



Whatcom County 2017 Ecosystem Report

Prepared by the Wildlife Advisory Committee for the Whatcom County Council



Table of Contents

Preface	iii
I. Introduction	1
II. Historical Overview	4
III. Present Conditions.....	7
Habitat Connectivity and Corridors	8
Importance of Wildlife to People.....	9
IV. Methodology	12
How Information Was Collected.....	12
Literature Review	12
Watershed Planning.....	13
Critical Areas Ordinance	14
Canopy Height	14
Wildlife Habitat Categories.....	16
Forest and Woodland	17
Grassland and Shrubland.....	17
Developed Habitats and Agriculture	17
Aquatic and Riparian.....	17
Maritime and Coastal	17
Conservation Value.....	19
Watershed Basins.....	20
V. Current Regulations.....	21
Critical Areas Ordinance	21
Shoreline Management Program.....	22
Forest Practices and the Habitat Conservation Plan.....	23
National Environmental Policy Act (NEPA).....	23
Endangered Species Act (ESA)	24
The Bald and Golden Eagle Protection Act.....	24
Point Elliott Treaty of 1855	24
VI. Findings	25
Stressors of Wildlife and Habitat.....	40
Changes to Habitat Composition.....	40
Changes to Habitat Configuration	40
Changes to Habitat Connectivity.....	40
Additional stressors include:	40
VII. Information Gaps	44
VIII. Recommendations	45
Landscape Management Recommendations	45
Programmatic Recommendations	46
IX. Closing.....	49
X. Appendices	50

List of Figures

Figure 1. Forestland on Slide Mountain	iii
Figure 2. North Fork of Nooksack River at confluence with South Fork.	1
Figure 3. Whatcom County Jurisdictions	3
Figure 4. Historic photo of logging crew near Bellingham, from a postcard published ca. 1910 by Sprouse & Son, Importers and Publishers, Tacoma, Washington.....	4
Figure 5. Whatcom County in 1850	6
Figure 6. Whatcom County Satellite Image (NAIP, 2016)	11
Figure 7. Water Resource Inventory Areas of Whatcom County and their Subwatersheds (Washington Department Ecology)	13
Figure 8. Example of Critical Areas Ordinance areas	14
Figure 9. Example of canopy height mapping.....	15
Figure 10. Habitat classifications (Northwest Habitat Institute (NWHI) and WDFW (1999))	18
Figure 11. Conservation value of an example area in Whatcom County as determined by the Whatcom Legacy Project	19
Figure 12. WRIA 1 and WRIA 3 Watershed Basins within Whatcom County.....	20
Figure 13. How Stressors Can Impact Habitats and Associated Species (WDFW, Landscape Planning 2009).....	43
Figure 14. Wildlife Stressors. Habitat fragmentation and wildlife mortality. (2010- 2014 WSDOT)	43

List of Tables

Table 1. Acreage and Land Use Designations of the Major Jurisdictional Entities in Whatcom County	2
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Preface

In July 2015 the Whatcom County Council passed Ordinance 2015-031, creating the Whatcom County Wildlife Advisory Committee. The ad hoc committee of wildlife professionals and informed citizens convened its first meeting in November 2015. As identified in the ordinance, the purpose of the committee is to advise the Whatcom County Planning and Development Services and the Whatcom County Council on the value and importance of wildlife and habitat management issues as they relate to the Whatcom County Comprehensive Plan and to integrate wildlife management and protection into Whatcom County's community planning process. Goal 10K of the Comprehensive Plan is to "protect and enhance ecosystems, which provide economic, ecological, aesthetic, and cultural benefit" and Goal 10L is to "protect and enhance ecosystems that support native fish and wildlife populations and habitat." To serve the Comprehensive Plan goals and purpose of Ordinance 2015-031, this committee was tasked with "developing an Existing Conditions Report (Ecosystem Report) that would include an inventory, characterization, and assessment of current ecosystem conditions, and include an analysis of risk, initial management recommendations, and landscape planning considerations." This Ecosystem Report has been developed to fulfill this task, using primary literature, GIS datasets, and expert local knowledge in addition to local, regional, and federal guidance on species, habitat, biodiversity, and ecosystem management.



Figure 1. Forestland on Slide Mountain

This report provides the foundation that will support wildlife and ecosystem planning efforts, though additional efforts will be required to better understand local ecosystem conditions and needs, as well as strategize and implement long-term species and ecosystem needs. Key aspects of this report include an overview of Whatcom County's ecosystems and wildlife species, their current status, known data gaps, and initial recommendations on how to better ensure that ecosystem integrity is protected throughout the County, and that the species within those ecosystems continue to exist. This report also identifies the existing regulatory mechanisms for

ecosystem protection and identifies the appropriate agencies that are the authority for ecosystem management, protection, enhancement and recovery.

According to the Washington Comprehensive Wildlife Conservation Strategy developed by the Washington Department of Fish and Wildlife (WDFW) (2005), "Habitat loss, fragmentation, and degradation are the major threats to the persistence of Washington's fish and wildlife." How and where we develop on the landscape determines the success of many species. It is the hope of the Wildlife Advisory Committee and the intent of Whatcom County Council that this document be used by County agencies to support biodiversity planning efforts.

Wildlife Advisory Committee Members include:

Barry Wenger*	Wendy Harris
Vikki Jackson*	Guy Occhiogrosso
Frank Bob*	Caanan Cowles*
John McLaughlin*	Christopher Kazimer
Fenner Yarborough*	Joel Ingram*
Stephen Nyman*	

*indicates Technical sub-committee member

Previous committee members: Michael Williams*, Paul Woodcock

This project was also offered significant GIS map and data support and literature research from Whatcom County Planning and Development Service intern Stirling Scott. Her expertise and support during the first half of 2017 greatly improved staff's ability to evaluate and consider various ecosystem features, functions, and assets.

Whatcom County staff support was provided by Chris Elder, Sarah Watts, and the Natural Resource staff of Planning and Development Services.

Photo Credits: All photos are provided by Whatcom County except where noted. Elk in traffic on the cover page was provided WDFW.

I. Introduction

Whatcom County is vast, encompassing roughly 2,107 square miles (1,378,446 acres) of land and 397 square miles of water. And it is geographically complex. Within its boundaries exist a great variety of geographic features, ranging from the marine waters, islands, bays, and shorelines of the Salish Sea—including northern Puget Sound and Georgia Strait—to the rich estuarine interface with the lowlands of the Nooksack River basin, to the expansive greater Cascades ecosystem at higher elevations. Despite the alterations of the landscape and impacts on wildlife over time, Whatcom County remains an area of significant biodiversity. Whatcom County is characterized by 36 general habitat types (described in Appendix A) and presently has on record 433 non-fish vertebrate species, including 15 amphibians, 8 reptiles, 320 birds, and 86 mammals. If fish species were added to this list, there would be well over 500 vertebrate species known to occur (described in Appendix B). Whatcom County is also home to over 1,100 species of plants as well as an unknown number of fungi, invertebrates, and other organisms on which the higher forms, including humans, depend. From the depths of Rosario Strait to the Cascade crest, the natural cycle of life is both dynamic and delicate, the future of which is ultimately in the hands of the human community.



Figure 2. North Fork of Nooksack River at confluence with South Fork.

The jurisdictional landscape of Whatcom County (Figure 3) is equally complex, with intersecting local, state, tribal, federal, and private management considerations. Approximately two thirds (850,980 acres) of the County is under federal management administered through the U.S. Department of Agriculture, Forest Service and Department of the Interior, National Park Service.

Table 1 summarizes by acreage the major jurisdictions in the County and the designated land use categories under the Whatcom County Comprehensive Plan. The Washington State Department of Fish and Wildlife is the state agency responsible for management of wildlife populations in collaboration with Washington State Tribes as determined by the Point Elliot Treaty of 1855. The Department of Natural Resources is responsible for managing and monitoring forest practices and forest practice applications. Whatcom County is responsible for managing and monitoring development impacts on lands under Whatcom County jurisdiction.

Whatcom County Jurisdictional Acreages		Whatcom County Comp Plan Designations	
Incorporated Cities	31,613	Agriculture	85,922
Whatcom County	472,258	Commercial Forestry	186,243
		Rural Forestry	35,638
Ross Lake National Recreation Area	104,642	Rural	121,533
Okanogan Wilderness	114,108	Rural Business	186
Okanogan National Forest	48,504	Rural Community	8,425
North Cascades National Park	308,217	Rural Neighborhood	3,077
Noisy-Diobsud Wilderness	5,919	Rural Tourism	8
Mt. Baker Wilderness	120,261	Small Town	211
Mt. Baker/Snoqualmie National Forest	164,251	Urban Growth Area (UGA)	13,047
Mt. Baker National Recreation Area	8,673	UGA Reserve	1,967
TOTAL Federal Jurisdiction	874,575	Major Port/Industrial UGA	7,035
		MRL	4,146
Total WHATCOM COUNTY Acreage	1,378,446	Public Recreation	4,820
Lummi Nation Acreage	13,350	Marine Areas	212,695
TOTAL County Jurisdiction			472,258

Table 1. Acreage and Land Use Designations of the Major Jurisdictional Entities in Whatcom County

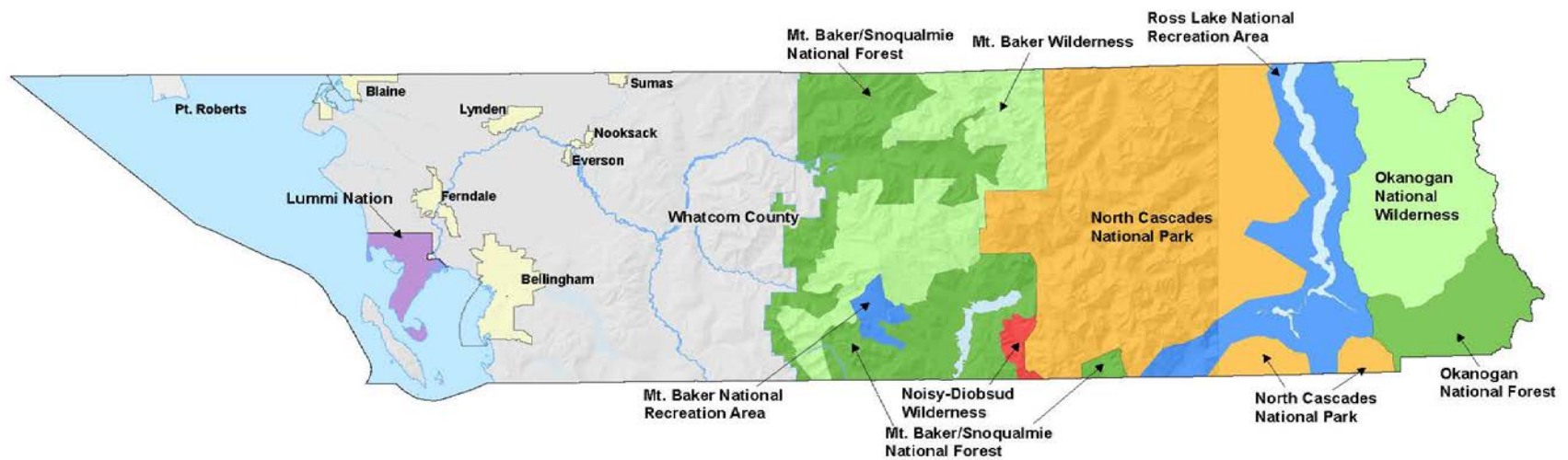


Figure 3. Whatcom County Jurisdictions

II. Historical Overview

Prior to the early Spanish coastal exploration, the indigenous people of this area lived in a sustained balance with the natural system. The Lummi and Nooksack peoples lived with wildlife, which provided food, clothing, tools, symbolism, and culture. The balance of humans and wildlife populations was quite stable, until the white settlers came.

In 1792 when Captain George Vancouver sailed into the waters of what was to become Whatcom County, old growth forests dominated the landscape from the Cascade alpine to the Salish Sea shoreline. Lowland coniferous forest was broken only by the gaps of expansive wetlands, water courses, lakes, talus slopes, cliffs, meadows, and deciduous woodlands.

The wildlife inhabiting the area were only briefly mentioned in journal accounts and usually associated with the descriptions of local indigenous people, trade items, and game hunted by the ship's crew. By this time however, as a result of Captain Vancouver's earlier voyages, the North Coast fur trade was well under way, resulting in the harvest of sea otter, beaver, and other fur-bearing mammal pelts in quantities that nearly extirpated many species. Wildlife was clearly viewed as a commodity by the early explorers.

Beginning in the 1850s, as white settlers began their colonization of Northwest Washington, the abundant natural resources became a source of subsistence and capital.

Entrepreneurialism was a compelling factor in the settlement of this area. Fur, fish, timber, and gold were sought by many. The first white settlers in Whatcom County recognized the monetary wealth of timber and proceeded to construct a saw mill on Whatcom Creek, and soon the landscape changed. As the landscape changed, the habitat was altered.



Figure 4. Historic photo of logging crew near Bellingham, from a postcard published ca. 1910 by Sprouse & Son, Importers and Publishers, Tacoma, Washington

In the early part of the twentieth century, it was observed that 123 bird species had diminished since 1890, and "the ecological changes which have so altered the bird fauna have had a similar and even greater effect on the mammalian life of northwestern Washington." (Birds and Wild Animals, Roth 1926) Many of the larger animals, such as grizzly bear and Roosevelt Elk were wholly driven out by the settlement of the county and are now to be found only occasionally in the wilds of the mountains. Several species, including the trumpeter swan and wood duck, had neared the point of extinction due to over-hunting. Numerous non-indigenous species were introduced to Whatcom County or spread here from other points of introduction. This includes bob-white, mountain quail, California quail, Hungarian or European pheasant, and ring-necked pheasant. Opossum, eastern gray squirrel, European starling, and English (Old world/House) sparrow, and American bullfrog populations have all increased or expanded their ranges into Washington State since their introduction. As opportunists, most of these species benefit from urbanization. European starlings and House sparrows are now considered nuisance species by the U.S. Fish and Wildlife Service. Introduced species compete with native species for habitat, including aggressive displacement from nest sites. Introduced invasive plant species have altered vegetation communities and the wildlife populations dependent on them.

The earliest wildlife regulatory body was the Whatcom County Wildlife Commission. Established sometime in the early 1900s, this local commission set and enforced hunting seasons on a local level. With the establishment of a state wildlife regulatory department, the task of game management became centralized statewide. In 1933 the Washington State Department of Game was created and given management responsibilities and sole authority over the state's wildlife resources. The Game Department's primary focus was managing fish and game or those species of game value. In the 1980s a growing recognition of the importance of a broader range of wildlife led to the creation of the Non-game Program and renaming of the agency to the Department of Fish & Wildlife.

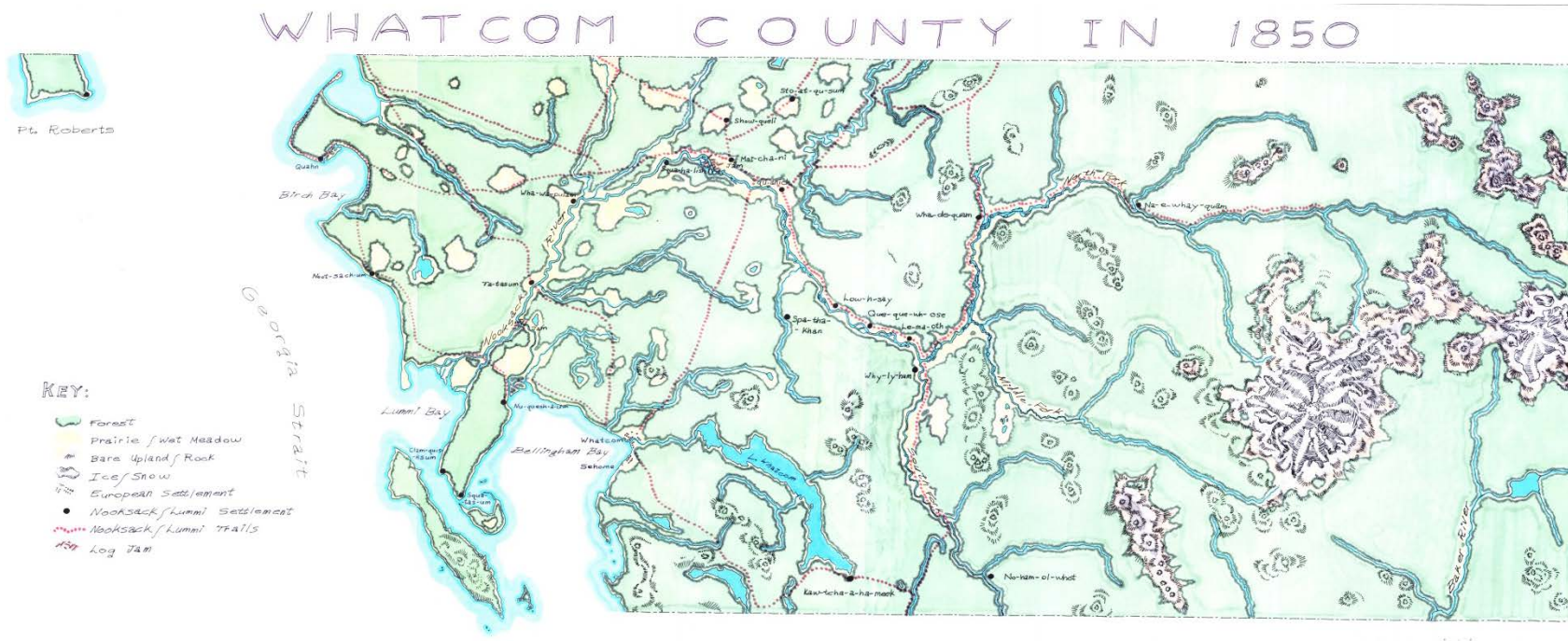


Figure 5. Whatcom County in 1850

III. Present Conditions

Today the landscape of Whatcom County is greatly changed from the days of Captain Vancouver and the early settlers. The lowland forests have all been logged, the Nooksack River diked with a large percentage of wetlands ditched or filled, and habitat transformed. In the process of change, some species, including basking shark, gray wolf, and grizzly bear were extirpated while many more species have been greatly reduced.

The western edge of the County is characterized by a rich marine environment interspersed with islands ranging in size from small rock outcrops to large land masses. The tidally influenced marine waters and associated coastal shoreline provide habitat for marine invertebrates, fishes, harbor seals, river otters, several whale species and porpoises, seabirds (e.g., gulls and terns), wading birds, and shorebirds. The physical features of the irregular shoreline, including promontories, bluffs, cliffs, spits, cobble and sandy beaches provide a variety of habitats and foraging opportunities for many species. The richest marine bird habitats are found in estuarine flats, marshes, and other marine wetlands, where concentrations of shorebirds, herons, and other birds forage on invertebrates or small fish, and their large, concentrated numbers afford excellent hunting for falcons and bald eagles.

Moving upstream from the estuaries along river and stream corridors, associated wetlands, ponds, lakes, and other special habitats of great value to wildlife have formed. Freshwater wetlands serve as nurseries for many fish species and support most of our native amphibians with an aquatic life stage—including the federally threatened Oregon Spotted Frog. Wetlands also provide homes for vital habitat to waterfowl, wading birds, river otter, mink, beaver, and muskrat. Most terrestrial birds benefit from wetlands at some time during the year. Whatcom County has several freshwater lakes (most of which have been greatly impacted by shoreline development), whose function as open water habitat is vital to migratory water birds, osprey, bald eagle, bats, otter, and other aquatic and semi-aquatic species.

The area of transition from aquatic to terrestrial habitats, termed the riparian area or zone, constitutes one of the most important habitats in the County. Riparian vegetation is generally structurally complex and diverse, and proximity to water is an attractant to many species of wildlife. In fact, roughly 86 percent of all wildlife species in western Washington use riparian areas at some time in

their life cycle (Brown, 1985). Riparian areas also form a natural corridor system across the landscape, linking not only aquatic with upland habitats, but spanning elevations from the lowlands to the alpine.

Upland habitats in Whatcom County are a mix of pasture/grassland, cultivated agricultural land, coppice or small woodlands, mixed forest, conifer forest, high elevation forests, and alpine areas. Forested uplands below 2,000 feet elevation serve as the primary habitat for the majority of local terrestrial species and in many cases provide an essential habitat element for wetland or water-associated species. As examples, during the winter months female and juvenile great blue herons depend on rodents and frogs from open pasture for their primary food source; and wintering swans feed in local fields then roost near lakes. The interspersed of pasture/cultivated land/mixed forest and stream/wetland areas is prevalent in the lowlands. Many of the species characteristic of these areas are habitat generalists, moving easily across small habitat patches, and are not reliant on large patches of forest or forest interior conditions to thrive. Not unexpectedly, the most common species include some associated with non-forested habitats and early stages of forest succession, which may increase their adaptability to suburban and agricultural landscapes.

The upland conifer forests of the County are at various stages of succession and, as such, represent ever-changing habitats. The changes in forest conditions directly affect habitat value and species occurrence. Low elevation old-growth forests exist only as remnants in Whatcom County, and much of the mature second growth forests that provide habitat for a diversity of wildlife species have been harvested in recent years.

High elevation forests above 3,000 feet and alpine habitats are distinctly unique ecosystems due to temperature and climatic extremes and mountainous terrain. The harsh conditions of these areas limit the diversity and abundance of wildlife species. Familiar animals associated with these habitats include hoary marmot, pika, mountain goat, black bear, ptarmigan, gray jay, and golden eagle.

Habitat Connectivity and Corridors

Whatcom County, situated on the 49th parallel between the Cascades and Georgia Strait, provides a geographical link in the north-south migratory corridor known as the Pacific Flyway. The Pacific Flyway extends south from the North American Arctic to South America. This flyway was identified by the U.S. Fish and Wildlife Service as the most significant route used by western Pacific migratory waterfowl. Based on the U.S. Fish and Wildlife Service data, millions of ducks and geese and tens of

thousands of swans travel along this corridor twice annually. The Pacific Flyway is also used by millions of shorebirds and migratory raptors and neotropical migrant songbirds.

The temperate, climate, and diverse habitat of Northwest Washington, and specifically Whatcom County, provides suitable wintering and breeding habitat for many migratory birds given the relatively mild winter conditions. Species such as the trumpeter and tundra swan make this area their wintering grounds or southernmost destination from their breeding grounds in Alaska. Neotropical migrants such as the Vaux's swift make this their northernmost destination, flying from Central America in the spring, residing here through the summer to reproduce, then returning south again in the fall.

In addition to those species that migrate great distances to over-winter or breed, are the large flocks of migrants which stop to rest and feed while migrating, or those that gather here prior to migrating. The geographical locations where such resting, feeding, and gathering takes place are known as staging areas. During peak migration, these areas can harbor tens of thousands of individuals.

Elk, deer, and other non-hibernating mammals may migrate seasonally from the lowland winter range to higher-elevation summer ranges; pond-breeding amphibians travel to and from breeding sites; and the juveniles of many species disperse across the landscape. The suitability of habitat and habitat links along any migratory route or travel corridor are critical to the survivability of the migrant. Whatcom County's important habitat features include migration and movement corridors, particularly those along stream courses linking wetlands, uplands, and marine areas.

Importance of Wildlife to People

Native wildlife has been appreciated by local citizens past and present. From subsistence to sport, recreation, and simple pleasure, wildlife is a subject of changing values in Whatcom County. Today, year-round naturalist programs, birdwatching field trips, wildlife photography, and other wildlife appreciation activities are as popular as hunting, trapping, and fishing. A healthy and diverse natural environment is becoming increasingly important to both human and non-humans alike. Many residents of Western Washington value wildlife, as part of their heritage and lifestyle and have demonstrated the desire to incorporate wildlife-related activities into their daily lives. If there is a "Northwest Tradition," it must include wildlife (Significant Wildlife Areas, 1994).

The Tribes have always considered wildlife and wildlife habitats as a vital component of their culture. When identifying wildlife as a cultural resource, planning for ecosystem health becomes an intrinsic necessity. Traditional Ecological Knowledge (TEK) refers to the evolving knowledge acquired by indigenous and local peoples over hundreds or thousands of years through direct contact with the environment. An increasing number of scientists and Native people believe that Western Science and TEK are complementary and can inform successful wildlife management. Agencies using TEK include the United States Fish and Wildlife Service.



Figure 6. Whatcom County Satellite Image (NAIP, 2016)

IV. Methodology

The Whatcom County Wildlife Advisory Committee and Technical Subcommittee met a combined total of 26 times between November 2015 and July 2017. Whatcom County Planning and Development Services provided 0.25 FTE of staff time to support the committee and develop the Ecosystem Report. Much of the committee's time was spent becoming familiar with the enabling ordinance and discussing the comprehensive plan and the critical areas ordinance updates. These discussions helped provide context and understanding before developing the Ecosystem Report. Staff followed committee member guidance in developing this ecosystem report. Given the size, geographic diversity, and biodiversity of Whatcom County, in addition to the jurisdictional complexity, dramatic historical and current land use changes, the committee noted that additional field and desktop survey work by trained consultants or staff is required to continue to improve our understanding of local ecosystem processes.

How Information Was Collected

The Ecosystem Report of Whatcom County is an assessment of some of the current conditions of wildlife populations, habitat types, and the greater environment within and adjacent to Whatcom County that has been gathered through literature and GIS data review as well as expert input from members of the Wildlife Advisory Committee. This assessment of current conditions in Whatcom County provides the framework, including methodology used, for periodic assessment updates. It should be noted that a significant amount of information exists with regards to wildlife and ecosystem management and that the Wildlife Advisory Committee made significant efforts to compile, condense, and summarize a significant portion of the data available. However, site specific information on wildlife and habitat composition is lacking in many locations.

Literature Review

Staff performed a broad literature search, recruiting data from Washington State Department of Fish and Wildlife (WDFW), Department of Natural Resources (DNR), Department of Ecology (DOE), Whatcom County, The Habitat Institute, the City of Bellingham, as well as primary literature and many other local, regional, and national sources. Visit Appendix E for a full list of sources reviewed.

To complement the literature review and improve staff's and the public's ability to consider wildlife habitat features and functionality, GIS datasets were collected and made available to County staff to consider when making land use decisions and to achieve the purpose of this report. After an initial review of literature and datasets available, efforts were taken to assess general habitat types and conditions and compile this information in an easy-to-reference format.

Watershed Planning

Given that a significant amount of local planning efforts are based on watershed or sub-watershed boundaries, we chose to organize ecosystem and habitat data according to sub-watershed. The below map (Figure 7) illustrates the three Watershed Resource Inventory Areas (WRIA)—WRIA 1 (Nooksack River), WRIA 3 (Samish River), and WRIA 4 (Skagit River)—located in part within Whatcom County and the component sub-watersheds of each WRIA. Performing an ecosystem analysis by sub-watershed allows ecosystem conditions to be considered alongside other environmental factors such as water quality and water quantity. Whatcom County staff has compiled an initial assessment of all sub-watersheds within Whatcom County that includes habitat type, conservation value, canopy height, and current identified critical areas (see example maps in the following sections, with full maps contained in Appendix D). Staff will continue to collect additional data to add to this countywide sub-watershed ecosystem assessment.

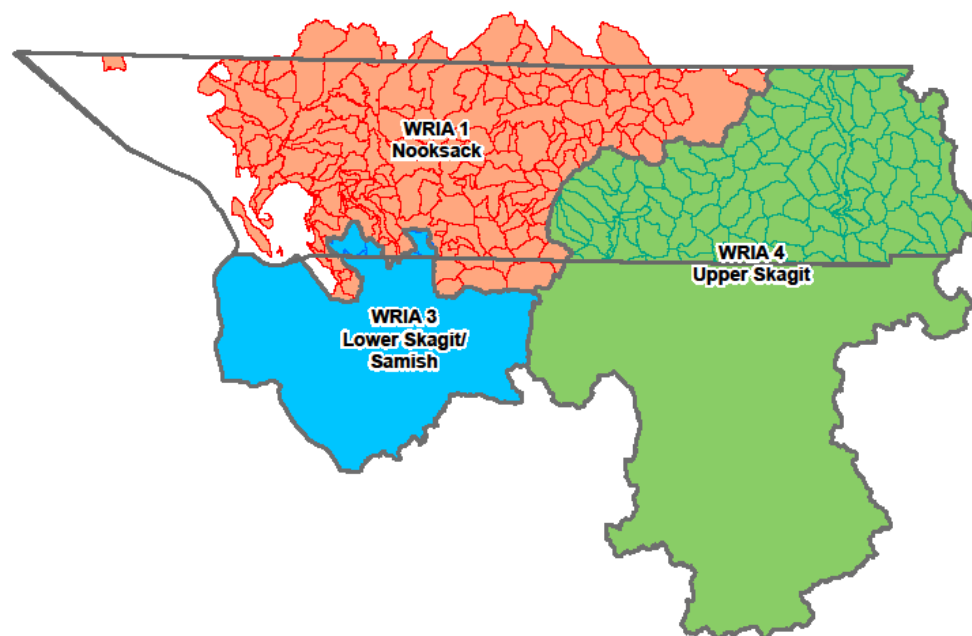


Figure 7. Water Resource Inventory Areas of Whatcom County and their Subwatersheds (Washington Department Ecology)

Critical Areas Ordinance

Current regulations such as the Critical Areas Ordinance (CAO) were also considered to determine how well ecosystem conditions and connections are being maintained. Figure 8 illustrates an overlay of designated CAO fish and wildlife habitat conservation areas and wetland areas in one example location. The CAO relies on data obtained from WDFW and the National Wetlands Inventory for identification of ecologically important areas such as habitat conservation areas and wetlands. WDFW datasets were accessed through the Priority and Habitat Species (PHS) (dated March 2017) and are listed as Priority Habitat Species Areas, Statewide Washington Integrated Fish Distribution (SWFID), Salmonid Stock Inventory (SaSI), and Marine Environment.

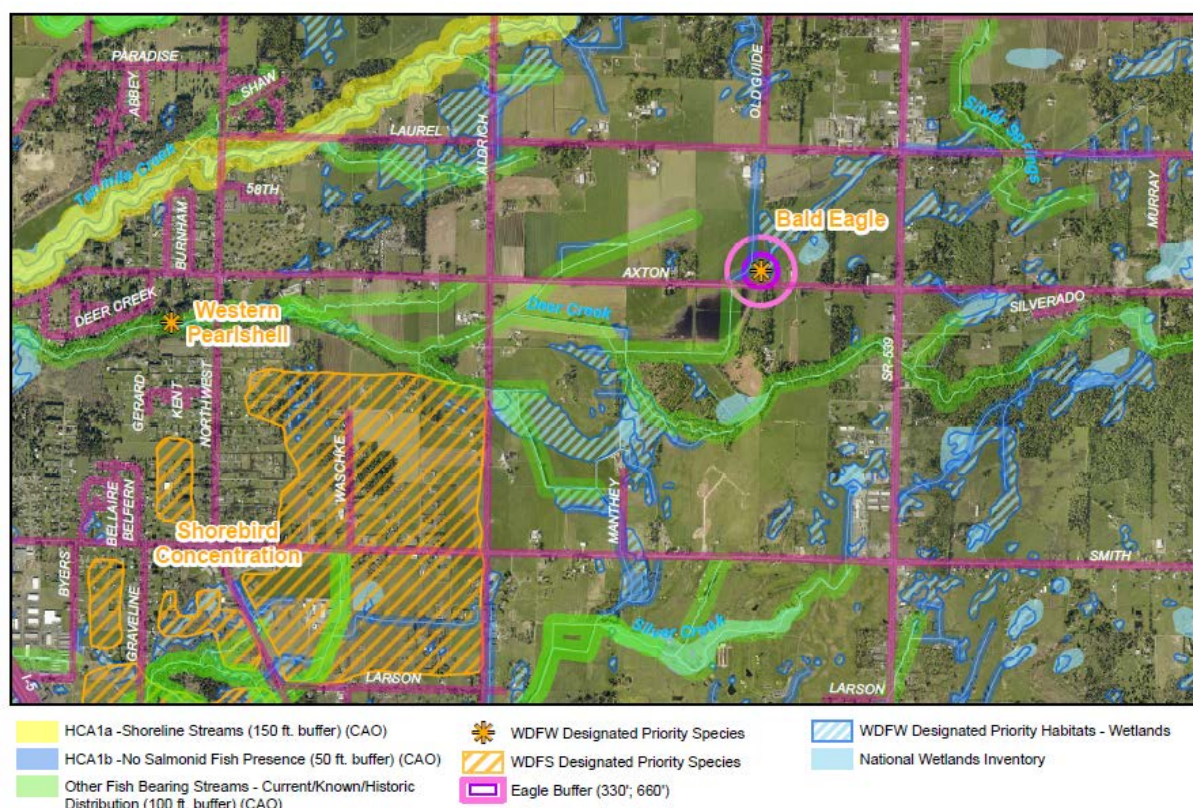


Figure 8. Example of Critical Areas Ordinance areas

Canopy Height

LiDAR stands for Light Detection And Ranging. LiDAR measurements involve pointing a laser at a land surface at closely spaced intervals and measuring the time it takes for light to return to the source. Very accurate three-dimensional information can be obtained with sufficient measurements. Whatcom County has collected LiDAR data for various parts of the County since 2006. LiDAR can be used to identify significant geographic features as well as determine tree canopy height (Figure 9) and density.

Canopy height provides a convenient visual estimate of potential forest conditions, because tree height is generally related to tree age, when corrected for differences in growth by species and by site conditions (e.g., trees exhibit slower growth at high elevations and along windy coasts). Whatcom County staff used several LiDAR datasets including City of Bellingham (2013), Puget Sound Lidar Consortium: Lummi Peninsula 2005; Nooksack River (Basin 2013), and; Whatcom County (portion) 2009, 2016). Geoprocessing tool Minus was used to subtract the bare earth dataset from the highest hit dataset with the remainder being the height of the canopy. Canopy density can also be determined using LiDAR; however, staff has not yet been able to apply this tool for ecosystem assessment purposes.

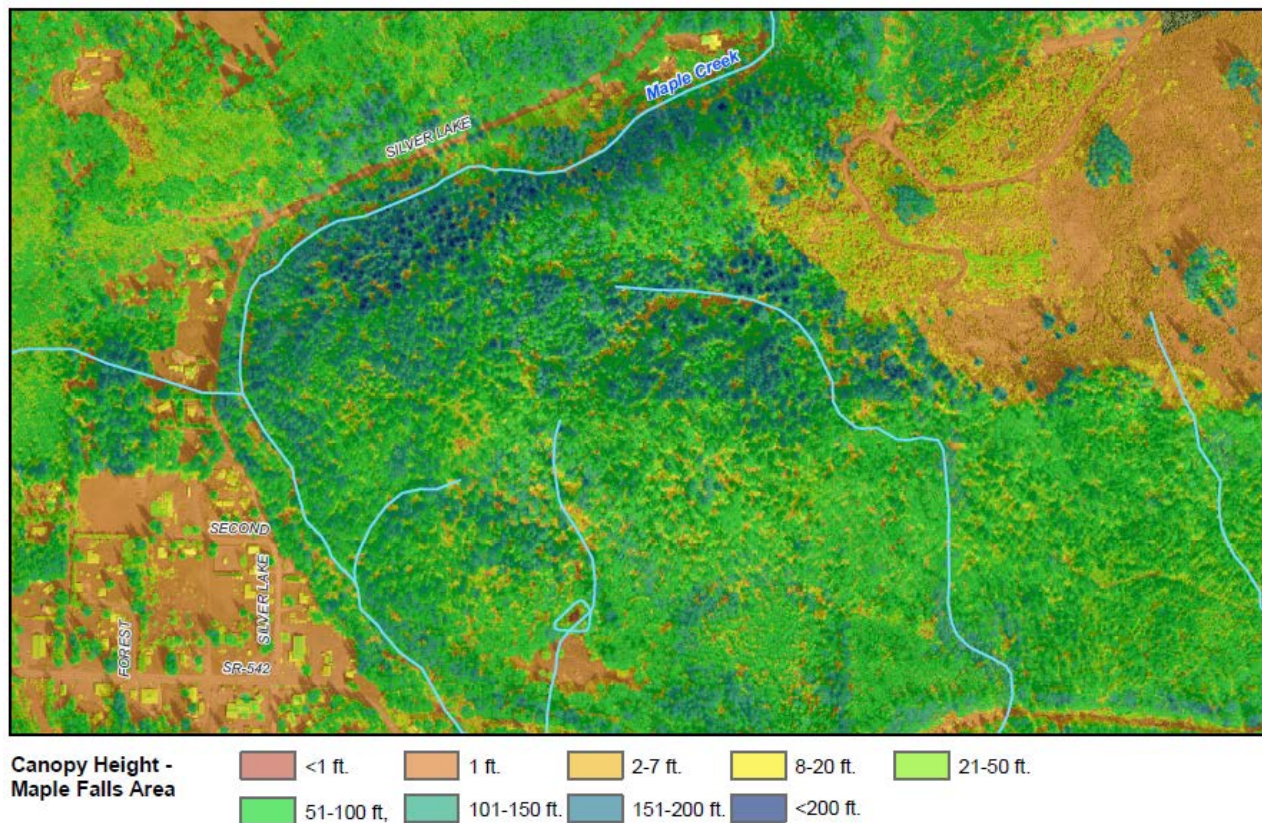


Figure 9. Example of canopy height mapping

Wildlife Habitat Categories

The Wildlife Advisory Committee determined that a wildlife-habitat association methodology would be most effective in supporting an initial assessment of wildlife-habitat conditions. Staff recruited GIS datasets from four different sources including:

- NatureServe and Washington Department of Natural Resources Natural Heritage Program (2016);
- Northwest Habitat Institute (NWHI) and WDFW (1999);
- National Oceanic and Atmospheric Association C-CAP(Coastal Change Analysis Program); and
- Whatcom County Planning and Development Services

Ultimately it was determined that the NWHI and WDFW habitat classifications were the most accurate and useful to ecosystem planning efforts as can be found in Appendix B.

The grouping of specific habitat types into wildlife-habitat categories provides an initial estimation of the expected occurrences of certain wildlife species within each wildlife-habitat categories. Broadly defined habitat categories such as “forest and woodlands” supports effective wildlife planning as it represents areas with grossly similar vegetation cover characteristics or land forms that can be correlated with specific wildlife species. The wildlife-habitat categories can be further divided into more narrowly defined habitat types, each of which could predict more specific assemblages of potential wildlife species present. The use of wildlife-habitat associations recognizes that the actual composition of wildlife communities may differ from predicted occurrence because of local conditions, habitat patch size, successional stage, stand dynamics, effects of management and anthropogenic impacts, or other factors, and therefore this approach is not a substitute for field observations of habitat condition and species present.

To further refine the prediction requires more detailed information, including the condition of the habitat in the area of concern. Habitat condition includes the types and amounts of different structural stages and habitat elements, historical conditions, and any stressors.

Five broad wildlife-habitat categories were identified, representing the following types and approximate total area in Whatcom County:

Forest and Woodland

825,000 acres

Forest & Woodland Habitat is dominated by woody plants, typically trees greater than 30 feet high. It includes a complex mix of forests typically classified by vegetation height and successional stage, number of canopy layers, and canopy cover. Important habitat elements associated with this category include existing or animal- excavated tree cavities, snags (dead or defective standing trees), large and small woody debris (stumps and fallen logs), and natural openings. Streams and wetlands located within forest and woodland habitat increase the potential for wildlife diversity.

Grassland and Shrubland

281,981 acres

Grassland and shrubland habitats are dominated by woody plants less than 30 feet high or native meadow habitats dominated by native grass and herbaceous species.

Developed Habitats and Agriculture

180,286 acres

Developed habitats & agriculture are habitats that have been altered or exist only due to ongoing human activity. These habitats are typically dominated by non-native plant communities and may include large areas of impervious surfaces, though pasture and certain croplands can provide valuable habitat for migratory birds and other species. Urban development occurs within or adjacent to nearly every habitat type in Whatcom County, and often replaces habitats that are valuable for wildlife. The highest urban densities normally occur in lower elevations along natural or human-made transportation corridors such as rivers, railroad lines, coastlines, or interstate highways. These areas often contain good soils and lush vegetation with little or no slope. Once level areas become crowded, growth may continue along rivers or shores of lakes or oceans, and eventually up elevated sites with steep slopes or rocky outcrops.

Aquatic and Riparian

75,090 acres

Aquatic & Riparian Habitats include lakes, ponds, wetlands, stream and rivers and the associated plant community that is influenced by their presence.

Maritime and Coastal

220,235 acres (219,029 marine & 1,206 coastal)

Maritime & Coastal Habitats are associated with marine waters which include coastal open water, nearshore habitats, estuary and coastal lagoons.

Each broad wildlife habitat category includes a number of more specific habitat types that are detailed in Appendix B.

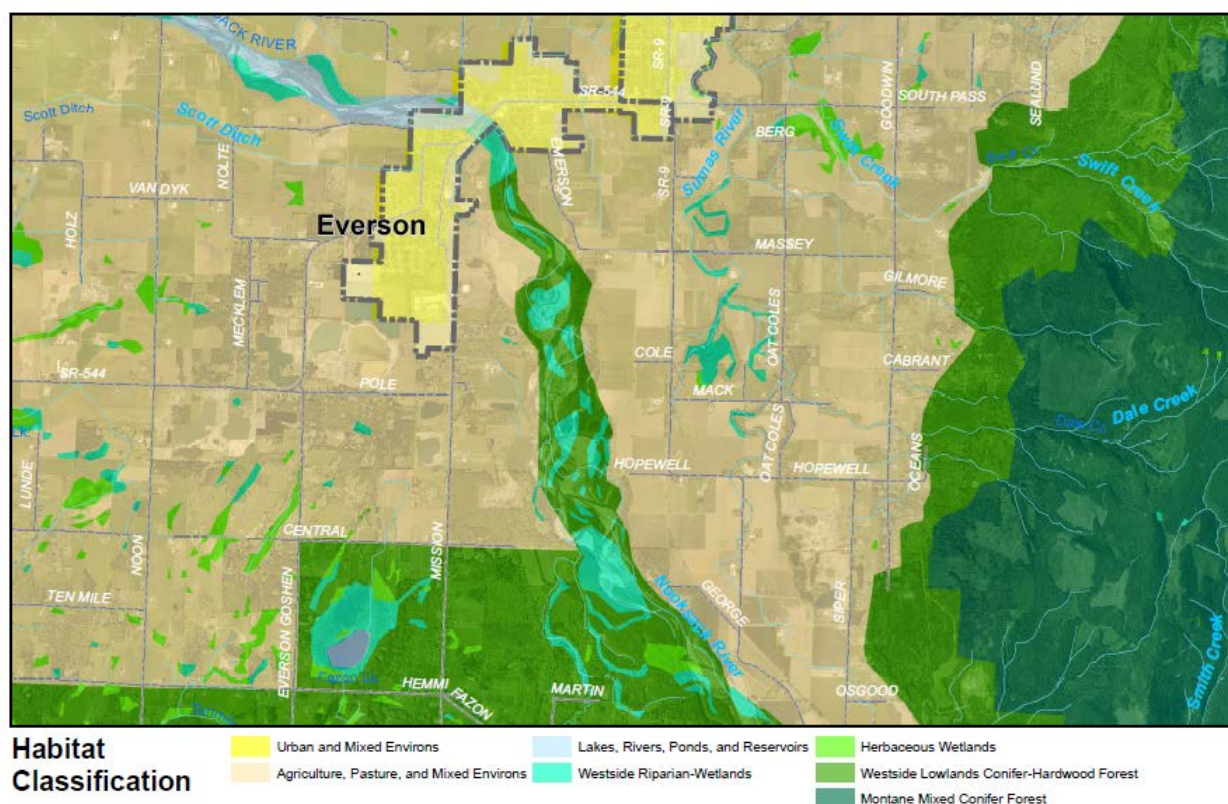


Figure 10. Habitat classifications (Northwest Habitat Institute (NWHI) and WDFW (1999))

Although wetlands and associated buffers provide very important water quality and habitat functions for the species of Whatcom County, information on wetland occurrence derived from PHS and NWI should be used cautiously, because the original mapping efforts were generally based on remote data collection and were not necessarily ground-truthed. Similarly, categories of wetlands (e.g. palustrine emergent wetland versus palustrine scrub-shrub wetland) may be inaccurate due to a lack of access to accurate and current field conditions.

Conservation Value

The Whatcom Legacy Project (2007) developed an initial assessment of current ecosystem conditions based off of NatureServe's Vista conservation planning software and incorporating data from the following sources:

- Assessment of Freshwater Systems for Washington State (Skidmore 2006)
- North Cascades Ecoregional Assessment (Iachetti et al. 2006)
- Washington State Comprehensive Wildlife Conservation Strategy (WDFW 2005)
- Washington State Gap Analysis Program (Cassidy et al 1997)
- Willamette Valley – Puget Trough – Georgia Basin Ecoregional Assessment
- Whatcom County Critical Areas
- Whatcom County Natural Heritage Plan
- Whatcom County Shoreline Management Plan
- Whatcom County Wildlife Atlas
- Whatcom Land Trust Salmon, Eagle, and Elk Analysis (TerraLogic 2000)

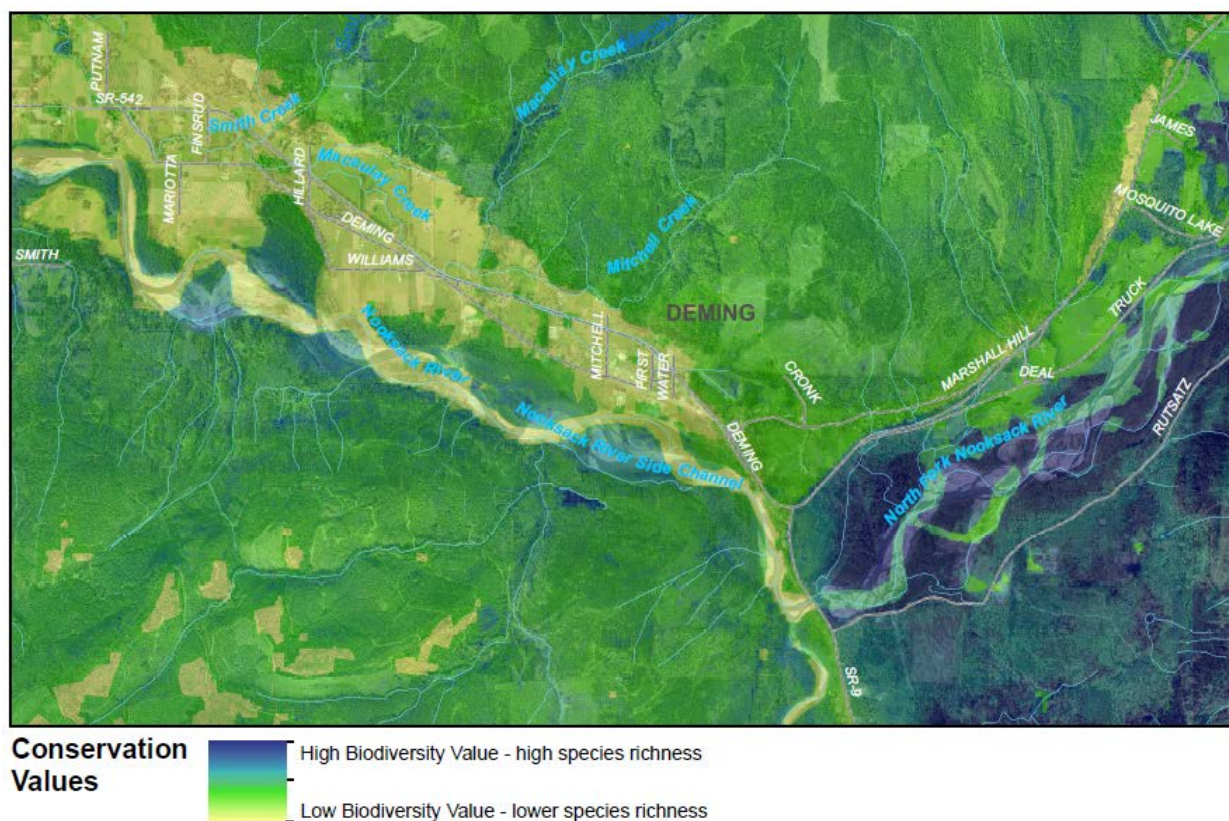


Figure 11. Conservation value of an example area in Whatcom County as determined by the Whatcom Legacy Project

The Whatcom Legacy Project represents a significant endeavor undertaken to help guide conservation planning efforts in Whatcom County. Data considered in development of the conservation values includes identification of conservation targets (including specific ecological systems), known locations of conservation targets, and integrity and relative confidence of each target. Local conservation concerns were also considered in development of the conservation values and assessments. The Whatcom Legacy Project report states that it should only be used as a starting point and that the limitations with the database are well described in the report.

Watershed Basins

Data were collected and grouped according to smaller subwatershed units and larger WRIA 1 & WRIA 3 Basins. Data presented in the Findings section are grouped by watershed basin. Note that data were not available for every single subwatershed. Staff has made note where data was not available.

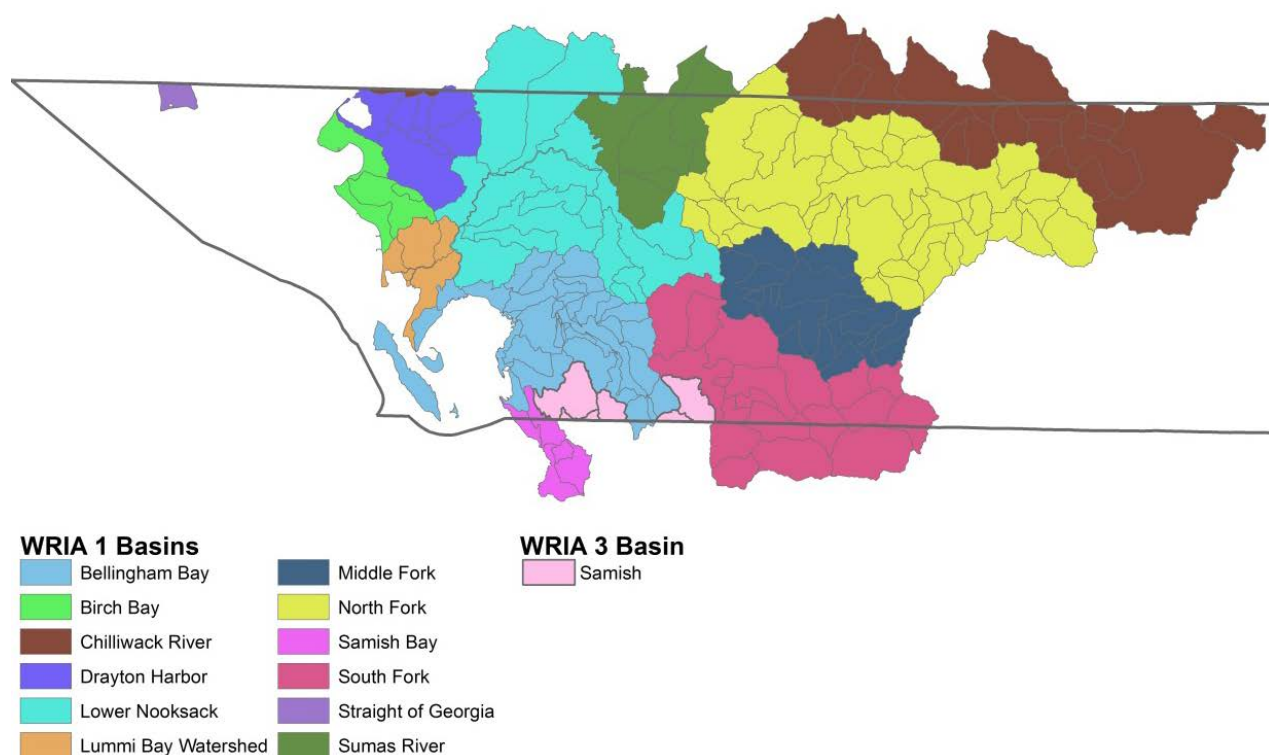


Figure 12. WRIA 1 and WRIA 3 Watershed Basins within Whatcom County

V. Current Regulations

Critical Areas Ordinance

The Critical Areas Ordinance (Whatcom County Code 16.16) carries out the goals of the Whatcom County Comprehensive Plan and the State of Washington Growth Management Act (Chapter 36.70A RCW) by implementing rules that designate and classify critical areas, and by protecting their functions and values, while allowing for appropriate economically beneficial or productive use of land and property. Best available science is considered when developing policies and development regulations to protect the functions and values of critical areas (RCW 36.70A.172). Regulated critical areas include geologically hazardous areas, frequently flooded areas, critical aquifer recharge areas, wetlands, and fish and wildlife habitat conservation areas. Development regulations may not allow a net loss of the functions and values of the ecosystem that includes the impacted or lost critical areas (WAC 365-196-830(4)). Functions and values must be evaluated at a scale appropriate to the function being evaluated. Functions are the conditions and processes that support the ecosystem. Some critical areas, such as wetlands and fish and wildlife habitat conservation areas, may constitute ecosystems or parts of ecosystems that transcend the boundaries of individual parcels and jurisdictions, so that protection of their function and values should be considered on a larger scale (WAC 365-196-830(6)).

The Wildlife Advisory Committee noted that while the CAO aims to protect different species and habitats on a parcel-by-parcel basis during development actions, a more comprehensive approach to wildlife protection and ecosystem planning with consideration given to cumulative impact would greatly benefit local wildlife species and overall ecosystem health and functionality. It should be noted that the CAO only applies to regulated development actions and does not necessarily address non-regulated actions that may impact habitats and species. Non-regulated actions include non-conversion forest practices and activities that do not convert uses or result in development. Natural Resource staff and environmental consultants rely on species and habitat mapping as well as management recommendations developed by the Washington State Department of Fish and Wildlife (WDFW) when designing and approving development actions.

WDFW has identified locations of some of the Priority Habitats and Species within Whatcom County. This data is available through GIS data downloads or through

PHS on the Web which is a web-based, publicly available interactive map allowing anyone to find basic information about the known location of Priority Habitats and Species (PHS) in Washington State. PHS is a source of best available science that can inform local planning activities, development projects, conservation strategies, incentive programs, and numerous other land use applications.

The habitats and species that appear on the PHS map are informed by WDFW's PHS List, which includes habitats of exceptional value for wildlife and species listed on the State and Federal lists of animals identified as Threatened, Endangered, Sensitive, Candidate, and Monitor. The map displays known locations of priority habitats and species that have been provided to WDFW by agency biologists and other sources of scientific data about species and habitat locations. Data are updated as new information is gathered and verified in the field. However, some mapped occurrences are out of date and few areas have been thoroughly surveyed. Therefore, the map should not be considered an exhaustive survey of all fish and wildlife presence in a given area.

Washington State Supreme Court Decisions have clarified that CAO provisions under the GMA require protection of existing critical area functions, but do not require restoration of previously degraded critical areas or their functions.

Shoreline Management Program

The Shoreline Management Program (SMP) was originally enacted under the Shoreline Management Act and, with regards to wildlife and habitats, is intended to protect shoreline ecology in the following ways:

- By using a process that identifies, inventories, and ensures meaningful understanding of current and potential ecological functions provided by shorelines.
- By including policies and regulations that require mitigation of significant adverse impacts in a manner that ensures no net loss of shoreline ecological functions. The required mitigation shall include avoidance, minimization, and compensation of impacts in accordance with the policies and regulations for mitigation sequencing in SMP 23.90.03 and the Whatcom County CAO. This Program and any future amendment hereto shall ensure no net loss of shoreline ecological functions and processes on a programmatic basis in accordance with the baseline functions present as of the date of adoption of this program, Feb. 27, 2007.

- By including policies and regulations to address cumulative impacts, including ensuring that the cumulative loss of shoreline ecological functions, and by fairly allocating the burden of addressing such impacts among development opportunities.
- By including regulations and regulatory incentives designed to protect shoreline ecological functions, and restore impaired ecological functions where such opportunities have been identified, consistent with the Shoreline Management Program Restoration Plan developed by Whatcom County.

It should be noted that the CAO goal is to protect important ecosystem functions and values and the SMP standard is no net loss of shoreline functions.

Forest Practices and the Habitat Conservation Plan

The Washington State Department of Natural Resources developed the Forest Practices Act to provide minimum standards for private land forest management in Washington State. Forest Practices as described in 76.09 RCW provide minimal planning requirements for terrestrial wildlife species. State lands are required to be in compliance with the Habitat Conservation Plan (HCP) in response to the federal listing of certain threatened and endangered fish species. The HCP describes how those listed fish and other species would be protected. The purpose of the HCP is to ensure that landowners who conduct forest practice activities are in compliance with the Forest Practices Act and will also follow the requirements of the Federal Endangered Species Act for those species present. The HCP seeks to provide long-term conservation of designated species, support an economically viable timber industry, and create regulatory stability for landowners. While the HCP does provide consideration and planning for threatened and endangered species, it provides a limited amount of protection for biodiversity, habitat connectivity, and cumulative impacts to wildlife. Class I, II, III, and IV special forest practices conducted in accordance with the applicable standards of the Washington State Forest Practices Act, Chapter 222-16 WAC, are exempt from CAO review unless the lands have been or are proposed to be converted to a use other than commercial forest production. This includes temporary gravel roads constructed for logging under these exempt projects.

National Environmental Policy Act (NEPA)

NEPA was enacted to declare a national policy to encourage productive and enjoyable harmony between humankind and their environment; to promote efforts which prevent or eliminate damage to the environment and biosphere and stimulate the health and welfare of humanity; to enrich the understanding of the ecological

systems and natural resources important to the Nation; and to establish a Council on Environmental Quality.

Endangered Species Act (ESA)

The ESA provides a program for the conservation of threatened and endangered plants and animals and the habitats in which they are found. The lead federal agencies for implementing ESA are the U.S. Fish and Wildlife Service (USFWS) and the U.S. National Oceanic and Atmospheric Administration Fisheries Service (NOAA Fisheries). The USFWS maintains a worldwide list of endangered species including insects, crustaceans, fish, amphibians, reptiles, birds, mammals, and plants.

The Bald and Golden Eagle Protection Act

This law, originally passed in 1940, provides for the protection of the bald eagle and the golden eagle (as amended in 1962) by prohibiting the take, possession, sale, purchase, barter, offer to sell, purchase or barter, transport, export or import, of any bald or golden eagle, alive or dead, including any part, nest, or egg, unless allowed by permit (16 U.S.C. 668(a); 50 CFR 22).

Point Elliott Treaty of 1855

The Point Elliott Treaty of 1855 was signed with the United States granting title of the lands comprising the treaty area to the United States. In 1905, the US Supreme Court re-affirmed the tribes' access rights to natural resources, wildlife, and gathering of roots, berries, cedar bark, etc., throughout the treaty area in the Reserved Rights Doctrine that stemmed from the US v. Winans case that year.

There, the court held that in a grantor-grantee relationship anything not explicitly given by the grantor (the tribes) to the grantee (the United States and its successors) was considered as being retained by the grantor. Article 5 of the Point Elliot Treaty reaffirms the tribe's rights to the natural resources within opened and unclaimed lands.

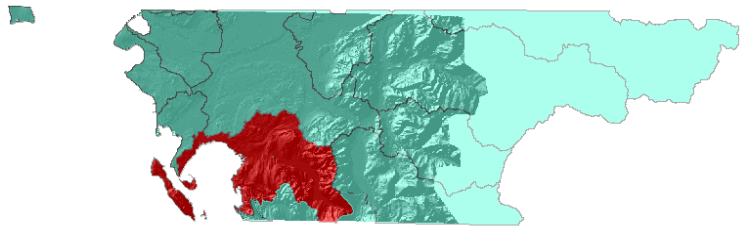
The preservation and protection of the Ecological Systems within Whatcom County are vital for maintaining tribal cultural Identity. It is imperative that the tribes be timely notified and included in meaningful discussions in land use proposals that the county is or may consider in order for the tribes to ensure that any such actions will not have any negative impacts on natural resources that are vital for tribal cultural identities.

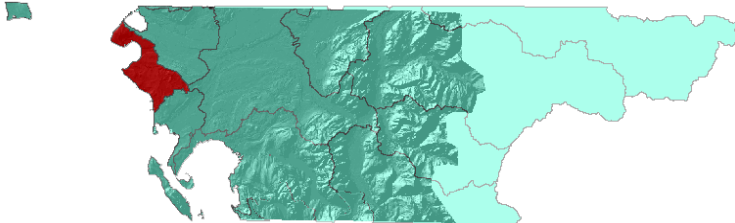
VI. Findings

Virtually every land use action affects wildlife habitat. When we recognize the dependency of wildlife on soils, vegetation, clean air, and water, one can appreciate the importance of minimizing the adverse impacts on wildlife through careful land use. Incremental habitat loss and fragmentation results in cumulative impacts and ultimately demonstrates the need for a broader-scale ecosystem management system.

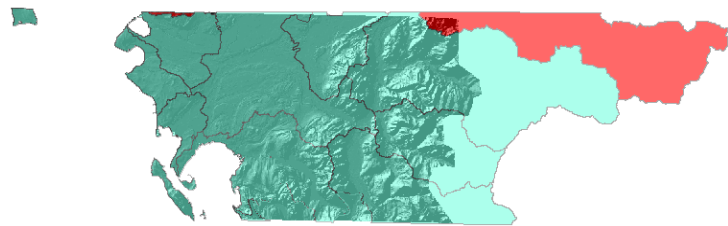
Given the rapid rate of development and population growth, habitat condition across the County has generally degraded for the past two centuries. This is evident throughout the landscape but is most stark given the disappearance of lowland forests and the near-loss of old-growth forests throughout the County. This report provides a cross-section of current conditions in Whatcom County and identifies current habitat types, conservation values, canopy heights, identified fish and wildlife habitat conservation areas, and the current regulatory backdrop. To get a full sense of current habitat and species conditions, refer to appendices A (Species) and B (Habitats).

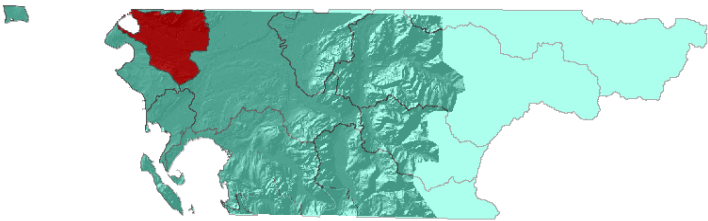
The following tables present our findings of total acreage, canopy height, habitat type, impervious surface percentage, and PHS species and habitats of concern by watershed basin. The tables show that each watershed is unique with different habitat types, species, and levels of development. Based on the findings within each watershed basin and the knowledge of stressors and impacts to ecosystems and wildlife, certain determinations can be made and certain land use planning decisions should be considered.

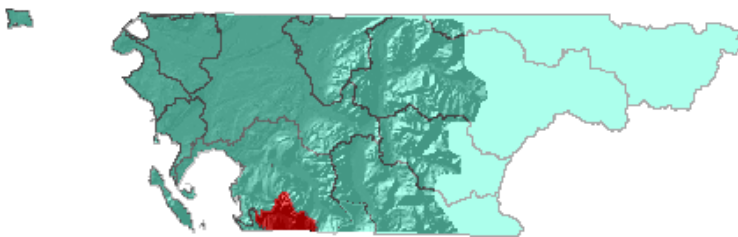
Bellingham Bay									
Total Area (acres)	80,368		Impervious Surface (acres)		13,831			% of Basin	17.20%
									
Wildlife-Habitat		Acres	% of Basin						
Aquatic & Riparian Habitats		10082.41	12.26%						
Developed Habitats		23,397.94	28.45%						
Forest & Woodland Habitats		48,194.48	58.61%						
Marine & Coastal Habitats		554.47	0.67%						
PHS Species & Habitats	Bald Eagle		Nest Terr., CA, Comm. Roost		Pandalid Shrimp		Presence		
	Black Oyster Catcher		Nest, Biotic Detection		Peregrine Falcon		Nest		
	California Myotis		Biotic Detection		Purple Martin		Breeding Colony		
	Caspian Tern		Breeding Colony		Red Sea Urchin		Presence		
	Common Loon		Biotic Detection		Salish Sucker		Biotic Detection		
	Geoduck		Concentration		Shore/Waterfowl		Wintering Area		
	Golden Eagle		Nest		Sub-tidal Hardshell Clam		Concentration		
	Great Blue Heron		Breeding Colony		Tailed Frog		Biotic Detection		
	Harbor Seal		Haulout		Townsend's Big Eared Bat		Biotic Detection		
	Hardshell Clam		Concentration		Trumpeter Swan		Communal Night Roost		
	Herring Adult Holding		Concentration		Western Toad		Biotic Detection		
	Herring Spawning		Concentration						
	Marbled Murrelet		Biotic Detection		Biodiversity Area & Corridor				
	Northern Goshawk		Nest		Cliffs & Bluffs				
	Osprey		Nest		Estuarine Zones				
	Pacific Sand Lance		Concentration		PHS Wetlands				
					Shorebirds & Waterfowl Concentration Areas				
	Canopy Height (feet)	0-1	2-7	8-20	21-50	51-100	101-150	151-200	>200
	23.00%	4.10%	5.20%	14.80%	36.40%	13.80%	1.60%	0.03%	
(19 of 41 Sub-basins analyzed. Source City of Bellingham LiDAR 2013; Whatcom County LiDAR 2016)									

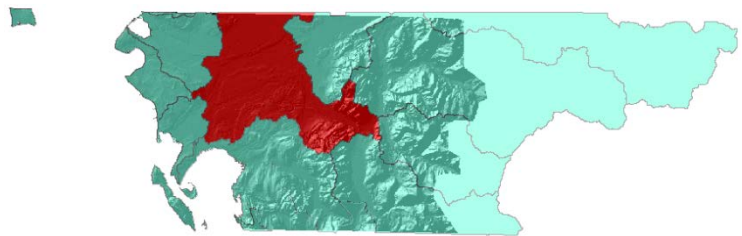
Birch Bay Basin									
Total Area (acres)		20,185	Impervious Surface (acres)			3,177	Impervious % of Basin		15.74%
									
Wildlife-Habitat		Acres	% of Basin						
Aquatic & Riparian Habitats		6931.93	34.33%						
Developed Habitats		11001	54.48%						
Forest & Woodland Habitats		2127.21	10.53%						
Marine & Coastal Habitats		131.81	0.65%						
PHS Species & Habitats	Bald Eagle		Nest			Little Brown Bat		Biotic Detection	
	Big Brown Bat		Biotic Detection			Purple Martin		Nest	
	Common Loon		Biotic Detection			Surf Smelt Spawning		Concentration	
	Gray Wolf		Biotic Detection			Trumpeter Swan		Communal Night Roost	
	Great Blue Heron		Breeding Colony			Wood Duck		Nesting	
	Harbor Seal		Haulout						
	Hardshell Clam		Presence			Biodiversity Area & Corridor			
	Herring Spawning		Concentration			PHS Wetlands			
	Herring Adult Holding		Concentration			Shorebird & Waterfowl Concentration Areas			
Canopy Height (feet)		0-1	2-7	8-20	21-50	51-100	101-150	151-200	>200
		52.10%	6.10%	5.60%	11.30%	21.90%	2.60%	0.01%	0%
(4 of 4 Sub-basins analyzed. Source Whatcom County LiDAR2009, 2016)									

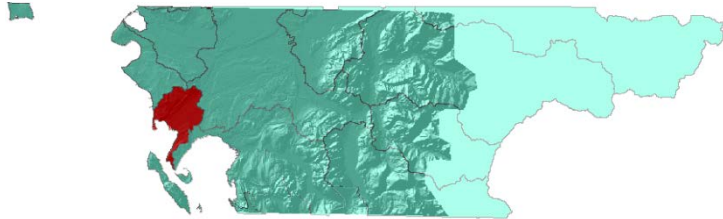
(4 of 4 Sub-basins analyzed. Source Whatcom County LiDAR2009, 2016)

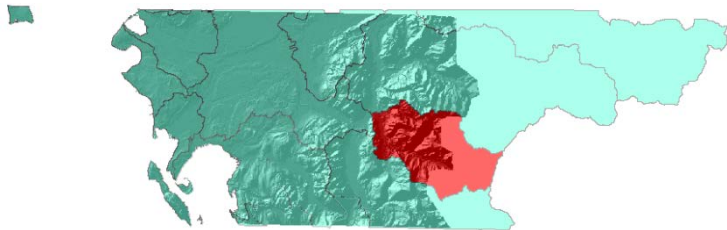
Chilliwack River								
Total Area (acres)	4,781	Impervious Surface (acres)			93	Impervious % of Basin		0.02%
								
Wildlife-Habitat		Acres	% of Basin					
Alpine Grassland & Shrubland		43011.53	39.81%					
Aquatic & Riparian Habitats		520.84	0.48%					
Developed Habitats		116.53	0.11%					
Forest & Woodland Habitats		64,395.23	59.60%					
PHS Species & Habitats		Cavity Nesting Ducks		Breeding		Three Toed Woodpecker		Nest
		Band-Tailed Pigeon		Nesting		Western Toad		Biotic Detection
		Gray Wolf		Biotic Detection				
		Great Gray Owl		Biotic Detection				
		Spotted Owl		Single		Biodiversity Area & Corridor PHS Wetlands		
		Tailed Frog		Biotic Detection				
Canopy Height (feet)	0-1	2-7	8-20	21-50	51-100	101-150	151-200	>200
	12.90%	11.30%	15.50%	31.10%	25.90%	3.00%	0.03%	0.00%
(2 of 18 Sub-basins analyzed - no current LiDAR coverage for the rest of the basin. Source Whatcom County LiDAR 2009.)								

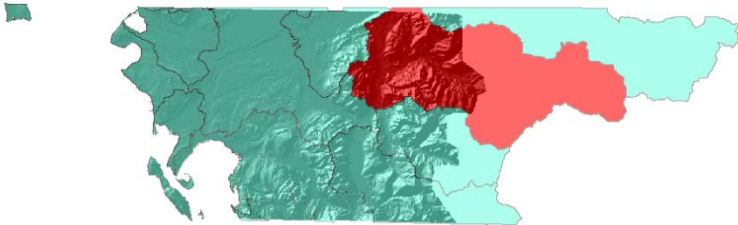
Drayton Harbor								
Total Area (acres)	36,091	Impervious Surface (acres)			3,719	Impervious % of Basin		10.30%
								
Wildlife-Habitat		Acres	% of Basin					
Aquatic & Riparian Habitats		4,439.43	12.30%					
Developed Habitats		20,464.84	56.71%					
Forest & Woodland Habitats		10,975.24	30.41%					
Marine & Coastal Habitats		207.97	0.58%					
PHS Species & Habitats	Bald Eagle	Nest, Breeding			Pac. Sand Lance Spawning	Territory		
	Cavity Nesting Duck	Breeding						
	Great Blue Heron	Breeding						
	Hard Shell Clam	Concentration			Biodiversity Areas & Corridor			
	Harbor Seal	Haulout			Estuarine Zones			
	Surf Smelt Spawning	Concentration			PHS Wetlands			
	Herring Spawning	Concentration			Shorebird & Waterfowl Concentration Areas			
Canopy Height (in feet)	0-1	2-7	8-20	21-50	51-100	101-150	151-200	>200
	51.70%	6.50%	5.80%	10.80%	21.80%	2.90%	0.20%	0%
(6 of 6 Sub-basins analyzed. Source Whatcom County LiDAR 2009, 2016.)								

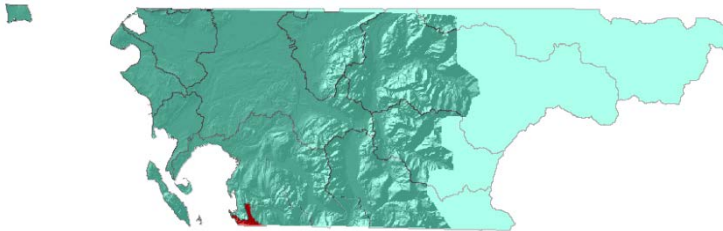
Friday Creek								
Total Area (acres)	4,781	Impervious Surface (acres)			93	Impervious % of Basin		0.02%
<div><div></div><div></div></div>								
Wildlife-Habitat Category		Acres	% of Basin					
Aquatic & Riparian Habitats		1,289	11.44%					
Developed Habitats		619.43	5.50%					
Forest & Woodland Habitats		9358.51	83.06%					
PHS Species & Habitats	Bald Eagle		Nest, Communal Roost			Biodiversity Areas & Corridor		
	Osprey		Nest			Bluffs & Cliffs		
	Western Floater		Biotic Detection			PHS Wetlands		
						Waterfowl Concentration Areas		
Canopy Height (feet)	0-1	2-7	8-20	21-50	51-100	101-150	151-200	>200
	11.86%	3.48%	5.78%	18.64%	45.82%	13.48%	0.88%	0%
(3 of 3 Sub-basins analyzed. Source Whatcom County LiDAR 2009, 2016; City of Bellingham LiDAR 2013.)								

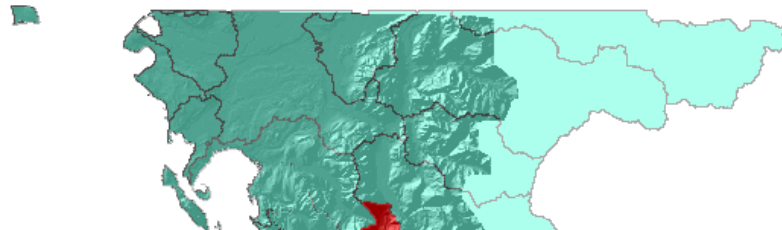
Lower Nooksack								
Total Area (acres)	118,190	Impervious Surface (acres)			11,188	Impervious % of Basin		9.47%
								
Wildlife-Habitat Category		Acres	% of Basin					
Aquatic & Riparian Habitats		9,422.89	9.10%					
Developed Habitats		74,617.47	64.14%					
Forest & Woodland Habitats		32,290.54	27.76%					
PHS Species & Habitats	Bald Eagle	Nest, Communal Roost			Turkey Vulture	Concentration		
	Band-tailed Pigeon	Concentration			Western Pearlshell	Biotic Detection		
	California Myotis	Biotic Detection			Yuma Myotis	Biotic Detection		
	Cavity Nesting Duck	Nest						
	Gray Wolf	Biotic Detection						
	Great Blue Heron	Breeding			Biodiversity Areas & Corridor			
	Little Brown Bat	Biotic Detection			Cliffs & Bluffs			
	Pacific Lamprey	Biotic Detection			Estuarine Zones			
	Sandhill Crane	Staging Area			PHS Wetlands			
	Trumpeter Swan	Communal Night Roost			Shorebird & Waterfowl Concentration Areas			
Canopy Height (feet)	0-1	2-7	8-20	21-50	51-100	101-150	151-200	>200
	64.50%	6.80%	5.30%	8.50%	12.50%	2.10%	0.10%	0%
(11 of 16 Sub-basins analyzed. Source Whatcom County LiDAR 2009, 2016; City of Bellingham LiDAR 2013.)								

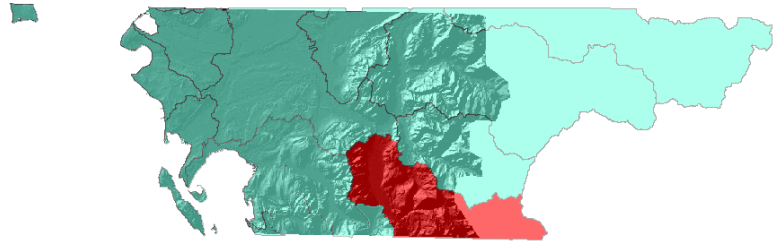
Lummi Bay																	
Total Area (acres)		17,349	Impervious Surface (acres)			2,244	Impervious % of Basin		12.93%								
																	
										Wildlife-Habitat Category		Acres	% of Basin				
										Aquatic & Riparian Habitats		1,363.90	7.81%				
										Developed Habitats		12,843.54	73.53%				
										Forest & Woodland Habitats		2969.89	17.00%				
										Marine & Coastal Habitats		288.8	1.65%				
PHS Species & Habitats		Bald Eagle		Nesting, Breeding		Surf Smelt Spawning		Concentration									
		Great Blue Heron		Nesting, Breeding		Trumpeter Swan		Concentration									
		Herring Adult Holding		Concentration													
		Herring Spawning		Concentration													
		Purple Martin		Colony		PHS Wetlands											
		Sand Lance Spawning		Concentration		Shorebird & Waterfowl Concentration Areas											
Canopy Height		0-1	2-7	8-20	21-50	51-100	101-150	151-200	>200								
		63%	8.70%	5.50%	7.20%	14.30%	1.10%	0.00%	0%								
(5 of 5 Sub-basins analyzed. Source Whatcom County LiDAR 2009, 2016; City of Bellingham LiDAR 2013.)																	

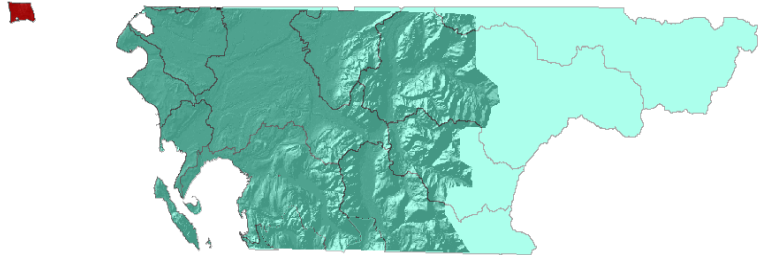
Middle Fork Nooksack																							
Total Area (acres)	63,685	Impervious Surface (acres)			161	Impervious % of Basin		0.25%															
<table><tr><th>Wildlife-Habitat Category</th><th>Acres</th><th>% of Basin</th></tr><tr><td>Alpine Grassland & Shrubland</td><td>8706.31</td><td>13.67%</td></tr><tr><td>Aquatic & Riparian Habitats</td><td>2,813.06</td><td>4.42%</td></tr><tr><td>Developed Habitats</td><td>32.16</td><td>0.05%</td></tr><tr><td>Forest & Woodland Habitats</td><td>52,133.83</td><td>81.86%</td></tr></table>					Wildlife-Habitat Category	Acres	% of Basin	Alpine Grassland & Shrubland	8706.31	13.67%	Aquatic & Riparian Habitats	2,813.06	4.42%	Developed Habitats	32.16	0.05%	Forest & Woodland Habitats	52,133.83	81.86%				
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					Alpine Grassland & Shrubland	8706.31	13.67%																
					Aquatic & Riparian Habitats	2,813.06	4.42%																
					Developed Habitats	32.16	0.05%																
Forest & Woodland Habitats	52,133.83	81.86%																					
PHS Species & Habitats	Bald Eagle		Nest, Communal Roost		Tailed Frog		Biotic Detection																
	Boreal Chickadee		Biotic Detection		Turkey Vulture		Concentration																
	Fisher		Biotic Detection		Western Toad		Biotic Detection																
	Harlequin Duck		Breeding		Wood Duck		Concentration																
	Marbled Murrelet		Biotic Detection		Wolverine		Biotic Detection																
	Norther Goshawk		Nest																				
	Osprey		Nest		Cliffs & Bluffs																		
	Spotted Owl		Single, Pair		PHS Wetlands																		
Canopy Height	0-1	2-7	8-20	21-50	51-100	101-150	151-200	>200															
	7.20%	7.60%	9.20%	23.40%	40.20%	11.70%	0.60%	0%															
(5 of 17 Sub-basins analyzed - no current LiDAR coverage for the rest of the basin. Source Whatcom County LiDAR 2009.)																							

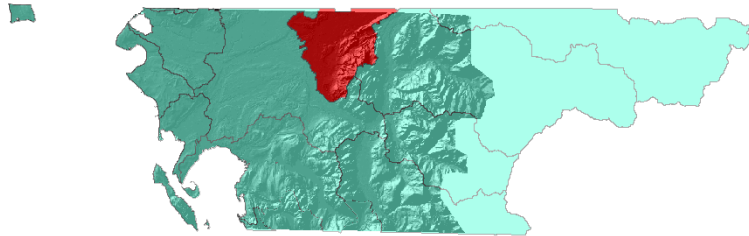
North Fork Nooksack																																			
Total Area (acres)	187,611	Impervious Surface (acres)			946	Impervious % of Basin		0.50%																											
<table><tr><th>Wildlife-Habitat Category</th><th>Acres</th><th>% of Basin</th></tr><tr><td>Alpine Grassland & Shrubland</td><td>27,779.85</td><td>15.00%</td></tr><tr><td>Aquatic & Riparian Habitats</td><td>7,754.44</td><td>4.19%</td></tr><tr><td>Developed Habitats</td><td>3,392.08</td><td>1.83%</td></tr><tr><td>Forest & Woodland Habitats</td><td>146,215.93</td><td>78.97%</td></tr></table>					Wildlife-Habitat Category	Acres	% of Basin	Alpine Grassland & Shrubland	27,779.85	15.00%	Aquatic & Riparian Habitats	7,754.44	4.19%	Developed Habitats	3,392.08	1.83%	Forest & Woodland Habitats	146,215.93	78.97%																
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					Developed Habitats	3,392.08	1.83%																												
					Forest & Woodland Habitats	146,215.93	78.97%																												
<table><tr><td rowspan="10">PHS Species & Habitats</td><td>Bald Eagle</td><td>Nest, Communal Roost</td><td rowspan="6">Spotted Owl Tailed Frog Three Toed Woodpecker Western Bluebird Western Toad Wolverine</td><td rowspan="6">Concentration Biotic Detection Nest Breeding Biotic Detection Biotic Detection</td></tr><tr><td>Band Tailed Pigeon</td><td>Nest</td></tr><tr><td>Common Loon</td><td>Biotic Detection</td></tr><tr><td>Golden Eagle</td><td>Nest</td></tr><tr><td>Gray Wolf</td><td>Biotic Detection</td></tr><tr><td>Harlequin Duck</td><td>Breeding</td></tr><tr><td>Marbled Murrelet</td><td>Biotic Detection</td><td colspan="2"></td></tr><tr><td>Northern Goshawk</td><td>Nest</td><td colspan="2">Cliffs & Bluffs</td></tr><tr><td>Osprey</td><td>Nest</td><td colspan="2">PHS Wetlands</td></tr><tr><td>Peregrine Falcon</td><td>Biotic Detection</td><td colspan="2">Talus Slopes</td></tr></table>					PHS Species & Habitats	Bald Eagle	Nest, Communal Roost	Spotted Owl Tailed Frog Three Toed Woodpecker Western Bluebird Western Toad Wolverine	Concentration Biotic Detection Nest Breeding Biotic Detection Biotic Detection	Band Tailed Pigeon	Nest	Common Loon	Biotic Detection	Golden Eagle	Nest	Gray Wolf	Biotic Detection	Harlequin Duck	Breeding	Marbled Murrelet	Biotic Detection			Northern Goshawk	Nest	Cliffs & Bluffs		Osprey	Nest	PHS Wetlands		Peregrine Falcon	Biotic Detection	Talus Slopes	
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(17 of 39 Sub-basins analyzed - no current LiDAR coverage for the rest of the basin. Source Whatcom County LiDAR 2009, 2016.)																																			

Samish Bay									
Total Area (acres)	1,951	Impervious Surface (acres)			41	Impervious % of Basin		2.10%	
									
					Wildlife-Habitat Category		Acres	% of Basin	
					Aquatic & Riparian Habitats		62.96	3.23%	
					Developed Habitats		284.25	14.56%	
					Forest & Woodland Habitats		1595.99	81.77%	
					Marine & Coastal Habitats		8.54	0.44%	
PHS Species & Habitats	Bald Eagle		Breeding		Wood Duck		Nesting		
	Harbor Seal		Haulout						
	Hardshell Clam		Concentration						
	Herring Adult Holding		Concentration		Biodiversity Areas & Corridor				
	Herring Spawning		Concentration		Cliffs & Bluffs				
	Townsend's Big-eared Bat		Biotic Detection		PHS Wetlands				
Canopy Height (feet)	0-1	2-7	8-20	21-50	51-100	101-150	151-200	>200	
	4.60%	2.00%	1.90%	5.90%	49.00%	33.30%	0.05%	0%	
(2 of 2 Sub-basins analyzed. Source Whatcom County LiDAR 2009, 2016.)									

Samish River								
Total Area (acres)	6,068	Impervious Surface (acres)			667	Impervious % of Basin		10.99%
								
Wildlife-Habitat Category		Acres	% of Basin					
Aquatic & Riparian Habitats		685.6	11.74%					
Developed Habitats		88.55	1.52%					
Forest & Woodland Habitats		5,064.27	86.74%					
PHS Species & Habitats	Elk		Winter Range					
	Marbled Murrelet		Biotic Detection					
	Oregon Spotted Frog		Biotic Detection		PHS Wetlands			
Canopy Height (feet)	0-1	2-7	8-20	21-50	51-100	101-150	151-200	>200
	16.50%	7.70%	9%	22.10%	31.10%	10.20%	3.10%	0.01%
(2 of 2 Sub-basins analyzed. Source Whatcom County LiDAR 2009, 2016; City of Bellingham LiDAR 2013.)								

South Fork																																													
Total Area (acres)	79,287	Impervious Surface (acres)			556	Impervious % of Basin		0.70%																																					
<table><tr><th>Wildlife-Habitat Category</th><th>Acres</th><th>% of Basin</th></tr><tr><td>Alpine Grassland & Shrubland</td><td>5,083.60</td><td>6.47%</td></tr><tr><td>Aquatic & Riparian Habitats</td><td>2,787.86</td><td>3.55%</td></tr><tr><td>Developed Habitats</td><td>6,499.25</td><td>8.28%</td></tr><tr><td>Forest & Woodland Habitats</td><td>64,165.92</td><td>81.70%</td></tr></table>					Wildlife-Habitat Category	Acres	% of Basin	Alpine Grassland & Shrubland	5,083.60	6.47%	Aquatic & Riparian Habitats	2,787.86	3.55%	Developed Habitats	6,499.25	8.28%	Forest & Woodland Habitats	64,165.92	81.70%																										
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Canopy Height	0-1	2-7	8-20	21-50	51-100	101-150	151-200	>200																																					
	15.70%	11.50%	11.50%	23.70%	26.70%	9.20%	1.30%	0.04%																																					
(11 of 15 Sub-basins analyzed. Source Whatcom County LiDAR 2009, 2016; City of Bellingham LiDAR 2013. No current LiDAR coverage for 4 sub-basins.)																																													

Strait of Georgia								
Total Area (acres)	3,091	Impervious Surface (acres)			749	Impervious % of Basin		24.23%
<div><div></div><div></div></div>								
Wildlife-Habitat Category		Acres	% of Basin					
Aquatic & Riparian Habitats		3,070.05	99.51%					
Marine & Coastal Habitats		15.23	0.49%					
PHS Species & Habitats	Bald Eagle	Nest, Breeding, Comm. Roost			Red Sea Urchin	Concentration		
	Great Blue Heron	Colony			Surf Smelt Spawning	Concentration		
	Harbor Seal	Haulout			Sub-Tidal Hardshell Clam	Concentration		
	Hardshell Clam	Concentration						
	Herring Spawning	Concentration			Biodiversity Area & Corridor			
Canopy Height (feet)	0-1	2-7	8-20	21-50	51-100	101-150	151-200	>200
	No Data	No Data	No Data	No Data	No Data	No Data	No Data	No Data
(Basin canopy height not analyzed - no current LiDAR coverage.)								

Sumas River								
Total Area (acres)	43,070	Impervious Surface (acres)			2,182	Impervious % of Basin		5.07%
								
Wildlife-Habitat Category		Acres	% of Basin					
Aquatic & Riparian Habitats		2,633.76	6.12%					
Developed Habitats		26,814.82	59.31%					
Forest & Woodland Habitats		13,592.64	31.58%					
PHS Species & Habitats	Bald Eagle		Nest, Communal Roost		Tailed Frog		Biotic Detection	
	Band Tailed Pigeon		Concentration		Trumpeter Swan		Communal Roost	
	Cavity Nesting Ducks		Nesting		Western Toad		Biotic Detection	
	Great Gray Owl		Biotic Detection					
	Marbled Murrelet		Nest					
	Oregon Spotted Frog		Biotic Detection		Cliffs & Bluffs			
	Peregrine Falcon		Nest		PHS Wetlands			
	Sandhill Crane		Concentration		Waterfowl Concentration Areas			
Canopy Height (feet)	0-1	2-7	8-20	21-50	51-100	101-150	151-200	>200
	48.10%	6.30%	6.80%	11.50%	21.40%	5.40%	0.40%	0.01%
(6 of 6 Sub-basins analyzed. Source Whatcom County LiDAR 2009, 2016.)								

Stressors of Wildlife and Habitat

Some of the most common effects of land use changes on wildlife include the loss of habitat, the creation of smaller and more scattered remaining fragments or patches of habitat, loss of habitat quality within patches, increased road mortality, reduced water quality, and increased competition between native species and nonnative species. The effects of land use, one of the “stressors,” can result in the further loss of species from an area. Land use planning that considers wildlife in the local decision-making process can minimize the effects of stressors on wildlife as the landscape is developed.

The primary stressors identified are:

Changes to Habitat Composition

Examples include:

- Clearing and grading
- Lawn maintenance and landscaping
- Removal of decadent(hazard) trees

Changes to Habitat Configuration

Examples include:

- Development along riparian corridors
- Development within or adjacent to wetlands
- Development after expansion of Urban Growth Areas
- Introduction of domestic or invasive species to the ecosystem

Changes to Habitat Connectivity

Examples include:

- Fences and barriers
- Powerline and other utility corridors
- Construction of local residential streets
- Development of high capacity roads
- Land division and subsequent development
- Noise and glare from artificial light

Additional stressors include:

- Hydrological depletions or additions
- Interruption in water flow may have negative impacts on fish populations
- Pathogens, nutrients, and toxicants

- Interspecific interactions
- Introduced species outcompeting native species
- Changes in disturbance regimes
- Distance from natural range of variability
- The impact of climate change on habitats and habitat connections

In 2010 the Washington State Habitat Connectivity Working Group released the Washington Connected Landscapes: Statewide Analysis. Figure 13 demonstrates how stressors can impact habitats and the effects that can have on associated species. One of the conclusions reached by this Working Group is that “climate change and widespread loss of habitat call on us to explore options for conserving connectivity that transcend jurisdictional boundaries and sustain natural processes.

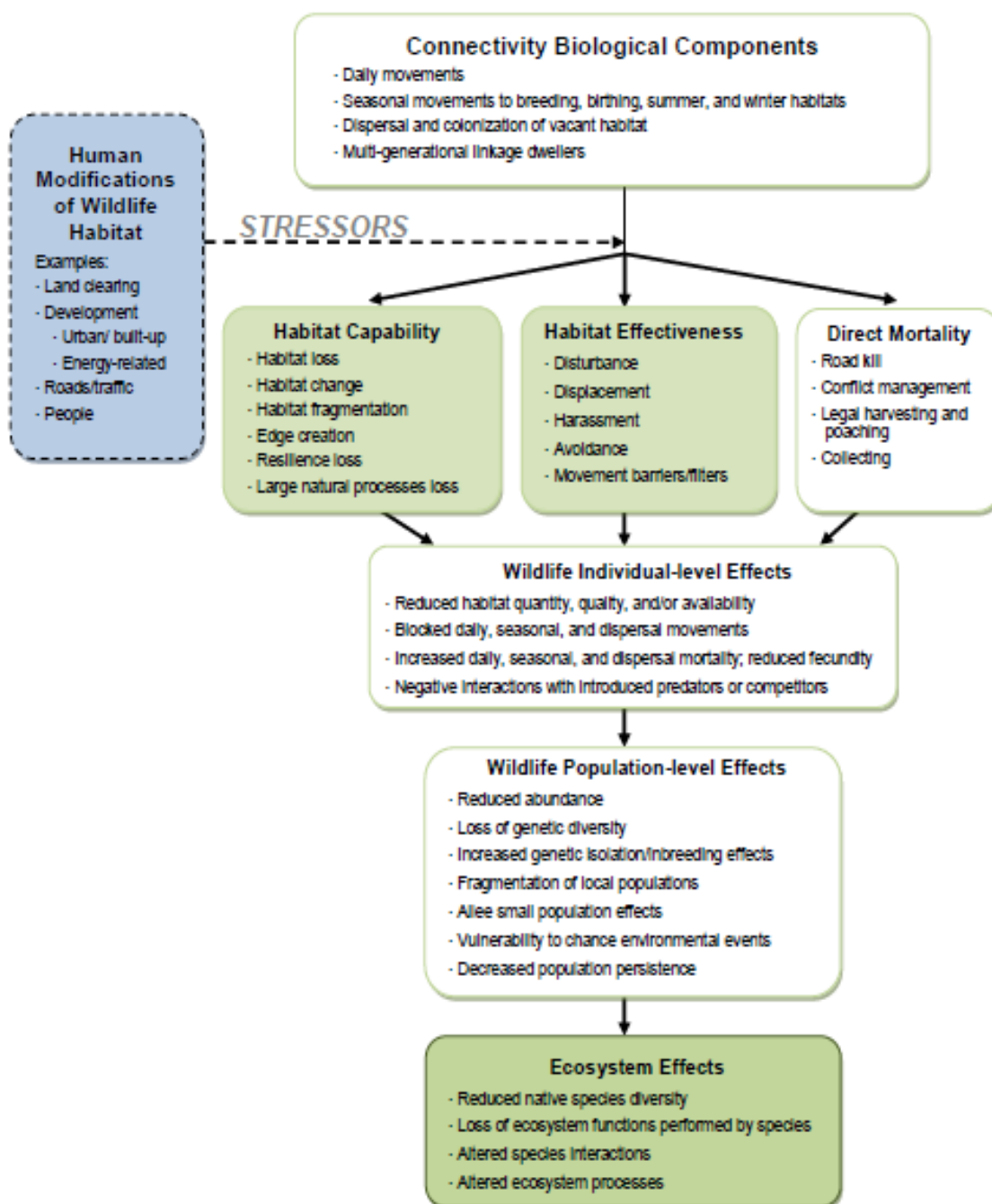


Figure 13. How Stressors Can Impact Habitats and Associated Species (WDFW, Landscape Planning 2009)

Wildlife mortality (road kill) data is available from Washington State Department of Transportation on Washington state roads. The map below is located within the Chuckanut Wildlife Corridor and demonstrates how fragmentation of habitats contributes to wildlife mortality as species attempt to move from one habitat block to another.

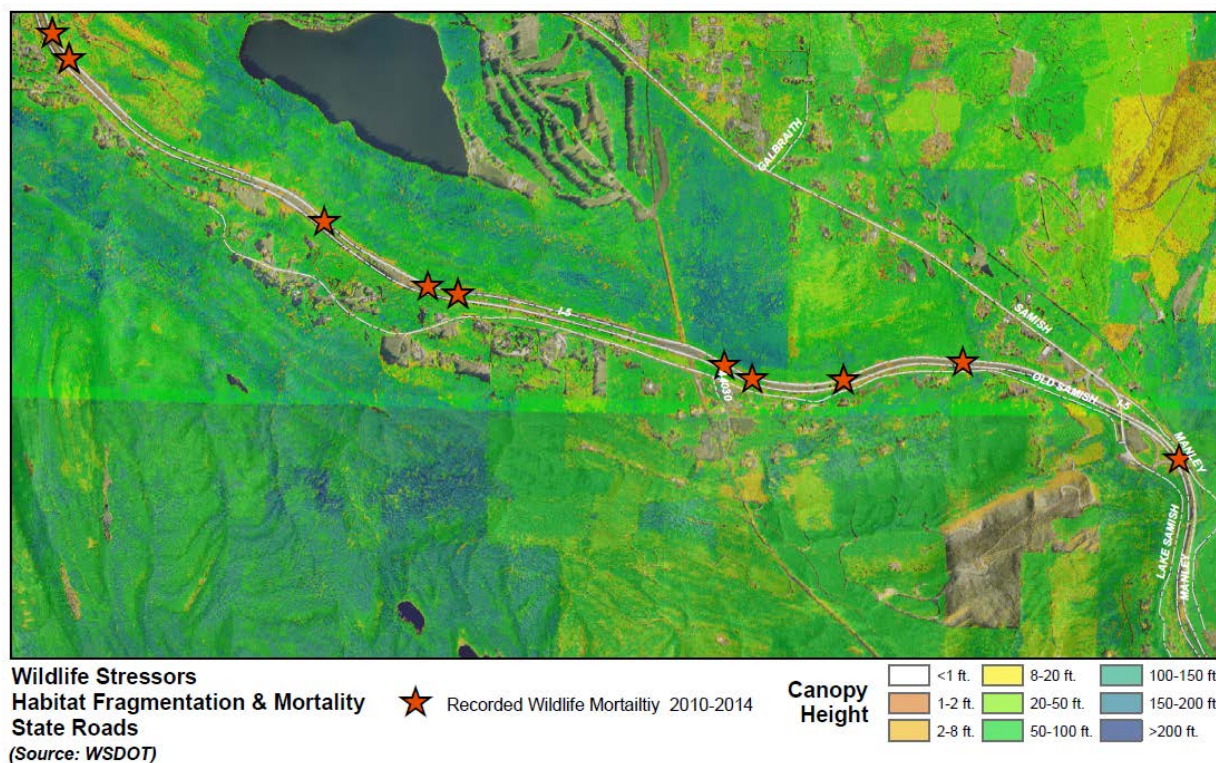


Figure 14. Wildlife Stressors. Habitat fragmentation and wildlife mortality. (2010-2014 WSDOT)

VII. Information Gaps

Throughout meetings of the Wildlife Advisory Committee they became aware of certain gaps in information available for Whatcom County. The following list highlights current gaps in knowledge identified by the committee:

- In general, areas outside of identified critical areas and SMP jurisdiction areas have limited ecosystem information.
- On-the-ground assessments of GIS mapped ecosystems and habitats are recommended to provide increased resolution about habitat quality and species presence and use.
- Field verified information only exists in cases where a development permit has been issued and it only applies to regulated habitats and species under the CAO.
- Non-game or diversity species abundances and actual distribution (WDFW has significant data regarding monitored fish and game species).
- Habitat condition information.
- Clear and adopted management recommendations for biodiversity areas, movement corridors, and habitat connections.
- Culturally significant areas, usual and protected areas under Article 5 of Point Elliott Treaty

VIII. Recommendations

Per Ordinance 2015-031, the Technical Subcommittee of the Wildlife Advisory Committee is tasked with providing initial management recommendations. They were to use best available science to ensure appropriate habitat conditions are maintained for local species, with an emphasis on biodiversity and healthy ecosystem processes and functions. This may include recommendations regarding wildlife corridors, landscape ecological planning, wildlife management, and avoiding human/wildlife conflict.

The Wildlife Advisory Committee has developed achievable recommendations based on a review of best available scientific studies and resources, an assessment of current ecosystem conditions, and the professional experiences of Technical Advisory Committee members. These recommendations have been broken up into two categories: Landscape Management and Programmatic. The Committee submits the following recommendations to the County Council for consideration in determining how best to protect wildlife, habitats, and ecosystem functions.

Landscape Management Recommendations

The Wildlife Advisory Committee concludes that, in general, wildlife is best served by:

- Maintaining large, undeveloped and connected patches of native vegetation by designating growth and development areas in other locations.
- Maintaining low-density zoning or using other land use mechanisms within and immediately adjacent to high-value habitat areas to encourage larger, undisturbed tracts as well as encouraging maintenance of native vegetation.
- Avoiding fragmentation of habitat by minimizing the number of new roads and other barriers to important animal movement corridors, and restore wildlife crossings between habitats.
- Requiring infrastructure to be designed for safe wildlife passage and not create a barrier to migration.
- Restoring the structure, function, and spatial extent of floodplains (refer to Comprehensive Flood Hazard Management Plan).

- Adopting in the Critical Areas Ordinance terrestrial wildlife habitat buffers and management recommendations for biodiversity areas and corridors.
- Protect and restore mature forest stands that form connected habitat blocks from the Puget Sound to the Cascade Mountains (e.g., Chuckanut Wildlife Corridor, Nooksack River and associated tributaries)
- Protecting wetlands, riparian areas, and associated buffers from logging and other exempt stressors.

Programmatic Recommendations

To protect wildlife populations, the Wildlife Advisory Committee recommends the following items be integrated into Whatcom County government actions and procedures, especially the following departments: Planning and Development Services, Public Works, and Parks and Recreation:

- Adopt recommendations contained within this report into Whatcom County Code, as applicable
- Develop a Whatcom County Ecosystem Conservation Plan or Program that ensures habitat connectivity, protects important remaining habitats, restores degraded or important habitat areas, and develops the programmatic support within Whatcom County government to enact the Plan. This Plan would build upon the work of the many ecosystem reports including, but not limited to:
 - Cascades to Chuckanuts Conservation Plan (2004)
 - Shoreline Restoration Plan (2008)
 - State of the Watershed Report (2010)
 - Bellingham Technical Assessment (2015)
 - Ecosystem Report (2017)
- Protect high-value habitat and corridors for animal movement through purchase of development rights, land acquisition, open space tax assessments, conservation easements, land use restrictions, and/or a comprehensive wildlife and habitat program.
- When land use application proposals are submitted, a comprehensive Natural Resource ecosystem assessment must be completed that includes consideration of watershed conditions with regards to terrestrial wildlife, requiring maintenance of habitat connections, and considering impacts to nearby important habitat areas.

- Develop management recommendations for identified Habitat Conservation Areas that currently lack management recommendations such as wildlife corridors and biodiversity areas.
- Incorporate terrestrial wildlife crossing structures in new road design or during culvert replacement and/or road improvements.
- Encourage the Washington State Department of Natural Resources to maintain mature forest habitats and habitat connectivity for protection of biodiversity beyond the minimum fish bearing stream and wetland buffer requirements when approving forest practice applications within and adjacent to Whatcom County.
- Minimize new road construction in important habitat areas and restore habitat connections fragmented by roads.
- Improve resolution for whole county habitat mapping, including marine areas, through continued GIS data recruitment, organization, and incorporation, as well as the collection of on-the-ground field data.
- Incorporate climate change projections into the Ecosystem Plan and Critical Areas Ordinance and develop an adaptation plan.
- Perform a Countywide Ecosystem Functions and Values Study that should include:
- Hiring of a consultant to design a baseline analysis, develop data architecture, develop data assessment forms, and train field crew(Whatcom County staff)
- Expand County-sponsored citizen science programs, such as the Marine Resource Committee's programs, to terrestrial ecosystems and develop a working relationship with Western Washington University to support these efforts.
- Complete Rapid Habitat Assessments for various habitats and wildlife
- Complete GIS Vegetation Change Analysis
- Develop an effective habitat and wetland banking, in-lieu fee, and/or mitigation program.
- Determine whether there are any locally important species and habitats for extra protection under the CAO.
- Budget for additional staff time to support ongoing wildlife and habitat planning efforts.

- Extend the duration of the Wildlife Advisory Committee to meet at a minimum of 4 times per year to steward the recommendations outlined in this document and to provide feedback and guidance to County Council and County staff on wildlife planning issues and solutions.
- Re-evaluate types of permitted activities and exemptions within Fish and Wildlife Habitat Conservation Areas.
- Provide resources and funding for staff and consultants to map existing conditions in the field and provide more thorough GIS analysis of existing conditions.

IX. Closing

The Wildlife Advisory Committee is very thankful to have had the opportunity to explore and consider the ecosystems and wildlife of Whatcom County. It is the hope of the committee that this document will serve as a guidance document for Whatcom County Council, staff, and residents alike.

X. Appendices

The attached appendices are intended to represent a centralized repository of information to provide a wealth of ecosystem and wildlife information that can be referenced and used according to relevant needs or interests.

- A. Species lists
- B. Habitats
- C. Ordinance 2015-031
- D. Maps
 - Wildlife Habitat Types
 - Conservation Value ~ Whatcom Legacy Project
 - WDFW – Priority Habitats and Species
 - Canopy Height
- E. References