Chapter Ten
Environment

Introduction

Each person in Whatcom County has a fundamental right to a healthful and safe environment in which to live and grow. With this right comes a responsibility to contribute to the protection and enhancement of our natural environment. Consequently, an important goal of the Whatcom County Comprehensive Plan is to protect or enhance the county's environmental quality. This means that, individually and collectively, we have the obligation to protect these resources for our children and their children. Essential to this is the establishment of safe development practices and patterns that do not significantly disrupt ecosystems and that ensure the continuation of ample amounts of clean water, natural areas, farmlands, forest lands, and fish and wildlife habitat.

Chapter Organization

This chapter is composed of an introduction and four sections organized by topic heading. The first section, entitled "General Environmental Management," addresses general environmental goals and policies. The remaining three sections deal with Natural Hazards, Water Resources, and Ecosystems. Together, the sections of this chapter provide the direction necessary to ensure and promote long-term sustainability of the environment in Whatcom County.

Purpose

Whatcom County's natural environment, with its seasonally abundant supply of water, its beauty, and its other natural resources, has attracted people to our community for generations. This setting is important to our sense of well-being, to our health, to our economic well-being, and to our future. Sustaining these assets in the face of increasingly intense human activity becomes more difficult each year. The challenge of protecting this environment while accommodating growth requires maintaining guidelines for development so that growth does not ultimately overrun the very assets that brought most of us here. The purpose of this chapter is to create such guidelines.

GMA Goals and Countywide Planning Policies

GMA Planning Goal 10, "Environment" (RCW 36.70A.020(10)), provides the directive for much of this chapter. It requires Whatcom County to "protect the environment and enhance the state's high quality of life, including air and water quality, and the availability of water." In addition, some of the goals and policies of this chapter support Planning Goal 9, "Open Space and Recreation" (RCW 36.70A.020(9), which directs the county to "conserve fish and wildlife habitat."

Relative to environmental protection, Whatcom County's Countywide Planning Policies (CWPP) give the most attention to water issues. They state, "The quality of life and economic health of Whatcom County communities depend on the

maintenance of a safe and reliable water supply. All jurisdictions and water purveyors should cooperate to ensure the protection and quality of the area's water resources." Specific policies address water, promoting inter-jurisdictional cooperation in conserving, protecting, and managing the water resource, and in reducing water pollution (CWPP Policies N.1 – 6). The CWPPs also support protecting wildlife habitat and corridors, natural drainage features, and "other environmental, cultural and scenic resources."

GMA Requirements

The GMA requires Whatcom County to identify and manage critical areas in such a manner as to prevent destruction of the resource base and reduce potential losses to property and human life. The GMA has identified Critical Areas to include the following areas and ecosystems:

- Wetlands
- Critical Aquifer Recharge Areas
- Fish and wildlife habitat conservation areas
- Frequently flooded areas
- Geologically hazardous areas

Environmental Setting

Whatcom County bedrock geology can be divided into five bedrock geologic provinces. From east to west these provinces are the Methow terrain, the Cascade Crystalline Core, the Northwest Cascades System, the Fraser Lowland, and the San Juan Island system. Tectonic activity over the past 15 million years has created the present North Cascades and the formation of Mount Baker, a 10,000-foot high composite volcano.

The mountains of Whatcom County, as well as the streams, lakes, valleys, hills, and shoreline features are the result of millions of years of geologic events. Over 2.5 million years ago, during the Ice Ages, glacial ice invaded the Puget Sound lowlands from the north at least four times, with the last major glacial event, the Fraser Glaciation, ending approximately 12,000 years ago. A minor advance of glacial ice, the Sumas Advance, ended approximately 10,000 years ago. The ice formed from the accumulation of snow in the British Columbia Coast Range and interior of British Columbia. Numerous glaciers are still present within the mountains of Whatcom County, and some of these mountain glaciers formerly extended far down the mountain valleys of the County. The underlying bedrock was deeply eroded during these glacial events creating very steep mountainsides, and in some areas, particularly in northwestern Whatcom County, a thick sequence of glacial related sediments was deposited. The glacial ice was approximately 6,000 feet thick in the vicinity of Bellingham.

Two main glacial advances are the most important to our area, the Salmon Springs glaciation and the later Vashon glaciation. Each time the massive glacier advanced, it dammed up the Puget lowlands to form a huge lake. As the floating ice melted, sand, gravel, clay and occasional boulders would melt out of the ice and fall to the sea floor. This deposit, the Bellingham Drift, covers the ground surface over a large

area of western Whatcom County. Each time the Ice Age glacier advanced, it also compacted underlying sediments with its great weight. It created a concrete-like material called "till" (also known as "hardpan") beneath it. Because the Bellingham Drift consists primarily of clay and silt, it is relatively impermeable; water tends to accumulate on the ground surface. Wetlands are common on the Bellingham Drift.

On the bottom of the lake, "rock flour", the finely ground remains of rocks pulverized by glacial action, settled out. These deposits became the familiar "blue clays" of the Puget lowland. The milky color of the Nooksack River is due to the same kind of rock flour, created by glacial activity on the slopes of Mount Baker.

Additionally, each time the glacier retreated, water from the melting ice deposited thick layers of sand and gravel known as "outwash." The outwash areas are typically where we find our most productive aquifers, since these loose sands and gravel are porous and drain rapidly. While these areas absorb rainwater for our later use from wells, they are also vulnerable to contamination. An example of this phenomenon is found in the outwash sands and gravels resulting from the Sumas Advance. Large meltwater streams and rivers flowed from this glacier depositing the Sumas Outwash sands and gravels. The Sumas Outwash sands and gravels make up the best non-floodplain farmland in the County and some of the highest quality construction gravel deposits. Abandoned outwash channels were formerly used as sources of peat.

Each of these glacial sediments, lake bed deposits, till and outwash is present in various places and in varied combinations in Whatcom County. These sediments provide both the formations that hold the groundwater for many of the area's wells, and the parent material for most of the different soils.

Out of these long physical processes a complex natural ecology has emerged that supports a diversity of wildlife. Many of our lakes, rivers, and streams support fish including, but not limited to, native species such as the five pacific salmon (Chinook, Coho, Sockeye, Chum, Pink) as well as Steelhead, Rainbow Trout, Cutthroat (coastal and resident), Bull Trout, and Dolly Varden. Every year salmon return to spawn in the streams and rivers of Whatcom County. Whatcom County is located within the Pacific Migratory Flyway and serves as a stopover and critical habitat area for many migratory birds. Bufflehead and goldeneye ducks winter here. Additionally, numerous bird species including scoters, snow geese, trumpeter swans, canvasbacks, cormorants, grebes, loons, and other migrating waterfowl pass through every spring and fall as they travel between their breeding grounds in Alaska and Canada and their wintering grounds in California and Mexico. Mallards, Canada geese, great blue herons, and numerous songbirds live in the county year-round. Maintaining these unique resources is a high priority for both present and future county residents. Whatcom County is home to a distinct subspecies of the Great Blue Heron, which has the third largest colony in the Puget Sound area. The wetlands, fields, streams, and nearshore habitat in the county support many birds of special concern, such as the bald eagle (protected under the Bald and Golden Eagle Protection Act), the pileated woodpecker (candidate for State threatened list), and the peregrine falcon (ESA candidate species). The National

Audubon Society has designated Semiahmoo, Drayton Harbor, and Birch Bay as "Important Bird Areas."

Environmental Management

Introduction

General environmental goals and policies are intended to provide guidance for environmental management that will promote environmental protection and good stewardship practices through a balance of public education and involvement; incentives, acquisition, and voluntary programs; land use planning and regulations; environmental monitoring; and intergovernmental cooperation. These goals and policies are also intended to provide guidance to County government as it assists its citizens in maintaining a balance between individual property rights, economic development, and environmental protection.

Background Summary

Development in the last 100 years has had a significant impact on the natural environment in Whatcom County. At the turn of the 20th century, some areas surrounding Lynden, Sumas, and Ferndale were logged, drained, and converted to agricultural land and other types of development. In the intervening years, many of the remaining forests were logged, many streams re-routed and channelized, and much of the native vegetation removed and replaced with a wide variety of introduced vegetative types. Roads now crisscross most areas, with homes, farms, businesses, and industries scattered throughout the county.

Issue, Goals, and Policies

There are designated lands in Whatcom County that can still accommodate development. Whatcom County also has areas that are sensitive to human activity, including wetlands, streams, lakes, and marine shorelines, and lands that can pose a hazard to the community, including floodplains and unstable slopes. In these areas development must be carefully planned or limited to maintain environmental quality and public safety. This can be done through the creation and implementation of goals and policies that seek to reduce hazards and prevent adverse environmental impacts.

Community and Environmental Protection

The elements of the natural environment: water, air, soil, plants, and animals; are interconnected and interdependent, functioning as one dynamic ecosystem. Environmental resources within this ecosystem are extensive and, in some cases, irreplaceable. They provide important beneficial uses to the community such as: the supply of clean drinking water; management of stormwater run-off and flood hazard management; support for a wide variety of fish and wildlife; fresh air; and a sense of place in which residents invest, enjoy, and expect.

Some of these same resources result in serious environmental constraints or pose a hazard to development and a danger to the community. Flooding in the Nooksack

River is frequent and impacts much of the valley floor. There are numerous wetlands and hydric soils throughout the lowlands that provide critical wetland functions and are generally unsuitable for development. The steep gradient and geologic structure of the mountain ranges in conjunction with heavy annual precipitation can contribute to slope instability and flood-prone drainage basins.

Much of the environmental degradation and destruction to property occurs as a result of a lack of information or understanding rather than willful action. Ecosystems are subtle and complex. Too often both their benefits and hazards are not readily apparent to the community. Additionally, baseline information is not always available to help identify the real costs or hazards of building in Whatcom County. There is a need for further research and education.

Goal 10A: **Protect natural resources and systems, life, and property from potential hazards.**

Policy 10A-1: Support good stewardship of Whatcom County lands, and apply this principle to the management of public lands.

Policy 10A-2: Protect the environment through a comprehensive program that includes voluntary activity, education, incentives, regulation, enforcement, restoration, monitoring, acquisition, mitigation, and intergovernmental coordination.

Policy 10A-3: Continue to identify, designate, and protect Critical Areas and other important environmental features.

Policy 10A-4: Manage designated Critical Areas as needed, to minimize or protect against environmental degradation and reduce the potential for losses to property and human life.

Policy 10A-5: Actively pursue voluntary, cooperative, and mutually beneficial efforts aimed at advancing county environmental goals.

Policy 10A-6: Aim to meet or exceed national, state, and regional air quality standards. Work with the Northwest Clean Air Agency to ensure compliance with applicable air quality standards.

Policy 10A-7: Using Best Available Science, support efforts to educate and inform the public as to the benefits of a healthy and viable environment, ecologically fragile areas, and their economic and social value.

Policy 10A-8: Lead and/or coordinate efforts with property owners, citizen groups, and governmental and non-governmental agencies in furthering Whatcom County's environmental goals and policies.

Policy 10A-9: Cooperate with state and federal agencies and neighboring jurisdictions to identify and protect threatened and endangered fish and wildlife species and their habitats.

Policy 10A-10: Support acquisition, conservation easements, open space, and other such programs to protect high-value natural areas as identified through the GMA planning process, the Natural

Heritage Plan, the state Priority Habitats and Species (PHS) program, the Lake Whatcom Management Program, and other sources.

Policy 10A-11: Designate high-value open space and natural areas for acquisition, conservation easements, open space, and other such programs to protect these natural areas upon request or consent of the property owner.

Policy 10A-12: Broadly inform the people of Whatcom County of the locations of potential development constraints associated with natural conditions. Information should include known natural hazards and an assessment of the potential danger to both the property owner and the public.

Administration and Regulation

There are currently a multitude of regulations and administrative processes at the federal, state and local level that, together, have become excessive and difficult to understand. Conflicting regulations and complicated administrative processes can create undue hardship on community members and result in reduced levels of environmental protection.

Goal 10B: Simplify and harmonize regulations relating to the identification, delineation, and protection of environmental features.

Policy: 10B-1: Develop, as a significant component of a comprehensive environmental management program, non-regulatory measures that include voluntary activity, education, incentives, restoration, acquisition, advanced mitigation (i.e., mitigation done in advance of impacts), and intergovernmental coordination.

Policy 10B-2: Provide incentives for good stewardship of the land through the use of non-regulatory and innovative land use management techniques.

Policy 10B-3: Support education as an important tool in developing public appreciation for the value of ecosystems and provide the public with informational materials and presentations relating to natural system functions, regulations, and issues.

Policy 10B-4: Promote cooperation and coordination among involved government agencies when multiple agencies have jurisdiction over aspects of a single project.

Policy 10B-5: Process the environmental review of building and development permit applications within an established timeframe that is predictable and expeditious.

Policy 10B-6: Provide clear, timely, appropriate, and understandable direction to citizens, developers, and property owners.

Policy 10B-7: Ensure regulations are as simple and easy to understand as possible and maintain effective inspection, compliance, and enforcement measures as necessary.

~~Policy 10B-8: Recognize the policies of the Whatcom County Shoreline Management Program as constituting a "Shoreline Element" of this plan. The shoreline program regulations and policies shall be considered to be consistent with this plan.~~

Comment [CES1]: No longer needed, as a new Chapter 11, Shorelines, has been created.

The Environment and Property Rights

Prior to the 1970s, growth in Whatcom County was relatively slow and received little management. As a result, private property owners were left to their own resources as they determined how best to use their land. However, as increasing numbers of people moved to this area and settled, a greater demand was placed on Whatcom County's natural resources.

The problems that arise from this situation have caused many to realize what one person does with his/her property may have an impact on the larger environmental system that sustains us as a community and on the rights of other property owners.

Land use decisions can no longer be considered exclusively private matters. We are aware public actions impact every private citizen in Whatcom County and private actions may have public consequences as well. To that end, the law must protect the public good from detrimental private actions. Nevertheless, the right of the individual to use his or her property, within the bounds permitted by law, is a value supported by law and the community and must be recognized when making land use decisions in Whatcom County.

Goal 10C: In implementing environmental policies, provide for protection of private property rights, economic opportunities, and plan appropriately for growth.

Policy 10C-1: Actively pursue voluntary and cooperative efforts that advance Whatcom County's goals in a mutually beneficial manner.

Policy 10C-2: When adopting new environmental protection programs, consider multiple economic parameters including development objectives, impacts, and the economic benefits of the natural environment as both a resource and an amenity.

Policy 10C-3: Emphasize an approach to environmental protection by encouraging the use of conservation easements, open space taxation, land acquisition, purchase/voluntary, workable transfer of development rights, and other mechanisms that assist affected property owners.

Policy 10C-4: Avoid standards and procedures likely to require compensation to property owners or invalidation of such rules.

Climate Change

Climate change is a global phenomenon that has the potential for significant local impacts to natural resources, ecosystem functions, as well as human health, infrastructure, and the economy. In Washington State, the Climate Impacts Group (CIG), a consortium of scientists at the University of Washington, has done the most extensive analysis of potential local climate change impacts in the Pacific Northwest. Based on a range of climate change model projections, as well as peer-reviewed scientific publications, the CIG concludes that during the next 20-40 years the Pacific Northwest climate may change significantly. See *Climate Change Impacts and Adaptation in Washington State: Technical Summaries for Decision Makers, Climate Impacts Group, University of Washington, December 2013*. The CIG confirms that global climate models project mid-21st century temperatures in the Pacific Northwest higher than the natural range of temperature observed in the 20th century. The CIG reports that as a result of likely climate change, causing slightly higher average annual temperature, impacts to the Pacific Northwest will likely affect a broad spectrum of the natural environment, but most notably changes to water resources, including:

- More precipitation falls as rain rather than snowfall in the Cascades due to an increased snow-line elevation;
- Decreased (winter) mountain snowpack and earlier (spring) snowmelt;
- Higher winter streamflow in rivers that depend on snowmelt;
- Higher winter streamflow in rain-fed river basins resulting in scouring floods that negatively affect salmon populations if winter precipitation and rain-on-snow events increases in the future as projected;
- Earlier peak (spring) streamflow in rivers that depend on snowmelt;
- Lower summer streamflow in rivers and streams; and,
- Decreased water in summer for irrigation, fish, human consumption and recreational use (more drought-like conditions).

Climate change impacts are likely to include longer-term shifts in forest types and species, potentially increasing wildfire risk and greater exposure to insects and disease. Nearshore and riverine fisheries may be subjected to increased stress due to even lower average summer stream flows (and higher summer stream temperatures) and increased acidity in Puget Sound. Agricultural sector concerns include the cost of climate adaptation, development of more climate-resilient technologies, and management and availability of adequate water supplies. Susceptibility to natural hazards is also expected to intensify due to climate change, including increased landslides, erosion, and coastal and riverine flooding due to more winter rainfall, and potential rising sea levels.

In 2007, Whatcom County completed a Climate Protection and Energy Conservation Action Plan that laid out specific actions and targets for reducing greenhouse gas emissions and increasing energy conservation efforts in response to potential climate change.

In addition many insurance industry experts are now factoring in the costs of climate change into insurance premiums as the increase in the frequency and severity of extreme weather events around the world results in a corresponding increase in claims costs.

Local government, residents and businesses must anticipate that as the climate changes, more frequent and severe damage to private and public infrastructure will occur. Maintenance costs and insurance premiums can be expected to increase accordingly.

Goal 10D: Strengthen the sustainability of Whatcom County's economy, natural environment, and built communities by responding and adapting to the impacts of climate change.

Policy 10D-1: Whatcom County's natural resource-based economic sectors, ecosystems, water resources, infrastructure, emergency management, and public health all face climate change related risks in the future. The County should consider potential long-range climate change implications into its on-going functional planning and implementation actions. The County should:

1. Study the resilience of its natural and built environments to the potential impacts of climate change;
2. Identify the relative vulnerability of these sectors to climate change; and,
3. Examine the adaptive capacity of these sectors to cope with or mitigate climate change and take advantage of any beneficial opportunities.

Policy 10D-2: Develop strategies that encourage a diversified and sustainable economy that is resilient to the impacts of climate change.

Policy 10D-3: Promote the efficient use, conservation, and protection of water resources.

Policy 10D-4: Pursue strategies to reduce the vehicle miles traveled (VMT) in the county by encouraging expanded availability and use of public transportation, carpooling, and non-vehicular modes of transportation.

Policy 10D-5: Establish land use patterns that minimize transportation-related greenhouse gas emissions and encourage preservation of natural resource lands and the protection of water resources.

Policy 10D-6: Convene a climate impact advisory committee by 2017. The advisory committee should consist of (but not be limited to) experts in energy efficiency and carbon emission reduction, representatives from Whatcom County, and interested community members. The committee will be tasked with:

- Evaluating Whatcom County's compliance with meeting

targets set forth in the 2007 Climate Plan;

- Establishing new targets that meet or exceed state and federal climate impact goals;
- Updating the Climate Plan, at minimum every five years, or as needed to meet targets;
- Recommending updates to the Whatcom County Comprehensive Plan in accordance with meeting Whatcom County's emission reduction goals;
- Ensuring that Whatcom County government facilities and operations are designed to meet or exceed goals and standards resolved in the current Climate Protection and Energy Conservation Action Plan; and
- Recommend updates to Whatcom County land use policies and development regulations to support renewable energy development goals.

Policy 10D-7: Encourage sustainability by developing strategies and practices to increase the use of renewable, net-neutral carbon energy in Whatcom County facilities and County vehicles, with a goal of net zero man-made carbon emission by 2050.

Policy 10D-8: Encourage sustainability by developing strategies and practices to reduce landfill waste from Whatcom County government facilities to near zero.

Policy 10D-9: Identify responsible parties and agencies and encourage them to identify and properly seal and/or burn methane that is escaping into the atmosphere from wells.

Policy 10D-10: Create updates to Whatcom County land use policies and development regulations to support renewable energy development goals.

Natural Hazards

Introduction

The location, climate, and geology of Whatcom County combine to create many natural hazards to people and their developments. Earthquakes, volcanoes, landslides, and flooding are some of the major natural hazards found in our region. Additionally, old mines are scattered around the county that could be dangerous to the community. Natural Hazards goals and policies are intended to provide guidance to county government as it assists its citizens in effectively managing natural hazards in a manner that minimizes the danger to each member of this community, while continuing to provide for economic opportunities.

Background Summary

Natural Hazards include the following (**Map 10-4**):

Landslide Hazards – The geologically recent retreat of glaciers from the Whatcom County landscape, succeed by contemporaneous geomorphic processes of erosion, sediment transport, deposition, isostatic rebound and tectonic uplift, has left many hillsides over-steepened and susceptible to naturally occurring and human-triggered slope failure and erosion. Several large, well-known landslides are presently active in Whatcom County, such as the Swift Creek Slide on Sumas Mountain. In addition, numerous large-scale, pre-historic slope failure deposits have been mapped by past workers and are readily identified in more recently available LiDar imagery. Various slope failure processes contribute to the mosaic of landslide hazards present in the county and the potential exists for a multitude of impacts ranging from periodic small- to large-scale rockfall and slides, massive debris slides and avalanches, destructive debris flows, and deep-seated earthflows, slumps and slides. These landslide processes act on large- and small-scale, and though much less catastrophic in nature, smaller landslides occur more frequently and pose a continual hazard to County residents and infrastructure. Certain types of geologic conditions and formations commonly cause landslides, namely the Chuckanut Formation and the Darrington Phyllite, but are also frequently observed in unconsolidated glacial sediments, in the presence of day-lighting groundwater seams and springs, on slopes in excess of 35 percent, along coastal bluffs, and in areas of fluvial erosion.

Alluvial Fan Hazards – Alluvial fan hazards areas exist where steep mountain streams flow onto floodplains or into lakes and deposit debris and sediment. Because these streams are steep and flow in confined canyons, they can carry more sediment and debris than a similar-sized stream flowing over flat land. During a large storm, streams on alluvial fans can create catastrophic flooding and debris floods, such as were experienced in 1983 in the Lake Whatcom area. During this storm event, the Sudden Valley development on Lake Whatcom incurred significant damage to property from flooding and debris flows on the Austin Creek alluvial fan.

Flood Hazards – Heavy winter rains and a transient snowpack combined with the steep and sometimes unstable slopes of Whatcom County's foothills create conditions ideal for flooding and debris flows along many of our rivers and streams. The Nooksack River floodplain alone covers 38,000 acres in Whatcom County. In 1989 and 1990, the Nooksack River overflowed and flooded lowland Whatcom County causing millions of dollars of damage. During some extreme floods, the Nooksack River overflows near Everson and adversely impacts residents along Johnson Creek in Sumas, and in the Abbotsford area of British Columbia. It is projected that climate change will increase flood risk, due to increased sea level and changes in rainfall patterns. Significant damage may result from such floods. In 1991, Whatcom County formed a countywide Flood Control Zone District to address the major flooding issues in the county.

Volcanic Hazards – The presence of Mt. Baker is an asset to our region. Its 10,778-foot peak is one of the dominant features of Whatcom County's landscape. However, Mt. Baker is also considered one of the most active volcanoes in the Cascade Range, and of the six major volcanoes in the range, Mt. Baker is considered by geologists to be very hazardous during and after an eruption. Pyroclastic flows, ash flows, and especially volcanic mudflows, also known as lahars, are believed to be the greatest dangers to human life and development in Whatcom County. Geologic evidence indicates that an eruption on Mt. Baker caused a major lahar about 6,600 years ago that inundated the Middle Fork Nooksack Valley from its headwaters downstream past the confluence with the North Fork at Welcome. The same lahar is now known to have been over 300 feet deep in the upper reaches of the Middle Fork and extended as far west as Nugent's Corner. A major lahar along the Nooksack would divert the river from its channel and cause mass flooding. Fortunately, volcanic eruptions are infrequent with periods of hundreds and thousands of years between events, but this infrequency also makes forecasting a volcanic eruption extremely difficult. However, a major eruption of Mt. Baker would pose a serious threat to human life and property. The deeply weathered nature of the rocks forming Mt. Baker may also fail, triggering a mudflow that would travel rapidly down the stream channels ringing the volcano and result in damage similar to that from a volcanic eruption trigger. Mapping over the past decade of other Cascade volcanoes has demonstrated massive mudflows extending from the volcanoes to Puget Sound, and from Mount Rainier and Glacier Peak.

Earthquake Hazards – Whatcom County lies within the influence of the convergent plate margin between the Pacific and North American Plate termed the Cascadia Subduction Zone. Regionally-extensive and damaging earthquakes, termed mega-thrusts, are possible when stress generated between the subducting Pacific Plate and over-riding North American Plate is released. A mega-thrust earthquake is capable of generating an earthquake of magnitude 9, or greater, and research has indicated an approximate recurrence interval of 500-600 years. Associated with the stresses generated at the convergent plate margin are shallow, crustal faults that are mapped throughout Whatcom County. Earthquake activity on these fault systems is much more frequent than that observed at the Cascadia Subduction Zone, and the Deming area is considered one of the most seismically active areas in Washington. Recent research has shown these crustal faults are capable of generating a magnitude 7 earthquake with an average recurrence interval of 30 to 50 years. While all buildings are susceptible to damage from seismic-shaking, structures built on peat soils, large areas of non-structural fill, or liquefiable soils are prone to more severe shaking during an earthquake. If the shaking is strong enough, or of sufficient duration, structures may collapse or become damaged due to building fatigue, ground settlement/liquefaction, and/or lateral spreading. In addition to seismic hazards posed by the Cascadia Subduction Zone, a significant mega-thrust earthquake has the potential to generate a large and destructive tsunami that has the potential to affect most low-bank areas of the County.

Mine Hazards – Mine hazard areas are sites of abandoned underground mine shafts, adits, and mine tailings. Coal mining was a major industry in Whatcom County in the early part of the 20th century, and several major mines were developed in various parts of the county. All of the formerly active mines are now no longer worked and are abandoned. For the most part these mine locations are known and mapped, such as the extensive coal mines under the northern part of the City of Bellingham and in the Blue Canyon area of South Lake Whatcom.

Issues, Goals, and Policies

Landslides – Siting human development on or adjacent to known landslide hazard areas can create health and safety risks. The risks can be elevated due to extreme weather events and earthquakes, but may also occur with little or no warning. In the case of the Swift Creek Landslide, the release of asbestos-laden sediment poses an additional risk to public health. Development activity can de-stabilize naturally unstable slopes and impact ecosystems. However, predicting the exact timing, location, or extent of a damaging landslide is difficult, and in particular areas of the county landslide hazards are not possible to completely mitigate or avoid. In some circumstances, the development of upland properties may place downslope neighbors and ecosystems at risk from rockfall or landslides. A similar relationship holds true for development at the toe of a potentially unstable slope. In either event, development in proximity to landslide hazards must proceed in consideration of potential impacts in order to ensure life safety and preserve and protect public and private infrastructure.

Alluvial Fans – Because alluvial fan areas are associated with streams, are generally gently sloping and elevated above the adjacent floodplain, and are located at the base of mountains, they have historically been popular places to develop. However, once every 10-25 years, a large storm event occurs in our area and streams flood homes and developments, causing damage to property, ecosystems, and sometimes loss of lives.

Flooding – Floodwaters from the Nooksack River can damage homes, agricultural areas, businesses, and industries in the small cities situated along the river; fish and wildlife habitat and other ecosystems; and disrupt transportation and utility corridors. Storm tides can flood homes and roads along low, exposed marine shorelines in the Birch Bay, Sandy Point, Point Roberts, and Gooseberry Point areas. Homes along Lake Whatcom, Lake Samish, and Cain/Reed Lakes have also been impacted by flooding during extreme storm events. Property and public safety are also impacted by rapid channel morphology events.

Volcanos – A volcanic eruption or mudflow at Mount Baker could potentially severely affect river flow on the Nooksack River or Baker River and cause severe property damage near the volcanoes or along lahar routes. A lahar is an extremely rare and unpredictable occurrence. Evacuation routes should be planned and made public. Development should be regulated according to the Critical Areas Ordinance.

Earthquakes – A major earthquake may likely and significantly affect Whatcom County. If the shaking is strong enough, buildings may collapse, roads could be damaged, and/or communications, power, and utilities could be severely disrupted, mud and rock slides could occur on unstable slopes, and local sea levels may change as shorelines assume altered post-quake elevations.

Mines – Some abandoned mine areas may pose a risk of ground subsidence from the collapse of abandoned mine shafts. Air and water pollution may also be hazards associated with abandoned mine tailings and trapped toxic gases. Development on or near mine hazards could be adversely impacted.

Gas wells – Several exploratory oil & gas wells have been drilled around the county over the last 70+years. Some of these present potential environmental hazards due to ongoing leakage of gas.

Old Landfills – There are known abandoned landfills in the County and possibly some that are unknown. There are also several sites around the County that contain large numbers of abandoned vehicles and other debris. As with most landfills these locations pose some degree of risk of hazardous substances leaking into local aquifers.

Balanced Management – A central issue common to all development in natural hazard areas is the need for Whatcom County to balance the responsibility of local government to protect the public interest and provide for a safe and healthy environment while safeguarding the rights of private property owners.

Economic Impact – Damage to private and public property resulting from the siting of human development in areas of natural hazards is significant to the people of Whatcom County. The 1990 Nooksack River floods caused over $20 million dollars in damage to roads, bridges, buildings, and farmland. Disaster relief efforts are expensive and dangerous to conduct during an emergency. Public efforts to reduce hazards, such as the establishment of the Flood Control Zone District, are also expensive.

Goal 10E: **Minimize potential loss of life, damage to property, the expenditure of public funds, and degradation of ecosystems resulting from development in hazardous areas such as floodplains, landslide-prone areas, seismic hazards areas, volcanic impact areas, abandoned mine and exploratory gas well locations, potentially dangerous alluvial fans, and other known natural hazards by advocating the use of land acquisition, open space taxation, conservation easements, growth planning, regulations, and other options to discourage or minimize development, or prohibit inappropriate development in such areas.**

Policy 10E-1: Avoid or minimize public investments for future infrastructure development on known natural hazard areas.

Policy 10E-2: Use Best Available Science and data to research and investigate the nature and extent of known natural hazards in the county and make this information available to the general public and policy makers in an accessible and understandable form.

Policy 10E-3: Broadly inform the people of Whatcom County of the locations of known natural hazards, and the potential for adverse impacts of such natural hazards to the health, safety, and welfare of people and their properties.

Policy 10E-4: Establish acceptable levels of public risk for development in known natural hazard areas based upon the nature of the natural hazard and levels of public risk, and maintain regulatory criteria for approving, disapproving, conditioning, or mitigating development activity.

Policy 10E-5: Prohibit the siting of critical public facilities in known natural hazard areas unless the siting of the facility can be shown to have a public benefit that outweighs the risk of siting in the particular hazard area.

Policy 10E-6: Maintain a comprehensive program of regulatory and non-regulatory mechanisms to achieve Natural Hazard goals and policies. This program should include such mechanisms as education, tax incentives, zoning, land use regulations, conservation easements, purchase of development rights, transfer of development rights, and public acquisition.

Policy 10E-7: Be consistent with the Natural Hazard goals and policies and consider the locations of Natural Hazard Areas when establishing or changing zoning patterns and densities.

Policy 10E-8: To address the causes of flooding and avoid expensive and maintenance-intensive bank protection measures, the County should prioritize its floodplain property acquisition program.

Policy 10E-9: Discourage new development in the floodplain.

Policy 10E-10: Require applicants for development permits located in natural hazard areas to provide development plans designed to minimize the potential to exacerbate the natural hazard as well as the risk of damage to property or threats to human health and safety. In natural hazard areas where engineering solutions cannot be designed to withstand the forces expected to occur under the design event of a particular natural hazard, or off-site adverse impacts to adjacent properties or ecosystems cannot be adequately mitigated, Whatcom County may deny development permits intended for permanent or seasonal human habitation as described in the Critical Areas Ordinance.

Policy 10E-11: Consider conducting a public process with affected citizens, technical experts, and decision-makers to establish

recommended levels of public risk for each of the identified natural hazards. In developing recommended levels of public risk for natural hazards, consider the appropriate variables affecting developments in hazardous areas. These variables may include:

- Specific types of risk associated with the particular hazard area;
- The gradation of hazards associated with a particular geo-hazard;
- Level of detail necessary to map hazard areas;
- Different levels of risk associated with different ownership classes (e.g. public ownership versus private ownership);
- Different levels of risk associated with different types of land uses; and,
- Mitigation measures related to specific adverse impacts of development in hazard areas.

Once a set of risk levels has been identified, propose these risk levels for adoption of legislation by the County Council as the level to which future development must be designed.

Policy 10E-12: Consider establishing acceptable levels of public risk for use in approving and conditioning development activity in known natural hazard areas. The established level of risk may be expressed as the potential hazard posed as determined by scientific and historical methods applicable to each specific natural hazard.

Policy 10E-13: Review the findings and recommendations of alluvial fan hazard evaluations and make appropriate recommendations for land use and zoning regulations to the County Council to assist in reducing the hazards posed on these fans. Whatcom County has completed or nearly completed alluvial fan evaluations of Canyon Creek, Jones Creek, and Glacier-Gallop Creeks.

Policy 10E-14: Review the findings and recommendations of the Comprehensive Flood Hazard Management Plan (CFHMP) and make appropriate recommendations for land use and zoning regulations to the County Council to assist in the implementation of the CFHMP.

Policy 10-15E: Identify known locations of abandoned wells that could produce methane and/or other hazardous substances and where immediate danger of methane and hazardous substance leaking exists, condition development approvals on affected parcels to mitigate those impacts.

Water Resources

Introduction

Water resources refer to the numerous surface waters such as lakes, streams, wetlands; groundwater; estuaries; and marine waterbodies within Whatcom County (**Map 10-1**). These waterbodies are often integrally linked through the complex network referred to as the water cycle. The water cycle describes the series of transformations that occur in the circulation of water from the atmosphere onto the surface and into the subsurface regions of the earth, and then back from the surface to the atmosphere. Water resources of Whatcom County provide: natural beauty; recreation; habitat for fish and wildlife; water for drinking, agriculture, and industry; and other benefits essential to the quality of life and economic health of the community. The quality of life and economic health of our county's communities depend on the maintenance of a safe and reliable water supply. Decisions affecting any element of the water environment must be based on consideration of the effects on other elements.

Background Summary

Whatcom County has 16 major freshwater lakes, 3,012 miles of rivers and streams, over 37,000 acres of wetlands, 134 miles of marine shoreline, and aquifers containing an undetermined amount of groundwater. These water resources serve multiple uses, including providing a source of drinking water for the people of Whatcom County. Surface water sources such as Lake Whatcom, the Nooksack River, and Lake Samish provide water to more than half the county residents, with the remainder relying on groundwater, either from individual wells or from about 300 public water systems. Agriculture relies on both ground and surface water for a variety of uses, including irrigation and drinking water for livestock. Businesses and industries may also require water, sometimes in substantial quantities, from non-potable and potable supplies. Water is also essential to meet many of what are referred to as "instream" uses, such as recreation, shellfish growing and harvesting, fish and wildlife habitat, aesthetics, and other uses and benefits.

Groundwater is contained in aquifers, which are subterranean layers of porous rock or soil. Most of the surficial aquifers in Whatcom County are replenished by rainwater. Aquifers are often integrally linked with surface water systems and are essential for meeting instream and out-of-stream water needs such as for drinking water, agriculture, industry, and other uses.

Rainfall that runs into drainage courses such as ditches, streams, wetlands, rivers, lakes, and the Strait of Georgia supports local surface and marine waters. Natural drainage systems have many important functions, including storing excess water flow, purifying surface water, recharging groundwater, conveying water, and supporting important biological activities. As more areas in Whatcom County are being urbanized, natural water resource systems are being replaced with built systems, leading to permanent changes in hydrology.

Whatcom County government has a major role in helping to maintain these benefits through its many responsibilities and programs, particularly in the areas of health,

safety, land use, and development. The intent of the following goals and policies is to provide guidance to Whatcom County government as it assists its citizens in effectively managing our water resources in a manner that ensures that the benefits of those resources are maintained far into the future. The water resource section focuses primarily on groundwater and surface water management. Surface water management relates generally to watershed protection and stormwater/ drainage systems. However, some policy direction may indirectly be provided for areas such as wetlands, estuaries, streams, and marine waterbodies within the Water Resource section. Some of these areas are covered in more detail in other sections within the Environment Chapter.

Whatcom County Water Resource Programs

Whatcom County has and/or participates in numerous water resource programs aimed at protecting and enhancing water quality and quantity, including:

- WRIA 1 Watershed Management Project;
- Lake Whatcom Watershed Management;
- Groundwater Protection & Management;
- Flood Hazard Management; and,
- Stormwater Management.

WRIA 1 Watershed Management Project

The WRIA 1 Watershed Management Project is the result of the 1998 Washington State Watershed Management Act, which required all participating local governments to address water quantity, with the option of addressing water quality, instream flows, and fish habitat. The WRIA 1 Watershed Management Project has brought together citizens, local governments, tribes, and state and federal agencies to address these issues.

The framework for watershed management in the state is based on geographic areas known as Water Resource Inventory Areas (WRIAs). WRIA 1 includes the Nooksack River basin and several adjoining smaller watersheds, such as the coastal drainages of Dakota and California Creeks, as well as Lake Whatcom.

Watershed planning in WRIA 1 started in 1998 with the signing of a Memorandum of Agreement (MOA) between the *Initiating Governments*. In the WRIA 1 the Initiating Governments are Whatcom County, City of Bellingham, Public Utility District No. 1, Lummi Nation, and Nooksack Tribe (the latter joining slightly later through a Letter of Agreement). The role of the Initiating Governments was to review a recommended Watershed Plan and take it to their governments' councils for adoption.

Historical Organization (1999-2016)

WRIA 1 Joint Board

In 1999, an Interlocal Agreement further formalized the government-to-government relationship essential to the tribes' participation in the process by

creating a *Joint Board*. The Joint Board is comprised of the Initiating Governments, including the mayor of the City of Bellingham, executive for Whatcom County, manager of Public Utility District No. 1, and designated policy representatives of Lummi Nation and Nooksack Tribe. The Board manages the project's administrative functions such as contracts and budgets. Members of the Joint Board also sit on the Joint Policy Boards.

WRIA 1 Joint Policy Boards

The WRIA 1 Joint Policy Boards are comprised of members of the WRIA 1 Joint Board and Salmon Recovery Board. This organizational level interacts with federal, state, and regional organizations at a policy-level to coordinate the implementation and management of the WRIA 1 Watershed Management Plan – Phase 1, the WRIA 1 Salmonid Recovery Plan and other related activities.

Local Integrating Organization (LIO)

The Whatcom Local Integrating Organization (LIO) is a function of the WRIA 1 Watershed Joint Board and WRIA 1 Salmon Recovery Board (Joint Policy Boards). Local integrating organizations are designated by the Puget Sound Partnership. The two WRIA 1 Boards accepted the function of the Whatcom LIO in October 2010 under the integrated program structure, and was officially recognized by the Puget Sound Partnership's Leadership Council in November 2010. The purpose of the Whatcom LIO is to coordinate implementation of Puget Sound Action Agenda priorities that are consistent with or complement local priorities. One of its functions is to provide a local update to the Action Agenda for Puget Sound. Local updates are intended to identify local priorities in the form of near-term actions (NTAs), which are priority actions with measurable outcomes that can be implemented in the next two years and that align with strategies in the Action Agenda for Puget Sound.

WRIA 1 Planning Unit

The Initiating Governments established the Planning Unit to ensure representation of a broad range of water resource interests. The Planning Unit's role is to recommend actions for a Watershed Plan and to contribute knowledge, interests, technical expertise, and other resources to its development. The Planning Unit is made up of representatives from the Initiating Governments, other governments, and various caucuses. There are 16 total caucuses on the WRIA 1 Planning Unit.

Organizational Update (2016)

Through an interlocal agreement entered into in 2016, the Watershed Management Project Joint Board and the WRIA 1 Salmon Recovery Board were dissolved and the duties and functions of those boards were assumed by the new WRIA 1 Watershed Management Board, consisting of one representative from the Lummi Nation, the Nooksack Tribe, the Washington State Department of Fish and Wildlife, Whatcom County, Whatcom County PUD No. 1, and the cities of Bellingham, Blaine, Everson, Ferndale, Lynden, Nooksack, and Sumas.

The primary functions of the WRIA 1 Watershed Management Board are to:

- Facilitate implementation and adaptive management of the WRIA 1 Watershed Management Plan-Phase 1 as currently constituted or subsequently amended;
- Coordinate the implementation and adaptive management of the WRIA 1 Salmonid Recovery Plan and associated implementation documents,
- Serve as the WRIA 1 Salmon Recovery Lead Entity pursuant to RCW 77.85,
- Coordinate participation in Puget Sound salmon recovery efforts,
- Coordinate the development, implementation and adaptive management of WRIA 1 watershed chapters of recovery plans for ESA listed salmonids and other salmonid species as warranted;
- Coordinate planning, implementation, monitoring and adaptive management of ecosystem recovery actions in WRIA 1 consistent with agreed local goals and objectives,
- Serve as the WRIA 1 Local Integrating Organization and a partner in the Puget Sound Partnership in representing WRIA 1 goals and priorities; and
- Participate in other related activities as agreed to by the Board.

The roles of the Local Integrating Organization and Planning Unit did not change.

2005 WRIA 1 Watershed Management Plan – Phase 1

The 2005 WRIA 1 Watershed Management Plan was approved in 2005 by the Joint Administrative Board, Planning Unit (by consensus), and the County Council. Pursuant to subsequent state requirements, a WRIA 1 Watershed Detailed Implementation Plan was approved by the Joint Administrative Board, Planning Unit, and County Council in 2007. It provides a roadmap for addressing water quantity, water quality, instream flow, and fish habitat challenges. The goals of the WRIA 1 Watershed Management Project are: water of sufficient quantity and quality to meet the needs of current and future human generations; restoration of salmon, steelhead, and trout populations to healthy harvestable levels; and the improvement of habitats on which fish and shellfish rely. These goals are addressed more specifically below:

- **Water Quantity** – To assess water supply and use, and develop strategies to meet current and future needs. The strategies should retain or provide adequate amounts of water to protect and restore fish habitat, provide water for future out-of-stream-uses, and ensure adequate water supplies are available for agriculture, energy production, and population and economic growth under the requirements of the state's Growth Management Act.
- **Water Quality** – To ensure the quality of our water is sufficient for current and future uses, including restoring and protecting water quality to meet the needs of salmon and shellfish, recreational uses, cultural uses, protection of wildlife, providing affordable and safe domestic water supplies, and other beneficial uses. The initial objectives of the water quality management strategy will be to meet the water quality standards.

- **Instream Flow** – To supply water in sufficient quantities to restore salmon, steelhead, and trout populations to healthy and harvestable levels and improve habitats on which fish rely.
- **Fish Habitat** – To protect or enhance fish habitat in the management area and to restore salmon, steelhead, and trout populations to healthy and harvestable levels and improve habitats on which fish rely.

In 2010, the WRIA 1 Joint Board adopted a work plan, budget, and financing strategy, called the Lower Nooksack Strategy, to advance a negotiated settlement of Tribal and state instream flow water rights on the mainstem of the Nooksack River, while maximizing the economic and environmental benefits of out-of-stream water use in the Lower Nooksack sub-basin. The Joint Board adopted the Lower Nooksack Strategy consistent with WRIA 1 Watershed Management Plan priorities.

Lower Nooksack Strategy Objectives:

- Develop and implement a process for negotiating settlement of water rights on the Mainstem Nooksack River.
- Update and verify the Lower Nooksack River sub-basin water budget and develop a groundwater model.
- Determine out-of-stream water user needs:
  - Public water system needs determined by updated the Whatcom County Coordinated Water System Plan (CWSP).
  - Other out-of-stream user needs (e.g., agriculture, private domestic wells, industrial, etc.) determined through a regional water supply planning process.
- Continue and, if appropriate, enhance targeted streamflow and water quality sampling.
- Advance work on tools that foster water resource allocations consistent with long-term economic and environmental land-use goals for implementation in five years.

Streamflow Restoration Act (ESSB 6091)

The Streamflow Restoration Act (ESSB 6091), enacted by the Washington State Legislature on January 18, 2018 and effective on January 19, 2018, directs the Department of Ecology to work with the initiation governments (i.e., the WRIA I Watershed Management Board), in collaboration with the planning unit established pursuant to chapter 90.82 RCW, on updating the WRIA 1 Watershed Management Plan for approval by the Whatcom County Council by February 1, 2019.

The Act requires that the updated plan include recommendations for projects and actions that will measure, protect, and enhance instream resources and improve watershed functions that support the recovery of threatened and endangered salmonids. Such recommendations may include, but are not limited to, acquiring senior water rights, water conservation, water reuse, stream gaging, groundwater monitoring, and developing natural and constructed infrastructure, which includes,

but is not limited to, such projects as floodplain restoration, off-channel storage, and aquifer recharge. Qualifying projects must be specifically designed to enhance streamflows and not result in negative impacts to ecological functions or critical habitat.

At a minimum, the watershed plan must include those actions determined to be necessary to offset potential impacts to instream flows associated with permit-exempt domestic water use. The highest priority recommendations must include replacing the quantity of consumptive water use during the same time as the impact and in the same basin or tributary. Lower priority projects include projects not in the same basin or tributary and projects that replace consumptive water supply impacts only during critical flow periods. The watershed plan may include projects that protect or improve instream resources without replacing the consumptive quantity of water where such projects are in addition to those actions determined to be necessary to offset potential consumptive impacts to instream flows associated with permit-exempt domestic water use.

Until the updated watershed plan is approved and rules are adopted by the Department of Ecology, the County, in issuing building permits under RCW 19.27.097(1)(c) or approving subdivisions under chapter 58.17 RCW in WRIA 1, will comply with all of the specific requirements of ESSB 6091.

Lake Whatcom Watershed Management

Lake Whatcom is a large multi-purpose reservoir that is the source of drinking water for the City of Bellingham, Lake Whatcom Water and Sewer District, several other smaller water districts/associations, and about 250 homes that draw water directly from the lake. The lake provides water to about half the population of Whatcom County.

Lake Whatcom is a multiple use lake and watershed. In addition to providing water for drinking, commercial, and industrial uses, the lake is used for boating, swimming, and fishing. The majority of the watershed is forested, mainly surrounding the large southernmost portion of the lake. Other land uses include residential development (approximately 5,300 homes are located within the watershed), limited agriculture and commercial development, parks, and other public facilities. The on-going management challenge is trying to determine the extent to which these practices can occur while maintaining safe, clean drinking water. The challenge is further complicated by possible requirements related to the Endangered Species Act, tribal water rights, and the potential impact these issues may have on how the City's diversion from the Nooksack River is operated.

The watershed contains four developed areas: the City of Bellingham, which straddles the upper portion of the northern-most basin of the lake; Geneva, which is immediately south and east of Bellingham's city limits and is part of the city's urban growth area; Hillsdale, which is immediately north and east of Bellingham's city limits and is also part of the city's urban growth areas; and the Sudden Valley Rural Community. In addition, it includes a variety of other zones, including resource, rural, and residential rural zones. Outside the Bellingham City limits,

approximately 70% of the watershed is in Forestry zoning and more than 75% of the current land use is forestry.

Water and sewer service are provided by the Lake Whatcom Water and Sewer District. Capacity problems in the district's sewer line, which serves Geneva and Sudden Valley, have caused overflows into the lake in the past. An aggressive program to preclude stormwater infiltration has reduced the overflow problems to a large extent. In addition, the district has a contractually limited flow capacity to Bellingham. The Lake Louise Road sewage interceptor was constructed in January 2003 to carry waste water from Sudden Valley and Geneva and serves as a complement to the Lake Whatcom Boulevard trunk line. The interceptor was designed to service full build-out of Sudden Valley and Geneva.

The City of Bellingham and Lake Whatcom Water and Sewer District are responsible for ensuring drinking water standards are met for their customers. To date water supplies have consistently met standards. The ability to continue to economically meet drinking water standards requires maintaining source water that requires minimal treatment. For this reason the City of Bellingham maintains an on-going source water-monitoring program. Other agencies including Western Washington University, Department of Natural Resources, Department of Fish and Wildlife, Department of Ecology, Lake Whatcom Water and Sewer District, and Whatcom County, have also conducted monitoring, studies, and/or evaluations of the lake and watershed.

Studies on Lake Whatcom conducted over a number of years indicate water quality in the lake has declined. In 1998, the Washington State Department of Ecology listed Lake Whatcom as an impaired water body and placed Lake Whatcom on the Federal Clean Water Act 303(d) list because of low oxygen levels in the Lake and high bacteria levels in streams that flow into the Lake. The 303(d) listing requires the establishment of a Total Maximum Daily Loads (TMDLs). The Department of Ecology issued the “Lake Whatcom Watershed Total Phosphorus and Bacteria Total Maximum Daily Loads: Volume 1, Water Quality Study Findings” in 2008. This study documented Lake Whatcom is impaired for dissolved oxygen due to phosphorus loading and that streams flowing into Lake Whatcom do not meet fecal coliform bacteria standards. Loading capacities for total phosphorus and bacteria reduction targets were set forth in this document. In 2013 The Department of Ecology issued a draft “Lake Whatcom Watershed Total Phosphorus and Bacteria Total Maximum Daily Loads: Volume 2, Water Quality Improvement Report and Implementation Strategy.” This report identifies how much phosphorus can be discharged to the Lake and identifies how the bacteria load should be allocated between the County and City of Bellingham, in order to meet water quality standards.

A significant cause of declining oxygen levels has been from residential development in the watershed. Past development permitted by the City of Bellingham and Whatcom County has led to increased phosphorus loading into the lake, which stimulates algae growth. Bacteria that consume the dying algae deplete the dissolved oxygen, leading to lower oxygen levels in the lake. Past poorly managed forest practices may have led to significant increases in phosphorus loading to the lake.

Whatcom County has taken a number of actions to reduce phosphorus and otherwise address Lake Whatcom water quality. These include rezoning land to allow less development in the watershed, adoption of the Lake Whatcom Comprehensive Stormwater Management Plan, revising stormwater management standards for private development to significantly reduce potential phosphorus runoff, construction of stormwater capital improvement projects and adoption of regulations that restrict the application of commercial fertilizers.

In 2014, approximately 8,800 acres of forest lands around Lake Whatcom were transferred to Whatcom County from the Washington Department of Natural Resources through reconveyance. These lands will provide passive recreation opportunities with hiking and biking trails connecting various communities, neighborhoods, and parks throughout the watershed. Under County ownership, the forests will be allowed to mature to an older growth environment benefiting the watershed and helping to stabilize steep slopes that surround the lake.

In 2004, the Department of Natural Resources (DNR) Board on Natural Resources adopted the Lake Whatcom Landscape Plan. This plan provides additional protections on remaining state managed lands within the Lake Whatcom watershed. The plan provides additional protections on streams and potentially unstable slopes not normally included in forest practices in Washington State.

Lake Whatcom Watershed Management Program

A variety of agencies, organizations, and individuals play a role in managing and protecting Lake Whatcom. In an effort to coordinate efforts of these various players, in 1990, the City of Bellingham, Whatcom County, and Water District 10 (now known as the Lake Whatcom Water and Sewer District) began meeting to develop a joint management strategy for the Lake Whatcom watershed.

In November/December 1992, a joint resolution was passed by the Bellingham City Council, Whatcom County Council, and the Lake Whatcom Water and Sewer District (formerly Water District 10) Commissioners, which reaffirmed this position with six general goal statements and a set of specific goal statements in various categories. The specific goal statements for urbanization were the following:

- Prevent water quality degradation associated with development within the watershed.
- Review and recommend changes in zoning and development potential that are compatible with a drinking-water reservoir environment.
- In addition to zoning, identify and promote other actions to minimize potential for increased development in the watershed (i.e. land trust, development rights, cost incentives, etc.).
- Develop specific standards which reduce the impacts of urbanization, such as minimal lot clearing; clustered development to reduce infrastructure; collection and treatment of stormwater before entering the lake.

- Develop appropriate interlocal agreements with governing agencies to prohibit the potential for additional development once an agreed upon level is set.

The joint resolution included goals for watershed management that extended beyond urbanization. Goals were included for stormwater management, on-site waste systems, conservation, forest management, spill response, hazardous materials transport and handling, data/information management, education/public involvement, and other topics. A joint strategy was approved for developing specific plans to meet the adopted goals. Eight high priority goals were selected first and plans have been completed and jointly adopted for each of the goals.

In 1998, the City, County, and District 10 formalized their joint commitment to protect and manage the lake through the joint adoption of an interlocal agreement and allocation of funding toward protection and management efforts in the watershed. A five-year program plan was developed for ten program areas. Specific priority was placed on activities related to watershed ownership, stormwater management, and urbanization/land development.

The resulting Lake Whatcom Management Program guides actions to protect Lake Whatcom as a long-term supply of drinking water for the City of Bellingham and portions of Whatcom County. The program emphasizes protection over treatment in managing Lake Whatcom and its watershed. The structure of the Lake Whatcom Management Program includes legislative bodies, a management team, an interjurisdictional coordinating team, agency staff, and advisory committees.

The Lake Whatcom Watershed Management Program website (http://www.lakewhatcom.whatcomcounty.org/resources) contains the management plans, reports, and work programs, as well as the jurisdictions' pertinent regulations and brochures on the different programs aimed at the various efforts to improve water quality.

Sudden Valley

Sudden Valley is a community within the Lake Whatcom Watershed. It was established in the early 1970s as a recreation/resort area but over the last thirty years has developed into a significant residential area.

Since 1985, Sudden Valley has mandated the use of appropriate stormwater best management practices through standards for individual stormwater detention for all new construction. Any new building permits on existing lots must be able to demonstrate that stormwater detention is included in the plan as a precondition to issuance of a permit. Sudden Valley is also subject to additional regulatory protections that apply to the Lake Whatcom Watershed under the Water Resource Protection Overlay District, Stormwater Special District, and Water Resource Special Management Area requirements. Under the provisions of these special districts, potential impacts from impervious surfaces, stormwater runoff, and clearing activities are required to be addressed either on-site or through a community-wide process.

Groundwater Protection & Management

Groundwater is contained in aquifers, which are subterranean layers of porous rock or soil. Most aquifers are replenished by rainwater, though some may contain water trapped during glacial periods. Aquifers are often integrally linked with surface water systems and are essential for meeting instream and out-of-stream water needs, such as for drinking water, agriculture, and industry. Whatcom County residents rely heavily on groundwater for drinking water, agriculture, and commercial and industrial needs. Groundwater also plays an important role in maintaining stream flows.

Many studies have been conducted related to groundwater quality in Whatcom County documenting water quality issues, such as exceedances of standards for nitrate, ethylene dibromide (EDB) and 1,2-dichloropropane (1,2-D), pesticides, iron and other agricultural-related contaminates, particularly in the northern portion of the County. In general, groundwater in Whatcom County is very vulnerable to contamination because much of the County's groundwater lies within a shallow unconfined aquifer. Activities that occur on the surface of the ground directly affect groundwater quality. Shallow wells that draw water from unconfined water table aquifers are at highest risk.

Whatcom County's Critical Areas Regulations protect Critical Aquifer Recharge Areas (CARAs) during the development process, by precluding certain uses in CARAs and/or requiring certain precautions be taken in handling certain chemicals.

Flood Hazard Management

A comprehensive approach to flood hazard management planning provides a better understanding of the river and floodplain system. It also ensures flooding and channel morphology problems are not simply transferred to another location within the basin, but are addressed in a comprehensive, basinwide manner. This approach directs future flood hazard management expenditures in the most efficient and cost effective manner.

Whatcom County Public Works coordinates with the Flood Control Zone District Advisory Committee (FCZDAC) to identify and characterize flooding problems and provide recommendations for achieving consistent, long-term flood hazard reduction strategies. Some activities typically involved in developing a Comprehensive Flood Hazard Management Plan (CFHMP) include data collection, hydraulic modeling, alternatives analysis, floodplain mapping, and meander limit identification. In addition to the technical components in comprehensive flood planning, extensive coordination with the public and other agencies is required throughout the planning process.

Other County flood management programs include:

Early Flood Warning –Work with the United States Geological Survey (USGS) to maintain a network of early flood warning stations to help citizens prepare and take appropriate measures to protect lives and property from flood damages.

Flood Hazard Reduction Program – Implement projects to reduce future flood damages and public expenditures to repair damaged areas. Examples include

construction of setback levees and overflow spillways, and designation of overflow corridors in overbank areas. Two alluvial fan studies have been completed for Jones Creek and Canyon Creek. For Jones Creek, review of potential mitigation measures and concept design of a preferred approach has also been completed.

Comprehensive Flood Hazard Management Planning – Identify flooding problems and provide recommendations for achieving long-term flood hazard reduction strategies. The Lower Nooksack River Comprehensive Flood Hazard Management Plan was adopted in 1999. Implementation of the plan is ongoing.

Preparedness and Response – Plan for and implement a coordinated response during flood events to ensure public safety and minimize flood damages.

National Flood Insurance Program – Participate in the Congress-initiated National Flood Insurance Program (NFIP) of 1968, to make affordable flood insurance available to citizens of communities that adopt approved flood management regulations.

Repair and Maintenance Program – Address problem areas with rivers, streams, and coastlines of Whatcom County, and mitigate future flood damages in a proactive and cost-effective manner.

Technical Assistance – Provide technical assistance regarding drainage and flood issues to private citizens and businesses located along the many waterbodies within Whatcom County.

Organization

Flood Control Zone District (FCZD)

Following the severe floods of 1989 and 1990, in 1992 Whatcom County created the countywide Flood Control Zone District (FCZD), including both incorporated and unincorporated areas of the County. The FCZD is a quasi-municipal corporation that is a separate legal entity from Whatcom County government. Even though this legal separation exists, the Whatcom County Council and the County Executive (Board of Supervisors) and the Public Works Department (staff) perform the governance and administrative support for the district.

The primary purpose of the FCZD is flood hazard management. Revenue generated to for this purpose is accomplished in two ways: (1) a county-wide uniformly applied tax; and, (2) supplemental revenue generated within localized Diking Districts and Sub-Flood Districts where specific local project activity is planned.

While the primary purpose of the FCZD is flood hazard management, the district is allowed to address a wide variety of water resource issues. Due to this ability, revenue generated by the district is currently used to finance additional water supply and water quality related improvement projects.

Pertinent Documents

Lower Nooksack River Comprehensive Flood Hazard Management Plan (CFHMP)

In 1999, the county adopted the Lower Nooksack River Comprehensive Flood Hazard Management Plan (CFHMP). The CFHMP identifies projects, programs, and other recommendations aimed at reducing future flood damages along the Lower Nooksack River.

Critical Areas Regulations (WCC 16.16)

Whatcom County's Critical Areas Regulations aim to protect people and property in Frequently Flooded Area (FFAs) by requiring development in these areas conforms to WCC Title 17, Flood Damage Prevention.

Stormwater Management

Stormwater runoff occurs when precipitation from rain or snowmelt flows over the land surface. The addition of roads, driveways, parking lots, rooftops, and other surfaces that prevent water from soaking into the ground greatly increases the runoff volume created during storms. This runoff is swiftly carried to our local streams, lakes, wetlands and rivers and can cause flooding and erosion. Stormwater runoff also picks up and carries with it many different pollutants that are found on paved surfaces, such as sediment, nitrogen, phosphorus, bacteria, oil and grease, trash, pesticides, and metals.

County Stormwater Management Programs

National Pollutant Discharge and Elimination System (NPDES) Phase II Permit

Stormwater runoff picks up pollutants as it travels over our developed landscapes and is a major source of water quality problems. In 1987, the Federal Clean Water Act was amended to address stormwater pollution. As a result, the United States Environmental Protection Agency (EPA) created the National Pollutant Discharge Elimination System (NPDES) to address stormwater runoff. States are required to administer permits to local jurisdictions to regulate runoff as part of the NPDES Program. The Permit is referred to as the "NPDES Phase II Permit" or "Phase II Municipal Stormwater Permit".

In February of 2007, the Washington State Department of Ecology issued Whatcom County's Phase II Municipal Stormwater Permit. This permit regulates discharges from Small Municipal Separate Storm Sewers, and is part of the National Pollutant Discharge and Elimination System (NPDES) and State Waste Discharge General Permit. It sets forth requirements of municipalities to address stormwater runoff in areas determined to have population densities reaching urban standards. Whatcom County is required to implement various stormwater management strategies to comply with this State permit.

The current Permit boundary covers approximately 15,000 acres and generally includes the following areas (Figure 1):

- Bellingham Urban Growth Area

- Sudden Valley
- Portions of the Hillsdale and Emerald Lake area
- Portions along North Shore Drive on Lake Whatcom and Lake Whatcom Boulevard
- Ferndale Urban Growth Area
- Portions along Chuckanut Drive and Chuckanut Bay
- Birch Bay Urban Growth Area

Additionally, though not within the NPEDES permit area, the County has made the entire Lake Whatcom watershed is subject to the illicit discharge detection and elimination requirements of the Permit through ordinance and agreement with the Department of Ecology.

Jurisdictions are allowed to discharge runoff into waterbodies of the State (such as rivers, lakes, and streams) as long as they implement programs that protect water quality by reducing pollutants to the maximum extent possible through requirements of the NPDES Phase II Permit. Those requirements are reported and submitted to the Department of Ecology through the Stormwater Management Program (SWMP) and the Annual Compliance Report.

The Western Washington Phase II Municipal Stormwater Permit is required by the State of Washington Water Pollution Control Law Chapter 90.48 RCW, and the Federal Water Pollution Control Act Title 33 United States Code (Clean Water Act). The Permit is administered by the Washington State Department of Ecology.

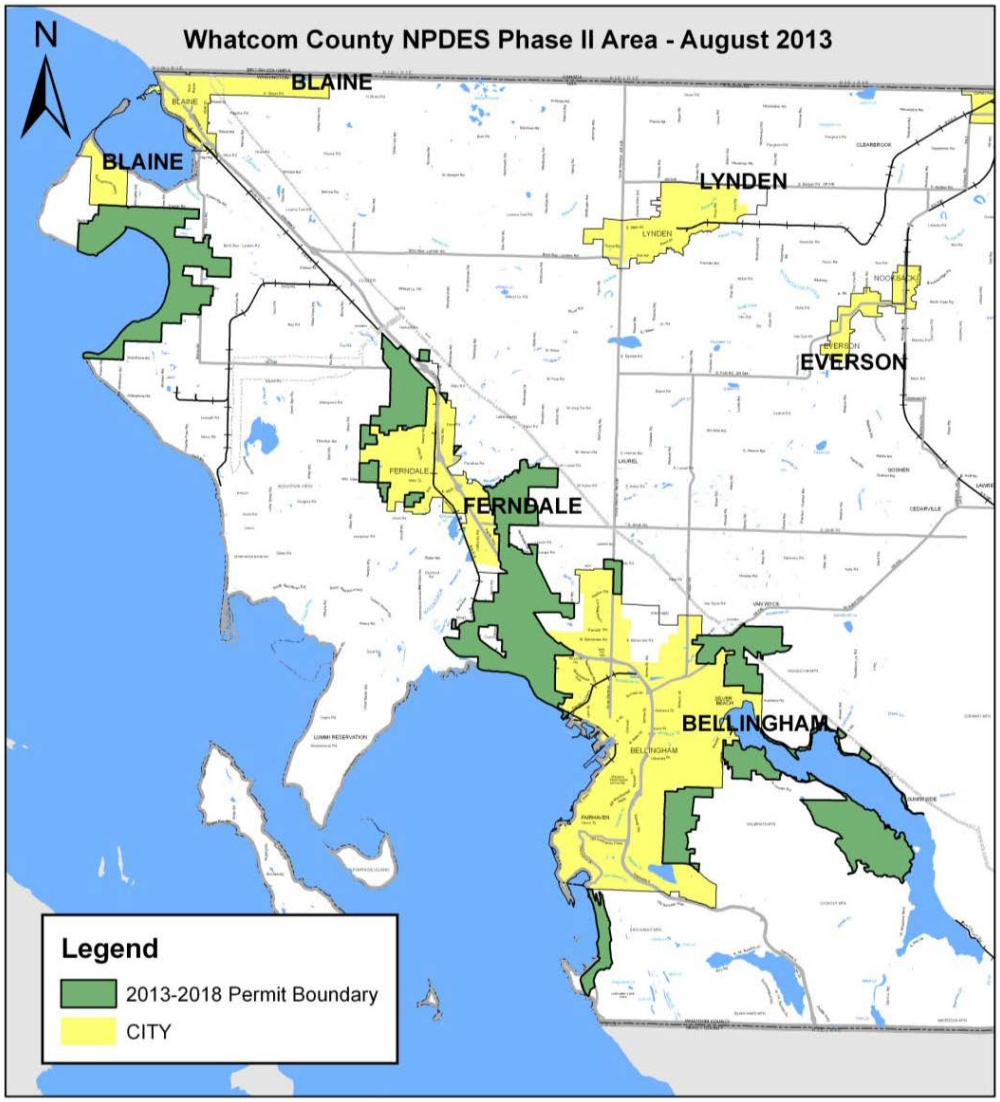

Figure 1. NPDES Phase II Boundaries

Pollution Identification and Correction (PIC) Program

Clean water supports healthy drinking water, safe recreational uses, quality water for irrigation and livestock, healthy fish, and shellfish that are safe to consume. Currently, many streams in Whatcom County do not meet water quality standards for fecal coliform bacteria. Fecal coliform bacteria are found in the intestinal tract of warm-blooded animals and when found in streams are an indicator of human or animal waste in the water. The higher the bacteria level, the greater the public

health risk to people drinking water, wading, fishing, or consuming shellfish. The Pollution Identification and Correction (PIC) Program was created to help implement community solutions to clean water.

Pollution – The key potential sources of bacteria that have been identified in Whatcom County coastal drainages are (1) **animal waste** from agricultural operations, domestic pets, waterfowl, and wildlife, and (2) **human sewage** from failing on-site sewage systems (OSS), leaking sewers, or cross-connections.

Identification – Whatcom County coordinates a routine water quality monitoring program at approximately 90 stations in watersheds that discharge to marine waters. Samples are collected on at least a monthly basis and analyzed for fecal coliform bacteria. Results are evaluated annually to identify focus areas with the largest bacteria problems. Within the focus areas, stream segments are monitored and potential bacteria sources are identified.

Correction – Technical and financial resources are offered to landowners to identify and implement solutions on their property. Residents can help improve the community's water quality by inspecting and maintaining septic systems and by fencing animals out of streams, ditches and swales. By actively managing pastures, creating protected heavy use areas, and covering manure storage areas, residents can prevent manure-contaminated mud from polluting surface water. Planting shrubs and trees along stream banks and picking up after dogs also contributes to better water quality.

Issues, Goals, and Policies

Watershed Planning and Management

Goal 10F: **Protect and enhance water quantity and quality and promote sustainable and efficient use of water resources.**

Policy 10F-1: Maintain as a high priority the protection of water quality and quantity.

Policy 10F-2: Actively participate in and support efforts to coordinate local, federal, tribal, and state agencies to achieve integration and/or consistency between the various levels of environmental regulations relating to the County.

Policy 10F-3: Work cooperatively with Federal, State, and local jurisdictions, Tribal governments, municipal corporations, and the public to implement the goals and policies of the Comprehensive Plan as well as state water resources and water quality laws.

Policy 10F-4: Participate in the coordination of all local water and land management efforts, plans, and data to ensure adequate oversight of water quantity and quality issues.

Policy 10F-5: Manage water resources for multiple instream and out-of-stream beneficial uses, including instream flows set by the State Department of Ecology.

Policy 10F-6: Actively promote and participate in education, research, and information opportunities that improve our understanding of the county's complex water resource systems. New information should be considered in the development and evaluation of management actions.

Policy 10F-7: Pursue the most effective methods for protecting water quantity and quality, through both regulatory (e.g. zoning, enforcement, fines) and non-regulatory approaches (education, incentives, and technical/financial assistance). Emphasis shall be placed on non-regulatory approaches where possible and effective.

Policy 10F-8: Track the development of policies and regulations at the local, state, and federal level. Provide input to those regulations and policies as necessary to ensure that the interests of Whatcom County are considered.

Policy 10F-9: In conjunction with all jurisdictions, develop and adopt programs to protect water quality and quantity within watersheds, aquifers, and marine waterbodies that cross jurisdictional boundaries.

Policy 10F-10: Promote awareness and participation in management and protection efforts by individual citizens and the community as a whole.

Policy 10F-11 Pursuant to ESSB 6091, Whatcom County will work through the Planning Unit and WRIA 1 Watershed Management Board and its established processes to update the WRIA 1 Watershed Management Plan, consistent with ESSB 6091, for approval by the Whatcom County Council by February 1, 2019. The updated plan shall include recommendations for projects and actions that will measure, protect, and enhance instream resources and improve watershed functions that support the recovery of threatened and endangered salmonids.

At a minimum, the watershed plan must include those actions determined to be necessary to offset potential impacts to instream flows associated with permit-exempt domestic water use. The highest priority recommendations must include replacing the quantity of consumptive water use during the same time as the impact and in the same basin or tributary. Lower priority projects include projects not in the same basin or tributary and projects that replace consumptive water supply impacts only during critical flow periods. The watershed plan may include projects that protect or improve instream resources without replacing the consumptive quantity of water where such projects are in addition to those actions determined to be necessary to offset potential consumptive impacts to instream flows associated with permit-exempt domestic water use.

Watershed plan recommendations may include, but are not limited to, acquiring senior water rights, water conservation, water reuse, stream gaging, groundwater monitoring, and developing natural and constructed infrastructure, which includes, but is not limited to, such projects as floodplain restoration, off-channel storage, and aquifer recharge. Qualifying projects must be specifically designed to enhance streamflows and not result in negative impacts to ecological functions or critical habitat.

Until the updated watershed plan is approved and rules are adopted, the County, in issuing building permits under RCW 19.27.097(1)(c) or approving subdivisions under chapter 58.17 RCW in WRIA 1 will comply with all of the specific requirements of ESSB 6091.

Surface Water and Groundwater

Goal 10G: Protect and enhance Whatcom County's surface water and groundwater quality and quantity for current and future generations.

Policy 10G-1: Manage surface water systems on a watershed basis.

Policy 10-2G: Coordinate efforts to bring all water users in Whatcom County into compliance with state and federal water laws in a way that enhances stream flows, water quality, and fish and wildlife habitat while advocating for adequate water for existing agriculture.

Policy 10G-3: In conjunction with the public and appropriate local, state, Tribal, and federal jurisdictions, define, identify, and develop management strategies for watershed basins and subbasins that may require special protection. These areas may include aquifers, critical aquifer recharge areas as defined under the Growth Management Act, Groundwater Management Areas, wellhead protection areas, and high priority watersheds such as those specified under WAC 400 (Local Planning and Management of Non-point Source Pollution), WRIA Watershed Management Planning, and under legislative policy direction (e.g. Nooksack Basin, Lake Whatcom, Lake Samish and Drayton Harbor).

Policy 10G-4: Management efforts should consider both water quality and quantity. Water quality efforts should help reduce the likelihood that potential contaminant sources will pollute water supplies. Water quantity efforts should include consideration and protection of recharge areas and potential effects on stream flow.

Policy 10G-5: Support the implementation of local and state Watershed Management Plans, the Lower Nooksack Strategy, the Lake

Whatcom Management Program, NPDES Phase II Permitting, and the WRIA Watershed Management Projects.

Policy 10G-6: Pursue the adoption and implementation of ground and/or surface water management plans and their integration into local comprehensive plans. Designate the Lake Whatcom and Lake Samish Watersheds as high priorities in this effort.

Policy 10G-7: Oppose the use of hydraulic fracturing in oil and gas wells (also known as "fracking") to avoid the potential degradation of water quality in aquifers and other groundwater.

Policy 10G-8: Monitor, prevent, and reduce the establishment of invasive species in Whatcom County waterbodies.

Policy 10G-9: Identify and/or update wellhead protection areas and critical aquifer recharge areas and incorporate into the Critical Areas Ordinance. This information should be available to the public.

Stormwater and Drainage

Goal 10H: Protect water resources and natural drainage systems by controlling the quality and quantity of stormwater runoff.

Policy 10H-1: Manage stormwater runoff to minimize surface water quality and quantity impacts and downstream impacts on channel morphology, property owners, and aquatic species and habitats.

Policy 10H-2: Maintain or enhance, when appropriate, natural drainage systems and natural water storage sites in order to better protect water quality, moderate water quantity, minimize environmental degradation, and reduce public costs.

Policy 10H-3: Limit the alteration of natural drainage systems and natural water storage sites without mitigating measures. Such measures should not degrade water quality or fish and wildlife habitat and should not increase hazards to the community.

Policy 10H-4: Support the use by resource industries—such as agriculture, forestry, and mineral resource extraction—of management practices that minimize erosion and sedimentation, and significantly reduce pollutants.

Policy 10H-5: Evaluate the role of watersheds in the maintenance of water quality and quantity and determine what cumulative impacts development activity may have on watershed hydrology.

Policy 10H-6: Develop specific stormwater management programs for each drainage basin within the county's jurisdiction that may be impacted by urban levels of development. Recognize the Lake Whatcom Watershed, Lake Samish, and Drayton Harbor as high priorities in this effort. Coordinate efforts with the Lake

Whatcom Policy Group, the various shellfish protection districts, and other watershed management entities.

Policy 10H-7: Establish, as a high priority, a stormwater maintenance program that ensures that stormwater systems are adequately maintained and function at or near design capacity.

Policy 10H-8: Strongly incentivize the use of low impact development strategies. Minimize the amount of impervious surface whenever practicable by using natural engineering design methods such as the use of open, grassed, street swales and rain gardens instead of curbs and gutters. Where feasible, encourage alternate surfacing options and other techniques associated with low impact development (see Glossary).

Policy 10H-9: Develop and administer stormwater management standards as required by the NPDES Phase II Permit.

Policy 10H-10: Develop and administer regulations and incentives such that there is no net loss of ecological functions and values of regulated wetlands and fish and wildlife habitats.

Policy 10H-11: Place a high priority on integrating impervious surface reduction incentives into policies, regulations, and standards.

Policy 10H-12: Develop and implement comprehensive stormwater management programs and strategies designed to address runoff from all private and public developments and facilities within regulated and sensitive watersheds.

1. Implement the Western Washington Phase II Municipal Stormwater Permit as part of the National Pollutant Discharge Elimination System (NPDES) Program. Incorporate watershed considerations into the development of a comprehensive stormwater management strategy for designated areas.
2. Review Stormwater Special Districts Standards, Watershed Protection Districts, and other related codes that address runoff treatment from potentially polluting surfaces for their applicability to other sensitive watersheds with the Technical Advisory Committee and other appropriate agencies. Coordinate efforts for ongoing monitoring and evaluation within the sensitive watersheds and NPDES areas.
3. Amend subdivision, zoning, and other land use regulations and design standards to encourage that land use activities minimize the amount of impervious surface.
4. Identify and implement a long-term funding source to provide for water resource protection services, including non-

point source identification and enforcement of applicable county regulations.

5. Focus on the Lake Whatcom watershed as a high priority in developing a stormwater management program. Develop a stormwater management plan that achieves a uniform level of protection throughout the Lake Whatcom watershed. Ensure coordination and communication with the public and affected jurisdictions, such as the Lake Whatcom Water and Sewer District, the Sudden Valley Community Association, and the City of Bellingham.
6. Ensure existing stormwater standards are adequately enforced within Stormwater Special Districts, Watershed Protection Districts, and the NPDES areas.
7. Prioritize stormwater polluting areas and develop retrofits for areas most likely to impact sensitive waters.

Water Conservation

Goal 10-I: Support water conservation, reclamation, reuse measures, and education as a means to ensure sufficient water supplies in the future.

Policy 10I-1: Support and assist water users in the development of cost-effective means of improving efficiency of water use.

Policy 10I-2: Support efforts to establish and protect sustainable water supplies to meet existing and future demands for water in the county.

Policy 10I-3: Develop and implement plans to comply with the Department of Ecology's instream flow and water management rules and water resources management programs.

Policy 10I-4: Coordinate local water and land management efforts, plans, and data to ensure adequate oversight of water quality and quantity issues.

Policy 10I-5: Quantify water use to promote conservation.

Policy 10I-6: Use water use data to encourage conservation and maintain availability of water for agriculture and instream flow.

Policy 10I-7: Encourage the Department of Ecology to provide flexibility in the application of the water relinquishment rule simultaneous with establishing a water bank/water exchange program in Whatcom County in cooperation with stakeholders.

Lake Whatcom Watershed

Goal 10-J: Prioritize the Lake Whatcom watershed as an area in which to minimize development, repair existing

stormwater problems (specifically for phosphorus), and ensure forestry practices do not negatively impact water quality. Provide sufficient funding and support to be successful.

Policy 10J-1: Work with property owners to find acceptable development solutions at lower overall densities than the present zoning allows.

Policy 10J-2: Develop and implement the fair and equitable funding mechanisms called for in the 2008 Lake Whatcom Comprehensive Stormwater Plan to support lake water quality protections by 2018.

Policy 10J-3: Recognize that all users of Lake Whatcom water have an interest in the resource and should share in the cost of its protection.

Policy 10J-4: Work cooperatively with the City of Bellingham, the Lake Whatcom Water and Sewer District, and applicable associations and organizations to identify, review, and, as appropriate, recommend changes to existing monitoring programs to better improve lake water quality.

Policy 10J-5: Evaluate and pursue, as appropriate, the use of incentives to encourage voluntary lot consolidation, transfer or purchase of development rights, current use taxation, and participation in open space conservation programs.

Policy 10J-6: Do not allow density bonuses within the Lake Whatcom Watershed.

Policy 10J-7: Work cooperatively with the City of Bellingham and the Lake Whatcom Water and Sewer District to develop and track benchmarks to determine: the effectiveness of management options; when goals have been achieved; and/or when additional actions are necessary.

Policy 10J-8: Continue to develop and refine structural and non-structural best management practices (BMPs), both voluntary and required, to minimize development impacts within the Lake Whatcom watershed.

Policy 10J-9: Work to keep publicly-owned forest lands within the Lake Whatcom watershed in public ownership, and support managing forestry on these lands in a manner that minimizes sediment and phosphorus yields from streams, and is consistent with Best Available Science (BAS) data, in order to protect and enhance water quality.

Policy 10J-10: Encourage the location of public services, such as schools, libraries, parks/open space, and post offices within Sudden

Valley in an attempt to reduce the vehicle miles traveled within the watershed.

Policy 10J-11: Continue to work with Bellingham and Lake Whatcom Water and Sewer District to protect and manage the Lake Whatcom watershed in accordance with the 1998 jointly adopted interlocal agreement. Focus on continued implementation of the 5-Year Work Plans of the Lake Whatcom Management Program. In addition, work with the affected jurisdictions and secure funding for programs that protect and enhance water quality.

Policy 10J-12: Review and modify (as needed) the current development review process for projects in the Lake Whatcom Watershed to ensure coordination with other jurisdictions to streamline regulations that improve and protect water quality.

Policy 10J-13: The existence of sewer lines in the Rural and Rural Forestry comprehensive plan designations will not be used to justify rezoning property in the Lake Whatcom watershed to allow higher density land uses.

Policy 10J-14: Existing Urban Growth Areas shall not be designated or expanded nor new Urban Growth Areas designated within the Lake Whatcom Watershed, and rezones that allow greater residential densities will not be allowed.

Ecosystems

Introduction

Ecological systems, or ecosystems, refer to the natural systems that have developed within the geologic and geographic setting of Whatcom County. Whatcom County contains a significant number of distinct ecosystem types, with associated fish, wildlife, and plant species, as well as many other living organisms. This biodiversity has evolved and adapted according to the specific physical and climatic conditions of the county (Map 10-2, Map 10-3). Ecosystem goals and policies are intended to provide guidance to county government as it assists people to manage and protect these ecosystems. Additionally they ensure other benefits are maintained far into the future.

Background Summary

Whatcom County provides a wide variety of natural habitats that support and shelter a diverse array of fish and wildlife species. The county's wildlife is particularly varied and abundant when compared to many other areas of Washington State. There are a number of factors that have contributed to this: abundant water resources, rich soils, mild climate conditions, and a moderate degree of urbanization are among the most important. Among the habitats of importance to fish and wildlife are the following:

- wetlands, lakes, and streams;

- nearshore, intertidal, estuarine habitats, and marine habitats including, but not limited to, kelp and eelgrass beds;
- riparian areas and other travel corridors;
- snags and downed logs;
- forested habitats in a variety of successional stages;
- caves, cliffs, rocky balds, and talus slopes;
- grasslands and cultivated fields; and,
- thickets and fence rows.

Aquatic habitats include rivers, streams, ponds, lakes, and their riparian borders. Together, these habitats are essential to Whatcom County's fish and wildlife. Twenty-six species of fish—including twelve economically important stocks of salmon and trout—inhabit fresh water in Whatcom County for all or part of their life cycles. Healthy flowing streams and rivers, as well as off-channel wetland habitats, are essential to the survival of the majority of these fish. Wetland ponds, especially beaver ponds, provide optimal habitats for rearing and over-wintering of young fish, particularly Coho salmon and cutthroat trout juveniles.

Most wildlife species regularly use aquatic and riparian habitats for breeding, feeding, shelter, and migratory activities. Of this large grouping, over half are dependent upon wetland habitats at some point in their life cycles, and would decline or disappear in the absence of wetlands. Wetlands also contain unique vegetative communities that harbor many species of rare and unusual plants.

Fish and Wildlife Populations and Habitat

Optimum habitat for Pacific Northwest salmon and other fish is one that resembles the riparian landscape of pre-settlement times: braided streams wandering freely through nearly continuous forest; trees overhanging and partly fallen into streams; stream beds with abundant logs, step waterfalls, pools, and cutbanks; and vegetated marine and estuarine communities. In most cases, it is not realistic to return to that state. However, measures can be taken to retain or regain those features that provide the minimum requirements of a viable fishery.

The best habitat for native wildlife includes native plants, which are more closely matched to local soils, climate, and wildlife. They provide the right kinds of food, shelter, and diversity needed by wildlife. Native plants frequently need less watering, spraying, pruning, fertilizing, or other maintenance than do exotic or imported plants. Loss of native vegetation through conversion to ornamental vegetation and non-native species can result in loss of wildlife habitat, increased competition to native wildlife from introduced species, such as starlings, and increased maintenance needs. Loss of native vegetation also can occur through invasions of non-native species, such as the spread of *Spartina*, which can drastically displace important native eelgrass and mudflat communities.

Salmon Recovery Program

The decline of salmonids throughout Washington and the Pacific Northwest over the past century is well established. Since 1991, numerous evolutionarily significant

units (ESUs) of Pacific salmonids have been listed as endangered or threatened under the Endangered Species Act (ESA), including those of chinook, coho, chum, sockeye, and steelhead. Decline in wild salmonid abundances have been attributed to widespread loss and degradation of habitat, due to hydropower, residential and urban development, agriculture, forestry, and fishing and hatchery production.

In the Nooksack basin, abundances of several salmonid stocks have diminished substantially from historical levels. The declines in local salmonid stocks, especially Chinook salmon, have had profound economic, cultural, and social impacts on the greater WRIA 1 community. Direct impacts include reduced jobs and income for commercial fisherman, severe curtailment of tribal and subsistence catch, and loss of tourism associated with recreational fishing. In addition, ESA listings impose constraints on the activities of local and tribal governments, businesses, the agricultural community, and citizens, who must seek to avoid or minimize take of listed species. Nonetheless, salmon remain an integral part of the natural and social landscape of Whatcom County and the Nooksack River Watershed. Recent watershed recovery planning and restoration efforts by federal, state, local, and tribal governments, non-profit organizations, businesses, and private citizens demonstrate a commitment to salmon recovery in WRIA 1.

The WRIA 1 Salmon Recovery Program is a multi-government planning effort with a WRIA-wide scope to address salmon recovery and protection of ESA and non-ESA listed salmonids.

WRIA 1 Salmon Recovery Strategy

The ultimate goal for salmon recovery in WRIA 1 is to recover self-sustaining salmonid runs to harvestable levels through the restoration of healthy rivers and natural stream, river, estuarine, and nearshore marine processes; careful use of hatcheries; and responsible harvest, with the active participation and support of local landowners, businesses, and the larger community. The purpose of the *WRIA 1 Salmonid Recovery Plan* is to identify the actions necessary to recover WRIA 1 salmonid populations, especially listed species, and to outline the framework for implementation of recommended actions that have been agreed to by local, state, tribal, and federal governments and stakeholders in WRIA 1. In the near term, the objectives are to:

1. Focus and prioritize salmon recovery efforts to maximize benefit to the two Nooksack early chinook populations;
2. Address late-timed Chinook through adaptive management, focusing in the near-term on identifying hatchery versus naturally-produced population components;
3. Facilitate recovery of WRIA 1 bull trout and steelhead by implementing actions with mutual benefit to early chinook, bull trout, and steelhead, by removing fish passage barriers in presumed bull trout and steelhead spawning and rearing habitats in the upper Nooksack River watershed; and

4. Address other salmonid populations by (a) protecting and restoring WRIA 1 salmonid habitats and habitat-forming processes through regulatory and incentive based programs; and (b) encouraging and supporting voluntary actions that benefit other WRIA 1 salmonid populations without diverting attention from early chinook recovery.

Focusing efforts on early chinook is consistent with regional salmon recovery, current abundance and productivity for the two populations is very low and recovery of both populations is critical to delisting and recovery of the Puget Sound Evolutionarily Significant Unit (ESU) for Chinook salmon.

Salmon Recovery Board (SRB)

WRIA 1 Salmon Recovery Board membership includes the County Executive, Bellingham Mayor, Mayors of the Small Cities of Whatcom County, the regional director of the Washington Department of Fish and Wildlife, and policy representatives from Lummi Nation and Nooksack Indian Tribe.

The WRIA 1 Salmonid Recovery Plan (2005), a chapter of the Puget Sound Salmon Recovery Plan, guides restoration in the Nooksack River and adjacent watersheds. This plan was developed in partnership with Nooksack Tribe, Lummi Nation, Washington Department of Fish and Wildlife, Bellingham, Whatcom County Government, and the small cities of Whatcom County. Chinook salmon populations (listed as threatened with extinction under the Federal Endangered Species Act) are prioritized, yet the plan also provides the template for recovery of threatened steelhead and bull trout and the other salmon and trout populations native to Whatcom County.

The salmon plan was developed in parallel with the WRIA 1 Watershed Management Plan. Salmon habitat is intricately linked to watershed management; salmon recovery will be most successful when fish habitat objectives are carefully coordinated with watershed management objectives. Integrating salmon recovery with flood hazard management and restoring fish passage under County roads are two primary areas of focus.

Marine Resources Management

Marine habitats include all saltwater bodies and their shorelines, kelp and macro algae beds, eelgrass meadows, salt marshes, beaches, and mudflats. These habitats play a vital role in the health of the local environment, as well as of the broader Puget Sound region. They provide spawning, rearing, and feeding grounds for a wide variety of marine life, as well as refuge for juvenile and adult fish, birds, and shellfish. The vegetation on back-shore marshes and within estuaries buffers adjacent upland areas by absorbing wave energy and slowing erosion.

Symptoms of ecosystem stress include: declining stocks of salmon, bottomfish, and forage fish; closures of recreational and commercial shellfish beds; degradation and losses of eelgrass beds, kelp forests, and other marine habitats; and dwindling populations of seabirds and marine mammals.

The Northwest Straits Marine Conservation Initiative was authorized by Congress in 1998. The Initiative established the Northwest Straits Commission and Marine Resources Committees (MRCs) in seven western Washington counties, including Whatcom County. The MRCs' main purpose is to guide local communities, using up-to-date information and scientific expertise, to achieve the important goals of resource conservation and habitat protection within the Northwest Straits. The Whatcom County MRC acts as an advisory committee to the Whatcom County Council.

Shellfish Recovery

Many of the marine waterbodies in Whatcom County support natural and cultured bivalve shellfish, including oysters and many species of clams. The warm, nutrient-rich tide flats in and around Lummi, Portage, and Birch Bays; Drayton Harbor; and Eliza and Lummi Islands represent unique water resources in this regard. Commercial shellfish growers, recreational clam and oyster harvesters, and Native Americans have used this resource for many years. It is an important part of our community's heritage.

Our ability to grow and harvest shellfish that is safe for human consumption is directly linked to surface water quality and the influence it has on marine waters. The primary measure of water quality for shellfish harvesting is bacterial contamination. There are many potential sources of fecal bacteria, such as municipal sewage treatment plants, on-site sewage systems, boat waste, farm animals, pets, and wildlife. Since 1995, valuable shellfish beds in Portage Bay and Drayton Harbor have been downgraded (harvest prohibited) due to non-point pollution impacting recreational, tribal, and commercial harvesting. In 2014, Portage Bay was identified as a threatened Shellfish Growing Area by the Washington Department of Health. (Washington Department of Health, 2014)

Shellfish Protection Advisory Boards

Whatcom County has three Shellfish Protection District Advisory Committees, one for each of the Shellfish Protection Districts: Birch Bay, Drayton Harbor, and Portage Bay. Each advises the County Council on proposed actions and operations relating to the restoration of water quality in their respective watersheds.

Shellfish Recovery Plans

Shellfish Recovery Plans have been created for each of three districts. The plans outline the primary sources of bacteria and actions to improve water quality:

- Drayton Harbor Shellfish Recovery Plan (2007)
- Portage Bay Shellfish Recovery Plan (2014), Portage Bay Initial Closure Response Strategy (1998)
- Birch Bay Initial Closure Response Strategy (2009)

Pertinent Documents

- Whatcom Marine Resources Committee 2011 - 2015 Strategic Plan (2010)

This document outlines the MRC's mission, vision, values, goals, objectives, and strategies for achieving them.

Shoreline Management Program

This section has been moved to and is addressed in Chapter 11, Shorelines.~~The State Legislature passed the Washington State Shoreline Management Act (SMA) in June 1971. The SMA was overwhelmingly passed by public initiative in 1972. Under the SMA, each county and city was required to prepare a shoreline "master program" in accordance with the shoreline guidelines issued by the State Department of Ecology in 1972.~~

~~The Whatcom County Shoreline Management Program (SMP), WCC Title 23, is the document that implements the goals and policies of the SMA at the local level. It was adopted in 1976 in accordance with RCW 90.58. The goals and policies of the Whatcom County Shoreline Management Program also constitute the shoreline component of the Whatcom County Comprehensive Plan.~~

~~Under the provisions of the SMA, all development along shorelines of the state is required to comply with the provisions of local shoreline master programs. The Whatcom County Shoreline Management Program works with other chapters of the Whatcom County Code to protect and preserve saltwater and freshwater shorelines throughout the county by managing natural resources and directing development and land use suitable for the shoreline environment.~~

~~The Whatcom County Shoreline Management Program jurisdiction includes:~~

- ~~More than 130 miles of marine shoreline;~~
- ~~More than 60 miles of lake shoreline;~~
- ~~More than 220 miles of stream channels; and,~~
- ~~All wetlands and floodways associated with the above shorelines, together with all upland areas within 200 feet of the Ordinary High Water Mark (OHWM).~~

~~Whatcom County and the Washington State Department of Ecology (DOE) share joint authority and responsibility for the Whatcom County SMP. Whatcom County Planning and Development Services is the primary agency responsible for implementation of the Whatcom County Shoreline Management Program.~~

Issues, Goals, and Policies

General – Ecosystems

Development and urbanization of the land base have and may continue to result in the degradation and reduction of ecosystem functions. Wetlands and estuaries continue to be lost incrementally. Streams and their adjacent riparian habitat are affected by land clearing, ditching, erosion, and road building. Lakeshore development degrades the foreshore environment for waterfowl and other species, as well as negatively affecting water quality. It is estimated that Washington has also lost approximately one-third of its historic eelgrass beds from a variety of causes, including dredging, shading, and filling. Large-diameter snags and downed logs, an essential feature for dozens of wildlife species, are lost during clearing or intensive forest management. Forested habitats are lost to a number of development processes including urbanization, agriculture, increased rural/

suburban housing density, and timber harvesting. The delicate environment of cliffs and caves may be affected by housing development, mining, and other activities. Conversely, grasslands, thickets, fields, and fence rows are habitats largely provided and enhanced by human activities, and are thus fairly abundant and stable within the developing county. The existence of farms, in particular, has contributed to an abundance of these more open, pastoral habitats.

Many stream systems in Whatcom County have been altered by agriculture, forestry, development, and flood control practices, contributing to low stream flows, fisheries loss, water pollution, sedimentation and other problems. These impacts can directly affect the fisheries resources by depositing silt and debris into spawning beds, by removing trees that shade and cool the water, bank armoring, interfering with the recruitment and establishment of large woody debris (LWD), by obstructing fish passage with culverts and roads, by altering natural channels through filling, bank hardening, and channelizing. In addition, the physical processes that create functional habitats for fish life stages are altered by increasing flows through stormwater runoff or consuming water volume for other out-of-stream uses.

Finally, a healthy and functioning ecosystem, including forests, wetlands, fish, wildlife, and native plants they harbor, is an identified resource. A healthy ecosystem supports diverse and abundant wildlife, fish, and plant populations, and is necessary. The gathering of fish, game, and other natural resources forms a central aspect of many cultures in Whatcom County. The mere presence of these natural resources constitutes a community amenity that is a substantial part of our local economic base.

Goal 10K: **Protect and enhance ecosystems, which provide economic, ecological, aesthetic, and cultural benefit.**

Policy 10K-1: Define and identify species, habitats, and habitat features important to a balanced and sustainable web of life, biodiversity, and especially important to fish, native plants, and wildlife. Create, and regularly update an Ecosystem Report.

Policy 10K-2: Develop and adopt programs that protect habitats essential to the conservation of species that have been identified as endangered, threatened, or sensitive by the state or federal government as well as habitats identified as necessary in the Ecosystem Report. These programs should maintain and encourage restoration of habitat conditions for listed species of concern, as well as habitats identified as having significant biodiversity, connectivity, and other important features and functions.

Policy 10K-3: Develop incentives for protection of environmentally fragile areas or critical plant and wildlife habitats as well as habitats that provide connectivity (corridors).

Policy 10K-4: Where feasible, incorporate fish and wildlife habitats into public capital improvement projects.

Policy 10K-5: Provide measures to mitigate negative water quality and quantity impacts from both public and private alterations of natural drainage systems.

Policy 10K-6: Consider sensitive fish, shellfish, and wildlife species and their habitats when establishing zoning densities and patterns.

Policy 10K-7: Promote voluntary fish and wildlife habitat enhancement projects through educational and incentive programs, such as purchase of development rights or habitat conservation easements. These projects, which can be done by individuals, organizations, and businesses, will buffer and expand fish, plant, and wildlife habitat.

Policy 10K-8: Give careful consideration to the siting of industrial, commercial, residential, and other land use designations when located near important marine, terrestrial, or other critical habitats.

Policy 10K-9: Protect, retain, and enhance the beneficial uses and functions of streams and rivers. Define and identify the beneficial uses and functions of streams and rivers, including wildlife and fisheries habitat, water quality, open space, aesthetics, and recreation.

Policy 10K-10: Protect and enhance ecosystem functions when flood hazard management measures are used.

Policy 10K-11: Regulate the operation of river gravel extraction activities in such a manner so as to provide long-term protection of fish and wildlife habitat and water quality.

Policy 10K-12: Ensure design and development of residential and industrial development minimizes disturbance to rivers, streams, and functioning riparian areas.

Policy 10K-13: Evaluate the full value of the fishery; including its cultural and economic value; in land use decisions that may impact that fishery. Unavoidable impacts to an individual habitat or fishery shall be mitigated.

Policy 10K-14: Continue to consider the value of wildlife populations for which habitat conservation areas have been identified in PDS's wildlife habitat mapping, their associated habitats, and connectivity in land use planning that may impact them. This is not intended to require landowners to pay for any additional studies.

Policy 10K-15: Mitigation to Habitat Conservation Areas should be tracked and monitored to ensure no net loss to natural area.

Policy 10K-16: Monitor Habitat Conservation Areas to obtain a baseline of current conditions and to ensure no net loss and avoidance of cumulative impacts.

Fish and Wildlife Populations and Habitat

Goal 10L: Protect and enhance ecosystems that support native fish and wildlife populations and habitat.

Policy 10L-1: Strongly discourage any activity that might cause significant degradation of the fishery resource or habitat.

Policy 10L-2: Support the protection and enhancement of significant fish spawning and rearing habitat, food resources, refugia (shelter), and travel passages.

Policy 10L-3: Establish non-regulatory mechanisms and incentives for development that accommodates the habitat needs of fish and wildlife and encourages good stewardship practices.

Policy 10L-4: Support protection and enhancement of fish and wildlife habitat through site design in new development.

Policy 10L-5: Native vegetation and soils on streambanks and shorelines should be disturbed as little as possible. In situations where re-vegetation is necessary to restore streambank or shoreline stability and provide shading, site-specific native plants should be used. Retention of vegetated riparian areas on all lake and marine shorelines shall also be encouraged.

Policy 10L-6: Discourage shoreline armoring. Instead, encourage natural or bio-engineering solutions such as planting native vegetation, engineered log jams/LWD, and beach nourishment along eroding banks to address stream and shoreline bank erosion problems. Riparian buffers should be replanted with suitable native vegetation as a part of all bank stabilization projects.

Policy 10L-7: Encourage native vegetation and soil retention and plantings that provide or maintain the beneficial uses and functions of streams, rivers, lakes, and marine shorelines.

Policy 10L-8: Maintain and encourage restoration of habitat functions for threatened and endangered fish species.

Policy 10L-9: Use Best Available Science to inform the creation of regulations to mitigate adverse impacts of development adjacent to rivers, streams, and marine shorelines.

Policy 10L-10: Encourage landowners to voluntarily protect surface water quality with filter strips or other appropriate water cleansing mechanisms installed between lawns, landscaping, livestock pens, or agricultural fields and waterbodies.

Policy 10L-11: Formulate and implement a comprehensive, landscape-based, environmental management program to protect fish and wildlife. The program should include the following:

1. Formulate an administrative approach to the review of development and planning proposals that consider natural system policies;
2. Investigate and develop programs for acquisition and restoration of important fish and wildlife habitat areas;
3. Develop and enter into cooperative agreements with State and Federal agencies and neighboring jurisdictions to identify and protect ecosystems;
4. Identify and map important habitat corridors and connectivity throughout the county; and,
5. Support the development of educational materials which list, describe, and characterize the appropriate use of native vegetation to enhance ecosystem functions in Whatcom County.

Policy 10L-12: Consider establishing formal meander limits for the Nooksack River, precluding additional development within this zone, and promote the River and Flood property acquisition program within these areas.

Policy 10L-13: Diligently work to prevent and/or reduce the establishment and/or spread of invasive species.

Policy 10L-14: Actively participate in and support WRIA 1 Salmon Recovery efforts to return self-sustaining salmonid runs to harvestable levels through: the restoration of healthy rivers, marine shorelines, and natural processes; the careful use of hatcheries; and responsible harvest.

Policy 10L-15: Participate in protection and improvement of biodiversity.

Policy 10L-16: Consider establishing important habitat areas as sending areas after creating a voluntary, workable transfer of development rights (TDR) program.

Policy 10L-17: Mitigation of wetlands should be reviewed and tracked over time to ensure no net loss of wetland function.

Policy 10L-18: A baseline of wetland identification and function should be made to track and prevent net loss and avoid cumulative impacts.

Policy 10L-19: The County will support the work of the Fisheries Co-managers (Lummi Nation, Nooksack Tribe, and the State Department of Fish and Wildlife) and stakeholders to establish a sustainable salmon harvest goal for the Nooksack Basin.

Comment [P/C2]: This proposed amendment is not part of the SMP Update. Rather, it is a policy the Council expressed in interest in adding in support of the fisheries co-manager's Sustainable Salmon Harvest Goal. Adding such a policy was placed on the docket by Council in 2018 (#PLN2018-00010).

Wetlands

Wetlands are crucial environmental features in Whatcom County. Wetlands provide invaluable functions in aquifer recharge, groundwater storage, floodwater

detention, pollutant removal and purification of water supplies, as well as provision of fish and wildlife habitat. Loss of wetlands has been due to many factors, including urbanization, agricultural development, and drainage projects.

A plethora of complex and often confusing laws govern the definition, delineation, and protection of wetlands. These laws originate at national, state, and county levels. Land managers and private citizens often experience difficulty in interpreting, synthesizing, and applying wetland regulations. In general, however, state regulations must comply with federal standards and local regulations must comply with both federal and state standards.

Goal 10M: Conserve and enhance regulated wetlands.

Policy 10M-1: Recognize natural wetlands such as swamps, bogs, saltwater marshes, and ponds for their value in cleaning water, reducing flood damage, providing valuable habitat for plants, fish and wildlife, and as sites for groundwater recharge.

Policy 10M-2: Develop and adopt criteria to identify and evaluate wetland functions that meet the Best Available Science standard and that are consistent with state and federal guidelines.

Policy 10M-3: Biological functions of wetlands are complex and interwoven. Evaluate the full range of potential and immediate economic impacts in land use decisions relating to wetlands, including fisheries, wildlife, recreation, farmlands, sustainable resources, air and water quality, flood hazard management, real estate, cultural attributes, and other uses.

Policy 10M-4: Encourage land development to avoid wetland impacts. Impacts to regulated wetlands should be contingent upon full mitigation measures that equitably compensate for wetlands impacts, on a case-by-case basis. Approved mitigation measures shall include resources for long-term monitoring and adaptive management of mitigation outcomes to assure effectiveness. Strongly discourage alteration of land that results in the degradation of type 1 and 2 wetlands.

Policy 10M-5: Property rights and public services are essential components of our political and economic system. Where such rights and public services are significantly compromised by the goal of wetland preservation, adverse wetland impacts may be permitted through standardized mitigation. This may include avoidance, impact minimization, restoration, enhancement, creation, or off-site compensation for loss of wetland functions in accordance with mitigation sequencing.

Policy 10M-6: Recognize beneficial wetland uses, functions, and values. Support protection of fish and wildlife habitat, water quality, plant diversity, flood attenuation and low-flow contribution, and water storage through planning, acquisition, incentive programs, and mitigation.

Policy 10M-7: Development applications should be assessed on a case-by-case basis so that marginal wetlands are not preserved at the expense of upland areas with higher habitat value.

Marine Habitat

Goal 10N: Protect and enhance marine ecosystems and resources in Whatcom County.

Policy 10N-1: Support the Whatcom County Marine Resources Committee in its pursuit of the Northwest Straits Commission benchmarks as follows:

- Broad county participation in MRCs;
- A net gain in high-value habitat and ecosystem functions;
- A net reduction in shellfish bed closures;
- Measurable increases in factors supporting bottomfish recovery;
- Population increases in other key indicator species;
- Coordination of scientific data;
- Successful public education and outreach efforts; and,
- The establishment of a regional system of Marine Protected Areas (MPA's).

Policy 10N-2: Promote naturalized shoreline buffers and restoration of riparian vegetation.

Goal 10P: Protect and enhance shellfish habitat in commercial and recreational areas to ensure a productive resource base for long-term use.

Policy 10P-1: Identify and designate marine shellfish habitat for commercial and recreational uses.

Policy 10P-2: Restore degraded waters within the drainage basins of shellfish growing areas to a level that allows/supports shellfish harvesting by work with the Department of Ecology, Tribes, Department of Health, Department of Fish and Wildlife, and affected property owners to improve water quality.

Policy 10P-3: Protect shellfish resources by means of pollution prevention and enforcement when necessary. This should include surface and groundwater monitoring for early detection of pollution to minimize the damage and cost of resource restoration.

Policy 10P-4: Improve knowledge of the importance of protecting, preserving, and improving the quality of shellfish habitat within the County. Seek out valuable partnerships that will raise awareness, provide education, and enhance shellfish habitat.

Policy 10P-5: Develop Low Impact Development standards in shellfish habitat areas.

Policy 10P-6: Identify and encourage the use of stormwater treatment systems and Best Management Practices to reduce fecal coliform bacteria levels in stormwater discharging directly into shellfish habitat areas.

Policy 10P-7: Solicit input from the Shellfish Protection District advisory committees and appropriate state, federal, and tribal agencies when considering updates to the Comprehensive Plan that relate to shellfish protection.

Policy 10P-8: Identify and restore functions, selected through best available landscape-based science, of key wetland areas.

Policy 10P-9: Modify county roadside ditch maintenance procedures to protect water quality.

Policy 10P-10: Continue to partner with jurisdictions in British Columbia to minimize impacts on water quality, including what affects shellfish habitat.

Policy 10P-11: Work within the structure of County programs such as the WRIA Watershed Management Planning process to achieve improvements in land use Best Management Practices that will positively affect change in marine water quality.

Policy 10P-12: Continue to develop programs that identify potential pollution sources and ensure timely and science-based approaches are used in response to problems as they arise.

Policy 10P-13: Develop educational tools and opportunities to raise public awareness of marine issues and to inform them of how they can have a positive impact by helping preserve these marine resources.

Policy 10P-14: Identify areas (such as wetlands and the nearshore environment) that are important to shellfish habitat preservation. Also identify river and stream processes that adversely impact shellfish habitat. Use this information when making land use management and preservation decisions.

Policy 10P-15: Create a tracking mechanism to document progress made toward improving downgraded shellfish areas. This information will be useful not only in supporting an upgrade when water quality shows improvement, but also in preventing degradation in currently approved shellfish areas.

Policy 10P-16: Work with the County Shellfish Advisory Committees, Marine Resources Committee, Salmon Recovery Fund Board, WRIA Watershed Management Board, and other local, state, federal,

and tribal agencies to address issues associated with shellfish, shellfish area closures, and shellfish habitat.

Policy 10P-17: Consider establishing the Drayton Harbor Watershed as a sending area when considering a transfer of development rights (TDR) program in.

Policy 10P-18 Support the Department of Health's On-Site Sewage System (OSS) Program as a means to lower degradation of our waterways.

Other Marine and Marine Dependent Organisms and Systems

Our Marine system supports not only local, critical, and global fisheries resources, but also a myriad of interdependent organisms, the importance of which we lack the capacity to fully grasp. The Marine ecosystem is a complex web of life that is increasingly affected by anthropogenic impacts. Toxics, hormones, heavy metals, and other harmful substances flushed into nearshore and marine environments with stormwater have been shown to have deleterious cumulative impacts on a range of aquatic and marine dependent organisms. Whatcom County will take steps to halt the practice of treating its streams and rivers as a storm sewer and the marine system as a water treatment facility.

Policy 10P-19: Promote Best Management Practices, land use, and stormwater policies that result in a minimal release of harmful chemicals and metallic substances into surface water and the marine environment.