. Where the City determines that more effective public access can be provided through other means.

    b. Where it is demonstrated to be infeasible due to reasons of incompatible uses, safety, security, or impact to the shoreline environment or due to constitutional or other legal limitations that may be applicable.

       In determining the infeasibility, undesirability, or incompatibility of public access in a given situation, the City will consider alternate methods of providing public access, such as off-site improvements, viewing platforms, separation of uses through site planning and design, and restricting hours of public access.

    c. For individual single-family residences not part of a development planned for more than four parcels.

7. The City will work with project proponents to ensure that public access policies and priorities are implemented, especially in ensuring that the opportunities for continuous trails, linear parks and reclamation areas are not lost.

8. Shoreline development by public entities, including local governments, state agencies, and public utility districts, shall include public access measures as part of each development project, unless such access is shown to be incompatible due to reasons of safety, security, or impact to the shoreline environment or where the City determines that a more effective public access system can be achieved through alternate means, such as focusing public access at the most desirable locations.

I. Shorelines of Statewide Significance

1. Applicability

The Shoreline Management Act of 1971 designated certain shoreline areas as shorelines of statewide significance. Within this City's jurisdiction, the Skykomish River is a shoreline of statewide significance. Shorelines thus designated are important to the entire state. Because these shorelines are major resources from which all people in the state derive benefit, this jurisdiction gives preference to uses which favor long-range goals and support the overall public interest.

2. Policies

In implementing the objectives of RCW 90.58.020, the City will base decisions and actions on the following policies in order of priority, 1 being the highest and 6 being lowest.

1. Recognize and protect the state-wide interest over local interest.

    a. Solicit comments and opinions from groups and individuals representing state-wide interests by circulating the Shoreline Master Program, and any amendments there of affecting shorelines of statewide significance, to state agencies, adjacent jurisdictions, citizen's advisory committees and local officials and state-wide interest groups.

    b. Recognize and take into account state agencies' policies, programs and recommendations in developing and administering use regulations and in approving shoreline permits.

    c. Solicit comments, opinions and advice from individuals with expertise in ecology, geology, limnology, aquaculture and other scientific fields pertinent to shoreline management.

2. Preserve the natural character of the shoreline.

    a. Designate and administer shoreline environments and use regulations to protect and restore the ecology and environment of the shoreline as a result of man-made intrusions on shorelines.

    b. Upgrade and redevelop those areas where intensive development already exists in order to reduce adverse impact on the environment and to accommodate future growth rather than allowing high-intensity uses to extend into low-intensity use or underdeveloped areas.

    c. Protect and restore existing diversity of vegetation and habitat values, wetlands and riparian corridors associated with shoreline areas.

    d. Protect and restore habitats for State-listed "priority species."

3. Result in long-term over short-term benefit.

    a. Evaluate the short-term economic gain or convenience of developments relative to the long-term and potentially costly impairments to the natural shoreline.

    b. In general, preserve resources and values of shorelines of statewide significance for future generations and restrict or prohibit development that would irretrievably damage shoreline resources.

4. Protect the resources and ecology of the shoreline.

    a. Prevent development activity that will interfere with the natural shoreline ecological functions.

    b. All shoreline development should be located, designed, constructed and managed to avoid disturbance of and minimize adverse impacts to wildlife resources, including spawning, nesting, rearing and habitat areas and migratory routes.

    c. Shoreline materials including, but not limited to, bank substrate, soils, beach sands and gravel bars should be left undisturbed by shoreline development. Gravel mining should be severely limited in shoreline areas.

    d. Actively promote esthetic considerations when contemplating new development, redevelopment of existing facilities or general enhancement of shoreline areas.

5. Increase public access to publicly owned areas of the shoreline.

    a. Give priority to developing paths and trails to shoreline areas, linear access along the shorelines and to developed upland parking.

    b. Locate development landward of the ordinary high water mark so that access is enhanced.

    c. Prevent development that would impede navigation on waters of the state.

6. Increase recreational opportunities for the public on the shoreline.

    a. Plan for and encourage development of facilities for recreational use of the shoreline.

    b. Reserve areas for lodging and related facilities on uplands well away from the shorelines with provisions for nonmotorized access to the shoreline.

J. Signage

1. Applicability

A sign is defined as a device of any material or medium, including structural component parts, which is used or intended to be used to attract attention to the subject matter for advertising, identification or informative purposes. The following provisions apply to any commercial or advertising sign directing attention to a business, professional service, community, site, facility, or entertainment, conducted or sold either on or off premises.

2. Policies

1. Signs should be designed and placed so that they are compatible with the esthetic quality of the existing shoreline and adjacent land and water uses.

2. Signs should not block or otherwise interfere with visual access to the water or shorelands.

3. The design of signs should not reduce auto safety or visual esthetics from adjacent property.

4. Signs should be of a permanent nature that are linked to the operation of existing uses and attached to said uses.

3. Regulations

1. Sign plans and designs shall be submitted for review and approval at the time of shoreline permit approval.

2. All signs shall be located and designed to avoid interference with vistas, viewpoints and visual access to the shoreline.

3. Over-water signs or signs on floats or pilings are prohibited except those needed for navigation.

4. Lighted signs shall be hooded, shaded, or aimed so that direct light will not result in glare when viewed from surrounding properties or watercourses.

5. Signs that do not meet the policies and regulations of this program shall be removed or conform within two years of the adoption of this Shoreline Master Program.

8. No signs shall be placed in a required view corridor.

9. Allowable Signs: The following types of signs may be allowed in the High Intensity, Urban Conservancy, and Tye Stormwater Facility environments:

    a. Water navigational signs, and highway and railroad signs necessary for operation, safety and direction.

    b. Public information signs directly relating to a shoreline use or activity.

    c. Off-premise, free-standing signs for community identification, information, or directional purposes.

    d. National, site and institutional flags or temporary decorations customary for special holidays and similar events of a public nature.

    e. Temporary directional signs to public or quasi-public events if removed within 10 days following the event.

10. Prohibited Signs: The following types of signs are prohibited in all environments:

    a. Signage in view corridors which impair visual access.

    b. Off-premises detached outdoor advertising signs.

    c. Spinners, streamers, pennants, flashing lights and other animated signs used for commercial purposes. Highway and railroad signs are exceptions.

    d. Signs placed on trees or other natural features.

    e. Commercial signs for products, services, or facilities located off-site.

K. Utilities (Accessory)

1. Applicability

Accessory utilities are those on-site utility features such as power, telephone, cable, water and sewer lines, including stormwater systems, that are accessory to a primary shoreline use. They are addressed in this section because they concern all types of development and have the potential to impact the quality of the shoreline and its waters. Accessory utilities shall be permitted as part of the primary use, but also must comply with the following policies and regulations.

2. Policies

1. Accessory utilities should be properly installed so as to protect the shoreline and water from contamination and degradation.

2. Accessory utility facilities and rights-of-way should be located outside of the shoreline area to the maximum extent possible. When utility lines require a shoreline location, they should be placed underground.

3. Accessory utility facilities should be designed and located in a manner which preserves the natural landscape and shoreline ecological processes and functions and minimizes conflicts with present and planned land uses.

3. Regulations

1. In shoreline areas, accessory utility transmission lines, pipelines and cables shall be placed underground unless demonstrated to be infeasible. Further, such lines shall utilize existing rights-of-way, corridors and/or bridge crossings whenever possible. Proposals for new corridors in shoreline areas involving water crossings must fully substantiate the infeasibility of existing routes.

2. Accessory utility development shall, through coordination with government agencies, provide for compatible multiple use of sites and rights-of-way. Such uses include shoreline access points, trails and other forms of recreation and transportation systems, providing such uses will not unduly interfere with utility operations or endanger public health and safety.

3. Accessory utility facilities should be located so as to avoid the need for bank stabilization structures, whenever feasible.

4. Sites disturbed for utility installation shall be stabilized during and following construction to avoid adverse impacts from erosion and to assure no net loss of ecological functions.

L. Vegetation Conservation

1. Applicability and Concepts

This section applies to the conservation of native and non-invasive vegetation in shoreline areas, in order to preserve and restore vegetative cover and shading for fish habitat, reduce erosion along streams, and provide needed buffers from human activity in proximity to, or adjacent to, the shoreline environment. Policies and regulations in this section do not apply to forest practices, which are not otherwise regulated by the City of Monroe, or to noxious weed removal.

2. Policies

1. It is the policy of this Shoreline Master Program that vegetation within the City shoreline areas be enhanced over time to provide a greater level of ecological functions, human safety and property protection. To this end, shoreline management activities, including the provisions and implementation of this Shoreline Master Program, are based on a comprehensive approach that considers the ecological functions currently and potentially provided by vegetation on different sections of the shoreline.

2. This Shoreline Master Program in conjunction with other City development regulations should establish a coordinated and effective set of provisions and programs to protect and restore those functions provided by shoreline vegetation.

3. The restoration of vegetation should be a condition of all development that causes significant vegetation removal and nonwater dependent development within shoreline areas where vegetation has been degraded from a natural state.

4. Restoration of degraded shorelines due to natural or manmade causes should, wherever feasible, use soil bioengineering techniques to arrest the processes of erosion, sedimentation and flooding.

5. Aquatic weed management should stress prevention first. Where active removal or destruction is necessary, it should be the minimum to allow water-dependent activities to continue, minimize negative impacts to native plant communities, and include appropriate handling or disposal of weed materials. Proposals to apply aquatic herbicides must meet all state requirements.

3. Regulations

All Shoreline Environments:

1. The creation of new land parcels or lots that would require significant vegetation removal in order to develop is not allowed. In order to create a new lot partially or wholly within shoreline jurisdiction, the applicant must demonstrate that development can be accomplished without significant vegetation removal. The City may make exceptions to this standard for water dependent development and for development in the High Intensity and Tye Stormwater Facility Environments only.

2. For activities conducted under the Washington State Forest Practices Act, conform to the provision of that Act and this Shoreline Master Program.

3. All development, including clearing and grading, shall minimize significant vegetation removal to the extent feasible. In order to implement this regulation, applicants proposing development that includes significant vegetation removal, clearing or grading, must provide, as a part of a shoreline permit or a letter of exemption application, a site plan, drawn to scale, indicating extent of the proposed clearing and/or grading. The City may require that the proposed development or extent of clearing and grading be modified to mitigate the impacts to ecological functions.

4. Restoration of any shoreline that has been disturbed or degraded shall use native plant materials with a diversity and type similar to that which naturally occurs on-site unless the City finds that native plant materials are inappropriate or not hardy in the particular situation.

Natural Environment:

5. Clearing, grading or significant vegetation removal are prohibited except for habitat and natural systems enhancement projects, research and scientific activities, public access, and low impact activities where ecological functions are not diminished or are mitigated.

Urban Conservancy Environment

6. Wherever possible, development shall be located away from shorelines that have been identified as unstable and/or sensitive to erosion. The City may require that the proposed development or extent of clearing and grading be modified to reduce the impacts to ecological functions.

7. A condition of all development shall be that those shorelands on the site not occupied by structures, shoreline uses or human activities shall be revegetated.

8. The enhancement of vegetation shall be a condition of all nonwater-dependent development in the Urban Conservancy environment except where the City finds that:

    a. Vegetation enhancement is not feasible on the project site. In these cases the City may require off-site vegetation enhancement that performs the same ecological functions within the watershed or drift cell, or

    b. The restoration of ecological processes and functions can be better achieved through other measures such as the removal of channel constraints, or

    c. Sufficient native vegetation already exists.

High Intensity and Tye Stormwater Facility Environments

9. The impacts due to significant vegetation removal shall be mitigated according to the sequence described in Section E, Chapter 3.

10. A condition of all development shall be that those shorelands on the site not occupied by structures, shoreline uses or human activities shall be revegetated.

Shoreline Residential Environment and Residential Development In Other Environments

11. For properties within areas planned for residential development within the "Urban Conservancy" or "Shoreline Residential" environments, new development that will cause significant vegetation removal shall not be allowed except where the dimensions of existing lots or parcels are not sufficient to accommodate permitted primary residential structures outside of the buffer (see Appendix A – Critical Areas Regulations). In these instances the City will apply the mitigation sequence in Chapter 3, Section E, to minimize ecological impacts. Generally, this will mean placing the development away from the shoreline as far as possible, locating the development to avoid tree cutting, and modifying building dimensions to reduce vegetation removal.

12. The removal of native vegetation for replacement with lawn or nonnative plant materials is prohibited.

Aquatic Environment

13. Aquatic weed control shall only occur when native plant communities and associated habitats are threatened or where an existing water dependent use is restricted by the presence of weeds. Aquatic weed control shall occur in compliance with all other applicable laws and standards.

14. The control of aquatic weeds by hand pulling, mechanical harvesting, or placement of aqua screens, if proposed to maintain existing water depth for navigation, shall be considered normal maintenance and repair and therefore exempt from the requirement to obtain a shoreline Substantial Development Permit.

15. The control of aquatic weeds by derooting, rotovating or other method which disturbs the bottom sediment or benthos shall be considered development for which a Substantial Development Permit is required, unless it will maintain existing water depth for navigation in an area covered by a previous permit for such activity, in which case it shall be considered normal maintenance and repair and therefore exempt from the requirement to obtain a Substantial Development Permit.

16. Where large quantities of plant material are generated by control measures, they shall be collected and disposed of in an appropriate, identified upland location.

17. Use of herbicides to control aquatic weeds shall be prohibited except where no reasonable alternative exists and weed control is demonstrated to be in the public's interest. A Conditional Use Permit shall be required in such case.

M. Water Quality

1. Applicability

The following section applies to all development and uses in shoreline jurisdiction that affect water quality, as defined in the definitions section.

2. Policies

1. All shoreline uses and activities should be located, designed, constructed, and maintained to avoid significant ecological impacts by altering water quality, quantity, or flow characteristics.

2. The City should require reasonable setbacks, buffers, and storm water storage basins to achieve the objective of lessening negative impacts on water quality.

3. All measures for controlling erosion, stream flow rates, or flood waters through the use of stream control works should be located, designed, constructed, and maintained so that net off-site impacts related to water do not degrade the existing water quality.

4. As a general policy, the City will seek to improve water quality, quantity, and flow characteristics in order to protect and restore ecological functions and ecosystem-wide processes of shorelines within Shoreline Management Act jurisdiction. The City will implement this policy through the regulation of development and activities, through the design of new public works, such as roads, drainage, and water treatment facilities, and through coordination with other local, state, and federal water quality regulations and programs. The City of Monroe has a policy of adopting the latest version of the Department of Ecology *Stormwater Management Manual for Western Washington* to regulate stormwater discharge and management. The City will encourage practices that further minimize impervious surfaces and stormwater runoff, including use of best available technologies.

5. All measures for the treatment of runoff for the purpose of maintaining and/or enhancing water quality should be conducted on-site before shoreline development impacts waters off-site.

6. The above policies apply to the Tye Stormwater Facility environment and its associated Aquatic environment only as they are consistent with maintaining the primary purpose of the human-made Tye Stormwater Facility, collecting and treating stormwater runoff from existing and future developments within its catchment area. Any loss of ecological functions should be mitigated.

3. Regulations

1. All shoreline development, both during and after construction, shall avoid or minimize ecological impacts, including any increase in surface runoff, through control, treatment, and release of surface water runoff so that the receiving water quality and shore properties and features are not adversely affected. Control measures include, but are not limited to, catch basins or settling ponds, oil interceptor drains, grassy swales, planted buffers, fugitive dust controls, or best available technologies as directed by the City.

2. All development shall adhere to all required setbacks, buffers, and standard in this Shoreline Master Program. (Refer to Shoreline Use Provisions, Environment Designation Provisions, and the Critical Areas Regulations in Appendix A for specific limits.)

3. All development shall conform to local, state, and federal water quality regulations, provided the regulations do not conflict with this Shoreline Master Program. Where there is a conflict, provisions most protective of the natural ecology shall apply. The City of Monroe adopts the latest version of the Department of Ecology *Stormwater Management Manual for Western Washington* to regulate stormwater discharge and management.

4. The above regulations apply to the Tye Stormwater Facility environment and its associated Aquatic environment only as they are consistent with maintaining the primary purpose of the human-made Tye Stormwater Facility, collecting and treating stormwater runoff from

existing and future developments within its catchment area. Any loss of ecological functions must be mitigated.

Chapter 4: Shoreline Modification Provisions

A. Introduction

Shoreline modifications are structures or actions that permanently change the physical configuration or quality of the shoreline, particularly at the point where land and water meet. Shoreline modification activities include, but are not limited to, structures such as revetments, bulkheads, levees, breakwaters, docks, and floats. Actions such as clearing, grading, filling, and dredging are also considered shoreline modifications.

Generally, shoreline modification activities are undertaken for the following reasons:

1. To prepare a site for a shoreline use.
2. To provide shoreline stabilization or shoreline protection.
3. To support an upland use.

The policies and regulations in this chapter are intended to prevent or mitigate the adverse environmental impacts of proposed shoreline modifications. Provisions tailored to specific shoreline modification activities follow general provisions, which apply to all shoreline modification activities. This chapter provides policies and regulators for shoreline modification features, including shoreline stabilization measures.

B. General

1. Applicability

The following provisions apply to all shoreline modification activities, whether such proposals address a single property or multiple properties.

2. Policies

1. All new shoreline development should be located and designed to prevent or minimize the need for shoreline modification activities.
2. When shoreline modifications are necessary, they should be as compatible as possible with ecological shoreline processes and functions.

3. When shoreline modifications are necessary, the first preference shall be using soft-bank stabilization techniques in order to maintain ecological shoreline processes and functions to the greatest extent possible.

4. Only those modifications that are appropriate to the specific type of shoreline and environmental conditions for which they are proposed will be allowed.

5. Mitigation sequencing shall be required for all modification proposals.

6. Shoreline modification of existing natural shorelines should be discouraged.

7. In the review of proposals involving modifications to the shoreline, consideration should be given to the potential cumulative impacts of similar proposals. Steps should be taken to prevent the gradual degradation of the shoreline due to the cumulative impacts of seemingly small modifications.

8. The above policies apply to the Tye Stormwater Facility environment and its associated Aquatic environment only as they are consistent with maintaining the primary purpose of the human-made Tye Stormwater Facility, collecting and treating stormwater runoff from existing and future developments within its catchment area. Any loss of ecological functions should be mitigated.

3. Regulations

1. All new shoreline modifications must be in support of an allowable shoreline use that conforms to the provisions of this Shoreline Master Program. Except as otherwise noted, all shoreline modifications not associated with a legally existing or an approved shoreline use must demonstrate that such activities are necessary and in the public interest for the maintenance of shoreline environmental resources values. If those conditions are met, the activity shall require a Conditional Use Permit (CUP).

2. Structural shoreline modification measures shall be permitted only if nonstructural measures are unable to achieve the same purpose. Nonstructural measures considered shall include alternative site designs, increased setbacks, drainage improvements, relocation, and vegetation enhancement.

3. Stream channel modification (i.e., realignment) shall be prohibited as a means of shoreline stabilization or shoreline protection, unless it is the only feasible alternative.

4. All new shoreline development shall be located and designed to prevent or minimize the need for shoreline modification activities.

5. Proponents of shoreline modification projects shall obtain all applicable federal and state permits and shall meet all permit requirements.

6. In addition to the permit information required by WAC 173-27-180, the City shall require and consider the following information when reviewing shoreline modification proposals:

    a. Construction materials and methods.

b. Project location relative to the ordinary high water mark (OHWM).

c. General direction and speed of prevailing winds.

d. Profile rendition of beach and uplands.

e. Beach and upland soil type, slope, and material.

f. Physical or geologic stability of uplands.

g. Potential impact to natural shoreline processes, adjacent properties, and upland stability.

7. Shoreline modification materials shall be only those approved by applicable state agencies. No toxic or quickly degradable materials (e.g., plastic or fiberglass that deteriorates under ultraviolet exposure) shall be used.

8. The above regulations apply to the Tye Stormwater Facility environment and its associated Aquatic environment only as they are consistent with maintaining the primary purpose of the human-made Tye Stormwater Facility, collecting and treating stormwater runoff from existing and future developments within its catchment area. Any loss of ecological functions must be mitigated.

C. Shoreline Stabilization (Including Bulkheads)

1. Applicability

Shoreline stabilization includes actions taken to address the impacts of erosion to property, dwellings, or essential structures caused by natural processes, such as current, flood, tide, wind, or wave action. These include structural and nonstructural methods.

Nonstructural methods include building setbacks, relocation of the structure to be protected, groundwater management, planning, and regulatory measures to avoid the need for structural stabilization.

“Hard” structural stabilization measures refer to those with solid, hard surfaces, such as concrete bulkheads, while “soft” structural measures rely on softer materials, such as biotechnical vegetation measures or beach enhancement.

Generally, the harder the construction measure, the greater the impact on shoreline processes, including sediment transport, geomorphology, and biological functions.

As applied to shoreline stabilization measures, “normal repair” and “normal maintenance” include the patching, sealing, or refinishing of the exiting structure, the replenishment of sand or other materials that have been washed away, and the replacement of less than one-third of the structure. Normal maintenance and normal repair are limited to those actions that are typically done on a periodic basis. Construction that causes significant ecological impacts is not

considered normal maintenance and repair. Complete definitions of "normal repair" and "normal maintenance" can be found under the definition of "substantial development" in Chapter 8 of this SMP.

As applied to shoreline stabilization measures, "replacement" means the construction of a new structure to perform a shoreline stabilization function of an existing structure that can no longer adequately serve its purpose.

Additions to or increases in size of existing shoreline stabilization measures shall be considered new structures.

The Washington State Administrative Code, at WAC 173-27-040(2)(c), states that a "normal protective" bulkhead common to single-family residences does not require a Substantial Development Permit. The section adds the following qualifications:

> A "normal protective" bulkhead includes those structural and nonstructural developments installed at or near, and parallel to, the ordinary high water mark for the sole purpose of protecting an existing single-family residence and appurtenant structures from loss or damage by erosion. A normal protective bulkhead is not exempt if constructed for the purpose of creating dry land. When a vertical or near vertical wall is being constructed or reconstructed, not more than one cubic yard of fill per one foot of wall may be used as backfill. When an existing bulkhead is being repaired by construction of a vertical wall fronting the existing wall, it shall be constructed no further waterward of the existing bulkhead than is necessary for construction of new footings. When a bulkhead has deteriorated such that an ordinary high water mark has been established by the presence and action of water landward of the bulkhead then the replacement bulkhead must be located at or near the actual ordinary high water mark. Beach nourishment and bioengineered erosion control projects may be considered a normal protective bulkhead when any structural elements are consistent with the above requirements and when the project has been approved by the Washington Department of Fish and Wildlife.

Note that residential bulkheads and other forms of "development" that are exempt from a permit requirement must still conform to the provisions of this Shoreline Master Program and the Shoreline Management Act.

2. Policies

1. "Soft" shoreline stabilization of natural materials such as protective berms, beach enhancement, or vegetation stabilization are strongly preferred over "hard" structural shoreline stabilization made of materials such as steel, wood, or concrete. Nonstructural or "soft" measures have less adverse and cumulative impacts on shore features and habitats. Proposals for structural solutions, including bulkheads, should demonstrate that natural methods are unworkable.

2. Bulkheads and other structural stabilizations should be located, designed, and constructed primarily to prevent damage to existing development and minimize adverse impacts to ecological functions. New development requiring bulkheads and/or similar protection should

not be allowed. Shoreline uses should be located in a manner so that bulkheading and other structural stabilizations are not likely to become necessary in the future.

3. Structural modifications will be allowed only where they are demonstrated to be necessary to support or protect an allowed primary structure or a legally existing shoreline use that is in danger of loss or substantial damage or are necessary for reconfiguration of the shoreline for mitigation or enhancement purposes (WAC 173-26-231(2)(a)).

4. Shoreline modifications individually and cumulatively shall not result in a net loss of ecological functions. This is to be achieved by giving preference to those types of shoreline modifications that have a lesser impact on ecological functions and requiring mitigation of identified impacts resulting from shoreline modifications.

5. The above policies apply to the Tye Stormwater Facility environment and its associated Aquatic environment only as they are consistent with maintaining the primary purpose of the human-made Tye Stormwater Facility, collecting and treating stormwater runoff from existing and future developments within its catchment area. Any loss of ecological functions should be mitigated.

3. Regulations

1. New stabilization measures are not allowed except to protect or support an existing or approved development, for the restoration of ecological functions, or for hazardous substance remediation pursuant to Chapter 10.105D RCW.

2. New development shall, where feasible, be located and designed to eliminate the need for concurrent or future shoreline stabilization.

3. New structural stabilization measures shall not be allowed except when necessity is demonstrated in accordance with the criteria provided in WAC 173-26-231(3)(a)(iii)(B), (D) and (E), and unless there is conclusive evidence documented by a geotechnical analysis that the structure is in danger from shoreline erosion caused by currents or waves. The geotechnical analysis should evaluate on-site drainage issues and address drainage problems away from the shoreline edge before considering structural shoreline stabilization.

4. Shoreline stabilization and flood protection measures shall not reduce performance of existing ecological functions or ecosystem-wide processes, and shall be constructed in a manner so as to prevent the loss of in-channel habitat. Soil bioengineering methods shall be the preferred method of bank protection. Use of bank hardening methods, such as rip-rap, concrete walls, or extensive revetments, shall only be allowed when the applicant demonstrates that soil bioengineering will not be effective. The report must be prepared by an engineer or other qualified specialist with experience in evaluating suitability of and designing non-structural stabilization measures. All stabilization and protection works shall include revegetation in their design and implementation.

5. Subdivision of land must be regulated to assure that the lots created will not require shoreline stabilization in order for reasonable development to occur using geotechnical analysis of the site and shoreline characteristics.

6. New development on steep slopes shall be set back sufficiently to ensure that shoreline stabilization is unlikely to be necessary during the life of the structure, as demonstrated by a geotechnical analysis.

7. New development that would require shoreline stabilization that causes significant impacts to ecological functions, adjacent or downstream properties, and shoreline areas shall not be allowed.

8. An existing shoreline stabilization structure may be replaced with a similar structure if there is a demonstrated need to protect principal uses or structures from erosion caused by currents and waves in accordance with WAC 173-26-231(3)(a)(iii)(C), (D) and (E).

9. All stabilization measures will be the minimum in size and impact to accomplish necessary stabilization.

10. Shoreline stabilization proposals must incorporate cumulative effects analysis to determine how the project may affect adjacent shoreline areas upstream and downstream of the site. Cumulative effects must be evaluated by utilizing expertise in several different fields of study (i.e., geomorphologists, biologists, hydrologists).

11. Publicly financed or subsidized shoreline erosion control measures shall not restrict appropriate public access to the shoreline except where such access is determined to be infeasible because of incompatible uses, safety, security, or harm to ecological functions. Where feasible, incorporate ecological restoration and public access improvements into the project.

12. The above regulations apply to the Tye Stormwater Facility environment and its associated Aquatic environment only as they are consistent with maintaining the primary purpose of the human-made Tye Stormwater Facility, collecting and treating stormwater runoff from existing and future developments within its catchment area. Any loss of ecological functions must be mitigated.

D. Fill

1. Applicability

A fill means the addition of soil, sand, rock, gravel, sediment, earth retaining structure or other material to an area waterward of the OHWM, in wetlands, or on shorelands in a manner that raises the elevation or creates dry land. Most fills destroy the existing natural character of a shoreline and can result in erosion and silting problems, impacts to habitat, along with diminishing of the water surface area. (Note: the placement of fill to replace shoreline areas that have been removed by normal erosion processes is covered under Shoreline Stabilization.

2. Policies

1. Fill should be located, designed, and constructed to protect shoreline ecological functions and ecosystem-wide processes and public access to the shoreline.

2. Where permitted, fills should be the minimum necessary to provide for the proposed use and should be permitted only when tied to a specific development proposal that is permitted by the Master Program. Speculative fill is prohibited.

3. Fills landward of the ordinary high water mark should be permitted only when necessary to accommodate uses listed as permitted in Chapter 2.C (Shoreline Use and Modification Matrix) of the Master Program, and when significant impacts can be avoided or mitigated.

4. Fills waterward of the ordinary high water mark should be discouraged and only allowed through a Conditional Use Permit when necessary to facilitate water-dependent uses consistent with the Master Program, for necessary river crossings, and for projects beneficial to the environment.

5. The perimeter of fills should be designed to avoid or eliminate erosion and sedimentation impacts, both during initial fill activities and over time.

6. Mitigation for wetland impacts must be implemented pursuant to the Critical Areas Regulations contained in Appendix A.

7. Fills should not adversely impact navigation.

3. Regulations

1. Applications for fills shall include the following:

    a. Proposed use of the fill area;

    b. Physical, chemical, and biological characteristics of the fill material;

    c. Source of fill material;

    d. Method of placement and compaction;

    e. Location of fill relative to natural and/or existing drainage patterns;

    f. Location of the fill perimeter relative to the floodway;

    g. Perimeter erosion control and stabilization means;

    h. Type of surfacing and runoff control devices; and

    i. Location of wetlands or other sensitive areas.

2. Fill waterward of the ordinary high water mark shall be permitted as a conditional use only:

    a. In conjunction with a water-dependent use permitted under this Master Program.

b. In conjunction with a bridge, utility, or navigational structure for which there is a demonstrated public need and where no feasible upland sites, design solutions, or routes exist.

c. As part of an approved restoration project; or

d. For fishing or wildlife habitat enhancement projects.

3. Pier or pile supports shall be utilized in preference to fills. Fills for approved road development in floodplains or wetlands shall be permitted only if pile or pier supports are proven structurally infeasible.

4. Fills shall only be permitted in conjunction with a specific development already permitted by the Master Program or proposed simultaneously as part of a Conditional Use Permit application.

5. Speculative fills are prohibited.

6. Fills shall be permitted only where it is demonstrated that the proposed action will not:

   a. Result in significant adverse impacts to water quality, fish, and/or wildlife habitat.

   b. Result in significant adverse impacts to natural drainage and current patterns or floodwater capacities.

7. Where fills are permitted, the fill shall be the minimum necessary to accommodate the proposed use.

8. Fill shall be designed, constructed, and maintained to prevent, minimize, and control all material movement, erosion, and sedimentation for the affected area. Fill perimeters shall be designed and constructed with silt curtains, vegetation, retaining walls, or other mechanisms to prevent material movement. In addition the sides of the fill shall be appropriately sloped to prevent erosion and sedimentation, both during initial fill activities and afterwards.

9. Fill materials shall be clean sand, gravel, soil, rock, or similar material. Use of polluted dredge spoils and sanitary fill materials are prohibited. The developer shall provide evidence that the material has been obtained from a clean source prior to fill placement.

10. Fills shall be designed to allow surface water penetration into aquifers, if such conditions existed prior to the fill.

Chapter 5: Shoreline Use Provisions

A. Introduction and General Policies

The provisions in this chapter apply to individual shoreline uses. For any specific development, Shoreline Modification Provisions and General Provisions also apply. The uses are presented in alphabetical order. Also refer to the Shoreline Use and Modification Matrix in Chapter 2, Section C.

As summarized in WAC 173-26-176, the Act establishes policy that preference be given to uses that are unique to or dependent upon a shoreline location. Consistent with this policy, these guidelines use the terms "water-dependent," "water-related," and "water-enjoyment," as defined in WAC 173-26-020, when discussing appropriate uses for various shoreline areas.

Shoreline areas, being a limited ecological and economic resource, are the setting for competing uses and ecological protection and restoration activities. Consistent with RCW 90.58.020 and WAC 173-26-171 through 186, the following preferences and priorities shall be applied in the order listed below when determining allowable uses and resolving use conflicts in all shoreline areas. Consequently this Master Program includes the following policies that apply to the location of uses along the shoreline.

1. Reserve appropriate areas for protecting and restoring ecological functions to control pollution and prevent damage to the natural environment and public health.

2. Reserve shoreline areas for water-dependent and associated water-related uses.

3. Reserve shoreline areas for other water-related and water-enjoyment uses that are compatible with ecological protection and restoration objectives.

4. Locate single-family residential uses where they are appropriate and can be developed without significant impact to ecological functions or displacement of water-dependent uses.

5. Limit nonwater-oriented uses to those locations where the above-described uses are inappropriate or where nonwater-oriented uses demonstrably contribute to the objectives of the Shoreline Management Act.

B. Commercial Development

1. Applicability

Commercial development means those uses that are involved in wholesale, retail, service, and business trade. Examples include hotels, motels, grocery markets, shopping centers, restaurants, shops, offices, and private or public indoor recreation facilities. Excluded from this category are boating, transportation, and industrial facilities.

Uses and activities associated with commercial development that are identified as separate uses in this program include Mining, Industry, Transportation and Parking, and Utilities. In-stream structures, shoreline stabilization, flood protection, and other shoreline modifications are sometimes associated with commercial development and are subject to those shoreline modification regulations in addition to the standards for commercial development established herein.

2. Policies

1. Except for those properties with no direct shoreline water body access and that are not contiguous with a shoreline water body, new commercial development located in shoreline areas should be limited to those that are water-oriented uses and activities as defined herein. In reviewing shoreline development proposals, the City will first give preference to water-dependent commercial uses over nonwater-dependent commercial uses and, second, give preference to water-related and water-enjoyment commercial uses over nonwater-oriented commercial uses.

   Nonwater-oriented commercial development is strongly discouraged; however, when permitted, it should not displace water-oriented development in shoreline areas and should be conditioned with the requirement for ecological restoration and public access enhancements.

2. Nonwater-oriented commercial developments should be prohibited except in the High Intensity and Tye Stormwater Facility environments, and except for those properties with no direct shoreline water body access and that are not contiguous with a shoreline water body. Water-enjoyment and water-related uses should be permitted over water only as part of a mixed-use project that features water-dependent uses.

3. Commercial developments should be located along shorelines in a way that ensures the protection and preservation of natural areas or systems identified as having geological, ecological, biological, or cultural significance.

4. New commercial development on shorelines should be encouraged to locate in those areas with existing legal commercial uses and in a manner that will promote the efficient use of shoreline areas.

5. Commercial development should be encouraged to utilize existing transportation corridors and minimize the number of ingress/egress points. Ingress-egress should be designed to minimize potential conflicts with and impact on regular corridor traffic.

6. Commercial development should conform to the City development standards and design guidelines. Structures should not significantly impact views from upland properties, public roadways or other public areas, and from the water. See Site Development Standards in Chapter 2, Section D.

7. For all new water-dependent commercial development, ecological restoration and public access enhancement should be considered. For all new water-related and water-enjoyment development, ecological restoration and public access should be required unless demonstrated to be infeasible. For all otherwise allowed new nonwater-oriented development, ecological restoration and public access, where feasible, should be required as a permit condition.

3. Regulations

1. The City shall require and utilize the following information in its review of commercial development proposals:

    a. Nature of the commercial activity (e.g., water-dependent, water-related, water-enjoyment, nonwater-oriented, mixed-use), including a breakdown of specific shoreline use components.

    b. The reason(s) why the project needs a shoreline location.

    c. A description of design measures to mitigate impacts and achieve objectives of this Shoreline Master Program.

    d. Provisions for ecological restoration and for public visual and physical access to the shoreline.

    e. Provisions to ensure that the development will not cause significant ecological impacts or adverse environmental impacts.

    f. Layout, size, height, and general appearance of all proposed structures.

    g. Pedestrian and vehicular circulation, pavements, landscaping, and view corridors.

    h. For mixed-use proposals, the mix of water-oriented and nonwater-oriented uses and activities, structure locations, site designs and bulk considerations, enhancements for physical and visual public access to the shoreline (both public and private space), and other design measures that address the goals and policies of the Shoreline Master Program.

2. Nonwater-oriented commercial developments may be permitted as indicated in the Shoreline Use Matrix in Chapter 2, Section C and in accordance with WAC 173-26-241(3)(d)(i) and (ii) which provides the following criteria:

    a. The use is part of a mixed-use project that includes water-dependent uses and provides a significant public benefit with respect to the Shoreline Management Act's objectives such as providing public access and ecological restoration;

    b. Navigability is severely limited at the project site and the commercial use provides a significant public benefit with respect to the Shoreline Management Act's objectives such as providing public access and ecological restoration.

Nonwater-oriented uses are allowed in the Tye Stormwater Facility environment and may be permitted in the High Intensity environment as a conditional use.

3. Commercial development shall be designed to avoid or minimize ecological impacts, to protect human health and safety, and to avoid significant adverse impacts to surrounding uses and the area's visual qualities. To this end, the City may adjust the project dimensions and setbacks (so long as they are not relaxed below minimum standards without a shoreline Variance) and/or prescribe operation intensity and screening standards as deemed appropriate. Need and special considerations for landscaping and buffer areas shall also be subject to review.

4. The amount of impervious surface shall be the minimum necessary to provide for the intended use, and shall be consistent with the lot coverage standards listed above in Chapter 2, Section D. The City of Monroe has a policy of adopting the latest version of the Department of Ecology *Stormwater Management Manual for Western Washington* to regulate stormwater discharge and management. The City will encourage practices that further minimize impervious surfaces and stormwater runoff, including use of best available technologies. The remaining land area shall be landscaped with native plants or treated as directed by the City.

5. See Critical Areas Regulations (Appendix A) and Chapter 2D of this SMP for buffer/setback requirements and other development standards.

6. All new development proposals will be reviewed by the City for ecological restoration and public access opportunities. When restoration and/or public access plans indicate opportunities exist, the City may require that those opportunities be either implemented as part of the development project or that the project design be altered so that those opportunities are not diminished. Public access provisions shall conform to the requirements in Chapter 3 (General Provisions), Section H.

   All new water-related and water-enjoyment development shall be conditioned with the requirement for ecological restoration and public access unless those activities are demonstrated to be not feasible. (See definition of "feasible.")

   All new nonwater-oriented development, where allowed, shall be conditioned with the requirement to provide ecological restoration and public access.

7. All commercial loading and service areas shall be located on the upland side of the commercial activities, or provisions must be made to set back and screen the loading and service area from the shoreline and water body.

C. Industry

1. Applicability

Industrial developments and uses are facilities for processing, manufacturing, and storing of finished or semi-finished goods. Excluded from this category and covered under other sections of the Shoreline Master Program are boating facilities, mining (including on-site processing of raw materials), utilities, solid waste disposal, and transportation facilities.

Shoreline modifications and other uses associated with industrial development are described separately in this Shoreline Master Program. In Monroe, industrial development of the shoreline is not anticipated due to the lack of suitable locations for industrial development, limitations to navigation and physical characteristics of the shoreline adjacent to the Skykomish River, and is allowed only in the High Intensity and Tye Stormwater Facility environments. There are only small areas of High-Intensity in Monroe, and they are located on uplands far separated from the shoreline water body. The areas of the Tye Stormwater Facility environment that are zoned for industrial uses are also separated from the shoreline water body.

2. Policies

1. Regional and state-wide needs for industrial facilities should be carefully considered in reviewing new proposals as well as in allocating shorelines for such development. Such reviews or allocations will be coordinated with adjacent counties and cities, and the state in order to minimize duplicate, under-utilized facilities elsewhere in the region or unnecessary adverse impacts on other jurisdictions.

2. Expansion or redevelopment of existing legally established industrial areas, facilities, and services to incorporate mixed-use development should be encouraged over the addition and/or location of new or single-purpose industrial facilities.

3. Industrial development should not be located on sensitive and ecologically valuable shorelines, such as wetlands or wildlife habitat areas, nor on shores inherently hazardous for such development, such as flood-prone and erosion-prone areas and steep or unstable slopes.

4. New industrial development on properties with shoreline water body frontage should be required to provide physical and/or visual access to shorelines whenever possible and when such access does not cause significant interference with operations or hazards to life and property.

5. The amount of paving and construction of structures should be minimized. Areas not needed for industrial activities should be either left undeveloped or restored.

6. Ecological restoration should be a condition of all nonwater-dependent industrial development and considered as part of water-dependent development.

3. Regulations

1. Only water-dependent and water-related industrial development shall be permitted where there is direct access to the shoreline water body. Existing nonwater-oriented uses in the High Intensity and Tye Stormwater Facility environments only may be expanded, provided ecological restoration is provided, as directed by the City. New nonwater-oriented industrial development may be allowed, in the High Intensity and Tye Stormwater Facility environments only, where there is no access to the shoreline water body.

2. For parcels contiguous with a shoreline water body, accessory development which does not require a shoreline location shall be located upland of the water-dependent portions of the development. Industrial uses on properties not contiguous to the shoreline may be allowed in the High Intensity and Tye Stormwater Facility environments subject to the provisions of this SMP and Title 18 of the Monroe Municipal Code.

3. New nonwater-dependent industry shall not cause significant ecological impacts. The applicant must demonstrate that adequate consideration has been given to, and plans made to mitigate, negative environmental impacts, and that environmental cleanup and restoration can be accomplished. In addition, new nonwater-oriented industrial development shall be prohibited on shorelines except when:

    a. the use is part of a mixed-use project that includes water-dependent uses and provides a significant public benefit with respect to the Shoreline Management Act's objectives such as providing public access and ecological restoration; or

    b. the subject property is not contiguous with nor provides access to the shoreline water body.

4. The amount of impervious surface shall be the minimum necessary to provide for the intended use. New industrial development shall have no more than 75 percent total lot coverage. The City of Monroe has a policy of adopting the latest version of the Department of Ecology *Stormwater Management Manual for Western Washington* to regulate stormwater discharge and management. For these regulations, maximum lot coverage is defined under MMC 18.10.220, as "the total area to be covered by buildings, driveways, parking areas, sidewalks, pools, and similar impervious surface areas"; a credit towards the total impervious surface coverage may be provided through the use of permeable materials, such as pervious concrete, subject to the approval of the City's Engineering Department. The City will encourage practices that further minimize impervious surfaces and stormwater runoff, including use of best available technologies. The remaining land area shall be landscaped with native plants or treated as directed by the City.

5. Storage and/or disposal of industrial wastes are prohibited within shoreline jurisdiction.

6. At new or expanded industrial developments, the best available facilities practices and procedures shall be employed for the safe handling of fuels and toxic or hazardous materials to prevent them from entering the water, and optimum means shall be employed for prompt and effective cleanup of those spills that do occur. The City may require specific facilities to support those activities as well as demonstration of a cleanup/spill prevention program.

7. See Critical Areas Regulations (Appendix A) and Chapter 2D of this SMP for buffer/setback requirements and other development standards.

8. Display and other exterior lighting shall be designed, shielded, and operated to minimize glare, avoid illuminating nearby properties and the water, and prevent hazards for public traffic.

D. In-Stream Structures

1. Applicability

"In-stream structure" means a structure placed by humans within a stream or river waterward of the ordinary high water mark that either causes or has the potential to cause water impoundment or the diversion, obstruction, or modification of water flow. In-stream structures may include those for irrigation, water supply, flood control, transportation, utility service transmission, fish habitat enhancement, or other purpose. This section covers both the structures themselves and their support facilities. This applies to their construction, operation, and maintenance, as well as the expansion of existing structures and facilities.

2. Policies

1. In-stream structures should provide for the protection, preservation, and restoration of ecosystem-wide processes, ecological functions, and cultural resources, including, but not limited to, fish and fish passage, wildlife and water resources, shoreline critical areas, hydrogeologic processes, and natural scenic vistas.

2. The location and planning of in-stream structures should give due consideration to the full range of public interests, watershed functions and processes, and environmental concerns, with special emphasis on protecting and restoring priority habitats and species.

3. Careful consideration should be given to avoiding or minimizing land and water use conflicts with properties in shoreline jurisdiction and with properties adjacent to, upstream of, and downstream of the proposed site.

4. Proposals for in-stream structures and associated facilities should give careful consideration to the design, location, security, and construction of access roads, impoundment structures and reservoirs, penstocks, and power houses to minimize adverse impacts to the shoreline and the surrounding area.

5. Applications for in-stream structures should clearly document the suitability of the proposed site for the specific type of development, including alternative locations. Such site suitability analysis should thoroughly consider the environmental effects of the proposed facilities at the primary site and at alternative sites.

6. All diversion structures should be designed to permit natural transport of bed load materials.

7. In-stream structures and their support facilities should be designed to minimize removal of riparian vegetation and the necessity for massive shore defense structures.

8. All nonwater-oriented facilities associated with in-stream structures, such as staging and storage areas, switching yards, and utility transmission lines should be located at least 200 feet landward of the OHWM.

9. Mitigation should be required for loss of fisheries, wildlife resources, and natural systems, including wetlands and sensitive areas. No net loss in function or value of acreage should occur as a result of in-stream structures. When required, mitigation measures should be properly planned and monitored to ensure their effectiveness.

10. In-stream structures and associated facilities should be located and designed so they do not interfere with public navigation of the watercourse, including commercial and recreational navigation. Such uses include barging, rafting, sail boarding, kayaking, and canoeing.

11. In-stream structures and associated facilities should not be located where they will adversely impact publicly owned lands or waters used extensively for recreation. Impacts that should be avoided include the visual impact of the structure or facilities, the intrusion of roads or utility corridors into undeveloped area used for recreation, reduced water noise, and significant visual impacts from reduced water flows.

12. In-stream structures should be designed and constructed to ensure public access to and along the shoreline, in accordance with the public access policies and regulations contained in this Shoreline Master Program. Existing public access and recreational opportunities should be retained, enhanced, or replaced.

13. In-stream structures should provide trails and other access links as well as appropriate ancillary facilities, such as parking and sanitary facilities, if recreational opportunity is created.

14. Proposals for in-stream structures should be evaluated for their impacts on ecological processes within the watershed and the resultant impacts on flood hazards and wildlife habitats.

3. Regulations

General

1. All permit applications for in-stream structures shall contain, at a minimum, the following:

    a. A site suitability analysis, which provides sufficient justification for the proposed site. The analysis must fully address alternative sites for the proposed development.

    b. Proposed location and design of primary and accessory structures, transmission equipment, utility corridors, and access/service roads.

    c. Provision for public access to and along the affected shoreline and proposed recreational features at the site, where applicable.

d. A plan that describes the extent and location of vegetation which is proposed to be removed to accommodate the proposed facility, and any site revegetation plan required by this Shoreline Master Program.

e. A hydraulic analysis prepared by a licensed professional engineer that sufficiently describes the project's effects on streamway hydraulics, including potential increases in base flood elevation, changes in stream velocity, and the potential for redirection of the normal flow of the affected stream.

f. A hydrologic analysis that analyzes the project's effects on ecological processes, including delivery and rate of water and sediment, geomorphology, and recruitment of large woody debris.

g. Biological resource inventory and analysis that sufficiently describe the project's effects on fisheries and wildlife resources, prepared by a professional biologist.

h. Provision for erosion control, protection of water quality, and protection of fishery and wildlife resources during construction.

i. Long-term management plans that describe, in sufficient detail, provisions for protection of in-stream resources during construction and operation. The plan shall include means for monitoring its success.

2. In-stream structures may be required to provide public access, provided public access improvements do not create significant ecological impacts or other adverse environmental impacts to and along the affected shoreline nor create a safety hazard to the public. Public access provisions shall include, but not be limited to, any combination of trails, vistas, parking, and any necessary sanitation facilities. Required public access sites shall be dedicated for public use through fee acquisition or recorded easement. The public access provisions in this Master Program apply.

3. All shoreline development must conform to the General Provisions and the Environment Designation Provisions stated in this Shoreline Master Program.

Site Development

4. Temporary and emergency erosion control drainage measures, such as, but not limited to, silt curtains, berms, and stormwater catch basins, shall be utilized during construction to prevent shoreline erosion and siltation of the water body. Temporary erosion and drainage control devices may be removed following construction completion, provided that an approved erosion control and maintenance plan has been implemented by the contractor(s). Materials adequate to immediately correct emergency erosion situations shall be maintained on-site.

5. All debris, overburden, and other waste materials from construction not useful for channel restoration shall be disposed of in such a manner as to prevent their entry into a water body by erosion or from drainage, high water, or other vectoring mechanisms.

6. All heavy construction equipment, as well as fuel storage and repair areas, shall be located greater than 200 feet from the OHWM. Construction material staging areas shall be located greater than 200 feet from the OHWM, EXCEPT during construction and assembly periods. Service roads shall be of a size that is minimally necessary to safely accomplish maintenance and repair of the facility and shall be designed and located to minimize vegetation removal

and erosion and sedimentation impacts. Hazardous and/or toxic materials storage shall be prohibited within shoreline jurisdiction, and such materials shall be prevented from entering the water through accidental spillage at staging or storage areas located outside immediate shoreline jurisdiction.

Structural Development

7. Structures shall be designed, located, and constructed in such a manner as to avoid extensive topographical alteration and to minimize or avoid, as much as possible, impacts to the natural features of the shoreline. Structures shall be designed and located to minimize removal of riparian vegetation and to return flow to the stream in as short a distance as possible.

8. Where practicable, transmission lines shall be located underground. Utilities and transmission lines shall be located so as to minimize obstruction or degradation of a scenic view.

9. Subject to the approval of the appropriate state authority, in-stream structures shall provide for adequate upstream and downstream migration of anadromous fish, where applicable. The City shall not approve an in-stream structure project that has a significant ecological impact on anadromous fishes or state-listed priority species.

10. On run-of-the-river developments, impoundments shall be located in such a manner as to minimize impacts to natural scenic values.

Impacts and Mitigation

11. In-stream structures shall not diminish the ecological processes that occur in the watershed (or sub-basin) or diminish habitat for priority species.

12. Mitigation shall be required of the proponent for the loss of state-listed priority species, habitats, or ecological functions. The mitigation required shall be commensurate to the value and type of resource or system lost and shall be in accordance with the mitigation sequence. No net loss in function, value, or acreage shall occur from such development.

13. Mitigation for loss of natural systems and resources is required. A mitigation plan that details the objectives of the mitigation activities shall be prepared by the proponent and be subject to the approval by the Washington Department of Ecology in consultation with the Washington Department of Fish and Wildlife.

E. Mining

1. Applicability

Mining is the removal and primary processing of naturally occurring materials from the earth for economic use. For purposes of this definition, “processing” includes washing, screening, crushing, and stockpiling. Mining activities also include in-water dredging activities related to mineral extraction. Processing does not include general manufacturing, such as the manufacture

of molded or cast concrete or asphalt products, asphalt mixing operations, or concrete batching operations. (See "Industry" for general standards relating to these uses, and the sections below for standards applicable to potential continued concrete batching operations at the existing mining operation.)

There is currently one mining operation within the area of shoreline jurisdiction in Monroe, permitted under Shoreline Substantial Development Permit SL 195003, adopted by City of Monroe Resolution 96/07, which will expire in 2012. The permit allows excavation of gravel and sand from the floodplain, and under certain conditions from an active gravel bar. Shoreline Substantial Development Permit SL 195003 also allows processing and concrete batching operations, and the Master Plan implementing the permit discloses the permit-holder's plans to continue aggregate processing and concrete batching operations for imported aggregates after 2012 across a small, 37-acre portion of the currently occupied larger site.

2. Policies

1. Existing sand and gravel mining operations may be reauthorized, with the exception of river bar scalping or other extraction activities waterward of the ordinary high water mark, provided that appropriate permits are secured for the proposed activity and the activity is consistent with the City's critical area regulations and protective of endangered, threatened, or sensitive species. No new mining activities (e.g., expanding the boundary of the extraction area or the materials extracted) should be permitted within shoreline jurisdiction.

2. All impacts shall be mitigated and, where possible, shoreline enhancement should also be encouraged.

3. All practical measures shall be taken to protect the downstream natural character of the shoreline, including hydrology, geomorphology, sediment flux, and ecological functions both during operations and after mining activities cease.

4. All practical measures shall be taken to protect water bodies from all sources of pollution, including, but not limited to, sedimentation and siltation, chemical and petrochemical use and spillage, and storage or disposal of mining wastes and spoils. Maximum protection should be provided for anadromous fisheries resources.

5. Mining activities should allow the natural ecosystem-wide processes to function with a minimum of disruption during their operations and should re-create a high quality riparian and wetland ecosystem.

6. Mining operations shall minimize adverse visual and noise impacts on surrounding shoreline areas, and should include ecological restoration as feasible during operations.

3. Regulations

General

1. Existing sand and gravel mining operations may be reauthorized, with the exception of river bar scalping or other extraction activities waterward of the ordinary high water mark, provided that appropriate permits are secured for the proposed activity and the activity is

consistent with the City's critical area regulations and protective of endangered, threatened, or sensitive species. No new mining activities (e.g., expanding the boundary of the extraction area or the materials extracted) shall be permitted within shoreline jurisdiction.

2. Gravel storage and processing, concrete batching, sales, and equipment storage is allowed when adjacent to an active or reclaimed excavation site.

3. Mining, including the excavation of sand, gravel, and other minerals, shall be done in strict conformance to the Washington State Surface Mining Reclamation Act, Chapter 78.44 RCW, and applicable provisions of the City code.

4. Mining waterward of the Ordinary High Water Mark is prohibited.

5. Excavation of sand, gravel, and other river materials upland of the Ordinary High Water Mark may be permitted as a conditional use, provided the proposed activity: secures all necessary permits; is consistent with the City's Critical Areas Regulations (as adopted in Appendix A) and protective of endangered, threatened, or sensitive species; is consistent with the environmental policies and the provisions of WAC 173-26-241(3)(h); and is located consistent with mineral resource lands designation criteria pursuant to RCW 36.70A.170 and WAC 365-190-070. See Regulations 25-30 below for additional reclamation requirements.

6. All mining impacts shall be mitigated through site restoration, including: restoration during site operations in portions of the site where operations have permanently ceased; restoration of the site after all mining activities have ceased; and shoreline enhancement in both disturbed and undisturbed portions of the site.

7. Mining activities that take place adjacent to a river shall take all practical steps to ensure that no negative downstream impacts to the hydrology, geomorphology, and sediment flux of the river occur, either during mining operations or after mining operations cease.

8. All practical measures should be taken to protect water bodies from all sources of pollution, including, but not limited to, sedimentation and siltation, chemical and petrochemical use and spillage, and storage or disposal of mining wastes and spoils. Maximum protection should be provided for anadromous fisheries resources.

9. Mining proposals shall provide the following information as part of an application for a shoreline permit:

    a. Materials to be mined.

    b. Quantity of materials to be mined, by type.

    c. Quality of materials to be mined, by type. For certain minerals, a qualified geologist's evaluation may be required.

    d. Mining technique and equipment to be utilized.

    e. Depth of overburden and proposed depth of mining.

    f. Lateral extent and depth of total mineral deposit.

g. Cross section diagrams indicating present and proposed elevations and/or extraction levels.

h. Existing drainage patterns, seasonal or continuous, and proposed alterations thereof, including transport and deposition of sediment and channel changes that may result.

i. Proposed means of controlling/handling surface runoff and preventing or minimizing erosion and sedimentation, including impacts to banks both upstream and downstream of the excavation.

j. The location and sensitivity of any affected flood hazard areas and wetlands.

k. Subsurface water resources or aquifer recharge areas: origin, depth, and extent.

l. Quality analysis of overburden, excavation material, and tailings with plans for storage, usage, or disposition.

m. Mining plan and scheduling, including seasonal, phasing, and daily operation schedules.

n. Reclamation plan that meets the requirement of this chapter and, at a minimum, Chapter 78.44 RCW (for surface mining operations only).

o. Screening, earthen berm buffering, and/or fencing plans that meet the requirements of this Shoreline Master Program.

p. Description of impacts to ecosystem-wide processes and ecological functions within the sub-basin and to aquatic and riparian habitats.

10. Mining operations shall comply with all local, state and federal water quality standards and pollution control laws. Operations shall utilize effective techniques to prevent or minimize surface water runoff, erosion, and sedimentation; to prevent reduction of natural flows; to protect all shoreline areas from acidic or toxic materials; and to maintain the natural drainage courses of all streams. Surface water runoff shall be impounded as necessary to prevent accelerated runoff and erosion.

11. Mining and associated activities shall not be allowed where such uses would result in sort-term or long-term significant ecological impacts to shoreline ecological functions or ecosystem-wide processes.

12. Where mining and associated activities are allowed, they shall be conducted in a manner that is consistent with the policies of the environment designation in which they are located, impacts to fish and wildlife habitat shall be avoided, and all disturbed areas shall be restored upon completion of mining. Destruction of critical habitat for priority species is prohibited.

13. Surface mining reclamation plans shall provide for subsequent use of the property that is consistent with the policies of the environment designation in which it is located and shall assure that ecological functions of the shoreline are restored.

14. In locations where gravel removal has been allowed in the past, any future authorization to continue shall be based on studies as required above, and no further authorization shall be granted except in conformance with this provision.

15. Overburden, mining debris, and tailings shall not be placed in water bodies or floodways and shall be stored and protected in such a manner so as to prevent or minimize erosion or seepage to surface and ground waters.

16. Mining operations shall provide maximum protection for anadromous fisheries resources, including, but not limited to, limitations on the periods of the year during which mining activities may occur.

17. If substantial evidence indicates that mining operations are causing, or continuation of operation would cause, significant adverse impacts to water quality or to the geohydraulic functioning of a river, the City may terminate the mining permit or impose further conditions on the mining operation.

18. In no case shall mining operations impair lateral support and thereby result in earth movements extending beyond the boundaries of the site.

19. Precautions shall be taken to ensure that stagnant or standing water, especially that of a toxic or noxious nature, does not develop, and that flooding and evaporation will not lead to the stranding of fish in open pits.

20. Activities such as truck storage, rock crushing, storage of material from off site, etc are prohibited, except when such activities occur adjacent to an active or reclaimed excavation site more than 200 feet from the banks of the main stem of the Skykomish River.

Setbacks and Buffers

21. A minimum 200-foot buffer of undisturbed soils and native vegetation shall be maintained and/or planted between the mining site (including all accessory facilities) and adjacent properties and abutting bodies of water or wetlands.

22. Mining activities should be set back a sufficient distance from water bodies and wetlands to minimize erosion, protect water quality from all possible sources of pollution, and preserve the natural vegetation and aesthetics of the shoreline environment.

23. Where the potential for stream avulsion exists, river banks shall be stabilized per an approved stabilization plan that includes the use of biological bank stabilization techniques ("bioengineering") and that is designed to prevent avulsion in the 100-year storm event.

24. Mining equipment, works, and structures shall be sited and stored as far landward as feasible from the OHWM. Minimum setbacks and buffer areas are established in the chapter entitled Environment Designations and in the Critical Areas Regulations found in Appendix A. Any facilities located within the 100-year floodplain must be able to withstand a 100-year flood without becoming hazardous.

Reclamation

25. Reclamation plans to create high-quality riparian and/or wetland ecosystems shall be submitted with each permit application and shall provide for reclamation of the site into a use that is permitted by this program and shall also indicate when reclamation shall occur. See

Washington State Surface Mining Reclamation Act Chapter 78.44 RCW. In the event of a conflict between the City's reclamation policies and State law, the State law shall control.

26. In order to ensure the future use and viability of shoreline areas subsequent to mining activities, the reclamation plan shall include the following provisions to be fulfilled within one year of completed mining operations:

    a. All equipment, machinery, buildings, and structures not involved in reclamation activities shall be removed from the site upon review and approval of the reclamation as required by state and local agencies.

    b. No stagnant or standing water shall be allowed to collect or remain except as provided in an approved site reclamation plan. Such areas shall be flood-proofed.

    c. Backfill material shall be of natural, compatible materials. Combustible, flammable, noxious, toxic, or solid waste materials are prohibited as backfill.

    d. All overburden, waste, and nontoxic material storage piles and areas shall either be leveled, sodded and planted, or returned to the excavated area for reuse as backfill and subsequently sodded and planted.

    e. The site shall be rehabilitated so as to prevent erosion and sedimentation during and after reclamation.

27. Suitable drainage systems approved by the City engineer shall be installed and maintained if natural, gradual drainage is not possible. Such systems should collect, treat, and release surface runoff as close to original flow patterns as possible and in such a manner as to prevent erosion and sedimentation.

28. To the extent possible, topography of the site shall be restored to the contours existing prior to mining activity. Contours of the reclaimed site shall be compatible with the surrounding land and shoreline area.

29. Revegetation shall consist of compatible, native, self-sustaining trees, shrubs, legumes, or grasses, with species, size, and quantities and locations as approved by the City.

30. All toxic and acid-forming mining refuse and materials shall be either treated so as to be nonpolluting prior to on-site disposal or removed and properly disposed of away from shoreline areas.

F. Recreational Development

1. Applicability

Recreational development includes facilities for passive recreational activities such as hiking, photography, viewing, and fishing. It also includes facilities for active or more intensive uses, such as parks, campgrounds, golf courses, and other outdoor recreation areas. This section

applies to both publicly and privately owned shoreline facilities intended for use by the public or a private club, group, association or individual.

Recreational uses and development can be part of a larger mixed-use project. For example, a resort will probably contain characteristics of, and be reviewed under, both the Commercial Development and the Recreational Development sections. Primary activities such as boating facilities, subdivisions, and motels are not addressed directly in this category.

Uses and activities associated with recreational developments that are identified as separate use activities in this program, such as Boating Facilities, Residential Development, Utilities, and Commercial Development, are subject to the regulations established for those uses in addition to the standards for recreation established in this section.

2. Policies

1. The coordination of local, state, and federal recreation planning should be encouraged to satisfy recreational needs. Shoreline recreational developments should be consistent with the City of Monroe Parks, Recreation and Open Space Plan (as amended). State-owned shorelines, being particularly adapted to providing beaches, ecological study areas, and other recreational uses, should be given special consideration for park and recreational uses.

2. Shoreline recreational development shall be given priority and shall be primarily related to access to, enjoyment and use of the water and shorelines of the state.

3. Recreational developments and plans should promote preservation of the natural character, resources and ecological functions and processes.

4. Recreational developments should be located, designed, and operated to be compatible with- and to prevent, or if that is not possible, minimize, adverse impacts on-environmental quality and valuable natural features as well as adjacent and surrounding land and water uses. Favorable consideration should be given to proposals that complement their environment and surrounding land and water uses and leave natural areas undisturbed and protected.

5. Shoreline areas with a potential for providing recreation or public access opportunities should be identified for this use, acquired by lease or purchase, and incorporated into the public park and open space system.

6. A variety of compatible recreational experiences and activities should be encouraged to satisfy diverse recreational needs.

7. Within shoreline jurisdiction, water-dependent recreational uses, such as angling, boating, and swimming, should have priority over water-enjoyment uses, such as picnicking and nature study. Water-enjoyment uses should have priority over nonwater-oriented recreational uses, such as baseball or soccer.

8. The linkage of shoreline parks, recreation areas, and public access points with linear systems, such as hiking paths, bicycle paths, easements, and/or scenic drives, should be encouraged. Recreational facilities should be integrated with public access systems.

9. Recreational developments should be located and designed to preserve, enhance, or create scenic views and vistas. Such scenic views should be identified in the shoreline inventory.

10. Where appropriate, non-intensive recreational uses may be permitted in floodplain areas.

11. The use of shoreline street ends and publicly owned lands for public access and development of recreational opportunities should be encouraged.

12. All recreational developments should make adequate provisions for:

    a. Protection of ecological functions.
    b. Vehicular and pedestrian access, both on-site and off-site.
    c. Proper water supply and solid and sewage waste disposal methods.
    d. Security and fire protection.
    e. The prevention of overflow and trespass onto adjacent properties, including, but not limited to, landscaping, fencing, and posting of property.
    f. Buffering of such development from adjacent private properties or natural areas.

13. Trails and pathways on steep shoreline bluffs should be located, designed, and maintained to protect bank stability.

3. Regulations

General

1. The City shall require and utilize the following information in its review of recreational development proposals:

    a. Nature of the recreational activity (e.g., water-dependent, water-related, water-enjoyment, nonwater-oriented, mixed-use), including a breakdown of specific shoreline use components.
    b. The reasons why the project needs a shoreline location.
    c. Special considerations for enhancing the relationship of the activity to the shoreline.
    d. Provisions for ecological restoration and for public visual and physical access to the shoreline;
    e. Provisions to ensure that the development will not cause adverse environmental impacts.
    f. Layout, size, height, and general appearance of all proposed structures.
    g. Pedestrian and vehicular circulation, parking areas, pavements, landscaping, and view corridors.
    h. Horticultural or maintenance methods, including lawn or turf care, plant maintenance, and allowable beach uses.

2. Water-oriented recreational developments may be permitted as indicated in Chapter 2, Section C, Shoreline Use and Shoreline Modification Matrix. In accordance with said matrix

and other provisions of this Shoreline Master Program, nonwater-oriented recreational developments may be permitted by CUP (except in the Tye Stormwater Facility environment which allows nonwater-oriented recreational developments) only where it can be demonstrated that:

a. A water-oriented use is not reasonably expected to locate on the proposed site due to topography, surrounding land uses, physical features, or the site's separation from the water.

b. The proposed use does not usurp or displace land currently occupied by a water-oriented use and will not interfere with adjacent water-oriented uses.

c. The proposed use will be of appreciable public benefit by increasing ecological functions together with public use, enjoyment, or access to the shoreline.

3. Accessory parking shall not be located in shoreline jurisdiction unless there is no other feasible option.

4. All new recreational development proposals will be reviewed by the City for ecological restoration and public access opportunities. When restoration and/or public access plans indicate opportunities exist, the City may require that those opportunities be either implemented as part of the development project or that the project design be altered so that those opportunities are not diminished.

   All new nonwater-oriented recreational development, where allowed, shall be conditioned with the requirement to provide ecological restoration and public access.

   The City shall consult the Shoreline Restoration Element and the City of Monroe Park, Recreation and Open Space Plan to determine the applicability and extent of ecological restoration and/or public access required.

5. Public access provisions shall conform to the requirements in Section H, Chapter 3.

6. Recreational development that causes significant ecological impact is not allowed, except as provided below. Public water-oriented recreational development that would cause unavoidable significant ecological impacts may be permitted if the project includes ecological restoration that will improve ecological functions within the same stream reach or within Tye Stormwater Facility, as appropriate. Compensating ecological mitigation or restoration must be in place and functioning prior to construction of the recreational facility.

7. Valuable shoreline resources and fragile or unique areas, such as wetlands, shall be used only for non-intensive uses and nonstructural recreation developments.

8. Substantial structures, such as restrooms, recreation halls and gymnasiums, recreational buildings and fields, access roads, and parking areas, shall be set back from the OHWM at least 25 feet in the Tye Stormwater Facility environment and at least 200 feet or as otherwise allowed under the Critical Areas Regulations (see Appendix A) in all other environments. These areas may be linked to the shoreline by walkways.

9. For recreational developments that require the use of fertilizers, pesticides, or other toxic chemicals, such as play fields, the applicant shall submit plans demonstrating the methods to be used to prevent these applications and resultant leachate from entering adjacent water bodies, consistent with the City's adopted Best Management Practices for such uses.

Design

10. In approving shoreline recreational developments, the City shall ensure that the development will maintain, enhance, or restore desirable shoreline features, including unique and fragile areas, scenic views, and aesthetic values. To this end, the City may adjust and/or prescribe project dimensions, location of project components on the site, intensity of use, screening, parking requirements, and setbacks, as deemed appropriate to achieve this intent.

11. Recreational developments shall provide facilities for nonmotorized access to the shoreline, such as pedestrian and bicycle paths. Motorized vehicular access is prohibited on beaches, bars, spits, and stream beds, EXCEPT for boat launching and maintenance activities in designated areas.

12. To protect natural resources and adjacent properties, recreational facility design and operation shall prohibit the use of all-terrain and off-road vehicles in the shoreline area, EXCEPT where specific areas for such use are set aside and controlled, and then only when it can be demonstrated that demand is sufficient to warrant such activity.

13. Proposals for developments shall include a landscape plan that utilizes primarily native, self-sustaining vegetation. The removal of on-site native vegetation shall be limited to the minimum necessary for the development of play areas/fields, selected view points, or other permitted structures or facilities. (See Chapter 3, Section L, "Vegetation Conservation") Where feasible, such facilities requiring vegetation removal shall be set back to avoid significant vegetation removal.

14. No recreational buildings or structures shall be built over water except water-dependent and/or public access structures, such as bridges or viewing platforms.

15. Proposals for recreational development shall include adequate facilities for water supply, sewage, and garbage disposal. Where sewage treatment facilities are not available, the appropriate reviewing authority shall limit the intensity of development to meet City, county, and state on-site sewage disposal requirements.

G. Residential Development

1. Applicability

Residential development means one or more buildings, structures, lots, parcels or portions thereof which are designed for and used or intended to be used to provide a place of abode for human beings, including single-family residences, duplexes, other detached dwellings, floating homes, multi-family residences, apartments, townhouses, mobile home parks, other similar

group housing, condominiums, subdivisions and short subdivisions, together with accessory uses and structures normally applicable to residential uses including but not limited to garages, sheds, tennis courts, swimming pools, parking areas, fences, cabanas, saunas and guest cottages. Residential development does not include hotels, motels or any other type of overnight or transient housing or camping facilities. In Monroe, residential development is allowed in the High Intensity and Shoreline Residential environments.

Although some owner-occupied single-family residences are exempt from the Substantial Development Permit process, they still must comply with all of the provisions of this section and of the Shoreline Master Program. Subdivisions and short subdivisions must also comply with all of the provisions of this section and the Shoreline Master Program. Uses and facilities associated with residential development which are identified as separate use activities in this program, such as Boating Facilities, Bulkheads, Shoreline Stabilization and Flood Protection, Utilities, Fill, and Clearing and Grading, are subject to the regulations established for those uses in addition to any special conditions relating to residential areas established in this section.

The General Provisions and Environment Designation Provisions also apply.

2. Policies

1. Residential development should be permitted only where there are adequate provisions for utilities, circulation, and access.

2. Single-family residences are the most common form of shoreline development and are identified as a priority use when developed in a manner consistent with control of pollution and prevention of damage to the natural environment (WAC 173-26-241(3)(j).

3. Residential development should be prohibited in environmentally sensitive areas, including, but not limited to, wetlands, geohazardous areas, floodways, and critical habitats.

4. The overall density of development, lot coverage, and height of structures should be appropriate to the physical capabilities of the site and consistent with the comprehensive plan. New residential development should be designed so as not to cause significant ecological impacts or significant adverse impacts to shoreline aesthetic characteristics, views, and public use of the shoreline and the water.

5. Recognizing the single-purpose, irreversible, and space-consumptive nature of shoreline residential development, new development should provide adequate setbacks and natural buffers from the water and ample open space between structures to provide space for outdoor recreation, to protect and restore ecological functions and ecosystem-wide processes, to preserve views, and to minimize use conflicts.

6. Adequate provisions should be made for protection of groundwater supplies, erosion control, drainage systems, aquatic and wildlife habitat, geohydraulic processes, and open space.

7. New multiunit residential development, including duplexes, fourplexes, and the subdivision of land for more than four parcels, should provide community and/or public access in conformance with Chapter 3, Section H of this Shoreline Master Program.

8. New residential development should be located and designed so as to not cause significant adverse impacts to or result in the displacement of other nearby shoreline uses, including recreational uses.

9. New residential development should be located and designed so as to minimize conflicts or incompatibilities with water-oriented uses. Residential development should not be allowed where occupants would be exposed to noise, bright lights, or other necessary impacts of water development uses, such as industrial activities.

10. Appurtenances should be located landward of the principal residence.

11. New residences should be designed and located so that shoreline armoring or structural erosion control measures will not be necessary to protect the structure.

12. When demonstrated to be necessary, shoreline stabilization measures should be designed and located to avoid or minimize adverse impacts. Replacement shoreline stabilization structures should be designed to minimize ecological impacts.

13. The creation of new residential lots should not be allowed unless it is demonstrated that the lots can be developed with no net loss to ecological functions.

14. The application of non-organic chemicals, including fertilizers, herbicides and pesticides, within shoreline jurisdiction is discouraged.

3. Regulations

1. Applications for residential development shall include the following information:

    a. Size, location, dimensions, predominant materials, and method of construction (e.g., wood frame, poured-in-place concrete, driven short piles) for all structures.

    b. Existing trees over 6-inch caliper proposed for removal.

    c. Expected amount of earthwork, clearing, and grading.

    d. Location and extent of paved or gravel surfaces.

    e. Character and extent of existing vegetation and proposed vegetation restoration/landscaping plans.

    f. If shoreline stabilization measures are involved, a geotechnical report consistent with Section C, Chapter 4 of this Shoreline Master Program.

2. All residential development shall meet the provisions of this Shoreline Master Program. In order to implement the objectives of the Shoreline Management Act, RCW 90.58.020, the City shall review development proposals for such actions. Persons intending to carry out the types of single-family development described above shall apply for a “letter of exemption,” as described in the administrative provisions of Chapter 19.01 of the Monroe Municipal Code. The application for the letter of exemption shall describe the information required in Regulation 1 of this section.

3. Residential development is prohibited within floodways, channel migration zones, wetlands, critical wildlife habitats, and other hazardous areas, such as steep slopes and areas with unstable soils or geologic conditions.

Development Standards

4. New residential development shall comply with the standards for building height, lot coverage, setbacks, and buffers as outlined in Chapter 2.D, Site Development Standards, and the Critical Areas Regulations (Appendix A). The City of Monroe has a policy of adopting the latest version of the Department of Ecology *Stormwater Management Manual for Western Washington* to regulate stormwater discharge and management. The City will encourage practices that further minimize impervious surfaces and stormwater runoff, including use of best available technologies.

Appurtenances and Accessory Structures

5. Appurtenances, as defined in this Shoreline Master Program consistent with Chapter 173-27 WAC, shall be subject to the same conditions as primary residences, except that for the protection of human health and safety and ecological functions further restrictions may apply.

6. Accessory uses that are not appurtenant structures shall be reasonable in size and purpose and compatible with on-site and adjacent structures, uses, and natural features. Accessory structures that are not water-dependent are not permitted waterward of the principal residence unless thee is a compelling reason to the contrary. Accessory and appurtenant structures should not be located within shoreline buffers to assure that buffer integrity is maintained.

Public Access

7. Subdivisions and planned unit developments of five or more waterfront lots/units shall dedicate, improve, and provide maintenance provisions for a pedestrian easement that provides area sufficient to ensure usable access to and along the shoreline for all residents of the development and the general public. When required, public access easements shall be a minimum of 25 feet in width and shall be in compliance with public access standards contained herein.

8. Residences, appurtenances, and accessory structures shall not be located in required view corridors.

The Creation of New Residential Lots

9. The creation of new lots shall be prohibited unless all of the following can be demonstrated.

    a. A primary residence can be built on each new lot without any of the following being necessary:

        i. New structural shoreline stabilization.

        ii. New development or clearing and grading that does not meet vegetation conservation standards in Section C, Chapter 3.

iii. New structures in the required shoreline setback, geohazardous areas, wetland, required wetland buffer, critical habitat, or critical habitat buffer (see Appendix A for Critical Areas Regulations).

iv. Causing significant erosion or reduction in slope stability.

v. Causing increased flood or geological hazard in the new development or to other properties.

b. Adequate sewer, water, access, and utilities can be provided.

c. The intensity and type of development is consistent with the City comprehensive plan and development regulations.

d. Potential adverse environmental impacts (including ecological impacts) can be avoided or mitigated to achieve no net loss of ecological functions, taking into consideration temporal loss due to development and potential cumulative impacts to the environment.

e. The proposed development is consistent with other development standards outlined in Chapter 2, Section D (Site Development Standards).

H. Transportation and Parking

1. Applicability

Transportation facilities are those structures and developments that aid in land and water surface movement of people, goods, and services. They include roads and highways, bridges and causeways, bikeways, trails, railroad facilities, airports, heliports, and other related facilities.

The various transport facilities that can impact the shoreline cut across all environmental designations and all specific use categories. The policies and regulations identified in this section pertain to any project, within any environment, that is effecting some change in present transportation facilities.

2. Policies

1. Nonwater-dependent transportation facilities should be located outside shoreline jurisdiction, if feasible. (See definition of "feasible.")

2. Transportation facilities should provide safe, reasonable, and adequate circulation systems to shorelines.

3. Transportation and parking plans and projects should be consistent with the Shoreline Master Program public access policies, public access plan, and environmental protection provisions.

4. Circulation system planning to and on shorelands should include systems for pedestrian, bicycle, and public transportation where appropriate. Circulation planning and projects should support existing and proposed shoreline uses that are consistent with the Shoreline Master Program.

5. Proposed transportation and parking facilities should be located, planned, and designed where routes will have the least possible adverse affect on unique or fragile shoreline features and existing ecological functions or on existing or future water-dependent uses. Where other options are available and feasible, new roads or road expansions should not be built within shoreline jurisdiction.

6. Parking facilities in shorelines are not a preferred use and shall be allowed only as necessary to support a preferred use. Chapter 3, Section G (Parking) contains policies and regulations to minimize the environmental and visual impacts of parking facilities.

7. Restoration of shoreline ecological functions should be a condition of new and expanded nonwater-dependent transportation and parking facilities.

8. New roads, railroads, and bridges in shoreline jurisdiction should be minimized and allowed only when related to and necessary for the support of permitted shoreline activities. Major new highways, freeways, and/or railways should be located out of shoreline jurisdiction.

9. Road and railroad locations should be planned to fit the topographical characteristics of the shoreline such that minimum alteration of natural conditions results. New transportation facilities should be located and designed to minimize the need for shoreline protection measures and minimize the need to modify natural drainage systems. The number of waterway crossings should be limited to the maximum extent possible.

10. When existing transportation corridors (or rights-of-way, including railroad) are abandoned, they should be reused for water-dependent use or public access.

11. Joint use of transportation corridors within shoreline jurisdiction for roads, utilities, and motorized forms of transportation should be encouraged.

3. Regulations

General

1. Applications for new or expanded transportation facilities development in shoreline jurisdiction shall include the following information:

    a. Demonstration of the need for the facility.

    b. An analysis of alternative alignments or routes, including alignments or routes outside shoreline jurisdiction.

    c. An analysis of potential impacts complying with the State Environmental Policy Act, including an analysis of comparative impacts of feasible alternative routes. (See the definition of “feasible” in Definitions, Chapter 7.)

    d. Description of construction, including location, construction type, and materials.

    e. Description of mitigation and restoration measures.

2. New nonwater-dependent transportation facilities shall be located outside shoreline jurisdiction, if possible. In determining the feasibility of a non-shoreline location, the City

will apply the definition of "feasible" and weigh the action's relative public costs and benefits, considered in the short- and long-term time frames.

3. All new and expanded transportation facilities shall be conditioned with the requirement to mitigate adverse impacts consistent with Section E, Chapter 3 of this Shoreline Master Program. New or expanded transportation facilities that cause ecological impacts shall not be allowed unless the development includes shoreline mitigation/restoration that increases the ecological functions being impacted to the point where:

   a. Short- and long-term risks to the shoreline ecology from the development are eliminated.

   b. Long-term opportunities to increase the natural ecological functions and processes are not diminished.

   If physically feasible, the mitigation/restoration shall be in place and functioning prior to project impacts. The mitigation/restoration shall include a monitoring and adaptive management program.

4. Restoration of shoreline ecological functions shall be a condition of new and expanded nonwater-dependent transportation and parking facilities if they would diminish short- or long-term opportunities to restore ecological functions or ecosystem-wide processes within a watershed.

5. Except where water crossing is necessary, roads, railroads, and other transportation facilities permitted shall be located landward of: critical areas, the channel migration zone and officially designated fish and wildlife habitats.

6. All roads and railroads, if permitted parallel to shoreline areas, shall be adequately set back from water bodies and shall provide buffer areas of compatible, self-sustaining vegetation. Shoreline scenic drives and viewpoints may provide breaks periodically in the vegetative buffer to allow open views of the water.

7. New transportation facilities shall be located and designed to prevent or to minimize the need for shoreline protective measures such as riprap or other bank stabilization, fill, bulkheads, groins, jetties, or substantial site grading. Transportation facilities allowed to cross over water bodies and wetlands shall utilize elevated, open pile, or pier structures whenever feasible. All bridges must be built high enough to allow the passage of debris and provide three feet of freeboard above the 100-year flood level.

8. Shoreline transportation facilities shall be sited and designed to avoid steep or unstable areas and fit the existing topography in order to minimize cuts and fills.

9. All new and expanded transportation facilities in shoreline jurisdiction shall be consistent with the City's comprehensive plan and applicable capital improvement plans.

10. New and expanded transportation facilities shall include provisions for pedestrian, bicycle, and public transportation where appropriate. Circulation planning and projects shall support existing and proposed shoreline uses that are consistent with the Shoreline Master Program.

11. Transportation facilities and services shall utilize existing transportation corridors whenever possible, provided that facility additions and modifications will not adversely impact shoreline resources and are otherwise consistent with this program. If expansion of the existing corridor will result in significant adverse impacts, then a less disruptive alternative shall be utilized.

12. Transportation and primary utility facilities shall be required to make joint use of rights-of-way and to consolidate crossings of water bodies where adverse impact to the shoreline can be minimized by doing so.

13. Fills for transportation facilities are prohibited in water bodies, wetlands, and on accretion beaches; EXCEPT, when all structural and upland alternatives have been proven infeasible and the transportation facilities are necessary to support uses consistent with this program, such fill may be permitted as a CUP. Placement of transportation facilities in all critical areas, including streams and wetlands, must comply with the Critical Areas Regulations (see Appendix A).

14. New and expanded transportation facilities shall not diminish public access to the shoreline, as described in Chapter 3, Section H.

15. The following regulation applies to shoreline road ends:

    RCW 37.79.035 and RCW 35.87.130 prohibit the City from vacating any City road which abuts a body of fresh water unless the street or road is not currently used or suitable for boat moorage or launching site or for a park, viewpoint, recreation, education or other public purposes (see RCW legal procedure to vacate streets).

16. Waterway crossings shall be designed to provide minimal disturbance to banks.

17. Roads and railroads shall be located to minimize the need for routing surface waters into and through culverts.

18. Culverts and similar devices shall be designed consistent with the latest version of the Washington Department of Fish and Wildlife's *Design of Road Culverts for Fish Passage* guidelines. Culverts shall be located so as to avoid relocation of the stream channel unless relocation is part of an approved restoration plan.

19. Bridges, crossings, debris grates, culverts, and similar devices used by fish shall meet all requirements set by the Washington Department of Fish and Wildlife.

20. All transportation facilities shall be designed, constructed, and maintained to contain and control all debris, overburden, runoff, erosion, and sediment generated from the affected areas. Relief culverts and diversion ditches shall not discharge onto erodible soils, fills, or sidecast materials.

21. Bridge abutments and necessary approach fills shall be located landward of wetlands or the OHWM for water bodies without wetlands; PROVIDED, bridge piers may be permitted in a water body as a conditional use. Placement of transportation facilities in all critical areas,

including streams and wetlands, must comply with the Critical Areas Regulations (see Appendix A).

Construction and Maintenance

22. Overburden, debris, and other waste materials from both construction and maintenance activities, including drainage ditch clearing, shall not be deposited into or sidecast on the shoreline side of roads or in water bodies, wetlands, and other unique natural areas. Such materials shall be deposited in stable locations where reentry and erosion into such areas is prevented.

23. All shoreline areas disturbed by facility construction and maintenance shall be replanted and stabilized with compatible, native self-sustaining vegetation by seeding, mulching, or other effective means immediately upon completion of the construction or maintenance activity. Such vegetation shall be maintained until established by the agency or developer constructing or maintaining the road. The vegetation restoration/replanting plans shall be as approved by the City.

24. The City shall give preference to mechanical means rather than the use of herbicides for roadside brush control on City roads in shoreline jurisdiction. If the situation requires the use of herbicides, they shall be applied to noxious weeds only, so that chemicals do not enter adjacent water bodies or damage or kill beneficial native shoreline vegetation.

25. No machinery shall operate within a stream bed except in compliance with a hydraulics permit issued by the Washington Department of Fish and Wildlife.

I. Utilities

1. Applicability

Utilities are services and facilities that produce, transmit, carry, store, process, or dispose of electric power, gas, water, sewage, communications, oil, and the like. The provisions in this section apply to primary uses and activities, such as solid waste handling and disposal, sewage treatment plants and outfalls, public high-tension utility lines on public property or easements, power generating or transfer facilities, and gas distribution lines and storage facilities. See Chapter 3, Section K, "Utilities," for on-site accessory use utilities.

Solid waste disposal means the discharge, deposit, injection, dumping, spilling, leaking, or placing of any solid or hazardous waste on any land area or in the water.

2. Policies

1. Utilities should utilize existing transportation and utility sites, rights-of-way and corridors whenever possible rather than creating new corridors. Joint use of rights-of-way and corridors should be encouraged.

2. All utility facilities should be designed and located to avoid or, if that is not possible, minimize harm to shoreline functions, preserve the natural landscape, and minimize conflicts with present and planned land and shoreline uses while meeting the needs of future populations in areas planned to accommodate growth.

3. Utility processing facilities, such as solid waste disposal facilities, sewage treatment plants, or parts of those facilities, that are nonwater-oriented should not be allowed in shoreline areas unless it can be demonstrated that no other feasible option is available.

4. Utilities should be prohibited in wetland buffers of Category II-IV wetlands, critical fish and wildlife habitat conservation areas, or other unique and fragile areas unless no feasible alternatives exist. Utilities should be prohibited in wetlands and buffers of Category I wetlands.

5. New utility facilities should be located so as not to require extensive shoreline protection works.

6. Utility facilities and corridors should be located so as to protect scenic views. Whenever possible, such facilities should be placed underground or alongside or under bridges.

7. Utility facilities and rights-of-way should be designed to preserve the natural landscape and to minimize conflicts with present and planned land uses.

3. Regulations

General

1. Applications for new or expanded utility facilities in shoreline jurisdiction shall include the following:

    a. Demonstration of the need for the facility.

    b. An analysis of alternative alignments or routes, including alignments or routes outside shoreline jurisdiction.

    c. An analysis of potential impacts complying with the State Environmental Policy Act, including an analysis of comparative impacts of feasible alternative routes.

    d. Description of construction, including location, construction type, and materials.

    e. Location of other utility facilities in the vicinity of the proposed project and any plans to include the facilities of other types of utilities in the project.

    f. Plans for reclamation of areas disturbed both during construction and following decommissioning and/or completion of the primary utility's useful life.

    g. Plans for control of erosion and turbidity during construction and operation.

    h. Identification of any possibility for locating the proposed facility at another existing utility facility site or within an existing utility right-of-way.

2. All utility facilities shall be designed and located to minimize harm to shoreline ecological functions, preserve the natural landscape, and minimize conflicts with present and planned

land and shoreline uses while meeting the needs of future populations in areas planned to accommodate growth. The City may require the relocation or redesign of proposed utility development order to avoid significant ecological impacts or significant adverse impacts.

3. Utility production and processing facilities, such as solid waste disposal facilities and sewage treatment plants, or parts of those facilities, that are nonwater-oriented shall not be allowed in shoreline areas unless it can be demonstrated that no other feasible option is available.

4. Transmission facilities for the conveyance of services, such as power lines, cables, and pipelines, shall be located to cause minimum harm to the shoreline and shall be located outside of the shoreline area where feasible. Utilities should be located in existing rights-of-way and corridors whenever possible. Proposals for new corridors or water crossings must fully substantiate the infeasibility of existing routes.

5. Development of facilities that may require periodic maintenance or that cause significant ecological impacts shall not be allowed unless no other feasible option exists. When permitted, those facilities shall include adequate provisions to protect against significant ecological impacts.

6. Restoration of ecological functions shall be a condition of new and expanded nonwater-dependent utility facilities.

7. Utility development shall, through coordination with local government agencies, provide for compatible, multiple use of sites and rights-of-way. Such uses include shoreline access points, trail systems and other forms of recreation and transportation, providing such uses will not unduly interfere with utility operations, endanger public health and safety or create a significant and disproportionate liability for the owner.

8. Utility lines shall utilize existing rights-of-way, corridors and/or bridge crossings whenever possible and shall avoid duplication and construction of new or parallel corridors in all shoreline areas. Proposals for new corridors or water crossings must fully substantiate the infeasibility of existing routes.

9. The following utility facilities are not essentially water-dependent. The following new and expanded utility facilities are prohibited in shoreline jurisdiction unless authorized by Conditional Use Permit and where it can be shown that no feasible alternatives exist:

    a. Water system treatment plants.

    b. Sewage system lines, interceptors, pump stations and treatment plants.

    c. Electrical substations, lines and cables.

    d. Petroleum and gas pipelines.

10. New solid waste disposal sites and facilities are prohibited.

11. Sewage treatment, water reclamation, and desalinization plants may only be permitted by conditional use and shall be located where they do not interfere with and are compatible with recreational, residential, or other public uses of the water and shorelands.

Location and Design

12. New utility lines including electricity, communications and fuel lines shall be located underground, except where the presence of bedrock or other obstructions make such placement infeasible or if it is demonstrated that above-ground lines would have a lesser impacts. Existing above-ground lines shall be moved underground during normal replacement processes.

13. Transmission and distribution facilities shall cross areas of shoreline jurisdiction by the shortest, most direct route feasible, unless such route would cause significant environmental damage.

14. Utility facilities requiring withdrawal of water from streams or rivers shall be allowed only with a documented water right, and located only where minimum flows as established by the Washington Department of Ecology can be maintained.

15. Utilities shall be located and designated so as to avoid or minimize the use of any structural or artificial shore defense or flood protection works.

16. Where major facilities must be placed in a shoreline area, the location and design shall be chosen so as not to destroy or obstruct scenic views.

17. Utilities shall utilize required setback areas to provide screening of facilities from water bodies and adjacent properties. Type of screening required shall be determined by the City on a case-by-case basis.

18. Underground (or water) utility lines shall be completely buried under the river bed in all river or stream crossings EXCEPT where any of the following apply:

    a. Such lines can be affixed to a bridge structure.

    b. Appropriate water or sewage treatment plant intake pipes or outfalls.

    c. It is demonstrated that above-ground lines would have a lesser impact.

19. All underwater pipelines transporting liquids intrinsically harmful to aquatic life or potentially injurious to water quality are prohibited, unless no other feasible alternative exists. In those limited instances when permitted by conditional use, automatic shut-off valves shall be provided on both sides of the water body.

20. Filling in shoreline jurisdiction for utility facility or line development purposes is prohibited, except where no other feasible option exists and the proposal would avoid or minimize impacts more completely than other methods. Permitted crossings shall utilize pier or open pile techniques.

21. Power generating facilities are not permitted in shoreline jurisdiction.

Chapter 6: Administrative Provisions

A. Conditional Use Permits

1. Conditional Use Permits - Generally

The Hearing Examiner shall have the authority to hear and make findings, conclusions, and recommendations, and the City Council shall have the authority to grant, in appropriate cases and subject to appropriate conditions and safeguards, shoreline Conditional Use Permits as authorized by Chapter 19.01 of the Monroe Municipal Code (MMC), and as consistent with the SMA (RCW 90.58.100(5)) and WAC 173-27-160. The application for a shoreline Conditional Use Permit shall be made on forms prescribed by the Community Development Department and shall be processed pursuant to the rules of the Hearing Examiner. Review will be for purposes of determining consistency with:

- The legislative policies stated in the Shoreline Management Act, RCW 90.58.020 (SMA).
- The Shoreline Master Program of the City of Monroe.

Notice of public hearings shall be published in the same manner as provided in the Monroe Municipal Code.

All Conditional Use Permits issued by the City must be submitted to the Department of Ecology for its approval or disapproval.

2. Conditional Use Permit Criteria

The purpose of a Conditional Use Permit is to allow greater flexibility in administering the use regulations of the Master Program in a manner consistent with the policies of the SMA. Conditional Use Permits may also be granted in circumstances where denial of the permit would result in a thwarting of the policy enumerated in the SMA. In authorizing a Conditional Use, special conditions may be attached to the permit by the City of Monroe or the Department of Ecology to prevent undesirable effects of the proposed use and/or to assure consistency of the project with the SMA and this Master Program. The criteria for granting Conditional Use Permits is the following:

1. The uses which are classified or set forth in the Master Program as conditional uses may be authorized, provided the applicant can demonstrate all of the following:

    a. That the proposed use will be consistent with the policies of the SMA and the policies of the Master Program.

b. That the proposed use will not interfere with the normal public use of public shorelines.

c. That the proposed use of this site and design of the project will be compatible with other permitted uses within the area.

d. That the proposed use will cause no unreasonably adverse effects to the shoreline environment designation in which it is to be located.

e. That the public interest suffers no substantial detrimental effect.

2. Other uses which are not classified or set forth in the Master Program may be authorized as conditional uses provided that the applicant can demonstrate, in addition to the criteria set forth in Subsections 1 and 3 of this section, that extraordinary circumstances preclude reasonable use of the property in a manner consistent with the use regulations of this Master Program.

3. In the granting of all Conditional Use Permits, consideration shall be given to the cumulative impact of additional requests or like actions in the area.

4. Uses which are specifically prohibited by this Master Program may not be authorized pursuant to either Subsection 1 or 3 of this section.

3. Imposition of Conditions

To ensure compliance with the criteria stated in the this Master Program, the Hearing Examiner shall have the authority to recommend, and the City Council shall have the authority to require and approve, a specific plan for a proposed use, to impose performance standards that make the use compatible with other permitted uses within the area, and to increase the requirements set forth in this Master Program which are applicable to the proposed use. In no case shall the City have the authority to decrease the requirements of this Shoreline Master Program when considering an application for a shoreline Conditional Use Permit; any such decrease shall only be granted upon the issuance of a shoreline Variance.

4. Subsequent Hearing—Publication of Notice

At the City Council meeting following the filing of such findings by the Hearing Examiner, the City Council, on its own initiative or on request of an aggrieved party, whether the applicant or any other individual, may set another hearing date by giving notice in the newspaper and by mail in the manner prescribed for the Hearing Examiner, and at such public hearing determine on the merits whether the development is consistent with the criteria referenced in this Master Program. If at such hearing the majority of the Council determines that such development satisfies the criteria, then a shoreline Conditional Use Permit shall be issued upon the terms and conditions hereinafter prescribed and prescribed by the Council.

5. Compliance with Conditions

1. Where plans are required to be submitted and approved as part of the application for a shoreline conditional use permit, modifications of the original plans may be made only after a review has been conducted by the Hearing Examiner and approval granted by the City Council.

2. In the event of failure to comply with the plans approved by the City or with any conditions imposed upon the shoreline conditional use permit, the permit shall immediately become void and any continuation of the use activity shall be construed as being in violation of this Shoreline Master Program and a public nuisance.

B. Variances

1. Variances - Generally

The Hearing Examiner shall have authority to act upon, and the City Council shall have authority to grant, variances from the substantive requirements of this Shoreline Master Program. The application for a shoreline Variance shall be made on forms prescribed by the Community Development Department and shall be processed and acted upon in the same manner as is provided for Substantial Development and Conditional Use Permits. If a Variance application is not merged with a pending Substantial Development Permit application, the applicant shall pay the City the Variance application fee in effect at that time. All Variances issued by the City must be submitted to the Department of Ecology for its approval or disapproval.

2. Variance Criteria

The purpose of a Variance is strictly limited to granting relief to specific bulk, dimensional, or performance standards set forth in this Master Program where there are extraordinary or unique circumstances relating to the properties such that the strict implementation of the Master Program would impose unnecessary hardships on the applicant or thwart the policies set forth in the SMA. The criteria for granting Variances shall be consistent with WAC 173-27-170 and include the following:

1. Variances should be granted in circumstances where denial of the permit would result in a thwarting of the policy enumerated in RCW 90.58.020. In all instances, the applicant must demonstrate that extraordinary circumstances exist, and the public interest shall suffer no substantial detrimental effect.

2. Variances for development and/or uses that will be located landward of the ordinary high-water mark, as defined in RCW 90.58.030(2)(b), and/or landward of any wetland as defined in RCW 90.58.030(2)(h), may be authorized provided the applicant can demonstrate all of the following:

    a. That the strict application of the bulk, dimensional, or performance standards as set forth in the Master Program precludes, or significantly interferes with, reasonable use of the property;

    b. That the hardship described in (a) of this subsection is specifically related to the property and is the result of unique conditions, such as irregular lot shape, size, or natural features, and the application of the Master Program, and not, for example, from deed restrictions or the applicant's own actions;

c. That the design of the project is compatible with other authorized uses within the area and with uses planned for the area under the Comprehensive Plan and Shoreline Master Program, and will not cause adverse impacts to the shoreline environment;

d. That the Variance will not constitute a grant of special privilege not enjoyed by other properties in the area;

e. That the Variance requested is the minimum necessary to afford relief; and

f. That the public interest will suffer no substantial detrimental effect.

3. Variances for development and/or uses that will be located waterward of the ordinary high water mark as defined in RCW 90.58.030(2)(b), or within any wetland as defined in RCW 90.58.030(2)(h), may be authorized provided the applicant can demonstrate all of the following:

   a. That the strict application of the bulk, dimensional or performance standards set forth in this Master Program precludes all reasonable use of the property;

   b. That the proposal is consistent with the criteria established under subsection (2)(b) through (f) of this section; and

   c. That the public rights of navigation and use of the shorelines will not be adversely affected.

4. In the granting of all Variances, consideration shall be given to the cumulative impact of additional requests for like actions in the area. For example, if variances were granted to other developments and/or uses in the area where similar circumstances exist the total of the variances shall also remain consistent with the policies of RCW 90.58.020 and shall not cause substantial adverse effects to the shoreline environment.

5. Variances from the use regulations of this Master Program are prohibited.

C. Revisions to Permits

A permit revision is required whenever the applicant proposes substantive changes to the design, terms or conditions of a project from that which is approved in the permit. Changes are substantive if they materially alter the project in a manner that relates to its conformance to the terms and conditions of the permit, this Master Program and/or the policies and provisions of Chapter 90.58 RCW. Changes that are not substantive in effect do not require approval of a revision.

When an applicant seeks to revise a Substantial Development, Conditional Use, or Variance Permit, the City Planning Department shall request from the applicant detailed plans and text describing the proposed changes in the permit.

1. If the planning staff determines that the proposed changes are within the scope and intent of the original permit, the revision shall be automatically approved, provided it is consistent with Chapter 173-27 WAC, the SMA, and this Master Program.

2. “Within the scope and intent of the original permit” means the following:

    a. No additional over- or in-water construction will be involved.

    b. Lot coverage and height may be increased a maximum of 10 percent from provisions of the original permit, provided that revisions involving new structures not shown on the original site plan shall require a new permit.

    c. The revised permit does not authorize development to exceed height, lot coverage, setback, or any other requirements of this Master Program except as authorized under a Variance granted as the original permit or a part thereof.

    d. Additional or revised landscaping is consistent with any conditions attached to the original permit and with the applicable Master Program.

    e. The use authorized pursuant to the original permit is not changed.

    f. No adverse environmental impact will be caused by the project revision.

3. Revisions to permits may be authorized after original permit authorization has expired under RCW 90.58.143. The purpose of such revisions shall be limited to authorization of changes which are consistent with this section and which would not require a permit for the development or change proposed under the terms of Chapter 90.58 RCW, WAC 173-27-100, and this Master Program. If the proposed change constitutes substantial development then a new permit is required. Provided, this subsection shall not be used to extend the time requirements or to authorize substantial development beyond the time limits of the original permit.

4. If the revision, or the sum of the revision and any previously approved revisions, will violate the criteria specified above, the City shall require the applicant to apply for a new Substantial Development, Conditional Use, or Variance Permit, as appropriate, in the manner provided for herein.

5. The revision approval, including the revised site plans and text consistent with the provisions of WAC 173-27-180 as necessary to clearly indicate the authorized changes, and the final ruling on consistency with this section, shall be filed with Ecology. In addition, the City shall notify parties of record of their action.

6. If the revision to the original permit involves a Conditional Use or Variance, the City shall submit the revision to Ecology for Ecology’s approval, approval with conditions, or denial, and shall indicate that the revision is being submitted under the requirements of this subsection. Ecology shall render and transmit to the City and the applicant its final decision within fifteen days of the date of Ecology’s receipt of the submittal from the City. The City shall notify parties of record of Ecology’s final decision.

7. The revised permit is effective immediately upon final decision by the City or, when appropriate under Subsection 6 of this section, upon final action by Ecology.

8. Appeals shall be in accordance with RCW 90.58.180 and shall be filed within twenty-one days from the date of receipt of the City's action by Ecology or, when appropriate under Subsection 6 of this section, the date Ecology's final decision is transmitted to the City and the applicant. Appeals shall be based only upon contentions of noncompliance with the provisions of Subsection 2 of this section. Construction undertaken pursuant to that portion of a revised permit not authorized under the original permit is at the applicant's own risk until the expiration of the appeals deadline. If an appeal is successful in proving that a revision is not within the scope and intent of the original permit, the decision shall have no bearing on the original permit.

D. Nonconforming Uses and Development Standards

1. "Nonconforming use or development" means a shoreline use or development which was lawfully constructed or established prior to the effective date of the Shoreline Management Act or this Master Program, or amendments thereto, but which does not conform to present regulations or standards of this Master Program.

2. Structures that were legally established and are used for a conforming use, but which are nonconforming with regard to setbacks, buffers or yards; area; bulk; height or density, may be maintained and repaired and may be enlarged or expanded provided that said enlargement does not increase the extent of nonconformity by further encroaching upon or extending into areas where construction or use would not be allowed for new development or uses.

3. Uses and developments that were legally established and are nonconforming with regard to the use regulations of this Master Program may continue as legal nonconforming uses. Such uses shall not be enlarged or expanded, except that nonconforming single-family residences that are located landward of the ordinary high water mark may be enlarged or expanded in conformance with applicable bulk and dimensional standards by the addition of space to the main structure or by the addition of normal appurtenances as defined in WAC 173-27-240(2)(g) upon approval of a Conditional Use Permit.

4. A use which is listed as a conditional use, but which existed prior to adoption of this Master Program or any relevant amendment and for which a Conditional Use Permit has not been obtained, shall be considered a nonconforming use. A use which is listed as a conditional use, but which existed prior to the applicability of this Master Program to the site and for which a Conditional Use Permit has not been obtained, shall be considered a nonconforming use.

5. A structure for which a Variance has been issued shall be considered a legal nonconforming structure and the requirements of this section shall apply as they apply to preexisting nonconformities.

6. A structure which is being or has been used for a nonconforming use may be used for a different nonconforming use only upon the approval of a Conditional Use Permit. A Conditional Use Permit may be approved only upon a finding that:

    a. No reasonable alternative conforming use is practical; and

    b. The proposed use will be at least as consistent with the policies and provisions of the Act and this Master Program and as compatible with the uses in the area as the preexisting use. In addition such conditions may be attached to the permit as are deemed necessary to assure compliance with the above findings, the requirements of this Master Program and the Shoreline Management Act and to assure that the use will not become a nuisance or a hazard.

7. A nonconforming structure which is moved any distance must be brought into conformance with this Master Program and the Act.

8. If a nonconforming development is damaged to an extent not exceeding seventy-five percent of the replacement cost of the original development, it may be reconstructed to those configurations existing immediately prior to the time the development was damaged, provided that application is made for the permits necessary to restore the development within six months of the date the damage occurred, all permits are obtained and the restoration is completed within two years of permit issuance.

9. If a nonconforming use is discontinued for twelve consecutive months or for twelve months during any two-year period, the nonconforming rights shall expire and any subsequent use shall be conforming. A use authorized pursuant to subsection (6) of this section shall be considered a conforming use for purposes of this section.

10. An undeveloped lot, tract, parcel, site, or division of land located landward of the ordinary high water mark which was established in accordance with local and state subdivision requirements prior to the effective date of the Act or this Master Program, but which does not conform to the present lot size standards may be developed if permitted by other land use regulations of the City of Monroe and so long as such development conforms to all other requirements of this Master Program and the Act.

E. Documentation of Project Review Actions and Changing Conditions in Shoreline Areas

The City will keep on file documentation of all project review actions, including applicant submissions and records of decisions, relating to shoreline management provisions in this SMP.

F. Amendments to This Master Program

If the City or Ecology determines it necessary, the City will review shoreline conditions and update this SMP within seven years of its adoption. In addition, it is acknowledged that on-going FEMA mapping efforts[1] may result in conflicts between this SMP's mapped shoreland designations and the true physical qualifications of those lands under the state criteria for designating shorelands. Pursuant to WAC 173-22-055, in the event that the shoreland designations shown on this SMP's map conflict with the shoreland definitions in the State criteria, the State criteria control, and the City would be obligated to treat the shoreland boundaries as defined by those State criteria. Upon discovery of any such discrepancy that removes SMP-mapped lands from the shoreland definition, the City will drop those lands from SMP regulation and will also amend this SMP within three years.

[1] As of publication of this SMP, the latest floodplain mapping effort shows a 100-year floodplain that is consistent with the enclosed map of shoreline jurisdiction.

Chapter 7: Shoreline Restoration Plan

A. Introduction

A jurisdiction's Shoreline Master Program applies to activities in the jurisdiction's shoreline zone. Activities that have adverse affects on the ecological functions and values of the shoreline must provide mitigation for those impacts. By law, the proponent of that activity is not required to return the subject shoreline to a condition that is better than the baseline level at the time the activity takes place. How then can the shoreline be improved over time in areas where the baseline condition is severely, or even marginally, degraded?

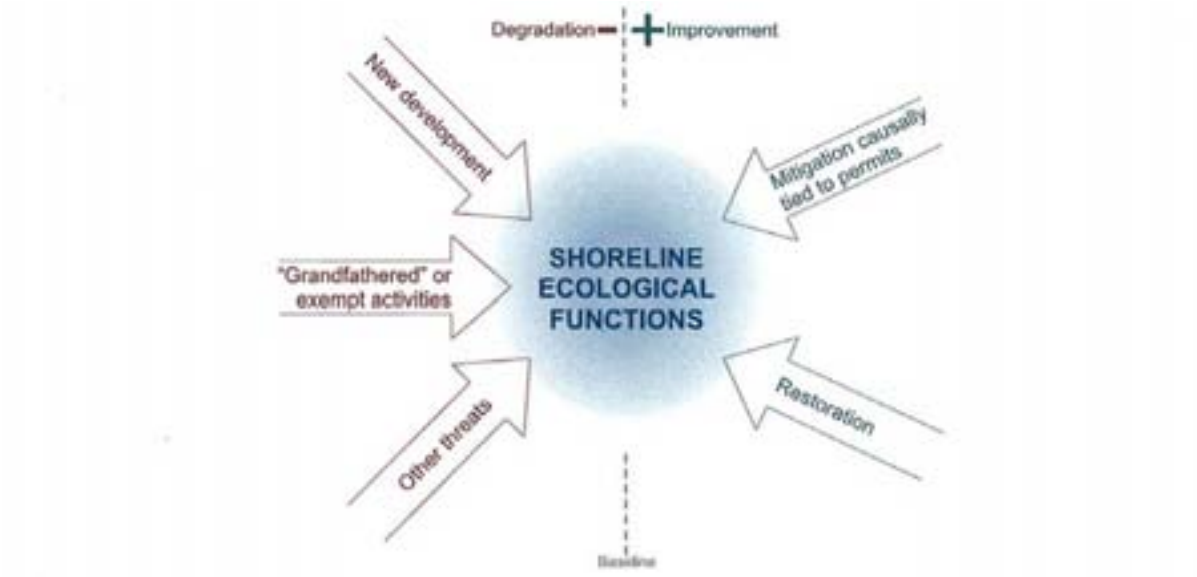
Section 173-26-201(2)(f) of the Guidelines says:

> "master programs shall include goals and policies that provide for restoration of such impaired ecological functions. These master program provisions shall identify existing policies and programs that contribute to planned restoration goals and identify any additional policies and programs that local government will implement to achieve its goals. These master program elements regarding restoration should make real and meaningful use of established or funded nonregulatory policies and programs that contribute to restoration of ecological functions, and should appropriately consider the direct or indirect effects of other regulatory or nonregulatory programs under other local, state, and federal laws, as well as any restoration effects that may flow indirectly from shoreline development regulations and mitigation standards."

However, degraded shorelines are not just a result of pre-Shoreline Master Program activities, but also of unregulated activities and exempt development. The new Guidelines also require that "local master programs shall include regulations ensuring that exempt development in the aggregate will not cause a net loss of ecological functions of the shoreline." While some actions within shoreline jurisdiction are exempt from a permit, the Shoreline Master Program should clearly state that those actions are not exempt from compliance with the Shoreline Management Act or the local Shoreline Master Program. Because the shoreline environment is also affected by activities taking placed outside of a specific local master program's jurisdiction (e.g., outside of city limits, outside of the shoreline zone within the city), assembly of out-of-jurisdiction actions, programs and policies can be essential for understanding how the City fits into the larger watershed context. The latter is critical when establishing realistic goals and objectives for dynamic and highly inter-connected environments.

As directed by the Guidelines, the following discussion provides a summary of baseline shoreline conditions, lists restoration goals and objectives, and discusses existing or potential programs and projects that positively impact the shoreline environment. Finally, anticipated scheduling, funding, and monitoring of these various comprehensive restoration elements are provided. In total, implementation of the Shoreline Master Program (with mitigation of project-

related impacts) in combination with this Restoration Plan (for restoration of lost ecological functions that occurred prior to a specific project) should result in a net improvement in the City of Monroe's shoreline environment in the long term. The following graphic conceptually illustrates the operation of the SMP and the Restoration Plan on the shoreline environment condition.



Graphic conceptually prepared by Commissioner Dennis Gallagher.

In addition to meeting the requirements of the Guidelines, this Restoration Plan is also intended to support the City's or other non-governmental organizations' applications for grant funding, and to provide the interested public with contact information for the various entities working within the City to enhance the environment.

B. Shoreline Inventory Summary

1. Introduction

The City conducted a comprehensive inventory of the Skykomish River and Woods Creek shorelines in 2002 (Appendix B). The primary purpose of the shoreline inventory was to facilitate the City of Monroe's compliance with the State of Washington's Shoreline Management Act (SMA) and updated Shoreline Master Program Guidelines. Secondary purposes were to support compliance with State of Washington's Growth Management Act (GMA) and the federal Endangered Species Act (ESA). The inventory describes existing physical and biological conditions in the Skykomish River and Woods Creek shoreline zones, including recommendations for restoration of ecological functions where they are degraded. The full *Shoreline Master Program Inventory* is included as Appendix B and is summarized below. In addition, the Washington Department of Ecology identified the Tye Stormwater Facility in Lake Tye Park as a shoreline water body in June 2007 (see inventory addendum in Appendix C).

2. Shoreline Boundary

As defined by the Shoreline Management Act of 1971, shorelines include certain waters of the state plus their associated "shorelands." Shorelands are defined as:

> "those lands extending landward for 200 feet in all directions as measured on a horizontal plane from the ordinary high water mark; floodways and contiguous floodplain areas landward 200 feet from such floodways; and all wetlands and river deltas associated with the streams, lakes, and tidal waters which are subject to the provisions of this chapter…Any county or city may determine that portion of a one-hundred-year-floodplain[1] to be included in its master program as long as such portion includes, as a minimum, the floodway and the adjacent land extending landward two hundred feet therefrom (RCW 90.58.030)"

The City of Monroe's former shoreline boundary appeared to have been based partially on the floodway and partially on the floodplain as mapped by the Federal Emergency Management Agency (FEMA). As part of Shoreline Inventory development, the shoreline boundary was re-evaluated and updated. As stated in WAC 173-22-040, "…local government may, at its discretion, include all or a larger portion of the one hundred-year floodplain within the associated shorelands." The City has used its discretion to designate as regulated shoreline the larger of the 100-year floodplain or those areas landward 200 feet from the ordinary high water mark along the Skykomish River and Woods Creek shorelines where the waterbody is partially or fully encompassed by the City. The City reviewed maps showing the extent of both the 100-year floodplain and 200 feet from the floodway jurisdiction options, and found that the differences were minor. The only properties affected by the increase in shoreline jurisdiction were City parks and Cadman.[2] Under the minimum shoreline jurisdiction, only small areas (primarily wetland buffer) within the Cadman property would be outside of shoreline jurisdiction.

There are additional floodplain areas within the City limits that are not contiguous with the shoreline waterbody: 1) portions of the Fryelands are in the Snohomish River floodplain, and 2) a small isolated section of the reformatory property is in the Skykomish River floodplain. These shoreline areas within the City are separated from their respective waterbodies by Shoreline County jurisdiction. The Snohomish River is about 3 miles from Monroe's City boundary, and the Skykomish is about 0.5 mile from the isolated reformatory floodplain area. Inclusion of these areas in the City's shoreline jurisdiction would increase the regulatory burden on a developed residential area (Fryelands) and/or would not provide any meaningful protection to the waterbodies in question. In distant floodplain areas (and throughout the entire City), the primary potential affect of any development is limited to water quality and stormwater impacts which are regulated during and after construction by the City's stormwater manual (which is based on the latest Ecology stormwater manual) and after construction by individual property

[1] According to RCW 173-220-030, 100-year floodplain is "that land area susceptible to being inundated by stream derived waters with a one percent chance of being equaled or exceeded in any given year. The limit of this area shall be based upon flood ordinance regulation maps or a reasonable method which meets the objectives of the act;"

[2] The difference appears more significant when comparing the previous shoreline jurisdiction map to the proposed map because of errors in the original map with respect to location of the floodway and omission of associated wetlands.

owner's land management practices that are not regulated by the SMP (such as car washing, herbicide applications).

The Tye Stormwater Facility is also regulated as a shoreline of the state as a lake exceeding 20 acres. The majority of the Tye Stormwater Facility and its associated shorelands are in the 100-year floodplain of the Snohomish River.

3. Inventory

The *Final Shoreline Master Program Inventory for the City of Monroe's Shorelines: Skykomish River and Woods Creek* (The Watershed Company 2002) is divided into five main sections: introduction, land use and altered conditions, biological resources and critical areas, existing conditions analyzed by segment, and a gap analysis. The Skykomish River was divided into three segments (A, B and C) and Woods Creek was divided into two segments (A and B) based on gross land use and biological condition. Skykomish River Segment A extends from the downstream City limit at the west end of the Cadman site, upstream to the end of the active Cadman gravel mining operation. Skykomish River Segment B extends from the east end of the Cadman site to the mouth of Woods Creek, which lies immediately upstream of the SR 203/Lewis Street bridge over the river. Finally, Skykomish River Segment C extends from the mouth of Woods Creek upstream to the eastern extent of Al Borlin Park and the City limits adjacent to where the river nears and flows along SR 2 and a paralleling railway line. Woods Creek Segment A extends from the mouth of the creek at the Skykomish River, in Al Borlin Park just east of the SR 203 Skykomish River bridge, to the SR 2 bridge over the creek. Woods Creek Segment B extends from the SR 2 bridge to the City limits at the Old Owen Road bridge.

The 2002 report did not include the Tye Stormwater Facility and its associated shorelands. An August 2007 addendum (Appendix C) addresses the Tye Stormwater Facility.

4. Land Use

1. Existing Land Use: The majority (approximately 98%) of the Skykomish River shoreline is zoned and planned for limited open space (primarily Cadman Inc. gravel operation) and parks/open space (Skykomish River Centennial Park, Al Borlin City Park). Cadman's current gravel extraction permit is valid until 2012; at that time, Cadman has indicated to the City that it will re-apply. Part of the original Cadman approval was the requirement for a 200-foot buffer measured from the ordinary high water mark. Much of this buffer area has been affected by mining-related activities and is in less than natural condition. Woods Creek shoreline use is more diverse, including residential, commercial, light industrial, and some parks/open space. Much of the Tye Stormwater Facility is surrounded by Lake Tye Park. Two parcels, one of which remains undeveloped, in the northeast corner are zoned for commercial use. Light industrial uses are also zoned for parcels that are separated from the water body by either Fryelands Boulevard or a park-zoned parcel.

2. Parks and Open Space/Public Access: A dominant and beneficial feature of Monroe's shorelines are its parks. Skykomish River Centennial Park, Al Borlin Park, and Lewis Street Park occupy approximately half of the total shoreline length. In addition, the Cadman, Inc. gravel operation allows access to the Skykomish River for recreational fishing and other waterfront enjoyment uses. Much of the Tye Stormwater Facility is ringed by Lake Tye

Park, which includes a public beach, skateboard park, playgrounds, pedestrian/cyclist trail, and a gravel boat launch area.

The full shoreline inventory (Appendix B) and the *Tye Stormwater Facility Addendum* (Appendix C) include a more in-depth of discussion of the above topics, as well as information about Historic Land Use and Watershed Conditions; Impervious Surface; Filled Areas; Roads and Bridges; Flood Control Structures; Docks, Piers, and Over-Water Structures; Storm Water and Sewer Outfalls, and Other Utilities; and Culverts and Other Fish Passage Barriers.

5. Biological Resources and Critical Areas

1. Skykomish River Segment A: The most prominent land use feature of Segment A is the centrally located Cadman, Inc. gravel operation. However, the active use area is surrounded by a mix of forested and scrub-shrub wetlands and upland forest. The wetland complex formed in seasonal secondary channels of the Skykomish, and in and along the pre-1920s river channel. These wetlands include a series of beaver dams and ponds on the west edge of Cadman, plus several additional side channels and high-flow channels through the floodplain and riparian area. The wetland complex is tenuously connected to the main Skykomish River channel during normal flows, and is connected by high-flow channels on the north side of Cadman during flood events. The banks of the Skykomish River are generally well-vegetated with shrubs and maturing deciduous trees, mostly cottonwoods. Few or no conifers are present. Some invasive Himalayan blackberry and a considerable amount of invasive Japanese knotweed are present. No shoreline armoring was observed in this segment.

2. Skykomish River Segment B: The most prominent land use feature of Segment B is the Skykomish River Centennial Park. This land use will not change in the foreseeable future, although existing facilities in the park (such as ballfields) may be modified and expanded and new facilities may be constructed. Any expansions would not remove existing forested areas adjacent to the Skykomish, and are not expected to increase impervious surface. WDFW included the forested portion of Segment B as a riparian priority habitat because of its value as a "major migration corridor." This corridor is the only significant wildlife habitat in Segment B, because of its function as a migration corridor and as a connection between the high-quality habitats in Segments A and C. The vegetated corridor is interrupted by WDFW boat ramp and associated parking area. Near the boat ramp, the banks are armored with rip-rap.

3. Skykomish River Segment C: Most of Segment C, more than two-thirds of Al Borlin Park, is mapped by WDFW as a priority riparian habitat because of its "excellent habitat for a broad array of wildlife species, and a major migration corridor. The portion of the park that is not specifically mapped as a priority riparian habitat actually has equal habitat value. The park is managed as a natural area, and is rather sparsely covered by formal and informal pedestrian trails. Except for a small grassy picnic area at the southwest tip of the park, the entire park is vegetated by a deciduous-dominant, mature forest. Snags and downed wood are abundant, and non-native species are limited except along trail margins and other edges. Much of the western half of the park is forested wetland, and the eastern half of the park likely contains pockets of forested wetland. The Skykomish River banks are subject to severe erosion where trees and shrubs are absent as a result of clearing for formal and informal trails, parking, or

grassy picnic areas. No armoring is present on the banks of the Skykomish, although the flanks of an old railroad bed bisecting Al Borlin Park are hardened.

4. Woods Creek Segment A: The right[1] bank of Woods Creek is primarily park and residential, with smaller areas of industrial and commercial. Much of the shoreline area in these zones is sloped, vegetated creek buffer unsuitable for additional development, although there are some fairly substantial intrusions by existing residential development. Vegetation conditions along the right bank of the creek are variable, ranging from a wide band of forested vegetation to a narrow (or non-existent) band near some residential and industrial areas. An unused railroad[2] crossing and associated elevated railroad grade occurs in the floodplain just downstream of SR 2. The current plan is to incorporate the old rail line into a multi-purpose trail as part of the King County Rails to Trails program that would connect Monroe to Duvall. Streambanks in this segment are generally stable. Rip-rap lines the bank and its toe around bridge abutments.

5. Woods Creek Segment B: The shoreline along the left bank of Segment B contains a mix of developed (commercial, some residential, and the Monroe Motel complex) and undeveloped (few structures) areas. However, habitat alteration has occurred even in the undeveloped areas through vegetation clearing to provide pasture/lawn areas associated with a private park and a few residences. The shoreline along the south half of the left bank is worth preserving as it is entirely forested and is part of a larger corridor of forested vegetation which extends northeast and east. Steep slopes likely preclude development. Unlike many of the shoreline areas in the City, this section appears to have very few non-native plant species. Residences and the hotel occupy the entire shoreline along the north half of the left bank. A section of high, failing bank is located along the left bank (east) at the outside of a wide bend. Additional banks bordering a mobile home park would likely be failing if not heavily armored.

6. Tye Stormwater Facility: Upland of the ordinary high mark, the stormwater pond is intermittently ringed with patches of red alder, black cottonwood, willows, Himalayan blackberry, and Scotch broom, with grasses, buttercup, thistle, reed canarygrass, and birds-foot trefoil underlying. Below the ordinary high water mark, patches of emergent vegetation are found, including cattail, yellow-flag iris, soft rush, and hardstem bulrush. In general, all vegetated areas are narrow, and adjacent to trails, roads, two developments, or other park facilities and uses.

[1] "Right" and "left" banks are determined by facing downstream. In general, the right bank of Woods Creek is the west bank.

[2] Railroad-related developments in floodplain environments have several ecologically detrimental effects. 1) Most wooden railroad components are treated with creosote, which can leach toxins (such as carcinogenic polycyclic aromatic hydrocarbons) into the aquatic environment, accumulating in sediments, aquatic invertebrates, and finally into fish and terrestrial organisms. 2) Linear railroad features impede the natural flow paths of water, can increase erosion and reduce the natural recruitment of organic debris into the aquatic system.

C. Restoration Goals and Objectives

Goal 1[1]

Assure preservation, protection and restoration of salmon habitat to a sufficient extent and quality to support the productivity and diversity of all wild salmon stocks in the Snohomish River basin at a level that will sustain fisheries and non-consumptive salmon-related cultural and ecological values.

Objectives

1. Maintain and restore natural streambank conditions and achieve a net increase in the amount of natural streambank functions while protecting critical public facilities and infrastructure. Stabilize erosion areas using bioengineering techniques.

2. Protect natural watershed functions in the channel migration zone and floodplain and decrease hazards to people, property, critical facilities, and infrastructure.

3. Retain large woody debris in streams to support salmon[2] populations and watershed processes.

4. Eliminate human-made barriers such as blocking culverts and broken tide-gates to anadromous fish passage, prevent the creation of new barriers, and provide for transport of water, sediment and organic matter at all stream crossings.

5. Achieve no net loss in functions and values of wetlands that support watershed processes needed for salmon habitat within each sub-watershed in the Snohomish River basin, and achieve a net increase in wetland functions and values in sub-basins where historic loss of wetlands adversely affects watershed processes or fish habitat.

6. Protect and restore riparian areas sufficient to support salmon populations and watershed processes within the Snohomish River basin.

7. Avoid adverse habitat impacts to streams, riparian corridors, and wetlands, including both public works and private projects and operations.

Goal 2

Assure preservation, protection and restoration of all ecological functions.

[1] Goal 1 and its objectives are excerpted from the Snohomish River Basin Salmon Conservation Plan (Snohomish Basin Salmon Recovery Forum 2005).

[2] "Salmon" (or salmonids) encompasses a group of fish that include chinook, coho, chum, pink and sockeye salmon, as well as steelhead and bull trout.

Objectives

1. Strive to control non-indigenous plants or weeds that are proven harmful to native and/or beneficial vegetation or habitats. In particular, Himalayan blackberry and Japanese knotweed should be targeted.

2. Make efforts to meet and maintain state and county water quality standards in the Skykomish River, Woods Creek and the Tye Stormwater Facility, and their contributing waters, through effective stormwater management of new developments and redevelopments, through reductions in landscape chemical usage in City parks and other facilities, and through removal of chemically treated wood products (such as creosote-treated wood).[1]

3. Modify and regulate public access on the public-owned shorelines to insure that ecological functions are not unduly damaged by public use. Specifically, pedestrian paths to steepened Skykomish River banks in Al Borlin Park should be closed or relocated.

4. Develop a public education plan to inform private property owners in the shoreline zone and in the remainder of the City about the effects of land management practices and other unregulated activities (such as vegetation removal, pesticide/herbicide use, car washing) on fish and wildlife habitats.

5. Encourage reconnection of fragmented habitats, in particular the wetland/upland complex on the Cadman, Inc. site with its relic channels and the Skykomish River, and maintain and enhance existing corridors between larger patches of habitat.

6. Evaluate the restoration potential of shoreline areas being considered for siting of new developments or uses, including utilities and transportation corridors. Where feasible, locate new developments and uses outside of areas with high restoration potential that may contribute substantially to improvements in ecological function.

7. Continue involvement in WRIA 7 planning processes to understand the watershed context and the City's role in maximizing long-term achievement of WRIA 7 goals.

D. List of Existing and Ongoing Projects and Programs

The following series of existing projects and programs are generally organized from the larger watershed scale to the City-scale, including City projects and programs and finally non-profit organizations that are also active in the Monroe area.

[1] Understanding that the City's efforts to meet state and county water quality standards must be part of a regional effort that recognizes the contributions of upstream point and non-point sources of pollutants into Woods Creek and the Skykomish River.

1. Water Resource Inventory Area (WRIA) 7 Participation

The City is a member of the Snohomish Basin Salmon Recovery Forum, and participated in the drafting of the June 2005 *Snohomish River Basin Salmon Conservation Plan*. The Plan includes the City of Monroe's implementation commitment in the form of City Council Resolution 2005/005, approved 6 April 2005. The resolution specifically says that the City will: 1) continue to participate in the Forum "to support Plan implementation, evaluation, and management; 2) implement restoration and protection projects in the City of Monroe consistent with the Plan; and 3) implement policies, programs, and regulations consistent with the intent of the Plan as necessary to achieve salmon recovery, needs and goals." The "action menu," included in Section H of Chapter 7, was adopted by the Council as part of the resolution.

2. French Creek Watershed Management

The City of Monroe was an active member of the French Creek Watershed Management Committee (FCWMC), which co-authored with Snohomish County the December 2004 *French Creek Watershed Management Plan*. According to the Plan, approximately 12 percent of the watershed of French Creek, a tributary of the Snohomish River, is in Monroe. The Plan "presents a program to control nonpoint pollution, protect water resources, and address flooding and drainage problems" (FCWMC 2005). Although French Creek is not tributary to a Shoreline waterbody regulated by the City of Monroe, the City's efforts to directly and indirectly improve ecological functions in the French Creek watershed are an important component of overall watershed health. More information about the City's commitment to the French Creek watershed can be found in the Plan at http://www.co.snohomish.wa.us/documents/Departments/Public_Works/surfacewatermanagement/stewards/FinalFrenchCrPlanDec2004.pdf.

3. Comprehensive Plan Policies

The *Environmental Element* chapter of the City of Monroe's 2005 Comprehensive Plan contains a number of general and specific goals and policies that direct the City to permit and condition development in such a way that the natural environment is preserved and enhanced. Techniques suggested by the various policies to protect the natural environment include requiring setbacks from sensitive areas, preventing adverse alterations to water quality and quantity, preserving existing vegetation, educating the public, and mitigating necessary sensitive area impacts, among others. The existing *Shoreline Element* (last updated in 1998) includes a commitment to "achieve an orderly balance of shoreline uses that do not unduly diminish the quality of the environment."

4. Critical Areas Regulations

The City of Monroe completed a substantial update of the critical areas regulations in November 2003. The updated regulations are based on "best available science," and provide a high level of protection to critical areas in the City, particularly streams, wetlands, and fish and wildlife habitat conservation areas. Management of the City's critical areas using these regulations will insure that ecological functions and values are not degraded, and impacts to critical areas are mitigated fully. These critical areas regulations are one important tool that will help the City

meet its restoration goals. The adopted portions of the City's critical areas regulations are included in Appendix A.

5. Stormwater Planning

Per a 1991 Ordinance, the City of Monroe automatically adopts Ecology's latest *Stormwater Management Manual for Western Washington*. The stated purpose of the Manual is to: "provide guidance on the measures necessary to control the quantity and quality of stormwater produced by new development and redevelopment such that they comply with water quality standards and contribute to the protection of beneficial uses of the receiving waters."

The City received its final National Pollutant Discharge Elimination System (NPDES) Phase II permit in January 2007 from Ecology. The NPDES Phase II permit is required to cover the City's stormwater discharges into regulated lakes and streams. Under the conditions of the permit, the City must protect and improve water quality through public education and outreach, detect and eliminate illicit non-stormwater discharges (e.g., spills, illegal dumping, wastewater), manage and regulate construction site runoff, manage and regulate runoff from new development and redevelopment, and prevent pollution related to municipal operations.

Compliance with the terms of the permit is phased over five years, with full compliance required by 2012. The City currently has various programs to control stormwater pollution through maintenance of public facilities, inspection of private facilities, water quality treatment requirements for new development, source control work with businesses and residents, and spill control and response. Monitoring may be required as part of an illicit discharge detection and elimination program, for certain construction sites, or in waterbodies with a Total Maximum Daily Load (TMDL) Plan for particular pollutants, such as fecal coliform in Woods Creek. General water quality monitoring was not required in the first five-year term of the permit; however, the permit asks municipalities to assist in development of a monitoring program that will be implemented during the second five-year permit term. General water quality monitoring concerns include a) stormwater quality, b) effectiveness of best management practices, and c) effectiveness of the stormwater management program.

To date, the City is engaged in planning its strategy for compliance by 2012, and will be updating its *Stormwater Management Plan*. By 2010, the City will have developed its public education plan. The City has been monitoring water quality (dissolved oxygen and fecal coliform) in seven locations in Lake Tye, Woods Creek, and in the French Creek system using an Ecology grant. As part of compliance with the Phase II permit, the City will continue monitoring water quality in those locations.

In 2005, federal agencies approved Monroe's application to be qualified for an Endangered Species Act "take" limit when complying with the Regional Road Maintenance Program jointly developed by Washington Department of Transportation and a number of local jurisdictions. The Program includes, among other things, a detailed approach to managing stormwater runoff during road maintenance activities so that the potential to harm federally listed species is avoided and minimized to the maximum extent practicable. When Monroe's Public Works Department conducts various road maintenance activities consistent with the adopted best management practices, the City's exposure to an endangered species "takings" lawsuit is reduced and the City will be supported by the National Marine Fisheries Service if a lawsuit does occur.

6. Stilly-Snohomish Fisheries Enhancement Task Force

The Monroe Parks Department solidified a relationship with the Stilly-Snohomish Fisheries Enhancement Task Force, which is a member of the Woods Creek Coalition. As part of its *Buck Island Floodplain Forest Enhancement Project Buck Island Floodplain Forest Enhancement Project*, the Task Force has completed several vegetation enhancement projects in the past, specifically targeting removal of Himalayan blackberry and Japanese knotweed along the banks of Wood Creek, along park trails, and isolated pockets in the forest. Non-native vegetation is replaced with a mix of native trees and shrubs that enhance riparian and upland ecological functions for fish and/or wildlife. The Task Force submitted a report to the City, which included background information on the physical and biological character of Al Borlin Park; recommendations to enhance vegetation, increase public education efforts, and stabilize eroding Skykomish River bank at the southwest end of the island; and a proposed vegetation management schedule through 2004. This report is included as an appendix to the November 2002 *Shoreline Inventory Report* located in Appendix B. The City of Monroe Parks Department continues to work with the Task Force to improve the ecological functions of Al Borlin Park.

In a more recent letter to the Monroe Parks Department (Steiner, pers. comm., 28 March 2005), the Task Force listed projects completed at Al Borlin Park since 2003 and summarized its goals for Al Borlin Park as follows:

> "The objective of our ongoing work out there is to promote vegetation conditions that will enhance Buck Island's stability, re-establish healthy fish and wildlife habitat, and to enhance public education and passive recreation opportunities using the following strategies:
>
> - Enhance floodplain forest canopy species diversity across the island.
> - Reestablish a multi-layer forest canopy.
> - Suppress aggressive invasive and noxious weed species, including Japanese knotweed, Himalayan blackberries and English ivy.
> - Encourage public participation in the above strategies. "

Between April 2003 and March 2005 alone, the Task Force, using volunteers from the St. Thomas Moore School in Edmonds, the Everett Community Justice Center, and the Sky Valley Education Center in Monroe, accomplished the following:

Total # of trees and shrubs planted including live stakes/cuttings:	6,500
Total area of riparian buffer planting:	3.2 acres
Total understory area planted:	10 acres
Total area of site preparation and maintenance:	5 acres

Contact Information: Ann Boyce, Executive Director, Stilly-Snohomish Fisheries Enhancement Task Force, ann@stillysnofish.org, http://www.stillysnofish.org/

7. Trout Unlimited

According to Craig McKelvey, president of the Sky Valley chapter, the Sky Valley chapter of Trout Unlimited is not currently working on their own projects (pers. comm., 13 March 2006). Instead, they have been working on projects managed by the Stilly-Snohomish Fisheries

Enhancement Task Force (see Chapter 7, Section D.6 above). They hope to be independently managing and implementing projects next year.

Contact Information: Craig McKelvey, President, Sky Valley Chapter of Trout Unlimited, cwmckelvey@comcast.net, http://www.localaccess.com/troutunlimited/index.html

8. Adopt-A-Stream Foundation

The Adopt-A-Stream Foundation conducts projects in Monroe as the opportunity arises. They are occasionally approached by property owners, but more often partner with Snohomish County or the Snohomish Conservation District. Projects have included placement of large woody debris along in-City portions of Woods Creek to stabilize streambanks and increase habitat complexity, and native riparian plantings to replace invasive species and increase shade and organic inputs. Many of these projects are funded by Community Salmon Fund grants. Depending on the grant, monitoring and maintenance of completed projects continues.

Contact Information: Tom Hardy, aasf@streamkeeper.org, http://www.streamkeeper.org/

9. Environmental Science School, Sky Valley Education Center

Students at The Environmental Science School have recently begun enhancing pond-side vegetation on the north end of the Tye Stormwater Facility. In April 2007, students removed non-native plants (particulary Himalayan blackberry) and installed 110 native shrubs. The students will be maintaining and monitoring the plantings. The planting area, approximately 2,700 square feet, will be expanded in future areas.

Contact Information: Rob Sandelin, http://www.nonprofitpages.com/nica/EES.htm

E. List of Additional Projects and Programs to Achieve Local Restoration Goals

The following series of additional projects and programs are generally organized from the larger watershed scale to the City-scale, including City projects and programs and finally non-profit organizations that are also active in the Monroe area.

1. Unfunded WRIA 7 Projects

Four potential projects within Monroe's boundaries are specifically identified in the June 2005 *Snohomish River Basin Salmon Conservation Plan,* including two projects within Cadman (Primary Mainstem #108 and #109), one project in Al Borlin Park (Primary Mainstem #113),

and one project in the East LOS subarea (Primary Mainstem #114). The following descriptions of each project are excerpted verbatim from the *Conservation Plan*:

> #108 Cadman secondary channel improvement: Direct more flow through secondary-channel at head of bar adjacent to Cadman to enhance rearing year-round. Would potentially reduce erosion at Werkhoven Farm.
>
> #109 Cadman wall-based channel reconnection: May be substantial opportunity to reconnect a wall-based channel and off-channel habitat on the quarry site once Cadman operations are complete. Discussion needed with Cadman and City of Monroe. Side-channel length = 7900ft.
>
> #113 Buck Island side-channel enhancement: Increase connectivity along Buck Island between Woods Creek and the mainstem. Strategically placed LWD to promote side-channel and pool formation.
>
> #114 SR 2 oxbow reconnections: Provide access to oxbow channels that are cut off by State Route 2 and the railroad. Probably more costly than other similar projects because it would require the installation of large culverts under a major highway.

Project *Primary Mainstem #114* is the least likely of the above to occur as the land is privately owned and is currently in feasibility for development of a church or residences.

The June 2005 *Snohomish River Basin Salmon Conservation Plan* also includes projects in the French Creek system, which is tributary to the Snohomish River. Although the City has not elected to extend shoreline jurisdiction to include the Snohomish River floodplain in the City, any wetlands in the Snohomish River 100-year floodplain are within shoreline jurisdiction. The 100-year floodplain of the Snohomish River extends into the Fryelands area of the City. The following description of a French Creek floodplain wetlands projects is excerpted verbatim from the *Conservation Plan*:

> #84 French Creek floodplain wetland restoration: Restore a portion of the 4000 acres of wetland in the floodplain that were present historically. Project would depend on willing sellers. Project would have both a high cost and a high benefit.

2. Cadman Site Restoration

The Cadman operation and its on-site critical areas and their buffers are designated as Limited Open Space in the current zoning and future land use maps. According to the *Draft Supplemental Environmental Impact Statement*, the gravel pit first began operations in 1961 under a prior owner and before the area was annexed into the City. Cadman purchased the site in 1989, two years after it was annexed. In total, Cadman expects to remove approximately 11 million (M) tons of material over the life of the operation, with a peak output of approximately 1 M tons per year. The present operation plan calls for three phases, with different road and processing configurations for each phase. As portions of the site are closed, they are regraded, stabilized, and replanted. An attachment to the 2002 Master Plan includes conceptual grading and planting plans, the goals of which are to "create wildlife habitat and provide accessibility for future recreation".

Once all mining is completed and Cadman has implemented the Washington Department of Natural Resources-approved reclamation plan, the site (less 37 acres to serve as a base for "long-term site operations") will be deeded to the City for non-commercial public use and stewardship. Ten acres in the northeast portion of the site have already been conveyed to the City. Ideally, the reclamation plan and City management will result in:

1. Reestablishment of functional connections between the Skykomish River, the Cadman wetland complex, and the relic high flow channels.

2. Removal of unnatural fish migration barriers in the relic channel/wetland complex.

3. Restoration of a minimum 200-foot-wide vegetated buffer along the Skykomish River with native vegetation, including conifers.

4. Incorporation of environmental education materials into the park, either through interpretive signs, an environmental learning center, or other means.

5. Concentration of active use areas of the park away from high-quality forested wetland and upland habitats.

6. Development of relationships with local environmental restoration organizations, schools, or other interested groups to maximize volunteer and educational opportunities at the site.

These actions would implement *Primary Mainstem #108* and *Primary Mainstem #109* as described above under Section 5.1.

3. Accomplishments

The three projects listed below have been implemented since they were originally identified as recommendations or opportunities in the November 2002 *Shoreline Master Program Inventory* (Appendix B). The full list of recommended projects is provided below in Section 5.4.

- Project 11: Segment C of the Skykomish River has a large area of eroding riverbank with a nearby trail and parking area. Vehicles were driving close to the bank edge, damaging and eliminating shoreline vegetation and causing sloughing of the destabilized bank into the river. Following a flood in 2005 that eroded additional bank area, vehicular access was suspended.

- Project 12: The Skykomish River portion of the train trestle in Segment C was removed in July/August 2005 by Cadman, Inc. after the bridge became dangerously close to collapse. The project was coordinated jointly coordinated with the Washington State Department of Natural Resources and Snohomish County. Bridge removal was followed by some in-stream habitat enhancement in the affected area.

- Project 18: The Old Owen Road bridge in Segment B of Woods Creek included in-water piers that impacted movement of water, large woody debris, and sediment downstream. The old bridge has been replaced by Snohomish County with a structure that does not include any in-water supports.

4. Recommended Projects

The following is a summary of the specific potential projects identified for the Skykomish River and Woods Creek in the *Recommendations* sections of the individual reach discussion of the 2002 *Shoreline Master Program Inventory* (Appendix B). The list of potential projects for each shoreline segment was created after assessing conditions in each segment, and is intended to contribute to improvement of impaired functions. The first "General" recommendation applies also to the Tye Stormwater Facility.

General

1. Plant, encourage, and preserve stream and riverbank vegetation to provide shade (temperature control) and stabilize banks (erosion/sedimentation control). Increase conifer component to provide future source of large woody debris recruitment.

2. Provide adequate treatment of storm and sanitary sewage discharges to the river and its tributaries (water quality).[1]

3. Preserve and enhance existing wetlands and their buffers (wildlife habitat).

4. Secure large woody debris along the river/stream banks.

Skykomish River – Segment A

5. Review and possibly improve Cadman's water quality control measures to reduce turbidity of runoff water as applicable.

6. Restore shoreline areas disturbed through the gravel mining process by placing an adequate topsoil layer planted with a diverse assemblage of native riparian trees and shrubs consistent with Alternative 1 as described in the Draft EIS for the gravel operation. In addition, create a network of ponds and channels connecting to the river or existing channels.

Skykomish River – Segment B

7. Reduce the existing rip-rap bank protection adjacent to the WDFW parking area serving the boat ramp and/or supplement with soil and woody debris. If needed, consider alternative bank protection measures such as bank barbs or woody structures. Provide a wider buffer of native vegetation between the parking area and the river.

8. Reduce access to some of the fisherman trails along the river by increasing vegetation density. This would improve bank stability and provide other habitat functions including shade and terrestrial insect food supply.

9. Supplement existing rip-rap at the location of a sewage outfall with soil and native vegetation.

[1] The treatment plant discharges are currently in compliance with the standards of the latest National Pollutant Discharge Elimination System (NPDES) permit.

10. Consider options to reduce need for chemical applications to lawn areas of Skykomish River Centennial Park.

Skykomish River – Segment C

11. Trails and parking areas should be moved back from areas of eroding riverbank, and the banks and buffer area should be restored by planting native trees and shrubs.

12. Investigate alternative bank stabilizing methods for the area of heavily rip-rapped railroad embankment lining the uppermost end of this segment. Supplement the banks with soil and native vegetation.

Woods Creek – Segment A

13. Encourage residential property owners along the right bank to increase the effective buffer widths along their properties by landscaping with native vegetation and increasing the density and diversity of such vegetation.

Woods Creek – Segment B

14. Encourage residential property owners along this segment to 1) substitute bank stabilization methods which are more compatible with habitat functions for the existing rip-rap and concrete, and 2) increase the effective buffer widths along their properties by landscaping with native vegetation and increasing the density and diversity of such vegetation. Existing rip-rap should be reduced and/or supplemented with soil and woody debris. If needed, alternative bank protection measures such as bank barbs or woody structures should be considered. A wider buffer of native vegetation should be provided between the existing buildings and the creek.

15. Investigate feasibility of restoring the lower, piped section of a small Woods Creek tributary to provide an open, fish-passable channel. The piped section can be found on the right bank near the middle of the segment.

16. The City should work with the County to ensure that the in-water piers supporting Old Owen Road bridge are removed.

17. Consider retaining some of the land currently [in 2002] zoned "public open space," but designated as "general commercial" on the comprehensive plan future land use map, as the "parks/open space" designation. In particular, forested, sloped areas on the left bank of Woods Creek, just north of SR 2 that are not already developed should be re-classified. Note: Although it is difficult to compare the maps available in 2002 to the current maps due to changes in mapping sophistication and detail, it appears that some of the area designated as "general commercial" in the future land use map available in 2002 has been amended to show "special regional use."

Tye Stormwater Facility

18. The City Parks Department should consider supporting The Environmental Science School in its native planting efforts. The School is looking for sources of native plants.

19. The City Parks & Recreation and Public Works Departments should consider minimizing areas of mowing of the Tye Stormwater Facility perimeter to accommodate native plantings.

20. The City Parks & Recreation Department should consider signage or other barriers to focus direct pond-side access to specific areas. This would reduce devegetation of the banks and exposure of bare soils to erosion.

The City shall encourage all development proposals to include a site-specific plan to improve and restore some level of lost ecological function, beyond required mitigation for any impacts that result explicitly from the development proposal. For example, projects could provide bands of native vegetation along the waterward edge of the property, reduce impervious surfaces through innovative use of pervious materials and reduce the impact of impervious surfaces through stormwater management that focuses on runoff quantity and quality, and remove or enhance armored banks.

5. Public Education

Consistent with Goal 2, Objective 4, above, the City should coordinate with non-profit environmental groups and educational institutions to develop a more comprehensive and collaborative education strategy. The resulting plan should include mechanisms for informing private property owners in the shoreline zone and in the remainder of the City about the effects of land management practices and other unregulated activities (such as vegetation removal, pesticide/herbicide use, car washing) on fish and wildlife habitats. Part of that strategy could incorporate Monroe Department of Public Works' public show-and-tell program that provides training about repair and maintenance of stormwater facilities, or a storm-drain stenciling program. The City Council also committed in its adopted WRIA 7 "Action Menu" (see chapter 7, Section H below) to provide its citizens with stormwater-related information.

6. Other Environmental Organizations

Although the following organizations include Monroe in their general service areas, they are not currently actively engaged in specific activities or programs that affect Monroe's shorelines. However, that does not preclude them from playing an active role in the future, particularly if any of Monroe's citizens solicit assistance from or become members in these organizations.

The Nature Conservancy

The mission of The Nature Conservancy is "to preserve the plants, animals and natural communities that represent the diversity of life on Earth by protecting the lands and waters they need to survive" (http://www.nature.org/). According to Peter Skidmore, Freshwater Program Manager, "The Nature Conservancy is not actively engaged in…work…in the Monroe area. I am not aware of anyone in our programs that is working with the City, or in this area specifically" (Skidmore, pers. comm., 9 March 2006).

Contact Information: Peter Skidmore, Freshwater Program Manager, Washington Chapter of The Nature Conservancy, pskidmore@tnc.org, http://www.nature.org/wherewework/northamerica/states/washington/

Pilchuck Audubon Society

The mission of the Pilchuck Audubon Society is "to conserve and restore natural ecosystems focusing on birds and other wildlife for the benefit of the earth's biological diversity. Through education, advocacy and community activism, PAS is committed to bringing people closer to wildlife in order to build a deeper understanding of the powerful links between healthy ecosystems and human beings and to encourage the involvement of our members in efforts to protect the habitat this wildlife depends upon for survival" (http://www.pilchuckaudubon.org/). According to Kristin Kelly, Smart Growth Director for the Pilchuck Audubon Society, the Society "has no current plans to do any type of restoration projects in the watersheds surrounding Monroe" (Kelly, pers. comm., 24 May 2006).

Contact Information: http://www.pilchuckaudubon.org/

F. Proposed Implementation Targets and Monitoring Methods

As previously noted, a substantial portion of the City's shoreline zone is occupied by City parks and open space. The total shoreline length of the City is approximately 4.5 miles, of which 2.3 miles is park (approximately 50%). Therefore, ecological function in the City's shoreline zone has and can be significantly impacted by past, current, and future management of the parks. Because the park lands are owned by the City, the opportunities for restoration are greater and the obstacles for implementation are fewer than on private land.

Table 1. Implementation Schedule and Funding for Restoration Projects, Programs and Plans.

Restoration Project/Program	Schedule	Funding Source or Commitment
D.1 WRIA 7 Participation	Ongoing	The City is an active member of the Snohomish Basin Salmon Recovery Forum. Membership at this time entails a commitment of staff time.
D.2 French Creek Watershed Management	Ongoing	The City was an active member of the French Creek Watershed Management Committee. The 2005 Plan includes a lengthy project/program list of recommendations, implementation schedule, and estimated cost.
D.3 Comprehensive Plan Policies	Adopted in 2005	The City makes a substantial commitment of staff time in the course of project and program reviews to determine consistency and compliance with the recently updated Comprehensive Plan.
D.4 Critical Areas Regulations	Adopted in September 2003	The City makes a substantial commitment of staff time in the course of project and program reviews to determine consistency and compliance with their recently updated Critical Areas Regulations.
D.5 Stormwater Planning	Ongoing	Currently, staff time and materials are the only City resource commitments.
D.6 Stilly-Snohomish	Ongoing	Currently, staff time and materials are the only City

	Restoration Project/Program	Schedule	Funding Source or Commitment
	Fisheries Enhancement Task Force Projects		resource commitments.
D.7	Trout Unlimited	Ongoing	These programs currently require no City investments.
D.8	Adopt-A-Stream Foundation		
D.9	The Environmental Science Program		
E.1	Unfunded WRIA 7 projects	As funds and opportunity allow	The City Council passed a resolution in 2005 making a commitment to implement the Snohomish Basin Salmon Recovery Plan. Projects will be funded by the City, partnering agencies and non-profit organizations, and grants as projects and funding opportunities arise.
E.2	Cadman Site Restoration	Following completion of mining	As needed to further WRIA 7 obligations following Cadman/DNR reclamation.
E.3	Recommended Projects		Projects identified in *Recommendations* discussions would likely be implemented either when grant funds are obtained, when partnerships are formed between the City and other agencies or non-profit groups, or as may be required by the critical areas regulations and the Shoreline Master Program during project-level reviews by the City.
E.4	Public Education		To be determined.
E.5	Other Environmental Organizations		

Monitoring, on the other hand, is more easily accomplished and documented through standard Parks and Recreation Department reporting processes. The Parks and Recreation Department should annually assemble a memo quantitatively or qualitatively, as appropriate, outlining implementation of various restoration actions (by the City or other groups) on park lands. These actions may include square feet of non-native vegetation removed, square feet of native vegetation planted or maintained, reductions in chemical usage to maintain turf, or linear feet of eroding shoreline stabilized through plantings. When available, the memo should include a description of the success of actions accomplished in prior years. If staffing and funding are limited, the Parks and Recreation Department should investigate partnerships with local environmental groups, other state or county agencies, or tribes to implement projects and conduct follow-up monitoring and reporting.

For projects implemented outside of park lands, the Planning Department is the most logical reporting agency. Most of those projects would be implemented on private property in either a critical area or its buffer, and are likely mitigation for a project that required a permit. Under the Critical Areas Regulations, up to five years of monitoring is required for mitigation projects, with annual monitoring reports to be submitted by the project applicant to the City. The City should annually assemble a memo outlining projects implemented that year in the shoreline zone, and attach monitoring reports submitted by the property owner. Restoration projects implemented by private property owners are dependent on volunteers or on submittal of a land use permit application. Accordingly, a timeline cannot reasonably be established.

City-assembled annual memos (by both the Parks and Recreation and Community Development Departments) should be submitted to Ecology. This background information will help the City and Ecology identify regulatory and implementation needs that can be addressed during the seven-year updates of the City's Shoreline Master Program.

G. Restoration Priorities

While the implementation scheduling for ongoing and prospective projects and programs is summarized in Table 1 in the previous section, the order of implementation may not, in all cases, be the same as the order of importance or priority. This discrepancy comes about because various obstacles get in the way of implementing projects in the exact order of their perceived priority. For example, as is listed below, restoring side channel and floodplain connectivity on and near the Cadman site along Skykomish Segment A has a very high priority associated with it, but in terms of feasibility of implementation, these improvements must wait until the anticipated cessation of operations at the Cadman site actually occur. Some projects, such as those associated with streamside riparian planting, are *relatively* inexpensive and easy to permit and so should be done in the short and intermediate term even though they may be perceived to be of lower priority than, say, reconnecting oxbows back to the main river channel. Straightforward projects for which funding is available should get under way for the worthwhile benefits they provide and to preserve a sense of momentum while permitting, design, site access authorization, and funding for the larger, more complicated, and more expensive projects are under way.

1. Priority 1 – Continue Water Resource Inventory Area (WRIA) 7 Participation

Of basic importance is the continuation of ongoing, programmatic, basin-wide programs and initiatives such as the WRIA 7, Snohomish Basin Salmon Recovery Forum process described in Section 7(D)(1), above. This process provides an opportunity for the City to keep in touch with its role on a basin-wide scale and to influence habitat conditions beyond its borders, which, in turn, come back to influence water quality and quantity and habitat issues within the City.

2. Priority 2 – Skykomish River and Woods Creek Off-Channel, Side Channel and Floodplain Connectivity Improvements

Floodplain habitats including off-channel and side channel habitats are typically described as the most diminished types of salmonid fish habitat relative to the pristine condition, and are also considered to be the most limiting. Projects in this category include the unfunded WRIA 7 projects listed in Section 7(E)(1): #108 Cadman secondary channel improvement, #109 Cadman wall-based channel reconnection, #113 Buck Island side-channel enhancement, and #114 SR 2 oxbow reconnections. Also included as this project type and at this priority level are the Cadman-vicinity floodplain projects of reestablishing functional connections between the Skykomish River, the Cadman wetland complex, and the relic high flow channels, removing

unnatural fish migration barriers in the process (items 1 and 2 under Section 7(E)(2)) and further removal of unused railroad bridges and embankment fill from waterways and the floodplain (items 12 and 14 under Section 7(E)(4)).

3. Priority 3 – Specific Bank and Riparian Projects – Trails, Revegetation, Bank and Soil Stabilization, Stormwater

Projects in this category as listed in previous sections include the ongoing Buck Island Floodplain Forest Enhancement Project (Section 7(D)(6)), Cadman-vicinity Skykomish River buffer revegetation and park use management (items 3 and 5 under Section 7(E)(4)), general stormwater, wetland, and habitat provisions (items 1-4 and 18-20 under Section 7(E)(4)), Cadman turbidity improvements (item 5 under Section 7(E)(4)), topsoil placement in areas disturbed by gravel mining (item 6 under Section 7(E)(4)), riverbank rip-rap reduction adjacent to WDFW parking area (item 7 under Section 7(E)(4)), consolidation and reduction of fisherman trails along the riverbank (item 8 under Section 7(E)(4)), soil supplementation and native revegetation at the sewage outfall location (item 9 under Section 7(E)(4)), possible reductions in chemical applications to lawn areas of Skykomish River Centennial Park (item 10 under Section 7(E)(4)), incorporate soils and native plantings into rip-rapped railroad embankments (item 13 under Section 7(E)(4)), and possible daylighting of a Woods Creek tributary section (item 17 under Section 7(E)(4)).

4. Priority 4 – Public Education and Involvement

Projects in this category as listed in previous sections include incorporating environmental education into park functions at the Cadman site and cultivating participation from local environmental organizations (items 4 and 6 under Section 7(E)(2)) and working with homeowners along Woods Creek to reduce “hard” streambank armoring and enhance buffer areas with native vegetation (items 15 and 16 under Section 7(E)(4)).

5. Priority 5 – City Zoning, Regulatory, and Planning Policies

City Zoning, Regulatory, and Planning Policies are listed as being of lower priority in this case simply because they have been the subject of a thorough review and have recently been updated accordingly. For the time being, it is considered more important to capitalize on this work by focusing on implementing projects consistent with these updated policies. Unimplemented or unused policies, by themselves, will not improve habitat. As time goes by, further review and potential updating of these policies may increase in priority. Policy-related items in this category as listed in previous sections include Comprehensive Plan Policies (Section 7(D)(3)), Critical Areas Regulations (Section 7(D)(4)), Stormwater Planning (Section 7(D)(5)), and possibly retaining as “parks/open space” some areas, especially along Woods Creek, designated as “general commercial” on the Comprehensive Plan’s future land use map (item 17 under Section 7(E)(4)).

H. City of Monroe Salmon Recovery "Action Menu"

Adopted as Resolution 2005/005, 6 April 2005.

Projects:

- French Creek – Current projects underway for habitat restoration and shading along French Creek tributary east of Fryelands Boulevard and south of SR 2. The City of Monroe is working in conjunction with the Monroe School District, Trout Unlimited, and other organizations (unfunded – public/private partnership).

- French Creek Restoration Project (Remlinger Farm) – Reconfigure Lake Tye, wetland creation, channel alignment, riparian and floodplain forest restoration, pumping plant reconfiguration, and barrier removal. Total Cost estimate $75,000,000 (private proposal: World River Habitech, Terry Williams (Tulalip Tribes), Frank Braillard (Real Estate Investment), Dave Remlinger (French Slough Flood Control), Terry Negri (Certified Forester), Renette Villella (Farmer), and Dave Somers (Ecologist). [Since Council adopted this action item in 2005, the project has been abandoned]

- Storm drain stenciling and marking program (unfunded and a schedule has not been established).

- Fish ditch behind McDonalds/Chevron Station at the intersection of State Route 2 and Fryelands Blvd – tree planting and removal of non-native vegetation (on-going volunteer program through the Sky Valley School).

- Al Borlin Park – reforest park with 2,000 cedars, spruce, hemlock and fir trees; suppress invasive plants including Japanese knotweed; provide erosion control measures at the west end of Buck Island including live tree pole cuttings, logs, native tree groupings, and planters. The program includes monitoring for five years, and is a joint project between the Stilly-Snohomish Fisheries Task Force and the City of Monroe. This project is underway and partially funded by the City of Monroe: total project cost $37,247.57.

- Park, Recreation & Open Space Element of the City of Monroe Comprehensive Plan

    1. Purchase an additional 80 acres for conservation along major slopes, wetlands, and Woods Creek and Skykomish River corridors (unfunded and there are no specific locations identified).
    2. Waterfront access – Haskell Slough (not within the City of Monroe jurisdiction's and unfunded, although it is identified in the 20 year Park Plan CFP, with a total budget of $1,000,000)
    3. Skykomish River Trail - multi-purpose trail between Tester Road and Al Borlin Park (this project is identified in the Park Plan CFP to be funded between 2003-2008, with a total budget of $597,480).

4. Great Northern Railroad Bridge Trail – Multi-purpose trail constructed on the Great Northern Railroad bridge extending from Al Borlin Park south across the Skykomish River to connect with the Snoqualmie Valley Trail in King County (identified in the 20 year Park CFP with a total budget of $200,000 – currently unfunded). [Since Council adopted this action item in 2005, the Great Northern Railroad bridge has been removed]
5. Centennial Trail – Multi-purpose trail through the City of Monroe with trailheads at SR-522 and Al Borlin Park (unfunded).
6. Al Borlin boat launch – a non-motorized boat launch accessible from Simons Street (this project is identified in the Park Plan CFP to be funded between 2003-2008, with a total budget of $10,694).

Regulatory:

- Critical Areas Regulations, using best available science and consistent with the requirements of the Growth Management Act. Adopted by Ordinance #019/2003 on September 3, 2003.
- Shoreline Inventory, accepted by the Washington State Department of Ecology in November 2002.
- Shoreline Master Program – the City is currently in the process of updating the Shoreline Master Program. This will include new shoreline designations and regulations for land within the shoreline jurisdiction.
- We currently require compliance with the "Storm Water Management Manual for Western Washington," Department of Ecology, August 2001.
- The Public Works Department is in the process of adopting ESA compliant BMP and road maintenance standards.
- Improve stormwater management by developing ESA compliant Best Management Practices, developing an ordinance for the disposal of pet waste, monthly water quality monitoring beginning in April 2004 for fecal coliforms and dissolved oxygen, and develop prioritized strategies for examining storm sewer system for illicit discharges (begin work in April 2004 – applying for a grant).

Educational Programs:

- Mail out storm water brochures annually with utility bills, keep at City Hall, and keep on the web page (develop in 2004).

Chapter 8: Definitions

As used herein, the following words and phrases shall have the following meanings:

1. "Act" means the Washington State Shoreline Management Act, chapter 90.58 RCW.

2. "Adaptive management" means the modification of management practices to address changing conditions and new knowledge. Adaptive management is an approach that incorporates monitoring and research to allow projects and activities, including projects designed to produce environmental benefits, to go forward in the face of some uncertainty regarding consequences. The key provision of adaptive management is the responsibility to change adaptively in response to new understanding or information after an action is initiated.

3. "Amendment" means a revision, update, addition, deletion, and/or reenactment to an existing shoreline master program.

4. "Approval" means an official action by a local government legislative body agreeing to submit a proposed shoreline master program or amendments to the department for review and official action; or an official action by the department to make a local government shoreline master program effective, thereby incorporating the approved shoreline master program or amendment into the state master program.

5. "Aquatic" means pertaining to those areas waterward of the ordinary high-water mark.

6. "Bank full width" means the horizontal projection of bank full depth to the stream bank. Most river channels are bordered by a relatively flat area or valley floor.

7. "Bulkhead" means a solid wall erected generally parallel to and near the OHWM for the purposed of protecting adjacent uplands from waves or current action.

8. "Channel migration zone (CMZ)" means the lateral extent of likely movement along a stream reach with evidence of active stream channel movement over the past one hundred years. Evidence of active movement can be provided from aerial photos or specific channel and valley bottom characteristics. The CMZ shall include floodways and wetlands, as defined under chapter 90.58 RCW, whether associated with either shorelines of the state or shorelines of state-wide significance, as defined under chapter 90.58 RCW.

   With the exception of shorelands in the "natural" and "rural conservancy" environments, areas separated from the active channel by legally existing artificial channel constraints that limit bank erosion and channel avulsion without hydraulic connections shall not be considered within the CMZ. All areas, including areas within the "natural" and "rural conservancy" environments, separated from the natural channel by legally existing structures designed to withstand the 100-year flood shall not be considered within the CMZ. A tributary stream or other hydraulic connection allowing federally proposed, threatened or endangered species fish passage draining through a dike or other constricting structure shall be considered part of the CMZ.

9. “Clearing” means the destruction or removal of vegetation ground cover, shrubs and trees including, but not limited to root removal and/or topsoil removal.

10. “Department” means the state Department of Ecology.

11. “Developed shorelines” means those shoreline areas that are characterized by existing development or permanent structures located within shoreline jurisdiction.

12. “Development regulations” means the controls placed on development or land uses by a county or city, including, but not limited to, zoning ordinances, critical areas ordinances, all portions of a shoreline master program other than goals and policies approved or adopted under chapter 90.58 RCW, planned unit development ordinances, subdivision ordinances, and binding site plan ordinances together with any amendments thereto.

13. “Document of record” means the most current shoreline master program officially approved or adopted by rule by the department for a given local government jurisdiction, including any changes resulting from appeals filed pursuant to RCW 90.58.190.

14. “Ecological functions” or “shoreline functions” means the physical, chemical, and biological processes that contribute to the proper maintenance of the aquatic and terrestrial environments that constitute the shoreline ecosystem. Ecological functions relevant to specific shoreline ecological systems include, but are not limited to:

    a. Riverine:

        - Hydrologic processes: Maintaining a natural range of flow variability, sideflow and overflow channel functions, reducing peak flows and downstream erosion, and helping to maintain base flows.
        - Water quality: Temperature; removing excessive nutrients and toxic compounds.
        - Dynamic sediment processes: Sediment removal, stabilization, transport, deposition, and providing spawning gravels.
        - Habitat for: Proposed, threatened, endangered, and priority species (whatever they may be in the jurisdiction); aquatic and shoreline-dependent birds, invertebrates, and mammals; amphibians; and anadromous and resident native fish. Habitat functions may include, but are not limited to, shade, litter and woody debris recruitment, refugia, and food production.
        - Hyporheic functions: Water quality, water storage, vegetation base, and sediment storage.

    b. Wetlands:

        - Flood attenuation.
        - Water quality: Removing excessive nutrients and toxic compounds.
        - Ground water recharge.
        - Maintenance of base flows.

- Nutrient filtering.
- Habitat for: Proposed, threatened, endangered, and priority species (whatever they may be in the jurisdiction); aquatic and shoreline-dependent birds, invertebrates, and mammals; amphibians; and anadromous and resident native fish. Habitat functions may include, but are not limited to, shade, litter and woody debris recruitment, refugia, and food production.

15. "Exempt" developments are those set forth in WAC 173-27-040 and RCW 90.58.030 (3)(e), 90.58.045, 90.58.140(9), 90.58.147, 90.58.355, 90.58.370, 90.58.390, 90.58.515, and 77.55.181(4) which are not required to obtain a Substantial Development Permit, but which must otherwise comply with applicable provisions of the Act and this Master Program. RCW 90.58 should be reviewed after each legislative session to identify possible new exemptions.

16. "Feasible" means, for the purpose of this master program, that an action, such as a development project, mitigation, or preservation requirement, meets all of the following conditions:

    a. The action can be accomplished with technologies and methods that have been used in the past, or studies or tests have demonstrated that such approaches are currently available and likely to achieve the intended results;

    b. The action provides a reasonable likelihood of achieving its intended purpose; and

    c. The action does not physically preclude achieving the project's primary intended use.

    In cases where these guidelines require certain actions unless they are infeasible, the burden of proving infeasibility is on the applicant.

    In determining an action's infeasibility, the reviewing agency may weigh the action's relative public costs and public benefits, considered in the short- and long-term time frames.

17. "Fill" means the addition of soil, sand, rock, gravel, sediment, earth retaining structure, or other material to an area waterward of the OHWM, in wetlands, or on shorelands in a manner that raises the elevation or creates dry land.

18. "Flood plain" is synonymous with one hundred-year floodplain and means that land area susceptible to inundation with a one percent chance of being equaled or exceeded in any given year. The limit of this area shall be based upon flood ordinance regulation maps or a reasonable method which meets the objectives of the act.

19. "Geotechnical report" or "geotechnical analysis" means a scientific study or evaluation conducted by a qualified expert that includes a description of the ground and surface hydrology and geology, the affected land form and its susceptibility to mass wasting, erosion, and other geologic hazards or processes, conclusions and recommendations regarding the effect of the proposed development on geologic conditions, the adequacy of the site to be developed, the impacts of the proposed development, alternative approaches to the proposed development, and measures to mitigate potential site-specific and

cumulative impacts of the proposed development, including the potential adverse impacts to adjacent and down-current properties. Geotechnical reports shall conform to accepted technical standards and must be prepared by qualified engineers or geologists who are knowledgeable about the regional and local shoreline geology and processes.

20. "Grading" means the movement or redistribution of the soil, sand, rock, gravel, sediment, or other material on a site in a manner that alters the natural contour of the land.

21. "Guidelines" means those standards adopted by the department to implement the policy of chapter 90.58 RCW for regulation of use of the shorelines of the state prior to adoption of master programs. Such standards shall also provide criteria for local governments and the department in developing and amending master programs.

22. "In-stream structure" means a structure placed by humans within a stream or river waterward of the ordinary high water mark that either causes or has the potential to cause water impoundment or the diversion, obstruction, or modification of water flow. In-stream structures may include those for hydroelectric generation, irrigation, water supply, flood control, transportation, utility service transmission, fish habitat enhancement, or other purpose.

23. "Letter of exemption" means a letter or other official certificate issued by a local government to indicate that a proposed development is exempted from the requirement to obtain a shoreline permit as provided in WAC 173-27-050 and RCW 90.58 as amended. Letters of exemption may include conditions or other provisions placed on the proposal in order to ensure consistency with the Shoreline Management Act and this Master Program. The letter of exemption requirement is included in Chapter 19.01 of the Monroe Municipal Code.

24. "Local government" means any county, incorporated city or town which contains within its boundaries shorelines of the state subject to chapter 90.58 RCW.

25. "May" means the action is acceptable, provided it conforms to the provisions of this master program.

26. "Mitigation" or "mitigation sequencing" means the process of avoiding, reducing, or compensating for the environmental impact(s) of a proposal, including the following listed in the order of sequence priority, with (a) of this subsection being top priority.

    a. Avoiding the impact altogether by not taking a certain action or parts of an action;

    b. Minimizing impacts by limiting the degree or magnitude of the action and its implementation by using appropriate technology or by taking affirmative steps to avoid or reduce impacts;

    c. Rectifying the impact by repairing, rehabilitating, or restoring the affected environment;

    d. Reducing or eliminating the impact over time by preservation and maintenance operations;

    e. Compensating for the impact by replacing, enhancing, or providing substitute resources or environments; and

f. Monitoring the impact and the compensation projects and taking appropriate corrective measures.

27. "Must" means a mandate; the action is required.

28. "Nonconforming use or development" means a shoreline use or development which was lawfully constructed or established prior to the effective date of the Shoreline Management Act or this Master Program, or amendments thereto, but which does not conform to present regulations or standards of this Master Program.

29. "Nonpoint pollution" means pollution that enters any waters of the state from any dispersed land-based or water-based activities, including, but not limited to, atmospheric deposition, surface water runoff from agricultural lands, urban areas, or forest lands, subsurface or underground sources, or discharges from boats not otherwise regulated under the National Pollutant Discharge Elimination System program.

30. "Nonwater-oriented uses" means those uses that are not water-dependent, water-related, or water-enjoyment.

31. "Priority habitat" means a habitat type with unique or significant value to one or more species. An area classified and mapped as priority habitat must have one or more of the following attributes:

    - Comparatively high fish or wildlife density;
    - Comparatively high fish or wildlife species diversity;
    - Important fish or wildlife breeding habitat;
    - Important fish or wildlife seasonal ranges;
    - Important fish or wildlife movement corridors;
    - Rearing and foraging habitat;
    - Refugia habitat;
    - Limited availability;
    - High vulnerability to habitat alteration; or
    - Unique or dependent species.

    A priority habitat may be described by a unique vegetation type or by a dominant plant species that is of primary importance to fish and wildlife. A priority habitat may also be described by a successional stage (such as old growth and mature forests). Alternatively, a priority habitat may consist of a specific habitat element (such as talus slopes, caves, snags) of key value to fish and wildlife. A priority habitat may contain priority and/or non-priority fish and wildlife.

32. "Priority species" means species requiring protective measures and/or management guidelines to ensure their persistence at genetically viable population levels. Priority species are those that meet any of the criteria listed below.

a. Criterion 1. State-listed or state proposed species. State-listed species are those native fish and wildlife species legally designated as endangered (WAC 232-12-014), threatened (WAC 232-12-011), or sensitive (WAC 232-12-011). State proposed species are those fish and wildlife species that will be reviewed by the Washington Department of Fish and Wildlife (POL-M-6001) for possible listing as endangered, threatened, or sensitive according to the process and criteria defined in WAC 232-12-297.

b. Criterion 2. Vulnerable aggregations. Vulnerable aggregations include those species or groups of animals susceptible to significant population declines, within a specific area or state-wide, by virtue of their inclination to congregate. Examples include heron colonies and fish spawning and rearing areas.

c. Criterion 3. Species of recreational, commercial, and/or tribal importance. Native and nonnative fish and wildlife species of recreational or commercial importance and recognized species used for tribal ceremonial and subsistence purposes that are vulnerable to habitat loss or degradation.

d. Criterion 4. Species listed under the federal Endangered Species Act as either proposed, threatened, or endangered.

33. "Proposed, threatened, and endangered species" or "PTE species" means those native species that are proposed to be listed or are listed in rule by the Washington Department of Fish and Wildlife pursuant to RCW 77.12.020 as threatened (WAC 232-12-011) or endangered (WAC 232-12-014), or that are proposed to be listed as threatened or endangered or that are listed as threatened or endangered under the federal Endangered Species Act, 16 U.S.C. 1533.

34. "Provisions" means policies, regulations, standards, guideline criteria or designations.

35. "Restoration" or "ecological restoration" means the significant upgrading of ecological shoreline functions through measures such as revegetation, removal of intrusive shoreline structures and removal or treatment of toxic materials.

36. "Restore" means to significantly upgrade shoreline ecological functions through measures such as revegetation, removal of intrusive shoreline structures, and removal or treatment of toxic sediments.

37. "Revetment" means a facing of stone, concrete, etc. built to protect a embankment or shoreline structure against erosion by waves or currents.

38. "Riverine" means pertaining to a river system, including associated lakes and wetlands.

39. "Shall" means a mandate; the action must be done.

40. "Shoreline areas" and "shoreline jurisdiction" means all "shorelines of the state" and "shorelands" as defined in RCW 90.58.030.

41. "Shoreline modifications" means those actions that modify the physical configuration or qualities of the shoreline area, usually through the construction of a physical element such

as a dike, breakwater, pier, weir, dredged basin, fill, bulkhead, or other shoreline structures. They can include other actions, such as clearing, grading, or application of chemicals.

42. "Shoreline property" means an individual property wholly or partially within shoreline jurisdiction.

43. "Should" means that the particular action is required unless there is a demonstrated, compelling reason, based on policy of the Shoreline Management Act and this master program, against taking the action.

44. "Significant ecological impact" means an effect or consequence of an action if any of the following apply:

    a. The action measurably or noticeably reduces or harms an ecological function or ecosystem-wide process.

    b. Scientific evidence or objective analysis indicates that the action could cause reduction or harm to those ecological functions or ecosystem-wide processes described in (a) of this subsection under foreseeable conditions.

    c. Scientific evidence indicates that the action could contribute to a measurable or noticeable reduction or harm to ecological functions or ecosystem-wide processes described in (a) of this subsection as part of cumulative impacts, due to similar actions that are occurring or are likely to occur.

45. "Significant vegetation removal" means the removal or alteration of trees, shrubs, and/or ground cover by clearing, grading, cutting, burning, chemical means, or other activity that causes significant ecological impacts to functions provided by such vegetation. The removal of invasive or noxious weeds does not constitute significant vegetation removal. Tree pruning, not including tree topping, where it does not affect ecological functions, does not constitute significant vegetation removal. In reviewing shoreline permits and letters of exemption, the City will determine whether or not the development proposal would cause significant vegetation removal. Unless the City determines otherwise, the following actions constitute significant vegetation removal:

    a. The removal of one or more healthy coniferous trees over 6" caliper.

    b. The removal of vegetation along the shoreline edge that provides direct shade during summer months on the shoreline.

    c. The removal of vegetation that could potentially lead to bank instability, instability, sedimentation into the water or soil erosion.

    d. The removal of vegetation that provides significant habitat or food source for Washington State Priority Species.

46. "State master program" means the cumulative total of all shoreline master programs and amendments thereto approved or adopted by rule by the department.

47. “Storm water” means that portion of precipitation that does not normally percolate into the ground or evaporate but flows via overland flow, interflow, channels, or pipes into a defined surface water channel or constructed infiltration facility.

48. “Substantial development” shall mean any development of which the total cost or fair market value exceeds five thousand dollars, or any development which materially interferes with the normal public use of the water or shorelines of the state. The dollar threshold established in this subsection (3)(e) must be adjusted for inflation by the Office of Financial Management every five years, beginning July 1, 2007, based upon changes in the consumer price index during that time period. “Consumer price index” means, for any calendar year, that year’s annual average consumer price index, Seattle, Washington area, for urban wage earners and clerical workers, all items, compiled by the bureau of labor and statistics, United States Department of Labor. The Office of Financial Management must calculate the new dollar threshold and transmit it to the Office of the Code Reviser for publication in the Washington State Register at least one month before the new dollar threshold is to take effect. The following shall not be considered substantial developments for the purpose of this chapter:

    a. Normal maintenance or repair of existing structures or developments, including damage by accident, fire, or elements. “Normal maintenance” includes those usual acts to prevent a decline, lapse, or cessation from a lawfully established condition. “Normal repair” means to restore a development to a state comparable to its original condition, including but not limited to its size, shape, configuration, location and external appearance, within a reasonable period after decay or partial destruction, except where repair causes substantial adverse effects to shoreline resource or environment. Replacement of a structure or development may be authorized as repair where such replacement is the common method of repair for the type of structure or development and the replacement structure or development is comparable to the original structure or development including but not limited to its size, shape, configuration, location and external appearance and the replacement does not cause substantial adverse effects to shoreline resources or environment;
    b. Construction of the normal protective bulkhead common to single family residences. A “normal protective” bulkhead includes those structural and nonstructural developments installed at or near, and parallel to, the ordinary high water mark for the sole purpose of protecting an existing single-family residence and appurtenant structures from loss or damage by erosion. A normal protective bulkhead is not exempt if constructed for the purpose of creating dry land. When a vertical or near vertical wall is being constructed or reconstructed, not more than one cubic yard of fill per one foot of wall may be used as backfill. When an existing bulkhead is being repaired by construction of a vertical wall fronting the existing wall, it shall be constructed no further waterward of the existing bulkhead than is necessary for construction of new footings. When a bulkhead has deteriorated such that an ordinary high water mark has been established by the presence and action of water landward of the bulkhead then the replacement bulkhead must be located at or near the actual ordinary high water mark. Beach nourishment and bioengineered erosion control projects may be considered a normal protective bulkhead when any structural elements are consistent with the above requirements and when the project has been approved by the Washington Department of Fish and Wildlife;

c. Emergency construction necessary to protect property from damage by the elements. An "emergency" is an unanticipated and imminent threat to public health, safety, or the environment which requires immediate action within a time too short to allow full compliance with this chapter. Emergency construction does not include development of new permanent protective structures where none previously existed. Where new protective structures are deemed by the administrator to be the appropriate means to address the emergency situation, upon abatement of the emergency situation the new structure shall be removed or any permit which would have been required, absent an emergency, pursuant to chapter 90.58 RCW, chapter 173-27 WAC, or this Master Program, obtained. All emergency construction shall be consistent with the policies of chapter 90.58 RCW and this Master Program. As a general matter, flooding or other seasonal events that can be anticipated and may occur, but that are not imminent, are not an emergency;
d. Construction and practices normal or necessary for farming, irrigation, and ranching activities, including agricultural service roads and utilities on shorelands, and the construction and maintenance of irrigation structures including but not limited to head gates, pumping facilities, and irrigation channels. A feedlot of any size, all processing plants, other activities of a commercial nature, alteration of the contour of the shorelands by leveling or filling other than that which results from normal cultivation, shall not be considered normal or necessary farming or ranching activities. A feedlot shall be an enclosure or facility used or capable of being used for feeding livestock hay, grain, silage, or other livestock feed, but shall not include land for growing crops or vegetation for livestock feeding and/or grazing, nor shall it include normal livestock wintering operations;
e. Construction or modification of navigational aids such as channel markers and anchor buoys;
f. Construction on shorelands by an owner, lessee, or contract purchaser of a single-family residence for his own use or for the use of his or her family, which residence does not exceed a height of thirty-five feet above average grade level and which meets all requirements of the City of Monroe, other than requirements imposed pursuant to this chapter. "Single-family residence" means a detached dwelling designed for and occupied by one family including those structures and developments within a contiguous ownership which are a normal appurtenance. An "appurtenance" is necessarily connected to the use and enjoyment of a single-family residence and is located landward of the ordinary high water mark and the perimeter of a wetland. On a statewide basis, normal appurtenances include a garage, deck, driveway, utilities, fences, installation of a septic tank and drainfield, and grading which does not exceed two hundred fifty cubic yards and which does not involve placement of fill in any wetland or waterward of the ordinary high water mark. Construction authorized under this exemption shall be located landward of the ordinary high water mark;
g. Construction of a dock, including a community dock, designed for pleasure craft only, for the private noncommercial use of the owner, lessee, or contract purchaser of single and multiple family residences. This exception applies the fair market value of the dock does not exceed ten thousand dollars, but if subsequent construction having a fair market value exceeding two thousand five hundred dollars occurs within five years of completion of the prior construction, the subsequent construction shall be considered a substantial development for the purpose of this chapter;

h. Operation, maintenance, or construction of canals, waterways, drains, reservoirs, or other facilities that now exist or are hereafter created or developed as a part of an irrigation system for the primary purpose of making use of system waters, including return flow and artificially stored ground water for the irrigation of lands;
i. The marking of property lines or corners on state owned lands, when such marking does not significantly interfere with normal public use of the surface of the water;
j. Operation and maintenance of any system of dikes, ditches, drains, or other facilities existing on September 8, 1975, which were created, developed, or utilized primarily as a part of an agricultural drainage or diking system;
k. Site exploration and investigation activities that are prerequisite to preparation of an application for development authorization under this chapter, if:
    i. The activity does not interfere with the normal public use of the surface waters; The activity will have no significant adverse impact on the environment including, but not limited to, fish, wildlife, fish or wildlife habitat, water quality, and aesthetic values;
    ii. The activity does not involve the installation of a structure, and upon completion of the activity the vegetation and land configuration of the site are restored to conditions existing before the activity;
    iii. A private entity seeking development authorization under this section first posts a performance bond or provides other evidence of financial responsibility to the local jurisdiction to ensure that the site is restored to preexisting conditions; and
    iv. The activity is not subject to the permit requirements of RCW 90.58.550;
l. The process of removing or controlling an aquatic noxious weed, as defined in RCW 17.26.020, through the use of an herbicide or other treatment methods applicable to weed control that are recommended by a final environmental impact statement published by the Department of Agriculture or the Department of Ecology jointly with other state agencies under chapter 43.21C RCW.
m. Watershed restoration projects as defined herein. The City shall review the projects for consistency with the Shoreline Master Program in an expeditious manner and shall issue its decision along with any conditions within forty-five days of receiving all materials necessary to review the request for exemption from the applicant. No fee may be charged for accepting and processing requests for exemption for watershed restoration projects as used in this section.
    i. "Watershed restoration project" means a public or private project authorized by the sponsor of a watershed restoration plan that implements the plan or a part of the plan and consists of one or more of the following activities:
        (A) A project that involves less than ten miles of stream reach, in which less than twenty-five cubic yards of sand, gravel, or soil is removed, imported, disturbed or discharged, and in which no existing vegetation is removed except as minimally necessary to facilitate additional plantings;
        (B) A project for the restoration of an eroded or unstable stream bank that employs the principles of bioengineering, including limited use of rock as a stabilization only at the toe of the bank, and with primary emphasis on using native vegetation to control the erosive forces of flowing water; or
        (C) A project primarily designed to improve fish and wildlife habitat, remove or reduce impediments to migration of fish, or enhance the fishery resource available for use by all of the citizens of the state, provided that any structure, other than a bridge or culvert or instream habitat enhancement structure

associated with the project, is less than two hundred square feet in floor area and is located above the ordinary high water mark of the stream.

ii. "Watershed restoration plan" means a plan, developed or sponsored by the Washington Department of Fish and Wildlife, the Department of Ecology, the Department of Natural Resources, the Department of Transportation, a federally recognized Indian tribe acting within and pursuant to its authority, a city, a county, or a conservation district that provides a general program and implementation measures or actions for the preservation, restoration, re-creation, or enhancement of the natural resources, character, and ecology of a stream, stream segment, drainage area, or watershed for which agency and public review has been conducted pursuant to chapter 43.21C RCW, the State Environmental Policy Act;

n. A public or private project that is designed to improve fish or wildlife habitat or fish passage, when all of the following apply:

i. The project has been approved in writing by the Department of Fish and Wildlife;

ii. The project has received Hydraulic Project Approval by the Department of Fish and Wildlife pursuant to chapter 77.55 RCW; and

iii. The local government has determined that the project is substantially consistent with the local shoreline master program. The local government shall make such determination in a timely manner and provide it by letter to the project proponent. Fish habitat enhancement projects that conform to the provisions of RCW 77.55.181 are determined to be consistent with local shoreline master programs, as follows:

(A) In order to receive the permit review and approval process created in this section, a fish habitat enhancement project must meet the following criteria:

(I) A fish habitat enhancement project must be a project to accomplish one or more of the following tasks:

- Elimination of human-made fish passage barriers, including culvert repair and replacement;
- Restoration of an eroded or unstable streambank employing the principle of bioengineering, including limited use of rock as a stabilization only at the toe of the bank, and with primary emphasis on using native vegetation to control the erosive forces of flowing water; or
- Placement of woody debris or other instream structures that benefit naturally reproducing fish stocks.

The Department of Fish and Wildlife shall develop size or scale threshold tests to determine if projects accomplishing any of these tasks should be evaluated under the process created in this section or under other project review and approval processes. A project proposal shall not be reviewed under the process created in this section if the Department of Fish and Wildlife determines that the scale of the project raises concerns regarding public health and safety; and

(II) A fish habitat enhancement project must be approved in one of the following ways:

- By the Department of Fish and Wildlife pursuant to chapter 77.95 or 77.100 RCW;
- By the sponsor of a watershed restoration plan as provided in chapter 89.08 RCW;

- By the Department of Ecology as a Department of Fish and Wildlife-sponsored fish habitat enhancement or restoration project;
- Through the review and approval process for the Jobs for the Environment program;
- Through the review and approval process for conservation district-sponsored projects, where the project complies with design standards established by the Conservation Commission through interagency agreement with the United States Fish and Wildlife Service and the Natural Resource Conservation Service;
- Through a formal grant program established by the legislature or the Department of Fish and Wildlife for fish habitat enhancement or restoration; and
- Through other formal review and approval processes established by the legislature.

(B) Fish habitat enhancement projects meeting the criteria of (n)(iii)(A) of this subsection are expected to result in beneficial impacts to the environment. Decisions pertaining to fish habitat enhancement projects meeting the criteria of (n)(iii)(A) of this subsection and being reviewed and approved according to the provisions of this section are not subject to the requirements of RCW 43.21C.030 (2)(c).

(C) (I) A hydraulic project approval permit is required for projects that meet the criteria of (n)(iii)(A) of this subsection and are being reviewed and approved under this section. An applicant shall use a Joint Aquatic Resource Permit Application form developed by the Office of Regulatory Assistance to apply for approval under this chapter. On the same day, the applicant shall provide copies of the completed application form to the Department of Fish and Wildlife and to each appropriate local government. The City shall accept the application as notice of the proposed project. The Department of Fish and Wildlife shall provide a fifteen-day comment period during which it will receive comments regarding environmental impacts. Within forty-five days, the Department of Fish and Wildlife shall either issue a permit, with or without conditions, deny approval, or make a determination that the review and approval process created by this section is not appropriate for the proposed project. The Department of Fish and Wildlife shall base this determination on identification during the comment period of adverse impacts that cannot be mitigated by the conditioning of a permit. If the Department of Fish and Wildlife determines that the review and approval process created by this section is not appropriate for the proposed project, the Department of Fish and Wildlife shall notify the applicant and the City of its determination. The applicant may reapply for approval of the project under other review and approval processes.

(II) Any person aggrieved by the approval, denial, conditioning, or modification of a permit under this section may formally appeal the decision to the hydraulic appeals board pursuant to the provisions of this chapter.

(D) The City may not require permits or charge fees for fish habitat enhancement projects that meet the criteria of (n)(iii)(A) of this subsection and that are reviewed and approved according to the provisions of this section.

49. "Substantially degrade" means to cause damage or harm to an area's ecological functions. An action is considered to substantially degrade the environment if:

    a. The damaged ecological function or functions significantly affect other related functions or the viability of the larger ecosystem; or

    b. The degrading action may cause damage or harm to shoreline ecological functions under foreseeable conditions; or

    c. Scientific evidence indicates that the action may contribute to damage or harm to ecological functions as part of cumulative impacts.

50. "Water-dependent use" means a use or portion of a use which cannot exist in a location that is not adjacent to the water but is dependent on the water by reason of the intrinsic nature of its operations. Examples of water-dependent uses include fishing, barge loading facilities, ship building and dry docking, marinas, aquaculture, float plane facilities, surface water intake, and sewer outfalls.

51. "Water-enjoyment use" means a recreational use or other use that facilitates public access to the shoreline as a primary characteristic of the use; or a use that provides for recreational use or aesthetic enjoyment of the shoreline for a substantial number of people as a general characteristic of the use and which through location, design, and operation ensures the public's ability to enjoy the physical and aesthetic qualities of the shoreline. In order to qualify as a water-enjoyment use, the use must be open to the general public and the shoreline-oriented space within the project must be devoted to the specific aspects of the use that fosters shoreline enjoyment. Primary water-enjoyment uses may include, but are not limited to:

    - Parks with activities enhanced by proximity to the water;
    - Piers and other improvements that facilitate public access to shorelines of the state;
    - Restaurants with water views and public access improvements;
    - Museums with an orientation to shoreline topics;
    - Aquariums;
    - Scientific/ecological reserves;
    - Resorts with uses open to the public and public access to the shoreline; and any combination of those uses listed above.

52. "Water-oriented use" means a use that is water-dependent, water-related, or water-enjoyment, or a combination of such uses.

53. "Water quality" means the physical characteristics of water within shoreline jurisdiction, including water quantity, hydrological, physical, chemical, aesthetic, recreation-related, and biological characteristics. Where used in this master program, the term "water

quantity" refers only to development and uses regulated under this master program and affecting water quantity, such as impermeable surfaces and storm water handling practices. Water quantity, for purposes of this master program, does not mean the withdrawal of ground water or diversion of surface water pursuant to RCW 90.03.250 through 90.03.340.

54. "Water-related use" means a use or portion of a use which is not intrinsically dependent on a waterfront location but whose economic viability is dependent upon a waterfront location because:

    a. The use has a functional requirement for a waterfront location such as the arrival or shipment of materials by water or the need for large quantities of water; or

    b. The use provides a necessary service supportive of the water-dependent uses and the proximity of the use to its customers makes its services less expensive and/or more convenient.

    Water-related uses include manufacturing of ship parts large enough that transportation becomes a significant factor in the product's cost, professional services serving primarily water-dependent uses, and storage of water-transported foods. Other examples of water-related uses include the warehousing of goods transported by water, seafood processing plants, hydroelectric generating plants, gravel storage when transported by barge, oil refineries where transport is by tanker, and upland log storage for water-borne transportation.

Appendix A: Critical Areas Regulations

20.05.010 AUTHORITY

This ordinance is adopted under the authority of the Revised Code of Washington (RCW) Chapter 36.70A (the Growth Management Act), other federal and state environmental regulations, including but not limited to the State Environmental Policy Act, and the State and Federal Endangered Species Acts.

20.05.020 PURPOSE

The purpose of this chapter is to:

1. Protect the public health, safety and welfare by preventing adverse impacts of development;
2. Preserve and protect critical areas as identified by the Washington State Growth Management Act by regulating development within and adjacent to them;
3. Mitigate unavoidable impacts to critical areas by regulating alterations in and adjacent to critical areas;
4. Prevent adverse cumulative impacts to wetlands, streams, shoreline environments, and fish and wildlife habitat;
5. Protect the public and public resources and facilities from injury, loss of life, property damage or financial loss due to flooding, erosion, landslides, soils subsidence or steep slope failure; and
6. Implement the goals, policies, guidelines and requirements of the City of Monroe Comprehensive Plan and the Washington State Growth Management Act.

20.05.030 DEFINITIONS

Active fault – A fault that is considered likely to undergo renewed movement within a period of concern to humans. Faults are commonly considered to be active if the fault has moved one or more times in the last 10,000 years.

Adjacent – Immediately adjoining (in contact with the boundary of the influence area) or within a distance less than that needed to separate activities from critical areas to ensure protection of the functions and values of the critical areas. Adjacent shall mean any activity or development located:

1. On site immediately adjoining a critical area; or
2. A distance equal to or less than the required critical area buffer width and building setback.

Alteration – Any human-induced change in an existing condition of a critical area or its buffer. Alterations include, but are not limited to grading, filling, dredging, channelizing, clearing (vegetation), applying pesticides, discharging waste, construction, compaction, excavation, modifying for storm water management, relocating, or other activities that change the existing landform, vegetation, hydrology, wildlife or wildlife habitat value, of critical areas.

Anadromous fish – Fish that spawn in fresh water and mature in the marine environment.

Applicant – A person who files an application for a permit under this chapter and who is either the owner of the land on which that proposed activity would be located, a contract purchaser, or the authorized agent of such a person.

Aquifer recharge area – An area that, due to the presence of certain soils, geology, and surface water, acts to recharge ground water by percolation.

Base Flood – A flood having a one percent chance of being equaled or exceeded in any given year. Also referred to as the "100-year flood."

Base Flood Elevation – The water surface elevation of the base flood. It shall be referenced to the National Geodetic Vertical Datum of 1929 (NGVD).

Best Available Science – Current scientific information used in the process to designate, protect, or restore critical areas, that is derived from a valid scientific process as defined by Washington Administrative Code (WAC) 365-195-900 through 925.

Best Management Practices – Conservation practices or systems of practice and management measures that:

1. Control soil loss and reduce water quality degradation caused by high concentrations of nutrients, animal waste, toxics, and sediment;
2. Minimize adverse impacts to surface water and ground water flow, circulation patterns, and the chemical, physical, and biological characteristics of wetlands;
3. Protect trees and vegetation designated to be retained during and following site construction; and
4. Provides standards for proper use of chemical herbicides within critical areas.

Buffer – The zone contiguous with a critical area that is required for the continued maintenance, function, and structural stability of the critical area.

Building Setback Line (BSBL) – A line beyond which the foundation of a building shall not extend.

Channel Migration Zone (CMZ) – The lateral extent of likely movement along a stream or river during the next one hundred years as determined by evidence of active stream channel migration movement over the past one hundred years.

City – The City of Monroe.

Clearing – The destruction and removal of vegetation by any means and includes grubbing vegetation.

Compensation project – Actions specifically designed to replace project-induced critical area and buffer losses. Compensation project design elements may include, but are not limited to, land acquisition, planning, construction plans, monitoring, and contingency actions.

Compensatory mitigation – Types of mitigation used to replace project-induced critical area and buffer losses or impacts. Compensatory mitigation includes, but is not limited to, the following:

1. Restoration – Actions performed to reestablish functional characteristics that are lost or degraded due to unauthorized alteration, past management activities, or catastrophic events within an area that no longer meets the definition of a critical area.
2. Creation – Actions performed to intentionally establish a critical area at a site where it did not formerly exist.
3. Enhancement – Actions performed to improve the condition of an existing critical area so that the functions it provides are of a higher quality.

Critical Aquifer Recharge Area – Areas designated by WAC 365-190-080(2) that are determined to have critical recharging effect on aquifers used for potable water as defined by WAC 365-190-030(2).

Critical Areas – Any of the following areas or ecosystems: critical aquifer recharge areas, fish and wildlife habitat conservation areas, frequently flooded areas, geologically hazardous areas, and wetlands as defined by the Growth Management Act (RCW 36.70A), and this chapter.

Critical Facility – A facility for which even a slight chance of flooding, inundation, or impact from a hazard event might be too great. Critical facilities include, but are not limited to, schools, nursing homes, hospitals, police, fire and emergency installations, and installations that produce, use or store hazardous materials or hazardous waste.

Developable Area – Areas outside of any critical areas and its required setback or buffer.

Development Permit – Any permit issued by the City of Monroe, or other authorized agency, for construction, land use, or the alteration of land.

Director – Refers to the Community Development Director for the City of Monroe.

Engineering Geologist – A practicing professional engineering geologist licensed with the State of Washington.

Erosion – The process by which soil particles are mobilized and transported by natural agents such as wind, rain, frost action, or stream flow.

Erosion Hazard Area – Those areas of Monroe containing soils, which according to the USDA Soil Conservation Service, Snohomish County Soil Survey dated 1983, may experience severe to very severe erosion hazard.

Fish and Wildlife Habitat Conservation Areas – Areas necessary for maintaining species in suitable habitats within their natural geographic distribution so that isolated subpopulations are not created as designated by WAC 365-190-080(5). These areas include:

1. Areas with which state or federally designated endangered, threatened, and sensitive species have a primary association;
2. Habitats of local importance, including, but not limited to, areas designated as priority habitat by the Department of Fish and Wildlife;
3. Naturally occurring ponds under twenty acres and their submerged aquatic beds that provide fish and wildlife habitat;
4. Waters of the state, including lakes, rivers, ponds, streams, inland waters, underground waters, salt waters and all other surface water and watercourses within the jurisdiction of the state of Washington;
5. Lakes, ponds, streams, and rivers planted with game fish by a governmental or tribal entity;
6. State natural area preserves and natural resources conservation areas; and
7. Land essential for preserving connections between habitat blocks and open spaces.

Flood or flooding – A general and temporary condition of partial or complete inundation of normally dry land areas from the overflow of inland waters and/or the unusual and rapid accumulation of runoff or surface waters from any source.

Floodplain – The total area subject to inundation by the base flood including the flood fringe and floodway.

Flood Fringe – That portion of the floodplain outside of the floodway which is covered by floodwaters during the base flood; it is generally associated with standing water rather than rapidly flowing water.

Floodway – The channel of a river or other watercourse and the adjacent land area that must be reserved in order to discharge the base flood without cumulatively increasing the surface water elevation more than one (1) foot.

Floodway Dependent Structure – Structures that are floodway dependent include, but are not limited to, dams, levees and pump stations, stream bank stabilization, boat launches and related recreational structures, bridge piers and abutments, and fisheries enhancement or stream restoration projects.

Flood Insurance Rate Map (FIRM) – The official map on which the Federal Insurance Administration has delineated many areas of flood hazard, floodways, and the risk premium zones.

Flood Insurance Study – The official report provided by the Federal Insurance Administration that includes the flood profiles and the FIRM.

Flood Proofing – Adaptations that ensure a structure is substantially impermeable to the passage of water below the flood protection elevation and resists hydrostatic and hydrodynamic loads and effects of buoyancy.

Flood Protection Elevation – An elevation that is one (1) foot above the base flood elevation.

Formation – An assemblage of earth materials grouped together into a unit that is convenient for description or mapping.

Formation, confining – The relatively impermeable formation immediately overlaying a confined aquifer.

Frequently Flooded Areas – Lands in the floodplain subject to a one percent (1%) or greater chance of flooding in any given year and those lands that provide important flood storage, conveyance, and attenuation functions, as determined by the Director, in accordance with WAC 365-190-080(3).

Functions and Values – The beneficial roles served by critical areas, including, but not limited to, water quality protection and enhancement, fish and wildlife habitat, food chain support, flood storage, conveyance and attenuation, ground water recharge and discharge, erosion control, and recreation.

Geologist – A practicing professional geologist licensed with the state of Washington.

Geologically Hazardous Areas – Areas that may not be suited to development consistent with public health, safety or environmental standards, because of their susceptibility to erosion, sliding, earthquake, or other geological events as designated by WAC 365-190-080(4). Types of geologically hazardous areas include erosion, landslide, seismic, mine, and volcanic hazards.

Geotechnical Engineer – A practicing professional geotechnical/civil engineer licensed with the state of Washington.

Grading – Any excavation, clearing, filling, leveling, or contouring of the ground surface by human or mechanical means.

Hazard areas – Areas designated as frequently flooded or geologically hazardous areas due to potential for erosion, landslide, seismic activity, mine collapse, or other geologically hazardous conditions.

Heavy Equipment – Such construction machinery as backhoes, treaded tractor, dump trucks, and front-end loaders.

Hydraulic Project Approval (HPA) – A permit issued by the State Department of Fish and Wildlife for modification to waters of the state in accordance with RCW Chapter 75.20.

Hydrologist – A practicing professional hydrologist licensed with the state of Washington.

Impervious surface – A hard surface area that either prevents or retards the entry of water into the soil mantle as under natural conditions prior to development or that causes water to run off the surface in greater quantities or at an increased rate of flow from the present under natural conditions prior to development. Common impervious surfaces include, but are not limited to, roof tops, walkways, patios, driveways, parking lots, storage areas, concrete or asphalt paving, gravel roads, packed earthen materials, and oiled macadam or other surfaces which similarly impede the natural infiltration of stormwater.

Isolated Wetland – Those wetlands that are outside of and not contiguous to any 100-year floodplain, lake, river, or stream and have no contiguous hydric soil or hydrophytic vegetation between the wetland and any surface water.

Joint Aquatic Resources Permit Application (JARPA) – A single application form that may be used to apply for hydraulic project approvals, shoreline management projects, approval of exceedance of water quality standards, water quality certifications, Coast Guard bridge permits, Department of Natural Resources use authorization, and Army Corps of Engineer permits.

Lake – An area permanently inundated by water in excess of two meters deep and greater than twenty (20) acres in size measured at the ordinary high water mark.

Landslide – Episodic down slope movement of a mass of soil or rock that includes, but is not limited to, rock falls, slumps, mudflows, and earth flows.

Landslide Hazard Areas – Areas that are potentially subject to risk of mass movement due to a combination of geologic landslides resulting from a combination of geologic, topographic, and hydrologic factors.

Lowest Floor – The lowest enclosed area (including basement) of a structure. An area used solely for parking of vehicles, building access, or storage, in an area other than a basement area, is not considered a building's lowest point, provided that the enclosed area meets all of the structural requirements of the flood hazard development standards.

Minor Utility Project - The placement of a utility pole, street sign, anchor, vault, or other small component of a utility facility, where the disturbance of an area is less than seventy-five (75) square feet.

Mitigation – Avoiding, minimizing, or compensating for adverse impacts on critical areas. Mitigation shall use any of the actions that are listed below in descending order of preference:

1. Avoiding the impact altogether by not taking a certain action or parts of an action; or
2. Minimizing impacts by limiting the degree or magnitude of the action and its implementation, by using appropriate technology, or by taking affirmative steps to avoid or reduce impacts; or
3. Rectifying the impact by repairing, rehabilitating, or restoring the affected critical areas; or

4. Reducing or eliminating the impact over time by preservation or maintenance operations during the life of the development proposal; or
5. Compensating for the impact by replacing, enhancing, or providing substitute critical areas; and
6. Monitoring the impacts and compensation project, and taking appropriate corrective measures. Mitigation for individual actions may include a combination of the above.

Monitoring – The collection of data by various methods for the purpose of understanding natural systems and features, evaluating the impact of development proposals on such systems, and assessing the performance of mitigation measures imposed as conditions of development.

Native Vegetation – Plant species that are indigenous to the area in question.

Native Growth Protection Easement (NGPE) – An easement granted to the City of Monroe for the protection of native vegetation within a critical area or its associated buffer. The NGPE shall be recorded on the appropriate documents of title and filed with the Snohomish County Recordings Division.

Ordinary High Water Mark – The mark that will be found by examining the bed and banks of a stream and ascertaining where the presence and action of waters are so common and usual, and so long maintained in all ordinary years, that the soil a character distinct from that of the abutting upland, in respect to vegetation. In any area where the ordinary high water mark cannot be found, the line of mean high water shall substitute. In braided channels and alluvial fans, the ordinary high water mark or substitute shall be measured so as to include the entire stream feature.

Potable Water – Water that is safe and palatable for human use.

Practical Alternative – An alternative that is available and capable of being carried out after taking into consideration cost, existing technology, and logistics in light of overall project purposes, and having less impacts to critical areas.

Project Area – All areas within fifty (50) feet of the area proposed to be disturbed, altered, or used by the proposed activity or the construction of any proposed structures.

Priority Habitat – Habitat types or elements with unique or significant value to one or more species as classified by the state Department of Fish and Wildlife.

Qualified Professional – A person with experience and training in the pertinent scientific discipline, and who is a qualified expert with expertise appropriate for the relevant critical area subject in accordance with WAC 365-195-905(4). A qualified professional must have obtained a B.S. or B.A. or equivalent degree in biology, engineering, environmental sciences, fisheries, geomorphology or related field, and two years of related work experience.

1. A qualified professional for habitats or wetlands must have a degree in biology or a related environmental science and professional experience related to the subject.
2. A qualified professional for a geological hazard must be a professional engineer or geologist, licensed in the state of Washington.

3. A qualified professional for critical aquifer recharge areas must be a hydrologist, geologist, engineer, or other scientist with experience in preparing hydrological assessments.

Riparian Habitat – Areas adjacent to aquatic systems with flowing water that contains elements of both aquatic and terrestrial ecosystems that mutually influence each other.

Salmonid – A member of the fish family Salmonidae. In Snohomish County, chinook, coho, chum, sockeye, and pink salmon; cutthroat, brook, brown, rainbow, and steelhead trout; kokanee; and native char (bull trout and Dolly Varden).

Section 404 Permit – A permit issued by the Army Corp of Engineers for the placement of dredge or fill material waterward of the ordinary high water mark or clearing in waters of the United States, including wetlands, in accordance with 33 United State Code (USC) Section 1344.

Seismic Hazard Areas – Area that are subject to severe risk of damage as a result of earthquake-induced ground shaking, slope failure, settlement, or soil liquefaction.

Species, Endangered – A fish or wildlife species that is threatened with extinction throughout all or a significant portion of its range and is listed by the state or federal government as an endangered species.

Species, Threatened – Any fish or wildlife species that is likely to become an endangered species within the foreseeable future throughout a significant portion its range without cooperative management or removal of threats, and is listed by the state or federal government as a threatened species.

Steep Slopes – Those slopes forty percent (40%) or steeper within a vertical elevation change of at least ten (10) feet. A slope is defined by establishing its toe and top and is measured by averaging the inclination over at least ten (10) feet of vertical relief. For the purpose of this definition:

1. The toe of slope is a distinct topographical break in slope that separates slopes inclined at less than forty percent (40%) from slopes forty percent (40%) or steeper. When no distinct break exists, the toe of slope of a steep slope is the lowermost limit of the area where the ground surface drops ten (10) feet or more vertically within a horizontal distance of twenty-five (25) feet; and
2. The top of slope is a distinct, topographical break in slope that separates slopes inclined at less than forty percent (40%) from slopes forty percent (40%) or steeper. When no distinct break exists, the top of slope is the upper most limits of the area where the ground surface drops ten (10) feet or more vertically within a horizontal distance of twenty-five (25) feet.

Stream – Water contained within a channel, either perennial or intermittent, and classified according to WAC 222-16-030 or WAC 222-16-031 and as listed under “water typing system.” Streams also include natural watercourses modified by man. Streams do not include irrigation ditches, waste ways, drains, outfalls, operational spillways, channels, stormwater run-off facilities, or other wholly artificial watercourses, except those that directly result from the modification to a natural watercourse.

Topping – The severing of main trunks or stems of vegetation at any place above twenty-five percent (25%) of the vegetation height.

Unavoidable – Adverse impacts that remain after all appropriate and practicable avoidance and minimization have been achieved.

Understory – The vegetation layer of a forest that includes shrubs, herbs, grasses, and grass-like plants, but excludes trees.

Utility – A service and/or facility that produces, transmits, carries, stores, processes, or disposes of electrical power, gas, potable water, stormwater, communications (including, but not limited to, telephone and cable), sewage, oil and the like.

Vegetation – Any and all-organic plant life growing below, at, and above the soil surface.

Vegetation Alteration – Any clearing, grading, cutting, topping, limbing, or pruning of vegetation.

Water Resources Inventory Area (WRIA) – One of sixty-two (62) watersheds in the state of Washington, each composed of the drainage areas of a stream or streams, as established in Chapter 173-500 WAC as it existed on January 1, 1997. The City of Monroe is within WRIA 7 (Snohomish Basin).

Water Typing System – Streams are classified according to WAC 222-16-031:

1. Type 1 Stream – All streams, within their ordinary high water mark, as inventoried as "shorelines of the state" under Chapter 90.58 RCW and the rules adopted by Chapter 90.58 RCW, but not including those waters' associated wetlands.
2. Type 2 Stream – Segments of natural streams that are not classified as Type 1 Streams and have a high fish, wildlife, or human use. These are segments of natural streams and periodically inundated areas of their associated wetlands that:
    a. Are diverted for domestic use by more than one hundred (100) residential or camping units or by a public accommodation facility licensed to serve more than ten (10) persons, when such diversion is determined by the state Department of Natural Resources 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 fifty percent (50%), or whichever is less;
    b. Are diverted for use by federal, state, tribal or private fish hatcheries. Such waters shall be considered Type 2 Stream upstream from the point of diversion for 1,500 feet, including tributaries if highly significant for protection of downstream water quality.
    c. Are within a federal, state, local, or private campground having more than thirty (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 one hundred (100) feet of a camping unit.
    d. Are used for fish spawning, rearing or migration. Streams having the following characteristics are presumed to have highly significant fish populations:
        i. Stream segments having a defined channel twenty (20) feet or greater within the bankfull width and having a gradient of less than four percent (4%).

ii. Lakes, ponds, or impoundments having a surface area of one (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 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 five percent (5%) gradient.

3. Type 3 Streams – Segments of natural streams that are not classified as Type 1 or 2 Streams and have a moderate to slight fish, wildlife, and human use. These are segments of natural streams and periodically inundated areas of their associated wetlands that:
   a. Are diverted for domestic use by more than ten (10) residential or camping units or by a public accommodation facility licensed to serve more than ten (10) persons, where such diversion is determined by the state Department of Natural Resources to be a valid appropriation of water and the only practical water source for such use. 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 fifty percent (50%), whichever is less;
   b. Are used by fish for spawning, rearing, or migration. The requirements for determining fish use are described in the State Forest Practices Board Manual, Section 13. If fish use has not been determined:
      i. Stream segments having a defined channel of two (2) feet or greater within the bankfull width in Western Washington and having a gradient of sixteen percent (16%) or less;
      ii. Stream segments having a defined channel of two (2) feet or greater within the bankfull width, and having a gradient greater than sixteen percent (16%) and less than or equal to twenty percent (20%), and having an area greater than fifty (50) acres in contributing basin size based on hydrographic boundaries;
      iii. Ponds or impoundments having a surface area greater than one half (0.5) acre at seasonal low water and having an outlet to a fish stream;
      iv. Ponds or impoundments having a surface area greater than one half (0.5) acre at seasonal low water.
4. Type 4 Streams – All segments of natural streams 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 Streams 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, non-technical observations (see State Forest Practices Board Manual, Section 23), the Type 4 Streams begin at a point along the channel where the contributing basin area is at least thirteen (13) acres.
5. Type 5 Streams – All segments of natural streams within the bankfull width of defined channels that are not Type 1, 2, 3, or 4 Streams. 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 Streams. Type 5 Streams must be physically connected by an above-ground channel system to Type 1, 2, 3, or 4 Streams.

Wetland – Those areas that are inundated or saturated by ground or surface water at a frequency and duration sufficient to support, and that under normal circumstances do support, a prevalence of vegetation adapted for life in saturated soil conditions. Wetlands generally include swamps, marshes, bogs, and similar areas.

Wetlands do not include those artificial wetlands intentionally created from non-wetland sites, including, but not limited to, swales, canals, detention facilities, wastewater treatment facilities, farm ponds, and landscape amenities, or those wetlands created after July 1, 1990, that were unintentionally created as a result of the construction of a road, street, or highway.

Wetlands may include those artificial wetlands intentionally created from non-wetland areas to mitigate conversion of wetlands.

Wetland Classifications – There are three general types of wetlands as classified by the U.S. Fish and Wildlife Service (Cowardin, et al. 1979):

1. Emergent – a wetland with at least thirty percent (30%) of the surface area covered by erect, rooted, herbaceous vegetation extending above the water surface as the uppermost vegetation strata;
2. Forested – a wetland with at least twenty percent (20%) of the surface area covered by woody vegetation greater than twenty (20) feet in height; and
3. Scrub-shrub – A wetland with at least thirty percent (30%) of its surface area covered by woody vegetation less than twenty (20) feet as the uppermost strata.

Wetland Edge – Delineation of the wetland edge shall be based on the *Washington State Wetland Identification and Delineation Manual*, Department of Ecology, 1997, and Publication 96-94 or as revised.

Wetlands Rating System – Wetlands shall be rated according to the *Washington State Wetland Rating System for Western Washington*, Department of Ecology, 1997, Publication 3-74 or as revised.

1. Category I – Category I wetlands are those that meet the following criteria:
    a. Documented habitat for federal or state listed endangered or threatened fish, animal or plant species; or
    b. High quality native wetland communities, including documented category I or II quality Natural Heritage wetland sites and sites which qualify as category I or II quality Natural Heritage wetlands; or
    c. High quality, regionally rare wetland communities with irreplaceable ecological functions, including sphagnum bogs and fens, estuarine wetlands, or mature forested swamps; or
    d. Wetlands of exceptional local significance.
2. Category II – Category II wetlands are those not defined as Category I wetlands and that meet the following criteria:
    a. Documented habitats for state listed sensitive plant, fish, or animal species; or
    b. Wetlands that contain plant, fish, or animal species listed as a priority species by the state Department of Fish and Wildlife; or
    c. Wetland types with significant functions that may not be adequately replicated through creation or restoration; or

d. Wetlands possessing significant habitat value based on a score of twenty-two (22) or more points in the habitat rating system; or
e. Documented wetlands of local significance.

3. Category III – Category III wetlands are those that do not satisfy Category I, II, or IV criteria, and with a habitat rating of twenty-one (21) points or less.
4. Category IV – Category IV wetlands are those that meet the following criteria:
   a. Hydrologically isolated wetlands that are less than or equal to one (1) acre in size, have only one wetland class, and are dominated (greater than eighty percent (80%) areal cover) by a single non-native plant species (monotypic vegetation); or
   b. Hydrologically isolated wetlands that are less than two (2) acres in size, and have only one wetland class and greater than ninety percent (90%) areal cover of non-native plant species.

20.05.040 MAPS AND INVENTORIES

The City has prepared a series of maps, which approximate boundaries for the following critical areas within the City limits: geologically hazardous areas, wetlands, floodplains and floodways, shorelines, creeks, streams, and natural drainage courses. These maps provide only approximate boundaries of known features and are not adequate substitutes for more detailed maps and/or studies that could identify alternative locations of known features or additional critical area features not illustrated on the map. Copies of the maps are available for viewing at the Monroe City Hall.

The Flood Insurance Rate Maps (FIRM) are available for review at Monroe City Hall, please contact the City Engineer.

20.05.050 APPLICABILITY

1. The provisions of this Chapter shall apply to all lands, all land uses and development activity, and all structures and facilities in the City, whether or not a permit or authorization is required, and shall apply to every person, firm, partnership, corporation, group, governmental agency, or other entity that owns or leases land within the City of Monroe. No person, company, agency, or applicant shall alter a critical area or buffer except as consistent with the purpose and requirements of this Chapter.
2. The City of Monroe shall not approve any development proposal or otherwise issue any authorization to alter the condition of any land, water, or vegetation, or to construct or alter any structure or improvement in, over, or on a critical area or associated buffer, without first assuring compliance with the requirements of this Chapter. Development proposals include proposals that require any of the following, or any subsequently adopted permits or required approvals not expressly exempted from these regulations:
   a. Building Permit
   b. Grading Permit
   c. Shoreline Substantial Development Permit
   d. Shoreline Conditional Use Permit
   e. Shoreline Variance
   f. Right-of-Way Disturbance Permit
   g. Conditional Use Permit
   h. Variance Permit

i. Unclassified Use Permit
j. Planned Residential Development
k. Subdivision
l. Short Subdivision
m. Binding Site Plan
n. Accessory Dwelling Unit

3. Approval of a permit or development proposal pursuant to the provisions of this Chapter does not discharge the obligation of the applicant to comply with the provisions of this Chapter.

20.05.060 CRITICAL AREAS STUDIES

A. STUDIES REQUIRED

When sufficient information to evaluate a proposal is not available, the Director or his designee shall notify the applicant that a critical areas report is required. The City may hire an independent qualified professional to verify that a critical areas report is necessary and may be used to review the subsequent report.

Critical area reports shall be written by a qualified professional, as defined in the definitions section of this Chapter. A critical areas report shall include a site analysis, a discussion of potential impacts, and specific mitigation measures designed to mitigate potential unavoidable impacts. A monitoring program may be required to evaluate the effectiveness of mitigating measures. These studies may be part of an expanded environmental checklist or included in an environmental impact statement.

B. TIMING AND USE OF STUDIES

When an applicant submits an application for any development proposal, it shall indicate whether any critical areas or buffers are located on or adjacent to the site. If a critical area report is required, the City may retain consultants, at the applicant's expense, to assist in review of studies that are outside the range of staff expertise. The presence of critical areas may require additional time for review.

C. GENERAL CRITICAL AREAS REPORT REQUIREMENTS

A critical areas report shall have three components: a) a site analysis, b) an impact analysis, and c) proposed mitigation measures. More or less detail may be required for each component depending on the size of the project, severity, and potential impacts. The Director may waive the requirement of any component when adequate information is otherwise available.

All studies shall contain the following information unless it is already available in the permit application.

1. Map of the project area at a 1:20 or larger scale including:
   a. Reference streets and property lines.
   b. Existing and proposed easements, right-of-ways, and structures.
   c. Contour intervals, as determined by the Director.
   d. Hydrology: show surface water features both on and adjacent to the site; show any water movement into, through, and off the project area; show stream and wetlands classifications, show seeps, springs, and saturated soil zones; label wetlands not found on the City inventory maps as un-inventoried.

e. Location of buffer and building setback lines (if required or proposed).

2. Written report detailing:
   a. How, when, and by whom the report was performed (including methodology and techniques);
   b. Weather conditions during and prior to any field studies if relevant to conclusions and recommendations;
   c. Description of the project site and its existing condition;
   d. The total acreage of the site in critical area(s) and associated buffers;
   e. The proposed action and potential environmental impact of the proposed project to the critical area(s);
   f. The mitigation measures proposed to avoid or lessen the project impacts (during construction and permanently). When alteration to the critical area or its buffer is proposed, include a mitigation plan as specified by this Chapter.

D. ADDITIONAL WETLAND REPORT REQUIREMENTS:

In addition, for wetlands, reports shall include the following:

1. On the map:
   a. The edge of the wetland as flagged and surveyed in the field using the *Washington State Wetland Identification and Delineation Manual*, as required by RCW 36.70A.157;
   b. The edge of the 100-year floodplain, if appropriate;
   c. The location of any existing or proposed utility easements, right-of-ways, and trail corridors;
   d. The location of any proposed wetland area(s) to be created through mitigation measures; and
   e. The location of any proposed wetland alteration or fill.
2. In the report:
   a. Description of the wetland by classification and general condition of wetland;
   b. Description of vegetation species and community types present in the wetland and surrounding buffer;
   c. Description of soil types within the wetland and the surrounding buffer using the USDA Soil Conservation Service soil classification system;
   d. Description of hydrologic regime and findings;
   e. Description of habitat features present and determination of actual use of the wetland by any endangered, threatened, rare, sensitive, or unique species of plants or wildlife as listed by the federal government or state of Washington;
   f. Description of existing wetland and buffer functions and values;
   g. Description of any proposed alteration to the wetland or its buffer including, but not limited to, filling, dredging, modification for storm water detention, clearing, grading, restoring, enhancing, grazing or other physical activities that change the existing vegetation, hydrology, soils or habitat;
   h. If applicable, description of potential impacts to wetland functions and values and description of any proposed mitigation measures; and
   i. Description of local, state, and federal regulations and permit requirements.

E. ADDITIONAL STREAM REPORT REQUIREMENTS:

In addition, for streams (including drainage ditches), reports shall include the following information:

1. On the map:
    a. The location of the ordinary high water mark;
    b. The toe of any slope twenty-five percent (25%) or greater within twenty-five (25) feet of the ordinary high water mark;
    c. The location of any proposed or existing stream crossing, utility easements, right-of-ways and trails; and
    d. The edge of the existing 100-year floodplain and, if applicable, the edge of the floodway.
2. In the report:
    a. Characterization of riparian (streamside) vegetation species, composition, and habitat function;
    b. Description of the soil types adjacent to and underlying the stream, using the Soil Conservation Service soil classification system;
    c. Determination of the presence or absence of fish, and reference sources; and
    d. When stream alteration is proposed, include stream width and flow, stability of the channel, type of substratum, discussions of infiltration capacity and biofiltration as compared to the stream prior to alteration, presence of hydrologically linked wetlands, analysis of fish and wildlife habitat, and proposed floodplain limits.

F. ADDITIONAL FLOOD HAZARD REPORT REQUIREMENTS:

In addition, for areas in flood hazards, reports shall include the following information:

1. On the Map:
    a. The location of all floodplains in the development;
    b. The location of the floodway where it has been delineated on the most recent Flood Insurance Study map (FIRM);
    c. Where basin plans have been completed and adopted, the location of the floodplain and floodways shall be based upon the hydrologic and hydraulic analysis;
    d. Identification of all proposed structures and grading within the floodplain.
2. In the Report:
    a. Identify how the boundaries of the floodways and floodplain were determined;
    b. Record the elevation of National Geodetic Vertical Datum (NGVD) of the lowest floor of all new or substantially improved structures proposed in the existing floodplain.

G. ADDITIONAL GEOLOGICALLY HAZARDOUS AREA REPORT REQUIREMENTS:

For geologically hazardous areas, reports shall include the following information:

1. On the Map:
    a. All geologically hazardous areas within or adjacent to the project area or that have potential to be affected by the proposal;
    b. The top and toe of slope (Note: these should be located and flagged in the field subject to City staff review);
    c. The location of any existing or proposed trails or utility corridors; and
    d. All drainage plans for discharge of stormwater runoff from developed areas.
2. In the Report:
    a. A geological description of the site;

b. A discussion of any evidence of existing instability, significant erosion or seepage on the slope;
c. A discussion of the depth of weathered or loosened soil on the site and the nature of the weathered and underlying basement soils;
d. An estimate of load capacity, including surface and ground water conditions, public and private sewage disposal system, fill and excavations, and all structural development;
e. Recommendations for building limitations, structural foundations, and an estimate of foundation settlement;
f. A complete discussion of the potential impacts of seismic activity on the site;
g. Recommendations for management of stormwater for any development above the top of slope;
h. A description of the nature and extent of any colluvium or slope debris near the toe of slope in the vicinity of any proposed development; and
i. Recommendations for appropriate building setbacks, grading restrictions, and vegetation management and erosion control for any proposed development in the vicinity of the geologically hazardous areas.

H. ADDITIONAL FISH AND WILDLIFE HABITAT CONSERVATION HABITAT REPORT REQUIREMENTS:

1. In the Report: An assessment of habitats including the following site and proposal related information:
   a. A detailed description of vegetation on and adjacent to the project area;
   b. Identification of any species of local importance; priority species; or endangered, threatened, sensitive or candidate species that have a primary association with habitat on or adjacent to the project area, and assessment of potential project impacts to the use of the site by the species;
   c. A discussion of any federal, state, or local species management recommendations, including the state Department of Fish and Wildlife habitat management recommendations, that have been developed for species or habitat located on or adjacent to the project area;
   d. A detailed discussion of the potential impacts on habitat by the project, including potential impacts to water quality;
   e. A discussion of measures, including avoidance, minimization, and lastly mitigation, proposed to preserve existing habitats and restore any habitat that was degraded prior to the current proposed land use activity and to be conducted in accordance with the mitigation sequencing; and
   f. A discussion of ongoing management practices that will protect habitat after the project site has been developed, including proposed monitoring and maintenance programs.

20.05.070 PROTECTION AND MITIGATION MEASURES

The City of Monroe will use the following methods and mechanisms to accomplish the purposes of the Critical Areas Regulations. This section shall be applied to all approved development applications and alterations when action is taken to implement the proposed action.

A. NATIVE GROWTH PROTECTION EASEMENTS

A Native Growth Protection Easement (NGPE) is an easement granted to the City for the protection of a critical area and/or its associated buffer. NGPEs shall be required as specified in these rules and shall be recorded on plats, short plats and final development permits and all documents of title and with the county Recorder at the applicant's expense. The required language is as follows:

> "Dedication of a Native Growth Protection Easement (NGPE) conveys to the public a beneficial interest in the land within the easement. This interest includes the preservation of existing vegetation for all purposes that benefit the public health, safety and welfare, including control of surface water and erosion, maintenance of slope stability, visual and aural buffering, and protection of plant and animal habitat. The NGPE imposes upon all present and future owners and occupiers of land subject to the easement the obligation, enforceable on behalf of the public of the City of Monroe, to leave undisturbed all trees and other vegetation within the easement. The vegetation in the easement may not be cut, pruned, covered by fill, removed, or damaged without express permission from the City of Monroe, which permission must be obtained in writing.
>
> Before beginning and during the course of any grading, building construction or other development activity on a lot or development site subject to the NGPE, the common boundary between the easement and the area of development activity must be fenced or otherwise marked to the satisfaction of the City of Monroe."

B. CRITICAL AREA TRACTS

Critical areas tracts are legally created non-building lots containing critical areas and their buffers that shall remain undeveloped pursuant to the Critical Areas Regulations. Separate critical 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 incorporated in the area of the parent lot for purposes of subdivision and method of allocation and minimum lot size. The following development proposals shall identify such areas as separate tracts:

1. Subdivisions
2. Short subdivisions
3. Planned Residential Developments
4. Contract Rezones

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 City of Monroe.

The following note shall appear on the face of all plats, PRDs, or contract rezones and shall be recorded on the title for all affected lots:

> "NOTE: All lots adjoining separate tracts identified as Native Growth Protection Easements are jointly and severally responsible for the maintenance and protection of the tracts. Maintenance includes ensuring that no alteration occurs within the separate and that vegetation remains undisturbed unless the express written permission of the City of Monroe has been received."

C. BUILDING SETBACK LINE (BSBL)

Unless otherwise specified, a minimum BSBL of ten (10) feet is required from the edge of any separate tract, buffer or NGPE, which ever is greatest.

D. MARKING AND/OR FENCING

1. Temporary markers. The outer perimeter of the wetland or buffer and the limits of these areas to be disturbed pursuant to an approved permit or authorization shall be marked in the field so no unauthorized intrusion will occur and is subject to inspection by the Director or his designee prior to the commencement of permitted activities. This temporary marking shall be maintained throughout construction and shall not be removed until directed by the Director, or until permanent signs and/or fencing, if required, are in place.
2. Permanent marking and/or fencing. Following the implementation of an approved development plan or alteration, the outer perimeter of the critical area or buffer that is not disturbed shall be permanently identified. This identification shall include permanent wood or metal signs on treated wood or metal posts. Signs shall be worded as follows:

> "Protection of this natural area is in your care. Alteration or disturbance is prohibited. Please call the City of Monroe for more information."

The City shall approve sign locations during review of the development proposal. Along residential boundaries, the signs shall be at least 4" X 6" in size and spaced one per lot or every one-hundred-fifty (150) feet for lots whose boundaries exceed one-hundred-fifty (150) feet. At road endings, crossings, and other areas where public access to the critical area is allowed, the sign shall be a minimum of 18" X 24" in size and spaced one every one-hundred-fifty (150) feet.

Domestic grazing animals shall be excluded from stream, wetlands, and associated buffers by permanent fencing when necessary unless otherwise approved by the City.

The fencing may provide limited access to the stream or wetland for stock watering purposes, but shall minimize bank disturbance.

The City may require permanent fencing where there is a substantial likelihood of the presence of domestic grazing animals with the development proposal. The City shall also require such fencing when, subsequent to approval of the development proposal, domestic grazing animals are in fact introduced. The City may use any appropriate enforcement actions including, but not limited, to fines, abatement, or permit denial to ensure compliance.

E. MONITORING

The City will require monitoring in development proposals where alteration of critical areas or their buffers are approved. Such monitoring shall be an element of the required mitigation plan and shall document and track impacts of development on the functions and values of critical areas, and the success and failure of mitigation requirements. Monitoring may include, but is not limited to:

1. Establishing vegetation transects or plots to track changes in plant species composition over time;
2. Using aerial or other photography to evaluate vegetation community response;

3. Sampling surface and ground waters to determine pollutant loading;
4. Measuring base flow rates and stormwater runoff to model and evaluate water quantity predictions;
5. Measuring sedimentation rates; and
6. Sampling fish and wildlife populations to determine habitat utilization, species abundance, and diversity.

The property owner will be required to submit monitoring data and reports to the City on an annual basis or other schedule as required by the Director. Monitoring shall continue for a period of five (5) years or for a period necessary to establish that the mitigation performance standards have been met.

When monitoring reveals a significant deviation from predicted impacts or a failure of mitigation measures, the applicant shall be responsible for appropriate corrective action. Contingency plans developed as part of the original mitigation plan shall apply, but may be modified to address a specific deviation or failure. Contingency plan measures shall be subject to the monitoring requirement to the same extent as the original mitigation measures.

As a condition of approval for any project for which monitoring is required pursuant to this section, the applicant shall be required to record the monitoring requirements on a form approved by the City of Monroe so that subsequent purchasers of the property subject to the monitoring requirements are bound by and aware of the requirements.

F. NOTICE ON TITLE

1. In order to inform subsequent purchasers of real property of the existence of critical areas, the owner of any real property containing a critical area or buffer on which a development proposal is submitted shall file a notice with the Recordings Division of Snohomish County. The notice shall state the presence of the critical area or buffer on the property, of the application of this Title to the property, and the fact that limitations on actions in or affecting the critical area or buffer may exist. The notice shall run with the property.
2. This notice on title shall not be required for a development proposal by a public agency or public or private utility:
    a. Within a recorded easement or right-of-way;
    b. Where the agency or utility has been adjudicated the right to an easement or right-of-way; or
    c. On the site of a permanent public facility.
3. The applicant shall submit proof that the notice has been filed for public record before the City of Monroe approves any development proposal for the property or, in the case of subdivisions, short plats, planned residential developments, at or before recording.

G. FEES

The applicant is responsible for the initiation, preparation, submission, and expense of all required reports, assessment(s), studies, plans, reconnaissance(s), peer review by qualified consultants, and other work prepared in support of, or necessary for, the City of Monroe critical areas review processing.

H. PERFORMANCE STANDARDS

Subdivisions, short subdivisions, and planned residential developments of land in critical areas and associated buffers is subject to the following:

1. Land that is wholly within a critical area or associated buffer may not be subdivided.
2. Land that is partially within a critical areas or associated buffer area may be subdivided provided that an accessible and contiguous portion of each new lot is:
   a. Located outside the critical area and buffer; and
   b. Large enough to accommodate the intended use.
3. Accessory roads and utilities serving the proposed subdivision may be permitted within the critical area and associated buffer only if the Director determines that no other feasible alternative exists and when consistent with this Chapter.

I. LIMITED DENSITY TRANSFER - Density Credit of Critical Areas

1. An owner of property containing a critical area may be permitted to transfer the density attributed to the critical area to another, not containing a critical area(s) portion of the same site or property, subject to the limitations of this section.
2. Up to one-hundred percent (100%) of the density that could be achieved on the critical area and buffer portion of the site can be transferred to a portion of the site not containing a critical area, subject to:
   a. The density limitation of the underlying zoning classification;
   b. The minimum lot size of the underlying zoning classification may be reduced to 6,000 square feet (or as revised by the Planned Residential Development standards) in order to accommodate the transfer in densities;
   c. All other applicable lot performance standards established by MMC Section 18.10.060 (Zoning lot area, lot coverage, and setback requirements matrix) shall be met; and
   d. The area to which density is transferred shall not be constrained by other critical areas regulation.

20.05.080 WETLAND DEVELOPMENT STANDARDS

A. GENERAL STANDARDS

Activities and uses shall be prohibited from wetlands and wetland buffers, except as provided by this Chapter. The following activities may only be permitted in a wetland or wetland buffer if the applicant can demonstrate that the activity will not degrade the functions and values of the wetland and other critical areas.

1. Category I wetlands. Activities and uses shall be prohibited from Category I wetlands, except as provided in the variance sections of this SMP and Title 18 of the Monroe Municipal Code.
2. Category II and III wetlands. The following standards shall apply to Category II and III wetlands:
   a. Water-dependent activities may be allowed where there are no practicable alternatives that would have a less adverse impact on the wetland and other critical areas.
   b. Where nonwater dependent activities are proposed, it shall be presumed that alternative locations are available, and activities and uses shall be prohibited, unless the applicant demonstrates that:

i. The basic project purpose cannot reasonably be accommodated on another site in the general region and successfully avoid, or result in less adverse impacts on, a wetland or its buffer;
ii. There are no feasible alternative designs of the project as proposed that would avoid, or result in less of an adverse impact on, a wetlands or its buffer, such as a reduction in the size, scope, configuration, or density of the project.

3. Category IV wetlands. Activities and uses that result in unavoidable and necessary impacts may be permitted in Category IV wetlands and associated buffers in accordance with an approved critical areas report and mitigation plan, and only if the proposed activity is the only reasonable alternative that will accomplish the applicant's objective.
4. Property access. Any wetland may be altered with the least possible impact and to the minimum extent necessary to gain access to developable property when no other alternative access exists. Alteration proposals shall be subject to City review and shall require compensation pursuant to a mitigation plan (See Applicability, Exemptions, and Exceptions).
5. Stormwater Management. Stormwater management facilities are not allowed in wetlands. Stormwater management facilities, limited to stormwater dispersion outfall and bioswales, may be allowed within the outer twenty-five percent (25%) of the buffer of Category III and IV wetlands only, provided that:
   a. No other location is feasible; and
   b. The location of such facilities will not degrade the functions and values of the wetland.
6. Trails. Public and private trails may be allowed within all buffers where it can be demonstrated in a critical areas report that the wetland and wetland buffer functions and values will not be degraded by trail construction or use. Trail planning, construction, and maintenance shall adhere to the following criteria:
   a. Trail alignment shall follow a path beyond a distance from the wetland edge equal to seventy-five percent (75%) of the buffer width except as needed to access viewing platforms. Trails may be placed on existing levees or railroad grades within these limits;
   b. Trails shall be constructed of pervious materials. The trail surface shall meet all other requirements, including water quality standards set forth in the Washington State Department of Ecology *Stormwater Management Manual for Western Washington*, August 2001 or as revised;
   c. Trail alignment shall avoid trees in excess of six inches in diameter of any tree trunk at a height of four and a half (4.5) feet above the ground on the upslope side of the tree;
   d. Trail construction and maintenance shall follow the U.S. Forest Service *Trails Management Handbook* (FSH 2309.18, June 1987) and *Standard Specifications for Construction of Trails* (EM-7720-102, June 1984 or as revised);
   e. Access trails to viewing platforms within the wetland may be provided. Trail access and platforms shall be aligned and constructed to minimize disturbance to valuable functions of the wetland or its buffer and still provide enjoyment of the resource.
   f. Buffer widths shall be increased, where possible, equal to the width of the trial corridor, including disturbed areas; and

g. Equestrian trails shall provide measures to assure that runoff from the trail does not directly discharge to the wetland.

7. Utilities. Public and private utility corridors may be allowed within wetland buffers for Category II, III, and IV wetlands when no lesser impacting alternative alignment is feasible, and wetland and wetland buffer functions and values will not be degraded. Utilities, whenever possible, shall be constructed in existing, improved roads, drivable surface or shoulder, subject to compliance with road and maintenance BMPs, or within an existing utility corridor. Otherwise, corridor alignment, construction, restoration and maintenance shall adhere to the following criteria:
   a. Corridor alignment shall follow a path beyond a distance from the wetland edge equal to seventy-five percent (75%) of the buffer width, except when crossing a Category IV wetland and its buffer;
   b. Corridor construction and maintenance shall maintain and protect the hydrologic and hydraulic functions of the wetland and the buffer;
   c. Corridors shall be fully revegetated with appropriate native vegetation upon completion of construction; and
   d. Utilities requiring maintenance roads shall be prohibited in wetland buffers unless the following criteria are met:
      i. There are no lesser impacting alternatives;
      ii. Any required maintenance roads shall be no greater than fifteen (15) feet wide. Roads shall closely approximate the location of the utility to minimize disturbances; and
      iii. The maintenance road shall be constructed of pervious materials and designed to maintain and protect the hydrologic functions of the wetland and its buffer.

B. BEST AVAILABLE SCIENCE

Any approval of alterations of impacts to a wetland or its buffer shall be supported by the best available science.

C. NATIVE GROWTH PROTECTION EASEMENT/CRITICAL AREA TRACT

As part of the implementation of approved development applications and alterations, wetlands and their buffers that remain undeveloped pursuant to the Critical Areas Regulations, in accordance with the section labeled “Protection and Mitigation Measures,” shall be designated as Native Growth Protection Easements (NGPE). Any wetland and its associated buffer created as compensation for approved alterations shall also be designated as an NGPE.

When the subject development is a formal subdivision, short subdivision (short plat), or Planned Residential Development (PRD), wetlands and their buffers shall be placed in a critical areas tract instead of an NGPE, as described in the section labeled “Protection and Mitigation Measures,” of these regulations.

D. MINIMUM BUFFERS

The following buffers are minimum requirements. All buffers are measured from the wetland’s edge as surveyed in the field:

1. Category I wetlands shall have a two-hundred-foot (200’) undisturbed buffer.
2. Category II wetlands shall have a one-hundred-foot (100’) undisturbed buffer.
3. Category III wetlands shall have a seventy-five-foot (75’) undisturbed buffer.
4. Category IV wetland shall have a fifty-foot (50’) undisturbed buffer.

5. Any wetland created as compensation for approved wetland alteration shall have the minimum buffer required for the new classification of the created wetland.
6. Un-inventoried wetlands shall be assigned a rating based on the wetland report and field verification, and the appropriate buffer shall apply.

E. ADDITIONAL BUFFERS

The City may require increased buffer sizes as necessary to protect wetlands when either the wetland is particularly sensitive to disturbance or the development poses unusual impacts. Examples of circumstances that may require buffers beyond minimum requirements include, but are not limited to:

1. Unclassified uses;
2. The wetland is in a critical drainage basin;
3. The wetland is a critical fish habitat for spawning or rearing as determined by the Washington Department of Fish and Wildlife;
4. The wetland serves an important ground water recharge area as determined by a Ground Water Management Plan;
5. The wetland acts as habitat for endangered, threatened, rare, sensitive, or monitor species;
6. The land adjacent to the wetland and its associated buffer and included in the development proposal is classified as an erosion hazard area; or

A trail or utility corridor in excess of ten percent (10%) of the buffer width is proposed for inclusion in the buffer.

F. BUFFER REDUCTION

The City may reduce up to twenty-five percent (25%) of the wetland buffer requirement only if sufficient information is available showing:

1. The applicant has demonstrated that mitigation sequencing efforts have been appropriately utilized: avoid, minimize, and lastly mitigate;
2. The proposed buffer reduction shall be accompanied by a mitigation plan that includes enhancement of the reduced buffer area;
3. The reduction will not adversely affect water quality;
4. The reduction will not destroy, damage, or disrupt a significant habitat area; and
5. The reduction is necessary for reasonable development of the subject property.

G. BUFFER AVERAGING

The City will consider the allowance of wetland buffer averaging only when the buffer area width after averaging will not adversely impact the critical area and/or buffer functions and values. At a minimum, any proposed buffer averaging must also meet the following criteria:

1. The buffer area after averaging is no less than that which would be contained within the standard buffer; and
2. The buffer width shall not be reduced by more than twenty-five percent (25%) at any one point as a result of the buffer averaging.

H. ADDITIONAL WETLAND MITIGATION REQUIREMENTS

No net loss of wetland functions and values shall occur as a result of the overall project. If a wetland alteration is allowed, then the associated impacts will be considered unavoidable and the

following mitigation measures to minimize and reduce wetland impacts shall be required, in addition to the requirements in the section titled "Protection and Mitigation Measures."

1. Restoration/rehabilitation is required when a wetland (or stream) or its buffers has been altered on the site in violation of City regulations prior to development approval and as a consequence its functions and values have been degraded. Restoration is also required when the alteration occurs in violation of City regulations during the construction of an approved development proposal. At a minimum, all impacted areas shall be restored to their previous condition pursuant to an approved mitigation plan.
2. Restoration/rehabilitation is required when a wetland (or stream) or it buffers will be temporarily altered during the construction of an approved development proposal. At a minimum, all impacted areas shall be restored to their previous condition pursuant to an approved mitigation plan.
3. Compensation. The overall aim of compensation is no net loss of wetland and/or buffer functions on a development site. Compensation includes replacement or enhancement of wetlands and/or buffer (stream) depending on the scope of the approved alteration and what is needed to maintain or improve wetland and/or buffer functions. Compensation for approved wetland and/or buffer alterations shall meet the following minimum performance standards and shall occur pursuant to an approved mitigation plan.
    a. Mitigation shall achieve equivalent or greater biological functions. Mitigation plans shall be consistent with the state Department of Ecology *Guidelines for Developing Freshwater Wetland Mitigation Plans and Proposals*, 1994, as revised.
    b. Preference of mitigation actions. Mitigation actions that require compensation shall occur in the following order of preference:
        i. Restoring wetlands on upland sites that were formerly wetlands.
        ii. Creating wetlands on disturbed upland sites such as those with vegetation cover consisting primarily of exotic introduced species.
        iii. Enhancing significantly degraded wetlands only after a minimum 1:1 replacement ratio has been met.
    b. On-site and In-kind. Unless otherwise approved, all wetland impacts shall be compensated for through restoration or creation of replacement wetlands that are in-kind, on-site, and of similar or better wetland category. Mitigation shall be timed prior to or concurrent with the approved alteration and shall have a high probability of success. The following ratios shall apply to wetland restoration and creation for mitigation:
        i. Category I on a 6:1 area basis with equal or greater functions and values.
        ii. Category II on a 3:1 area basis with equal or greater functions and values.
        iii. Category III on a 2:1 area basis with equal or greater functions and values.
        iv. Category IV on a 1.5:1 area basis with equal or greater functions and values.
    c. Off-site and In-kind. The City may consider and approve off-site compensation where the applicant can demonstration that equivalent or greater biological and hydrological functions and values will be achieved. The compensation may include restoration, creation, or enhancement of wetland or streams so long as the project is within the same sub-drainage basin. The compensation formulas required in "c" above shall apply for off-site compensation as well.

d. Increased Replacement Ratios. The Director may increase the ratios under the following circumstances:
    i. Uncertainty exists as to the probable success of the proposed restoration or creation due to an unproven methodology or proponent; or
    ii. A significant period will elapse between impact and replication of wetland functions; or
    iii. The impact was unauthorized.

f. Decreased Replacement Ratios. The City may decrease the ratios required in "c" above when all the following criteria are met:
    i. A minimum replacement ratio of 1:1 will be maintained;
    ii. Documentation by a qualified wetlands specialist demonstrates that the proposed mitigation actions have a very high rate of success;
    iii. Documentation by a qualified wetlands specialist demonstrates that the proposed mitigation actions will provide functions and values that are significantly greater than the wetland being impacted; and
    iv. The proposed mitigation actions are conducted in advance of the impact and have been shown to be successful.

g. Wetland Enhancement as Mitigation.
    i. Impacts to wetlands may be mitigated by enhancement of existing significantly degraded wetlands only after a 1:1 minimum acreage replacement ratio has been satisfied. Applicants proposing to enhance wetlands must produce a critical areas report that identifies how enhancement will increase the functions and values of the degraded wetland and how this increase will adequately mitigate for the loss of wetland function at the impact site.
    ii. At a minimum, enhancement acreage shall be double the acreage required for creation acreage under "c" above. The ratios shall be greater than double the required acreage when the enhancement proposal would result in minimal gain in the performance of wetland functions currently provided in the wetland.

4. Mitigation Plans for Alterations to Wetlands and Wetland Buffers. Mitigation plans shall be consistent with the state Department of Ecology *Guidelines for Developing Freshwater Wetland Mitigation Plan and Proposals*, 1994, or as revised. At a minimum, the following components shall be included in a complete mitigation plan:
    a. Baseline Information. Provide existing conditions information for both the impacted critical area and the proposed mitigation site as described in "General critical area report requirements" and "Additional wetland report requirements."
    b. Environmental Goals and Objectives. The mitigation plan shall include a written report identifying environmental goals and objectives of the compensation proposed and include:
        i. A description of the anticipated impacts to the critical areas and the mitigating actions proposed and the purposes of the compensation measures, including the site selection criteria, identification of compensation goals, identification of resource functions, and dates for beginning and completing site compensation construction activities. The goals and objectives shall be related to the functions and values of the impacted critical area; and
        ii. A review of the best available science supporting the proposed mitigation.

c. Performance Standards. The mitigation plan shall include measurable specific criteria for evaluating whether or not the goals and objectives of the mitigation project have been successfully attained and whether or not the requirements of this Chapter have been met. They may include water quality standards; species richness and diversity targets; habitat diversity indices; or other ecological, geological, or hydrological criteria.
d. Detailed Construction Plan. These are the written specifications and descriptions of mitigation techniques. This plan should include the proposed construction sequencing, grading and excavation details, erosion and sedimentation control features, a native planting plan, and detailed site diagrams and any other drawings appropriate to show construction techniques or anticipated final outcome.
e. Monitoring and/or Evaluation Program. The mitigation plan shall include a program for monitoring construction of the compensation project, and for assessing a completed project. A protocol shall be included outlining the schedule for site monitoring, and how the monitoring data will be evaluated to determine if the performance standards are being met. A monitoring report shall be submitted as needed to document milestones, successes, problems, and contingency actions of the compensation project. The compensation project shall be monitored for five (5) years or a period necessary to establish that performance standards have been met.
f. Contingency Plan. This section identifies potential courses of action, and any corrective measures to be taken when monitoring or evaluation indicates projected performance standards have not been met.

20.05.090 STREAM DEVELOPMENT STANDARDS

A. GENERAL STANDARDS

Activities may only be permitted in a stream or stream buffer if the applicant can show that the proposed activity will not degrade the functions and values of the stream, stream buffer, or other critical area.

1. Type 1, 2, and 3 Streams. Activities and uses shall be prohibited in Type 1,2, and 3 streams except as provided for in the variance sections of this SMP and Title 18 of the Monroe Municipal Code.
2. Type 4 and 5 Streams. Activities and uses that result in unavoidable and necessary impacts may be permitted in Type 4 and 5 streams and buffers in accordance with an approved critical areas report and mitigation plan, and only if the proposed activity is the only reasonable alternative that will accomplish the applicant's objectives.
3. Stream Crossings. Stream crossing shall be minimized, but when necessary they shall conform to the following standards as well as other applicable laws (see the state Department of Fish and Wildlife, or Ecology).
   a. The stream crossing is the only reasonable alternative that has the least impact;
   b. It has been shown in the critical areas report that the proposed crossing will not decrease the stream and associated buffer functions and values;
   c. All stream crossings using culverts shall use super span or oversized culverts with appropriate fish enhancement measures. Culverts shall not obstruct fish passage;
   d. All stream crossings shall be constructed during the summer low flow period between June 15th and September 15th or as specified by the state Department of Fish and Wildlife in the Hydraulic Project Approval;

e. Stream crossings shall not occur through salmonid spawning areas unless no other feasible crossing site exists;
f. Bridge piers or abutments shall not be placed in either the floodway or between the ordinary high water marks unless no other feasible alternative placement exists;
g. Stream crossings shall not diminish the flood carrying capacity of the stream;
h. Stream crossings shall provide for maintenance of culverts and bridges; and
i. Stream crossings shall be minimized by serving multiple properties whenever possible.

4. Relocations. Type 4 streams beyond one-quarter mile of a stream with salmonids and Type 5 streams may be relocated with appropriate floodplain protection measures under the following conditions:
   a. Stream and buffer functions in the relocated stream section must be equal to or greater than the functions and values provided by the stream and buffer prior to relocation;
   b. The equivalent base flood storage volume shall be maintained;
   c. There shall be no impact to local ground water;
   d. There shall be no increase in water velocity;
   e. There is no interbasin transfer of water;
   f. The relocation shall occur on-site and shall not result in additional encumbrances on neighboring properties unless necessary easements and waivers are obtained from affected property owners;
   g. The alteration conforms to other applicable laws or rules, including erosion control in accordance with the City of Monroe Public Works Design and Construction Standards;
   h. The required mitigation plan has been reviewed and approved by the City of Monroe; and
   i. The studies required in the Critical Areas Regulations section of these regulations shall be submitted and approved.
5. Trails. The criteria for alignment, construction, and maintenance of trails within wetlands and their buffers shall apply to trails within stream buffers. The criteria for stream crossings shall also apply.
6. Utilities. The criteria for alignment, construction, and maintenance within the wetland buffers shall apply to utility corridors within stream buffers. In addition, corridors shall not be aligned parallel with any stream channel unless the corridor is outside the buffer, and crossings shall be minimized. Crossings shall be contained within the existing footprint of an existing road or utility crossing where possible. Otherwise, crossings shall be at an angle greater than sixty degrees to the centerline of the channel. The criteria for stream crossing shall also apply.
7. Floodway Dependent Structures. Floodway dependent structures or installations may be permitted within streams if allowed or approved by other ordinances or other agencies with jurisdiction.
8. Stream Channel Stabilization. Stream bank stabilization shall only be allowed when it is shown, through a stream bank stability assessment conducted by a qualified fluvial geomorphologist or hydraulic engineer, that such stabilization is required for public safety reasons, that no other less intrusive actions are possible, and that the stabilization will not degrade in-stream or downstream channel stability. Stream bank stabilization shall conform to the *Integrated Streambank Protection Guidelines*

developed by the Washington State Department of Fish and Wildlife, 2002 or as revised.

B. BEST AVAILABLE SCIENCE

Any approval of alterations of impacts to a stream or its buffers shall be supported by the best available science.

C. NATIVE GROWTH PROTECTION EASEMENT/CRITICAL AREAS TRACT

As part of the implementation of approved development applications and alterations, streams and their buffers shall remain undeveloped pursuant to the Critical Areas Regulations, in accordance with the section labeled "Protection and Mitigation Measures," and shall be designated as Native Growth Protection Easements (NGPE). These include Type 1, 2, 3, and 4 streams when located within one-quarter (0.25) mile of a stream with salmonids, unless the City has waived the NGPE requirements (see below), or where the alteration section expressly exempts Type 5 streams and Type 4 streams, when beyond one-quarter (0.25) mile of a stream with salmonids, from an NGPE. Where a stream or its buffer has been altered on the site prior to approval of the development proposal, the area altered shall be restored using native plants and materials. The restoration work shall be done pursuant to an approved mitigation plan.

The City may waive the NGPE requirements on Type 4 streams, when located beyond one-quarter (0.25) mile of a stream with salmonids, and Type 5 streams and their buffers if all the following criteria are met:

1. The stream does not flow directly into a stream used by salmonids;
2. The stream is not in a critical drainage basin;
3. All buffer, building setback line, and flood plain distances are identified on the appropriate documents of title;
4. The stream channel and buffer are maintained as a vegetated open swale without altering the channel dimensions or alignment and are recorded in a drainage easement to the City of Monroe that requires that the channel remain open and vegetated for water quality and hydrologic purposes;
5. All clearing proposed within the stream and its buffer shall occur between April 1 and September 1, or as further restricted by timing limits established by the State Department of Fish and Wildlife, and shall meet all erosion and sedimentation requirements of the City;
6. There are no downstream flooding or erosion problems within one-half (0.5) mile of the site;
7. The stream is not within an erosion hazard area; and
8. No existing water wells are within or adjacent to the stream.

When the subject development is a formal subdivision, short subdivision (short plat), or Planned Residential Development (PRD), the streams and their buffers shall be placed in a critical areas tract instead of an NGPE, as described in the section labeled "Protection and Mitigation Measures" of these regulations.

D. MINIMUM BUFFERS

The following buffers are the minimum requirements. All buffers shall be measured from the ordinary high water mark (OHWM).

1. Type 1 streams shall have a two-hundred-foot (200') buffer on each side of the channel.
2. Type 2 streams shall have a two-hundred-foot (200') buffer on each side of the channel.
3. Type 3 streams shall have a two-hundred-foot (200') buffer on each side of the channel.
4. Type 4 streams, within a quarter mile of a stream with salmonids shall have a buffer of one hundred-fifty-feet (150') on each side of the channel.
5. Type 4 streams, beyond a quarter mile of a stream with salmonids shall have a buffer of seventy-five-feet (75') on each side of the channel.
6. Type 5 streams shall have a fifty-foot (50') buffer on each side of the channel.
7. Unclassified streams shall be assigned a rating based on the critical areas report and field verification, and the appropriate buffer shall apply.

E. ADDITIONAL BUFFERS

The City may require increased buffer sizes as necessary to protect streams when either the stream is particularly sensitive to disturbances or the development poses unusual impacts. Examples of circumstances that may require buffers beyond minimum requirements include, but are not limited to:

1. Unclassified uses;
2. The stream is in a critical drainage basin as designated by the City of Monroe;
3. The stream reach adjacent to the development proposal serves as critical fish habitat for spawning and rearing;
4. The stream serves as habitat for endangered, threatened, rare, sensitive, or monitor species listed by the federal government or the state of Washington;
5. The land adjacent to the stream and its associated buffer and included within the development proposal is classified as an erosion hazard area; or
6. A trail in excess of ten percent (10%) of the buffer width is proposed for inclusion in the buffer.

F. BUFFER REDUCTIONS

The City may reduce up to twenty-five percent (25%) of the buffer requirement only if sufficient information is available showing:

1. The applicant has demonstrated that mitigation sequencing efforts have been appropriately utilized: avoid, minimize, and lastly mitigate;
2. The proposed buffer reduction shall be accompanied by a mitigation plan that includes enhancement of the reduced buffer area;
3. The reduction will not adversely affect directly or indirectly the critical area and/or buffer in the short or long term;
4. The reduction will not adversely affect water quality;
5. The reduction will not destroy, damage or disrupt a significant habitat area; and
6. The reduction is necessary for reasonable development of the subject property.

G. BUFFER AVERAGING

The City will consider the allowance of buffer averaging only when the buffer area after the averaging is no less than that which would be contained within the standard buffer. Additionally, the buffer width shall not be reduced by more than twenty-five percent (25%) at

any one point as a result of the buffer averaging. The buffer width reduction will not adversely impact the critical area and/or its buffer functions and values.

H. ADDITIONAL STREAM MITIGATION REQUIREMENTS

No net loss of stream functions and values shall occur as a result of the overall project. The mitigation requirements for stream alterations, in addition to the requirements in the section titled "Protection and Mitigation Measures," shall meet the following minimum performance standards and shall occur pursuant to an approved mitigation plan:

1. Maintain or improve stream channel dimensions, including depth, length, and gradient;
2. Restore disturbed stream buffer areas with native vegetation;
3. Create an equivalent or improved channel bed;
4. Create equivalent or improved biofiltration; and
5. Replace disturbed stream and stream buffer habitat features and areas.

I. MITIGATION PLANS FOR ALTERATION TO STREAMS AND STREAM BUFFERS

The scope and content of a mitigation plan shall be decided on a case-by-case basis: as the impacts to the critical area increase, the mitigation measures to offset these impacts will increase in number and complexity. At a minimum, the following components shall be included in a complete mitigation plan:

1. Baseline Information. Provide existing conditions information for both the impacted critical areas and the proposed mitigation site as described in "General critical area report requirements" and "Additional stream report requirements."
2. Environmental Goals and Objectives. The mitigation plan shall include a written report identifying environmental goals and objectives of the compensation proposed and including:
    a. A description of the anticipated impacts to the critical areas, the mitigating actions proposed, and the purposes of the compensation measures, including the site selection criteria, identification of compensation goals, identification of resource functions, and dates for beginning and completing site compensation construction activities. The goals and objectives shall be related to the functions and values of the impacted critical area; and
    b. A review of the best available science supporting the proposed mitigation.
3. Performance Standards. The mitigation plan shall include measurable specific criteria for evaluating whether or not the goals and objectives of the mitigation project have been successfully attained and whether or not the requirements of this Chapter have been met. They may include water quality standards, species richness and diversity targets, habitat diversity indices, or other ecological, geological, or hydrological criteria.
4. Detailed Construction Plan. These are the written specifications and descriptions of mitigation technique. This plan should include the proposed construction sequencing, grading and excavation details, erosion and sedimentation control features, a native planting plan, and detailed site diagrams and any other drawings appropriate to show construction techniques or anticipated final outcome.
5. Monitoring and/or Evaluation Program. The mitigation plan shall include a program for monitoring construction of the compensation project, and for assessing a completed project. A protocol shall be included outlining the schedule for site monitoring, and how the monitoring data will be evaluated to determine if the

performance standards are being met. A monitoring report shall be submitted as needed to document milestones, successes, problems, and contingency actions of the compensation project. The compensation project shall be monitored for five (5) years or a period necessary to establish that performance standards have been met.

6. Contingency Plan. This section identifies potential courses of action, and any corrective measures to be taken when monitoring or evaluation indicates projected performance standards have not been met.

The City of Monroe shall determine during the review of the requested studies which of the above components shall be required as part of the mitigation plan. Key factors in this determination shall be the size and nature of the development proposal, the nature of the impacted critical areas, and the degree of cumulative impacts on the critical area from other development proposals.

20.05.100 FISH AND WILDLIFE HABITAT CONSERVATION AREAS STANDARDS

A. GENERAL STANDARDS

Fish and wildlife habitat conservation areas may be altered only if the proposed alteration of the habitat or the mitigation proposed does not degrade the qualitative functions and values of the habitat. All new structures and land alterations shall be prohibited from habitat conservation areas, except in accordance with this Chapter.

No plant, wildlife, or fish species not indigenous to the region shall be introduced into a habitat conservation area unless authorized by a state or federal permit or approval.

Mitigation sites shall be located to achieve contiguous wildlife habitat corridors in accordance with a mitigation plan that is part of an approved critical areas report to minimize the isolating effects of development on habitat areas, so long as mitigation of aquatic habitat is located within the same aquatic ecosystem as the area disturbed.

B. CONDITIONS

The Director shall condition approvals of activities allowed within or adjacent to a habitat conservation area or its buffer, as necessary to minimize or mitigate any potential adverse impacts. Conditions may include:

1. Establishment of buffer zones;
2. Preservation of critically important vegetation;
3. Limitation of access to the habitat area, including fencing to deter unauthorized access;
4. Seasonal restrictions of construction activities;
5. Establishment of a duration and timetable for periodic review of mitigation activities; and
6. Requirement of a performance bond, when necessary, to ensure completion.

C. MITIGATION

Mitigation of alterations to habitat conservation areas shall achieve equivalent or greater biological functions and shall include mitigation for adverse impacts upstream and downstream

of the development proposal site. Mitigation shall address each function affected by the alteration to achieve functional equivalency or improvement on a per function basis.

D. BEST AVAILABLE SCIENCE

Any approval of alterations or impacts to habitat conservation area shall be supported by the best available science.

E. NATIVE GROWTH PROTECTION EASEMENT/CRITICAL AREA TRACT

As part of the implementation of approved development applications and alterations, fish and wildlife habitat conservation areas and any associated buffers that remain undeveloped pursuant to the Critical Areas Regulations, in accordance with the section labeled "Protection and Mitigation Measures," shall be designated as Native Growth Protection Easements (NGPE).

When the subject development is a formal subdivision, short subdivision (short plat), or Planned Residential Development (PRD), the fish and wildlife habitat conservation area(s) and any associated buffers shall be placed in a critical areas tract instead of an NGPE, as described in the section labeled "Protection and Mitigation Measures," of these regulations.

F. BUFFERS

1. Buffer areas shall be established for areas of activity in, or adjacent to, habitat conservation areas when needed to protect such areas. Buffers shall consist of an undisturbed area of native vegetation, or areas identified for restoration, established to protect the integrity, function and values of the affected habitat. Required buffer widths shall reflect the sensitivity of the habitat and type and intensity of human activity proposed to be conducted nearby, and shall be consistent with the management recommendations issued by the state Department of Fish and Wildlife.
2. When a species is more susceptible to adverse impacts during specific periods of the year, seasonal restrictions may apply. Larger buffers may be required and activities may be further restricted during the seasonal period.

G. ENDANGERED, THREATENED, AND SENSITIVE SPECIES

1. No development shall be allowed within a habitat conservation area or any associated buffer with which state or federally endangered, threatened, or sensitive species have a primary association.
2. Whenever activities are proposed adjacent to a habitat conservation area with which state of federally endangered, threatened, or sensitive species have a primary association, such areas shall be protected through the application of protection measures in accordance with a critical areas report prepared by a qualified professional and approved by the City. Approval of alteration of land adjacent to the habitat conservation area or any associated buffer shall not occur prior to consultation with the state Department of Fish and Wildlife and the appropriate federal agency, if applicable.
3. Bald eagle habitat shall be protected pursuant to the Washington State Bald Eagle Protection Rules (WAC 232-12-292).

H. ANADROMOUS FISH

1. Activities, uses, and alterations proposed to be located in water bodies used by anadromous fish or in areas that affect such water bodies shall give special

consideration to the preservation and enhancement of anadromous fish habitat, including, but not limited to, the following:

a. Activities shall be timed to occur only during the allowable work window as designated by the state Department of Fish and Wildlife;
b. An alternative alignment or location for the activity is not feasible;
c. The activity is designed so that it will minimize the degradation of the functions or values of the fish habitat or other critical areas; and
d. Any impact to the functions and values of the habitat conservation area are mitigated in accordance with an approved critical areas report.

2. Structures that prevent the migration of salmonids shall not be allowed in the portion of water bodies currently or historically used by anadromous fish. Fish bypass facilities shall be provided that allow the upstream migration of adult fish and shall prevent juveniles migrating downstream from being trapped or harmed.
3. Fills, when authorized, shall minimize the adverse impacts to anadromous fish and their habitat, shall mitigate any unavoidable impacts, and shall only be allowed for water-dependent uses.

20.05.110 FLOOD HAZARD AREA DEVELOPMENT STANDARDS

A. FLOODWAYS

All buffer and building setback line requirements for stream, lakes, and wetlands shall apply. Authorized uses and structures are permitted within the floodway but beyond the buffers and BSBLs pursuant to the following:

1. All development proposals, including permitted new construction and reconstruction shall be subject to a one-foot rise restriction on the floodway, i.e. no cumulative increases greater than one (1) foot in base flood height.
2. Development proposals in the floodway which will increase the base flood height may be allowed if amendments are made to the designated floodway lines, base flood profiles, and Flood Insurance Rate Map (FIRM) in order to remove the project site from the floodway; provided that the appropriate legal arrangements have been made with all property owners affected by the increased flood elevations in their properties.
3. Construction of new residential or nonresidential structures is prohibited within the floodway except developments that are vested according to the City's Flood Hazard Ordinance. New construction in nonconforming developments shall meet the construction standards set forth in this Chapter.
4. Reconstruction of existing structures within the floodway shall be subject to the requirements of 173-158-170 WAC; provided that reconstruction of existing residential structures between the floodway defined in 173-158-030(8) and the floodway defined in the Critical Areas Regulations and these rules need only meet the standards for new residential construction set forth in this Chapter.
5. The following circumstances are presumed to produce no increase in base flood heights and shall not require special studies to establish this fact:
   a. Areas of proposed structure on the nonconforming lots is less than 2,000 square feet; or
   b. Reconstruction of existing structures in the floodway where the structure's footprint is not increased.
6. Above-ground utility transmission lines, not including electrical transmission lines, shall only be allowed in the floodway for the transportation of non-hazardous

materials, as defined by the state Department of Ecology, where a bridge or other structure is capable of transporting the line.

7. Floodway Dependent Structures. Installations or structures that are floodway dependent may be located within the floodway provided that the development proposal receives approval from all other agencies with jurisdiction. Such installation include but are not limited to:
    a. Dams or diversions for water supply, flood control, hydroelectric production, irrigation or fisheries enhancement;
    b. Flood damage reduction facilities such as levees and pumping stations;
    c. Stream bank stabilization structures where no feasible alternative exist to protect public or private property;
    d. Stormwater conveyance facilities subject to the requirements of the development standards for streams and wetlands;
    e. Boat launches and related recreation structures;
    f. Bridge piers and abutments when no reasonable alternative is available; and
    g. Fisheries enhancement or stream restoration projects.
8. Along streams when the floodway is not identified by the applicant in the special studies, the entire floodplain shall be treated as the floodway.

B. FLOOD FRINGE

Development proposals within the flood fringe are permitted including the placement of fill provided that the cumulative increase of all proposed and historic fills does not exceed the criteria established in A.1 above.

C. GENERAL RESTRICTIONS

The following construction standards apply in both floodway and flood fringe areas.

1. No structures shall be allowed which would be at risk due to stream bank destabilization associated with channel location (meandering).
2. All construction elevated by pilings must be designed and certified by a professional structural engineer registered in the state of Washington and approved by the City building official prior to construction.
3. Subdivisions, short subdivisions, PRDs and Binding Site Plans shall follow there requirements:
    a. Locate and construct all utilities and their facilities in a manner that minimize flood damage;
    b. Provide adequate drainage to reduce exposure to flood damage; base flood data and floor hazard notes shall be shown on the face of the recorded plat, this may include, the floodwater depth, required flood elevations, and the boundary of the base flood and floodway as deemed appropriate by the City; and the following note shall appear on the face recorded documents and shall recorded on the title of record for all affected lots:
    c. Base flood data and flood hazard notes shall be shown on the face of the recorded plat; this may include the floodwater depth, required flood elevations, and the boundary of the base flood and floodway as deemed appropriated by the City;
    d. The following note shall appear on the face of the recorded documents and shall be recorded on the title of records for all affected lots:

"Note: Lots and structures located within flood hazard areas may be inaccessible to emergency vehicles during flood events. Residents and property owners should take appropriate advance precautions to provide access."

4. Utilities shall meet the following criteria:
   a. All new and replacement utilities including sewage treatment facilities, shall be flood-proofed to the flood protection elevation.
   b. New on-site sewage disposal systems shall be, to the extent possible, located outside the limits of the 100-year floodplain. Installation of new on-site sewage disposal systems shall be prohibited inside the floodway unless the Snohomish County Health District grants a waiver. The installation of a new on-site sewage disposal system in the flood fringe may be allowed if no feasible alternative site is available.
   c. Sewage and manure waste storage facilities shall be flood-proofed to the flood protection elevation.
   d. Aboveground utility transmission lines, other than electric transmission lines, shall only be allowed for the transportation of non-hazardous substances.
   e. Buried utility transmission lines transporting hazardous substances (as defined by the Washington State Hazardous Waste Management Act in RCW 70.105.005) shall be buried a minimum of four (4) feet beneath the maximum depth of scour of the base flood for the entire width of the floodway and shall achieve sufficient negative buoyancy so that any potential for flotation or upward migration is eliminated.
5. Critical facilities include, but are not limited to, schools, hospitals, police, fire and emergency response installations, nursing homes, and hazardous materials production. Construction of new critical facilities shall only be allowed within the flood hazard area when no reasonable alternative site is available. Critical facilities constructed within the flood hazard area shall have the lowest floor elevated to three (3) or more feet above the level of the base flood elevation. Flood-proofing and sealing measures must be taken to ensure toxic or hazardous substances will not be displaced by or released into floodwaters. Access routes elevated to or above the level of the 100-year frequency flood shall be provided to all critical facilities to the extent possible.
6. New residential construction shall meet the following criteria:
   a. The lowest floor shall be elevated to the flood protection elevation;
   b. Fully enclosed areas below the lowest floor that are subject to flooding are prohibited. The area and rooms below the lowest floor shall be designated to automatically equalize hydrostatic flood forces on exterior walls by allowing for the entry and exit of floodwaters. Designs for meeting this requirement must meet or exceed the following minimum criteria:
      i. A minimum of two (2) openings shall be provided on opposite walls having a total new area of not less than one (1) square inch for every square foot of enclosed area subject to flooding.
      ii. The bottom of all openings shall be no higher than one (1) foot above grade.
      iii. Openings may be equipped with screens, louvers, or other coverings or devices provided that they permit the unrestricted entry and exit of floodwaters.
7. New nonresidential construction and substantial improvements of any existing commercial, industrial, or other non-residential structure shall either elevate the

lowest floor, including the basement, to the flood protection elevation or flood-proof the structure to the same elevation. If the structure is flood-proofed, the following criteria are required:

a. The flood-proofing must be certified by a professional civil or structural engineer registered in the state of Washington stating that the flood-proofing methods are adequate to withstand the flood-depths, pressures, velocities, impacts, uplift forces, and other factors associated with the base flood. After construction, the engineer shall certify that the permitted work conforms to the approved plans and specifications;
b. Approved building permits for flood-proofed nonresidential buildings shall contain a statement to notify applicants that flood insurance premiums will be based upon rates for structures that are one (1) foot below the flood-proofed level.

8. Construction materials for residential and nonresidential structures shall meet the following criteria:
   a. All new and reconstructed buildings shall be constructed with materials and utility equipment resistant to flood damage, using methods and products that minimize flood damage;
   b. Electrical, heating, ventilation, plumbing, air conditioning equipment, and other service facilities shall be flood-proofed to the flood protection elevation.
9. All new construction shall be anchored to prevent flotation, collapse, or lateral movement of the structure.
10. For all mobile/manufactured homes, all standards for flood hazard protection for residential construction shall apply. All mobile/manufactured homes must be anchored and shall be installed using methods and practices that minimize flood damage. For existing mobile/manufactured homes where the repair/reconstruction of the utilities and pad equals or exceeds fifty percent (50%) of the value of utilities and pad before the repair/reconstruction has commenced, all standards for flood hazard protection applicable for residential construction shall apply to the mobile/manufactured home.

20.05.120 GEOLOGICALLY HAZARDOUS AREAS

A. DESIGNATION

Geologically hazardous areas include areas susceptible to erosion, sliding, earthquake, or other geological events. They pose a threat to the health and safety of citizens when incompatible development is sited in areas of significant hazard. Such incompatible development may not only place itself at risk, but may also increase the hazard to surrounding development and uses. Areas susceptible to one or more of the following types of hazards shall be designated as a geologically hazardous area:

1. Erosion hazard;
2. Landslide hazard;
3. Seismic hazard; and
4. Other geological events including, tsunamis, mass wasting, debris flows, rock falls, and differential settlement.

B. DESIGNATION OF SPECIFIC GEOLOGIC HAZARD AREAS

1. Erosion hazard areas. Erosion hazard areas are at least those areas identified by the U.S. Department of Agriculture's Natural Resources Conservation Service as having "severe" or "very severe" rill and inter-rill erosion hazard.
2. Landslide hazard areas. Landslide hazard areas are areas potentially subject to landslides based on a combination of geologic, topographic, and hydrologic factors. They include areas susceptible because of any combination of bedrock, soil, slope (gradient), slope aspect, structure, hydrology, or other factors. Examples of these may include, but are not limited to, the following:
    a. Areas of historic failure, such as:
        i. Those areas delineated by the U.S. Department of Agriculture's Natural Resources Conservation Service as having a "severe" limitation for building site development; or
        ii. Areas designated as quaternary slumps, earth flows, mudflows, lahars, or landslides on maps published by the U.S. Geological Survey or Department of Natural Resources.
    b. Areas with all three of the following characteristics:
        i. Slopes steeper than fifteen percent (15%); and
        ii. Hillsides intersecting geologic contacts with a relatively permeable sediment overlaying a relatively impermeable sediment or bedrock; and
        iii. Springs or groundwater seepage.
    c. Areas that have shown movement during the Holocene epoch (from ten thousand years ago to the present) or that are underlain or covered by mass wastage debris of that epoch;
    d. Slopes that are parallel or sub-parallel to planes of weakness (such as bedding planes, joint systems, and faults) in subsurface materials;
    e. Slopes having a gradient steeper than eighty percent (80%) subject to rock fall during seismic shaking;
    f. Areas potentially unstable because of rapid stream incision, stream bank erosion, and undercutting by wave action;
    g. Areas located in a canyon or on an active alluvial fan, presently or potentially subject to inundation by debris flows or catastrophic flooding; and
    h. Any area with a slope of forty percent (40%) or steeper and with a vertical relief of ten (10) or more feet except areas composed of consolidated rock. A slope delineated by establishing its toe and top and measured by averaging the inclination over at least ten (10) feet of vertical relief.
3. Seismic hazard areas. Seismic hazard areas are subject to severe risk of damage as a result of earthquake-induced ground shaking, slope failure, settlement, soil liquefaction, lateral spreading, or surface failure. The strength of ground shaking is primarily affected by:
    a. The magnitude of an earthquake;
    b. The distance from the source of an earthquake;
    c. The type and thickness of geologic materials at the surface; and
    d. The type of subsurface geological structure.

C. MAPPING OF GEOLOGICALLY HAZARDOUS AREAS

1. The approximate location and extent of geologically hazardous areas are shown on the adopted critical areas map. The adopted critical areas maps includes:

a. U.S. Geological Survey landslide hazard, seismic hazard, and volcanic hazard maps;
b. Department of Natural Resources seismic hazard maps of Western Washington, as they become available;
c. Department of Natural Resources slope stability maps, as they become available;
d. Federal Emergency Management Administration flood insurance maps; and
e. Locally adopted maps.

2. These maps are to be used as a guide for the City of Monroe, project applicants, and/or property owners, and may be continuously updated as new critical areas are identified. They are a reference and do not provide a final critical area designation.

D. BEST AVAILABLE SCIENCE

Any approval of alterations of impacts to a geologically hazardous area or any associated buffers shall be supported by the best available science.

E. NATIVE GROWTH PROTECTION EASEMENT/CRITICAL AREA TRACT

As part of the implementation of approved development applications and alterations, geologically hazardous areas and any associated buffers that remain undeveloped pursuant to the Critical Areas Regulations, in accordance with the section labeled "Protection and Mitigation Measures," shall be designated as Native Growth Protection Easements (NGPE).

When the subject development is a formal subdivision, short subdivision (short plat), or Planned Residential Development (PRD), the geologically hazardous area(s) and any buffers shall be placed in a critical areas tract instead of a NGPE, as described in the section labeled "Protection and Mitigation Measures," of these regulations.

F. ALLOWED ACTIVITIES

The following activities are allowed in geologically hazardous areas and do not require submission of a critical areas report:

1. Erosion and landslide hazard areas. Except as otherwise provided for in this Chapter, only those activities approved and permitted consistent with an approved critical areas report in accordance with this Chapter shall be allowed.
2. Seismic hazard areas. The following activities are allowed within seismic hazard areas.
   a. Construction of new buildings and/or additions will be reviewed on a case-by-case basis.
   b. Installation of fences.
3. Other hazard areas. The following activities are allowed within other geological hazard areas.
   a. Construction of new buildings and/or additions will be reviewed on a case-by-case basis.
   b. Installation of fences.

G. PERFORMANCE STANDARDS - GENERAL REQUIREMENTS

1. Alterations of geologically hazardous areas or associated buffers may only occur for activities that:
   a. Will not increase the threat of the geological hazard to adjacent properties beyond pre-development conditions;
   b. Will not adversely impact other critical areas;

c. Are designed so that the hazard to the project is eliminated or mitigated to a level equal to or less than pre-development conditions; and
d. Are certified as safe as designed and under anticipated conditions by a qualified geotechnical engineer or geologist, licensed in the state of Washington.

H. PERFORMANCE STANDARDS – SPECIFIC HAZARDS

1. Erosion and landslide hazard areas. Activities on sites containing erosion or landslide hazards shall meet the following requirements:
   a. Buffers required. A buffer shall be established for all edges of erosion or landslide hazard areas. The size of the buffer shall be determined by the City to eliminate or minimize the risk of property damage, death, or injury resulting from erosion and landslides caused in whole or part by the development, based upon review of and concurrence with a critical areas report prepared by a qualified professional.
   b. Minimum buffers. The minimum buffer shall be equal to the height of the slope or fifty (50) feet, whichever is greater.
   c. Buffer reduction. The buffer may be reduced to a minimum of ten (10) feet when a qualified professional demonstrates to the Director's satisfaction that the reduction will adequately protect the proposed development, adjacent developments and, uses and the subject critical area.
   d. Increased buffer. The buffer may be increased when the Director determines a larger buffer is necessary to prevent risk of damage to proposed and existing development.
   e. Alterations. Alterations of an erosion or landslide hazard area and/or buffer may only occur for activities for which a geotechnical analysis is submitted and certifies that:
      i. The development will not increase surface water discharge or sedimentation to adjacent properties beyond the pre-development condition;
      ii. The development will not decrease slope stability on adjacent properties; and
      iii. Such alteration will not adversely impact other critical areas.

I. DESIGN STANDARDS

Development within an erosion or landslide hazard area and/or buffer shall be designed to meet the following basic requirements unless it can be demonstrated that an alternative design that deviates from one or more of these standards provides greater long-term slope stability while meeting all other provisions of this Chapter. The requirements for long-term slope stability shall exclude designs that require regular and periodic maintenance to maintain their level of function. The basic development design standards are:

1. The proposed development shall not decrease the factor of safety for landslide occurrences below the limits of 1.5 for static condition and 1.2 for dynamic conditions. Analysis of dynamic conditions shall be based on a minimum horizontal acceleration as established by the current version of the Uniform Building Code.
2. Structures and improvements shall be clustered to avoid geologically hazardous areas and other critical areas;
3. Structures and improvements shall minimize alterations to the natural contours of the slope and foundations shall be tiered where possible to conform to existing topography;

4. Structures and improvements shall be located to preserve the most critical portion of the site and its natural landforms and vegetation;
5. The proposed development shall not result in greater risk or a need for increased buffers on neighboring properties;
6. The use of retaining wall that allow the maintenance of existing natural slopes are preferred over graded artificial slopes; and
7. Development shall be designed to minimize impervious lot coverage.

J. VEGETATION

Vegetation shall be retained unless it can be shown that the removal will not increase the geologic hazards, and a vegetation management plan is submitted with the request.

K. SEASONAL RESTRICTION

Clearing shall be allowed only from May 1st to October 1st of each year provided that the City may extend or shorten the dry season on a case-by-case basis depending on the actual weather conditions, except that timber harvest, not including brush clearing or stump removal, may be allowed pursuant to an approved forest practices permit issued by the state Department of Natural Resources.

L. UTILITY LINES AND PIPES

Utility lines and pipes shall be permitted in the erosion and landslide hazard areas only when the applicant demonstrates that no other practical alternative is available. The line or pipe shall be located above ground and be properly anchored and/or designed so that it will continue to function in the event of an underlying slide. Stormwater conveyance shall be allowed only through a high-density polyethylene pipe with fuse-welded joints, or similar product that is technically equal or superior.

M. POINT DISCHARGE

Point discharges from surface water facilities and roof drains onto or upstream from an erosion or landslide hazard area shall be prohibited except as follows:

1. Conveyance via continuous storm pipe downslopes to a point where there are no erosion hazard areas downstream from the discharge; and
2. Access roads and utilities may be permitted within the erosion or landslide hazard area and associated buffers if the City determines that no other feasible alternative exists.

N. SUBDIVISIONS

The division of land in erosion or landslide hazard areas and associated buffers is subject to provisions established for all critical areas in the section labeled “Protection and Mitigation Measures.”

O. PROHIBITED DEVELOPMENT

On-site sewage disposal systems, including drain fields, shall be prohibited within erosion and landslide hazard areas and associated buffers.

20.05.130 BONDS

An applicant for development within a critical area as identified herein may be required to furnish the City with a performance bond and/or maintenance bond for any required mitigating measures. The City Attorney or Director shall determine the amount and time limitation of the bond or other security.

20.05.140 APPEAL

Appeals of administrative decisions shall be governed by Title 21 (Development Regular Administration) of the Monroe Municipal Code.

20.05.150 ENFORCEMENT

The provisions of Chapter 21.70 (Enforcement) shall regulate the enforcement of these Critical Areas Regulations.

Adherence to the provisions of this Chapter and/or to the project conditions shall be required throughout the construction of the development. Should the Director determine that a development is not in compliance with the approved plans, a stop work order may be issued for the violation. In the event of a violation of this Chapter, the Director shall have the power to order complete or partial restoration of the critical area by the person or agent responsible for the violation. If such responsible person or agent does not complete such restoration within a reasonable time following the order, the City shall have the authority to restore the affected critical area to the prior condition wherever possible and the person or agent responsible for the original violation shall be indebted to the City for the cost of restoration. When a stop work order has been issued, construction shall not continue until such time as the violation has been corrected and that the same or similar violation is not likely to reoccur.

APPENDIX B

FINAL SHORELINE MASTER PROGRAM INVENTORY FOR THE CITY OF MONROE'S SHORELINES: SKYKOMISH RIVER AND WOODS CREEK

City of Monroe
Grant No. G0200041

November 2002

FINAL REPORT

Shoreline Master Program Inventory for the City of Monroe's Shorelines: Skykomish River and Woods Creek

Prepared for:

City of Monroe
806 West Main Street
Monroe, WA 98272

This report was funded in part through a cooperative agreement with the National Oceanic and Atmospheric Administration.

The Watershed Company
1410 Market Street • Kirkland, WA 98033
(425) 822-5242 • Fax (425) 827-8136
www.watershedco.com

City of Monroe
Grant No. G0200041

FINAL REPORT

Shoreline Master Program Inventory for the City of Monroe's Shorelines: Skykomish River and Woods Creek

Prepared for:

City of Monroe
806 West Main Street
Monroe, Washington 98272-4007

Prepared by:

The Watershed Company
1410 Market Street
Kirkland, Washington 98033
(425) 822-5242 Fax (425) 827-8136
watershed@watershedco.com
http://www.watershedco.com

This report was funded in part through a cooperative agreement with the National Oceanic and Atmospheric Administration.

The views expressed herein are those of the authors and do not necessarily reflect the views of NOAA or any of its subagencies.

November 2002

Section

List of Tables

1. INTRODUCTION

1.1 BACKGROUND

This document is intended to accomplish three objectives for the City of Monroe: 1) facilitate compliance with the State of Washington's Shoreline Management Act (SMA), 2) facilitate compliance with State of Washington's Growth Management Act (GMA), and 3) facilitate compliance with the federal Endangered Species Act (ESA).

On 29 November 2000, the Department of Ecology adopted a new set of guidelines implementing the state SMA of 1971. The state Shorelines Hearings Board invalidated Parts III and IV of the new shoreline management guidelines on 27 August 2001, leaving only Parts I and II (procedural rules for Shoreline Master Program [SMP] amendments) and the original SMA in place. Accordingly, the current standard for preparation of SMP amendments is guidance found in RCW 90.58.100(1):

> "(a) Utilize a systematic interdisciplinary approach which will insure the integrated use of the natural and social sciences and the environmental design arts;
>
> (b) Consult with and obtain the comments of any federal, state, regional, or local agency having any special expertise with respect to any environmental impact;
>
> (c) Consider all plans, studies, surveys, inventories, and systems of classification made or being made by federal, state, regional, or local agencies, by private individuals, or by organizations dealing with pertinent shorelines of the state;
>
> (d) Conduct or support such further research, studies, surveys, and interviews as are deemed necessary;
>
> (e) Utilize all available information regarding hydrology, geography, topography, ecology, economics, and other pertinent data;
>
> (f) Employ, when feasible, all appropriate, modern scientific data processing and computer techniques to store, index, analyze, and manage the information gathered."

The following inventory and analysis of the City of Monroe's shorelines, the Skykomish River and Woods Creek, was conducted using the above guidance and giving consideration to the expected performance-based standard of protecting and restoring ecosystem-wide processes and ecological functions.

In 1997, the City of Monroe incorporated the goals and policies of its Shoreline Management Master Program into its Comprehensive Plan (a GMA planning document) as a new element called "Shoreline Management." An amendment to the GMA (RCW

36.70A.172) requires use of "best available science" to develop policies and development regulations protecting functions and values of critical areas, and required that those policies and regulations "give special consideration to preserving or enhancing anadromous fisheries." As this report supports future changes to the City's Shoreline Management element, best available science criteria were used in the selection of reference materials and in the development of this report. The condition of habitat for anadromous fish (in particular, the ESA-listed species) is discussed extensively in Sections 3 and 4.

Chinook salmon and bull trout were listed as threatened under the federal ESA in March 1999 and November 1999, respectively. In June 2000, the National Marine Fisheries Service (NMFS) adopted a Section 4(d) Rule prohibiting "take" of chinook salmon (U.S. Federal Register, 10 July 2000). The U.S. Fish and Wildlife Service (USFWS) prohibited take of bull trout at the time of its listing. "Take" is defined as "harass, harm, pursue, hunt, shoot, wound, kill, trap, capture, or collect, or attempt to engage in any such conduct." "Harass" has been further defined as "actions that create the likelihood of injury to listed species to such an extent as to significantly disrupt normal behavior patterns which include, but are not limited to, breeding, feeding or sheltering." "Harm" has been further defined as "significant habitat modification or degradation that results in death or injury to listed species by significantly impairing behavioral patterns such as breeding, feeding, or sheltering" (NMFS 1999). The prohibition against take applies to federal, state, and local governments, as well as individuals and businesses. Any City of Monroe actions or programs that "take" listed fish put the City at risk for legal action. To reduce risk, the City must evaluate all programs and actions to determine their potential for take. Because the City borders the Skykomish River and Woods Creek, shorelines that contain listed fish, the potential for take is moderately high. Critical habitat designated for Puget Sound chinook salmon (U.S. Federal Register, 16 February 2000) was withdrawn as of 30 April 2002 as part of a settlement between NMFS and the National Association of Home Builders. Designation of critical habitat will be reevaluated with special emphasis placed on economic analysis. NMFS "expects this action will not significantly affect the protection of … chinook…" because "[t]he authorities of the Endangered Species Act (sections 4, 7, 9, and 10) that [NMFS] primarily relies on for its enforcement and protective actions remain in effect" (NOAA 2002). As mentioned above, the definition of take already includes habitat modification or degradation.

The following analysis of the Skykomish River and Woods Creek will provide the City with a foundation for reviewing its planning documents and activities, and making science-based modifications that will satisfy regulatory requirements, protect and restore the environment for the benefit of its residents and fish and wildlife, and reduce risk.

1.2 SHORELINE BOUNDARY

As defined by the Shoreline Management Act of 1971, shorelines include certain waters of the state plus their associated "shorelands." Shorelands are defined as:

> "those lands extending landward for 200 feet in all directions as measured on a horizontal plane from the ordinary high water mark; floodways and contiguous floodplain areas landward 200 feet from such floodways; and all wetlands and river deltas associated with the streams, lakes, and tidal waters which are subject to the provisions of this chapter…Any county or city may determine that portion of a one-hundred-year-floodplain to be included in its master program as long as such portion includes, as a minimum, the floodway and the adjacent land extending landward two hundred feet therefrom (RCW 90.58.030)"

The City of Monroe's current shoreline boundary (Figure 1[1]) appears to have been based partially on the floodway and partially on the floodplain as mapped by the Federal Emergency Management Agency (FEMA) (see Figure 8). However, significant areas of associated wetlands were not included in the formal map of the shoreline. The City's shoreline boundary has been updated concurrent with this assessment to include the entire 100-year floodplain, those areas landward 200 feet from the floodway that are not otherwise in the 100-year floodplain, and any associated wetlands. The revised shoreline boundary is illustrated on Figure 1. All calculations of land use and impervious surface areas conducted in the course of this assessment were made using the revised shoreline boundary.

1.3 METHODOLOGY

Per the guidance contained in the SMA, an attempt was made to "gather and incorporate all pertinent and available information, existing inventory data and materials from state agencies, affected Indian tribes, watershed management planning, and other appropriate sources." A list of potential information sources was compiled and an information request letter was distributed (Appendix B). Collected information was supplemented with other resources such as City documents, scientific literature, personal communications, aerial photographs, internet data, and a physical inventory of the City's shorelines. The Skykomish River and Woods Creek were divided into segments, and the condition of each segment was described qualitatively. The aquatic habitat was characterized using the categories listed in the NMFS Matrix of Pathways and Indicators (1999), although the matrix labels were not applied as NMFS definitions are not necessarily appropriate for the City's shoreline and streams.

[1] **Note: all figures are located in Appendix A at the end of this report.**

2. LAND USE AND "ALTERED" CONDITIONS

The City of Monroe is located approximately 25 miles northeast of Seattle, on the right bank of the Skykomish River. State Route (SR) 2, which has its western terminus in Everett, passes through Monroe and follows the Skykomish eastward towards Stevens Pass. Woods Creek is the largest tributary to the Skykomish in Monroe, and meets the river at the western edge of Al Borlin Park, at approximately river mile[1] 25 on the Skykomish.

The City of Monroe encompasses 4.33 square miles. An additional 2.67 square miles around Monroe has been designated as Urban Growth Area, yielding a total planning area of 7.00 square miles. Most of this area is situated on alluvium, soils deposited by river processes, and is relatively flat, ranging in elevation from approximately 40 to 60 feet. The higher land to the north (rising to 200 feet and above) is underlain by a combination of glacial outwash (material deposited by glacial meltwater) and glacial till (material directly deposited by glaciers). The southwestern portion of the City, in the vicinity of the Washington State Department of Corrections facility, is also situated on glacial till.

Before 1960, the population of Monroe remained small and relatively constant at under 2,000. Exponential growth has occurred since 1980. By 1990, the population had grown to almost 4,300, and by 2000, well over 13,000 people lived in Monroe (Figure 2).

The shoreline jurisdiction of Monroe includes the land bordering the Skykomish River and Woods Creek. The total length of shoreline is over 3.5 miles, and while only one side of the Skykomish is within the City limits, both sides of Woods Creek are within the City. This creates a total shoreline area of approximately 446 acres. The shoreline area is divided between two subbasins: the lower mainstem Skykomish subbasin and the lower Woods Creek subbasin (Figure 3).

2.1 HISTORIC LAND USE AND WATERSHED CONDITIONS

The Skykomish River drains 842 square miles, originating high in the Cascades, including some glacially fed tributaries, and flowing west to the Puget Lowlands, where it meets the Snoqualmie River. The confluence of the Skykomish and Snoqualmie rivers form the Snohomish River, the second largest river entering Puget Sound.

The two primary tributaries of the Skykomish are the North Fork and the South Fork, which join the mainstem near Index, approximately 24 river miles upstream of Monroe. Both forks of the Skykomish originate in steep bedrock valleys, composed primarily of Tertiary granitic rock. From the confluence of the North and South Forks, the Skykomish

[1] The river mile gives the distance along a river or stream, measured from its mouth along the course of the channel, following all of its bends and turns.

continues through a relatively narrow valley for approximately four miles, where it enters a broad, glacially carved valley.

The Skykomish carries approximately 21,000 cubic yards of sediment annually (Collins and Dunne 1990, cited in DOE 1999). This sediment load is not transported in a smooth, continuous process; instead, some areas are dominated by erosion, and others by deposition. From the confluence of the North and South Forks to Startup in the glacially carved valley, the river is lacking in sediment and erodes the banks and bed of the channel. Further downstream, between Startup and Sultan, the river is no longer competent to carry its sediment load, and deposition occurs. From Sultan to Monroe, flood control projects have altered the sediment regime, with the result that there is neither excess erosion nor deposition. From Monroe to the Snohomish, deposition again dominates, and the river is considered unstable (Collins and Dunne 1987, cited in DOE 1999).

The gradient of the Skykomish has been described as "relatively steep" for a river its size, steeper than either the mainstem Snoqualmie or the mainstem Snohomish. The combination of steep gradient and high sediment load produces excellent spawning habitat for chinook and steelhead (Pentec Environmental, Inc. [Pentec] and NW GIS 1999). An abundance of side channels and alcoves produces good rearing and refuge habitat. The relatively steep gradient increases the power of the stream, so that woody debris generally only becomes stable if it forms into jams.

The path of the Skykomish within Monroe is relatively straight, but large abandoned meander loops indicate that the river once had a much more sinuous pattern. An 1888 survey map shows a much more sinuous channel in the Monroe area, including several side channels and large islands (Northwest Hydraulic Consultants inc. [NHC] 2001). However, the river had shifted to a pattern similar to its current one by 1917. Since 1917, various side channels have opened or been abandoned, but the primary channel has remained relatively stable.

Non-native American usage of the basin began over 100 years ago. In the late 1800s, woody debris was removed from the river to improve navigation, and wood and agricultural products were transported down the river to Port Gardner in Everett. The primary land use in the Snohomish basin has been forestry, with agriculture and urban development following well behind (Pentec and NW GIS 1999). The Culmback Dam on the Sultan river, which impounds Spada Lake, is the only dam upstream of Monroe.

Most of the riparian forest that once dominated the broad Skykomish floodplain near Monroe was cleared. While the basin is currently considered to be recovering from some of these past impacts (Pentec and NW GIS 1999), human activity continues to have an effect on the river.

Given the high rate of population growth in the Skykomish Basin, especially in Monroe, urbanization is becoming an increasingly important factor. Urbanization can increase peak flow rates and durations, introduce pollutants to surface waters, eliminate forested riparian vegetation, disturb stream channel structure, reduce groundwater recharge, and reduce low flow levels in streams (Booth and Jackson 1997).

Levee construction, draining and clearing began in the late 1800s, using dredged river material, local earth fill, and waste wood chips (hog fuel) (Snohomish County 1991). Such projects were generally small scale, and designed to protect individual property owners. In the early 1900s, diking districts were formed, and are still active today. The diking districts pool money from a number of property owners, and use this money to build and maintain larger scale structures. Most dikes in the Snohomish River valley are now maintained by one of nine public diking districts.

According to a map produced by Pentec and NW GIS (1999), 21 dikes/levees exist on the Skykomish between Index (on the North Fork) and Monroe. Additionally, eight significant bank hardening projects have been installed on the mainstem Skykomish, as well as a few small projects on various tributaries. Finally, SR 2, which parallels the Skykomish and the South Fork Skykomish towards Stevens Pass, has undoubtedly been associated with several bank-hardening projects not shown on the map.

2.2 CURRENT LAND USE AND PLANNING DESIGNATIONS

The City maintains several planning documents and maps that facilitate management of appropriate and desired growth within the City limits and the Urban Growth Area. Primary current land use, zoning (Figure 4), and preferred future land use (Figure 5) favor residential development (24% of City's area including UGA), and maintenance of special regional uses (e.g., Evergreen State Fairgrounds and Washington State Department of Corrections facility) (14%) and public parks/open space (18%) (City of Monroe 1998a).

The following sections describe current land use, zoning, preferred land use, and shoreline designations within the shoreline zones of the Skykomish River and Woods Creek. Tables 1 and 2 show comprehensive plan designations and zoning as a percent of total shoreline area. Because of the modifications to the original shoreline boundary, percentages of land area are not provided for SMP environment designations.

SKYKOMISH RIVER

In the shoreline zone, the current uses are primarily undeveloped (portions of Al Borlin Park and Skykomish River Centennial Park, protected wetlands and vegetated stream and wetland buffers), mineral extraction, and active park. Although portions of Al Borlin

Table 1. Summary of planning designations [1] in the Shoreline Zone of the Skykomish River.

Bank	Comp Plan	%	Zoning	%	SMP Environment Designation
Right	Limited Open Space	58.7	Limited Open Space	58.7	Rural
	Special Regional Use	1.2	Public Open Space	40.9	None assigned
	Public Facilities - Schools	0.3			None assigned
	Parks/Open Space	39.4			Rural / None assigned
	Industrial	0.4	Light Industrial	0.4	None assigned

Park are technically in the shoreline zone of both the Skykomish River and Woods Creek, all of Al Borlin Park was included in the Skykomish River planning designation summary to avoid double-counting.

The majority of the Skykomish River shoreline is zoned for limited open space (primarily Cadman Inc. gravel operation) and public open space (Skykomish River Centennial Park, Al Borlin City Park, and Washington State Department of Corrections facility) (City of Monroe 1999) (see Figure 4, Table 1). These zoning designations are consistent with the City's future land use designations contained in the Comprehensive Plan (City of Monroe 1998a). The primary comprehensive plan designations in the shorelands are limited open space (which corresponds directly to the limited open space zone), and parks/open space and public facilities-school (which corresponds directly to the public open space zone) (see Figure 5). A small area north of the Cadman operation is currently zoned and projected for future land use as light industrial and industrial, respectively. The current Shoreline Master Program (City of Monroe 1998a) identifies Rural, Conservancy, and Suburban shoreline areas along the Skykomish River.

WOODS CREEK

In the shoreline zone, the current uses are undeveloped (portions of Lewis Street Park, protected wetlands and vegetated stream and wetland buffers), single-family and multi-family residential areas, active park, and a small industrial area (see Table 2). As previously mentioned, the portion of Al Borlin Park that is technically within the Woods Creek shoreline are excluded from this discussion to avoid double-counting with the Skykomish River shoreline.

[1] Existing land use was determined using digital planimeter measurements taken from a 2001 aerial photograph produced at a 1"=157' scale (approximate, photos not ortho-corrected). Planning designations were transferred to the 2001 aerial photograph for measurement.

Table 2. Summary of planning designations[1] in the Shoreline Zone of Woods Creek (non-Skykomish River floodplain sections).

Bank	Comp Plan	%	Zoning	%	Current SMP Environment Designation
Right	Parks/Open Space	13	Public Open Space	13	Suburban
	Residential (R5-7)	23.1	Urban Residential (UR 6000)	28.8	Suburban
			Multi-Family (MR 6000)	8.4	Urban
	Industrial	26.2	General Industrial	26.2	Urban
	General Commercial	34.8	General Commercial	34.8	Conservancy
Left	Residential (R3-5)	40.2	Urban Residential (UR 9600)	40.2	Conservancy
	General Commercial	59.8	Public Open Space	33.3	
			General Commercial	26.5	

The Woods Creek shoreline is zoned for public open space (Lewis Street Park), urban residential, multi-family residential, general industrial, and general commercial (City of Monroe 1999) (see Figure 4). These zoning designations are generally consistent with the City's future land use designations contained in the Comprehensive Plan (City of Monroe 1998a). The comprehensive plan designations in the shoreline zone are residential (R3-5, R5-7), parks/open space, general commercial, and industrial (see Figure 5). The current Shoreline Master Program (City of Monroe 1998a) identifies Urban, Conservancy, and Suburban shoreline areas along Woods Creek.

2.3 PARKS AND OPEN SPACE/PUBLIC ACCESS

As noted above in Tables 1 and 2, a substantial portion of the City's shoreline zone is occupied by City parks and open space (Figure 6). Figure 7 shows only City parks. The total shoreline length of the City (including both banks of Woods Creek) is approximately 4.5 miles, of which 2.3 miles is park (almost 51%). Skykomish River Centennial Park, Lewis Street Park, and Al Borlin Park border approximately 1.3 linear miles of the in-City portion of the Skykomish River. Lewis Street Park and Al Borlin Park border approximately1.03 miles of the in-City portion of Woods Creek. Therefore, a detailed discussion of the City's shoreline parks is necessary as fish and wildlife use and habitat function has and can be significantly impacted by past, current, and future

[1] Existing land use was determined using digital planimeter measurements taken from a 2001 aerial photograph produced at a 1"=157' scale (approximate, photos not ortho-corrected). Planning designations were transferred to the 2001 aerial photograph for measurement.

management of the parks. Because the park lands are owned by the City, the opportunities for restoration are greater and the obstacles for implementation are fewer than on private land.

The *Park and Recreation Element* of the City of Monroe's Comprehensive Plan has specific policies for improving environmental conditions in the City's parks and open space areas. The relevant policies are as follows:

> *PR-4.5* – The city shall look toward increased mitigation of sensitive natural areas by using PRD codes in developments where sensitive natural areas exist.
>
> *PR-4.6* – The city wetland open space areas shall be preserved and where possible, a net increase in wetlands classifications shall be pursued.
>
> *PR-4.7* – The city shall strive to control non-indigenous plants or weeds that are proven harmful to native and/or beneficial vegetation or habitats.
>
> *PR-4.8* – The city shall make efforts to meet and maintain state and county water quality standards in the city's lakes and streams.

According to the City of Monroe's Parks Department, Monroe has more park and open space acreage than any other city in Snohomish County (City of Monroe 2001). As previously mentioned, approximately 18 percent of the City's area (including the UGA) consists of public parks and limited open space. A substantial portion of that area is located along the City's shorelines. There are three shoreline parks in the City: Skykomish River Centennial Park, Lewis Street Park, and Al Borlin Park (also known as Buck Island Park). These three parks are described briefly below:

> Al Borlin Park: The 90-acre Al Borlin Park is located between Woods Creek and the Skykomish River, and extends northwest from the mouth of Woods Creek to the Burlington Northern – Santa Fe Railroad, which is south of and roughly parallel to U.S. Highway 2. The majority of the park is forested, except for a landscaped picnic area at the mouth of Woods Creek, a parking area and gravel road near the north end of the park, and the network of formal and informal trails. Pedestrians and bicyclists frequently use the trails, and formal and informal trails are used often for fishing access. The park, essentially a low-elevation island no more than 15 feet above the normal water level, occasionally closes during winter floods (City of Monroe 1998a).
>
> According to Steve Crueger, Parks Superintendent (pers. comm., 25 January 2002), maintenance of Al Borlin Park typically consists of mowing in the parks small lawn area, placement of gravel on formal trails once per year, garbage removal, and vegetation clearing within 3 to 4 feet of formal trails. Gravel replacement is necessary due to losses during floods and losses to trail fringes or embeddedness as a result of pedestrian traffic. Any trees that fall in the park are left intact, except for

those portions of the tree that fall across the trail. Live or snag tree removal only occurs when the tree poses a safety hazard; hazard trees are cut and left on site. The Parks Department does not use any chemicals to control vegetation, nor does it have a formal invasive plant control program (e.g., for Himalayan blackberry or Japanese knotweed). Additional efforts appear necessary in Al Borlin Park to control Himalayan blackberry and Japanese knotweed as directed by PR-4.7.

The Parks Department has recently solidified a relationship with the Stillaguamish-Snohomish Fisheries Enhancement Task Force. The Task Force has completed several small vegetation enhancement projects in the past, most recently clearing a few patches of the invasive non-native Japanese knotweed along Woods Creek and planting western red cedar and other native trees. The Task Force submitted a report to the City, which included background information on the physical and biological character of Al Borlin Park; recommendations to enhance vegetation, increase public education efforts, and stabilize eroding Skykomish River bank at the southwest end of the island; and a proposed vegetation management schedule through 2004 (Ward, pers. comm., 28 March 2001; Appendix C). This timeline would likely be accelerated and additional activities added now that Monroe and the Task Force are committed to working together to improve Al Borlin Park.

Bank erosion is allowed to occur naturally, and no bank areas have been armored since the Parks Department has been managing the park. The only areas of significant erosion have occurred on the Skykomish River at the end of a dirt access road, and at the southwest tip of the island. Approximately 10 feet of bank at the access road has been lost during the past 12 years (Crueger, pers. comm., 25 January 2002).

Future plans for the Park include preparation of a Master Park Plan that would be consistent with the existing natural environment. New developments would likely be limited to minor improvements to existing parking and restroom facilities, placement of barriers to prevent vehicle access to the shoreline, and additional trails. Prevention of vehicle access to the waterfront is consistent with the following public access policies contained in the Shoreline Management Element of the Comprehensive Plan:

2. Locate, design and maintain public access development so as to protect the natural environment and natural processes.

6. Control and regulate public access on the public-owned shorelines to insure that the ecology shall not be unduly damaged by public use.

Lewis Street Park: The 5-acre Lewis Street Park is located between Lewis Street and Woods Creek, bounded to the south by the Skykomish River. The park includes parking areas, restroom facilities, play equipment, lawn area, and picnic benches (City of Monroe 1998a). Except on the steep slopes to the east along Woods Creek and to the south along the Skykomish, there are no natural vegetated areas. Century-old

cedar trees in the park have been retained (City of Monroe 1998a). A pedestrian bridge connects Lewis Street Park to Al Borlin Park.

According to Steve Crueger, Parks Superintendent (pers. comm., 25 January 2002), maintenance of Lewis Street Park typically consists of mowing, restroom upkeep, and weed control. Weeds are usually pulled by hand, but occasionally spot applications of Roundup® are used in the compacted gravel parking area. These rare occasions of chemical use do not occur when rain seems imminent.

Skykomish River Centennial Park: The 32-acre Skykomish River Centennial Park is located east of the Cadman, Inc. property with approximately 1,330 feet of Skykomish River frontage. Skykomish River Centennial Park is the only active use park in the City's shoreline, although most of the active-use facilities such as baseball and soccer fields are located more than 200 feet from the river near the north end of the park. The fields are treated with a granular fertilizer and liquid weed control at appropriate times of year and during appropriate weather conditions (Crueger, pers. comm., 1 March 2002). No chemicals are applied within 200 feet of the Skykomish River. The waterfront portion of Skykomish River Centennial Park allows for limited vehicle parking, and is frequently used for fishing access. A pedestrian shoreline trail starting in the Cadman, Inc. property continues east across the park.

Public access is provided at each of the parks discussed above. In addition, Cadman, Inc. allows access to the Skykomish River via its property for recreational fishing and other waterfront enjoyment uses. Cadman has an informally designated parking area on the south side of the facility, with a pedestrian trail leading to the gravel bar. A narrow dirt trail extends east along the Skykomish River through the Cadman, Inc. property to Skykomish River Centennial Park. Public access is also provided at a WDFW boat ramp on the Skykomish River just east of Skykomish River Centennial Park. Access is limited during low flow periods; Search & Rescue operations during low-flow periods launch from the Cadman site. A list of public access points is provided in Appendix D.

2.4 IMPERVIOUS SURFACE

The total impervious area (TIA) is a combination of areas that have had their infiltration capacity reduced through human activity and those areas that naturally contribute to surface water. Although portions of Al Borlin Park are technically in the shoreline zone of both the Skykomish River and Woods Creek, all of Al Borlin Park was included in the Skykomish River impervious surface calculation to avoid double-counting. This artificially inflates the impervious surface percentage calculated for Woods Creek. The net impervious surface percentage for the collective shoreline is approximately 19 percent.

SKYKOMISH RIVER

The shoreline jurisdiction of the Skykomish River has a very low impervious surface percentage due to the large area of natural park land and the characteristics of the Cadman gravel operation. TIA estimated from aerial photographs is only about 5.5 percent in the shoreline area (Table 3). Note that all areas are on the right bank of the Skykomish. According to *The Snohomish County Land Cover Project* (Purser and Simmonds 2001), the Lower Mainstem Skykomish Subbasin has a total impervious surface area of 7.5 percent (high impervious 3% plus medium impervious 7%*0.5, plus open water 1%).

Table 3. Impervious surface within the Shoreline Zone of the Skykomish River.

	Area (acres)[1]	Runoff Coefficient (Avg)	Equivalent impervious surface (acres)
Building	1.92	0.85	1.63
Road – paved	2.89	0.825	2.39
Road – gravel	8.49	0.8	6.79
Parking lot – paved	0.39	0.825	0.33
Parking lot - gravel	0.16	0.8	0.13
Open Gravel	39.66	0.05	1.98
Open Water	50.43	0.0	0.00
Undeveloped	301.85	0.2	60.37
Total	**405.8**		**73.62**
			TIA = 5.5%

WOODS CREEK

As previously mentioned, the portion of Al Borlin Park (which falls under the "undeveloped" category) that is technically part of the shoreline of Woods Creek was excluded from the calculation of impervious area so the value reported below is substantially inflated. TIA estimated from aerial photographs is about 27 percent in the shoreline area (Table 4). According to *The Snohomish County Land Cover Project* (Purser and Simmonds 2001), the Lower Woods Creek Subbasin has a total impervious surface area of 12.5 percent (split between high impervious 6% and medium impervious 13%*0.5).

2.5 FILLED AREAS

Significant shoreline fill areas are relatively limited in the City's shorelands. The most significant fill areas are primarily associated with an old railroad bed through Al Borlin Park, and shoreline hardening and minor flood-protection areas along the Skykomish

[1] Impervious surface was determined using digital planimeter measurements taken from 2001 aerial photographs printed at a 1"=157' scale. The aerial photographs were not ortho-corrected.

Table 4. Impervious surface within the Shoreline Zone of Woods Creek (non-Skykomish River floodplain sections).

	Area (acres)[1]	Runoff Coefficient (Avg)	Equivalent impervious surface (acres)
Building	2.59	0.85	2.20
Road – paved	1.01	0.825	0.83
Road – gravel	0.71	0.8	0.57
Parking lot – paved	0	0.825	0
Parking lot - gravel	0	0.8	0
Open Gravel	0	0.05	0
Open Water	0	0.0	0
Undeveloped	35.52	0.2	7.1
Total	**40.23**		**10.7**
			TIA = 27%

River and Woods Creek. Minor fills related to buildings, paved and gravel roads, and paved and gravel parking lots cover approximately 4 percent of the shoreline area (using the impervious surface areas reported in Tables 3 and 4). The Cadman operation is currently a network of substantial cuts and fills, which is expected to ultimately result in net cut. The volume of fill at this operation varies as roads and stockpiles change configuration, but is primarily derived from material excavated elsewhere on-site. One notable exception is approximately 375,000 tons of off-site material that has been or will be used as fill in the deepest portions of the main gravel pit.

2.6 ROADS AND BRIDGES

Several paved and unpaved roads are within the City's shoreline jurisdiction. SR 2, a heavily traveled two lane highway leading to one of the primary routes over the Cascades, parallels the Skykomish at the upstream end of Monroe. In Al Borlin Park, an unpaved road leads to a parking lot on an actively eroding bank of the Skykomish. Near the SR 203 bridge, a park maintenance road and walking trail (unpaved) crosses Woods Creek and meanders within the shoreline jurisdiction, at two points intersecting actively eroding banks of the Skykomish. The boat ramp and associated parking lot maintained by WDFW just west of the SR 203 bridge are largely unpaved (though the ramp itself is concrete). In Skykomish River Centennial Park, west of the boat ramp, a paved maintenance road between the Waste Water Treatment Plant (WWTP) and the Skykomish appears to have captured flow from the most recent flood event, estimated to have a recurrence interval of approximately two years. A feature on the south side of the gravel pit may have once been an unpaved road, but is now a high flow channel. Finally, 177th Avenue SE, on the west side of Monroe, is a paved road built on top of a revetment.

[1] Impervious surface was determined using digital planimeter measurements taken from 2001 aerial photographs printed at a 1"=157' scale. The aerial photographs were not ortho-corrected.

The shoreline zone of Woods Creek includes part of the downtown core of Monroe, on the northwest bank of the creek. Roads in the area are typical of older downtown residential neighborhoods – a grid of north-south and east-west oriented, relatively narrow paved streets. None of the residential streets cross the creek. On the opposite bank of Woods Creek, a few park access roads exist in Al Borlin Park, most of which are unpaved. Upstream of the downtown area, the roads in the Woods Creek shoreline include SR 2, a five-lane highway that narrows to two lanes in the eastern portion of the shoreline area, and Old Owen Road, a heavily traveled, two-lane, residential road. A short access road also connects a motel and cabins to Old Owen Road on the southeast bank of Woods Creek.

Only two bridges exist over the Skykomish in Monroe. The SR 203 bridge is a single span that carries a two-lane highway, with an abutment very near to the mouth of Woods Creek. Approximately two-thirds of a mile upstream of SR 203, an abandoned railroad spur crosses, supported by two piers built on artificial islands.

A total of four bridges cross Woods Creek within the city limits. The uppermost is a concrete bridge with a wooden center pier at Old Owen Road, on the northern edge of the City. Moving downstream, the next bridge is at SR 2, a single span bridge, followed by the Burlington Northern railroad, supported by two mid-channel piers, the abandoned railroad spur, and finally a small single-span bridge on an access road in Al Borlin Park.

2.7 FLOOD CONTROL STRUCTURES

SKYKOMISH RIVER

Two primary flood control structures exist on the Skykomish River in Monroe (Figure 8). At the upstream end of the City's jurisdiction, a rip-rap revetment protects the railroad track that runs between SR 2 and the Skykomish. The entire revetment is approximately 3,000 feet long, but only approximately 1,000 feet of it is within the City limits. The revetment affects little floodplain, since it is placed at the base of a hill that rises approximately 150 feet above the floodplain.

Further downstream, another rip-rap revetment begins at the base of the SR 203 bridge and extends downstream approximately 1,500 feet. Much of the land protected by the revetment is a parking lot managed by WDFW, and is associated with the boat ramp located immediately downstream from the bridge. The Monroe WWTP also has an outlet to the Skykomish in this revetment, and the rip-rap near the outlet appears to be much newer than the remainder of the revetment. At one time, the entire segment of river between the WDFW parking lot and the southern boundary of the current gravel pit was protected by a revetment. However, a 1960 flood removed much of this revetment, leaving only the revetment described above (City of Monroe 1994).

In addition to these two primary revetments, a few other structures should be addressed. One is located along the southern boundary of the gravel pit, where unvegetated gravel deposits mark the boundary between the floodplain and the pit. Hence, the southern boundary of the pit may be considered a revetment. However, this gravel does not appear to be piled higher than the rest of the gravel mining operation area, and was therefore probably not placed to prevent floodwater from entering the pit. This boundary may be a more or less natural feature that has simply been cleared of vegetation.

On the north and west sides of the pit is a tributary channel. According to Pentec and NW GIS (1999), a revetment exists on the portion of the channel that is oriented east-west. This tributary channel appears to be in a similar location to an old channel of the Skykomish (NHC 2001), and may be considered part of the ordinary high water mark of the Skykomish. However, the volume of flow from this channel indicates that it functions as a tributary, and it may be that the tributary has captured an abandoned channel of the mainstem river. Regardless of its genesis, the revetment on this channel has little or no practical influence on the mainstem of the Skykomish.

WOODS CREEK

Significant flood control structures on Woods Creek exist near Old Owen Road (see Figure 8). Viewed from Old Owen Road and looking downstream, Woods Creek makes a bend to the left. On this bend, the left bank has been built up several feet with rip-rap and soil to prevent flooding of a motel and cabins. The right bank is armored with rip-rap, but the rip-rap is generally flush with the top of the bank. This protection ends at the end of the motel property. Four bridges cross Woods Creek: SR 2, the Burlington Northern railroad track, the old railroad spur, and an access road in Al Borlin Park. Each of these bridges has some bank protection associated with them, but only enough to protect the bridge abutments. Further downstream in Al Borlin Park, a few minor areas of bank protection exist. These are minor in scope, encompassing only 10 to 20 feet of bank, and their original purpose is unknown.

2.8 DOCKS, PIERS, AND OVER-WATER STRUCTURES

With the exception of the bridges discussed in Section 2.6, no dock, piers or over-water structures exist along the Skykomish shoreline. The WDFW boat ramp west of the SR 203 bridge is the only boat access to the Skykomish in the City. Several old pilings were noted along the shoreline, but whatever structures they might have been used for no longer exist, with the exception of the railroad bridge.

2.9 STORM WATER AND SEWER OUTFALLS, AND OTHER UTILITIES

There are a total of seven documented outfalls to Woods Creek and the Skykomish River in Monroe (see Figure 7). The WWTP discharges its treated water to the Skykomish

River. It is currently capable of treating up to 3.229 million gallons per day, but in June of 2002, its capacity will be increased to 5.686 million gallons per day. Treated water generally leaves the plant via gravity flow, but pumps can be employed when water levels in the river are high. While some storm water does go through the WWTP to be discharged with the treated water, there is also a separate WWTP outfall that discharges only storm water (Feilberg, pers. comm., 6 March 2002).

The outfalls on Woods Creek are all stormwater outfalls. Three of these (Ann Street, McDougal and Lewis Street) drain primarily older residential and mixed-use neighborhoods. Water collected from SR 2 east of approximately Kelsey Street outfalls to Woods Creek near the overpass. A retail area and parking lot between Woods Creek Road and Old Owen Road drains via an outfall to Woods Creek north of SR 2.

While there are no major utility facilities in the shoreline zone, the residential and commercial properties in the shoreline area are serviced by various utilities, including water, sewer, electric, gas, phone and cable.

2.10 CULVERTS AND OTHER FISH PASSAGE BARRIERS

No fish passage barriers occur along the Skykomish River adjacent to the City of Monroe. A bridge carrying SR 203 and an unused railroad bridge cross the river, entering the City from unincorporated Snohomish County from the south, but neither poses a barrier or hindrance to fish migration. A backwater area off of the river, including beaver pond and oxbow areas, is located between 177th Avenue SE and the west side of the Cadman gravel mining area. The beaver dams may or may not hinder the upstream movements of adult and juvenile fish depending on the condition of the dams at any given time, the stage of the river, and the amount of flow coming out of the backwater area into the river. The Cadman access road crosses the backwater area, but the culvert under the road is not expected to impede fish passage either upstream or downstream due to the low gradient through the area. Juvenile salmonid fish utilizing the backwater areas for rearing or as refuge during periods of high river flow should be able to work their way back downstream to the river at will.

Within the City, Woods Creek is crossed by a number of bridges including a park pedestrian/vehicle access road bridge, two railroad bridges, the SR 2 bridge, and the Old Owen Road bridge at the City limits. No fish migration barriers or hindrances due to these bridges or other possible causes occur along Woods Creek within the City. There are no culverts present along the creek in this section. As mentioned previously, a small unnamed tributary, # 07-0827, enters Woods Creek through a piped section on the right (west) bank immediately upstream of SR 2. This piped section is likely not entirely fish passable, and the feasibility of restoring the lower sections of this creek to an open, fish-passable channel should be investigated.

3. BIOLOGICAL RESOURCES AND CRITICAL AREAS

3.1 WETLANDS

Information on wetlands in the shoreline zone was provided by: 1) National Wetlands Inventory (as shown on WDFW Priority Habitats and Species maps) (WDFW 2001a), 2) 2001 aerial photographs provided by the City, 3) the *Draft Supplemental Environmental Impact Statement – Skykomish River Pit – Cadman Inc*. (City of Monroe 1994), and 4) the City of Monroe Comprehensive Plan (1998a). Numbers have been assigned to the wetlands known to be located within the shoreline zone. These numbered wetlands are listed and briefly described in Table 5 and illustrated on Figure 9. Additional information about wetlands in the shoreline zone is provided in Section 3.3.3 (*Sensitive Wildlife Use and Habitats in the Monroe Area*) and the *Priority Habitat* discussions under each segment description in Section 4 (*Existing Conditions in the City of Monroe*). Additional site-specific review would be required to determine the presence of any additional associated wetlands, and to locate the exact boundaries of the following known wetlands.

Existing regulatory standards for wetlands are described in the City of Monroe Sensitive Area Guidelines (1990). However, the City is currently reviewing and revising these standards and plans to adopt revised sensitive area regulations in 2002/2003. In the existing guidelines, wetlands are classified into three classes based on size, plant and animal associations, vegetation type, and on the number of wetland subclasses within the wetland.

3.2 AQUIFER RECHARGE AREA

The shoreline areas of Monroe are underlain primarily by recessional outwash (deposits left by meltwater rivers as glaciers retreated at the end of the Ice Age) and younger alluvium (river deposits developed from more recent deposits not effected by continental glaciation), with some glacial till (dense, clay-rich material deposited and compacted by glaciers) in the vicinity of the Washington State Department of Corrections facility at the far western portion of the shoreline area (City of Monroe 1998b).

Glacial till is relatively impervious, and is therefore a poor aquifer. Outwash deposits are much better aquifers due to their much higher permeability. Since the outwash deposits tend to be at a higher elevation than their surroundings in Monroe, they are recharged primarily by downward percolation of precipitation. As water percolates through the outwash deposits, it commonly intersects areas of lower permeability and is forced to migrate laterally. As the laterally migrating water reaches the edge of the outwash, it is either passed to the neighboring deposit or emerges as a spring or seep and becomes

Table 5. Wetlands within the Shoreline Zone of the Skykomish River and Woods Creek.

Wetland	General Location	Wetland Class	Water Regime	Functions	Approximate Size	DOE Wetland Category
1	Cadman Pit	Palustrine Forested, Scrub/ Shrub, Aquatic Bed, Emergent, and Open Water	Some portions are seasonally flooded, some are semi-permanently flooded, and some are permanently flooded.	Moderate to high functions for wildlife habitat and food chain support; moderate functions for flood storage and water quality protection; and low functions for recreation and esthetic values.	40 acres	I[1]
2	Cadman Pit	Palustrine Forested, Scrub/Shrub, Emergent, Aquatic Bed, and Open Water; Riverine Lower Perennial Unconsolidated Shore	Some portions are temporarily flooded, some are seasonally flooded, some are semi-permanently flooded, and some are permanently flooded.	Moderate to high functions for wildlife habitat, food chain support, shoreline protection, flood storage, groundwater recharge, and water quality.	20 acres	I[1]
3, 3a, and 3b	Cadman Pit	Palustrine Open Water Excavated	Permanently flooded.	Low functions for wildlife habitat; moderate functions for flood storage and water quality.	38 acres total	III
4	Between Cadman and Centennial Park	Palustrine Scrub/Shrub and Emergent	Seasonally flooded.	Moderate functions for wildlife habitat, flood storage, groundwater recharge, and water quality.	1 acre	III

[1] Classification as Category I is based primarily on potential use by listed fish (chinook or coho salmon, bull trout) and/or wildlife (bald eagle).

Wetland	General Location	Wetland Class	Water Regime	Functions	Approximate Size	DOE Wetland Category
5	Confluence of Woods Creek and Skykomish River	Riverine Upper Perennial Unconsoli-dated Shore	Seasonally flooded	Moderate functions for wildlife habitat, flood storage, and water quality.	3 acres	I[1]
6	Al Borlin/Buck Island Park	Palustrine Forested	Temporarily flooded	High functions for wildlife habitat and food chain support; moderate to high functions for flood storage, groundwater recharge, and water quality.	35 acres	II
7	Woods Creek	Palustrine Forested, Scrub/ Shrub and Emergent	Seasonally flooded	Moderate to high functions for wildlife habitat, food chain support, shoreline protection, flood storage, groundwater recharge, and water quality (discontinuous along stream).	15 acres	I[1]
8a and 8b	Al Borlin/Buck Island Park on the Skykomish River	Riverine Upper Perennial Unconsoli-dated Shore	Seasonally flooded	Moderate to high functions for wildlife habitat and food chain support; high functions for shoreline protection, flood storage, groundwater recharge, and water quality.	1.5 acres total	I[1]

Wetland	General Location	Wetland Class	Water Regime	Functions	Approximate Size	DOE Wetland Category
9	Adjacent to the Skykomish River	Palustrine Forested, Scrub/ Shrub, Emergent; Riverine Upper Perennial Unconsoli-dated Shore	Seasonally flooded	Moderate to high functions for wildlife habitat and food chain support; high functions for shoreline protection, flood storage, groundwater recharge, and water quality.	8 acres	I[1]

surface flow. Younger alluvium is also highly permeable and constitutes the primary aquifer recharge area for Monroe (Figure 10). It is recharged by precipitation, by infiltration of surface runoff from surrounding higher-elevation areas, or by sub-surface lateral migration of water from surrounding deposits.

Aquifers are important for maintaining base summer flows in streams. During hot dry summer months, groundwater reaching the river provides not only higher flows, but also helps to keep the water cooler and carries nutrients and oxygen into the stream. Therefore, it is important that aquifers be allowed to store water during the winter months, so it will be available to the stream in the summer months.

Under the Growth Management Act, one of the five designated critical areas is "critical aquifer recharge area" which is defined as "[a]reas … that are determined to have a critical recharging effect on aquifers used for potable water …" Prior to 1969, the City received its water from local wells, including one on Buck Island (City of Monroe 1997). The City of Monroe currently purchases all of its water from the City of Everett; therefore, no drinking water is supplied by any aquifers in the City itself and groundwater recharge of local aquifers is not an issue from a drinking water perspective. The Washington State Department of Corrections facility obtained its water from two wells adjacent to the Skykomish River prior to 1996. The Department of Corrections has developed a plan to close the wells (City of Monroe 1997), and they are not currently in use.

3.3 SENSITIVE HABITATS AND SPECIES

A list of sensitive habitats and species in Monroe's shoreline zone was compiled from information provided by local, state, and federal sources. Sensitive species and habitats

include those designated by the state as "Priority"[1]; those listed, proposed for listing, or candidates for a proposal to list under the federal ESA; and those that provide actual or potential habitat for sensitive species. Local sources include the City of Monroe and Snohomish County; state sources include WDFW and DNR; and federal sources include NMFS and USFWS. This information was supplemented with field data collected by The Watershed Company. In general, the Skykomish River and Woods Creek shorelines include the following sensitive habitats and species: state and federal sensitive fish and wildlife; wetlands; and riparian areas (potential habitat for priority wildlife and an important component of ESA-listed fish habitat). The vegetation attributes of terrestrial wildlife habitat and riparian aquatic habitat overlap significantly; as much as possible, vegetation discussions in the aquatic and terrestrial habitat sections will focus on those specific elements critical to fish and wildlife habitat, respectively. Prior to a discussion of habitat and species on a City-specific basis, however, is a discussion about the basin as a whole and its processes that will help lay the groundwork for a meaningful discussion of Monroe.

3.3.1 Basin-Wide Ecological Functions/Ecosystem-Wide Processes

"Ecological" or "shoreline" functions are defined as "the physical, chemical, and biological processes that contribute to the proper maintenance of the aquatic and terrestrial environments that constitute the shoreline system." Related "ecosystem-wide processes" are the naturally occurring physical and geologic processes (including erosion, sediment transport, and deposition) and certain chemical processes that shape the landforms of a specific shoreline ecosystem, thereby largely determining the habitat types and functions present. The functioning of fish and other wildlife habitat throughout the Skykomish Basin has been significantly altered, and in most cases degraded, subsequent to European settlement during the last approximately 150 years. Land uses throughout the basin have been altered over time, converting most of the basin area, originally in an old-growth forested condition, to younger forests, agriculture, residential, urban, and industrial uses. These land use changes have ultimately affected terrestrial and aquatic wildlife alike.

Aquatic Habitat

The following sections summarize the status of salmonid fish habitats in the Skykomish basin Six overall pathways are included (consistent with NMFS Matrix of Pathways and Indicators): 1) water quality, 2) habitat access, 3) habitat elements, 4) channel conditions and dynamics, 5) flow/hydrology, and 6) watershed conditions. Each pathway is further subdivided into indicators. These conditions are summarized in Table 6.

[1] "*Priority species* include State Endangered, Threatened, Sensitive, and Candidate species; animal aggregations considered vulnerable; and those species of recreational, commercial, or tribal importance that are vulnerable. *Priority habitats* are those habitat types or elements with unique or significant value to a diverse assemblage of species. A *priority habitat* may consist of a unique vegetation type or dominant plant species, a described successional stage, or a specific structural element" (WDFW 2001b).

Table 6. Environmental Baseline – completed at scale of Snohomish Basin Watershed.

PATHWAYS INDICATORS	**ENVIRONMENTAL BASELINE**
Water Quality	
Temperature	High temperatures result of reduction in streamside vegetation, by channel widening associated with increased sediment loads, and reduced summertime low flows
Sediment/Turbidity	Variable throughout watershed
Chem. Contam./Nut.	Turbidity, fecal coliform, temperature, runoff from both commercial and "hobby" farms, land clearing, and construction are problems at specific locations and/or in specific tributaries; several 303(d) listed segments
Habitat Access	
Physical Barriers	Most barriers natural, except for seasonal hatchery-related blockage on Wallace River, the Sultan River dam, and culverts on small tributaries
Habitat Elements	
Substrate	Spawning habitat abundant, but substrate at risk for degradation related to sedimentation
Large Woody Debris	Large conifer recruitment potential low
Pool Frequency Pool Quality	Low frequency and quality is result of reduced LWD and vegetative cover, and sediment inputs
Off-Channel Habitat	Abundant
Refugia	Compromised
Channel Cond. & Dyn.	
Width/Depth Ratio	High width/depth ratio, result of sediment mobilization, reduction in pool size/frequency, reduced bank vegetation, and reduced LWD
Streambank Cond.	Stable for the most part – few areas of instability have large effect
Floodplain Connect.	Compromised - roads and railroads paralleling river and stream channels
Flow/Hydrology	
Peak/ Base Flows	Increased peak flows and reduced base flows, result of forest practices and an increase in other land uses
Drainage Network	Increased drainage network, result of roads
Watershed Conditions	
Road Dens. & Loc.	Numerous roads in valley bottoms
Disturbance History	Disturbances located in unstable and riparian areas, large reductions in old-growth forest
Riparian Reserves	Variable – still a high percentage of forest in the watershed

Temperature

High water temperatures pose a potentially significant problem with respect to the functioning of salmonid fish habitat in the Skykomish basin, more so in some of the tributaries than in the mainstem river itself. With some variations, the optimal temperature range for salmonid fish is 12-14^{o} C (54-57^{o} F). Lower temperatures are typically preferred for spawning, particularly for bull trout. Lethal temperatures for adults are in the range of 20-25^{o} C (68-77^{o} F) (MacDonald et al. 1991). In the Skykomish River at Monroe, summer temperatures usually meet standards, with only three measurements between 18 and 20^{o} C recorded during regular sampling during the last 10

years. Water temperatures farther downstream in the lower Snohomish and estuary areas exceed the standards more frequently. Over 50 percent of the July and August temperature readings measured there over the last 10 years have exceeded the standard (Thornburgh and Williams 2000). The Wallace River has been placed on the 1998 list of impaired and threatened water bodies by the Department of Ecology (the 303(d) list) solely on the basis of high temperatures. French Creek also exceeds water temperature standards frequently during the summer months.

Increases in stream temperatures beyond those that would be observed in the pristine or pre-European settlement state are believed to be primarily affected by a reduction in streamside vegetation and by channel widening associated with increased sediment loads. Reduced summertime low flows due to forest practices, clearing, increases in impervious surfaces, and other land use changes are also a factor.

Sediment/Turbidity

Excessive fine sedimentation is problematic for the habitat of salmonid fish in that it reduces water flow through gravel, thereby reducing or cutting off the supply of dissolved oxygen needed by incubating eggs. Cemented or clogged gravels can also prevent fry from emerging from the gravel, entombing them in the streambed. Excessive fine and coarser sediments can reduce pool habitat and cause channels to widen, contributing to increased water temperatures (Pentec and NW GIS 1999; WSCC 1999).

The Skykomish River transports an annual bed and sediment load of approximately 21,000 cubic yards. The main river channel is sediment-limited between Index and Startup, eroding terraces. Between Startup and Sultan, the gradient is less, allowing sediment to deposit and resulting in a wide and braided channel. Between Sultan and Monroe, erosion and deposition are in relative balance. Between Monroe and the confluence with the Snoqualmie River, the Skykomish deposits much of its sediment load, resulting in an unstable channel and frequent channel changes (Collins and Dunne 1990, cited in Pentec and NW GIS 1999). The sediment regime was listed as "at risk" for most of the Skykomish River reaches in the *Snohomish River Basin Chinook Salmon Habitat Evaluation Matrix* (SBSRTC 2000) with the lower mainstem listed as "not properly functioning" and the lower South Fork listed as "properly functioning."

Chemical Contamination/Nutrients

Maintaining overall good water quality, including control of fine sediment and temperature, as well as toxic substances and nutrients, is crucial for the survival, growth, and reproduction of salmonid fish. However, the nonpoint nature of the sources of many pollutants, environmental variation, and the interrelatedness of many water quality parameters make it difficult to isolate specific water quality factors which might be directly responsible for reduced salmon returns. In the Skykomish basin, water quality issues include turbidity, fecal coliform, temperature, runoff from both commercial and "hobby" farms, land clearing, and construction (Pentec and NW GIS 1999). Overall

water quality in the basin is generally good, with exceptions at specific locations and/or in specific tributaries (SBSRTC 1999). Toxic chemicals that may be problematic for fisheries resources are often associated with urban land uses (WSCC 1999). A number of streams and stream segments in the Skykomish basin have appeared on the "303(d) list," including the lower Skykomish River, the Wallace River, and Woods Creek (Thornburgh and Williams 2000). The 303(d) lists contains stream sections or water bodies not expected to meet water quality standards even after implementation of technology-based pollution controls (DOE 1997).

Chemical contaminant and nutrient levels for the Skykomish lower mainstem would probably fall in the "not properly functioning" category, the lower South Fork is "properly functioning," and the remaining Skykomish River sections are all "at risk" (SBSRTC 2000). The lower mainstem of the Skykomish was 303(d) listed in 1998 for copper, fecal coliform, lead, silver, and temperature. Overall, the Skykomish basin as a whole would probably be considered to be "at risk" for this category.

Physical Barriers

Williams et al. (1975) indicated that most of the barriers to anadromous fish passage in the Skykomish basin were natural in origin. As mentioned previously, a combination ladder-trap and haul facility has been operated by WDFW and its predecessors since 1958 at Sunset Falls on the South Fork of the Skykomish just upstream of the confluence with the North Fork. This facility opened up approximately 54 miles of additional stream length for anadromous fish usage (Williams et al. 1975). The Wallace River, a Skykomish River tributary, is blocked by impassable falls 8 miles upstream of its mouth. The state salmon hatchery at river mile 4 of the Wallace River also has a barrier weir in place from approximately June 1 through October1 for the trapping of summer chinook, although a goal of 500 summer chinook are not kept for hatchery use and are passed upstream. Coho salmon and other fish passing by the weir location generally have unrestricted access upstream during the October through May period when the barrier weir is not in place. Some pink salmon may be precluded or hindered from passing upstream since the barrier weir remains in place during the month of September, which is part of their migration and spawning season (Mills, pers. comm., 10 June 2002). The primary man-made fish migration barrier in the Skykomish basin is the storage and diversion dam complex on the Sultan River, tributary to the Skykomish. The diversion dam blocks anadromous fish at river mile 9.7, and operation of the facilities affects stream flow, in turn affecting migration, spawning and rearing in the Sultan River.

Additional natural upstream migration barriers also exist along many of the small and moderately sized tributary streams, but these block a minor proportion of potential fish use area (Williams et al. 1975). Traditionally, the focus on providing fish passage at culverts and other structures has been on providing upstream passage for adults. More recently, however, the importance of providing upstream passage through culverts for juveniles has been recognized as an important factor that could adversely affect carrying

capacity. Overwintering use of tributaries by juvenile coho and chinook is important, and the lack of access to existing such habitat within the basin is widespread (SBSRTC 1999).

Clearly, salmonid fish need access to habitat in order to make use of it. Improperly designed and installed road culverts can block such access to both adult and juvenile fish, affecting the productivity of fish populations. Problem culverts can entirely block upstream migrations, or less severe cases can block the migration of some species at some life history stages and/or some flows. Culverts tend to more negatively impact salmonid fish species such as coho, cutthroat, and steelhead which tend to use smaller tributary streams than those species such as pink, chum and chinook which tend to use larger stream channels (WSCC 1999).

Substrate

In general, the Skykomish River system provides large amounts of excellent spawning habitat for chinook and steelhead because of its relatively steep gradient and abundance of coarse, gravelly sediments (Pentec and NW GIS 1999). However, given that the sediment/turbidity indicator for the Skykomish basin is typically "at risk" (SBSRTC 2000), the substrate may be compromised in certain areas also. Though numerous individual channel and stream sections are likely in good condition, and certain others are degraded, the substrate conditions for the basin as a whole are at risk for degradation.

Large Woody Debris

In-stream large woody debris, i.e. stumps and logs, are important for the proper function of a number of in-stream natural processes, including those by which log jams are created. Large woody debris dissipates overall stream energy, while at the same time promoting the localized scour which forms pools. Wood also provides some nutrients and serves as a basis for aquatic food webs (WSCC 1999). Wood is generally recruited to streams and rivers when forested banks erode or channels migrate through forested riparian areas. Wood can also be recruited when landslides or debris flows containing wood reach stream channels. Old-growth conifers are commonly believed to be the best source of woody debris for the purpose of contributing to the formation and maintenance of salmonid fish habitat. Prior to floodplain timber harvest along the major river channels in the late 19th century, 20 percent of the riparian forest was coniferous, including trees up to 4 meters (12 feet) in diameter. Today, the remaining riparian forest is made up almost entirely of cottonwood with only 2 percent conifers, and few trees are larger than 1 meter (3 feet) in diameter (Haas and Collins 2001). Due to the gradient and power of the Skykomish, woody debris is usually effective at creating habitat only by forming debris jams (Pentec and NW GIS 1999).

Pool Frequency/Quality

Abundant, high quality pool habitat is important to salmonid fish, providing rearing areas for juveniles and cool resting areas for adults. Both summer steelhead and chinook require deep holding pools to rest and reach sexual maturity in, because they spend a comparatively long time in fresh water before spawning. Abundant large woody debris in such pools is also critical, both to provide protective cover for the fish, adults and juveniles alike, and because such large woody debris is often instrumental in the formation and maintenance of such pools (STAG 2000; WSCC 1999).

The reduction of pool area in the basin is associated with a reduction in large woody debris, increases in sediment supply, and increased peak flows. Pool spacing generally decreases (number of pools increases) with decreasing channel slope and increasing woody debris (Pess et al. 1999).

While some portions of the Skykomish system may have appropriate pool frequencies, others probably do not. The basin also has low to moderate pool quality since the number of deeper pools is reduced, many pools lack adequate cover, and some pool volume reduction by sediment may have occurred.

Off-Channel Habitat

Rearing and refuge habitat is formed along the Skykomish River by its many side channels and alcoves. The upper Snohomish River, below the confluence of the Skykomish and Snoqualmie Rivers and extending to just upstream of the town of Snohomish, includes gravel bars and riffles, deep pools, side channels and backwater eddies. These features allow that section of river to provide excellent overall fish habitat (Pentec and NW GIS 1999).

Refugia

Refugia areas have also been subject to disturbances. Certain tributary basins are less disturbed overall than the basin as a whole; however, potential refugia have been compromised. These prospective refugia may not be adequately buffered and may lack the size and connectivity to maintain viable sub-populations.

Width/Depth Ratio

Given the increase in sediment mobilization and an overall decrease in the size and frequency of pools in the Skykomish basin, its channels in the lower segments probably exhibit a higher width/depth ratio than existed pre-settlement or than would be “ideal.” Also, channel widening commonly occurs due to reduced bank vegetation and reduced recruitment of large woody debris.

Streambank Condition

Unstable stream and river banks exist, but these likely comprise less than 10 percent of the total. However, a few areas of unstable bank may contribute a disproportionately large amount of sediment.

Floodplain Connectivity

There is a moderate reduction in hydrologic connectivity between off-channel, wetland, floodplain, and riparian areas. These disconnections have occurred partly due to roads and railroads paralleling river and stream channels; their embankments act to limit the extent that flood flows can spill out onto historic floodplain areas.

Peak and Base Flows

Much of the area in the Skykomish basin is in the rain-on-snow or "transient zone," roughly between 1,000 and 3,000 feet in elevation. As such, the watershed would be somewhat sensitive to peak flows, even in its natural state. The rain-on-snow phenomenon occurs when warm, moisture-laden air passes over snow, causing condensation, releasing large amounts of latent heat energy, and melting large volumes of snow fairly rapidly. Combined with accompanying rainfall, this melting snow can cause river and stream flows to rise rapidly and result in flooding, erosion, and sedimentation. Timber harvest throughout the basin has likely accentuated the rain-on-snow phenomenon, contributing to flooding and channel scour. Scour due to high flows in gravel beds containing salmon eggs can cause the eggs to be displaced from the gravel. Alternatively, sedimentation due to high flows can bury and smother eggs at other locations. Salmon, which tend to spawn just prior to the fall and winter periods when flooding is most likely to occur, are most vulnerable to peak flow events, whether they are caused by rain-on-snow or other rainfall and weather patterns (WSCC 1999). High flows can also flush woody debris out of channels and make it difficult for overwintering juveniles to keep from being swept downstream.

On an annual hydrograph, high flows in the Skykomish are bimodal. The months of November through January have very high stream flows due to winter precipitation, much of which is rain but can include melting snow as the snow level rises and falls. The months of May and June also show elevated river flows due to the seasonal spring snowmelt. Lower-elevation tributaries do not show the springtime increases in flow because their basins do not accumulate a winter snowpack. The month with the lowest average flows in the Skykomish is typically August because most of the snow has already melted and little rainfall typically occurs during that month (Pentec and NW GIS 1999).

It is believed that both low and high flows in the Skykomish basin have been significantly affected by the removal of much of the old-growth forests in the basin over time and the accompanying increase in other land uses (STAG 2000; WSCC 1999).

There are likely "pronounced changes in peak flow, base flow, and/or low flow timing relative to an undisturbed watershed of similar size, geology, and geography."

Drainage Network

For the Skykomish basin as a whole, it is likely that there are significant (20-25%) increases in drainage network density due to roads.

Road Density and Location

At least within portions of the main river valley bottoms, including the mainstem, and portions of both Forks, road densities exceed 3 miles per square mile.

Disturbance History

Timber has been harvested from a high proportion of the watershed at some time. Much of the disturbance has occurred in riparian areas, and a number of landslides have been triggered or exacerbated by human activities such as road building and timber harvest.

Riparian Reserves

Functioning riparian reserves provide "adequate shade, large woody debris recruitment, and habitat protection and connectivity in all subwatersheds, and buffers or includes known refugia for sensitive aquatic species (>80% intact), and/or for grazing impacts; percent similarity of riparian vegetation to the potential natural community/composition >50%" (NMFS 1999).

The Skykomish Basin consists primarily of three vegetation zones: 1) western hemlock (0-2,297 ft. above sea level) (further subdivided into the Puget Sound area), 2) subalpine forest (further subdivided into silver fir and mountain hemlock zones), and 3) the timberline/alpine region (Franklin and Dyrness 1988). The lower Skykomish Basin, including the City of Monroe, is in the Puget Sound area of the western hemlock zone, which is dominated by western hemlock, Douglas-fir, western red cedar, and/or Sitka spruce. Deciduous tree species include red alder, black cottonwood, and bigleaf maple (Franklin and Dyrness 1988).

The Skykomish River Mainstem sub-basin, which includes the City of Monroe, is approximately 325 square miles, 75 percent of which is forested. In the remaining 25 percent of land area, residential land use is most common, followed by agriculture, particularly in the floodplain. The Skykomish River Forks sub-basin, upstream of the Skykomish River Mainstem sub-basin, is approximately 507 square miles, 98 percent of which is forested. Low-density residential land use is most common in the remaining two percent of land area (SBSRTC 1999). Pentec and NW GIS (1999) mapped riparian conditions along the Skykomish River from its confluence with the Snohomish River to a point between Gold Bar and the Forks, and portions of the Wallace and Sultan Rivers. The following table (Table 7) summarizes conditions in the mapped area.

Table 7. Summary of riparian conditions along 67.99 miles of river in the Skykomish Basin (both banks) (Pentec and NW GIS 1999).

Riparian Category	Total Miles	Percentage of Total
1 – grass or brush	2.92	4
2 – single line of trees	8.03	12
3 – 20- to 200-ft forested corridor	4.12	6
4 – 200- to 400-ft forested corridor	5.52	8
5 - >400ft forested corridor	40.10	59
6 – residences or farms, little forest	3.48	5
7 – residences or farms, significant forest	1.76	3
8 – roads or railroad	2.06	3
9 – industrial	--	--
10 - unforested wetland	--	--
TOTAL	**67.99**	**100**

Table 8 summarizes data collected in the Skykomish River Mainstem sub-basin; the Skykomish River Forks sub-basin is expected to have a substantially higher percentage of Category 5 condition. While these percentages appear favorable for fish (and wildlife), the data does not include information about vegetation species composition (native vs. non-native, conifer vs. deciduous) or forest age, which are the primary vegetation-related factors determining LWD recruitment (a non-vegetation-related factor is limitations on channel migration).

The *Initial Snohomish River Basin Chinook Salmon Conservation/Recovery Technical Work Plan* (SBSRTC 1999) identifies 21.25 miles of the Skykomish River Mainstem between Gold Bar and Monroe as a "priority critical habitat" due to the lack of shoreline hardening and the presence of a 200-foot-wide forested riparian corridor. Preservation of this area is considered essential to "preservation of key habitat-forming and habitat-maintaining processes" (SBSRTC 1999). The mapping of riparian condition conducted by Pentec and NW GIS (1999) supports that designation.

The following is a brief background discussion[1] of how shoreline vegetation can affect and can be affected by ecosystem-wide processes and functions related to aquatic habitat (summarized from Knutson and Naef 1997). It can be assumed that the contributions made by the historical riparian vegetation condition in the Skykomish Basin were optimized for each of these categories. The level of function of Monroe's current shoreline vegetation will be discussed in detail in Section 4.

Delivery and routing of water: Riparian vegetation affects stream flows in several ways, and to differing degrees depending on stream size. Vegetation directly intercepts rainfall, holding it on leaves and other plant structures for later evaporation and/or slowing the fall of water as it makes its way through several layers of vegetation. Rooting structures of

[1] This summary is greatly simplified. The inter-relationships between the processes and the physical features in the water and on land are complex; changes in any one process or physical feature commonly affect numerous other processes and physical features.

riparian vegetation also increase soil porosity, thereby increasing infiltration into the soil. Riparian vegetation also directly uses water that makes its way into the soil, losing it back into the atmosphere through evapotranspiration. All of these vegetation functions tend to reduce the overall quantity of water moving into the stream, and slow the movement of water into the stream, thereby reducing flow spikes and providing a source of water during the summer months to maintain base flows. Removal of significant amounts of riparian vegetation increases overall flow volumes and the intensity of flow spikes. Increased flow volumes and spike magnitude can adversely affect fish habitat through increased erosion, blowout of fish habitat structures (such as large woody debris), mobilization of spawning gravels and fine sediments, and mobilization or coverage of eggs (among others).

Delivery and routing of sediment: Sediment-laden water that moves through a vegetated riparian area before reaching a stream loses those sediments as it either infiltrates into the soil (whose porosity has been increased by rooting); filters through the surface layer of leaves, twigs, and other litter; or is trapped by downed wood and vegetation. The frictional resistance provided by vegetation, litter, and a loose organic humus layer slows the movement of water through the riparian area, allowing sediments to settle out. Vegetation on banks also helps regulate the input of sediment into streams by stabilizing soil. In unaltered watersheds, sediments mobilized by natural events that reach the stream can be trapped behind large woody debris; the presence of large woody debris is likewise a function of riparian vegetation condition. Removal of riparian vegetation eliminates much of the friction and filtering materials that slow water movement and strip muddy water of its sediment. Raindrop and streamflow energy are not dissipated by vegetation, and exposed soils in the riparian corridor and on the banks are more easily mobilized. Increased instream sedimentation can fill resting/rearing areas and spawning gravels, reduce production of food, damage fish gills, and adversely affect feeding and migration behaviors (among others).

Delivery and routing of nutrients/toxics: The vegetation and soil bacteria in healthy riparian areas together convert or store most of the nutrients (nitrates and phosphates primarily) and toxic compounds (e.g., pesticides) that move through the system. Nitrogen, for example, is either denitrified by soil bacteria or taken up by vegetation and turned into biomass. The decaying layer of sticks, leaves and other materials dropped on the soil by vegetation traps phosphates and heavy metals. Vegetation and soils can slow or halt the movement of toxics through the system, allowing time for decay and/or uptake. Removal of riparian vegetation speeds the flow of potentially harmful substances to the aquatic environment.

Delivery and routing of heat: Riparian vegetation plays a critical direct and indirect role in maintenance of cool water temperatures through shading. The ability of riparian vegetation to directly cool water temperatures is greater in narrow systems, decreasing as the system widens. In narrow systems, overhanging vegetation can completely shade a

stream, while in wider systems, riparian vegetation can only influence the nearshore area, with centrally located portions of the waterbody receiving no shade at all. Wider systems depend on inputs of cool water from shaded tributaries and groundwater; in large systems, aquatic species needing cool water utilize shaded pools or backwaters. Indirectly, vegetation influences water temperature by shading and cooling soils and litter that water moves through on its way to the waterbody. Loss of riparian vegetation can result in high mid-day water temperatures, and increased year-round average temperatures, potentially exceeding aquatic species' temperature tolerances. Increased temperatures reduce availability of oxygen. The combination of increased temperature and reduced oxygen can adversely affect growth of aquatic species, immune system function, and control of bacteria and algae growth that deplete oxygen further (among others).

Delivery and routing of LWD/organic matter: According to several sources cited in Knutson and Naef's 1997 report on riparian habitat, "approximately 70% of structural diversity within streams is derived from root wads, trees, and limbs that fall into the stream as a result of bank undercutting, mass slope movement, normal tree mortality, or windthrow." Large conifers generally provide the best structure in a stream because of their longevity and size. Structures can significantly affect flow patterns that contribute to formation of a variety of habitat features (e.g., pools, side channels), store substantial quantities of sediment and other organic and inorganic materials, stabilize banks, and provide a substrate for invertebrate production (among others). Decomposing wood provides chemical and physical support to the food chain. Alteration of riparian vegetation either by selectively removing conifers during logging, wholesale clearing for agriculture or other development, or reduction in the width of the riparian corridor can reduce the quantity and size of LWD inputs. Changes in LWD size and quantity adversely affect instream food production, availability of suitable spawning and rearing habitats, and accessibility of upstream habitats (among others).

Terrestrial Habitat

The primary terrestrial or amphibian wildlife habitat adjacent to waterbodies is the riparian habitat area (RHA). As defined by WDFW (Knutson and Naef 1997), RHA is "the area adjacent to aquatic systems with flowing water…that contains elements of both aquatic and terrestrial ecosystems which mutually influence each other." The RHA is bounded by aquatic and upland habitats, but can include upland and certain aquatic habitats (wetlands) where those habitats directly influence the stream system. In human-altered landscapes, the historic RHA may now be isolated from the aquatic habitat by installation of dikes and other shoreline hardening structures. Because the designated shorelands in the City of Monroe encompass the floodplain, as well as areas 200 feet from the floodway that are not otherwise in the floodplain, the entire Monroe shorelands could be considered "RHA" as the floodplain lands, whether upland or wetland, influence and are influenced by the strictly aquatic habitat.

According to Knutson and Naef (1997) "approximately 85 percent of Washington's terrestrial vertebrate species use riparian habitat for essential life activities and the density of wildlife in riparian areas is comparatively high." Wildlife habitat functions can be assessed to a large extent by examining and interpreting the vegetation characteristics. The recently invalidated Shoreline Master Program Guidelines mandated that City Shoreline Master Programs should be directed toward achieving the vegetation characteristics described in *Management Recommendations for Washington's Priority Habitats: Riparian* (Knutson and Naef 1997) "…where applicable and based on scientific and technical information." These "characteristics" (connectivity, vegetation composition, multiple canopy layers, natural disturbance, snags, woody debris, shape, width, stream bank, associated wetlands) are part of one or more shoreline vegetation functions and contribute to the operation of various processes (see discussion above under "*Riparian Reserve*"). The "*Riparian Reserve*" section above also discusses the historical and current vegetation conditions in the basin as a whole. Existing wildlife habitat conditions along Monroe's shorelines are discussed in detail by segment in Section 4, and in general in Section 3.3.3.

Vegetation/Habitat Characteristics

The *Riparian Reserve* section above discusses the relationship of vegetation and aquatic species and habitat; the following discussion explains the relationship between vegetation and terrestrial/amphibian species and habitat.

Structural Complexity: Structural complexity in a forested riparian system is provided over a long period of time. Once a catastrophic event (flood or fire) clears an area of vegetation, the long process of succession begins. Over time, rapid colonizers that thrive on disturbed, exposed sites will be supplemented by shade-loving species such as conifers. As the community develops and ages, natural disturbances (e.g., windthrow, mortality) will create openings that harbor early-successional species. Across the forested landscape, patches of old and young forest support a wide diversity of plant species, provide multiple canopy layers through differences in species mature heights and the recruitment of young trees, supply snags and downed wood as age-related mortality or disease kills or injures trees, and creates edges at the interface of young and old forest. This structural complexity provides a broad range of foraging and breeding opportunities for reptiles, amphibians, small and large mammals, and birds. Reductions in structural complexity which occur when the natural disturbance frequency and/or magnitude is increased through human activities (e.g., clearing, selective harvest of conifers) can eliminate a forest feature that is specifically required by one or more wildlife species for some part of the species life history. Due to the complex interactions between species and their habitats, elimination of one species can result in the loss of numerous species.

Connectivity with Other Ecosystems: Most wildlife species are mobile and can move through relatively large areas on a seasonal (migration) or daily basis to locate suitable conditions for feeding, nesting, roosting, and/or denning. Different wildlife species have

difference tolerances for micro- and macroclimate on a seasonal or daily basis, and needs for cover to avoid predators. Healthy vegetated riparian corridors provide most species with a relatively convenient and safe way to move from one area to another. Riparian areas also provide routes for dispersal of young that would otherwise exceed the capacity of the habitat, and prevent genetic isolation of different communities of the same species (Knutson and Naef 1997). The importance of connectivity increases in developed landscapes, where the riparian corridor might be the only protected path to other habitats (Knutson and Naef 1997).

Abundant Food Sources and Available Water: As previously mentioned, healthy riparian areas are structurally complex, including a wide variety of plant species and therefore a wide variety of food. Conditions in the riparian environment enhance plant growth and also contribute to an abundance of bacteria, fungi, and "other lower organisms" which "are at the base of a complex and highly productive food web…" (Knutson and Naef 1997). Wildlife that do not otherwise need to be riparian-associated can utilize riparian areas heavily simply because of the food abundance. Water is also readily available in riparian areas, either directly from the aquatic habitat or in associated seasonal or permanent open-water wetlands.

Moist and Moderate Microclimate: Riparian areas are generally cooler in the summer and warmer in the winter, and more humid than surrounding areas because of the moderating effects of abundant water and vegetation. These microclimate conditions are attractive for many species, particularly amphibians and other wildlife escaping extreme weather conditions. Removal of riparian vegetation or reductions in the width of the riparian corridor can reduce or eliminate the value of the riparian corridor for year-round amphibian use or seasonal weather refuge.

Habitat Condition in Skykomish Basin

At the scale of the Skykomish Basin (sum of Skykomish River Mainstem sub-basin and Skykomish River Forks sub-basin as defined in SBSRTC 1999), 89 percent of the land area is forested. Although the area of forested land is high for the largely urban Puget Sound region, much of the remaining 11 percent of developed (residential and agricultural) land area is located along river valleys, in floodplains and former riparian areas. Wildlife habitat in riparian corridors does not consist solely of forests, which are typically either deciduous dominant or mixed conifer-deciduous. Other common riparian habitats include forested, scrub-shrub or emergent wetlands; and early-successional upland habitats developing in areas routinely or infrequently altered by natural disturbances such as windthrow, flooding, or age- and disease-related mortality.

The impacts of historic and current logging practices in the forested areas include reduced structural complexity, particularly as retention of existing snags and a percentage of living large trees for future snag recruitment and wildlife habitat is a relatively recent practice. Replanting of logged areas also tends to focus on the harvestable species, and

does not result in the species and height diversity typical of undisturbed forests, at least in the short term. Logging practices tend also to favor establishment of non-native invasive species such as Scotch broom and Himalayan blackberry which can preclude future recruitment of native shrubs and groundcovers. Creation of edge along the margins of cleared and retained forest is favorable to some species, such as deer and coyotes, but can have substantial adverse affects on other wildlife species, such as certain birds and amphibians who are very sensitive to changes in microclimate and/or are subject to egg predation by edge-favored birds.

Connectivity between ecosystems has also been negatively impacted by forestry and development. Clearcutting practices can create islands of forest that many terrestrial wildlife species cannot migrate from due to lack of protective cover or other environmental factor. Retention of a corridor (of varying widths during the history of forest management) along rivers and streams and around wetlands has helped to maintain connectivity, although these corridors are interrupted at road crossings and almost absent along rivers in some areas where agriculture and urban development have extended to the waterline.

Food availability has also been negatively impacted in the basin by forestry, agriculture and development. Food diversity for herbivores drops in relation to the drop in plant species diversity related to harvest practices. Some foods increase in quantity, such as blackberries, with positive effects on some species, but other food items favored by a particular wildlife species can be reduced such that the species must either starve, switch to a food item that may be less favorable energetically and nutritionally, or migrate to a site that still has the favored food item. Further up the food chain, carnivores are affected by the availability of their herbivorous prey in a similar fashion. Water availability in the basin has likely also been affected, although to a lesser degree than food. Changes in hydrology from forest practices or development can affect flow patterns and volumes, change the water regime in seasonal or permanent wetlands, and affect the vegetation community (species composition, successional stage) in the riparian corridor. Water is important not only for drinking, but also for maintenance of microclimate and soil moisture, and for certain breeding patterns.

3.3.2 Sensitive Fish Use in the Skykomish Basin

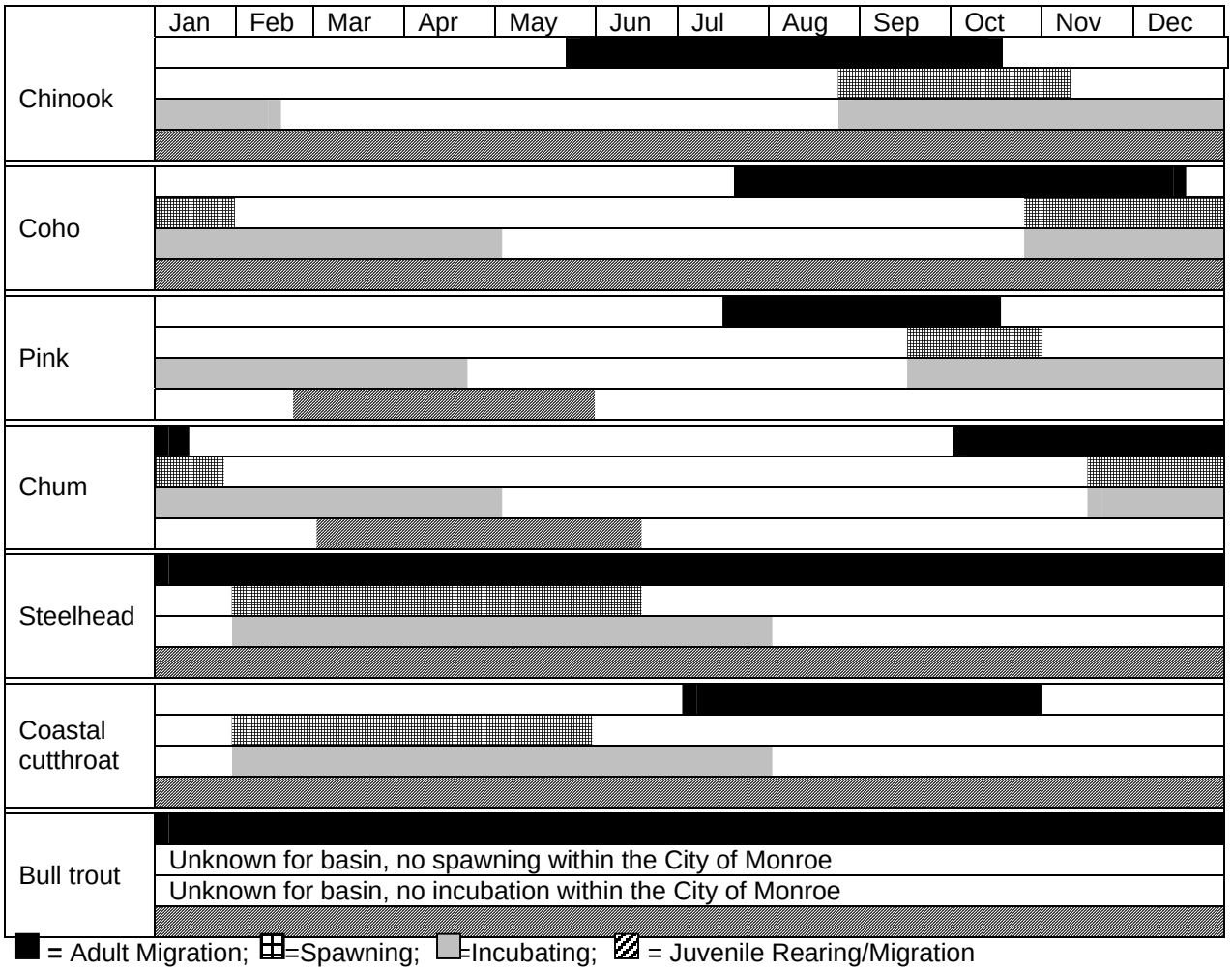
The Skykomish River and several of its tributaries are used by a number of salmonid fish species for various life-history stages (Tables 8 and 9). Certain of these species are divided into stocks as identified in the Washington State Salmon and Steelhead Stock Inventory (SASSI) (WDF at al. 1993; WDFW 1998). SASSI stocks in the Skykomish Basin presently include four chinook salmon stocks, two coho salmon stocks, two chum salmon stocks, two pink salmon stocks, three steelhead stocks, and one bull trout stock. In addition to the species and stocks identified in the SASSI, searun cutthroat trout make

Table 8. Fish Species with Special State or Federal Status in the Skykomish Basin.

Species	Federal Status	State Status	ESU/DPS[1]	Origin and Type
Chinook salmon *Oncorhynchus tshawytscha* Snohomish summer Wallace summer/fall Snohomish fall Bridal Veil Creek fall	Threatened March 1999	Candidate	Puget Sound ESU	 Native w/ wild production Mixed w/ composite production Native w/ wild production Native w/ wild production
Coho salmon *Oncorhynchus kisutch* Skykomish South Fork Skykomish	Candidate July 1995	None	Puget Sound -Strait of Georgia ESU	 Mixed w/ composite production Non-native w/ wild production
Chum salmon *Oncorhynchus keta* Skykomish Wallace	None	Priority		 Native w/ wild production Native w/ wild production
Pink salmon *Oncorhynchus gorbuscha* Snohomish odd-year Snohomish even-year	None	Priority		 Native w/ wild production
Steelhead trout *Oncorhynchus mykiss* North Fork Skykomish summer South Fork Skykomish summer Snohomish/Skykomish winter	None	Priority		 Native w/ wild production Non-native w/ wild production Native w/ wild production
Coastal cutthroat trout *Oncorhynchus clarki clarki*	None	Priority		Presumed native w/ wild production
Bull trout *Salvelinus confluentus*	Threatened November 1999	None	Coastal-Puget Sound DPS	Native w/ natural production

[1] ESU = Evolutionarily Significant Unit, the species definition used by the National Marine Fisheries Service
DPS = Distinct Population Segment, the species definition used by the U.S. Fish and Wildlife Service

Table 9. Use and timing of Monroe's shorelines by sensitive fish species.



widespread use of most accessible streams in the basin (WSCC 1999). Isolated resident cutthroat populations likely inhabit some tributary sections upstream of migration barriers.

Chinook salmon (*Oncorhynchus tshawytscha*) stocks occurring in the Puget Sound Evolutionarily Significant Unit (ESU), which includes all of the Skykomish River stocks, are listed as Threatened under the Endangered Species Act (ESA) by the National Marine Fisheries Service (NMFS) (U.S. Federal Register, 24 March 1999). NMFS has also designated coho salmon (*O. kisutch*) stocks in the Puget Sound-Strait of Georgia ESU, including the Skykomish River stocks, as Candidates, which are eligible for listing under the ESA (U.S. Federal Register, 25 July 1995). The U.S. Fish and Wildlife Service (USFWS) has designated bull trout in the Coastal-Puget Sound Distinct Population Segment (DPS), including the Skykomish stock, as Threatened (U.S. Federal Register, 1 November 1999).

The Skykomish River system is presently managed for both wild and hatchery production of chinook salmon, coho salmon, and steelhead trout. Hatcheries within the Snohomish River basin account for some of the production of the above three species. Pink and chum salmon in the Skykomish basin both consist of native, wild stocks which are managed for natural production. An adult trapping and hauling facility to pass salmonid fish upstream is operated at Sunset Falls on the South Fork of the Skykomish just upstream of its confluence with the North Fork, opening up approximately 54 river miles of additional stream length for anadromous fish use (Williams et al. 1975). Under WDFW's current Wild Salmonid Policy, it is questionable whether or not similar facilities would be authorized for construction today. Allowing anadromous fish access above the falls may have adversely affected the native trout and other fish populations existing there; however, the additional accessible habitat may, to some degree, compensate for habitat losses for anadromous fish elsewhere throughout the basin. Coho salmon were introduced upstream of the falls in the late 1950's; chinook and pink runs above Sunset Falls have become established due to lower river native stocks colonizing upstream areas (Williams et al. 1975).

Due to the City of Monroe's location along the Skykomish River, all of the anadromous salmonid fish species described below utilize the in-river and shoreline areas in and near the City associated with the river and its side channels for migration, at least, with some spawning and rearing as well. These same species also utilize the lower sections of Woods Creek within the City (Williams et al. 1975).

Chinook Salmon

The SASSI identifies four stocks of chinook salmon utilizing the Snohomish watershed. The Snohomish summer chinook stock is described as a native stock with wild production, which is depressed due to chronically low escapements and a long-term negative trend. These fish are September spawners in the mainstem Skykomish and associated tributaries (see Table 10). The Wallace summer/fall chinook are a mixed stock with composite production whose status is healthy. This is the stock propagated at the Wallace River salmon hatchery, which spawn from late August through October. The Snohomish fall chinook is a native stock with wild production, which is depressed due to chronically low escapements and a long-term negative trend. These fish spawn from mid-September through October in portions of the Sultan River, Pilchuck River, Woods Creek, Elwell Creek, and the Snoqualmie River. The Bridal Veil Creek fall chinook spawn in Bridal Veil Creek, the South Fork Skykomish up to Sunset Falls, and the North Fork Skykomish up to Bear Creek. They are a native stock with wild production whose status is unknown. As mentioned, these, along with other Puget Sound chinook stocks, were designated by NMFS as Threatened under the federal Endangered Species Act in March of 1999.

Most juvenile chinook rear for a few months in fresh water and estuarine areas before migrating to sea (ocean type); however, a small percentage may rear in fresh water for a full year (stream type) (Williams et al. 1975).

Coho Salmon

Two distinct coho salmon stocks are also identified by the SASSI for the Skykomish Basin. These are the Skykomish and South Fork Skykomish stocks. The Skykomish coho stock is a mixed stock with composite production whose status is healthy. They spawn from November through January in the mainstem and North Fork Skykomish, the Sultan and Wallace Rivers, and other tributaries. The South Fork Skykomish stock is a non-native stock with wild production whose status is healthy. These coho spawn upstream of Sunset Falls and are (presumably) the descendants of coho planted upstream of the falls in the late 1950s. Their spawning timing has not been documented, but their run timing is earlier than the other coho stocks in the basin. Coho are small stream spawners and generally spawn throughout the basin in November through January, utilizing nearly every accessible tributary to some degree (Williams et al. 1975). Coho fry emerge in March and April, and typically spend a full year in fresh water, preferring low-gradient streams, side channels, and beaver ponds. Migrating to sea as yearlings, they are less dependent on estuarine areas for rearing than some of the other salmon species.

Chum Salmon

The SASSI (WDF et al. 1993) distinguishes two distinct chum salmon (*O. keta*) stocks in the Skykomish basin. The Skykomish chum stock is a native stock with wild production whose status is healthy. They spawn from mid-November through December in Skykomish side channels and larger tributaries. The run size has strong odd/even fluctuations, being more abundant in even years (when they do not have to compete with odd-year pinks). The Wallace chum stock spawns in the Wallace River from November through December. It is a native stock with wild production whose status is healthy. Escapement is lower during odd years due to competition with pink salmon (see below). Chum salmon fry typically emerge from March through May and migrate downstream to salt and estuarine waters immediately upon emergence. Some may spend several months rearing in the estuarine waters near the mouth of the Snohomish River, which are highly important to the survival of these young fish (Williams et al. 1975).

Pink Salmon

Two pink salmon (*O. gorbuscha*) stocks are listed in the SASSI for the Snohomish watershed, including the Skykomish basin. These are the Snohomish odd-year and the Snohomish even-year stocks. They are both listed as native, wild stocks whose status is healthy. Pink salmon spawn in large numbers in the Skykomish (and other Puget Sound Rivers where they are found) in odd-numbered years only. In addition to the more typical odd-year run, however, the Snohomish basin supports a relatively small, but healthy run of even-year pinks. Their escapement is listed in the SASSI as up to 2,200

fish which spawn in September, primarily in the mainstem Snohomish and lower Skykomish. The more numerous odd-year pinks spawn from late September through October in the mainstem Snohomish, Skykomish, Snoqualmie, Wallace, and Sultan Rivers, and other larger tributaries. Pink salmon fry typically emerge in March and migrate immediately downstream to estuarine and salt-water areas (Williams et al. 1975).

Steelhead Trout

Three steelhead trout (*O. mykiss*) stocks are identified by the SASSI as occurring in the Skykomish River and its tributaries. The North Fork Skykomish summer steelhead stock is a native, wild stock, sustained by natural production, whose status is unknown. These fish are geographically isolated from other stocks, spawning upstream of Bear Creek Falls on the North Fork Skykomish, and its tributaries. Their spawning period is likely February through April. The South Fork Skykomish summer steelhead stock also consists of a geographically isolated population, which spawns in the South Fork Skykomish River, the Beckler River, and other tributaries upstream of Sunset Falls. These fish are believed to be derived primarily from Skamania hatchery summer run stock which colonized the habitat upstream of Sunset Falls, made accessible by the fish passage facilities built in the 1950s and operated since. They are believed to spawn from February through April. This is a non-native, wild stock, sustained by natural production, whose status is healthy based on adult counts past Sunset Falls. The Snohomish/Skykomish winter steelhead stock is a native, wild stock, sustained by natural production, whose status is healthy based on spawner escapement. Fish making up this stock spawn from early March through late June in the Snohomish, Skykomish, Sultan, and Wallace Rivers, and their suitable tributaries. Steelhead juveniles may rear in fresh water for one to three years before migrating to salt water as smolts from March through late June (WSCC 1999).

Coastal Cutthroat Trout

Searun and resident stocks of coastal cutthroat trout (*O. clarki clarki*) are found in streams throughout the Snohomish watershed. Isolated, resident cutthroat populations commonly occur upstream of migration barriers. Searun cutthroat typically rear from two to four years in fresh water before migrating to salt water for the first time (WSCC 1999). Most of the anadromous cutthroat in the Skykomish basin are found downstream of Gold Bar. Woods Creek and the Wallace River are important producers of searun cuthroat within the basin. Mature anadromous cutthroat enter the river from July through October, and spawn from early February through May (WDFW 2000).

Bull Trout

The WDFW 1998 Bull Trout and Dolly Varden SASSI Appendix identifies a population of native char as using streams in the upper Skykomish River basin. Native char include both bull trout and Dolly Varden char (*Salvelinus malma*), which are often indistinguishable from each other. They are believed to be found throughout the watershed at various life history stages and to include resident, fluvial, and anadromous

forms. Only resident forms are found in upper tributary reaches above fish-barrier falls, such as in Troublesome Creek. As mentioned previously, the Coastal-Puget Sound bull trout DPS, including the Snohomish/Skykomish stock, was listed as threatened by USFWS in November of 1999. Native char in the North and South Forks of the Skykomish are considered to be of the same, single stock. Skykomish char spawn in the upper North Fork Skykomish mainstem and its tributaries between Bear Creek Falls and Deer Creek Falls. South Fork Skykomish bull trout passing above Sunset Falls spawn primarily in the East Fork of the Foss River. Spawning typically occurs from October first through the first week in November, as temperatures drop to or below 8° C., but can occur as early as late August or as late as mid-November. Skykomish bull trout/Dolly Varden are native and maintained by natural production. Their stock status is healthy, and they have expanded their range within the watershed by utilizing habitat upstream of the Sunset Falls trap-and-haul fishway that was inaccessible to them prior to the mid-1950s.

3.3.3 Sensitive Wildlife Use and Habitats in the Monroe Area

The Washington Department of Fish and Wildlife (WDFW) maintains a Priority Habitats and Species program to inventory potential state or federal proposed, threatened, or endangered species as well as other "priority" species and habitats of state concern. Habitats and Species Maps were obtained from WDFW for the township/range areas that comprise the entire City of Monroe (WDFW 2001a). The priority habitats mapped along the Skykomish River and Woods Creek include several riparian zones and wetlands (discussed in greater detail in Section 3.1, *Wetlands*). Parts of the shoreline zone are also included in a bald eagle breeding territory, although the bald eagle does not nest within City limits.

The Washington Department of Natural Resources (DNR) was also contacted to obtain any information about "rare plants, select rare animal species, or high quality ecosystems" that might be listed in their Washington Natural Heritage Program. DNR does not have any records of rare plants, select rare animal species, or high quality ecosystems in the City of Monroe (Moody, pers. comm., 14 September 2001).

In addition, the U.S. Fish and Wildlife Service (USFWS) was contacted to obtain a list of any listed and proposed threatened and endangered species, candidate species, and species of concern that may be present within the City of Monroe (Berg, pers. comm., 11 February 2002) (Appendix E). The USFWS list included nesting and wintering bald eagle activity in the area. The USFWS list also included 14 Species of Concern that have been found in Snohomish County, although none of these species has an actual known occurrence within 1 mile of the City of Monroe. The Species of Concern will not be considered in this report, although many of the recommendations made in Sections 4.1.5 and 4.2.5 would incidentally benefit one or more of these species' habitats.

Wildlife

The only sensitive wildlife species known to be present in the shorelands of Monroe is the bald eagle. No nesting locations have been mapped by WDFW (2001) in the City. Douglas-fir trees with the appropriate structure suitable for nesting were not observed in the shoreline zone; however, bald eagles are known to occasionally use cottonwood trees. Large cottonwoods are abundant in the shoreline zone, so it is possible that bald eagles may nest within City limits in the future. Currently, bald eagle use in the City is limited to frequent foraging on spawning salmon and salmon carcasses in the Skykomish River (and possibly in Woods Creek as well). Therefore, perch and potential nest trees are an important habitat element to retain in the City's shorelines. In addition to being close to water, one of several nest and perch tree selection criteria appears to be that the view and flight path from the tree to open water be unobstructed (Parson 1992; Johnsgard 1990; Chandler et al. 1995). Such a location allows an eagle to find food easily (Chandler et al. 1995; Parson 1992), protect the nest and young, and define its territory boundaries (Parson 1992). It is generally agreed that bald eagles select nest trees based on structure not species (Grubb 1980; Rodrick and Milner 1991). In western Washington, Douglas-fir trees tend to have the required structure: tall, strong branches, broken tops, and some protective foliage above and surrounding the nest location (Grubb 1980; Rodrick and Milner 1991). Most nest trees are codominant with other large trees in heterogeneous stands (Grubb 1980). Suitable nest trees are also within range of other topped or dead trees, with limbs suitable for perching (Rodrick and Milner 1991). These elements are used for perches, roosts and defense posts (Rodrick and Milner 1991).

Wildlife observed in the Cadman wetland complex include great blue heron, red-tailed hawk, double-breasted cormorant, belted kingfisher, bufflehead, spotted towhee, golden-crowned sparrow, coyote, beaver, black-tailed deer, and raccoon (Ebasco Environmental 1992). Of these species, only the breeding areas of the great blue heron and the bufflehead (a cavity-nesting duck) and "regular large concentrations" of bufflehead are considered "priority" by WDFW. Neither the Cadman wetlands nor any of the other shoreline areas in the City of Monroe are mapped by WDFW as containing great blue heron rookeries, or bufflehead nests or concentrations.

Wildlife Habitat

Terrestrial habitat in the shoreline zone consists of a matrix of uplands and wetlands, with the upland vegetated habitat areas further divided into native forest in various stages of succession (generally either park land or protected critical area buffer), pasture/agriculture, and residential or commercial landscape (e.g., lawn, ballfields) (Figure 11). Because these areas are all in the floodplain, they also provide very temporary habitat for Skykomish River and Woods Creek fish. The riparian corridors associated with waterbodies containing chinook salmon, a species listed as Threatened under the federal ESA, are designated as part of "critical habitat[1]." Further, vegetated

[1] See discussion of critical habitat on page 2.

riparian corridors and associated wetlands contain potential habitat for priority wildlife species and possibly undiscovered occurrences of priority species. Accordingly, all riparian areas along the Skykomish River and Woods Creek will be discussed in this section, regardless of whether they have been designated "Priority" by WDFW.

A field reconnaissance was conducted in October and November 2001 to identify four characters of the riparian vegetation: dominant cover type, average tree size, tree density, and presence of non-native species. Additional habitat features were noted in the field, such as presence of snags and downed wood, structural and species diversity, and food and water availability. Aerial photographs taken in September 2001 were used to note broad patterns related to habitat connectivity. The significant findings and general descriptions of the riparian areas are provided below, and segment-specific detailed descriptions are provided in Section 4.

As previously mentioned, vegetation characteristics provide one of the best indicators of the quality of wildlife habitat. In general, the shorelands in the City of Monroe provide structural complexity, limited connectivity with other ecosystems, abundant food sources and water, and moist and moderate microclimate. The two most significant habitat areas are located at the west end of the City (Cadman-area wetlands) and the east end of the City (Al Borlin Park). The Cadman-area wetlands are a huge (approximately 60 acres) complex of permanent open water, emergent, scrub-shrub, and forested wetlands. Al Borlin Park is 90 acres of predominately native upland and wetland forest. Both of these areas are described in greater detail in Section 4.1.3.

A variable-width band of upland riparian vegetation, primarily dominated by black cottonwood, along the Skykomish River connects these two habitat areas. The primary interruption in this otherwise continuous band of connecting vegetation is the SR 203 bridge over the Skykomish River and Woods Creek (which is a barrier to mammals unless they can swim or navigate the pedestrian bridge crossing Woods Creek). An informal pedestrian trail also runs through this corridor, and some other low-impact land uses are adjacent to the corridor. However, the corridor still provides adequate cover for most wildlife species that would move through the area.

Additional small habitat patches north of SR 2 along Woods Creek are separated from the Al Borlin Park habitat area by SR 2. SR 2 is likely a source of mortality for wildlife crossing the road between these two habitat areas, and is likely a complete barrier to some species that do not attempt road crossings.

3.4 GEOLOGICALLY HAZARDOUS AREAS

Geologically hazardous areas are defined by the City of Monroe as areas that are not suited to the siting of commercial, residential or industrial development consistent with public health or safety concerns because of their susceptibility to erosion, sliding,

earthquake or other geological events. Erosion hazard areas are further defined as areas containing certain erosion-prone soils as determined by the USDA Soil Conservation Service (City of Monroe 1990; Soil Conservation Service 1983). Landslide hazard areas are further defined as areas with: a) a combination of slopes greater than 15 percent, interbedded permeable and impermeable soils, and springs or seeps; b) areas located on an historic landslide; or c) areas shown to be at risk of snow avalanches.

No comprehensive survey of geologic hazards has been completed for Monroe. The identification of specific geologic hazards is therefore speculative, and may be shown to be inaccurate when further data is developed.

SKYKOMISH RIVER

Steep slope areas that may be susceptible to sliding may exist in several portions of the Skykomish shoreline. On the eastern side of the City, portions of the ridge that separate Woods Creek from the Skykomish are within the Skykomish shoreline area. The City of Monroe Comprehensive Steep Slope map (City of Monroe 1998a) (see Figure 9) indicates that slopes in this area exceed 40 percent. Though the map indicates the steep slopes are outside the shoreline area, field observations clearly indicate that the steep slopes continue into the shoreline area of the Skykomish. On the western side of Monroe, along the western end of the gravel pit, slopes greater than 15 percent have been identified. Again, the steep slopes mapped are outside the shoreline zone, but field observations indicate that the slopes continue into the shoreline area. It has not been determined whether these areas have interbedded permeable and impermeable soils, nor whether seeps or springs exist in these areas.

Much of the shoreline area of the Skykomish is likely susceptible to erosion, though only a few areas of the listed erosion-prone soils exist. The proximity of the Skykomish increases the erosion potential of soils that otherwise would not be considered prone to erosion. On the eastern portion of town, in the triangle of land formed by the abandoned railroad spur, the active railroad tracks, and the Skykomish, numerous channels exist that appear to be active at high flows. Both railroads are protected from erosion by rip-rap. Approximately halfway between the abandoned railroad and the SR 203 bridge, another channel allows high flow water from the Skykomish to enter Woods Creek, and must be considered an erosion hazard. Near Woods Creek, the bridge abutment, boat launch and parking lot are all protected from erosion by rip-rap. The presence of protective armoring indicates that erosion hazards exist in the area. In the 1960s, the rip-rap armoring extended from the parking lot to the beginning of the side channel that forms the island immediately south of the gravel pit area. This armoring has since been destroyed by high flows. According to the draft supplemental EIS for the gravel pit (City of Monroe 1994), the pit itself is at risk of an avulsion, the sudden changing of a river channel to a new location. Early maps indicate that the Skykomish once flowed along the northern boundary of the current gravel pit, which may place the entire pit and its northern and western boundaries at risk of erosion hazard.

Earthquake hazards are potentially severe for Monroe. The South Whidbey Island Fault passes very near to Monroe (Figure 12) (University of Washington 1996). This fault is one of the longer faults in the Puget Sound region, and the maximum earthquake potential from a fault is generally correlated to the length of the fault.

A large earthquake has several hazards associated with it. The foremost is direct ground shaking. According to Noson et al. (1988), ground shaking can be intensified in areas underlain by soft sediments such as those found in the shoreline area of the Skykomish. Several types of ground failure are also associated with earthquakes. Of particular concern in this area are liquefaction, land spreading, and differential compaction.

Liquefaction occurs when saturated sand or silt is shaken violently enough to rearrange its individual grains. This rearrangement tends to compact the sediment, and if water stored in the sediment cannot escape fast enough, the load of any overlying structures (buildings, roads, etc) are temporarily transferred from the grains of sand or silt to the escaping water, and the saturated deposit becomes like "quicksand." Depending on the circumstances, this may lead to catastrophic failure of structures.

By a similar process, land spreading can occur. Soil that experiences liquefaction can flow similar to water, and like water, will seek out and fill topographic depressions. This flow can undermine the foundation of structures and fill in creek channels.

Differential compaction, as the name implies, occurs when different soils compact at different rates or by different amounts. As mentioned earlier, the shaking of an earthquake tends to compact soils, and different soils behave differently. If a building or similar structure is built on more than one soil type (e.g. partly on native soil, partly on artificial fill, or soil with wood chips or sawdust in it), and these soils do not compact at the same rate or to the same extent, it can cause serious damage to the structure.

WOODS CREEK

Much of the Woods Creek shoreline area is at risk of geologic hazards. Downstream of SR 2, most of the right bank (north and west of the stream) and some of the left bank present possible steep slope hazards. These hazards are intensified by the potential erosion hazard presented by the Creek at the bottom of the slopes. Upstream of SR 2, the primary steep slope area is on the left bank. Erosion potential is underscored by the bank armoring on both sides of the channel.

Woods Creek flows in a valley it inherited from glacial activity, and historically has not moved as much as the Skykomish. The soils developed in the floodplain may be somewhat more stable than those along the Skykomish. However, by and large the same earthquake potential and the same associated hazards related to the Skykomish will likely apply to the shoreline area of Woods Creek.

3.5 CHANNEL MIGRATION ZONE

The channel migration zone (CMZ) is defined by WAC 173-26 as "the lateral extent of likely movement along a stream reach with evidence of active stream channel movement over the past one hundred years." Areas that are legally protected from bank erosion or stream avulsion are considered outside the CMZ, unless the structures are designed to less than the 100-year recurrence interval flood event.

No studies have been done to delineate the channel migration zone in Monroe. The following discussion is based on the best estimate of the channel migration zone as determined by historical and current maps, aerial photographs, and limited field observations. The actual CMZ may vary somewhat from that depicted in this report, especially in the area between SR 203 and the current gravel pit.

SKYKOMISH RIVER

The probable CMZ of the Skykomish within the City of Monroe is depicted on Figure 8. The channel was formed by a combination of glacial and fluvial processes, and the channel migration zone is largely a product of those processes. However, as with most large rivers in the Pacific Northwest, the channel is limited in its ability to migrate by anthropogenic features as well. In Monroe, these features include SR 2, SR 203, Great Northern railroad tracks, an abandoned railroad track, and various revetments.

Several historic channels were identified in a study of the stability of Haskell Slough, a slough in the floodplain on the opposite bank of the Skykomish from Monroe (NHC 2001). An 1888 survey map shows that the position of the river as it approaches the eastern edge of Monroe was approximately the same then as it is today. However, while the 1888 map showed the river bending sharply to the left, and meandering significantly as it flowed past what would become Monroe, by 1917 the Skykomish straightened considerably, cutting off at least three significant meander bends. This 1917 map shows the positions of the older channels that were observed at the time (Figure 13).

Other researchers have identified glacial outwash terraces on the north side of the Skykomish in Monroe (NHC 2001; City of Monroe 1994). These terraces serve as the northern limit of the channel migration zone, except in those places where anthropogenic structures limit the ability of the river to migrate. In addition, a hill on the eastern edge of Monroe is a natural barrier to migration, with SR 2 and the railroad track at the toe of the slope and possibly limiting the channel migration zone by a few hundred feet.

The abandoned railroad bridge and the SR 203 bridge also limit the channel migration zone, creating "hard points" through which the river must pass. The SR 203 bridge is situated on a point where the terrace on the north bank approaches close to the river, so the bridge abutment has a minor effect on the north bank CMZ. The abandoned railroad bridge and its approach from the north are more intrusive into the CMZ. NHC (2001) identifies an historic channel or slough approximately 500 feet north of the present

channel, and the railroad approach cuts across this historic channel. However, the age of this historic channel has not been determined, and may well prove to be older than 100 years, which would preclude it from being part of the true CMZ.

Immediately downstream of the SR 203 bridge, a parking lot maintained by the WDFW is protected by rip-rap. The level of maintenance of this structure is unknown, but it is presently acting to prevent the channel from migrating, and its existing use as a boat ramp and parking indicate that it will likely be maintained in the foreseeable future. Hence, the rip-rap is considered the edge of the CMZ in this area.

The WWTP for Monroe has an outfall in the Skykomish downstream of the WDFW parking lot. Rip-rap has been placed to protect the outfall from scour, and this rip-rap will presumably be maintained. Therefore it is also considered the boundary of the CMZ.

In 1961, a revetment was built between the WDFW parking lot and approximately the south-east corner of the property now used to mine gravel (City of Monroe 1994). This revetment was destroyed during floods in 1990, and has not been replaced. Historic maps indicate that the Skykomish occupied portions of the present gravel pit in 1888, but had abandoned those areas by 1917. Because of the gap in the historic record, it is unclear whether this area meets the strict requirements of being within the CMZ, but clearly, without some structure to prevent it, the Skykomish could re-occupy that area under certain conditions. Therefore, the gravel pit is considered to be within the CMZ.

The western boundary of the CMZ is 177th Avenue SE and the revetment on which it is constructed. That road has existed since before 1917, when it was called Feller Road. It is unclear whether the revetment was built with the road, or if the revetment was built afterward. Aerial photographs and topographic maps provide evidence that the channel once flowed as much as 2,000 feet west of the current revetment, thought it is uncertain when the channel moved to its present position. Hence, while the revetment is the limit of the CMZ, clearly the channel at one time moved well beyond the revetment and road.

WOODS CREEK

Historic aerial photographs dating to 1933 indicate that the channel of Woods Creek has not migrated significantly within the City. Throughout Al Borlin Park, Woods Creek is confined to a relatively narrow channel, with high walls on the edge of the terrace on which most of Monroe is situated. The CMZ is likely quite small. Between SR 2 and Old Owen Road, channel confinement diminishes, and the potential for a larger channel migration zone exists. However, there is no evidence from photos or maps to indicate that the channel has migrated in the past 100 years, and therefore the CMZ is likely only slightly wider than the ordinary high water mark of the stream.

3.6 FREQUENTLY FLOODED AREAS

"Frequently flooded areas" is one of five categories of critical areas established under the Growth Management Act (WAC 365-195-200). Monroe defines flood hazard areas as those areas subject to inundation by the base flood. The base flood is defined as the flood that has a 1 percent chance of occurring in any given year, or the 100-year recurrence interval flood. The City of Monroe participates in the National Flood Insurance Program, which allows City residents to purchase flood insurance, and the Community Rating System, which qualifies City residents for reduced insurance premiums depending on the City's rating. The City began the CRS program in 1990 and since 2001 has been rated as Class 6, which yields a 20 percent reduction in insurance premiums for structures in the 100-year floodplain and a 10 percent reduction in premiums for structures located outside of the 100-year floodplain (City of Monroe *no date*; Feilberg, pers. comm., 1 November 2002). Activities that the City conducts to qualify as a Class 6 include providing Flood Insurance Rate Map information and flood insurance purchase requirement information to inquirers; preserving open space in the floodplain; enforcing floodplain management and stormwater provisions of local ordinances; and requiring new buildings to be elevated or otherwise protected, among others (City of Monroe 2002a).

SKYKOMISH RIVER

The 100-year floodplain maps produced by FEMA (1999) are a very good approximation of the flood hazard area (see Figure 8). It includes most of Centennial Park and the gravel pit area, Al Borlin Park, and the triangle of land between the active railroad, the railroad spur, and the Skykomish main channel.

WOODS CREEK

Frequently flooded areas of Woods Creek include the inside of the meander bend between Old Owen Road and SR 2, and Al Borlin Park. Woods Creek may not flood Al Borlin Park frequently enough to consider the park part of the Woods Creek flood hazard area. However, the park is flooded by the Skykomish River with sufficient frequency to qualify as part of the Skykomish River flood hazard area. To date, a "Repetitive Loss Update Worksheet" under the National Flood Insurance Program has only been completed for one property in the City of Monroe, located on Old Owen Road adjacent to Woods Creek. This property has made seven claims for damages over the past 20 years, totaling $128,217.73.

4. EXISTING CONDITIONS IN THE CITY OF MONROE

4.1 SKYKOMISH RIVER

Shoreline areas along the Skykomish River within the City of Monroe are those areas along the north (right) bank of the river within 200 feet of the ordinary high water mark (OHWM). This shoreline extends from along a short section of 177th Avenue SE at the downstream (west) end to along the BNSF railway line and SR 2 at the upstream (east) end, the far east end of the City's Al Borlin Park. The length of this shoreline is approximately 2.3 miles and extends between approximately river miles 23.7 and 26.0 as measured from the mouth of the Snohomish River at Possession Sound near Everett (Williams et al. 1975).

For survey purposes, the Skykomish shoreline within the Monroe City limits was broken down into three segments, which are shown on all figures. Segment A extends upstream along the river from City limits to the end of the active Cadman gravel mining operations, which lie at varying distances inland from (north of) the river. Segment B extends from the east end of the Cadman site to the mouth of Woods Creek, which lies immediately upstream of the SR 203/Lewis Street bridge over the river. Finally, Segment C extends from the mouth of Woods Creek upstream to the eastern extent of Al Borlin Park and the City Limits adjacent to where the river nears and flows along SR 2 and a paralleling railway line.

On 15 January 2002, Greg Johnston, fisheries biologist, and Mark Indrebo, fluvial geomorphologist, both of The Watershed Company, conducted a qualitative aquatic habitat survey of the shoreline areas in the City of Monroe along the right bank of the Skykomish River. The general purpose of the survey was to assess, where applicable, the level of functioning of the various indicators as listed on NMFS' Matrix of Pathways and Indicators, as described previously in *Basin-Wide Ecological Functions/Ecosystem-Wide Processes* under Section 3.3. Table 11 summarizes the conditions of each segment.

4.1.1 Segment A

Land Use

The Cadman operation and the on-site critical areas and their buffers comprise most of Segment A, which is designated as Limited Open Space in the current zoning and future land use maps. When gravel operations at the Cadman site are complete, the property will likely be redeveloped as a City park, providing even greater benefits to the public and the environment than currently exist. Very small portions of the segment are zoned as Public Space (Washington State Department of Corrections facility), Light Industrial, and Urban Residential. The portions of these land uses within the shoreline zone are mostly vegetated by lawn or pasture, with very few structures or impervious surface.

Future land use is not expected to change substantially, or have additional adverse impacts on shoreline function.

According to the Draft Supplemental Environmental Impact Statement (City of Monroe 1994), the gravel pit first began operations in 1961 under a prior owner and before the area was annexed into the City. Cadman purchased the site in 1989, two years after it was annexed. Historically, the site was mined using a combination of rubber-tired equipment to remove the gravel above the water table, followed by dredging using a bucket attached to cables and pulled towards a tower, similar to many logging operations. This method allows excavation to a depth of about 45 feet below ground surface. Under the present permit, a "clamshell" bucket may be used, capable of excavating to a depth of 100 feet. As mentioned earlier, the deepest portions of the pit will be back-filled with 375,000 tons of off-site material, yielding a final depth of approximately 40 feet. In total, Cadman expects to remove approximately 11 million (M) tons of material over the life of the operation, with a peak output of approximately 1 M tons per year.

The present operation plan calls for three phases, with different road and processing configurations for each phase. As portions of the site are closed, they are regraded, stabilized, and replanted. An attachment to the 2002 Master Plan (City of Monroe 2002b) includes conceptual grading and planting plans, the goals of which are to "create wildlife habitat and provide accessibility for future recreation" (City of Monroe 2002b). Once all mining is completed, the site (less 37 acres to serve as a base for "long-term site operations") will be deeded to the City for non-commercial public use and stewardship. Ten acres in the northeast portion of the site have already been conveyed to the City (City of Monroe 2002b). A concern that has been expressed regarding the mining operation is the potential for the Skykomish to change locations and flow through the pit. Historically, the river has occupied the area of the pit (NHC 2001), and through bank erosion or during a flood event, it could reoccupy the area. Such an occurrence would have significant impacts upstream and downstream of the site. If the river flowed over the pit, the pit would serve as a sediment trap, capturing most of the sediment load of the river. Downstream of the site, the river would be starved of sediment, leading to potential downcutting of the riverbed and an increase in bank erosion. Upstream of the site, downcutting and bank erosion would also be likely, as the river adjusted to the new base level dictated by the bottom of the pit and/or the downcut channel downstream of the pit. Such downcutting could have serious ramifications for the City, potentially creating bank instability which would threaten the parks, railroad and highway.

Cadman has addressed this concern by creating a 200-foot-wide, 1,400-foot-long armored buffer between the river and the pit. This buffer has been designed to withstand the 100-year recurrence interval flood, and prevent the channel from either slowly migrating or rapidly shifting into the pit area.

With the Skykomish River in its present location, the pit has little impact on the sediment regime of the river. Flow from the river only enters the pit during floods as overbank

flow. Overbank flow carries relatively little sediment, and while some of this sediment likely gets deposited in the pit, the volume is insignificant compared to the volume of sediment carried by the main flow of the Skykomish during a flood. Turbidity is also a concern during floods, as flow from the pit is carried out to the Skykomish. However, this too is deemed insignificant, since at flood flows the Skykomish itself becomes quite turbid. The extra turbidity derived from the pit is unlikely to have a significant impact in overall turbidity of the Skykomish (City of Monroe 1994).

Aquatic Habitat

The following discussion of aquatic habitat conditions is summarized in Table 10.

Table 10. Environmental Baseline – completed at segment scale for Segment A, Skykomish River.

PATHWAYS INDICATORS	**ENVIRONMENTAL BASELINE**
Water Quality	
Temperature	Slightly elevated summer temperatures
Sediment/Turbidity	Sediment load and turbidity occasionally high
Chem. Contam./Nut.	Variable depending on the contaminant and nutrient – several parameters are 303(d) listed
Habitat Access	
Physical Barriers	No barriers in mainstem – off-channel beaver dams and Cadman facilities may hinder passage
Habitat Elements	
Substrate	Gravel and cobble with low embeddedness
Large Woody Debris	LWD is present, but recruitment potential in the segment is low
Pool Frequency/Quality	frequency and quality are low – pool cover and LWD limited
Off-Channel Habitat	Present, but compromised by Cadman operation
Refugia	NA
Riparian Vegetation	Developing deciduous forest – few conifers, abundant non-native shrubs
Channel Cond. & Dyn.	
Width/Depth Ratio	Naturally high ratio because it's a depositional reach – likely further increased due to human activity
Streambank Cond.	Banks stable with a few areas of armoring
Floodplain Connectivity	Good connectivity
Flow/Hydrology	
Peak/ Base Flows	Increased peak flows and reduced base flows, result of forest practices and an increase in other land uses
Drainage Network	Somewhat compromised by Cadman

Temperature

Though the Skykomish River was included on the 1998 303(d) listing of the river because of temperature and other water quality parameters, summer temperatures at Monroe usually meet state standards with only three measurements between 18 and 20^{o} recorded during the last 10 years (Thornburgh and Williams 2000). However, DOE's

Water Quality Index (WQI) scores, compiled from measurements taken at a station in Monroe for temperature in eight of nine years (1992-2001), indicate that this parameter "met expectations and [is] of lowest concern" (http://www.ecy.wa.gov/apps/watersheds/riv/station.asp?sta=07C070). As noted on DOE's WQI website, "[t]he WQI may not be consistent with Ecology's 303(d) listing because the WQI and the 303(d) analyses use different data sources, different constituents (parameters), different time periods, and different evaluation techniques." In summary, the temperatures in the Skykomish River through Monroe are slightly elevated due to land use changes in the basin. Though there would be some benefit from steps that would reduce temperatures, the are generally within a range that will accommodate migrating and rearing salmonid fish.

Sediment/Turbidity

The sediment regime for the lower mainstem Skykomish as a whole is listed as "not properly functioning" in the *Snohomish River Basin Chinook Salmon Habitat Evaluation Matrix* (SBSRTC 2000), citing 14 percent total impervious surface as determined by Snohomish County (2000). A more recent study by Snohomish County (Purser and Simmonds 2001) reports total impervious surface area in the lower mainstem Skykomish subbasin at 7.5 percent. Because the performance standard given in the *Snohomish River Basin Chinook Salmon Habitat Evaluation Matrix* indicates that the sediment regime is "not properly functioning" if total impervious surface is greater than 12 percent, SBSRTC's 2000 sediment/turbidity designation should be updated to "at risk." DOE's WQI scores for suspended solids and turbidity, which are related, fluctuate between low and moderate concern over the nine-year period of record (http://www.ecy.wa.gov/apps/watersheds/riv/station.asp?sta=07C070).

Of note, tributary water entering the river at the west boundary of Segment A through a series of ponds and beaver dams along a former river channel paralleling 177th Avenue SE was noticeably more turbid than the receiving river water on 15 January 2002.

Chemical Contamination/Nutrients

Water quality for the lower mainstem of the Skykomish River, including Monroe, was reported as "not properly functioning" in the *Snohomish River Basin Chinook Salmon Habitat Evaluation Matrix* (SBSRTC 2000). This determination is based in large part on the 1998 303(d) listing of the lower Skykomish River for fecal coliform, dissolved oxygen, temperature, silver, copper, and lead (Thornburgh and Williams 2000). However, DOE's WQI scores for nitrogen, phosphorus and dissolved oxygen over a nine-year period indicate that these parameters "met expectations and are of lowest concern" (http://www.ecy.wa.gov/apps/watersheds/riv/station.asp?sta=07C070). During that same time period, fecal coliform was of low concern for eight out of nine years. Similarly to temperature, water quality along the mainstem Skykomish in Monroe could be improved to the benefit of salmonid fish, but is generally of high enough quality to meet basic

requirements. Water quality is presumed to be comparable for all three river segments defined along the City's jurisdiction.

Physical Barriers

No fish migration barriers are present along the river. A series of beaver dams is present along a drainage that joins the main river at the west boundary of Segment A, which may hinder fish passage under certain conditions. However, the additional rearing habitat provided by beaver ponds is generally thought to more than compensate for any reduction in fish passability.

During flood flows, fish may be able to enter the Cadman pit area. One condition of the current operating permit for the Cadman mine is that open channels be maintained that allow any fish brought into the pit during flood flows to re-enter the Skykomish. Construction of the fish escapement channels should begin within the next three years (City of Monroe 2002b).

Substrate

The substrate along the entire length of the Skykomish River bordering the City of Monroe is dominated by gravel and cobbles with a relatively low level of embeddedness. As such, the substrate is considered to be generally adequate to provide spawning habitat, though sandy materials tend to fill interstitial spaces in some areas.

Large Woody Debris

In Segment A, a fair amount of wood has formed jams along the margin of a side channel and a cottonwood forest. There is some recruitment potential, but probably not enough to maintain suitable conditions without continued recruitment of wood from upstream. Such continued recruitment is possible if upstream sources are not eliminated or compromised.

Pool Frequency and Quality

For a river the width of the Skykomish, pool frequency should be approximately 20 pools per mile, pools should be greater than 1 meter deep with good cover, and the reach should have adequate woody debris recruitment potential. At the time of observation, no pools were apparent, but a minimal number could possibly be discerned at low flow. Little overhanging vegetation is present, and the wood present in this segment is primarily stranded in jams on bars or well up the banks where it cannot provide cover to any pools. The combination of few pools and a lack of woody debris make this segment less than ideal for fish habitat.

Off-Channel Habitat

Suitable off-channel habitat consists of backwaters with cover and low-energy, off-channel areas. Segment A features a series of beaver dams and ponds along an apparent

former river channel at its downstream end plus several additional side channels and high-flow channels through the floodplain and riparian area.

Refugia

Refugia are areas of important remnant habitat for sensitive aquatic species. The concept of refugia is more applicable on a larger sub-basin or basin-wide scale and is not particularly applicable to the localized segments contained within the City of Monroe. No such refugia areas are contained within the City.

Riparian Vegetation

Riparian areas are well-vegetated with shrubs and maturing deciduous trees, mostly cottonwoods. Few or no conifers are present. Some Himalayan blackberry and a considerable amount of Japanese knotweed are present, reducing and interfering with the function of native vegetation. See detailed discussion under *Priority Habitat* below.

Width/Depth Ratio

The width of the Skykomish in Monroe varies between 350 and 700 feet. The depth of the Skykomish was not measured, so width/depth (W/D) ratio has not been determined. However, gravel bars are evident in all three segments, which may indicate channel widening. On a non-braided stream, a W/D ratio of grater than 12 is considered moderate to high (Rosgen 1996), and NMFS uses a W/D ratio of 18 as the maximum for a properly functioning stream. To achieve a W/D ratio of 18, the Skykomish would need to have an average depth of 20 to 40 feet through Monroe. While some pools may achieve these depths, it is unlikely that this is the average depth.

The Skykomish from Monroe to the confluence with the Snoqualmie is a depositional reach; it deposits much of the sediment that it carries (Pentec, 1999). Depositional reaches typically have a higher width/depth ratio than transport reaches, so the higher W/D ratio in Monroe is consistent with the downstream processes. However the volume of deposition between Monroe and the confluence with the Snoqualmie has likely been increased due to human activity over the last century. Therefore, the high W/D ratio in Monroe, while consistent with downstream process, may also be symptomatic of wider, watershed-scale disturbances.

Streambank Condition

Streambank condition is defined as a measure of bank stability. The banks of the Skykomish River are generally stable in all segments within the City. However, it should be mentioned that rip-rap lines the bank and its toe along 177th Avenue SE at the extreme downstream end of the City, along the railroad at the extreme upstream end, at a possible sewer outfall downstream of SR 203, and at the SR 203 and railroad bridges.

Floodplain Connectivity

On the right (north) bank of the river within the City's jurisdiction, there is good connectivity with the floodplain with clear evidence that the floodplain has been recently inundated.

Peak/Base Flows

Flows were not measured as a part of this survey, and their functioning along the City of Monroe will be the same as for the lower mainstem of the Skykomish River as a whole. The *Snohomish River Basin Chinook Salmon Habitat Evaluation Matrix* (SBSRTC 2000) lists this section of river as "not properly functioning" for both peak and base flows.

Increase in Drainage Network

Drainage patterns within the floodplain are functioning well, but have been disrupted by activities on the Cadman gravel mining site.

Priority Habitat

Segment A includes all the active Cadman facilities, the Cadman-area wetland complex, upland forest patches, and agricultural lands on the west side of 177th Avenue SE. The wetland complex is briefly described above in Table 5, and is mapped as a priority habitat by WDFW (WDFW 2001a). Vegetation on the west side of 177th Avenue SE is primarily characterized by pasture and lawn grasses associated with the Washington State Department of Corrections property. Wildlife value is primarily limited to small mammal habitat and raptor foraging.

Upland forest is present on the side slope between 177th Avenue SE and the wetland complex and in between lobes of the wetland complex. The size and width of these areas is variable. On the west side of the wetlands adjacent to the road, the buffer width ranges between approximately 75 and 150 feet wide. Although habitat west of the wetlands is limited by the proximity of road noise and noise from nearby Cadman facilities, vegetation is comprised of a native deciduous-dominant, mixed forested community with some snags and small- to medium-sized woody debris that provide some food, cover and/or nesting habitat for birds, small mammals and macroinvertebrates. Native bigleaf maple (*Acer macrophyllum*), red alder, bitter cherry (*Prunus emarginata*), and black cottonwood (*Populus balsamifera*) are found in the overstory. Understory vegetation in this forested community predominantly consists of native vine maple (*Acer circinatum*), red elderberry (*Sambucus racemosa*), snowberry (*Symphoricarpos albus*), hazelnut (*Corylus cornuta*), salmonberry (*Rubus spectabilis*), sword fern (*Polystichum munitum*) and nettle (*Urtica dioica*). Non-native Himalayan blackberry and Japanese knotweed are dominant in patches and along the along the road edge. Other upland forested patches in Segment A contain the same mix of species, and provide marginally better wildlife habitat because of their shape (generally non-linear with a lower edge to area ratio), the

increased abundance of snags and downed wood, and distance from a major road (although the Cadman operation is still a major disturbance).

The wetlands themselves are a mix of permanent and seasonal open water, aquatic bed, streambed, emergent, scrub-shrub, and forested vegetation classes with some ponded areas too deep to meet wetland criteria. The wetland complex formed in seasonal secondary channels of the Skykomish, and in and along the pre-1920s river channel (City of Monroe 1994). The wetland assessment in the City's EIS (City of Monroe 1994) attributes moderate to high functions to the wetlands based on the following factors: "food chain production; general and specialized habitats; aquatic study areas, sanctuaries or refuges; hydrologic support functions; shoreline protection; storage for flood waters; natural groundwater recharge; water purification through natural water filtration; and habitat for rare, restricted, or relic flora or fauna." The shrub and tree species are primarily native, but the groundcover layer of the wetlands is dominated in many areas by the non-native invasive reed canarygrass. Tree species include black cottonwood, Pacific and other willows (*Salix lucida ssp. lasiandra*, *S. sitchensis*, *S. scouleriana*), red alder (*Alnus rubra*), and western red cedar (*Thuja plicata*). Salmonberry, red-osier dogwood (*Cornus sericea ssp. sericea*), soft rush (*Juncus effusus*), lady fern (*Athyrium filix-femina*), and reed canarygrass (*Phalaris arundinacea*) in the understory. Snags, downed wood, the multi-storied canopy, vegetation species diversity, and a matrix of uplands and wetlands combine to create an excellent habitat area that should be preserved.

Habitat opportunities in Segment A to the south of the active Cadman operation are more limited due to the proximity of adjacent Cadman facilities, limited vegetation diversity, and reduced presence of habitat structures such as snags and woody debris. The vegetated buffer in this part of Segment A ranges in width from approximately 100 feet wide to 160 feet wide. Buffer vegetation is characterized by an early-successional, deciduous, forested community. Black cottonwood, red alder and bigleaf maple dominate the overstory in this area with osoberry (*Oemleria cerasiformis*), hazelnut, snowberry, Nootka rose (*Rosa nutkana*), salmonberry and/or Himalayan blackberry found in the understory. Wetland areas near the river provide some added habitat niches with black cottonwood, red alder and Pacific willow in the overstory and salmonberry and bulrush (*Scirpus microcarpus*) in the understory. Invasive Himalayan blackberry, evergreen blackberry (*Rubus laciniatus*), and various grass and herbaceous weed species are common in the transitional buffer areas immediately adjacent to the Cadman facilities.

Priority Species

As previously mentioned, Segments A through C are included in a bald eagle territory mapped by WDFW (2001). Further, USFWS noted wintering bald eagle use and a bald eagle winter concentration area just east of the City limits (Berg, pers. comm., 11 February 2002). No other state or federally listed wildlife species are mapped in the area.

The nearest bald eagle nest is more than 1.5 miles west of the City. Bald eagles could be found during the breeding and winter foraging seasons feeding on salmon and/or waterfowl in the Skykomish River and the Cadman wetland complex. Salmon can be found spawning the entire length of the in-City portions of the Skykomish River, providing an excellent source of bald eagle prey. In addition, salmon carcasses from these areas and areas further upstream collect on the Skykomish River banks when deposited by high flows, are grounded on gravel bars, or are trapped in vegetation or pockets of the bank. Carcasses also provide an excellent source of forage for bald eagles, as well as a variety of other non-priority species such as gulls and raccoons. Perch trees, primarily cottonwoods, are abundant along the Skykomish River shoreline.

Recommendations

1. Planting, encouraging, and preserving stream and riverbank vegetation which shades or would shade the river and its tributary stream sections within the City during the summer months is the primary method by which the City could ensure that any elevated river temperatures were not being exacerbated by conditions within the City and under its control or influence.

2. The City should work to prevent or reduce accelerated or unnatural rates of erosion along the banks of the river and its tributaries, such as Woods Creek, within its jurisdiction, as well as to control the sediment loading of runoff water originating within its jurisdiction. The establishment and maintenance of native streambank vegetation, including both understory and overstory layers, would facilitate achievement of this goal.

3. In general, the City can reduce and limit water quality impacts to the river by addressing the quality of storm and sanitary sewage discharges within its jurisdiction to the river and its tributaries.

4. Runoff water from the Cadman area through beaver ponds was somewhat turbid during site visits. Review and possibly improve Cadman's water quality control measures to reduce turbidity as applicable.

5. Those areas within the shoreline zone disturbed through the gravel mining process should ultimately be restored to include an adequate topsoil layer planted with a diverse assemblage of native riparian trees and shrubs consistent with Alternative 1 as described in the Draft EIS for the gravel operation. In addition, a network of ponds and channels connecting to the river or existing channels should be created in the process.

6. The existing wetlands and their buffers should be preserved, and enhanced through removal of non-native vegetation such as Himalayan blackberry, morning glory, and Japanese knotweed. These generally upland areas should be replanted with native trees and shrubs, such as Douglas-fir, western hemlock, osoberry, snowberry,

hazelnut, and hawthorn. Reed canarygrass-dominated areas should be enhanced through addition of native shrubs, such as red-osier dogwood and willow stakes. As redevelopment allows, expand the area of forested buffer and restore previous wetland areas.

4.1.2 Segment B

Land Use

Segment B is primarily the Skykomish River Centennial Park. This land use will not change in the foreseeable future, although existing facilities in the park (such as ballfields) may be modified and expanded and new facilities may be constructed. Any expansions would not remove existing forested areas adjacent to the Skykomish, and are not expected to increase impervious surface.

Aquatic Habitat

The following discussion of aquatic habitat conditions is summarized in Table 11.

Table 11. Environmental Baseline – completed at segment scale for Segment B, Skykomish River.

PATHWAYS INDICATORS	**ENVIRONMENTAL BASELINE**
Water Quality	
Temperature	Slightly elevated summer temperatures
Sediment/Turbidity	Sediment load and turbidity occasionally high
Chem. Contam./Nut.	Variable depending on the contaminant and nutrient – several parameters are 303(d) listed
Habitat Access	
Physical Barriers	None present
Habitat Elements	
Substrate	Gravel and cobble with low embeddedness
Large Woody Debris	Several logs and a stump – low recruitment potential in segment
Pool Frequency/Quality	no pools – cover potential and LWD potential limited
Off-Channel Habitat	None present
Refugia	NA
Riparian Vegetation	Fairly mature cottonwood forest – few conifers, some non-native shrubs
Channel Cond. & Dyn.	
Width/Depth Ratio	Naturally high ratio because it's a depositional reach – likely further increased due to human activity
Streambank Cond.	Banks stable with a few areas of armoring
Floodplain Connectivity	Good connectivity
Flow/Hydrology	
Peak/ Base Flows	Increased peak flows and reduced base flows, result of forest practices and an increase in other land uses
Drainage Network	Somewhat compromised by SR 203 bridge and boat ramp

Temperature

See discussion under Segment A.

Sediment/Turbidity

See discussion under Segment A.

Chemical Contamination/Nutrients

See discussion under Segment A.

Physical Barriers

No barriers are present in this segment.

Substrate

See discussion under Segment A.

Large Woody Debris

One old-growth stump rests on the bank and several larger logs are embedded in it. In addition, two or three large logs are partially submerged in the channel out from the bank. However, sufficient wood is not present to provide adequate cover and pool-forming functions, nor is recruitment potential present to maintain it. A fairly mature cottonwood forest lines most of the bank, but only a very few small conifers (cedars) are present.

Pool Frequency and Quality

No pools are present along this segment. Little overhanging bank vegetation or in-channel woody debris. Bank vegetation is suppressed due to access by fishermen via City parks and a WDFW boat launch and parking area adjacent to SR 203. As with Segment A, the lack of pools and the lack of woody debris make this segment less than ideal for fish.

Off-Channel Habitat

This segment includes no off-channel habitat (with the qualifier that the mouth of Woods Creek at the boundary between Segments B and C could be considered such habitat, but has been assigned to Segment C).

Refugia

See discussion under Segment A.

Riparian Vegetation

The riparian forest along the north bank of the river within the City of Monroe consists mostly of a fairly mature cottonwood forest including salmonberry, snowberry, and a few young cedar trees. Though increased numbers and maturity of conifers would improve

prospects for large woody debris recruitment, more than half of the riparian vegetation is similar to the potential natural community. See detailed discussion under *Priority Habitat* below.

Width/Depth Ratio

See discussion under Segment A.

Streambank Condition

See discussion under Segment A.

Floodplain Connectivity

Neither the right nor left banks of the river have levees, so the river is connected to its floodplain in a more or less natural fashion. The right bank is higher than the south bank, however, and so would flood less frequently.

Peak/Base Flows

See discussion under Segment A.

Increase in Drainage Network

Structures increasing the drainage network in this segment include the SR 203 bridge crossing of the river and a boat ramp with parking area.

Priority Habitat

Segment B includes a forested buffer along the Skykomish River, undeveloped portions of the Cadman property, and the Skykomish River Centennial Park. WDFW included the forested portion of Segment B as a riparian priority habitat because of its value as a "major migration corridor." This corridor is the only significant wildlife habitat in Segment B, because of its function as a migration corridor and as a connection between the high-quality habitats in Segments A and C.

A young, monotypic, black cottonwood-dominated community characterizes the southwestern part of Segment B where the buffer is limited to approximately 100 feet in width. Invasive, non-native Himalayan blackberry and Japanese knotweed (*Polygonum sachalinese*) are also present in the understory in this area and consequently reduce habitat opportunities for wildlife. In addition, few to no habitat structures, such as snags and woody debris, are present. However, further northeast, beyond Cadman's boundaries and southwest of the Skykomish River Centennial Park, the vegetated buffer width widens to 200^{+} feet wide and the vegetation community becomes more diverse. Black cottonwood trees still dominate the canopy, but they are larger in size and a few red alder, bigleaf maple and bitter cherry are also present in the overstory. The understory also becomes more diverse in this area with hazelnut, osoberry, salmonberry, Nootka rose, sword fern, piggy-back plant, and large-leaved avens present, in addition to a smaller

component of non-native Himalayan blackberry. Medium to large-sized snags and woody debris are also more abundant in this forested area, providing added habitat features for wildlife.

The northeast portion of Segment B bounds the Skykomish River Centennial Park. In this area, the native forested buffer narrows to 100 feet wide. Otherwise, the vegetation community remains similar in character to the previously described section of Segment B. An exception to this includes a large gravel parking lot that is located in the northeast end. In this area, the vegetated buffer narrows to between 0 and 10 feet wide. Vegetation present in this narrowed buffer area is fairly sparse and consists primarily of weedy grasses and herbaceous plant species with some Himalayan blackberry, evergreen blackberry, and Nootka rose.

Priority Species

See discussion under Segment A.

Recommendations

1. The existing rip-rap bank protection adjacent to the WDFW parking area serving the boat ramp should be reduced and/or supplemented with soil and woody debris. If needed, alternative bank protection measures such as bank barbs or woody structures should be considered. A wider buffer of native vegetation should be provided between the parking area and the river.

2. Some of the fisherman trails along the river throughout this segment should be vegetated to control access. The existing density and type of vegetation is presently limited by the trails and foot traffic. Increased vegetation density would improve bank stability and provide other habitat functions including shade and terrestrial insect food supply.

3. Existing rip-rap at the location of a sewage outfall should be supplemented with soil and vegetated with native shrub species.

4. In conjunction with native planting along this segment, all non-native plant specimens within the shoreline area, such as Himalayan blackberry and Scotch broom, should be removed.

5. Secure large woody debris along the river bank.

6. When upgrading or otherwise modifying lawn sections of Skykomish River Centennial Park, consider incorporating as many of the recommendations in *Ecologically Sound Lawn Care for the Pacific Northwest: findings from the scientific literature and recommendations from turf professionals* (McDonald 1999, http://www.ci.seattle.wa.us/util/lawncare/docs/Grnlwn61.pdf). These recommendations address ways to increase lawn health, thereby reducing weeds,

water runoff quantities, and the need for chemical applications, and increasing the biofiltration abilities of the soil.

4.1.3 Segment C

Land Use

Segment C is entirely Al Borlin Park. This land use will not change in the foreseeable future, although existing facilities in the park may be modified and new facilities may be constructed. These are briefly discussed above in Section 2.3. Impervious surface increases would be minor, and would likely not result in loss of vegetation.

Aquatic Habitat

The following discussion of aquatic habitat conditions is summarized in Table 12.

Table 12. Environmental Baseline – completed at segment scale for Segment C, Skykomish River.

PATHWAYS INDICATORS	**ENVIRONMENTAL BASELINE**
Water Quality	
Temperature	Slightly elevated summer temperatures
Sediment/Turbidity	Sediment load and turbidity occasionally high
Chem. Contam./Nut.	Variable depending on the contaminant and nutrient – several parameters are 303(d) listed
Habitat Access	
Physical Barriers	None present
Habitat Elements	
Substrate	Gravel and cobble with low embeddedness
Large Woody Debris	Woody debris abundant – low recruitment potential within segment
Pool Frequency/Quality	pool frequency and quality low – cover potential and LWD potential limited
Off-Channel Habitat	Several side channels present through Al Borlin Park
Refugia	NA
Riparian Vegetation	Young to mature deciduous forest – few conifers
Channel Cond. & Dyn.	
Width/Depth Ratio	Naturally high ratio because it's a depositional reach – likely further increased due to human activity
Streambank Cond.	Banks stable with a few areas of armoring
Floodplain Connectivity	Fairly good connectivity – compromised by bridges and SR 2
Flow/Hydrology	
Peak/ Base Flows	Increased peak flows and reduced base flows, result of forest practices and an increase in other land uses
Drainage Network	Compromised by roads, bridges, and railroad

Temperature

See discussion under Segment A.

Sediment/Turbidity

See discussion under Segment A.

Chemical Contamination/Nutrients

See discussion under Segment A.

Physical Barriers

No barriers are present in this segment.

Substrate

See discussion under Segment A.

Large Woody Debris

Similar to Segment A, a large amount of wood has stranded to form jams near the upstream end of the segment at the margin of a gravel bar and a cottonwood forest of medium maturity. Though sufficient wood is likely present to provide adequate habitat function, recruitment potential within the segment is not sufficient to maintain the condition. The wood which is present has been recruited from upstream and has stranded in the segment during high flows.

Pool Frequency and Quality

At low flows, pools are likely present in the vicinities of the railroad and SR 203 bridges. Some wood has also accumulated near the bridge abutments to provide limited cover, though most wood is stranded on bars or high on the banks as jams and is unavailable to function as cover in pools. This segment does not provide adequate large woody debris potential, which limits the utility of the pools that do likely exist.

Off-Channel Habitat

Side channels extend from the head of the bar near the upstream end of the segment to the railroad bridge. The mouth of Woods Creek can also be considered to provide off-channel habitat, especially during times of flood when it is backwatered by the river.

Refugia

See discussion under Segment A.

Riparian Vegetation

The riparian areas along this section consist primarily of deciduous forest, fairly mature in the lower end and less mature in the upper end due to natural river function disturbances. Scattered young cedar trees are present in the lower section. As for Segment B, above, mature conifers would improve prospects for large woody debris

recruitment, but more than half of the riparian vegetation is similar to the potential natural community. See detailed discussion under *Priority Habitat* below.

Width/Depth Ratio

See discussion under Segment A.

Streambank Condition

See discussion under Segment A.

Floodplain Connectivity

The channel through this segment is generally wide with gravel bars and riparian areas. However, some constriction in the floodplain occurs at each of the railroad and SR 203 bridges.

Peak/Base Flows

See discussion under Segment A.

Increase in Drainage Network

This segment includes park trails, roads and parking areas, a railroad bridge, and a railway line along the upstream end of the segment. A portion of SR 2 is also within the shoreline zone at the upper end.

Priority Habitat

Most of Segment C, more than two-thirds of Al Borlin Park, is mapped by WDFW as a priority riparian habitat because of its "excellent habitat for a broad array of wildlife species, and a major migration corridor" (WDFW 2001a). The portion of the park that is not specifically mapped as a priority riparian habitat actually has equal habitat value. The park is managed as a natural area, and is rather sparsely covered by formal and informal pedestrian trails. Except for a small grassy picnic area at the southwest tip of the park, the entire park is vegetated by a deciduous-dominant, mature forest. Snags and downed wood are abundant, and non-native species are limited except along trail margins and other edges. Much of the western half of the park is forested wetland, and the eastern half of the park likely contains pockets of forested wetland. The forest contains predominately bigleaf maple, red alder, and black cottonwood in the overstory. Conifers of varying ages, such as western hemlock, Douglas-fir and western red cedar, are present, but not in sufficient quantity to consider the area a mixed forest. The understory shrub layer is dense to sparse, and is dominated by salmonberry, willow, red-osier dogwood, and Japanese knotweed in wetland areas, and vine maple, red elderberry, osoberry, red huckleberry, salal, snowberry, rose, and thimbleberry in upland areas. Groundcovers include sword fern, lady fern, large-leaved avens, piggy-back plant, and stinging nettle.

Priority Species

See discussion under Segment A.

Recommendations

1. Bank erosion is occurring at a minimum of two locations in Al Borlin Park where trails meet the river and at a separate riverbank parking area. The trails and parking area should be moved back from the riverbank, and the banks and buffer area should be restored by planting native trees and shrubs.

2. Large woody debris could be anchored along the river channel extending from the mouth of Woods Creek to the railroad bridge. The portions of the segment upstream of the railroad bridge appear to have sufficient woody debris, though somewhat smaller in size than would be ideal.

3. Assuming it is no longer being used, remove the railroad bridge which crosses the river near the middle of this segment, including its approaches. The northern abutment of this bridge cuts across an area of historic channel, and the piers of the bridge rest in the present-day channel, possibly constricting the river at high flows. While this bridge undoubtedly has cultural and historic significance, it is potentially adversely affecting the Skykomish River. The City should consider plans to reduce or eliminate the impact the bridge may have on the Skykomish.

4. A railroad embankment lining the uppermost end of this segment is heavily armored with rip-rap. Investigate alternative bank stabilizing methods such as woody structure placement and bank barbs for this segment. Supplement the banks with soil and native vegetation.

4.2 WOODS CREEK

Shoreline areas along Woods Creek within the City of Monroe have been defined as those areas along the creek within the City limits (downstream of Old Owen Road to the Skykomish River) and within 200 feet of the floodway or within the 100-year floodplain, whichever is greater. The length of this shoreline is approximately 1.2 miles. Much of the section downstream of SR 2 flows through or borders on the City's Al Borlin Park.

For survey purposes, the length of Woods Creek within the Monroe City limits was broken down into two segments, which are shown on all figures. Segment A extends from the mouth of the creek at the Skykomish River, in Al Borlin Park just east of the SR 203 Skykomish River bridge, to the SR 2 bridge over the creek. Segment B extends from the SR 2 bridge to the City limits at the Old Owen Road bridge. On February 13, 2002, Greg Johnston, fisheries biologist with The Watershed Company, made a qualitative habitat survey of the shoreline areas in the City of Monroe along Woods Creek. The general purpose of the survey was to assess, where applicable, the level of functioning of

the various indicators as listed on NMFS' Matrix of Pathways and Indicators, as described previously in Section 3.3.1 *Basin-Wide Ecological Functions/Ecosystem-Wide Processes*.

4.2.1 Segment A

Land Use

The right bank of Woods Creek is primarily park and residential, with smaller areas of industrial and commercial. Much of the shoreline area in these zones is sloped, vegetated creek buffer unsuitable for additional development, although there are some fairly substantial intrusions by existing residential development. Planned growth in the City of Monroe is not expected to increase the amount of impervious surface in the shoreline zone, unless the industrial area is redeveloped more intensively. Currently, much of the industrial zone in the shoreline is bare dirt or gravel storage area. The left bank of Segment A consists entirely of Al Borlin Park, which has already been discussed several times in the preceding sections.

Aquatic Habitat

The following discussion of aquatic habitat conditions is summarized in Table 13.

Table 13. Environmental Baseline – completed at segment scale for Segment A, Woods Creek.

PATHWAYS INDICATORS	**ENVIRONMENTAL BASELINE**
Water Quality	
Temperature	Moderately elevated summer temperatures
Sediment/Turbidity	Sediment load and turbidity are moderately elevated
Chem. Contam./Nut.	303(d) listed for fecal coliform; nitrogen, phosphorus, and DO also a concern
Habitat Access	
Physical Barriers	no barriers present
Habitat Elements	
Substrate	Medium sandy gravel with moderate embeddedness
Large Woody Debris	LWD limited w/ limited recruitment potential
Pool Frequency/Quality	Adequate frequency with quality diminished by low LWD supply
Off-Channel Habitat	A few small and one large high-quality side channel present
Refugia	NA
Riparian Vegetation	Variable-width deciduous forest – large patches of non-native shrubs, few conifers
Channel Cond. & Dyn.	
Width/Depth Ratio	ratio low, stream downcut but probably naturally healing
Streambank Cond.	Banks stable – few armored areas around bridge abutments
Floodplain Connectivity	slight reduction from railroad grade
Flow/Hydrology	
Peak/ Base Flows	high peak and low base flows
Drainage Network	compromised by roads, driveways and trails

Temperature

The upper watershed generally meets state standards for temperature (Thornburgh and Williams 2000), but the *1992 Watershed Analysis* for the basin stated that high water temperatures could be acting as an upstream migration barrier in the basin (Thorn et al. 1992). DOE collected stream data for Woods Creek in 1996 and 1992. Based on those two years, temperature was of low and moderate concern (http://www.ecy.wa.gov/apps/watersheds/riv/station.asp?sta =07F055). Temperatures in lower Woods Creek are likely moderately elevated due to land use changes in the basin. Though these increased temperatures do not preclude fish use, lowering of temperatures would be of benefit.

Sediment/Turbidity

The substrate appeared to be primarily medium-sized gravel with sand. The sediment regime for lower Woods Creek is listed as "not properly functioning" in the *Snohomish River Basin Chinook Salmon Habitat Evaluation Matrix* (SBSRTC 2000), citing a number of references including a finding of 25 percent total impervious surface as determined by Snohomish County (2000). A more recent study by Snohomish County (Purser and Simmonds 2001) reports total impervious surface area in the lower Woods Creek subbasin is at 12.5 percent. Because the performance standard given in the *Snohomish River Basin Chinook Salmon Habitat Evaluation Matrix* indicates that the sediment regime is "not properly functioning" if total impervious surface is greater than 12 percent, the updated 12.5 percent total impervious surface value still justifies the "not properly functioning" classification.

DOE's WQI scores for suspended solids and turbidity, which are related, fluctuate between low and moderate concern over the two-year period of record (http://www.ecy.wa.gov/apps/watersheds/riv/station.asp?sta=07F055).

Chemical Contamination/Nutrients

Water quality for lower Woods Creek was found to be "at risk" in the *Snohomish River Basin Chinook Salmon Habitat Evaluation Matrix* (SBSRTC 2000). This determination is based in part on the 1998 303(d) listing of Woods Creek for fecal coliform (Thornburgh and Williams 2000). DOE's WQI scores for fecal coliform, phosphorus and dissolved oxygen indicate "moderate concern" (http://www.ecy.wa.gov/apps/watersheds/riv/station.asp?sta=07F055). In one year, nitrogen "did not meet expectations" and is "of highest concern." Richardson Creek and Lake Roesiger Creek, tributaries of Woods Creek, were also found to have possibly significant loadings of metals.

Physical Barriers

No fish migration barriers are present in Segment A.

Substrate

The substrate along the entire length of Woods Creek within the City of Monroe is dominated by medium-sized, sandy gravel including some cobbles and with a moderate level of embeddedness. As such, the substrate is considered to be less than ideal as spawning habitat due to sandy materials which tend to fill interstitial spaces.

Large Woody Debris

The *Snohomish River Basin Chinook Salmon Habitat Evaluation Matrix* (SBSRTC 2000) rates lower Woods Creek as "not properly functioning" for large woody debris, citing the *1992 Watershed Analysis* of the watershed (Thorn et al. 1992), which reported an almost complete loss of LWD and that most available wood was deciduous with few conifers available for the future. No large pieces and few small and medium pieces of wood were observed along the in-City portion of Woods Creek. The deciduous forests lining the banks do not yet provide adequate recruitment potential.

Pool Frequency and Quality

During a walk of the in-City segments of Woods Creek in October 2001, pool frequency was observed to be generally adequate. At the time of observation in February 2002, however, pool habitat was not readily discernible, due to moderately elevated flows, which tended to make the creek appear to be a more or less continuous run. For a stream the size of Woods Creek, pools should be greater than 1 meter deep with good cover, and the reach should provide adequate woody debris recruitment. Since large woody debris quantities and recruitment potential are low (see above), pool frequency and quality are likely to be adversely affected.

Off-Channel Habitat

Suitable off-channel habitat consists of backwaters with cover and low-energy, off-channel areas. A few, small, infrequently flooded overflow channels occur in the lower section, and one large side channel joins Woods Creek between the two railroad bridges just downstream of SR 2.

Refugia

Refugia are areas of important remnant habitat for sensitive aquatic species. The concept of refugia is more applicable on a larger sub-basin or basin-wide scale and is not particularly applicable to the localized segments contained within the City of Monroe. No such refugia areas are contained within the City.

Riparian Vegetation

The streambanks and riparian areas along this segment are vegetated with a maturing deciduous forest consisting primarily of cottonwood, bigleaf maple, and alder. Non-native Himalayan blackberry and Japanese knotweed are prevalent in some areas,

interfering with the functioning of native vegetation. The width of this forest is narrow, and even non-existent in places, on the right bank bordering residential areas. It is almost entirely lacking in conifer trees and, as such, does not provide adequate large woody debris recruitment potential.

Width/Depth Ratio

No depth data was available for this study, and the actual width/depth ratio has not been determined. Woods Creek is largely entrenched between approximately SR 2 and the Skykomish River. Entrenchment is the result of downcutting, indicating that the stream has eroded its bed, making it deeper and therefore decreasing the W/D ratio. Over time, a stream that has downcut can achieve a new equilibrium at the lower level, developing a floodplain within the entrenched reach. This appears to be occurring in Woods Creek, especially in the lower sections. Therefore, while the W/D ratio may be smaller than expected, it is probably in the process of healing itself. Also, a smaller W/D ratio is less problematic than one that is too large.

Streambank Condition

Streambanks in this segment are generally stable. Rip-rap lines the bank and its toe around bridge abutments.

Floodplain Connectivity

Floodplain connectivity has not been reduced by artificial diking along this section. Some banks are high enough that overbank flows may be infrequent in those areas. A railroad grade at the extreme uppermost end of this segment reduces floodplain connectivity slightly.

Peak/Base Flows

Flows were not measured as a part of this survey, but their functioning along the City of Monroe would be the same as for lower Woods Creek as a whole. The *Snohomish River Basin Chinook Salmon Habitat Evaluation Matrix* (SBSRTC 2000) lists lower Woods Creek as "not properly functioning" for both peak and base flows due to a high impervious surface percentage.

Increase in Drainage Network (due to roads)

Residential areas including roads and driveways exist along the right (west) bank of the creek. Park roads and trails are present in Al Borlin Park.

Priority Habitat

The left bank of Segment A is Al Borlin Park, which has already been described above under Segment C of the Skykomish River (Section 4.1.3). In general, a vegetated area between 100 and 150 feet wide is present along the right bank. The vegetation composition of this band is quite variable. At the extreme south end is a narrow upland

forest which includes bigleaf maple, western red cedar, red alder, hazelnut, snowberry, red elderberry, salmonberry, sword fern, and some Himalayan blackberry and Japanese knotweed. Wildlife habitat value is limited given the steepness of the slope and narrowness of the vegetated area adjacent to the Lewis Street Park lawn. However, substantial overhanging vegetation is provided benefiting aquatic habitat. North of this area is a band of deciduous-dominant forest with an average tree size between 12 and 20 inches in diameter at breast height (dbh). The overstory consisted of black cottonwood and Pacific and other willows, with red-osier dogwood, Himalayan blackberry, Japanese knotweed, and reed canarygrass in the understory. Except for reed canarygrass, the invasive non-natives were present in monotypic patches. Generally speaking, this area provides moderate wildlife habitat, limited by the absence of conifers and species diversity in general, the presence of non-natives, and the proximity of residential development. The outer shoreline area was primarily residential lawns and landscaping. A residential area cleared of the vegetation between the houses and the creek, leaving only grass, English ivy, and Himalayan blackberry, interrupted this deciduous forest habitat. This area had little to no habitat value and should be restored by planting species typical of a mixed forest, upland or wetland as conditions dictate.

The band of vegetation adjacent to the industrial area is similar to the other deciduous forested areas, but the tree density is much lower and the presence of invasive non-native species is much higher. A 150-foot-wide section of the right bank between the BNSF railroad and SR 2 is a conifer-dominant forest with western red cedar, Douglas-fir, willows, and abundant Himalayan blackberry. Although the understory is non-native and the area is adjacent to SR 2, this section provides some forage diversity to birds and other wildlife that utilize conifers.

Priority Species

Bald eagles could be found during the breeding and winter foraging seasons feeding on salmon and/or waterfowl in Woods Creek. Salmon can be found spawning the entire length of the in-City portions of Woods Creek, providing an excellent source of bald eagle prey. In addition, salmon carcasses from farther upstream collect on the banks when deposited by high flows, are grounded on gravel bars, or are trapped in vegetation or pockets of the bank. Carcasses also provide an excellent source of forage for bald eagles, as well as a variety of other non-priority species such as gulls and raccoons. Perch trees, primarily cottonwoods, are abundant along the Woods Creek shoreline.

Recommendations

1. Planting, encouraging, and preserving streambank vegetation which shades or would shade the creek sections within the City during the summer months is the primary method by which the City could ensure that any elevated stream temperatures were not being exacerbated by conditions within the City and under its control or influence.

2. The City should work to prevent or reduce erosion along the banks of Woods Creek within its jurisdiction, as well as to control the sediment loading of storm runoff water.

3. Secure large woody debris along the channel banks.

4. Plant conifer trees to in-fill the riparian/floodplain area, now dominated by deciduous trees, to enhance shade, woody recruitment, biofiltration, erosion protection, and other habitat functions. (This has already been done to some extent in some areas.)

5. Selectively remove non-native vegetation including Himalayan blackberry and Japanese knotweed from the floodplain and shoreline zone and plant native trees and shrubs in their place, also to enhance habitat functions.

6. An unused railroad crossing and associated elevated railroad grade occurs in the floodplain just downstream of SR 2. The current plan is to incorporate the old rail line into a multi-purpose trail as part of the King County Rails to Trails program that would connect Monroe to Duvall. If this railroad is not converted to a trail, the bridge and elevated grade should be removed in order to improve floodplain connectivity for both Woods Creek and the Skykomish River.

7. Encourage residential property owners along the right bank to increase the effective buffer widths along their properties by landscaping with native vegetation and increasing the density and diversity of such vegetation. This revegetation could be accomplished without sacrificing views given the high, steep slope between the residences and the creek.

4.2.2 Segment B

Land Use

The right bank of Segment B, from SR 2 north to Old Owen Road, is zoned commercial and planned for commercial land use. Currently, much of the shoreline in the commercial zone is undeveloped land (forest and shrubs, pasture) with a few residences. Because this area is floodplain with some significant wetland areas, additional commercial development is unlikely without incurring substantial impacts to the natural environment. A better use of this area would be to enhance the existing wetland and surrounding upland buffers for fish and wildlife, and create off-channel fish habitat.

The south half of the left bank is currently zoned public open space and general commercial, but is planned for commercial development. The entire shoreline area in this section is forested, with no developments observed in aerial photographs or in the field. Given its current natural state and the presence of steep slopes (see Figure 9), commercial development without substantial impacts to the natural environment is unlikely. The north half of the segment is zoned (UR 9600) and planned (R3-5) for

residential use. The current use is for a motel complex with some trailers and other structures.

Aquatic Habitat

The following discussion of aquatic habitat conditions is summarized in Table 14.

Table 14. Environmental Baseline – completed at segment scale for Segment B, Woods Creek.

PATHWAYS INDICATORS	**ENVIRONMENTAL BASELINE**
Water Quality	
Temperature	Moderately elevated summer temperatures
Sediment/Turbidity	Sediment load and turbidity are moderately elevated
Chem. Contam./Nut.	303(d) listed for fecal coliform; nitrogen, phosphorus, and DO also a concern
Habitat Access	
Physical Barriers	None in Woods Creek – access through piped tributary may be an issue
Habitat Elements	
Substrate	Medium sandy gravel with moderate embeddedness
Large Woody Debris	LWD limited w/ limited recruitment potential
Pool Frequency/Quality	Adequate frequency with quality diminished by low LWD supply
Off-Channel Habitat	little to no habitat present
Refugia	NA
Riparian Vegetation	Mix of deciduous forest, non-native shrubs, mowed areas, paved areas and buildings
Channel Cond. & Dyn.	
Width/Depth Ratio	Appropriate
Streambank Cond.	failing and armored banks present on east side
Floodplain Connectivity	reduced on east side by raised/armored bank
Flow/Hydrology	
Peak/ Base Flows	high peak and low base flows
Drainage Network	compromised by Old Owen Road, SR 2, driveways, & other paved areas

Temperature

See discussion under Segment A.

Sediment/Turbidity

See discussion under Segment A.

Chemical Contamination/Nutrients

See discussion under Segment A.

Physical Barriers

No fish migration barriers are present in Woods Creek in this segment. However, a small unnamed tributary, number 07-0827, enters Woods Creek through a piped section on the

right bank immediately upstream of SR 2. The piped section is likely a hindrance or barrier to any fish trying to enter this small creek.

Substrate

See discussion under Segment A.

Large Woody Debris

See discussion under Segment A.

Pool Frequency and Quality

See discussion under Segment A.

Off-Channel Habitat

This segment includes little or no off-channel habitat.

Refugia

See discussion under Segment A.

Riparian Vegetation

Riparian and shoreline areas along this segment include some young alders, salmonberry, and a few conifers, but consist largely of Himalayan blackberry, Japanese knotweed, mowed areas, paved areas, and buildings. Mobile homes and buildings along the left bank are close to the stream above armored, vertical banks with no vegetated buffers.

Width/Depth Ratio

No depth data was available for this study, and the actual width/depth ratio has not been determined. Visual estimates indicate that this segment is likely appropriate for a stream of this size.

Streambank Condition

A section of high, failing bank is located along the left bank (east) at the outside of a wide bend. Additional banks bordering a mobile home park would likely be failing if not heavily armored.

Floodplain Connectivity

Raised, armored banks along the left bank of the stream protect buildings and a mobile home park from flooding, but reduce floodplain connectivity.

Peak/Base Flows

See discussion under Segment A.

Increase in Drainage Network

This segment includes Old Owen Road, SR 2, driveways and paved areas, and stormwater outfalls.

Priority Habitat

The shoreline along the right bank of Segment B is generally undeveloped (few structures), likely due to its status as floodplain; however, habitat alteration has occurred in the past through vegetation clearing to provide pasture/lawn areas associated with a private park and a few residences. Significant habitat remains as young deciduous forest and scrub-shrub wetland and uplands with black cottonwood, bigleaf maple, willows, red alder, salmonberry, and red-osier dogwood. Japanese knotweed and Himalayan blackberry are dominant as patches in the understory. As previously mentioned, much of this segment is worth preserving and enhancing for both terrestrial and aquatic habitat.

The shoreline along the south half of the left bank is also worth preserving as it is entirely forested and is part of a larger corridor of forested vegetation which extends northeast and east. Steep slopes likely preclude development. Unlike many of the shoreline areas in the City, this section appears to have very few non-natives. Red alder and bigleaf maple are the dominant trees, with willow, red-osier dogwood, and salmonberry along the bank. Red elderberry, hazelnut, and maidenhair fern were also observed.

The shoreline along the north half of the left bank has almost no habitat value. Vegetation is very limited except for the occasional large maple or fir on the bank. Otherwise, ivy, Himalayan blackberry, and lawn grasses are the only vegetation. Residences and the hotel occupy the entire shoreline area in this section.

Priority Species

See discussion under Segment A.

Recommendations

1. Selectively remove non-native vegetation including Himalayan blackberry and Japanese knotweed from the floodplain and shoreline zone and plant native trees and shrubs in their place to enhance shade, woody recruitment, biofiltration, erosion protection, and other habitat functions. Conifer trees are especially needed to provide a long-term source of persistent woody debris. Some existing mowed grassy areas could also be restored to native vegetation to increase effective buffer widths.

2. Encourage residential property owners along this segment to 1) substitute bank stabilization methods which are more compatible with habitat functions for the existing rip-rap and concrete, and 2) increase the effective buffer widths along their properties by landscaping with native vegetation and increasing the density and diversity of such vegetation. Existing rip-rap should be reduced and/or supplemented with soil and woody debris. If needed, alternative bank protection measures such as

bank barbs or woody structures should be considered. A wider buffer of native vegetation should be provided between the existing buildings and the creek.

3. Secure large woody debris along the channel banks.

4. As mentioned previously, a small unnamed tributary, number 07-0827, enters Woods Creek through a piped section on the right bank immediately upstream of SR 2. The feasibility of restoring the lower sections of this creek to an open, fish-passable channel should be investigated.

5. The Old Owen Road bridge has piers that rest in the channel bottom. Snohomish County Public Works is currently planning to replace the bridge. The City should work with the County to ensure that the piers are removed.

6. Consider retaining some of the land currently zoned "public open space," but designated as "general commercial" on the comprehensive plan future land use map, as the "parks/open space" designation. In particular, forested, sloped areas on the left bank of Woods Creek, just north of SR 203 that are not already developed should be re-classified.

5. GAP ANALYSIS

This report was prepared using the best information available. However, we were unable to fully address certain issues due to a lack of pre-existing data. We recommend that the following studies be undertaken in order to supplement the information contained in this report.

Impervious Surface: This report estimated impervious surfaces within the shoreline area from measurements of aerial photographs that had not been ortho-rectified. We recommend that a comprehensive study of impervious surfaces within the City limits, including subtotals for all critical areas, be undertaken using GIS when available.

Aquifer Recharge: General soil characteristics were used to estimate the aquifer recharge potential of the shoreline area, and it was assumed that shoreline areas were hydrologically connected to the streams that constitute the shoreline area. A comprehensive study of groundwater resources in the City should be undertaken to supplement and verify the generalizations given in this report.

Geologic Hazards: With the exception of steep slopes, which were mapped by the City, geologic hazard areas were estimated based on USGS topographic maps and USDA Soil Conservation Service Soil Survey maps. These maps are generally insufficient to detect small-scale variations in slope, soil, and hydrological characteristics that may be important for determining the hazard potential of a particular site. Similarly, the earthquake hazards listed are primarily determined from regional data and may not be

accurate for site-specific applications. The City should consider developing a comprehensive geologic hazard study which could be used to guide future land-use decisions.

Channel Migration Zone/Flood Hazard: The channel migration zone in Monroe is complex, given the abundance of side channels, bank protection, and infrastructure. Additionally, while flood hazard areas are fairly well defined by the FEMA 100-year floodplain, the floodway mapped by FEMA may have been interpolated in some areas and may not accurately reflect the actual floodway. We recommend that a comprehensive channel migration zone and flood hazard study be undertaken to more accurately assess the potential for erosion and flooding in and near the shoreline area.

Disturbance History: It would be nice to know, to the extent feasible, what the original forested conditions of the shoreline areas within the City were, and how they evolved into their present condition. For example, many areas are now occupied by cottonwood forests of varying maturity. We might surmise that these areas were once cedar forests or at least forests with more cedar in them and propose a management or "restoration" strategy aimed at establishing cedar forests there. But before we actually implemented such a "restoration" strategy, it would be wise to verify, if possible, that our goal actually resembles the original condition. There could be reasons, such as frequent disturbance, perhaps, why cedars and other conifers would be inappropriate in certain areas.

Along Woods Creek, we noticed a few, very short isolated sections of the creek which were inexplicably armored, and a few features which appeared to be the remnant foundations of structures that previously existed in the area. If possible, it would be helpful to establish a timeline of land use for shoreline areas within the City including original clearing, possible use as agricultural land, re-growth of deciduous forest, and/or any other intervening uses bringing us to the present.

Refugia: Specific references to refugia in the Skykomish basin could not be located. It would be helpful to know if such refugia exist, if the survival of any populations of fish depends primarily on those refugia and their continued existence and functioning, and whether any populations now confined to comparatively limited refugia areas could and would expand their ranges and population sizes if conditions elsewhere in the basin were to improve.

The *Initial Snohomish River Basin Chinook Salmon Conservation/Recovery Technical Work Plan* (SBSRTC 1999) also identifies the following data gaps for the mainstem Skykomish River.

- Determine how egg survival is affected by river channel bed scour.
- Identify, perhaps via snorkeling surveys, what habitat juveniles are using.
- Determine if there are spring chinook salmon in the basin and if so, where.

- Determine if the apparently high number of yearlings is due to the amount of available habitat or the unique characteristics of the stocks.
- "Evaluate whether geomorphological analysis can be conducted to help define 'potential' habitat that may not be currently used.
- Research the extent to which loss of LWD has reduced the potential habitat.
- Gather historical data and examine how the mainstem Skykomish River channel changed (in area, type, etc.) between the 1930s when the first diking occurred and today.
- Gather data on historical changes in the braided reach channel length and area.
- Study how groundwater recharge affects landslides on the terraces.
- In the Skykomish River system, increased peak-flow frequency and amplitude resulting from forestry and other land-use practices significantly impact fish production by increasing channel scour and instability, and reducing the recruitment and retention of pool-forming large wood. Quantitative studies and modeling are needed to address these impacts within the mainstem Skykomish River and each of its tributaries of historically high salmonid production."

The City of Monroe can fund or partially fund studies with other jurisdictions and stakeholder groups to address one or more of the above-listed gaps.

6. REPORT REFERENCES AND BIBLIOGRAPHY

Berg, Ken S. Manager, Western Washington Fish and Wildlife Office, U.S. Fish and Wildlife Service, Lacey, WA. Personal communication, letter to Amy Myers (The Watershed Company), 11 February 2002.

Booth, D.B. and C.R. Jackson. 1997. Urbanization of aquatic systems: degradation thresholds, stormwater detection and the limits of mitigation. Journal of the American Water Resources Association 33(5):1077-1090.

Chandler, S.K., J.D. Fraser, D.A. Buehler, and J.K.D. Seegar. 1995. Perch trees and shoreline development as predictors of bald eagle distribution on Chesapeake Bay. J. Wildl. Manage. 59(2): 325-332.

City of Monroe. 2002a. Community rating system annual recertification: Section 3. Community Activities. August, 2002.

_____. 2002b. Master Plan Cadman Skykomish River Gravel Pit. Amended 2 September 2002. City of Monroe Ordinance 1272.

_____. 2001. Welcome to your Monroe parks! City of Monroe, Parks Department. 31 October 2001. www.ci.monroe.wa.us/citygov/depts/public_works/parks/Welcome.htm

_____. 1999. City of Monroe zoning map. Approved by Monroe City Council on 27 October 1999.

_____. 1998a. The City of Monroe Comprehensive Plan, 1998-2018. Prepared by City of Monroe, Monroe, WA and Earth Tech, Bellevue, WA.

_____. 1998b. Comprehensive water plan – service area.

_____. 1997. Comprehensive water plan. 23 December 1997.

_____. 1994. Draft supplemental environmental impact statement Skykomish River Pit Monroe, Washington. City of Monroe Planning Department, Monroe, WA.

_____. 1990. Sensitive area guidelines. 26 September 1990.

_____. No date. Flood preparedness special report. City of Monroe, Engineering Department.

Collins, B. and T. Dunne. 1990. Fluvial geomorphology and river-gravel mining: a guide for planners. California Department of Conservation, Division of Mines and Geology, Sacramento, CA.

Crueger, Steve. Parks Superintendent, City of Monroe Parks Department. Personal communication, meeting with Amy Myers (The Watershed Company), 25 January 2002 and telephone conversation with Amy Myers, 1 March 2002.

Ebasco Environmental. 1992. Wetland delineation report for the Sky River Pit. Prepared for Cadman (Rock), Inc. 23 pp. + appendices

Federal Emergency Management Agency (FEMA). 1999. Flood insurance rate map, Snohomish County, Washington and incorporated areas. Panels 1376 and 1377 of 1575.

Feilberg, Brad, P.E. City Engineer, Director of Engineering Department, City of Monroe. Personal communication, telephone conversation with Mark Indrebo (The Watershed Company), 6 March 2002.

Franklin, J.F. and C.T Dyrness. 1988. Natural vegetation of Oregon and Washington. [2d edition]. Oregon State Univ. Press, Corvallis, OR. 452 pp.

Grubb, T. G. 1980. An evaluation of bald eagle nesting in western Washington. Pages 87-103 *in:* R. L. Knight, G. T. Allen, M. V. Stalmaster, and C. W. Servheen, eds. Proceedings of the Washington bald eagle symposium. 15-15 June 1980, Seattle, WA.

Haas, A. and B. Collins. 2001. A historical analysis of habitat alterations in the Snohomish River Valley, Washington, since the mid-19th century: implications for chinook and coho salmon. The Tulalip Tribes and Snohomish County Department of Public Works. 57 pp. + figures

Johnsgard, P.A. 1990. Bald eagle *Haliaeetus leucocephalus* (Linnaeus) 1766. Pages 142-152 *in:* Hawks, eagles, & falcons of North America: Biology and natural history. Smithsonian Institution Press, Washington DC.

Knutson, K.L. and V.L. Naef. 1997. Management recommendations for Washington priority habitats: riparian. Washington Department of Fish and Wildlife, Olympia, WA. 181pp.

MacDonald, L.H., A.W. Smart, and R.C. Wissmar. 1991. Monitoring guidelines to evaluate effects of forestry activities on streams in the Pacific Northwest and Alaska. EPA 910/9-91-001, U. S. Environmental Protection Agency, Region X, Seattle, WA.

Mills, Darrel. Washington Department of Fish and Wildlife. Personal communication, telephone conversation with Greg Johnston (The Watershed Company), 10 June 2002.

Moody, Sandy Swope. Environmental Review Coordinator, Washington Natural Heritage Program, Washington State Department of Natural Resources. Personal communication, letter to Hiller West (City of Monroe), 14 September 2001.

National Marine Fisheries Service (NMFS). 1999. A guide to biological assessments. NMFS, Lacey, WA. 20 pp.

National Oceanic and Atmospheric Administration, National Marine Fisheries Service. 2002. Administration seeks to maintain Essential Fish Habitat while proposing to withdraw and revisit its critical habitat designations. Press release dated 11 March 2002.

Northwest Hydraulic Consultants inc. (NHC). 2001. Skykomish River, stability of Haskell Slough. Prepared for Snohomish County Public Works, Surface Water Management Division, Everett, WA.

Noson, L.L., A. Qamar, and G.W. Thorsen. 1988. Washington State earthquake hazards. Washington State Department of Natural Resources Information Circular 85, Olympia WA. 77 pp.

Parson, W. 1992. Effects of bald eagle management plans and habitat alterations on nesting bald eagles. Washington Department of Fish and Wildlife, Olympia, WA. 24 p.

Pentec Environmental, Inc. and NW GIS. 1999. Snohomish River Basin conditions and issues report, revised final report. 17 December 1999. Prepared for The Snohomish River Basin Work Group.

Pess, G.R., B.D Collins, M. Pollock, T.J. Beechie, A. Haas, and S. Grigsby. 1999. Historic and current factors that limit coho salmon (*Oncorhynchus kisutch*) production in the Stillaguamish River Basin, Washington: implications for salmonid habitat protection. Prepared for Snohomish County Department of Public Works, Surface Water Management Division, Everett, WA and The Stillaguamish Tribe of Indians, Arlington, WA. 46 pp. + appendices

Purser, M.D. and R. Simmonds. 2001. The Snohomish County Land Cover Project, February 2001 status report. Snohomish County Department of Public Works and Department of Information Services, Everett, WA. 11 pp.

Rodrick, E. and R. Milner, tech. eds. 1991. Management recommendations for Washington's Priority Habitats and Species. Washington Department of Fish and Wildlife, Olympia, WA.

Snohomish Basin Salmonid Recovery Technical Committee (SBSRTC). 2000. Snohomish River basin chinook salmon habitat evaluation matrix.

_____. 1999. Initial Snohomish River basin chinook salmon conservation/recovery technical work plan.

Snohomish County. 2000. Total impervious surface area for 62 sub-basins in WRIA 7, draft. Snohomish County Public Works, Surface Water Management Division, Everett, WA and University of Washington, Seattle, WA.

_____. 1991. Snohomish River Comprehensive Flood Control Management Plan. Snohomish County Public Works Surface Water Management, Everett, WA.

Snohomish Work Group, Snohomish Basin Salmonid Technical Committee. 2001. Matrix of key findings, Skykomish Mainstem Sub-Basin.

Soil Conservation Service. 1983. Soil survey of Snohomish County Area, Washington. U.S. Department of Agriculture, Soil Conservation Service, in cooperation with Washington State Department of Natural Resources and Washington State University Agriculture Research Center. 197 pp. + maps.

Stillaguamish Technical Advisory Group (STAG). 2000. Technical assessment and recommendations for chinook salmon recovery in the Stillaguamish watershed.

Thorn, T., G. Anderson, D. Parks, N. Wolff, A. Loch, and A. McGuire. 1992. Watershed Analysis: Woods Creek. Version 1.10. October 1992.

Thornburgh, K. and G. Williams. 2000. The State of the Waters – Water quality in Snohomish County's Rivers, Streams, and lakes, 2000 Assessment. Snohomish County Public Works, Surface Water Management, Everett, WA.

University of Washington, Department of Earth Sciences. 1996. Major Fault Zones in the Puget Sound, 10/96, Seattle. file /SEIS/PNSN/INFO_GENERAL/ puget_faults.html; modified 10/11/96 http://www.ess.washington.edu/SEIS/PNSN/ INFO_GENERAL/fig.pug_flts.gif

U.S. Federal Register Volume 65, No. 132, 10 July 2000 – Endangered and threatened species: final rule governing take of 14 threatened salmon and steelhead evolutionarily significant units (ESUs)

_____ Volume 65, No. 32, 16 February 2000, final rule – designated critical habitat.

_____ Volume 64, No. 210, 1 November 1999, final rule - *Salvelinus confluentuss*

_____ Volume 64, No. 56, 24 March 1999, final rule - *Oncorhynchus tshawytscha*.

_____ Volume 60, No. 142, 25 July 1995, proposed rule - *Oncorhynchus kisutch*.

U.S. Fish and Wildlife Service (USFWS). 1999. Biological assessment preparation and review. USFWS, Western Washington Office, Lacey, WA.

Washington Department of Ecology (DOE). 1999. Process-based river basin characterization: a case study Snohomish Basin, Washington. First draft.

_____. 1998. Final 1998 Section 303(d) List. http://www.ecy.wa.gov/programs/wq/303d/1998/1998-index.html

_____. 1987. Assessing the effects of gravel harvesting on river morphology and sediment transport: a guide for planners. Prepared for the Washington State Department of Ecology, Seattle, WA.

Washington Department of Fish and Wildlife (WDFW). 2001. Priority Habitats and Species database search results prepared for The Watershed Company, 16 July 2001.

_____. 2001. What is the PHS List? http://www.wa.gov/wdfw/hab/phslist.htm

_____. 2000. 2000 Washington State Salmonid Stock Inventory: coastal cutthroat trout. Blakely, A., B. Leland, and J. Ames, eds. June 2000. 267 pp.

_____ 1998a. 1998 Washington salmonid stock inventory appendix: bull trout and Dolly Varden. 437 p.

_____ 1998b. Fish passage Barrier Assessment and Prioritization Manual. Habitat and Lands Services Program, Salmon Screening, Habitat Enhancement, and Restoration (SSHEAR) Division

Washington Department of Fisheries (WDF), Washington Department of Wildlife, and Western Washington Treaty Indian Tribes. 1993. 1992 Washington State salmon and steelhead stock inventory. March 1993. Olympia, WA. 212 pp.

Washington State Conservation Commission (WSCC). 1999. Salmon habitat limiting factors final report – water resource inventory area 5 Stillaguamish Watershed.

Williams, R.W., R.M. Laramie, and J.J. Ames. 1975. A Catalog of Washington Streams and Salmon Utilization, vol. 1, Puget Sound Region. Washington Department of Fisheries.

Appendix A

REPORT FIGURES

SHORELINE MASTER PROGRAM INVENTORY
SKYKOMISH RIVER and WOODS CREEK
CITY OF MONROE, WA

SHORELINE INVENTORY

Shoreline Segments

City Limits

Shoreline Boundary

Old Shoreline Boundary

Old Shoreline Boundary

Shoreline boundary/Shorelands: Mapping based primarily on the 100-year floodplain, and 200 feet from the floodway where such area extends beyond the 100-year floodplain. These boundaries are approximate.

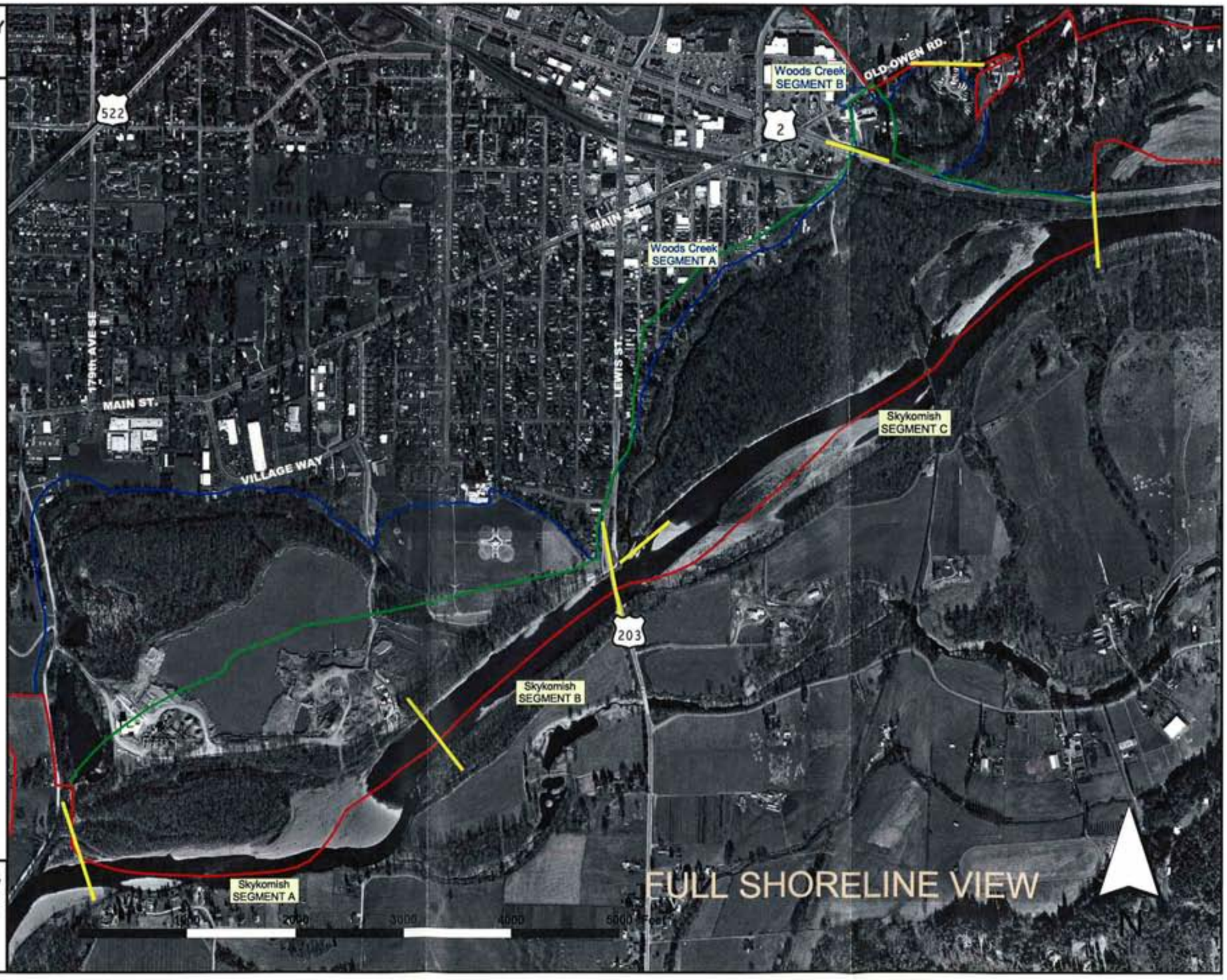


Figure 1.

CITY OF MONROE, WA

Map data shown are the property of the sources listed below. Inaccuracies may exist, and the City of Monroe implies no warranties or guarantees regarding any aspect of data depiction.
Source: City of Monroe GIS, 2002;
Watershed Company;
Snohomish County GIS, 2002

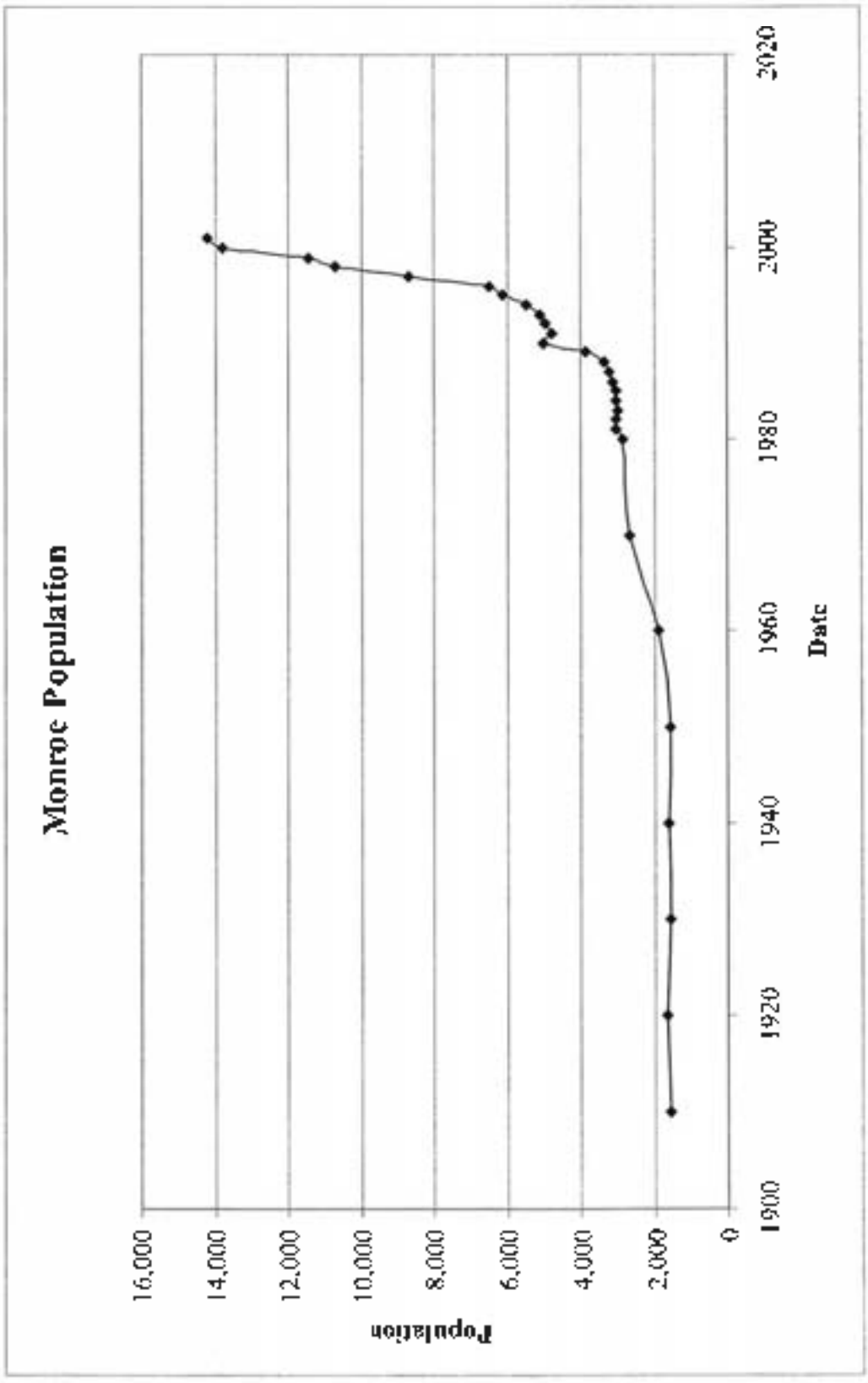

Monroe Population
Population
16,000
14,000
12,000
10,000
8,000
6,000
4,000
2,000
0
1900
1920
1940
1960
1980
2000
2020
Date

Figure 2.

City of Monroe
& Lower Woods
Creek Subbasin
Legend
French Creek Subbasin
Lower Mainstem Skykomish Subbasin
Lower Woods Creek Subbasin
Incorporated Area
Major Roads
0
0.5
1
kilometers
Monroe
2
522

Figure 3.

SHORELINE MASTER PROGRAM INVENTORY
SKYKOMISH RIVER and WOODS CREEK
CITY OF MONROE, WA

SHORELINE INVENTORY

- Shoreline Segments
- City Limits
- Shoreline Boundary

Zoning Districts

COMMERCIAL
- (DC) - Downtown Commercial
- (GC) - General Commercial
- (SC) - Service Commercial
- (PO) - Professional Office

INDUSTRIAL
- (GI) - General Industrial
- (LI) - Light Industrial

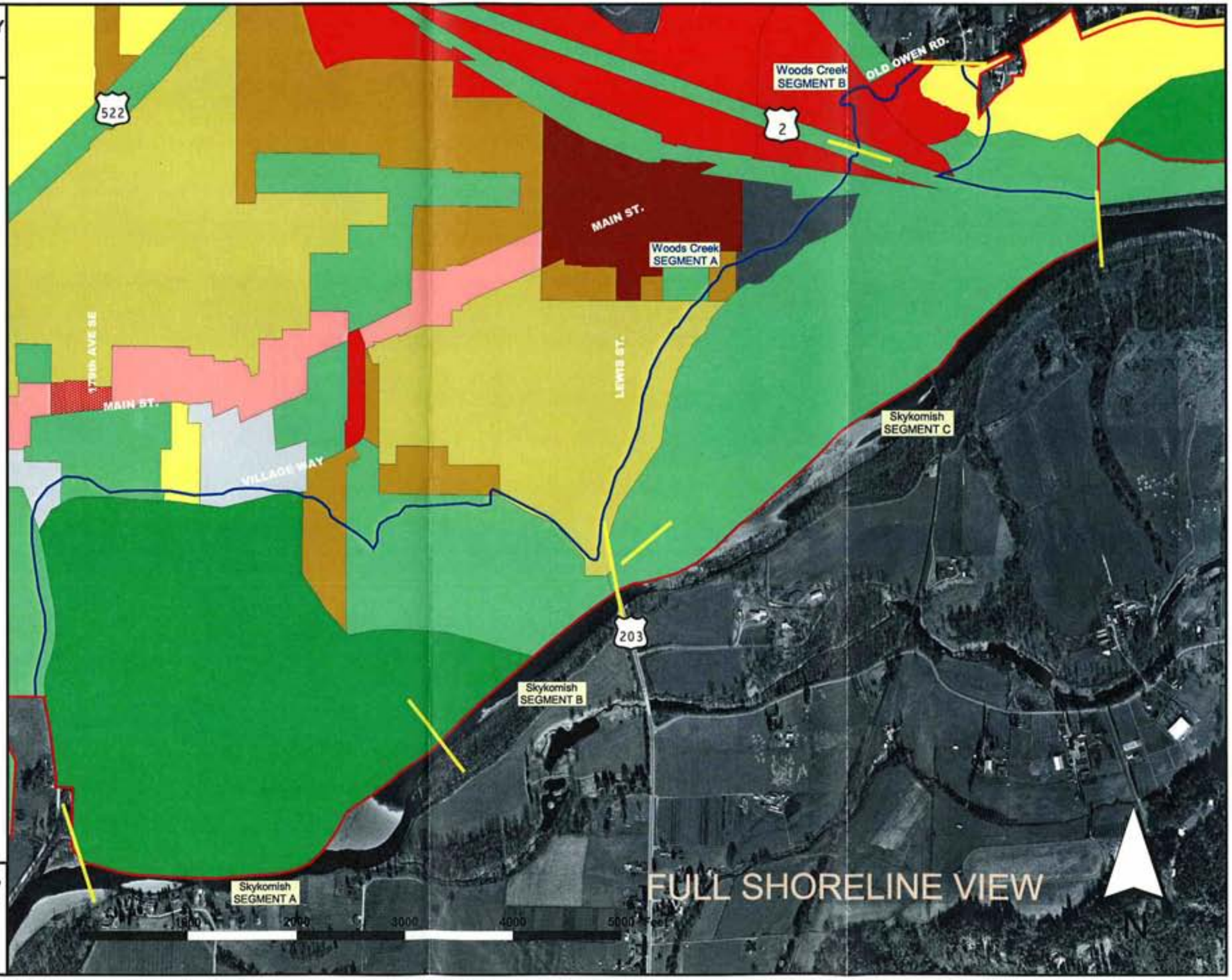
RESIDENTIAL
- (SR 15000) - Suburban Residential
- (R4) - Residential 4 Units/Acre
- (UR 9600) - Urban Residential
- (UR 6000) - Urban Residential
- (MR 6000) - Multi-Family

OPEN SPACE
- (LOS) - Limited Open Space
- (PS) - Public Open Space

Figure 4.

CITY OF MONROE, WA

Map data shown are the property of the sources listed below. Inaccuracies may exist, and the City of Monroe implies no warranties or guarantees regarding any aspect of data depiction.
Source: City of Monroe GIS, 2002; Watershed Company; Snohomish County GIS, 2002



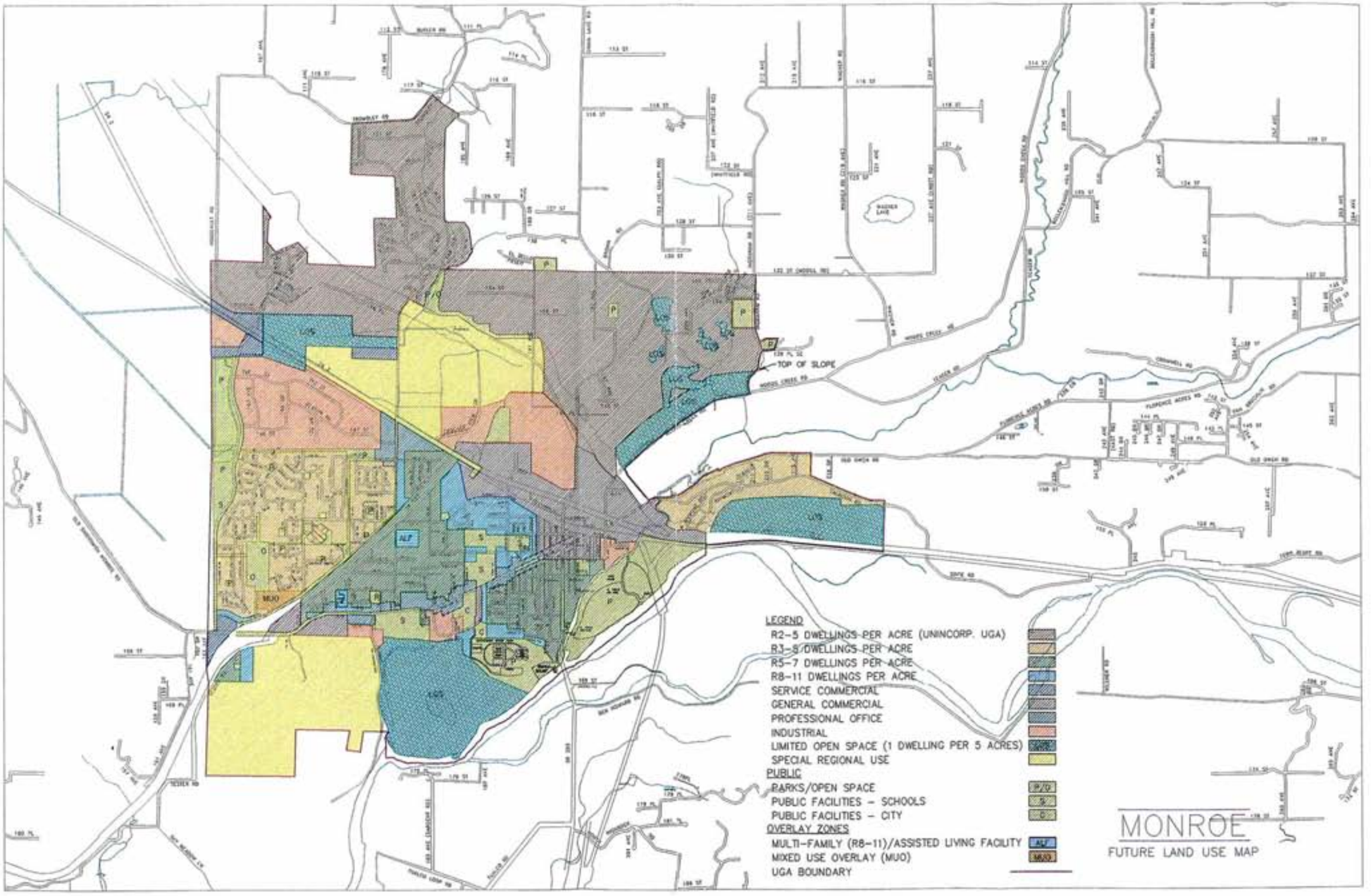

TOP OF SLOPE
LEGEND
R2-5 DWELLINGS PER ACRE (UNINCORP. UGA)
R3-5 DWELLINGS PER ACRE
R5-7 DWELLINGS PER ACRE
R8-11 DWELLINGS PER ACRE
SERVICE COMMERCIAL
GENERAL COMMERCIAL
PROFESSIONAL OFFICE
INDUSTRIAL
LIMITED OPEN SPACE (1 DWELLING PER 5 ACRES)
SPECIAL REGIONAL USE
PUBLIC
PARKS/OPEN SPACE
PUBLIC FACILITIES - SCHOOLS
PUBLIC FACILITIES - CITY
OVERLAY ZONES
MULTI-FAMILY (R8-11)/ASSISTED LIVING FACILITY
MIXED USE OVERLAY (MUO)
UGA BOUNDARY
MONROE
FUTURE LAND USE MAP

Figure 5.

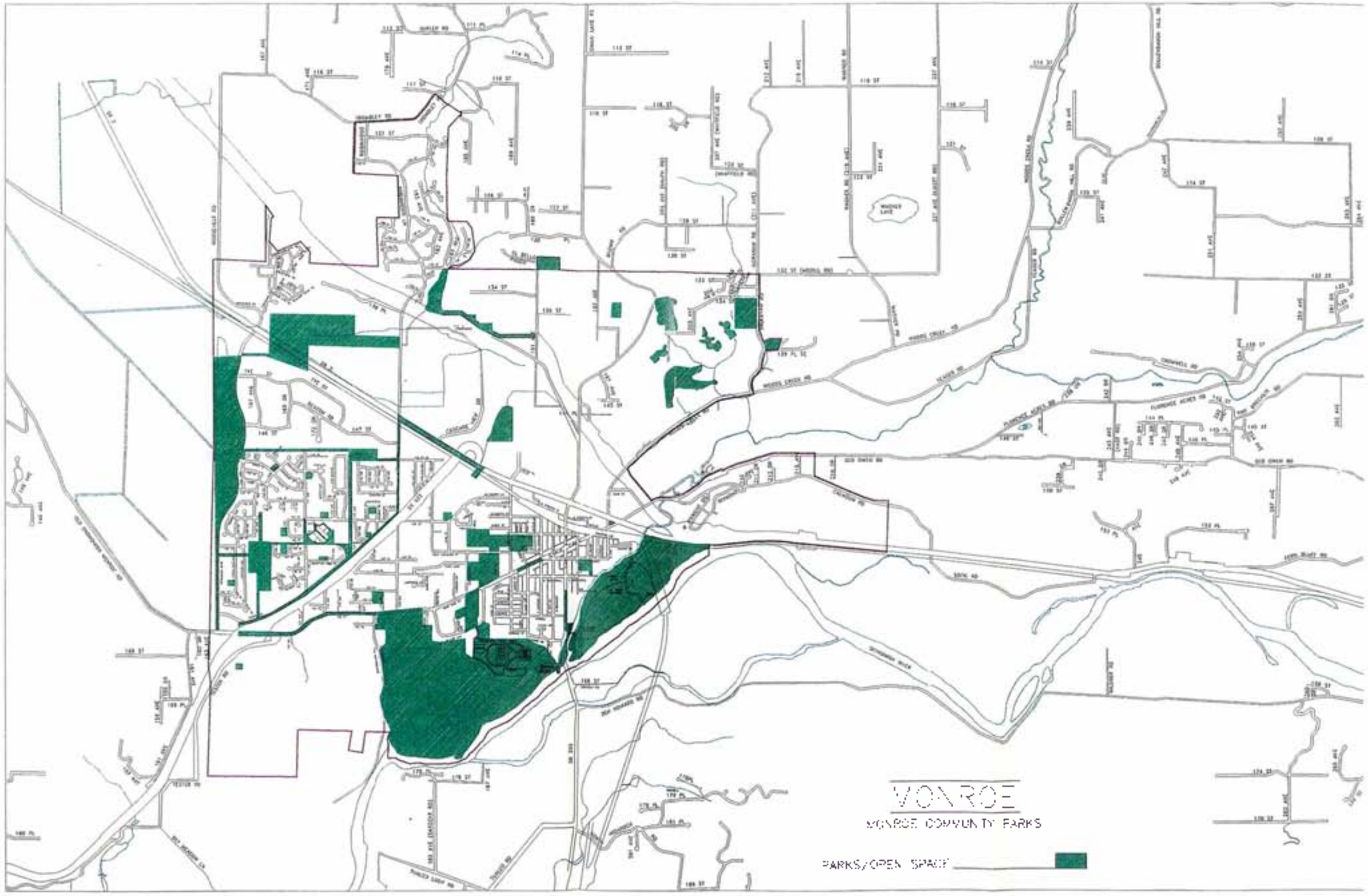


Figure 6.

SHORELINE MASTER PROGRAM INVENTORY
SKYKOMISH RIVER and WOODS CREEK
CITY OF MONROE, WA

SHORELINE INVENTORY

- Shoreline Segments
- City Limits
- Shoreline Boundary

Public Access

- Public Access Points
- Public Access Areas

Storm & Sewer Outfalls

- Storm & Sewer Outfalls

City Parks

- City Parks

Figure 7.

CITY OF MONROE, WA

Map data shown are the property of the sources listed below. Inaccuracies may exist, and the City of Monroe implies no warranties or guarantees regarding any aspect of data depiction.
Source: City of Monroe GIS, 2002; Watershed Company; Snohomish County GIS, 2002

SHORELINE MASTER PROGRAM INVENTORY
SKYKOMISH RIVER and WOODS CREEK
CITY OF MONROE, WA

SHORELINE INVENTORY

Shoreline Segments

City Limits

Shoreline Boundary

Shoreline Hardening

Shoreline Hardening

Frequently Flooded Areas

Frequently Flooded Areas

100-Year Floodplain

100 - Year Floodplain

Channel Migration Zone

Historic Channel Migration Zone

FIRM Floodway

FIRM Flood Way Area

Frequently flooded areas: Estimated boundaries based on field observations, historic maps, and aerial photographs.

100-year floodplain: Estimated boundaries based on USDA Soil Conservation Service (1983) maps.

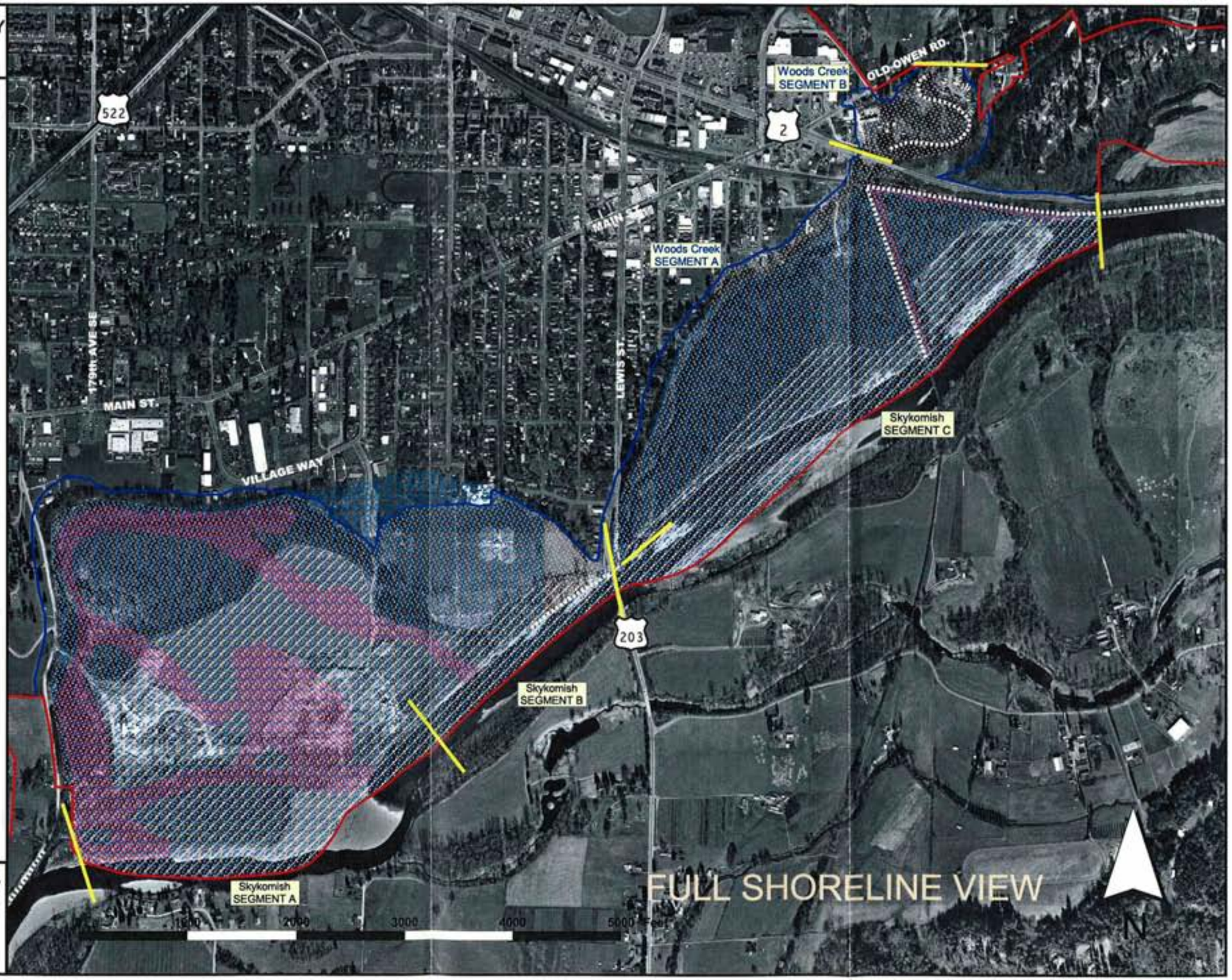
Channel migration zone: Estimated boundary based on historical and current maps and aerial photographs

Floodway: Boundary based on FEMA FIRM maps

Figure 8.

CITY OF MONROE, WA

Source: City of Monroe GIS, 2002; Watershed Company; Snohomish County GIS, 2002



SHORELINE MASTER PROGRAM INVENTORY
SKYKOMISH RIVER and WOODS CREEK
CITY OF MONROE, WA

SHORELINE INVENTORY

- Shoreline Segments
- City Limits
- Shoreline Boundary

Wetlands

- Category I
- Category II
- Category III

Steep Slopes

- Steep Slopes

Wetlands: Mapping based on NWI maps, WDFW maps, Snohomish County maps, and field observations. Wetlands are not delineated. The typing is per the Department of Ecology's "Washington State Wetlands Rating System: Western Washington" (publication #93-74), and is approximate.

Figure 9.

CITY OF MONROE, WA

Map data shown are the property of the sources listed below. Inaccuracies may exist, and the City of Monroe implies no warranties or guarantees regarding any aspect of data depiction.
Source: City of Monroe GIS, 2002; Watershed Company; Snohomish County GIS, 2002

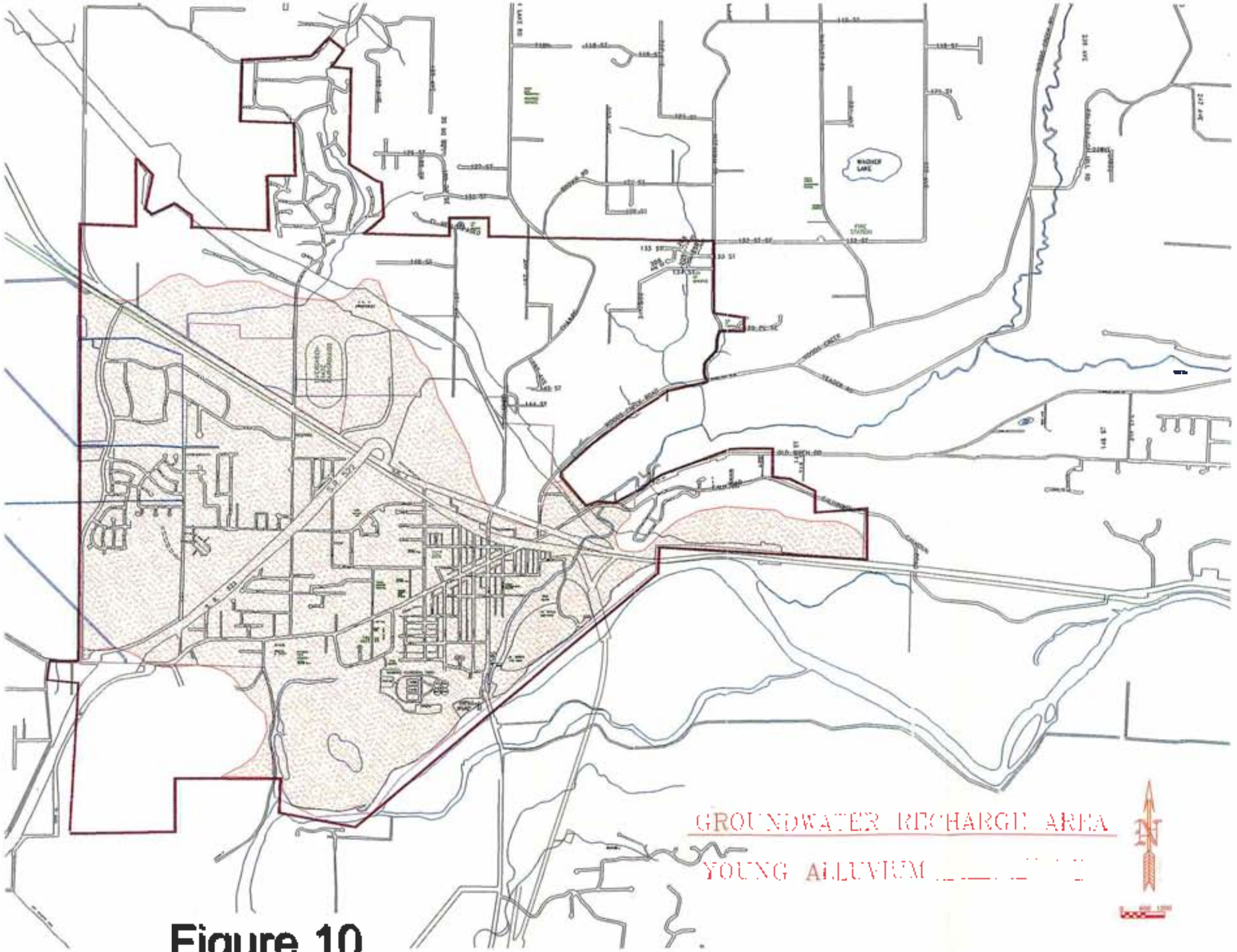


Figure 10.

SHORELINE MASTER PROGRAM INVENTORY
SKYKOMISH RIVER and WOODS CREEK
CITY OF MONROE, WA

SHORELINE INVENTORY

Shoreline Segments

City Limits

Shoreline Boundary

Vegetation

B / PG = Bare / Pasture & Grass

B = Bare, no Vegetation

OW = Open Water

PG = Pasture, Grass

UF = Upland Forest

US = Upland Shrub

WE / WS - Wetland Emergent & Shrub

WE = Wetland Emergent

WF / WS = Wetland Forest & Shrub

WF = Wetland Forest

WS = Wetland Shrub

Vegetation: Mapping is based on aerial photograph interpretation and field observations.

Figure 11.

CITY OF MONROE, WA

Map data shown are the property of the sources listed below. Inaccuracies may exist, and the City of Monroe implies no warranties or guarantees regarding any aspect of data depiction.
Source: City of Monroe GIS, 2002;
Watershed Company;
Snohomish County GIS, 2002

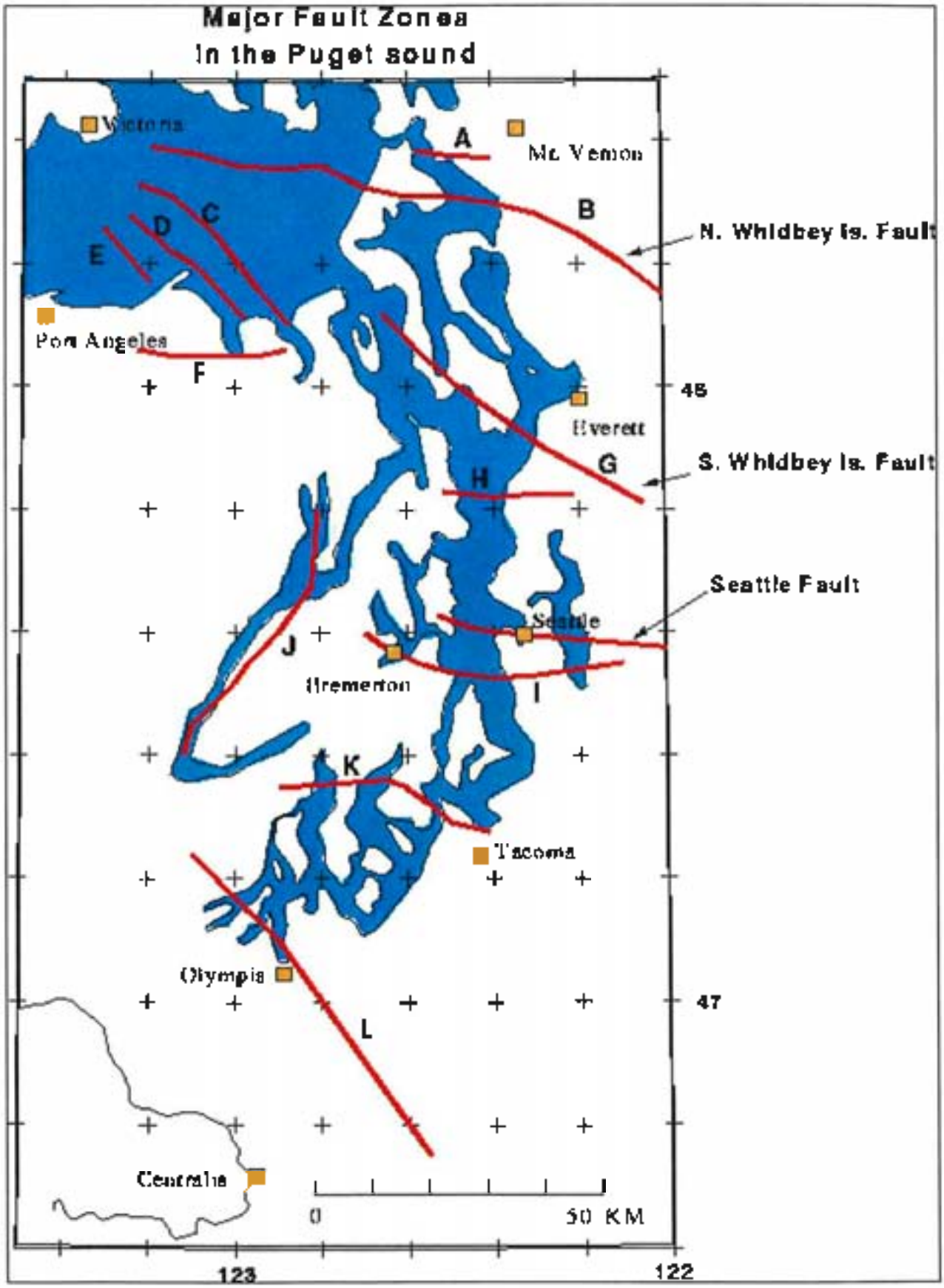

Major Fault Zones
In the Puget sound
Victoria
Mt. Vernon
A
B
C
D
E
F
N. Whidbey Is. Fault
Port Angeles
48
Everett
G
S. Whidbey Is. Fault
H
Seattle Fault
Seattle
J
Bremerton
I
K
Tacoma
Olympia
47
L
Centralia
0
50 KM
123
122

Figure 12.

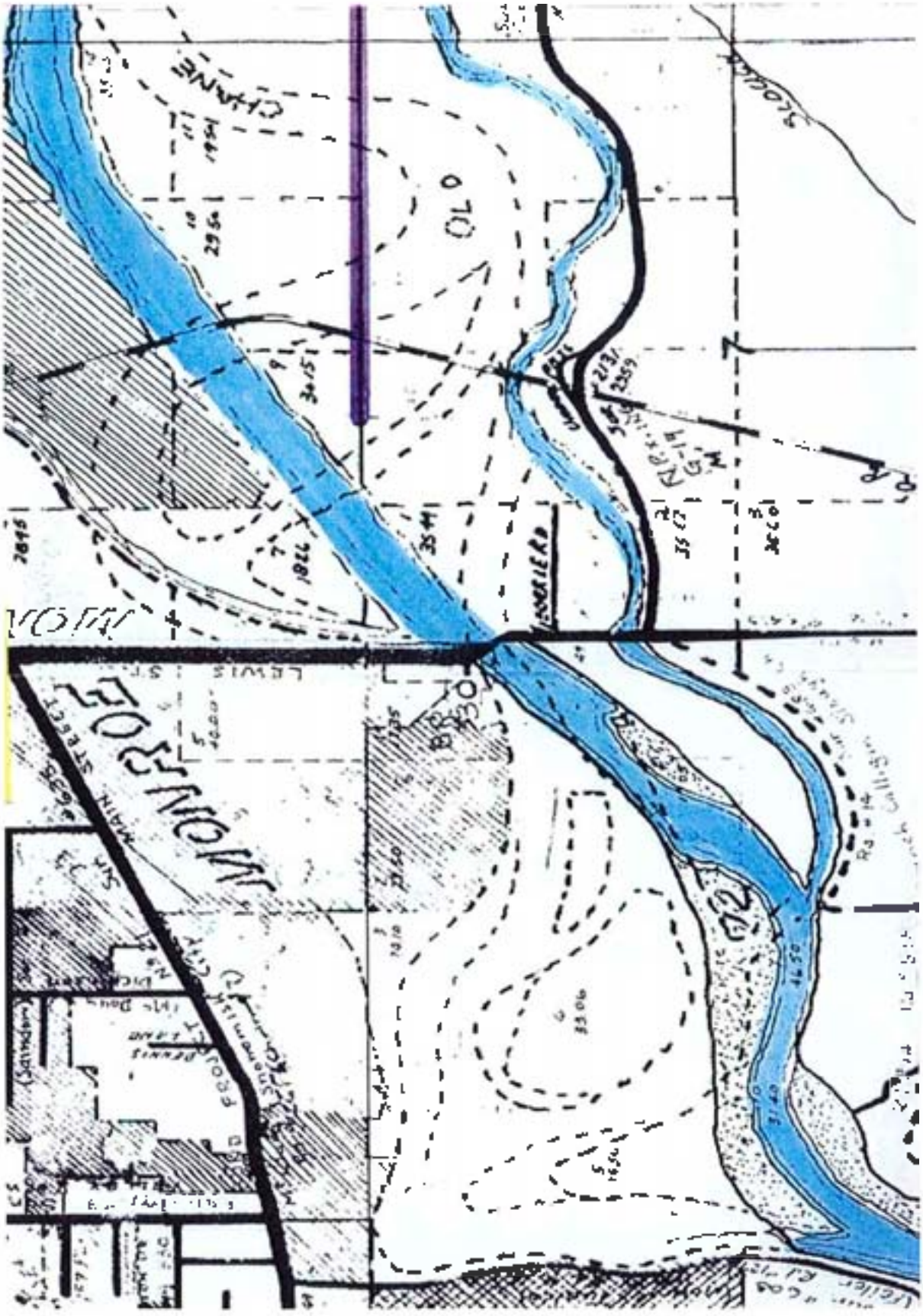


Figure 13.

Appendix B

INFORMATION SOLICITATION LETTER AND DISTRIBUTION LIST

City of Monroe

Community Development

August 28, 2001

U.S. Fish and Wildlife
510 Desmond Dr., Suite 102
Lacy, WA 98503-1263

Subject: Shoreline/Critical Areas Inventory, request for existing information

Dear Stakeholder:

The City of Monroe is in the process of updating its Shoreline Master Program (SMP) for compliance with the new requirements of the Washington State Department of Ecology's (DOE) Shoreline Master Program Guidelines and to meet the requirements of the Endangered Species Act. We have recently hired The Watershed Company to assist with the shoreline inventory after receiving a grant from the DOE. This is the first step of our update.

The City is requesting your help in obtaining all existing information regarding the Skykomish River, Woods Creek and other wetlands and/or water systems that eventually drain into the Skykomish River within the City of Monroe and our Urban Growth Area. We are interested in any and all inventories, water quality analysis, and/or fish and wildlife distribution and habitat information. A map is attached for your reference.

The revised Shoreline Master Program Guidelines require that "inventory methods and protocols are consistent with those of neighboring jurisdictions and state efforts" [WAC 173-26-300(3)(c)]. To that end, the City and The Watershed Company are proposing to utilize a combination of the *Urban Stream Baseline Evaluation Method* (USBEM), a protocol developed for the Tri-County Urban Issues EAS Study, and the *Inventory Methods for Wadable Streams in King County*, which are expected to be widely used. The selection of specific criteria from each protocol was evaluated against the inventory requirements of the SMP. Because of the differing objectives of the two protocols and the SMP, certain selected criteria were modified and other new criteria were added so that the combined protocol satisfied the requirements of the SMP for Path B (ESA) inventories. Our proposed data form and protocol are attached for your review and comment.

We are hoping to complete the shoreline inventory this summer/fall to take advantage of the favorable weather and to ensure that we meet our 6-month project deadline. Because we are hoping to reduce redundant data collection at the field level, a response would be appreciated by September 14, 2001. The City or the Watershed Company will be

806 W Main Monroe WA 98272
(360) 794-7400
fax (360) 794-4007

following this letter with a telephone call to arrange any information exchange or discussion meetings that may be necessary. If you believe that another individual within your organization would be a more appropriate contact for this solicitation, please forward this letter to that person, and notify us of the change in contact.

If you have any questions or need additional information, please feel free to contact Kate Galloway, Associate Planner, at (360) 863-4535 or Amy Myers, Wetland/Wildlife Biologist for The Watershed Company, at (425) 822-5242.

Sincerely,

Hiller West, AICP
Community Development Director

cc: Kate Galloway, Associate Planner
Amy Myers, Consultant (The Watershed Company)

HW/kg

Distribution List for City of Monroe Shoreline Master Program Inventory

Department of Ecology
Attn: Alice Schisel
P.O. Box 47600
Olympia, WA 98504-7600

Northwest Indian Fisheries Commission
6730 Martin Way E.
Olympia, WA 98516-5540
Phone:(360) 438-1180
(360) 438-1181 ext. 369

Snohomish County Department of Public Works
Surface Water Management Division
Attn: Stephanie Kaknes and Andy Haas and Will Hall
2731 Wetmore Avenue, Suite 300
Everett, WA 98201-3581
(425) 388-3464 x 4667

- Forwarded to Michael Purser, Principal Habitat Specialist, (425) 388-3464 ext. 4561.

Tulalip Tribe
Attn: Kurt Nelson
7615 Totem Beach Rd.
Marysville, WA 98271
(360) 651-4480

U.S. EPA Region 10
1200 6th Avenue
Seattle, WA 98101
(206) 553-1200

Washington Department of Fish and Wildlife
Attn: David Brock
16018 Mill Creek Boulevard
Mill Creek, WA 98012-1296

Washington Department of Natural Resources
Sandy Swope Moody
Natural Heritage Program
PO Box 47014
Olympia WA 98504-7014
(360) 902-1667

National Marine Fisheries Service
510 Desmond Drive SE, Suite 103
Lacey, WA 98503
(360) 753-9530

U.S. Fish and Wildlife Service
510 Desmond Drive, Suite 102
Lacey, WA 98503-1263
360-753-9440

Stilly-Snohomish Fisheries Enhancement Task Force
Attn: Ann Boyce
P.O. Box 5006
Everett, WA 98206

University of Washington
School of Aquatic & Fishery Sciences
Attn: Dr. David Armstrong
P.O. Box 355020
Seattle, WA 98195

Appendix C

STILLY-SNOHOMISH FISHERIES ENHANCEMENT TASK FORCE: BUCK ISLAND FLOODPLAIN FOREST ENHANCEMENT PROJECT

FILE

Stilly-Snohomish Fisheries Enhancement Task Force

Working to ensure the future of salmon in the Stillaguamish and Snohomish watersheds

P.O. Box 5006, Everett, WA 98206
Phone 425-252-6686 Fax 425-259-6873 - Email info@stillysnofish.org
www.stillysnofish.org

March 28, 2001

Mr. Ron Petrick
City of Monroe
Parks Department
306 West Main Street
Monroe WA 98272

RE: Buck Island Floodplain Forest Enhancement Project

Dear Ron:

We appreciate your interest in working with the Stilly-Snohomish Fisheries Enhancement Task Force to improve salmonid habitat conditions on Buck Island. We have already had a volunteer tree-planting crew on the island, and we have additional activities scheduled during the month of April. I am writing to report on our findings, to date, and to offer our recommendations for future work.

The Stilly-Snohomish Task Force has committed $10,000 to the project, most of which will be spent by the time we finish our plantings in April. In addition Snohomish County has offered salvaged trees and cottonwood pole stock at no cost. By the end of April we estimate that over 600 hours of volunteer time will have been contributed to this effort. At your earliest convenience, we should discuss further funding opportunities so that we can keep this worthwhile effort going.

Please don't hesitate to call me if you have questions about this report. We regard it as a work in progress, while we learn more about the specifics of Buck Island and its ecology.

Background

Buck Island is located at the confluence of Woods Creek and the Skykomish River in the City of Monroe. It once was an island in the Skykomish River, but changes in river channels in the 1940s connected the island with the north shore of the river. What is still known as Buck Island is now a peninsula defined on the north and west by Woods Creek, and by the Skykomish River on the south.

It is within the Skykomish floodplain and is flooded in varying degrees nearly every year. In the 1990 and 1995/1996 flood seasons, Buck Island was submerged by approximately 14 feet of water. In more typical years, it is flooded in small areas with less than one foot of water. Monroe Parks and Recreation manages the island as Al Borlin City Park.

In the mid-1990s, to enhance recreation opportunities, the City of Monroe cleared vegetation on the downstream end of the island, planted lawn and installed picnic tables. The city also exploited a network of footpaths through the island forest by grading, widening, and hardening the paths. Shortly after the trails and picnic areas were built, the 1995/1996 floods severely eroded the downstream end of the island.

Every year since, more of the downstream end is lost to the river due to shoreline erosion and headcutting during high water events. The lack of native vegetation allows floodwater to move across the island at higher velocities, promoting erosion. Clearing also allowed small stands of Japanese knotweed, which were previously suppressed by the forest canopy, to vigorously expand. Those stands now cover much of the island's north bank.

The remainder of the island is primarily covered in mature cottonwood/big-leaf maple single-layer canopy forest. Many of the trees are now falling down and there is little to replace them. Openings in the forest canopy are promoting the spread of Japanese knotweed and Himalayan blackberry. There are few conifers on the island and little coniferous seed source.

The Stilly-Snohomish Fisheries Enhancement Task Force is interested in working with the City of Monroe to promote vegetation conditions that will enhance Buck Island's stability, re-establish healthy fish and wildlife habitat, and enhance public education and passive recreation opportunities.

The Stilly-Snohomish Task Force is a 501(c)(3) not-for-profit corporation, registered as a charitable organization with the Washington Secretary of State. The mission of the Task Force is to ensure the future of salmon in the Stillaguamish and Snohomish watersheds.

The Task Force is dedicated to the restoration of viable salmonid populations and their habitat in the Stillaguamish and Snohomish River watersheds, a combined land area of more than 2,400 square miles. Since its beginning in 1990, the Task Force has directed its resources and energy to the challenge of developing community partnerships and strategies to improve and restore the recreational and commercial fisheries of the Pacific Northwest. We frequently collaborate with federal, state, and local agencies, businesses, community organizations, and individuals to achieve our goals. We regard local, hands-on community involvement as essential to our success.

The Stilly-Snohomish Task Force is a hands-on membership organization with more than 1000 volunteers supporting our three full-time staff members. Our programs and projects focus on salmon habitat improvement and protection, public outreach, and education. Since 1990, the Task Force has planned, designed, and implemented dozens of enhancement and restoration projects. In addition, we have collaborated with other organizations and alliances in many more projects. These include stream and riparian restoration projects, wetland restoration projects, fish passage projects, and improvements to agricultural lands and their management.

Project Objectives

The objective of this project is to promote vegetation conditions that will enhance Buck Island's stability, re-establish healthy fish and wildlife habitat, and enhance public education and passive recreation opportunities.

Strategies:

- Enhance floodplain forest species diversity across the island.
- Re-establish a forest canopy.
- Suppress invasive species: Japanese knotweed, Himalayan blackberries and English ivy.

- Encourage public participation in the above strategies.
- Establish recreation opportunities that are consistent with the maintenance of healthy floodplain forest ecosystems and their indigenous plant and wildlife species.

Buck Island Morphology

For the purposes of this report, the names Buck Island and Al Berlin City Park are used synonymously and refer to the area bounded on the north and west by Woods Creek, on the south by the Skykomish River, and on the east by the abandoned railroad grade the crosses the Skykomish River.

Buck Island lies within the channel migration zone of the Skykomish River. Aerial photographs from the 1933 series show Buck Island formed by the braided channels of the Skykomish River. At that time, the Skykomish River near Monroe looked much like the braided reach of the river near Gold Bar does today, with many braided channels and with Haskell and Riley Sloughs functioning as part of the river. The BNR east-west rail line was in place by this time, cutting off the point of a meander in the river's main channel and confining flows upstream of Buck Island.

By 1948, the river channel that formed Buck Island was dry. The rail line running south toward Duvall was relocated, changing the angle at which it crossed the river and forming an additional point of confinement for the river channel.

Prior to the 1930s the Skykomish River near Monroe flowed through several intertwining channels over an area one mile or more in width. Since then, the river remains generally confined to a single channel, generally less than 500 feet wide. Braiding of river channels and gravel bar formation has diminished significantly, and the river most likely runs faster and deeper than it has historically. The downstream end of Buck Island has expanded and contracted several times over the past seventy years. Changes here in recent years appear to be consistent with historic erosion and deposition patterns.

The downstream end of the island eroded considerably between 1995 and 1999. Sediment deposition during the 1999/2000 and 2000/2001 seasons, however, appears to be re-building the toe of the island. Those winters experienced relatively low flows and no significant high water events. A logjam also formed during those two seasons, extending from the north bank of the Skykomish River west to the confluence of Woods Creek. The ability of logjams to stabilize riverbanks and create habitat for salmon and other wildlife is well documented. This particular logjam appears to be enhancing sediment deposition at the toe of the island, and is creating scour-pools and cover suitable for salmon.

While changes to the island over time should be expected, our interest is in ensuring that excessive fine sediments are not entering the river as a result of human use of the island and that salmonid habitat-forming processes are maintained. Erosion at downstream end of Buck Island appears to be the result of several processes: 1) high flows from Woods Creek, 2) bank scour from the Skykomish River, 3) foot traffic from park users, and 4) headcutting during flood events. Of these processes, the easiest and most cost effective to address are headcutting and foot traffic.

Headcutting is a process that occurs on Buck Island during floods. As floodwaters recede, the levels of the Skykomish River and Woods Creek drop to a level lower than that of the water flowing over the surface of the island. As water drops off the downstream end of the island down to the level of the river, erosion occurs, progressing in a headward or upstream direction. The lack of deep-rooted native vegetation in the picnic area and along trail corridors enhances this

process by allowing water to sheet across the ground at higher velocities. Vegetation reduces floodwater velocities and stabilizes soils that would otherwise be subject to erosion.

Foot traffic up and down the eroded and undercut riverbank accelerates erosion. While this erosion is localized, it can over time generate conditions that promote hydraulic erosion. From a park management perspective, the eroding bank could be considered a safety hazard to park users.

Recommendations:

- *Retain the logjam.* The logjam reduces near-bank river velocities and is trapping sediment, apparently rebuilding the island. Logjams are also an important feature in big-river fish habitats. Chinook salmon, for example, are well known to use pools created by logjams. Whether this particular logjam will survive flood flows remains to be seen. There are a few large key members, but much of the material is fairly small. Augmenting the logjam with additional large pieces is worth additional study.

- *Install black cottonwood live-poles along the island's downstream shoreline.* Live-poles are green sections of cottonwood trunk, four to eight inches diameter that are buried or drilled into the ground. We recommend burying live poles four to eight feet deep and extending two to four feet above grade, at roughly four-foot centers. The live-poles in the short term act similar to pilings, stabilizing streambanks that are unstable or subject to rotational failure. In the long term the poles are expected to root and grow, providing further stability as root mass develops in the soil. During floods, the trees will disperse the energy of floodwaters and reduce water velocity. Snohomish County has offered black cottonwood cuttings sufficient to install a test area of 100 poles on Buck Island. If the City of Monroe can furnish an auger to drill holes, the Stilly-Snohomish Task Force will coordinate installation of the poles. This work could happen as soon as April 2001.

- *Plant native trees throughout the picnic area.* Like the live-pole plantings, trees will disperse the energy of floodwaters, reduce water velocity and stabilize saturated soils. Picnic areas can easily co-exist with island-stabilizing vegetation. We recommend, instead of a large open picnic ground, several smaller picnic areas separated by groves of trees. The groves should be planned to allow visibility for security purposes, but should also prevent the unimpeded flow of floodwaters. Western redcedar and Sitka spruce are particularly well suited to this purpose since they buttress well in unstable soils, are less prone to wind throw than hemlock, are tolerant of flooding, and are attractive. Should such massive flooding occur that no tree could survive, those species will also provide the best large woody debris in the downstream river system for salmonids.

- *Management of park users.* Young trees and live poles are sensitive to disturbance, especially in the first year after planting. Live-poles generally sprout only a few leaves in their first year, devoting most of their energy to root development. We recommend temporary fencing around live-pole plantings and around the undercut bank to increase survival rates of the plantings, to reduce bank erosion, and to reduce risk to the public using the picnic area. The fencing should be removed during the flood season when use of the picnic area is low. After the plantings branch out the fence should no longer be needed. To provide safe, controlled access to the water, an access point could be cut into the bank. This should be carefully designed and thickly vegetated (possibly with low-growing willows) to prevent the access from becoming a trigger for further erosion.

- *Trail design.* Wide, straight trails allow water to travel at higher velocities during floods, promoting scouring of soils. By allowing additional light into the forest understory, they act as vectors for invasive vegetation. There are many places on Buck Island where the trails have accelerated the spread of Japanese knotweed and Himalayan blackberry. We recommend planting the shoulders of trails with native vegetation wherever possible, however, we also recommend maintaining trails wide enough for emergency vehicle access and to allow sightlines sufficient for the safety of park users. In most cases, a vehicle-width trail should be sufficient for security purposes. Wherever possible, trails should bend and meander to prevent the unimpeded flow of floodwater.

Forest Composition

The forest canopy on Buck Island is currently dominated by black cottonwood (*Populus trichocarpa*), red alder (*Alnus rubra*), and big-leaf maple (*Acer macrophyllum*). Small stands of Pacific willow (*Salix lasiandra*) also contribute to the canopy along Woods Creek.

In many areas the cottonwoods and alders are reaching maturity and there are few young trees in the understory to replace them. As the mature trees fall, they leave openings in the canopy and Japanese knotweed and Himalayan blackberry are able to take advantage of the openings. As the knotweed and blackberry spread and develop thickets, they displace native understory vegetation and prevent the growth of young trees, which would form a new canopy.

Conifers are conspicuously lacking in the forest canopy, although western redcedar (*Thuja plicata*), western hemlock (*Tsuga heterophylla*), Sitka spruce (*Picea sitchensis*), and Douglas-fir (*Pseudotsuga menziesii*) can be found in small numbers. Conifers serve several significant functions on floodplain islands. Conifers are more effective at creating shade than deciduous trees, and are therefore more effective at controlling the spread of invasive species such as reed canarygrass, Japanese knotweed, and Himalayan blackberry.

Conifers are generally longer-lived than most deciduous species, and are consequently both an indicator and a promoter of island stability. On Buck Island, for example, western redcedar and Sitka spruce stumps exceeding five feet in diameter are evidence that there was an historic coniferous component to the island's vegetation. Some of those stumps are now falling into the Skykomish River as the island's south shore erodes. Historically, a five foot diameter cedar tree would have fallen into the river and acted as a breakwater, reducing downstream shoreline erosion. Several such downed trees along the length of the island would have furnished significant shoreline protection. The existing trees and the remaining old-growth stumps do not have sufficient mass to function in the same way.

Those conifers that fall into the river are extremely important to the development of fish habitat. Those that stay along the bank provide cover and create edge conditions beneficial to salmonid rearing and holding. Those that move downstream form logjams that provide cover, holding pools, food, and form other essential habitat components. On those occasions when floods cut new river channels through forested floodplains, the type and size of trees that enter the river can determine the quality of salmonid habitat for decades.

Recommendations

We recommend planting the entirety of Buck Island with conifer seedlings at a rate of about 400-500 trees per acre. We recommend using a mix dominated by western redcedar (*Thuja plicata*), western hemlock (*Tsuga heterophylla*), and Sitka spruce (*Picea sitchensis*).

The Stilly-Snohomish Task Force has already planted 1,000 seedlings between the northernmost trail and Woods Creek. This test planting will help us determine what levels of tree mortality and browsing from deer and rodents to expect. Planting at the proposed density is intended to accommodate some mortality over time.

The Task Force also established several study plots on Buck Island to enable us to evaluate the forest condition and diversity over time.

Invasive Species

Several non-indigenous, invasive plant species have taken advantage of the island's disturbed ecology. Similar floodplain areas along the Skykomish River with lower levels of disturbance do not exhibit the same spread of invasive species as Buck Island. One example, three mile upstream of Buck Island, has vehicle-width trails through the forest. With more conifers in its canopy and lower levels of disturbance to the vegetation, it has virtually no knotweed.

Although some conventional treatments of invasive species rely on herbicides, Task Force policy is to avoid herbicide use wherever possible since we work primarily in aquatic and riparian environments. In many cases such as Japanese knotweed, reed-canarygrass, and English ivy, there is little indication that herbicides are more effective than manual or mechanical methods. our recommended treatments are described below. Stewardship abstracts from the Nature Conservancy for several invasive species are also attached.

- **Scotch broom (Cytisus scoparius)**

  A few isolated Scotch broom plants have been identified on Buck Island. Scotch broom is not a significant problem at this time and should remain easy to control provided that individual plants are removed before they seed.
  Recommended Treatment: Pull individual plants as they are encountered.

- **English ivy (Hedera helix)**

  English ivy is present in many locations on Buck Island. While there are a few areas of concentration, ivy can be seen engulfing the trunks of trees at many locations across the island. English ivy commonly grows up the trunks of bigleaf maple, red alder, and cottonwood trees, either killing them or stunting their growth. Although it can spread via cuttings and broken stems, its primary method of dispersal is seed spread by birds, hence its discontinuous presence on the island.
  Recommended Treatment: Cutting the vines is the most important step in controlling the plant. This should be done across the island as soon as possible, and could be done as a summer volunteer activity. Removal of the vines from trees is difficult and is generally not necessary. Desiccation of the plant can take up to one year. While the live plants appear to have little wildlife value, the dead vines have been found to provide nesting habitat for some bird species, functioning much like snag habitat. Vines growing on the ground should be removed wherever possible.

- **Reed-canarygrass (Phalaris arundinacea)**

  Reed-canarygrass can be found on Buck Island along Woods Creek, however, it does not appear to be a significant problem at this time. It can become extremely troublesome in streams and in wet riparian areas where it shades-out and displaces native vegetation and wildlife.

Recommended Treatment: Reed-canarygrass is a sun-dependant species that can only be controlled over the long-term by establishing a tree canopy to shade it out. The recommended treatment for reed-canarygrass is virtually identical to that for Japanese knotweed (i.e. mowing and shade). We do not recommend any specific reed-canarygrass treatment on the island at this time. Plantings of native willows along Woods Creek should be productive in displacing reed canarygrass and Japanese knotweed over time. Willow plantings are beneficial to salmonids and to overall stream health.

- **Japanese knotweed (Polygonum cuspidatum)**

  Japanese knotweed is by far the most problematic and widespread invasive species on Buck Island. The plant grows in dense stands, four to eight feet tall, shading out and displacing native understory vegetation. The stands also prevent the growth of young trees, which over time, results in the gradual thinning and displacement of floodplain forests. In floodplain forest stands where short-lived species such as black cottonwood and red alder dominate, the thinning and displacement can occur quite rapidly. This appears to be occurring in many locations on Buck Island. Japanese knotweed in its native environment is a colonizer of disturbed soils, often being the first plant to appear on volcanic slopes after an eruption. On Buck Island, the primary vectors for its spread appear to be Woods Creek where it occurs along scoured banks and bars, flood channels where soils are scoured in flood events, and disturbed soils along trails. Although Japanese knotweed produces seeds, it primarily spreads by its aggressive rhizomes (that have been known to sprout through asphalt paving), and by vegetative propagation of stem fragments. It is capable of producing a new plant from stem fragments weighing less than a gram.

  Recommended Treatment: The most reliable eradication method is repeated mowing over several seasons. Mowing frequency varies between studies, ranging from weekly cuttings to five times during the growing season. Mowing plants eventually depletes the plants' rhizomes. The only known long-term prevention is shade.

  We recommend mowing Japanese knotweed stands to the ground at least every two weeks during the growing season. Stems should be left in place after mowing to prevent further spread of the plants. The plants mow easily, and with frequent mowing should not produce unmanageable amounts of debris.

  We also recommend, as a long-term site-specific treatment, encircling Japanese knotweed stands with a dense hedge of conifers and alders to shade the knotweed as soon as possible. We propose using five to eight foot-tall nursery stock for these plantings. As the mowing and shading treatments take effect, we can then plant inside the knotweed stands with large nursery stock as well.

Public Education

The Stilly-Snohomish Task Force places high value on public education. The impetus for the formation of the Task Force was to involve the public in salmonid recovery efforts. Buck Island is an ideal place for such public involvement. From both salmon habitat and public education perspectives, The City of Monroe has a tremendous opportunity in the enhancement of Buck Island's native ecosystem.

Recommendations

- *Maintain public access to Buck Island.* A well-maintained trail system on the island is the only opportunity many people have to experience a floodplain forest ecosystem. A

functioning natural ecosystem in a city park is a rarity. We commend the City of Monroe for its interest in maintaining the natural qualities of Buck Island.

- *Improve educational signage about Buck Island and its natural history.* Educational materials are important to the public's understanding of the island and its plants and wildlife. Although floods and vandalism damaged past signage on the island, other options for educational materials should be considered. Low-profile signage in other Snohomish County parks has survived floods. Another alternative is to install low-cost signs that can be replaced if damaged or lost.

- *Involve the public in habitat restoration efforts.* The Stilly-Snohomish Task Force makes every effort to involve the public in its projects. Already, we have had dozens of volunteers planting trees and surveying vegetation on Buck Island. We have approximately one-hundred volunteers booked to work on Earth Day 2001 and, in coordination with the Monroe YMCA, we expect fifty volunteers the week before Earth Day. Every volunteer effort includes an educational program about the history of the work area and why the work is important. Every volunteer leaves the project with a better understanding of fish, wildlife, and their community. Our high volume of repeat volunteers testifies to our success.

- *Install temporary signs that explain the nature of the restoration effort and its goals.* Some people may be offended that the picnic area is changing or that the view of the creek has changed. In our experience, if people understand the project, they are more accepting of the change. In fact, the more people learn about our projects, the more they want to get involved. Our most successful projects are the ones that have the most community support. On other habitat restoration projects we have had trees mowed, cut down, and pulled from the ground simply because people did not know that there was a restoration effort. In any public place, small simple signs that indicate the restoration area can determine the long-term success of the project.

Coordination of Stilly-Snohomish Task Force Work with the Work of Other Community Groups

Several groups have made efforts in recent years to address the spread of Japanese knotweed on Buck Island. Some planted trees and others cut knotweed. Unfortunately, the knotweed cutting has been infrequent and ineffective, and on at least two occasions resulted in the cutting of trees that had been planted the previous season.

Since fall 2000, the Stilly-Snohomish Task Force devoted $10,000 cash and approximately 300 hours of staff and volunteer effort to Buck Island. Our intent is to invest substantially more time and resources in this project. We have a vested interest in ensuring the long-term survival of our work.

We recommend that City of Monroe take steps to coordinate the work of community groups and schools interested in service projects on Buck Island to ensure that the work of any group is not in conflict with that of previous groups.

The Stilly-Snohomish Task Force is willing to coordinate all volunteer work done as part of this project. The Task Force specializes in coordinating volunteer habitat restoration efforts and is uniquely qualified to coordinate volunteer activities on Buck Island. We are motivated to ensure that work on the island is well coordinated, and that time and resources are used efficiently.

We, at the Stilly-Snohomish Task Force, appreciate the opportunity to work with the City of Monroe on this project. This work on Buck Island will ultimately be beneficial to endangered salmon and other wildlife, to the health of the river system as a whole, and to the citizens of Monroe. We look forward to working with the City of Monroe to ensure that Al Berlin Park remains the 'crown jewel' of Monroe's park system.

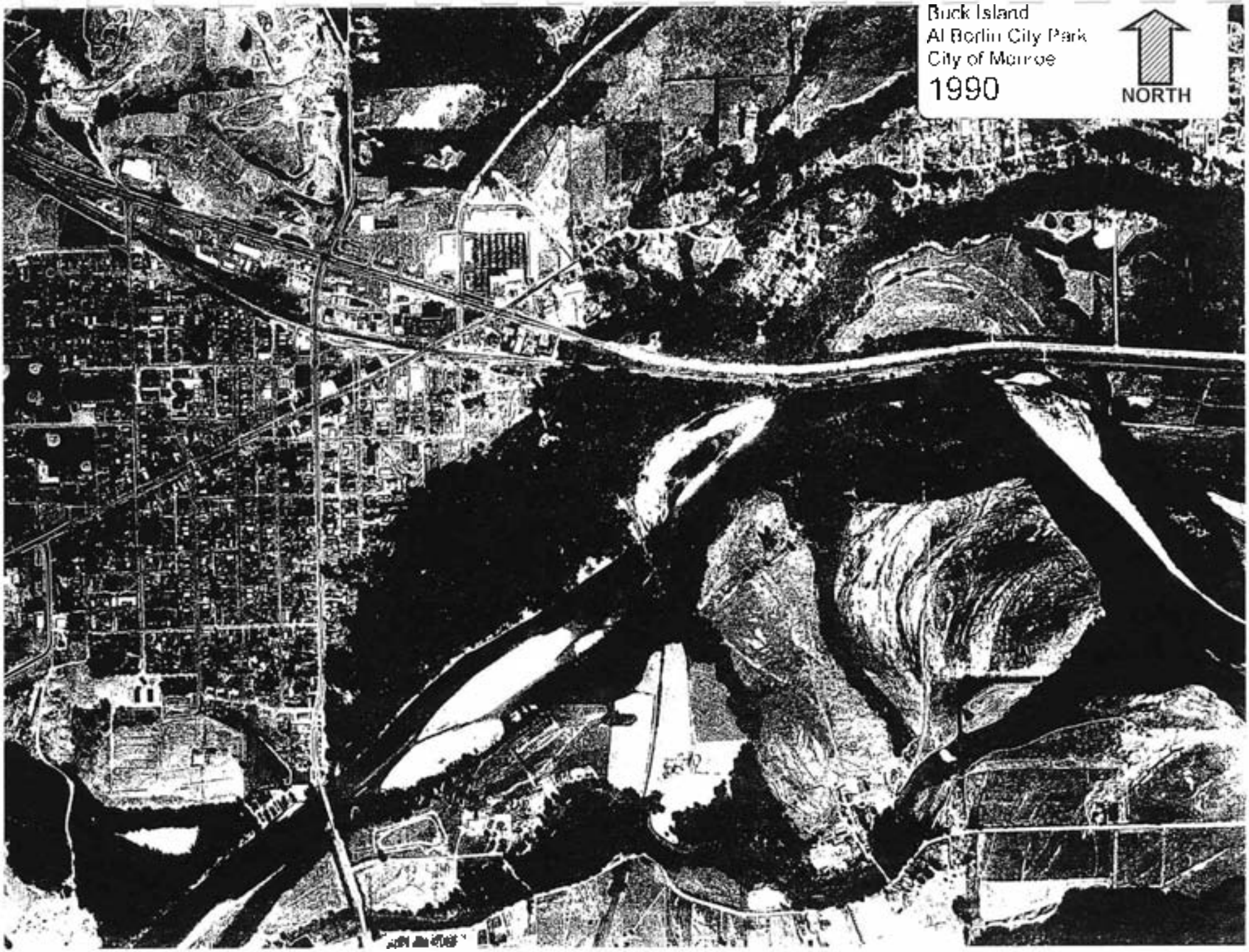
Please call me if you have any questions.

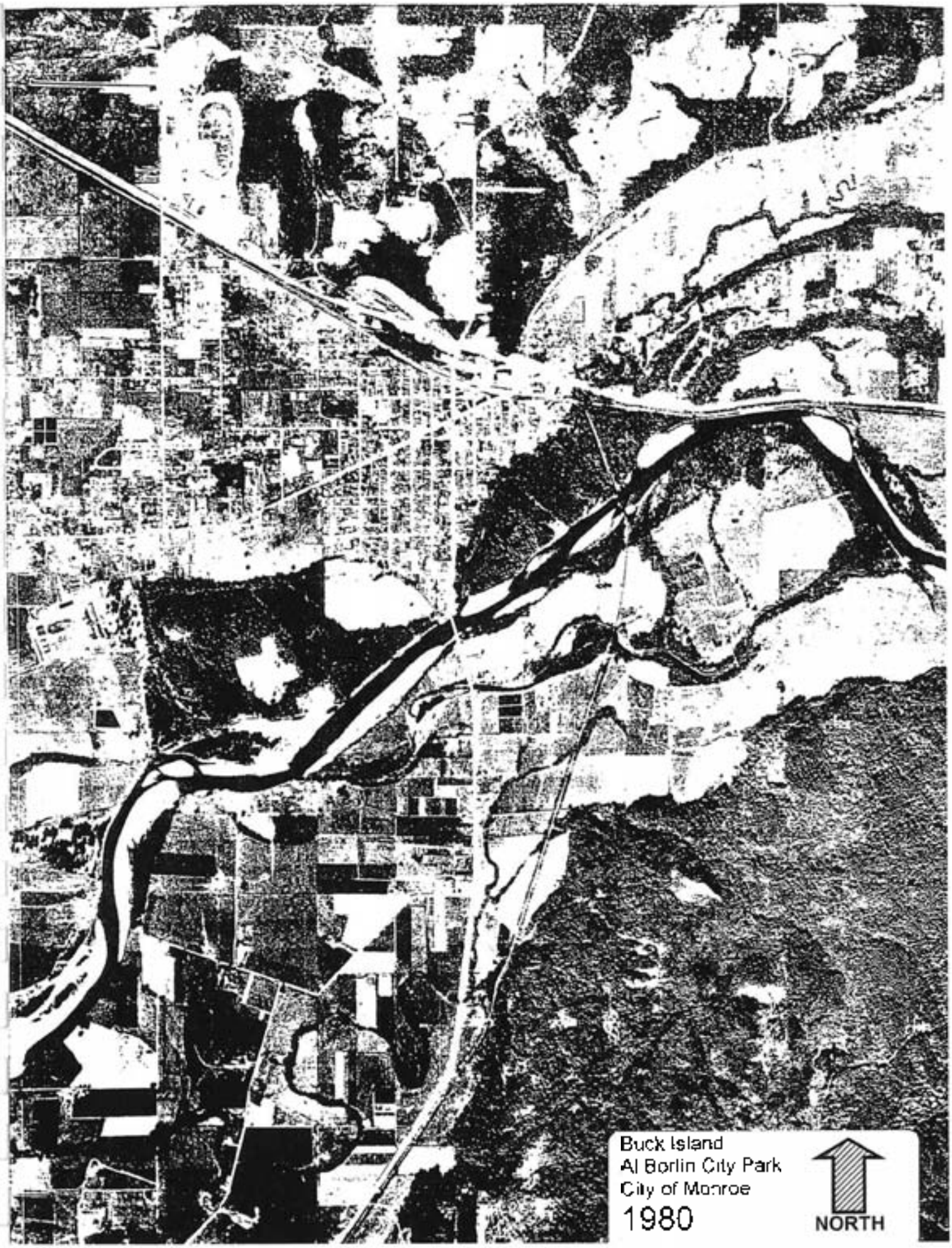
Sincerely,

Dave Ward

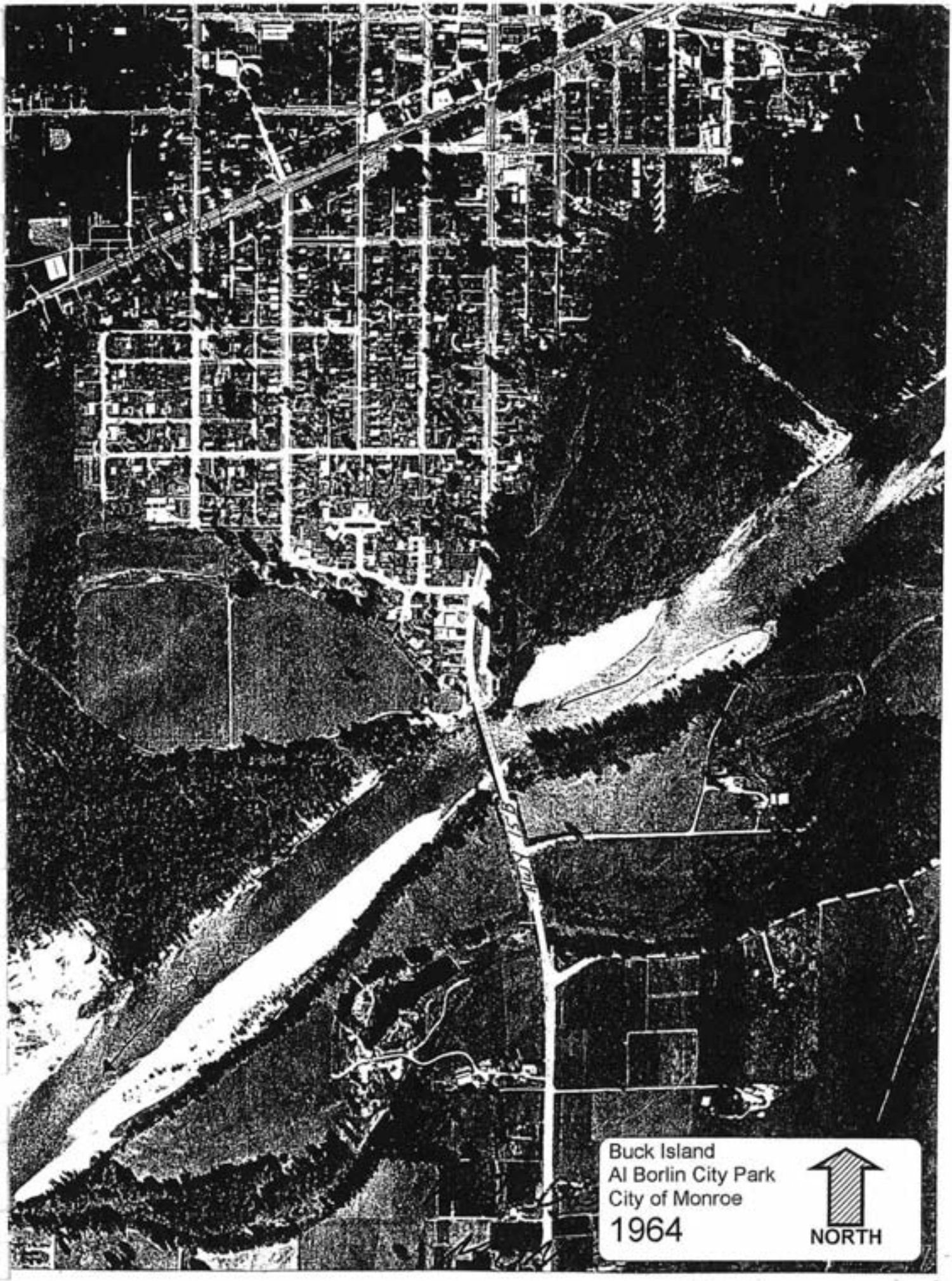
Habitat Restoration Projects Manager


Buck Island
At Berlin City Park
City of Monroe
1998
NORTH
500
0
500 Feet
1998 Aerial Photo


Buck Island
Al Borlin City Park
City of Monroe
1990
NORTH

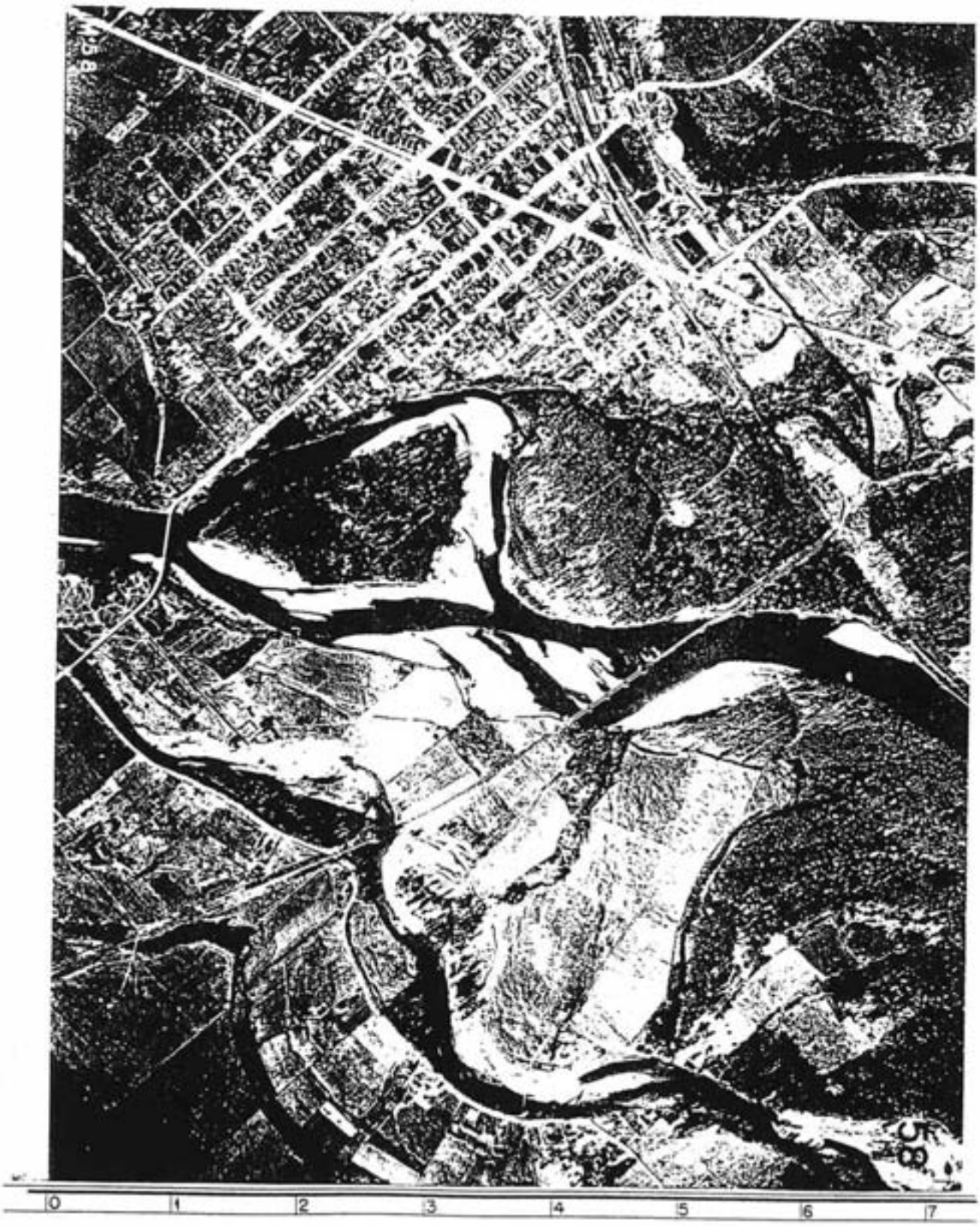

Buck Island
Al Borlin City Park
City of Monroe
1980
NORTH


Buck Island
Al Berlin City Park
City of Monroe
1976
NORTH


Buck Island
Al Borlin City Park
City of Monroe
1964
NORTH

Buck Island
At Berlin City Park
City of Monroe
1948

NORTH



Buck Island
At Borlin City Park
City of Monroe
1933

NORTH

Attachment A - Project Schedule

Date	Activity	Labor
Spring 2001	West-end knotweed perimeter planting	Task Force
	North-end forest composition planting	Task Force
	West-end pole planting	Task Force/ Monroe
Summer 2001	West-end knotweed mowing (bi-weekly)	Monroe
	East-end knotweed mowing (bi-weekly)	Monroe
	English ivy treatment	Task Force
Fall/Winter 2001	Complete west-end knotweed perimeter planting	Task Force
	West-end picnic area planting	Task Force
Spring 2002	East-end knotweed perimeter planting	Task Force
	South-end forest composition planting	Task Force
Summer 2002	West-end knotweed mowing (bi-weekly)	Monroe
	East-end knotweed mowing (bi-weekly)	Monroe
	Blackberry control	Monroe
	English ivy treatment	Task Force
Fall/Winter 2002	Complete east-end knotweed perimeter planting	Task Force
	Complete south-end forest composition planting	Task Force
Spring 2003	Complete north-end forest composition planting	Task Force
Summer 2003	West-end knotweed mowing (bi-weekly)	Monroe
	East-end knotweed mowing (bi-weekly)	Monroe
	Blackberry control	Monroe
Fall/Winter 2003	Touch-up composition plantings	Task Force
	Knotweed treatment area plantings	Task Force
	Blackberry area plantings	Monroe
Spring 2004	Island-center composition plantings	Task Force

Attachment B – Stewardship Abstract for Japanese Knotweed

ELEMENT STEWARDSHIP ABSTRACT
for

Polygonum cuspidatum

Japanese knotweed, Mexican bamboo

To the User:

Element Stewardship Abstracts (ESAs) are prepared to provide The Nature Conservancy's Stewardship staff and other land managers with current management-related information on those species and communities that are most important to protect, or most important to control. The abstracts organize and summarize data from numerous sources including literature and researchers and managers actively working with the species or community.

We hope, by providing this abstract free of charge, to encourage users to contribute their information to the abstract. This sharing of information will benefit all land managers by ensuring the availability of an abstract that contains up-to-date information on management techniques and knowledgeable contacts. Contributors of information will be acknowledged within the abstract and receive updated editions. To contribute information, contact the editor whose address is listed at the end of the document.

For ease of update and retrievability, the abstracts are stored on computer at the national office of The Nature Conservancy. This abstract is a compilation of available information and is not an endorsement of particular practices or products.

Please do not remove this cover statement from the attached abstract.

Authors of this Abstract:
Leslie Seiger

THE NATURE CONSERVANCY
1815 North Lynn Street, Arlington, Virginia 22209 (703) 841 5300

The Nature Conservancy
Element Stewardship Abstract
For *Polygonum cuspidatum* Sieb. & Zucc
(Reynoutria japonica Hoult.)
(Fallopia baldschuanica)

I. IDENTIFIERS

Common Name: Japanese knotweed, Mexican bamboo

General Description:
Polygonum cuspidatum was classified as Reynoutria japonica by Houttuyn in 1777 and as Polygonum cuspidatum by Siebold in 1846. It was not until the early part of the 20th century that these were discovered to be the same plant (Bailey, 1990). The plant is generally referred to as Polygonum cuspidatum by Japanese and American authors and as Reynoutria japonica in the United Kingdom and Europe. Recent evidence suggests that this plant should be reclassified as Fallopia japonica (Bailey, 1990).

The following is based on descriptions by Fernald (1950), Muenscher (1955), Locandro (1973,1978), and Ohwi (1965).

Polygonum cuspidatum is an herbaceous perennial which forms large clumps 1-3 meters high. It is fully dioecious and can reproduce by seed and by large rhizomes which may reach a length of 5-6 meters. The stout stems are hollow and bamboo-like, extend from an erect base and are simple or little branched and glabrous with thinly membranous sheaths. Leaves are broadly ovate, truncate to cuneate at base, abruptly cuspidate, 5-15 cm long, 5-12 cm broad, with petioles 1-3 cm long. Greenish white flowers 2.5-3 mm long, densely arranged in axillary panicles, 3 styles; 8-10 stamens with longitudinally dehiscing anthers. Fruiting calyx wing-angled, 6-10 mm long. Achenes shiny black-brown, 3-4 mm long, acutely trigonous. Male flowers have branched panicles on upright racemes with the distal end of the raceme in the highest position; individual panicles generally point up. Female flowers are drooping or decumbent with the distal end in the lowest position; individual panicles are not oriented in a particular direction. Both male and female flowers possess vestigial organs of the other sex.

Polygonum cuspidatum closely resembles Polygonum sachalinense (Reynoutria sachalinensis), an exotic species native to northern Japan and the Sakhalin Islands (Ohwi, 1965). P. sachalinense can be distinguished primarily by its larger size, greenish flowers and cordate leaves which gradually taper to the tip (Fernald, 1950). Polygonum cuspidatum is known to hybridize with Polygonum sachalinense and with Fallopia baldschuanica (Bailey, 1985,1988). Hybrids between Polygonum cuspidatum and Polygonum sachalinense have been frequently mistaken for Polygonum cuspidatum in the U.K. (Bailey, 1990).

II. STEWARDSHIP SUMMARY

Polygonum cuspidatum is widely distributed in much of the eastern U.S. In western Pennsylvania it already occupies hundreds of acres of wetlands, streambanks and hillsides and has spread along the banks of the Allegheny and Ohio Rivers and dominates the edges of many of the islands in these rivers (Wiegman, pers.comm.). It is present on at least two sites belonging to the Pennsylvania

Chapter of The Nature Conservancy (Long Pond in the Poconos and Bristol Marsh, an urban preserve near Philadelphia)and has become a problem on creeks in suburban Philadelphia (Broaddus, pers. comm.). It is also a serious problem in Rock Creek Park, a national park in Washington D.C. In the U.K., it is considered a major weed and a threat to conservation, and it is legally prohibited to introduce Japanese knotweed into the wild (Beerling, 1990; Nature Conservancy Council, 1989; Palmer, 1990). Its early emergence and great height combine to shade out other vegetation and prohibit regeneration of other species (Sukopp and Sukopp, 1988). Thus it reduces species diversity and damages wildlife habitat (Palmer, 1990; Scott and Mars, 1984; Wiegman, pers. comm.). It does not appear to be a threat in undisturbed forest and other low light areas, but it is likely that, if unchecked, it will continue to expand its range in open habitats. Once Polygonum cuspidatum has established it forms large, almost pure stands which are extremely persistent and difficult to eradicate.

III. NATURAL HISTORY

Habitat:

Polygonum cuspidatum is native to eastern Asia. It was introduced from Japan to the United Kingdom as an ornamental in 1825, and from there to North America in the late nineteenth century (Conolly, 1977; Patterson, 1976; Pridham and Bing, 1975). In Japan, Polygonum cuspidatum is widely distributed and is usually found in sunny places on hills and high mountains (Kanai, 1983; Ohwi, 1965). It is a dominant pioneer in the primary succession of volcanic slopes and is frequently a colonizer in secondary succession (Hirose, 1984).

In the U.K., Polygonum cuspidatum has spread extensively, occurring in virtually every 10 km square (Nature Conservancy Council, 1989). Stands range in size from individual plants to clumps more than 500 square meters (Palmer, 1990). Polygonum cuspidatum has also become naturalized in much of central Europe (Sukopp and Sukopp, 1988). In North America, it is widely found in the eastern U.S. and has been observed as far north as Nova Scotia and New Foundland, as far south as North Carolina, in much of the midwest and in the coastal areas of Washington and Oregon (Locandro, 1978; Patterson, 1976; Pauly, 1986). Large stands have been noted in western Pennsylvania, in particular along the banks of the Ohio and Allegheny Rivers and on the islands in these rivers (Wiegman, pers. comm.). Polygonum cuspidatum spreads primarily along river banks, but also grows in wetlands, waste places, along roadways, and in other disturbed areas (Beerling, 1990; Conolly, 1977; Muenscher, 1950).

Polygonum cuspidatum can thrive in a wide variety of habitats. In Japan, it can grow on volcanic soils high in sulfur and having a pH less than 4 (Conolly, 1977). In the U.S., it has been observed growing in a variety of soil types, including silt, loam, and sand, and in soils with pH ranging from 4.5 to 7.4 (Locandro, 1973). Analyses of soils from 17 stands in Wales showed no correlation between stand size and vigor and soil characteristics. The stands studied grew in soils with a broad range of pH, organic matter and nutrients (Palmer, 1990). In Japan, Polygonum cuspidatum growth is slow, but steady in nutrient poor sites, and rapid in nutrient rich sites (Hirose, 1984). In areas where Polygonum cuspidatum has been introduced, it is found primarily in moist, unshaded habitats. Distribution maps from the U.K. show that it is generally associated with regions of high precipitation (Conolly, 1977). Locandro (1973) reports it growing on xeric as well as hydric sites in the U.S. Its distribution appears to be limited by light. It is found primarily in open sites, and its growth and abundance are depressed in shady sites (Beerling, 1991; Seiger, unpublished data).

Polygonum cuspidatum flowers from July to October in Japan (Ohwi, 1965) and in August and September in the U.K. and North America (Conolly, 1977; Fernald, 1950; Muenscher, 1955). It is pollinated by bees and other insects (Bailey, 1990; Locandro, 1978). Seeds appear about two weeks after flowering (personal observation) and are wind dispersed (Maruta, 1976). In Japan, reproduction in Polygonum cuspidatum is characterized by high seed production and low seedling survival, but plants have a very high probability of survival once established (Hirose and Tateno, 1984). However, in the U.S., U.K, and Europe, seeds do not appear to be a significant mode of reproduction. In a study of the reproductive ecology of Polygonum cuspidatum populations in New Jersey, Locandro (1973) found viable pollen, but noted that fertile males were rare. Seedling germination was observed in the presence of males, but no seedling survival was recorded during five years of observation. In the absence of males, females produced empty achenes. In the U.K., fruit set is very rare. This was originally attributed to the rarity of male fertile flowers (Conolly, 1977). It has since been found that there are no male fertile forms of Polygonum cuspidatum in England and that the pollen source is actually a hybrid between Polygonum cuspidatum and Polygonum sachalinense (Bailey, 1990). Polygonum cuspidatum also hybridizes with Fallopia baldschuanica (Bailey, 1985,1988,1990). In the U.S., hybrids morphologically similar to those between Polygonum cuspidatum and Fallopia baldschuanica have been grown from seeds collected in the field, but seedling establishment has not been observed in the wild (Seiger, unpublished data).

The primary mode of reproduction in the U.S., U.K. and Europe is through extensive rhizomes which can reach 15-20 meters in length (Conolly, 1977; Locandro, 1973). Dispersal can occur naturally when rhizome fragments are washed downstream by the current and deposited on banks or, as more commonly occurs, when soil is transported by humans as fill dirt (Conolly, 1977; Locandro, 1978). Rhizomes can regenerate from small fragments, and have even been observed to regenerate from internode tissue (Locandro, 1973). Rhizomes can regenerate when buried up to 1 meter deep and have been observed growing through two inches of asphalt (Locandro, 1978; Pridham and Bing, 1975). The ability of rhizomes to generate shoots was found to be affected by the source of rhizome fragments, fragment size and depth planted, the optimal depth being just below the surface (Locandro, 1973).

Polygonum cuspidatum requires high light environments and effectively competes for light in such environments by emerging early in the spring and using its extensive rhizomatous reserves to quickly attain a height of 2-3 meters. Shoots generally begin to emerge in April and growth rates exceeding 8 cm per day have been recorded (Locandro, 1973). In addition, its deep root system gives it an advantage in foraging for nutrients and water, and contributes to soil stabilization on disturbed sites (Hirose and Tateno, 1984; Nakamura, 1984). Hirose and Tateno (1984) found that organic nitrogen levels on Mt. Fuji increased following colonization by Polygonum cuspidatum on bare volcanic desert and concluded that Polygonum cuspidatum contributes to the development of the ecosystem, in part, by acting as a nutrient reservoir.

Polygonum cuspidatum is found on open sites and does not appear to be able to invade forest understory due to its high light requirements (Beerling, 1991). Studies of the very closely related Polygonum sachalinense indicated that Polygonum sachalinense plants grown in low light did not have higher photosynthetic rates than plants grown in high light, and thus would not be expected to adapt to sites with low light intensity (Patterson, Longstreth and Peet, 1977). Transplant studies of Polygonum cuspidatum in closed understory sites showed poor survival and growth compared to open bank sites, confirming that it was environmental factors and not limitations on dispersal which exclude Polygonum cuspidatum from understory sites (Seiger and Merchant, 1992). Follow-up studies in the greenhouse showed that Polygonum cuspidatum grown under light levels comparable

to those foundin the understory had significantly less rhizomatous reserves at the end of the season than did plants grown under full sunlight (Seiger, unpublished data).

Polygonum cuspidatum occurs in much of the temperate U.S. Though not yet a major weed in the U.S., it is spreading, particularly in the eastern states. Dispersal is limited to areas where rhizome fragments from existing stands are washed downstream or soil containing rhizomes is transported by humans. Once established, it forms large, monospecific stands which displace virtually all other vegetation. Establishment can be prevented by monitoring for the introduction of Polygonum cuspidatum and manually removing the entire plant. Small stands may be controlled by repeated cutting, which may need to be supplemented by revegetation once growth of Polygonum cuspidatum has been reduced. At present, the only method to control large stands is with repeated application of herbicides. Complete eradication may not be possible.

IV. CONDITION

V. MANAGEMENT/MONITORING

Management Requirements:
Current control methods (mechanical, herbicidal) require continued treatment to prevent reestablishment of Polygonum cuspidatum. It may be feasible to reintroduce competitors as an alternative to continued treatment. There is a need for more research on whether native species might serve effectively as competitors and methods of reintroduction. Only very preliminary work has been done towards developing a biological control for Polygonum cuspidatum and much research remains to be done (see below).

The International Institute for Biological Control in conjunction with the National Agricultural Research center in Japan has produced a partial list of insect herbivores in Japan which are associated with Polygonum cuspidatum. A number of pathogens have been collected from Japan by CAB International and are held at the International Mycological Institute (Fowler and Schroeder, 1990). Plans are under way to begin a study of Polygonum cuspidatum in its native habitat (Fowler, pers. comm.). Contact:

Dr. Simon V. Fowler
International Institute of Biological Control
Silwood Park
Buckhurst Road
Ascot, Berks, SL5 7TA, UK

Recent studies in Rock Creek park, Washington, D.C. indicate potential for control by mechanical means combined with revegetation (Seiger, unpubished data) Field tests will be conducted in 1992. Contact:

Leslie Seiger
Dept. Biological Sciences
The George Washington University
Washington, DC 20052
(202)994-7144

In areas where Polygonum cuspidatum has not yet become established, the focus of management should be to prevent establishment by monitoring areas for introductions of Polygonum cuspidatum and eradicating newly established stands before they can become established.

Manual control consists of digging out the rhizomes or cutting the stalks. Digging is extremely labor intensive and tends to spread the rhizome fragments and promote disturbance and is not recommended (Palmer, 1990). Cutting, on the other hand, may be quite effective in eliminating Polygonum cuspidatum. It has been observed that Polygonum cuspidatum does not establish where grazing pressure is high (Beerling, 1990; Palmer, 1990). In a review of control methods, Palmer (1990) noted that eradication is not complete with cutting alone, but has been nearly achieved in some cases and should be feasible with persistence. A number of authors claim that cutting is ineffective (Pauly, 1986; Pridham and Bing, 1975; Orchowski, 1991). These conclusions are based on the observation that shoots are regenerated following cutting. However, a greenhouse study found that cutting stems results in a significant reduction of rhizomatous reserves. The same study also found that cutting was equally effective at any time during the growing season prior to the begining of senescence (Seiger and Merchant, 1990). A study of the effects of repeated cutting showed that at least three cuts are needed in a growing season to offset rhizome production (Seiger, unpublished data). Manual control can be labour intensive, but where populations are small and isolated, may be the best option. No research has been done to test the effectiveness of burning. It may act similarly to cutting by removing above ground material.

Shading, particularly in conjunction with cutting, may be another useful means of control on smaller stands. Studies showing that P. cuspidatum requires high light environments suggest that covering stands with black plastic or shade cloth may reduce growth. Pridham and Bing (1975) state that applying several layers of black polyethylene film covered by asphalt, blocks or stones to a leveled soil surface may provide some control. However, they also note that P. cuspidatum is able to emerge through asphalt. If shade cloth (or plastic) is to be applied without cutting, then, to prevent P. cuspidatum from emerging through the covering, shade cloth should be placed over shoots after the plants have reached their full height or placed well above newly emerging shoots, or raised as plants grow.

A number of biocidal chemicals have been found to be effective against Polygonum cuspidatum. Most of these are undesirable for use in conservation areas because they are nonselective, may be persistent in the soil and/or are not safe for use near water. One frequently used way to minimize the effects of non-selective herbicides on non-target species is to paint herbicides directly onto the target plants (Broaddus, pers. comm.). In the case of P. cuspidatum, this would probably require prior cutting for easier access if herbicides are to be applied after the plants have reached their full height. Herbicides appear to be more effective when combined with cutting (Scott and Mars, 1984; Orchowski, 1991).

Glyphosate [N-(phophonomethyl)glycine] has been found to be very effective against Polygonum cuspidatum (Ahrens, 1975; Beerling, 1990; Pauly, 1986). Glyphosate is a nonselective systemic herbicide with a short residual life (Ahrens, 1975; Lynn, Rogers and Graham,1979). Application is more effective in the fall when leaves are translocating to rhizomes (Lynn, et al. 1979). The British Nature Conservancy Council (1989) recommends applying 2.0 kg/ha in August with a prior cut in late spring or early summer. Glyphosate is available from Monsanto under the trade names Roundup™ and Rodeo™. Only Rodeo has been approved for use near water (Bender, 1988). Glyphosate has been used with limited success on some nature reserves in the U.K. (Palmer, 1990). Repeated applications over several years may be necessary (Beerling, 1990; Palmer, 1990, Pauly, 1986).

The Nature Conservancy Council (1989) also recommends picloram to be applied at a rate of 2.6 kg/ha in the spring. Picloram is a selective herbicide which is persistent in the soil. It must not be used near water, thus excluding its use in many of the areas where Polygonum cuspidatum is a problem (Gritten, 1990; Scott and Mars, 1984). Dicamba (3,6-dichloro-o-anisic acid) has also been found to be effective against Polygonum cuspidatum, but is persistent in the soil and nonselective (Pridham and Bing, 1975). A number of other herbicides have been tested against Polygonum cuspidatum, both alone and in combination with other herbicides (Orchowski, 1991; Scott and Mars, 1984). Herbicide may have to be used on stands that have been allowed to attain a large size. However, their use is not recommended in nature reserves because of their undesirable effects on other biota and the need for repeated applications to maintain control of Polygonum cuspidatum.

Regardless of whether control is manual or chemical, as long as some rhizomes remain in the soil Polygonum cuspidatum returns once management is relaxed (Beerling, 1990; Nature Conservancy Council, 1989; Palmer, 1990). It has been suggested that the reintroduction of effective competition might be possible (Eaton, 1986).

Research has only recently begun on biological control. The herbivores and pathogens of Polygonum cuspidatum in Wales have been examined for their potential as control agents (Fowler and Schroeder,1990). A program is underway at the International Institute of Biological Control to identify biological control agents (Fowler, pers. comm.). The genetic uniformity of Polygonum cuspidatum makes it a good candidate for biological control (Bailey, 1990). Biological control may be necessary where Polygonum cuspidatum has taken over vast areas as it has done in the U.K., but it may be years before a successful control agent can be found.

The following individuals are familiar with Polygonum cuspidatum and its control in natural areas:

Leslie Seiger
The Dept. of Biological Sciences
The George Washington University
Washington, D.C. 20052
(202)994-7144

John Palmer
Richards Moorehead & Laing Ltd
3 Clwyd Street
Ruthin
Clwyd LL15 1HF, Wales

VI. RESEARCH

Management Research Programs:
It is extremely difficult, if not impossible to eradicate large established stands of Polygonum cuspidatum. However, establishment can be prevented fairly easily by removing Polygonum cuspidatum before it becomes firmly entrenched. Areas known to be near established stands of Polygonum cuspidatum, particularly those downstream from such stands, should be monitored for the introduction of Polygonum cuspidatum.

The following individuals have direct experience monitoring Polygonum cuspidatum:

Leslie Seiger
Dept. Biological Sciences
The George Washington University
Washington DC 20052
(202)994-7144

Robert Orchowski, Director, Air Quality, Environmental Affairs Unit
Duquesne Light
One Oxford Center
301 Grant Street
Pittsburgh, PA 15279
(412)393-6099

John Palmer
Richards Moorehead & Laing Ltd
3 Clwyd Street
Ruthin
Clwyd LL15 1HF, Wales

David Beerling
School of Pure & Applied Biology
University of Wales
PO Box 915
Cardiff CF1 3TL, Wales

VII. ADDITIONAL TOPICS

VIII. INFORMATION SOURCES

Bibliography:

Ahrens, J.F. (1975). Preliminary results with glyphosate for control of Polygonum cuspidatum. Proc. Northeast. Weed Science Soc. 29:326.

Bailey, J.P. (1985). Chromosome numbers of some alien Reynoutria species in the British Isles. Watsonia, 15:269-277.

Bailey, J.P. (1988). Putative Reynoutria japonica Houtt. x Fallopia baldschuanica (Regel) Holub hybrids discovered in Britain. Watsonia, 17:163-181.

Bailey, J.P. (1990). Breeding behaviour and seed production in Alien Giant Knotweed in the British Isles. In: The biology and control of invasive plants. Conference organized by the Industrial Ecology Group of the British Ecological Society at the University of Wales College of Cardiff, September 20-21, 1990.

Beerling, D.J. (1990). The use of non-persistent herbicides to control riparian stands of Japanese Knotweed (Reynoutria Japonica Houtt). In: The biology and control of invasive plants. Conference organized by the Industrial Ecology Group of the British Ecological Society at the University of Wales College of Cardiff, September 20-21, 1990.

Beerling, D.J. (1991). The effect of riparian land use on occurrence and abundance of Japanese knotweed Reynoutria japonica on selected rivers in South Wales. Biol. Cons. 55:329-337.

Bender, J. (1988). Element Stewardship Abstract for Lythrum salicaria. The Nature Conservancy.

Broaddus,L. (1992). The Nature Conservancy, Pennsylvania Chapter. Memorandum to Leslie Seiger, March 6, 1992.

Conolly, A.P. (1977). The distribution and history in the British Isles of some alien species of Polygonum and Reynoutria. Watsonia 11:291-311.

Eaton, J.W. (1986). Waterplant ecology in landscape design. In Ecology and design in landscape. The 24th symposium of the British Ecological Society, Manchester 1983. A.D. Bradshaw, D.A Goode, E.H.P. Thorp (Eds.). Blackwell Scientific Publications. Oxford.

Fernald, M.L. (1950). Gray's Manual of Botany. 8th Ed. American Book Company. N.Y.

Fowler, S.V. (1991). International Institute of Biological Control, Silwood Park, Buckhurst Road, Ascot, Berks, SL5 7TA, UK Letter to Leslie Seiger, January 8, 1991.

Fowler, S.V. and D. Schroeder (1990). Biological control of invasive plants in the UK - prospects and possibilites. In: The biology and control of invasive plants. Conference organized by the Industrial Ecology Group of the British Ecological Society at the University of Wales College of Cardiff, September 20-21, 1990.

Gritten, R. (1990). The control of invasive plants in the Snowdonia National Park. In: The biology and control of invasive plants. Conference organized by the Industrial Ecology Group of the British Ecological Society at the University of Wales College of Cardiff, September 20-21, 1990.

Hirose, T. (1984). Nitrogen use efficiency in growth of Polygonum cuspidatum Sieb. et Zucc. Annals of Botany, 54:695-704.

Hirose, T., and M. Tateno (1984). Soil nitrogen patterns induced by colonization of Polygonum cuspidatum on Mt. Fuji. Oecologia 61:218-223.

Kanai, H. (1983). Study on the distribution patterns of Japanese plants (5): Accumulation of phytogeographical data of popular plants, points and measures. Journ. Jap. Bot., 59: 257-269.

Locandro, R.R. (1973). Reproduction ecology of Polygonum cuspidatum. Ph.D. thesis. Rutgers University.

Locandro, R.R. (1978). Weed watch: Japanese bamboo - 1978. Weeds Today 9:21-22.

Lynn, L.B., R.A. Rogers, and J.C. Graham (1979). Response of woody species to glyphosate in northeastern United States. Proc. Northeast Weed Sci. Soc. 33:336-342.

Maruta, E. (1976). Seedling establishment of Polygonum cuspidatum on Mt. Fuji. Jap. J. Ecol. 26:101-105.

Maruta, E. (1983). Growth and survival of current-year seedlings of Polygonum cuspidatum at the upper distributional limit on Mt. Fuji. Oecologia 60:316-320.

Mueuscher, W.C. (1955). Weeds. Second edition. McMillan Press. New York.

Nakamura, T. (1984). Vegetational recovery of landslide scars in the upper reaches of the Oi River, Central Japan. J. Jap. For. Soc. 66(8):328-332.

Nature Conservancy Council (1989). Japanese knotweed. In Urban Wildlife News, 6(2):3.

Ohwi, J. (1965). Flora of Japan. Smithsonian Institute, Washington, DC.

Orchowski, R.W. (1991). Knotweed control pilot program Brunot Island Wildlife Habitat Enhancement Project. Presented at the 3rd Annual Wildlife Enhancement Council Symposium. Washington, DC, November 19, 1991.

Palmer, J.P. (1990). Japanese knotweed (Reynoutria japonica) in Wales. In: The biology and control of invasive plants. Conference organized by the Industrial Ecology Group of the British Ecological Society at the University of Wales College of Cardiff. September 20-21, 1990.

Patterson, D.T. (1976). The history and distribution of five exotic weeds in North Carolina. Castanea 41:177-180.

Patterson, D.T., D.J. Longstreth, and M.M. Peet (1977). Photosynthetic adaptation to light intensity in Sakhalin knotweed (Polygonum sachalinense). Weed Science 25:319-323.

Pridham, A.M.S. and A. Bing (1975). Japanese-bamboo plants. Gard. 31:56-57.

Pauly,W.R. (1986). Summary of Mexican bamboo control methods (Wisconsin). Restoration and Management Notes, 4(1):37-38.

Scott, R., and R.H. Mars (1984). Impact of Japanese knotweed and methods of control. Aspects of applied biology 5, Weed control and vegetation managemnet in forestry and amenity areas pp. 291-296

Seiger, L.A. and H.C. Merchant (1990). The ecology and control of Polygonum cuspidatum. Bull. Ecol. Soc. Am. 71(2 suppl.):322.

Seiger, L.A. and H.C. Merchant (1991). Effects of site on survivorship and size of Polygonum cuspidatum. Bull. Ecol. Soc. Am. 72(2 suppl.):247.

Sukopp, H. and U. Sukopp (1988). Reynoutria japonica Houtt. in Japan und in Europa. Veroff. Geobot. Inst. ETH, Stiftung Rubel, Zurich 98:354-372.

Wiegman, P. (1992). Director of natural science and stewardship. Western Pennsylvania Conservancy. Pittsburgh, PA. Telephone conversation with Leslie Seiger, February 25, 1992.

IX. DOCUMENT PREPARATION & MAINTENANCE

Edition Date: ~1991

Contributing Author(s): Leslie Seiger

Attachment C – Stewardship Abstract for Himalayan Blackberry

ELEMENT STEWARDSHIP ABSTRACT
for
Rubus discolor, (*Rubus procerus*)

Himalayan Blackberry

To the User:

Element Stewardship Abstracts (ESAs) are prepared to provide The Nature Conservancy's Stewardship staff and other land managers with current management-related information on those species and communities that are most important to protect, or most important to control. The abstracts organize and summarize data from numerous sources including literature and researchers and managers actively working with the species or community.

We hope, by providing this abstract free of charge, to encourage users to contribute their information to the abstract. This sharing of information will benefit all land managers by ensuring the availability of an abstract that contains up-to-date information on management techniques and knowledgeable contacts. Contributors of information will be acknowledged within the abstract and receive updated editions. To contribute information, contact the editor whose address is listed at the end of the document.

For ease of update and retrievability, the abstracts are stored on computer at the national office of The Nature Conservancy. This abstract is a compilation of available information and is not an endorsement of particular practices or products.

Please do not remove this cover statement from the attached abstract.

Authors of this Abstract:
Marc Hoshovsky

THE NATURE CONSERVANCY
1815 North Lynn Street, Arlington, Virginia 22209 (703) 841-5300

The Nature Conservancy
Element Stewardship Abstract
For *Rubus discolor*, (*Rubus procerus*)

I. IDENTIFIERS

Common Name: Himalayan blackberry

General Description:
The following description of Rubus discolor is taken from Munz and Keck (1973).

Rubus discolor is a robust, sprawling, more or less evergreen, glandless shrub of the Rose Family (Rosaceae). The shrubs appear as "great mounds or banks" (Bailey 1945), with some of the canes standing up to 3 m tall. Other canes are decumbent, trailing or scandent up to 20-40 feet long (Bailey 1923), frequently taking root at the tips. The primocanes are pilose-pubescent, becoming nearly glabrous with age. These are very strongly angled and furrowed, bearing well-spaced, heavy, broad-based, straight or somewhat curved prickles 6-10 mm long. Primocane leaves are 5-foliolate, glabrous above when mature and cano-pubescent to cano-tomentose beneath. There are hooked prickles on the petioles and petiolules. The leaflets are large and broad with the terminal leaflet roundish to broad oblong. Leaflets are abruptly narrowed at the apex, unequally and coarsely serrate-dentate. Floricane leaflets are 3-5 foliolate and smaller than on the primocanes.

The inflorescence is a large terminal cluster with branches in the lower axils. The peduncles and pedicels are cano-tomentose and prickly. The flowers are white or rose colored, 2-2.5 cm across, with broad petals. Sepals are broad, cano-tomentose, conspicuously pointed and soon reflexed, approximately 7-8 mm long. The roundish fruit is black and shiny, up to 2 cm long, with large succulent drupelets. The fruit ripens late compared with native blackberries and over a considerable interval (Bailey 1945), from midsummer to autumn (Bailey 1923).

II. STEWARDSHIP SUMMARY

III. NATURAL HISTORY

Habitat:
Contrary to its common name, Himalaya-berry is a native of western Europe (Munz and Keck 1973). There is no botanical evidence to show that it is native of the Himalayan region. It may have found its way there as a cultivar (Bailey 1923). Rubus discolor was probably first introduced to North America in 1885 as a cultivated crop as well (Bailey 1945). By 1945 R. discolor had become naturalized along the West Coast. It also occurred in nursery and experiment grounds along the East Coast and in Ohio (Bailey 1945) by this time. R. discolor occurs mainly in areas with an average annual rainfall greater than 76 cm, at altitudes up to 1800 m, and on both acidic and alkaline soils (Amor 1972). It forms impenetrable thickets in wastelands, pastures, and forest plantations (Amor 1973). It grows along roadsides, creek gullies, river flats, fence lines (Parsons and Amor 1968), and right-of-way corridors. R. discolor tends to prefer wet sites even in relatively wet climates (Amor and Stevens 1976).

Reproduction:
Rubus discolor is a part of the Rubus fruticosus aggregate.

VEGETATIVE REPRODUCTION
Rooting at Cane Tips: R. discolor can form roots at cane apices. Amor (1974a) observed canes growing to a height of 40 cm before they arched over and trailed on the ground. Daughter plants developed where these canes rooted, forming only on first-year canes. All canes produced berries in the second year and then died, senescence commencing near the middle and at the apices of canes without daughter plants. Re-entry of canes into the center of the thicket resulted in an impenetrable mass of prickly canes within 2-1/2 years. Individual canes may only live 2-3 years, yet reach a density of 525 canes per square meter. A large quantity of litter and standing dead canes develops in old thickets (Amor 1972).

Canes of R. discolor can grow to lengths of up to 7 m in a single season. At one site observed by Amor (1974a), the mean horizontal projection of 50 first-year canes was 3.3 m. Ninety-six percent of these canes had daughter plants at their apices. Lateral branches on some canes had also formed daughter plants.

Adventitious Shoots on Lateral Roots: The root crown on R. discolor can be up to 20 cm in diameter, from which many lateral roots grow at various angles. One measured root had a maximum depth of 90 cm but was more than 10 m long (Northcroft 1927). Adventitious shoots (suckers) are occasionally formed on the roots and may emerge from a depth of 45 cm. Blackberries also readily propagate from root pieces and cane cuttings (Amor 1974a). In less than two years a cane cutting can produce a thicket 5 m in diameter (Amor 1973).

SEXUAL REPRODUCTION
Seed Production: Himalaya-berry thickets can produce 7000-13,000 seeds per square meter (Amor 1974a). When grown in dense shade, however, most species of blackberry do not form seeds. Good seed crops occur nearly every year (Brinkman 1974).

Each seed contains two ovules, but one usually aborts (Kerr 1954). The seeds are contained in berries, which consist of a number of loosely adhering drupelets. Berries ripen and turn black during the summer on canes more than one year old. Each drupelet contains one seed.

Seed Dispersal: Dispersal of Rubus seeds by birds has been reported by several authors (Amor 1974a). Passage of the seed through the digestive tract of birds may improve germination. Dispersal may also be accomplished by omnivorous mammals such as foxes, as suggested by numerous authors with respect to Australia (Brunner et al. 1976, Amor and Stevens 1976). The prompt invasion of cutover lands by Rubus indicates that the dispersed seeds remain viable in the soil for several years (Brinkman 1974).

Germination and Seedling Establishment: Blackberry seeds germinate mainly in the spring, but there is little germination of seed in the first spring after the seed is formed (Kerr 1954). Brinkman (1974) reported 33 percent germination in un-aged R. discolor seeds. A three year field trial showed only 10 percent germination in Rubus discolor (Amor 1972).

In Australia R. discolor seedlings receiving less than 44 percent of full sunlight did not survive (Amor 1974a). The slow growth of seedlings and their susceptibility to shading suggest that few seedlings would be expected to survive in dense pastures or forest plantations. Blackberry

thickets are also poor sites for seedling development. Amor (1972) counted less than 0.4 seedlings per square meter near thickets. The establishment of R. discolor seedlings depends on the availability of open habitats such as land neglected after cultivation, degraded pastures, and eroded soils along streams (Amor 1974a). Although seedlings show the potential for rapid growth under laboratory conditions, they grow much slower in the field and are easily surpassed by the more rapid growth rate of daughter plants.

Rubus discolor colonizes areas initially disturbed and then neglected by humans. It is a perennial weed which is difficult to control due to its ability to regenerate from sections of root stock. The production of dense thickets, especially in wet areas, may hinder medium- to large-sized mammals in gaining access to water. Himalaya-berry may also displace native plant species. Seeds can be widely dispersed by berry-eating birds.

Himalaya-berry occurs on TNC's Santa Rosa Plateau and McCloud River preserves in California.

IV. CONDITION

V. MANAGEMENT/MONITORING

Management Requirements:
With proper management, areas infested with R. discolor can be restored to more desirable vegetation. Mechanical removal or burning may be the most effective ways of removing the mature plants. Subsequent treatment with herbicides should be conducted cautiously for two reasons: (1) R. discolor often grows in riparian areas and the herbicide may be distributed to unforeseen locations by running water, and (2) some herbicides promote vegetative growth from lateral roots. Himalaya-berry re-establishment may be prevented by planting fast-growing shrubs or trees, since the species is usually intolerant of shade. Regrowth has also been controlled by grazing sheep and goats in areas where the mature plants have been removed.

Monitoring is needed to determine the effectiveness of management practices.

Detailed observations focused on the vegetational change of the affected area over time will help to determine what method of control would be most efficient.

No quantitative monitoring studies of Himalaya-berry were discovered in this research. Since it is not considered a major agricultural weed in California, there has been little interest or funding available for detailed sampling programs. Monitoring efforts so far have been only qualitative in nature: Has it invaded a site? Does it re-establish itself following control treatment?

Weed control involves three fundamental objectives: prevention, eradication and control.

From a practical viewpoint, methods of weed management are commonly categorized under the following categories: physical, managerial, biological and chemical controls, and prescribed burning (Watson 1977). Physical methods include both manual and mechanical means. Managerial methods include the encouragement of competitive displacement by native plants and prescribed grazing. Biological control is usually interpreted as the introduction of insects or pathogens which are highly selective on a particular weed species. Chemical control includes both broadcast and spot application. Prescribed burning includes both broadcast burning and spot treatment with a flame thrower.

The most desirable approach is that of an integrated pest management plan. This involves the optimal integration of appropriate control strategies to control weeds. This approach is generally accepted as the most effective, economical and environmentally sound, long-term pest control strategy (Watson 1977). In cases where more than one control technique is used, the various techniques should be compatible with one another. Broadcast herbicide application, for example, may not work well with certain managerial techniques (i.e., plant competition).

PHYSICAL CONTROL

The physical control methods discussed below, manual and mechanical, produce slash (i.e., cutting debris) that can be disposed of by several techniques. If cut before seeds are produced it may be piled and left for enhancement of wildlife habitat (i.e., cover for small mammals). Debris may be fed through a mechanical chipper and used as mulch during revegetation procedures. Particularly with Rubus, care should be taken to prevent vegetative reproduction from cuttings. Burning slash piles is also an effective method of disposal.

MANUAL METHODS

Manual methods use hand labor to remove undesirable vegetation. These methods are highly selective and permit weeds to be removed without damage to surrounding native vegetation.

The Bradley Method is one sensible approach to manual control of weeds (Fuller and Barbe 1985). This method consists of hand weeding selected small areas of infestation in a specific sequence, starting with the best stands of native vegetation (those with the least extent of weed infestation) and working towards those stands with the worst weed infestation. Initially, weeds that occur singly or in small groups should be eliminated from the extreme edges of the infestation. The next areas to work on are those with a ratio of at least two natives to every weed. As the native plants stabilize in each cleared area, work deeper into the center of the most dense weed patches. This method has great promise on nature reserves with low budgets and sensitive plant populations. More detailed information is contained in Fuller and Barbe (1985).

Hand Pulling: This method may be used to destroy seedlings and young plants up to 1 m tall. Seedlings are best pulled after a rain when the soil is loose. This facilitates removal of the rooting system, which may resprout if left in the ground. Plants should be pulled as soon as they are large enough to grasp but before they produce seeds.

Hand Hoeing: Plants can be destroyed readily while they are still small by hand hoeing, either by cutting off their tops or by stirring the surface soil so as to expose the seedlings to the drying action of the sun. The object of hoeing is to cut off weeds without going too deeply into the ground and doing damage to the roots of desirable vegetation.

For plants up to 4 m tall a claw mattock is effective for removing the root crowns. The dirt around the root is loosened by the claw, and the plant is pulled out in the same way that a claw hammer is used to pull out nails.

Cutting: Manually operated tools such as brush cutters, power saws, axes, machetes, loppers and clippers can be used to cut R. discolor. This is an important step before many other methods are tried, as it removes the above-ground portion of the plant. In addition, for a thickly growing, multi-stemmed shrub such as R. discolor, access to the base of the shrub may not only be difficult but dangerous where footing is uncertain.

An advantage of cane removal over foliage herbicides is that cane removal does not stimulate sucker formation on lateral roots. Amor (1974b) provides evidence that herbicides such as picloram and 2,4,5-T are not considerably more effective than cane removal. However, removal of canes alone is insufficient to adequately control Rubus discolor, as the root crown will simply resprout and produce more canes.

Hand Digging: The removal of rootstocks by hand digging is a slow but sure way of destroying R. discolor, a weed which resprouts from its roots. The work must be thorough to be effective as every piece of root that breaks off and remains in the soil may produce a new plant. Such a technique is only suitable for small infestations and around trees and shrubs where other methods are not practical.

MECHANICAL METHODS

Mechanical methods use mechanized equipment to remove above-ground vegetation. These methods are often non-selective in that all vegetation on a treated site is affected. Mechanical control is highly effective at controlling woody vegetation on gentle topography with few site obstacles such as root stumps or logs. Most mechanical equipment is not safe to operate on slopes over 30 percent. It is also of limited use where soils are highly susceptible to compaction or erosion or where excessive soil moisture is present.

Chopping, Cutting or Mowing: Rubus discolor plants may be trimmed back by tractor-mounted mowers on even ground or by scythes on rough or stony ground. Unwanted vegetation can be removed faster and more economically in these ways than by manual means and with less soil disturbance than with scarification. However, these methods are non-selective weed eradication techniques. They reduce the potential for biological control through plant competition and may open up new niches for undesirable vegetation. Wildlife forage is eliminated, cutting down on the general habitat value of the area. Another disadvantage of cutting, chopping or mowing is that perennial weeds such as Himalaya-berry usually require several cuttings before the underground parts exhaust their reserve food supply. If only a single cutting can be made, the best time is when the plants begin to flower. At this stage the reserve food supply in the roots has been nearly exhausted, and new seeds have not yet been produced. After cutting or chopping with mechanical equipment, Rubus may resprout from root crowns in greater density if not treated with herbicides.

PRESCRIBED BURNING

Broadcast Burning: Large areas of weed infestation may be burned in order to remove the standing mature plants. This may be accomplished with a pre-spray of herbicides to kill and desiccate plants, or without such spraying for notably flammable species. Used alone, this method will not prevent resprouting from root crowns. Burning is best followed by (1) stump herbicide treatment, (2) subsequent burning to exhaust soil seed bank and underground food reserves, and/or (3) revegetation with fast-growing native species. Other considerations for the use of prescribed burning include the time and cost of coordinating a burn and the soil disturbance resulting from firebreak construction

MANAGERIAL CONTROL

Biological Competition: Sowing native plant species which have the potential to out-compete weedy exotics for important resources is usually a preventive method of weed control. In some cases later successional plants may be encouraged to take root among the unwanted vegetation.

In most cases Himalaya-berry prevents the establishment of other native plants and must be initially removed. Following physical removal or burning of mature plants, root crowns must be treated to prevent resprouting. Seedlings of native plant species usually cannot establish fast enough to compete with sprout growth from untreated stumps.

Some plant species inhibit the establishment or growth of other plants through the effects of allelopathy (i.e., biochemical interference by metabolic products). Native species with such properties may be propagated in treated areas to control re-establishment of blackberry, but as allelopathy is occasionally a trait of noxious weeds, it is wise not to replace an old problem species with a new one.

Prescribed Grazing: Amor (1974a) described the effects of grazing by various animals on Himalaya-berry as follows: In an ungrazed area, 96% of the plants produced daughter plants; in areas grazed lightly by horses the number dropped to 11%; in areas grazed by cattle only 1% of all plants had daughter plants; and no plants had daughter plants in areas grazed by sheep.

In New Zealand the recognized method of Rubus control in the past has been the farming of large numbers of goats. This method has been effective in preventing canes from totally covering large areas (Wright 1927, Featherstone 1957). Crouchley (1980) mentions that blackberry is readily eaten by goats throughout the year, even when there is an abundant supply of pasture and other plants.

In many areas of California the use of Angora and Spanish goats is showing promise as an effective control for Himalaya-berry (Daar 1983). In Cleveland National Forest goats are herded for firebreak management of brush species on over 79,000 acres of land. Goats are less costly to utilize than mechanical and chemical control methods. They can negotiate slopes too steep to manage with machines and do not pose the environmental dangers inherent with herbicides (Andres 1979).

A pioneer in the use of goats for weed control in urban settings is Richard Otterstad, owner of Otterstad's Brush Clearing Service (718 Adams St., Albany, CA 94706, (415) 524-4063). The primary weed control "tools" utilized by Otterstad's company are Angora goats and light-weight flexible fencing reinforced with electrified wire. Angoras are preferred over Spanish goats because their smaller size makes them easier to transport (Otterstad uses a pickup truck). Dairy goats were abandoned when Otterstad found them to be "goof-offs" when it came to eating (Daar 1983).

Goats prefer woody vegetation over most grasses or forbs, although Angoras have a higher tolerance for non-woody species. Since goats will trample or browse virtually any vegetation within a fenced area, any desirable trees or shrubs must be protected. Experience has shown that goats are most cost-effective when used to clear or suppress brush regrowth of one to four years old rather than to do initial clearing of dense tall, mature stands of vegetation. When faced with mature brush, goats will defoliate twigs and strip off bark but will leave standing the plant's main superstructure which is too old and tough to tempt them. Sheep are more selective than goats in their food choices but function well in grazing down a variety of plants. Thus sheep grazing may be a practical alternative to mowing. It is important to properly manage sheep grazing due to soil compaction problems if sheep are allowed to graze an overly damp area. Sheep are valuable not only for weed control but also for their contribution of fertilizer to the soil and additional

income from the sale of their wool. However, exotic seeds may be initially introduced from sheep droppings.

Chickens, surprisingly enough, are known to effectively digest (and destroy) all weed seeds passing through their crops and can thoroughly graze back vegetation in areas of up to one acre in size. Releasing chickens into an area after the mature plants are removed allows them to scratch and peck out weed seeds and potentially reduce the weed seed bank in the soil (Andres 1979).

BIOLOGICAL CONTROL.
The USDA will not support the introduction of herbivorous insects to control Himalaya-berry due to the risk these insects may pose to commercially important Rubus species. Please notify the California Field Office of The Nature Conservancy of any field observations in which a native insect or pathogen is seen to have detrimental effects on Rubus species. These reports will be used to update this Element Stewardship Abstract. Management techniques which may encourage the spread of species-specific agents may be desirable in controlling Himalaya-berry.

CHEMICAL CONTROL.
Detailed information on herbicides is available in such publications as Weed Science Society of America (1983) or USDA (1984) and will not be comprehensively covered here. Publications such as these give specific information on nomenclature, chemical and physical properties of the pure chemical, use recommendations and precautions, physiological and biochemical behavior, behavior in or on soils, and toxicological properties for several hundred chemicals.

Herbicides may be applied non-selectively (i.e., broadcast applications) or selectively (i.e., spot treatments). Both types of treatments have advantages and disadvantages and will be discussed separately.

Broadcast Herbicide Application: Broadcast application of herbicides has become the mainstay of most weed control efforts today. This may be due to the illusion that it is a "quick fix" method of eradicating undesirable vegetation. Most herbicides so applied are non-selective and will kill most, if not all, of the vegetation sprayed. Those species which survive the treatment may, after repeated sprayings, form an herbicide-resistant vegetation cover, thus creating a more difficult problem to deal with. Such broadcast spraying may also kill off native plants which have the ability to out-compete exotic weeds.

Herbicides should be applied only when the plants are in full leaf. Results are poor if the plants are sprayed prior to this stage. The best results occur when plants are sprayed after seed-set (Matthews 1960).

Broadcast herbicide application may be most effective where the weed infestation is very dense and needs to be killed and desiccated prior to burning. It may also be useful following the removal of mature plants so as to reduce the soil seed bank.

2,4,5-T has been used to control blackberry (Skinner 1954), but repeated applications were necessary to kill the plants (Moffat 1966, Amor 1974b). Not all taxa of blackberry react the same way to 2,4,5-T; some are more resistant than others (Johnston 1955). Use of this herbicide suppresses shoot production from root crowns but stimulates sucker formation on lateral roots

(Amor 1974b). Richardson (1975a) suggests that it is difficult to completely kill Rubus discolor with 2,4,5-T because only sublethal amounts are translocated to the root system.

The effectiveness of control by 2,4,5-T depends on a variety of factors. Ester formulations are more effective than amine salts (Bell 1955). 2,4,5-T mixed with kerosene or diesel is not as effective as 2,4,5-T alone (Bell 1955). Suppression of root suckering is much better in the summer (Amor 1975a) and fall (Shannon and Leslie 1982) than when plants are sprayed prior to flowering. Plants regrew within two months after spring spraying compared to three to four months after autumn application (Shannon and Leslie 1982). Young daughter plants are more susceptible to herbicides than mother plants, and young thickets (three years old) are more susceptible than older thickets (Amor 1974b). Bell (1955) suggests that frequent applications at low concentrations are more effective than single doses at higher concentrations.

Picloram (Tordon) is much more effective at lower concentrations than 2,4,5-T (Patterson 1964, Pengelly and Ferguson 1964, Patterson 1965, Amor 1974b), but one application may not always be sufficient (Patterson 1964, Amor 1975a). Like 2,4,5-T it suppresses cane regrowth but stimulates the development of adventitious shoots (Amor 1974b). Foliage spraying is more effective in the summer than winter (Amor 1975a).

Formulations of 2,4,5-T and other herbicides produce different results. Mixtures of 2,4,5-T and picloram are less costly than picloram alone and are much more effective at lower concentrations than either herbicide used alone (Pengelly and Ferguson 1964, Patterson 1965, Moffat 1965, Upritchard 1969, Shannon and Leslie 1982). The addition of dicamba to 2,4,5-T is also more effective than 2,4,5-T alone, but it is more expensive (Taylor and Patterson 1969). 2,4,5-T, picloram and dicamba require a permit for use.

Many other herbicides have been used in an attempt to control Himalaya-berry with varying degrees of effectiveness. Fosamine is not as effective for killing Rubus discolor as is 2,4,5-T, but it is more effective in controlling regrowth (Shaw and Bruzzese 1979). Neither Forsamine, glyphosate (Dempsey 1981, Park and Lane 1983), nor thiazafluron (Rae and Patterson 1975) provide long-term control of R. discolor. Blackberry control has also been accomplished with benzabor, triae, dicamba (Amor 1970), aminotriazole (Amor 1975a), DPX-T6376 (Cornwell and Christie 1984), amitrole-thiocyanate (Boyd 1964, Amor 1972) and triclopyr ester (McCavish 1980).

Spot Chemical Methods. Spot chemical methods consist of various techniques for manually applying herbicides to individual plants or small clumps of plants (such as stump resprouts). These methods are highly selective as only specific plants are treated. They are most efficient when the density of stems to be treated is low. In applying herbicides it is recommended that a dye be used in the chemical mixture to mark the treated plants and thus minimize waste.

Jones and Stokes Associates (1984) reviewed a variety of spot chemical techniques. The following is an excerpt from this report, listing techniques in order of increasing possibility of herbicide exposure to the environment or to humans in the vicinity of treated plants.

1) Stem injection: Herbicides are injected into wounds or cuts in the stems or trunks of plants to be killed. The herbicide must penetrate to the cambial tissue and be water-soluble to be effective. The chemical is then translocated throughout the plant and can provide good root kill, which is important in order to prevent resprouting.

2) Cut stump treatment: Herbicides are directly applied to the cambial area around the edges of freshly cut stumps. Application must occur within 5-20 minutes of cutting to ensure effectiveness. McHenry (1985) suggests late spring as the best season to do this. In early spring sap may flow to the surface of the cut and rinse the chemical off. At other times of the year translocation is too poor to adequately distribute the chemical. Applications may be made with backpack sprayers, sprinkling cans, brush and pail, or squeeze bottles. Picloram should not be used for this technique as it is known to "flashback" through root grafts between treated and untreated plants and may damage the untreated individuals.

3) Basal-Stem sprays: High concentrations of herbicides in oil or other penetrating carriers are applied, using backpack sprayers, to the basal portion of stems to be killed. The oil carrier is necessary for the mixture to penetrate bark and enter the vascular system. This method gives good root kill, especially in the fall when vascular fluids are moving toward the roots. This method may be easier to use with small diameter stems than the two previous techniques.

4) Herbicide pellets: Pelletized or granular herbicides are scattered at the bases of unwanted plants. Subsequent rainfall dissolves the pellets and leaches the herbicide down to the root system. Piclorem granules are most effective in the winter and spring (Amor 1970) and should be applied prior to the end of the winter rains so as to allow the herbicide to penetrate to the root zone. Premature application, with a great deal of rain yet to fall, may leach the picloram below the root zone. Mowing of the top growth prior to the application of granular picloram improves control effectiveness. The presence of litter may retard the infiltration of the chemical into the soil (Amor 1970). Because picloram persists in the soil, is highly toxic to other plants and is costly, it is most suitable for small infestations (Amor 1975b).

Rubus discolor is difficult to control due to its variety of reproductive tactics. It may reproduce by seed, rooting at cane apices, suckering of lateral roots, and from pieces of roots and canes. It becomes established in disturbed and subsequently neglected areas.

Himalaya-berry rarely invades undisturbed sites because seedlings are easily outcompeted by other plants. Rooting at cane apices may be prevented by grazing, cultivation or herbicides. Cultivation or herbicides may be the only effective means of removing the root system, which must be killed to prevent regrowth.

VI. RESEARCH

Management Research Programs:
1) What methods may be used to prevent dispersal of seeds by birds?
2) Which method of propagation is the more significant, daughter plants or seedling establishment?
3) Is it possible to selectively treat Himalaya-berry when it grows in a mixed native and exotic berry thicket?

VII. ADDITIONAL TOPICS

VIII. INFORMATION SOURCES

Bibliography:

CITED REFERENCES

Amor, R.L. 1970. Comparison of granular herbicides for the control of blackberry (Rubus fruticosus L. agg.) regrowth in non-arable pasture. Pp. 673-676 in Proc. 11th Intl. Grassland Congress. Surfers' Paradise, Australia. 13-23 April.

Amor, R.L. 1972. A study of the ecology and control of blackberry (Rubus fruticosus L. agg.). J. Austral. Inst. Agric. Sci. 38(4):294.

Amor, R.L. 1973. Ecology and control of blackberry (Rubus fruticosus L. agg.): I. Rubus spp. as weeds in Victoria. Weed Res. 13:218-223.

Amor, R.L. 1974a. Ecology and control of blackberry (Rubus fruticosus L. agg.): II. Reproduction. Weed Res. 14:231-238.

Amor, R.L. 1974b. Ecology and control of blackberry (Rubus fruticosus L. agg.): III. Response of R. procerus to mechanical removal of top growth and to foliage applied herbicides. Weed Res. 14:239-243.

Amor, R.L. 1975a. Ecology and control of blackberry (Rubus fruticosus L. agg.): IV. Effect of single and repeated applications of 2,4,5-T, picloram and aminotriazole. Weed Res. 15:39-45.

Amor, R.L. 1975b. Ecology and control of blackberry (Rubus fruticosus L. agg.): V. Control by picloram granules. Weed Res. 15:47-52.

Amor, R.L. and P.L. Stevens. 1976. Spread of weeds from a roadside into sclerophyll forests at Dartmouth, Australia. Weed Res. 16:11-118.

Andres, L. 1979. Unpublished manuscript. Copy on file with the California Field Office of The Nature Conservancy, 785 Market Street, 3rd Floor, San Francisco, CA 94103.

Bailey, L. 1923. Certain cultivated Rubus. Gentes Herbarium 1(4):196-197.

Bailey, L. 1945. The genus Rubus in North America. Gentes Herbarium 5(1):851-854.

Bell, J.E. 1955. Weed problems of the Waikato. Pp. 7-12 in Proc. 8th New Zealand Weed and Pest Control Conference.

Boyd, P.G. 1964. Field observations with thiocyanate-activated amitrole. Pp. 115-118 in Proc. 17th New Zealand Weed and Pest Control Conference.

Brinkman, K.A. 1974. Rubus. Pp. 738-743 in C.S. Schopmeyer (ed.), Seeds of woody plants in the U.S. Agriculture Handbook No. 450, U.S. Govt. Printing Office, Washington, D.C.

Brunner, H., R.V. Harris, and R.L. Amor. 1976. A note on the dispersal of seeds of blackberry (Rubus procerus) by foxes and emus. Weed Res. 16:171-173.

Cornwell, M.J. and M.S. Christie. 1984. Preliminary results with DPX-T67376 for control of gorse and blackberry. Pp. 197-199 in Proc. 37th New Zealand Weed and Pest Control Conference.

Crutchley, G. 1980. Regrowth control by goats - plus useful meat returns. N.Z. J. Agric. 141151:9-14.

Daar, S. 1983. Using goats for brush control. The IPM Practitioner 5(4):4-6

Dempsey, G.P. 1981. The failure of fosamine and glyphosate to give long-term control of blackberry in Northland. Pp. 152-155 in Proc. 34th New Zealand Weed and Pest Control Conference.

Featherstone, C.L. 1957. The progress of chemical weed control in Hawke's Bay. Pp. 7-12 in Proc. 10th New Zealand Weed and Pest Control Conference.

Fuller, T.C. and G.D. Barbe. 1985. The Bradley Method of eliminating exotic plants from natural reserves. Fremontia 13(2):24-26.

Johnston, W. 1955. Control of difficult scrub weeds. Pp. 61-64 in Proc. 8th New Zealand Weed and Pest Control Conference.

Jones and Stokes Associates. 1984. Transmission right-of-way vegetation management program: analysis and recommendations. Prepared for Seattle City Light. Copy on file with the California Field Office of The Nature Conservancy, 785 Market Street, 3rd Floor, San Francisco, CA 94103.

Kerr, E.A. 1954. Seed development in blackberries. Can. J. Botany 32:654-657.

Matthews, L.J. 1960. Weed identification and control: broom. N.Z. J. Agric. 100(3):229.

McCavish, W.J. 1980. Herbicides for woody weed control by foliar application. Pp. 729-737 in Proc. 1980 Brit. Crop Protect. Conference -Weeds.

McHenry, J. 1985. Extension Weed Specialist. University of California, Davis, Cooperative Extension. Personal communication May 1985.

Moffatt, R.W. 1965. A summary of investigations with picloram on certain scrub weeds. Pp. 17-23 in Proc. 18th New Zealand Weed and Pest Control Conference.

Moffatt, R.W. 1966. Picloram granules for woody weed control. Pp. 90-95 in Proc. 19th New Zealand Weed and Pest Control Conference.

Munz, P.A. and D.D. Keck. 1973. A California Flora and supplement. Univ. California Press, Berkeley.

Northcroft, E.G. 1927. The blackberry pest. I. Biology of the plant. N.Z. J. Agric. 34:376-388.

Park, O.L. and P.M.S. Lane. 1983. Blackberry control with glyphosate. Pp. 200-202 in Proc. 37th New Zealand Weed and Pest Control Conference.

Parsons, W.T. and R.L. Amor. 1968. Comparison of herbicides and times of spraying for the control of blackberry (Rubus fruticosus). Austral. J. Exper. Agric. and Animal Husbandry 8:238-243.

Patterson, T.M. 1964. Departmental trials with "Tordon." Pp. 68-73 in Proc. 17th New Zealand Weed and Pest Control Conference.

Patterson, T.M. 1965. Departmental trials with piclorum. Pp. 24-31 in Proc. 18th New Zealand Weed and Pest Control Conference.

Pengelly, R. and R.H. Ferguson. 1964. Overseas and New Zealand field results with "Tordon." Pp. 222-228 in Proc. 17th New Zealand Weed and Pest Control Conference.

Rae, S.J. and T.M. Patterson. 1975. Scrub weed control with thiazafluron. Pp. 67-69 in Proc. 28th New Zealand Weed and Pest Control Conference.

Richardson, R.G. 1975a. Foliar penetration and translocation of 2,4,5-T in blackberry (Rubus procerus). Weed Res. 15:33-38.

Shannon, P.W. and J.M. Leslie. 1982. Chemical control of blackberry in Northland. Pp. 166-168 in Proc. 35th New Zealand Weed and Pest Control Conference.

Shaw, K.A. and E. Bruzzese. 1979. The use of fosamine for control of two Rubus species. Pp. 189-192 in Proc. 7th Asian-Pacific Weed Sci. Soc. Conference.

Skinner, H.R.W. 1954. Scrub control. Pp. 90-92 in Proc. 7th New Zealand Weed and Pest Control Conference.

Taylor, R.L. and J. Patterson. 1969. Control of scrub weeds with 2,4,5-T plus dicamba. Pp. 178-179 in Proc. 22nd New Zealand Weed and Pest Control Conference.

USDA. 1984. Pesticides background statements. Vol. I. Herbicides. Agricultural Handbook No. 633. U.S. Govt. Printing Office, Washington, D.C.

Upritchard, E.A. 1969. Formulations of piclorum with 2,4,5-T for brushweed control. Pp. 180-186 in Proc. 22nd New Zealand Weed and Pest Control Conference.

Watson, H.K. 1977. Present weed control and projections for the year 2001. Unpublished manuscript. Copy on file with the California Field Office of The Nature Conservancy, 785 Market Street, 3rd Floor, San Francisco, CA 94103.

Weed Science Society of America. 1983. Herbicide handbook.

Wright, R. 1927. Goats and noxious weeds control - elimination of blackberry, gorse and bracken on a taranaki farm. N.Z. J. Agric. 35(5):295-297.

OTHER (UNCITED) REFERENCES

Balneaves, J.M. 1982. The use of 2,4,5-T in forestry in the South Island, New Zealand. N.Z. J. Forestry 26(2):233-244.

Elliott, I.L. 1955. Pasture management and weed control. Pp. 42-43 in Proc. 8th New Zealand Weed and Pest Control Conference.

Elliott, D.A. 1976. The use of herbicides in releasing operations at Kaingaroa Forest. Pp. 283-292 in C.G.R. Chevasse (ed.). The use of herbicides in forestry in New Zealand. N.Z. Forest Res. Service, For. Res. Inst. Symp. 18.

Matthews, L.J. 1982. Pasture weeds of New Zealand. Pp. 387-393 in W. Holzner and N. Numata (eds.), Biology and ecology of weeds. W. Junk Publishers, The Hague.

Richardson, R.G. 1975b. Regeneration of blackberry (Rubus procerus) from root segments. Weed Res. 15:335-337.

Richardson, R.G. 1976. Changes in the translocation and distribution of 2,4,5-T in blackberry (Rubus procerus) with time. Weed Res. 16:375-378.

Richardson, R.G. and R.L. Amor. 1975. Effect of 2,4,5-T and picloram on the regeneration of blackberry (Rubus procerus) from root segments. Weed Res. 15:227-231.

Rolston, M.P., M.G. Lambert, and D.A. Clark. 1981. Weed control options in hill country. Proc. N.Z. Grassland Association 43:196-203.

Watt, G. and J. Tustin. 1976. The economics of herbicides in New Zealand plantation practice. Pp. 293-301 in C.G.R. Chevasse (ed.). The use of herbicides in forestry in New Zealand. N.Z. Forest Res. Serv., For. Res. Inst. Symp. 18.

Yeates, J.S. 1955. Weeds on the sheep farm: the scope and limitations of chemical control. Sheepfarming Annual 1955:99-109.

IX. DOCUMENT PREPARATION & MAINTENANCE

Edition Date: 89-5-31

Contributing Author(s): Marc Hoshovsky

Attachment D – Weed Notes: English ivy

Weed Notes: *Hedera helix L.*

TanyaLee Morisawa
The Nature Conservancy
Wildland Weeds Management and Research
http://nwweeds.ucdavis.edu
30 June 1999

Introduction:

Hedera helix L. is commonly called English ivy. *H. helix* belongs to the family Araliaceae (ginseng) and is a native of Europe. Brought to North America by colonial settlers, *H. helix* has become naturalized in the US. English ivy is cultivated in Europe and North America in gardens, landscapes and as house plants. This plant grows easily in many types of soil and in sun or shade. English ivy is fairly drought tolerant once it is established. Leaves are alternate and simple with the juvenile leaves 3-5 lobed and adult leaves ovate to rhombic. Mature plants will bear greenish-white flowers. The fruit is berry-like and black.

Poultices for cuts and sores are made from the leaves. However, an allergic reaction can occur in sensitive people. Secondary compounds within the leaves may be natural product pesticides for insects and molluscs.

English ivy outcompetes both grasses, herbs and trees, often reducing animal feeding habitats. In warm areas, *H. helix* can grow throughout the year and probably outcompetes native vegetation that is dormant during the winter. In Australia, English ivy is found in disturbed areas of the forest. Seeds are often spread into these areas by birds or other animals. *H. helix* is a pest in Europe but only in disturbed habitats.

Cultural Control:

Cutting is successful with persistence but does not always kill the plant. However, the use of cutting and then applying a herbicide may provide better control (see Chemical control section).

Using a shovel to remove plants provided immediate control with little regrowth. Weeding plants by hand or with pliers successfully allowed regeneration of most native species in Australia. Do not leave the pulled plants on the ground; they can continue to grow. If removal of the plants is not possible, place the pulled plants on a wooden platform to dry and decompose.

Immediately control English ivy that is growing up trees by cutting the vine at waist height, loosening the vine around the limbs and removing the roots. If the root can not be removed by hand, strip the bark and notch the exposed section of the vine. Paint on an undiluted herbicide such as glyphosate. If English ivy is growing on tree-ferns, take care that all pieces of the ivy are removed. The growth of *H. helix* can be sustained by the fibrous nature of the trunk.

Chemical Control:

A wax layer on the leaves often prevents herbicides, especially hydrophilic compounds such as glyphosate, from permeating the leaves.

In container pots, two applications, one month apart, of 2,4-D (Weedar 64) applied at 1.1 kg/ha (1.0 lb/A) provided control of English ivy. Two applications of glyphosate (Roundup) applied at 4.5 kg/ha (4.0 lb/A) effectively inhibited regrowth and provided some control. Regrowth but reduced shoot weight was observed with one treatment of 2,4-D and glyphosate at the rates stated above. The same observation was noted for one or two applications of glyphosate applied at a lower rate of 2.2 kg/ha (2.0 lb/A). Regrowth occurred with plants sprayed with one or two applications of Dicamba (Banvel) or triclopyr (Garlon) at the rate of 0.6 kg/ha (0.5 lb/A).

In another study, an application of glyphosate (25% solution) provided good control. Cutting (using a nylon cord weedeater to cut to the stem surface just before treatment) followed by a 25% solution of glyphosate also provided control of English ivy. Excellent control of *H. helix* that had been cut and then sprayed was achieved with a 2% solution of 2,4-D. A lower rate of glyphosate (2% solution) and cutting provided only slight control. Glyphosate only (2% solution) did not control English ivy. The herbicide triclopyr or mowing provided no control. Control evaluations were made 1 year post-treatment.

References:

1. Derr, J.F. 1993. English Ivy (Hedera helix) Response to Postemergence Herbicides. Journal of Environmental Horticulture 11(2):45-48.
2. Elmore, C.L., W.D. Hamilton and L.R. Costello. 1986. Control of ornamentals gone wild: pampas grass, bamboo, english and algerian ivy. Proceedings 38th Annual California Weed Conference pp.163 and 166.
3. Freshwater, V. 1991. Control of English ivy (Hedera helix) in Sherbrooke forest - a practical experience. Plant Protection Quarterly 6(3):127.
4. Thomas, L.K. Impact of Three Exotic Plant Species on a Potamac Island. Scientific Monograph # 13 Series US Department of the Interior..
5. TNC Wildland Weeds Management and Research Weed Report. 1995
6. Vlougeas, M.A., R. Rohr and A. Chamel. 1995. Structural changes and permeability of ivy (Hedera helix L.) leaf cuticles in relation to leaf development and after selective chemical treatments. New. Phytol. 130:337-348.

Attachment E - Plant Species Identified on Buck Island

The following plant species were identified on Buck Island during a survey conducted March 12, 2001 by the Stilly-Snohomish Fisheries Enhancement Task Force. The Task Force is planning additional surveys during the growing season to supplement this list. "N" denotes non-native species. "I" denotes invasive species.

Trees:

Big-leaf maple	*Acer macrophyllum*	
Black cottonwood	*Populus balsamifera trichocarpa*	
Douglas-fir	*Pseudotsuga menziesii*	
Pacific dogwood	*Cornus nuttallii*	
Red alder	*Alnus rubra*	
Sitka spruce	*Picea sitchensis*	
Western hemlock	*Tsuga heterophylla*	
Western red cedar	*Thuja plicata*	

Shrubs:

Beaked hazelnut	*Corylus cornuta*	
Bitter cherry	*Prunus emarginata*	
English ivy	*Hedera helix*	N, I
Himalayan blackberry	*Rubus discolor*	N, I
Indian plum	*Oemleria cerasiformis*	
Red elderberry	*Sambucus racemosa*	
Salmonberry	*Rubus spectabilis*	
Snowberry	*Symphoricarpos albus*	
Vine maple	*Acer circinatum*	
Wild gooseberry	*Ribes divaricatum*	

Herbaceous Plants:

Henderson's sedge	*Carex hendersonii*	
Japanese knotweed	*Polygonum cuspidatum*	N, I
Lady fern	*Anthyrium filix-femina*	
Licorice fern	*Polypodium glycyrrhiza*	
Pacific bleeding heart	*Dicentra formosa*	
Pacific waterleaf	*Hydrophyllum tenuipes*	
Stinging nettle	*Urtica dioica*	
Sword fern	*Polystichum munitum*	
Youth on age	*Tolmiea menziesii*	

Bryophyte species (mosses, liverworts)

Other plants known to exist on Buck Island but not identified in the March 12 survey:

Jewelweed	*Impatiens noli-tangere*	N
Reed-canarygrass	*Phalaris arundinacea*	N, I
Scotch broom	*Cytisus scoparius*	N, I

Attachment F – Timber Cruise Data

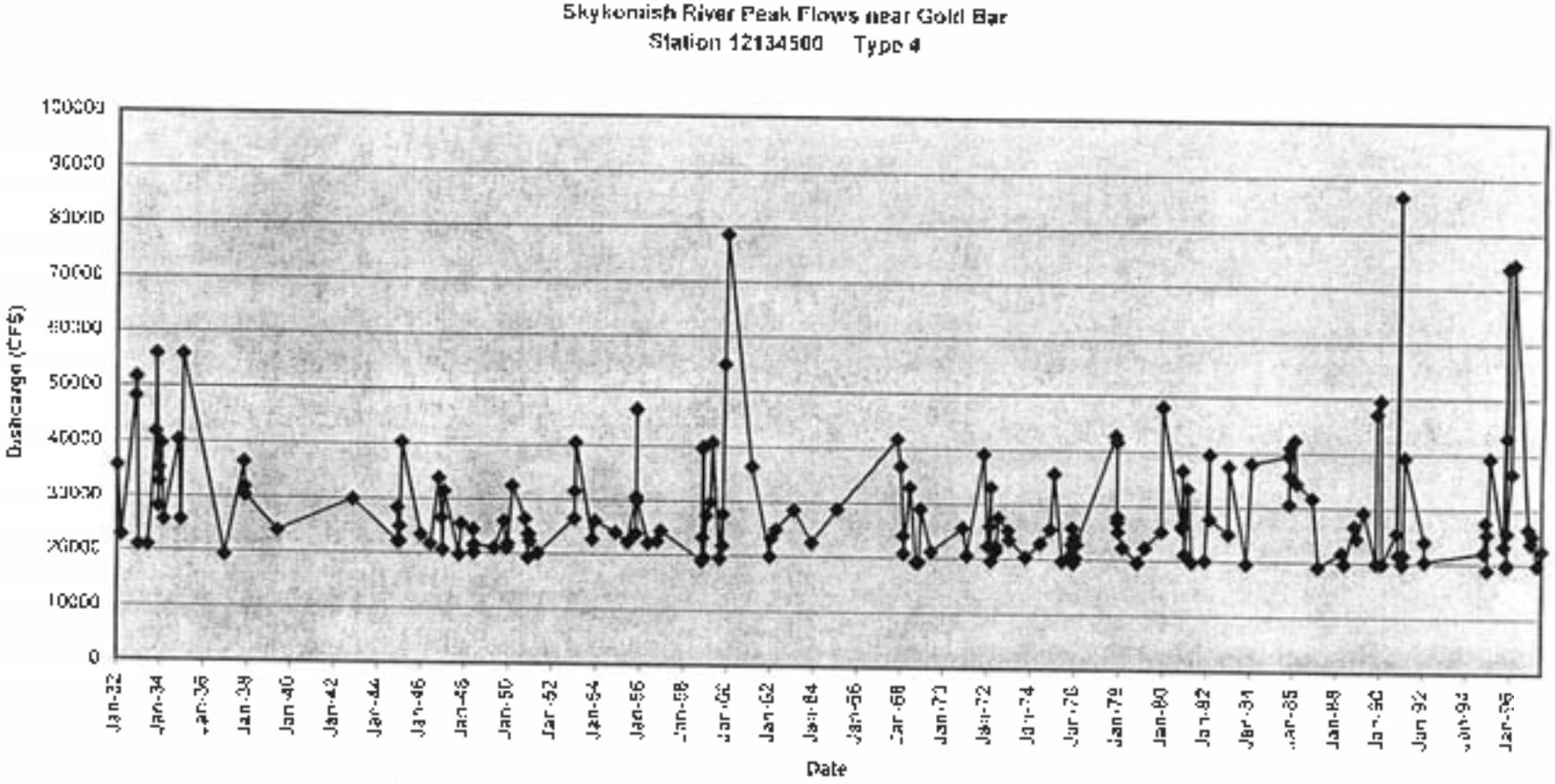
Modified Timber Cruise				
Large Plot Data				
Site: Buck Island	Date: March 12, 2001			
Plot: X	Weather: Overcast			
Plot Location: see plot A				
Plot Diameter: 100m	Time: 13:10			
Species:	DBH (cm):	Height Angle:	Distance (m):	Calculated Height (m):
Big Leaf Maple - *Acer macrophyllum*	165.2	49	19.71	22.87
Big Leaf Maple - *Acer macrophyllum*	242.75	46.5	15.95	18.33
Big Leaf Maple - *Acer macrophyllum*	230.8	54.5	18.97	25.45
Big Leaf Maple - *Acer macrophyllum*	67.3	58	8	12.9
Big Leaf Maple - *Acer macrophyllum*	147.1	62	13.5	26.14
Big Leaf Maple - *Acer macrophyllum*	213	56.5	14.73	22.25
Big Leaf Maple - *Acer macrophyllum*	164	72	2	10.29
Big Leaf Maple - *Acer macrophyllum*	83.5	62	12.87	25.25
Big Leaf Maple - *Acer macrophyllum*	90.6	61.5	13.47	24.81
Big Leaf Maple - *Acer macrophyllum*	100	63.5	11.7	23.47
Sitka Spruce - *Picea sitchensis*	56.3	42	34.3	31.33
Big Leaf Maple - *Acer macrophyllum*	73.5	57	9.7	22.85
Red Alder - *Alnus rubra*	54.4	61	7.8	14.07
Big Leaf Maple - *Acer macrophyllum*	99	66	13.4	30.1
Red Alder - *Alnus rubra*	81.5	58	13.4	33.17
Red Alder - *Alnus rubra*	65.5	45	25.9	25.9
Red Alder - *Alnus rubra*	75	50	25.9	30.97
All measured in the Southern half of the Plot - Northern half counted below				
Stem Count by Species				
Species:	Number:	Percent:		
Red Alder - *Alnus rubra*	9	23		
Big Leaf Maple - *Acer macrophyllum*	26	74		

Sitka Spruce - *Picea sitchensis*	1	3		
Includes complete circle				

Modified Timber Cruise				
Large Plot Data				
Site: Block stand	Date: March 12, 200*			
Plot: *	Weather: Overcast			
Plot Location: see plot G				
Plot Diameter: 100m	Time: 15:00			
Species:	DBH (cm):	Height Angle:	Distance (m):	Calculated Height (m) :
Black Cottonwood - *Populus trichocarpa*	49.6	61	5.8	36.62
Western Hemlock - *Tsuga heterophylla*	30.5	20	21.1	7.68
Bitter Cherry - *Prunus emarginata*	24.7	52	14	17.92
Big Leaf Maple - *Acer macrophyllum*	52	62	13.7	25.77
Stem Count by Species:				
Species:	Number:	Percent:		
Bitter Cherry - *Prunus emarginata*	2	1		
Big Leaf Maple - *Acer macrophyllum*	75	59		
Red Alder - *Alnus rubra*	14	11		
Black Cottonwood - *Populus trichocarpa*	34	27		
Western Hemlock - *Tsuga heterophylla*	1	1		
Douglas Fir - *Pseudotsuga menziesii*	1	1		
All stems counted and representative species weighted and measured				

Modified Timber Cruise				
Small Plot Data				
Site: Back Island	Date: March 12 2001			
Plot: Z	Weather: Overcast			
Plot Location: W edge is center of Plot A (no marked center for Z)				
Plot Diameter: 10m	Time: 15:45			
Species:	DBH (cm):	Height Angle:	Distance (m):	Calculated Height (m):
Big Leaf Maple - *Acer macrophyllum*	104.5	67	17.5	41.23
Black Cottonwood - *Populus trichocarpa*	107.4	52	37.7	48.25
All stems counted and representative species heighted and measured				
Stem Count by Species:				
Species:	Number:	Percent:		
Black Cottonwood - *Populus trichocarpa*	4	22		
Big Leaf Maple - *Acer macrophyllum*	9	50		
Red Alder - *Alnus rubra*	5	28		

Attachment G – Hydrograph Data



Appendix D

PUBLIC ACCESS LIST

List of Shoreline Public Access

1. Skykomish River Centennial Park
2. Washington Department of Fish and Wildlife Boat Ramp
3. Al Borlin Park
4. Lewis Street Park
5. Cadman, Inc. (informal)

There are no other shoreline public access points or easements located in the City of Monroe.

Appendix E

U.S. FISH AND WILDLIFE SERVICE SPECIES LIST

United States Department of the Interior

FISH AND WILDLIFE SERVICE
Western Washington Fish and Wildlife Office
510 Desmond Drive SE, Suite 102
Lacey, Washington 98503
Phone: (360) 753-9440 Fax: (360) 534-9331

FEB 1 1 2002

Dear Species List Requester:

We are providing the information you requested to assist your determination of possible impacts of a proposed project to species of Federal concern. Attachment A includes the listed threatened and endangered species, species proposed for listing, candidate species, and/or species of concern that may be within the area of your proposed project.

Any Federal agency, currently or in the future, that provides funding, permitting, licensing, or other authorization for this project must assure that its responsibilities section 7(a)(2) of the Endangered Species Act of 1973, as amended (Act), are met. Attachment B outlines the responsibilities of Federal agencies for consulting or conferencing with us (U.S. Fish and Wildlife Service).

If both listed and proposed species occur in the vicinity of a project that meets the requirements of a major Federal action (i.e., "major construction activity"), impacts to both listed and proposed species must be considered in a biological assessment (BA) (section 7(c); see Attachment B). Although the Federal agency is not required, under section 7(c), to address impacts to proposed species if listed species are not known to occur in the project area, it may be in the Federal agency's best interest to address impacts to proposed species. The listing process may be completed within a year, and information gathered on a proposed species could be used to address consultation needs should the species be listed. However, if the proposed action is likely to jeopardize the continued existence of a proposed species, or result in the destruction or adverse modification of proposed critical habitat, a formal conference with us is required by the Act (section 7(a)(4)). The results of the BA will determine if conferencing is required.

The Federal agency is responsible for making a determination of the effects of the project on listed species and/or critical habitat. For a Federal agency determination that a listed species or critical habitat is likely to be affected (adversely or beneficially) by the project, you should request section 7 consultation through this office. For a "not likely to adversely affect" determination, you should request our concurrence through the informal consultation process. For a "no effect" determination, we would appreciate receiving a copy for our information.

Candidate species and species of concern are those species whose conservation status is of concern to us, but for which additional information is needed. Candidate species are included as an advance notice to Federal agencies of species that may be proposed and listed in the future. Conservation measures for candidate species and species of concern are voluntary but recommended. Protection provided to these species now may preclude possible listing in the future.

For other federally listed species that may occur in the vicinity of your project, contact the National Marine Fisheries Service at (360) 753-9530 to request a list of species under their jurisdiction. For wetland permit requirements, contact the Seattle District of the U.S. Army Corps of Engineers for Federal permit requirements and the Washington State Department of Ecology for State permit requirements.

Thank you for your assistance in protecting listed threatened and endangered species and other species of Federal concern. If you have additional questions, please contact Yvonne Dettlaff (360) 753-9582

Sincerely,

Ken S. Berg, Manager
Western Washington Fish and Wildlife Office

Enclosure(s)

ATTACHMENT A

February 5, 2002

LISTED AND PROPOSED ENDANGERED AND THREATENED SPECIES, CRITICAL HABITAT, CANDIDATE SPECIES, AND SPECIES OF CONCERN THAT MAY OCCUR WITHIN THE VICINITY OF THE PROPOSED CITY OF MONROE SHORELINE MASTER PROJECT IN SNOHOMISH COUNTY, WASHINGTON

(T27N R6E S11-12; T27N R7E S6-7)

FWS REF: 1-3-02-SP-0617

LISTED

There is one bald eagle (*Haliaeetus leucocephalus*) nesting territory located in the vicinity of the project at T27N R6E S13. Nesting activities occur from January 1 through August 15.

Wintering bald eagles may occur in the vicinity of the project. Wintering activities occur from October 31 through March 31.

There is one bald eagle winter concentration in the vicinity of the project at T27N R7E S5.

Major concerns that should be addressed in your biological assessment of the project impacts to listed species include:

1. Level of use of the project area by listed species.

2. Effect of the project on listed species' primary food stocks, prey species, and foraging areas in all areas influenced by the project, and

3. Impacts from project construction (i.e., habitat loss, increased noise levels, increased human activity) that may result in disturbance to listed species and/or their avoidance of the project area.

PROPOSED

None

CANDIDATE

None

CRITICAL HABITAT

None

SPECIES OF CONCERN

The following species of concern have been documented in the county where the project is located. These species or their habitat could be located on or near the project site. Species in **bold** were specific occurrences located on the database within a 1 mile radius of the project site.

Beller's ground beetle (*Agonum belleri*)
California wolverine (*Gulo gulo luteus*)
Cascades frog (*Rana cascadae*)
Long-eared myotis (*Myotis evotis*)
Long-legged myotis (*Myotis volans*)
Northern goshawk (*Accipiter gentilis*)
Olive-sided flycatcher (*Contopus cooperi*)
Pacific fisher (*Martes pennanti pacifica*)
Pacific lamprey (*Lampetra tridentata*)
Pacific Townsend's big-eared bat (*Corynorhinus townsendii townsendii*)
Peregrine falcon (*Falco peregrinus*)
River lamprey (*Lampetra ayresi*)
Tailed frog (*Ascaphus truei*)
Western toad (*Bufo boreas*)

ATTACHMENT B

FEDERAL AGENCIES' RESPONSIBILITIES UNDER SECTIONS 7(a) AND 7(c) OF THE ENDANGERED SPECIES ACT OF 1973, AS AMENDED

SECTION 7(a) - Consultation/Conference

Requires:

1. Federal agencies to utilize their authorities to carry out programs to conserve endangered and threatened species;

2. Consultation with the U S Fish and Wildlife Service (FWS) when a Federal action may affect a listed endangered or threatened species to ensure that any action authorized, funded, or carried out by a Federal agency is not likely to jeopardize the continued existence of listed species or result in the destruction or adverse modification of critical habitat. The process is initiated by the Federal agency after it has determined if its action may affect (adversely or beneficially) a listed species; and

3. Conference with the FWS when a Federal action is likely to jeopardize the continued existence of a proposed species or result in destruction or an adverse modification of proposed critical habitat

SECTION 7(c) - Biological Assessment for Construction Projects *

Requires Federal agencies or their designees to prepare a Biological Assessment (BA) for construction projects only. The purpose of the BA is to identify any proposed and/or listed species that is/are likely to be affected by a construction project. The process is initiated by a Federal agency in requesting a list of proposed and listed threatened and endangered species (list attached). The BA should be completed within 180 days after its initiation (or within such a time period as is mutually agreeable). If the BA is not initiated within 90 days of receipt of the species list, please verify the accuracy of the list with the Service. No irreversible commitment of resources is to be made during the BA process which would result in violation of the requirements under Section 7(a) of the Act. Planning, design, and administrative actions may be taken; however, no construction may begin.

To complete the BA, your agency or its designee should (1) conduct an onsite inspection of the area to be affected by the proposal, which may include a detailed survey of the area to determine if the species is present and whether suitable habitat exists for either expanding the existing population or potential reintroduction of the species; (2) review literature and scientific data to determine species distribution, habitat needs, and other biological requirements; (3) interview experts including those within the FWS, National Marine Fisheries Service, state conservation department, universities, and others who may have data not yet published in scientific literature; (4) review and analyze the effects of the proposal on the species in terms of individuals and populations, including consideration of cumulative effects of the proposal on the species and its habitat; (5) analyze alternative actions that may provide conservation measures; and (6) prepare a report documenting the results, including a discussion of study methods used, any problems encountered, and other relevant information. Upon completion, the report should be forwarded to our Endangered Species Division, 510 Desmond Drive SE, Suite 102, Lacey, WA 98503-1273.

---

* "Construction project" means any major Federal action which significantly affects the quality of the human environment (requiring an EIS), designed primarily to result in the building or erection of human-made structures such as dams, buildings, roads, pipelines, channels, and the like. This includes Federal action such as permits, grants, licenses, or other forms of Federal authorization or approval which may result in construction.

APPENDIX C

SHORELINE MASTER PROGRAM INVENTORY ADDENDUM: TYE STORMWATER FACILITY

~~DRAFT~~ REPORT

Tye Stormwater Facility Addendum:
- **Inventory**
- **Restoration**

to the Shoreline Master Program for the City of Monroe

Prepared for:

City of Monroe
Department of Community Development
806 West Main Street
Monroe, Washington 98272-2125

Prepared by:

750 Sixth Street South, Kirkland WA 98033

This report was funded in part through a cooperative agreement with the National Oceanic and Atmospheric Administration.

The views expressed herein are those of the authors and do not necessarily reflect the views of NOAA or any of its subagencies.

20 August 2007

Table of Contents

List of Figures

MONROE SHORELINE MASTER PROGRAM UPDATE
TYE STORMWATER FACILITY ADDENDUM

1. INTRODUCTION

The City of Monroe completed its shoreline inventory and analysis report in November 2002, nearly 18 months after project commencement. In June 2007, the Department of Ecology (Ecology) notified the City that its interpretation of the Shoreline Management Act requires regulation of the Tye Stormwater Facility, located in Lake Tye Park. Although the stormwater pond is man-made, Ecology believes that it still falls under the Shoreline Management Act's regulation of lakes larger than 20 acres. Accordingly, this brief report is an addendum to the November 2002 *Shoreline Master Program Inventory for the City of Monroe's Shorelines: Skykomish River and Woods Creek.*

2. SHORELINE INVENTORY

2.1 Introduction

The Tye Stormwater Facility (TSF) is a 37-acre stormwater pond constructed in the Fryelands area of Monroe between 1991 and 1994. Its maximum depth is approximately 30 feet. Originally, the location of the stormwater pond was used to grow winter wheat, lettuce, and a variety of other agricultural crops, and was determined by the U.S. Army Corps of Engineers to be "prior converted cropland." Prior converted croplands are "wetlands that were drained, dredged, filled, leveled, or otherwise manipulated, including the removal of woody vegetation, before December 23, 1985, to make production of an agricultural commodity possible, and that (1) do not meet specific hydrologic criteria, (2) have had an agricultural commodity planted or produced at least once prior to December 23, 1985, and (3) have not since been abandoned. Activities in prior converted cropland are not regulated under Swampbuster [provision of the Food Security Act] or [Clean Water Act] Section 404" (http://www.mvm.usace.army.mil/regulatory/regulations/clean_water.htm).

According to Brad Feilberg, the City Engineer, the pond was originally excavated to provide fill soils for the Fryelands development to elevate it above the 100-year floodplain (pers. comm., 17 August 2007). The excavated pit was subsequently modified to serve as a detention pond for stormwater runoff originating from the almost fully developed Fryelands area, which includes relatively recent residential and industrial developments. A treatment swale is present at the southeast corner of the pond between the stormwater discharge and the pond. Shoreline jurisdiction for the Tye Stormwater Facility extends 200 feet landward of the ordinary high water mark. On July 2, 2007, City staff and the consultant team toured the Tye Stormwater Facility and its associated shorelands.

2.2 Land Use

The majority of the TSF shoreline zone consists of Lake Tye Park (see Section 2.7 below), which is zoned as Public Open Space. The park completely surrounds the stormwater pond except for two parcels at the northeast corner zoned Service Commercial that partially abut the pond.

Otherwise, a Light Industrial zone is also present in TSF shoreline jurisdiction; however, all of the Light Industrial areas are separated from the pond by Fryelands Boulevard (Figure 1) or park-zoned parcels. A quantitative summary of the zones present in the TSF shoreline area is presented below. A zoning map of the Tye Stormwater Facility shoreline environment is located in Appendix A.

Land Use Zone	Shoreline Environment	
	Tye Stormwater Facility	Aquatic
Light Industrial	8.39 acres	0.0 acre
Service Commercial	3.69 acres	0.06 acre
Public Open Space	13.57 acres	37.73 acres

Figure 1. Aerial view of developed Light Industrial-zoned area east of the Tye Stormwater Facility.

Lake Tye Park is described below in Section 2.7. The industrial uses consist of a portion of the parcel containing a concrete plant on the north side of the pond that is currently used primarily for storage of raw materials and also for production of concrete retaining wall/landscape blocks (Figure 2). The other developed industrial parcels consist of warehousing and storage uses, and the Cascade Community Church (see Figure 1). Most of the parcel areas that are in shoreline jurisdiction contain only the parking lots and landscaping associated with the buildings, not the buildings themselves. Fryelands Boulevard comprises at least half of the Light Industrial-zoned area. A few of the parcels are undeveloped, although construction is currently underway.

Only one of the two parcels zoned Service Commercial on the west side of Fryelands Boulevard adjacent to the pond is developed (Figure 3). Construction was completed this year, and most of

Figure 2. Aerial view of commercial development (under construction) at northeast end of the Tye Stormwater Facility, and the old concrete plant at the north end of the site.

Figure 3. Commercial development on northeast corner of Tye Stormwater Facility, facing south.

the spaces have been leased. Although the public trail does not continue from the park, the building design includes a covered walkway on the waterward side of the building. In addition, the Subway restaurant on the ground floor has a wall of windows on the waterward side. The currently undeveloped parcel to the north will likely be developed in the near future using the same standards as the recently completed development. The structure setback from the ordinary high mark on the recently completed building is 25 feet. The future development would also have a 25-foot setback unless increased based on a finding of pond-fringe wetlands. If wetlands are found, the appropriate buffer as established in the SMP's critical areas regulations would apply.

2.3 Transportation

The only roadway in the TSF environment is Fryelands Boulevard, a four-land major arterial, which parallels the pond to the east. Stormwater runoff from the road is directed to treatment swales and then into the Tye Stormwater Facility.

2.4 Utilities

The Tye Stormwater Facility is itself a utility. As previously discussed, it was originally excavated to provide a fill source to elevate the Fryelands development, but was then modified to serve as a detention pond for runoff generated by impervious surfaces in the Fryelands area. The TSF was altered to form a two-celled system, but because of water stagnation problems (and resultant occasional odor), a portion of the dam between the two cells was removed. All that remains of the original dam is a peninsula that juts into the pond from the west bank. Stormwater discharges into the pond in two locations: the northeast corner and the southeast corner. The pond's outfall is at the northwest corner of the former southern cell. Small portions of the treatment swales are also present in TSF shoreline jurisdiction.

Overhead power lines cross the stormwater pond in the location of the former dam. Finally, a natural gas main crosses TSF shoreline jurisdiction along the northeast boundary. See Figure 4 for approximate locations of known utilities.

2.5 Vegetation and Shoreline Modifications

Upland of the ordinary high mark, the stormwater pond is intermittently ringed with patches of red alder, black cottonwood, willows, Himalayan blackberry, and Scotch broom, with grasses, buttercup, thistle, reed canarygrass, and birds-foot trefoil underlying. Below the ordinary high water mark, patches of emergent vegetation are found, including cattail, yellow-flag iris, soft rush, and hardstem bulrush. In general, all vegetated areas are narrow, and adjacent to trails, roads, two developments, or other park facilities and uses. The City's Public Works and Parks & Recreation Departments share mowing of the pond's perimeter, and Parks & Recreation Services Department is also controlling invasive weeds (mechanical removal of Himalayan blackberry and thistle). Aquatic vegetation was not surveyed, but the non-native, invasive Eurasian watermilfoil was observed.

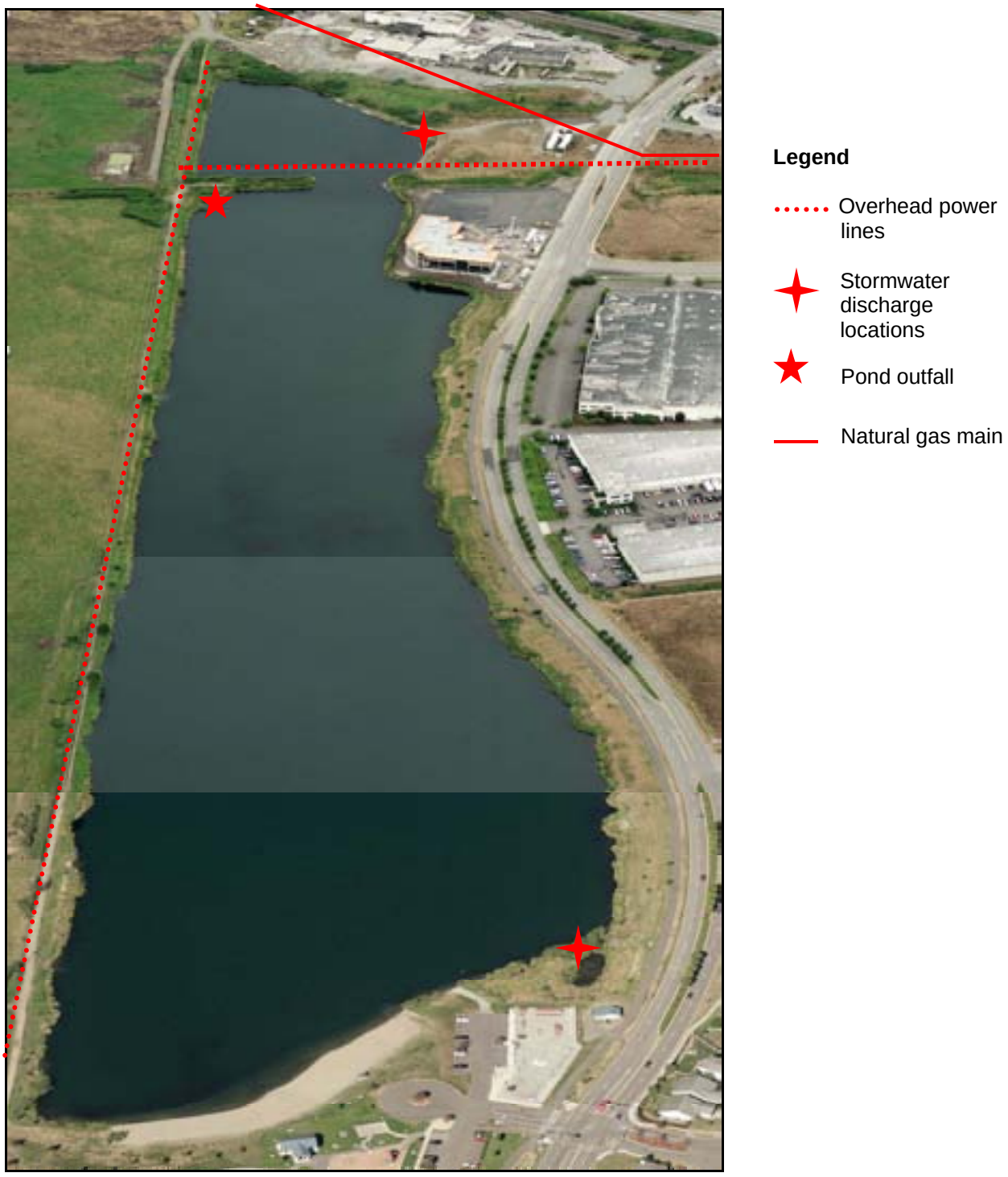


Figure 4. Overview of known utilities in the Tye Stormwater Facility shoreline jurisdiction.

The majority of the pond's banks are not armored. However, at the northeast corner, there are patches of rock on otherwise bare sections of the bank (Figure 5). These areas of rip-rap were placed and are maintained by the City to prevent bank erosion. The wind generally comes from the southwest, and the pond has a long fetch for wave development. At the south end of the pond, approximately 130 yards of shoreline is covered with sand to make a public beach. An approximately 5-foot-wide gravel path leads straight to the water's edge, east of the beach and separated from it by a patch of vegetation. This path can be used for small boat launching, and at the time of observation was a fishing spot for an angler.

Figure 5. View of small sections of shoreline armoring at north end of pond.

2.6 Biological Resources and Critical Areas

As previously mentioned, the Tye Stormwater Facility was constructed in "prior converted cropland," which are "wetlands that were drained, dredged, filled, leveled, or otherwise manipulated, including the removal of woody vegetation, before December 23, 1985, to make production of an agricultural commodity possible, and that (1) do not meet specific hydrologic criteria, (2) have had an agricultural commodity planted or produced at least once prior to December 23, 1985, and (3) have not since been abandoned (http://www.mvm.usace.army.mil/regulatory/regulations/clean_water.htm). Ecology has a different regulatory interest in wetlands such that any wetlands that have developed around the pond's fringe are regulated by Ecology. A formal wetland delineation has not been conducted around the pond, although wetland vegetation is clearly growing below the ordinary high water mark and in some areas above the high water mark. A formal delineation would be necessary to determine the presence of wetlands upslope of the pond's ordinary high water mark, which must meet soils and hydrology criteria, in addition to vegetation criteria.

The pond currently provides habitat for fish that are stocked by the Washington Department of Fish and Wildlife. Most recently, WDFW stocked the pond with 523 sterile, triploid rainbow

trout in April 2007, and has also stocked both sterile and non-sterile rainbow trout since 2003. The pond discharges into ditch systems in adjacent agricultural fields to the west, which are a part of the French Creek system. Although fish can pass out of the pond via the V-Notch weir at the outlet, they cannot enter the pond because of the elevation drop. However, fish within the French Creek system that would like to move upstream can bypass the Tye facility via a constructed ditch system to the north and east of the pond. WDFW and the City have agreed that the constructed ditch system is not a "stream" as regulated under the Growth Management Act and the City's critical areas ordinance.

The stormwater pond also provides habitat for amphibians (likely dominated by the non-native bull frog), waterfowl (primarily foraging, possibly some nesting), and other songbirds (foraging and some nesting). WDFW does not map the pond or nearby areas as a Priority Habitat.

2.7 Public Access/Parks

Slightly more than half of the Tye Stormwater Facility and its associated shorelands are zoned as Public Open Space. Lake Tye Park surrounds the stormwater pond, and contains a mix of active and passive recreational and public access opportunities (Figure 6). Paved and some unpaved trails, with sporadic trail-side benches, on its east, south and west sides are heavily used by cyclists, pedestrians, and joggers (Figure 7). The City's plan is to connect these trails to other City trails, creating a City-wide network, and eventually connecting to the Centennial Trail that would link the City with Snohomish and Duvall. The most intensively used part of the park is the south end, which has a wide sand/gravel beach (Figure 8), pedestrian boat launch (no gas-powered boats, only small electric boats), ball fields, skateboard park, picnic shelter, and playground. In the future, the City plans to install a pier that would improve small boat access, including kayaks and canoes.

In addition to pond-wide fishing for the trout stocked by WDFW, the Sky Valley Chapter of Trout Unlimited annually imports 1,000 trout into a netted area at the south end of the stormwater pond. A five-hour children's derby is then held, with each child allowed to keep as many as five fish, followed by a three-hour adult fishing derby. After the derby, the netted fish are released into the pond. (source: http://www.monroemonitor.com/PDFS/041007pdfs/0410071.pdf)

2.8 Floodplain

The Tye Stormwater Facility and much of its surrounding shorelands are mapped by FEMA in the 100-year floodplain of the Snohomish River (see map in Appendix A). However, the closest point of the Snohomish River to the TSF shoreline jurisdiction is approximately 3 miles away.

According to the City's Public Works Director, Gene Brazel, the area has at least a 1 percent chance of flooding in any given year. The most recent floods were in 1990 and 1995, and had a maximum elevation of 28.5 feet. Fryelands Boulevard contained the flood so that it inundated only the west side of the road, including soccer and baseball fields on the south side of the pond. The treatment and conveyance ditches draining the Fryelands area east of the road backed up per plan, but the banks were never overtopped. Residences and businesses were not affected by the flooding (Brazel, pers. comm., 25 July 2007).

Figure 6. Overview of public access/recreation amenities at the south end of Lake Tye Park.

Figure 7. Paved public trail along west side of Tye Stormwater Facility.

Figure 8. Public beach at south end of Tye Stormwater Facility.

2.9 Historical or Archaeological Sites

No special features are documented by the Washington State Office of Archaeology and Historic Preservation (OAHP) (http://www.oahp.wa.gov/gis/INDEX.CFM) in the shoreline zone of the Tye Stormwater Facility.

3. RESTORATION OPPORTUNITIES

The primary need of the Tye Stormwater Facility is for improved native vegetation around its perimeter. Students at The Environmental Science School have recently begun enhancing pond-side vegetation on the north end of the Tye Stormwater Facility. In April 2007, students removed non-native plants (particularly Himalayan blackberry) and installed 110 native shrubs. The students will be maintaining and monitoring the plantings. The planting area, approximately 2,700 square feet, will be expanded in future areas. The City Parks & Recreation Department should consider collaborating with the Environmental Science School. Recommended actions related to shoreline vegetation enhancement include:

- Increased, aggressive control of Himalayan blackberry.
- Additional plantings of native trees and shrubs around the pond's perimeter.
- Reduced mowing footprints.
- Using vegetation, fencing or signage to channel pedestrians into specific shoreline access areas. Several areas along the west shore are trampled, with bare soils and eroding banks.

Appendix A

TYE STORMWATER FACILITY INVENTORY MAPS

City of Monroe
Shoreline Environmental Designations

Boundaries

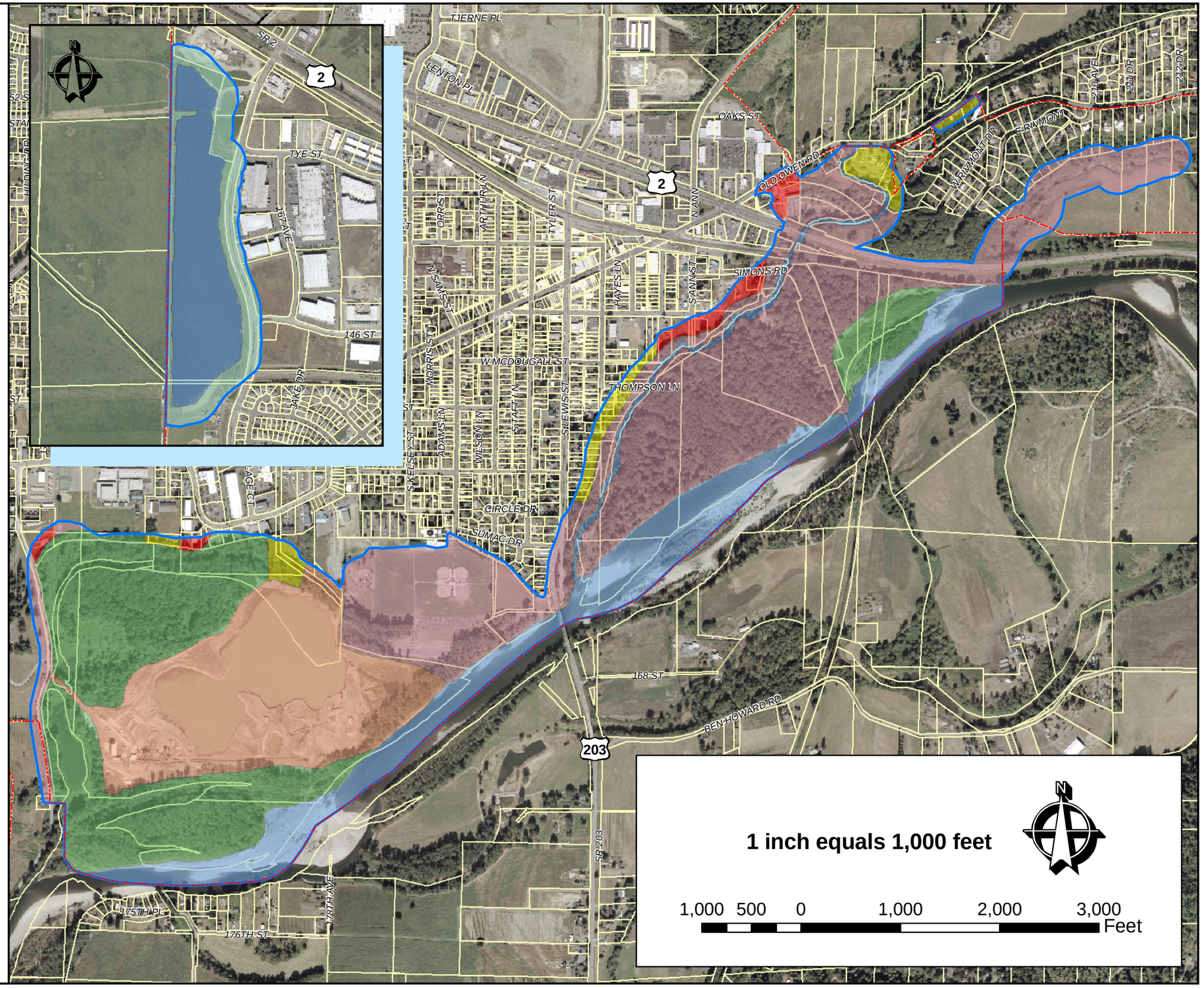
- Monroe City Limits
- Shoreline Boundary

Shoreline Designations

- (A) - Aquatic
- (HI) - High Intensity
- (N) - Natural
- (SR) - Shoreline Residential
- (TSF) - Tye Stormwater Facility
- (UC) - Urban Conservancy
- (UCm) - Urban Conservancy Mining

Map data shown is the property of the City of Monroe & Snohomish County. Inaccuracies may exist. The City of Monroe & Snohomish County imply no warranties or guaranties regarding any aspect of data depiction. No real estate decisions are to be made using this map. Please contact the City of Monroe Community Development Department to verify the designation(s).

Project: Shoreline Environmental Designations
Y:\GIS\Departments\CD\Shorelines\Shoreline Environmental Designations (7-20-07).mxd
Source: City of Monroe 2006; Snohomish County 2006, Watershed Company 2002
Revised: 08-27-07
Author: R. Wright



City of Monroe
Lake Tye Shoreline with City Zoning

City of MONROE

Boundaries

- Monroe City Limits
- Shoreline Boundary

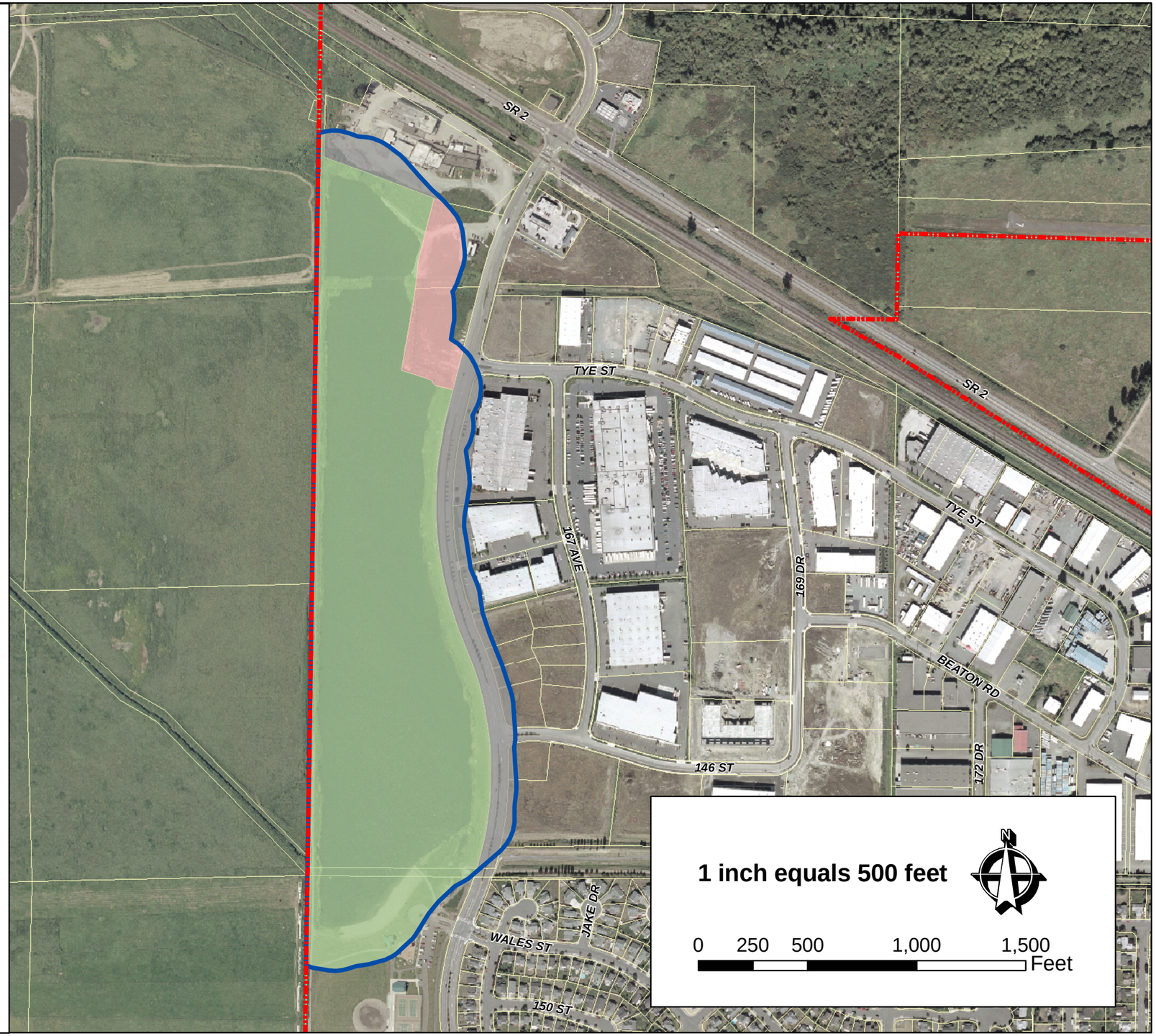
Lake Tye_zoning

- SC - Service Commercial
- LI - Light Industrial
- PS - Public Open Space

Note: the properties directly east of Lake Tye across Fryelands Blvd. are built out or are under development review. Additionally the property at the northeast end of Lake Tye, where the lake narrows, is built out.

The zoning of the surrounding properties within the city limits are Service Commercial, Light Industrial, Public Open Space, and UR 9600 Urban Residential

Project: Lake Tye Shoreline
Y:\GIS\Departments\CD\Shorelines\Lake Tye Shoreline 6-28-07.mxd
Source: City of Monroe 2006; Snohomish County 2006, Watershed Company 2002
Revised: 08-27-07
Author: R. Wright



City of Monroe
Lake Tye Shoreline
with Floodplain Boundaries

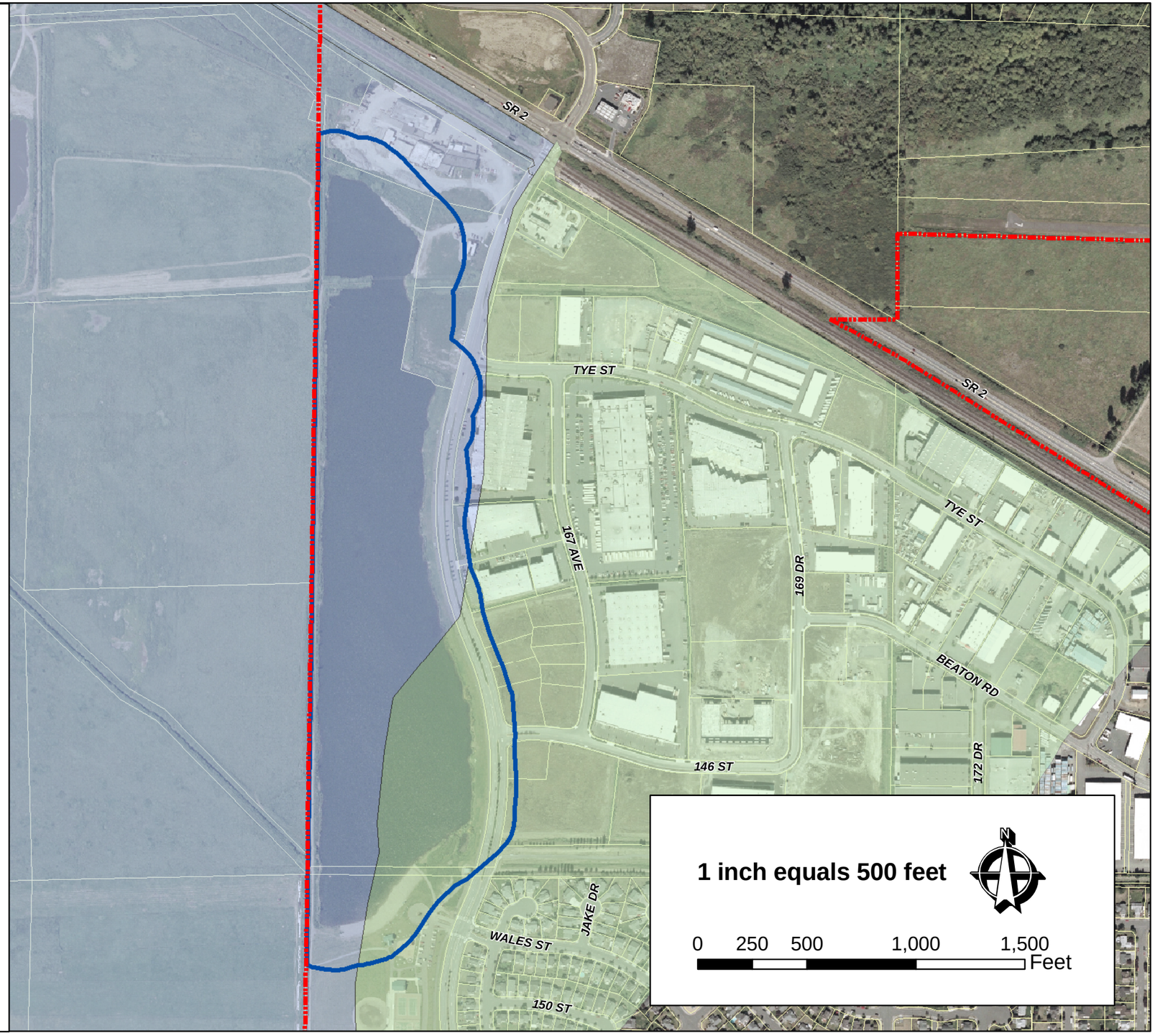
Boundaries

- Monroe City Limits
- Shoreline Boundary
- Zone AE (100 year 1%)
- Zone X (500 year .2%)

Note: the properties directly east of Lake Tye across Fryelands Blvd. are built out or are under development review. Additionally the property at the northeast end of Lake Tye, where the lake narrows, is built out.

Map data shown is the property of the City of Monroe & Snohomish County. Inaccuracies may exist. The City of Monroe & Snohomish County imply no warranties or guaranties regarding any aspect of data depiction. No real estate decisions are to be made using this map. Please contact the City of Monroe Community Development Department to verify the designation(s).

Project: Lake Tye Floodplain
Y:\GIS\Departments\CD\Shorelines\Lake Tye Floodplain 7-7-07.mxd
Source: City of Monroe 2006; Snohomish County 2006, Watershed Company 2002
Drafted: 08-27-07
Author: R. Wright



City of Monroe
Public Access Map

Boundaries

- Monroe City Limits
- Shoreline Boundary
- City Parks

Public Access Types

- Vehicle
- Boat
- Pedestrian
- Public Access
- Proposed Centennial Trail*

* Final alignment to be determined in the future

Public Properties

- City of Monroe Property
- School District Property
- Sno-Isle Library Property
- WA State Property

Map data shown is the property of the City of Monroe & Snohomish County. Inaccuracies may exist. The City of Monroe & Snohomish County imply no warranties or guaranties regarding any aspect of data depiction. No real estate decisions are to be made using this map. Please contact the City of Monroe Community Development Department to verify the designation(s).

Project: Shoreline Public Access
Y:\GIS\Departments\CD\Shorelines\Shoreline Public Access (6-12-07).mxd
Source: City of Monroe 2006; Snohomish County 2006, Watershed Company 2002
Drafted: 08-27-07
Author: R. Wright