



Regional Environmental Baseline

The central Puget Sound region is highly valued as a major metropolitan area in which to live, work, and play. It is known as a clean, healthy, safe, and diverse place with a vibrant economy and temperate climate. The region has a remarkably beautiful natural setting, including snowcapped peaks, abundant waterways and shorelines, and lush forests and greenery. The natural environment provides habitat that sustains a wide variety of fish and wildlife, and at the same time creates economic opportunity through industries such as fishing and timber harvest, and provides numerous recreational and tourism opportunities. These features have all made the region a magnet for growth.

While the environment is deeply connected to the identity, values, and quality of life in the region, over time we have caused harm, some of it irreversible. We needed natural resources for industry and employment, and we needed land, water, and materials for the region's cities and homes. We did not have a full understanding of how the environment functioned, and in the past we had different values than appear to be emerging today. Because of these values, the region has had success in restoring the environment, through both sound policies and coordinated action.

Growth has been steady and the forecast is for continued growth. Environmental protection in the face of continued population growth is what drives regional environmental planning. The primary question is: "How can the region absorb another 1.6 million people and 1.1 million new jobs by 2040 while protecting the environment and our overall quality of life?"

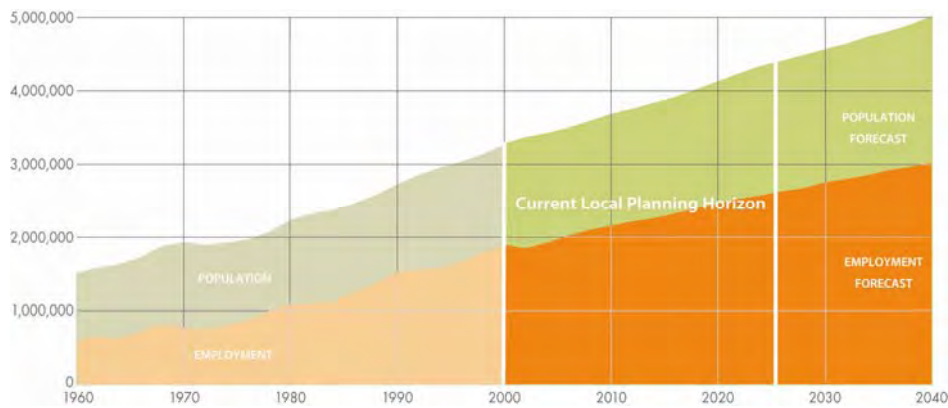
The VISION 2020 update's work to develop a regional VISION for growth, transportation, and economic development presents an opportunity to incorporate sustainability into the plan. The VISION 2020 update should ensure that environmental, social, and economic considerations are factored into decisions... and that the needs of the present can be met without compromising the ability to meet our needs in the future.

— King County Executive Ron Sims, comment made during public scoping

There is a growing understanding of the role the environment plays in quality of life, economic prosperity, food production, water quality, recreational opportunities, visual and aesthetics pleasures, sense of place, biodiversity, and our future overall. The Growth Management Act and the VISION's holistic and balanced approach — focusing on land use, transportation, economic development, and the environment — reflects this understanding and is central to securing the region's high quality of life and environmental health.



FIGURE 2-1: POPULATION HISTORY, TRENDS, AND FORECASTS



Source: Puget Sound Regional Council, 2005

This “baseline” attempts to make sense of where we have been, where we are and what we have learned, and where we may be going. It does not address future impacts, but instead focuses on what we know today.

Over the past decade and a half since the Puget Sound Regional Council first adopted VISION 2020, the number of agencies, research institutions and organizations working in the environmental field has grown. Some of these stakeholders have responsibility to administer laws related to specific issues such as clean air, water quality, flood protection, and ecosystems, or wildlife protection. Others are resource managers, environmental interest groups, and researchers. Through their efforts we have learned a great deal about how the environment functions, and we are now increasingly working in interdisciplinary ways that more fully recognize the interconnections between these issues.

The baseline takes a first step at drawing together what these stakeholders are doing in order to make sense of the new information at a regional scale. Ultimately, as the region looks forward to the year 2040 and the challenges of accommodating population and employment growth, the baseline is about choices and opportunities — in short, the consequences of our actions.

The baseline can be a call to action — a positive call that recognizes that many if not all of the tools needed to protect, conserve, and restore the environment already exist. These tools may be expensive or difficult to implement, but over the course of the 35-year horizon of the regional VISION, the region can likely implement a large number of these tools and make substantial progress toward creating a sustainable environment. And, as has been said before,

No place on Earth has a better shot at reconciling people and nature than the Pacific Northwest, the greenest corner of history's richest civilization. And with most of the planet's people aspiring to our North American standard of living, no one has a greater responsibility to set new standards for an ecologically endangered world.

— Northwest Environment Watch, 2004

CONTENTS OF THE ENVIRONMENTAL BASELINE

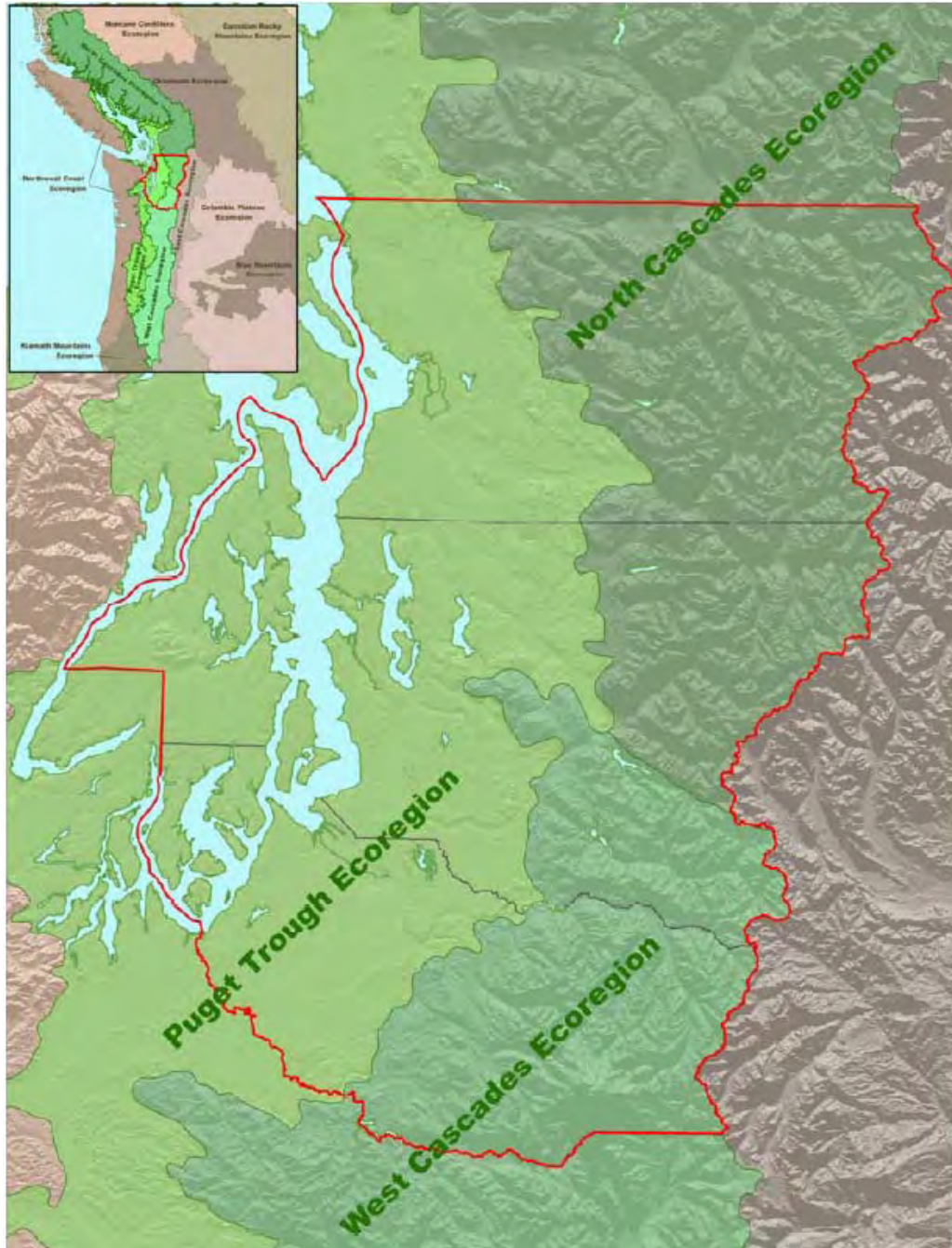
The environmental baseline discussion is organized in the following manner:

- A. **What is the nature of the region?** This section describes the ecology of the region, and the larger ecological setting in which the region resides, to give readers more context for understanding the impacts of growth and land use choices on the natural environment.
- B. **What has been happening to the region's environment over the past 150 years?** This section provides a high-level overview of human impacts on the region's environment.
- C. **Who are the region's environmental actors and what are they doing?** This section summarizes some efforts and initiatives currently underway, discusses new environmental planning information, and summarizes the environmental priorities as identified by these stakeholders.
- D. **What should VISION 2040 contribute?** This section describes how the VISION, the preferred growth alternative, and the multicounty planning policies can help improve regional environment planning and implement environmental safeguards.

A. What Is the Nature of the Region?

The central Puget Sound region is part of a set of larger ecoregions¹ that extends from the foothills of the Olympic Mountains to the foothills of the Cascade Mountains, encompassing the Puget Sound, and running from Oregon to Canada (Figure 2-2), through broad lowland valleys and the inland sea of the Puget Sound.

FIGURE 2-2: CENTRAL PUGET SOUND REGION IN THE LARGER ECOREGION



Source: The Nature Conservancy, Ecoregional Assessment

¹ An ecoregion is an area defined by broad ecological patterns in the landscape. Each ecoregion exhibits a distinctive composition and distribution of plant communities and associated wildlife.

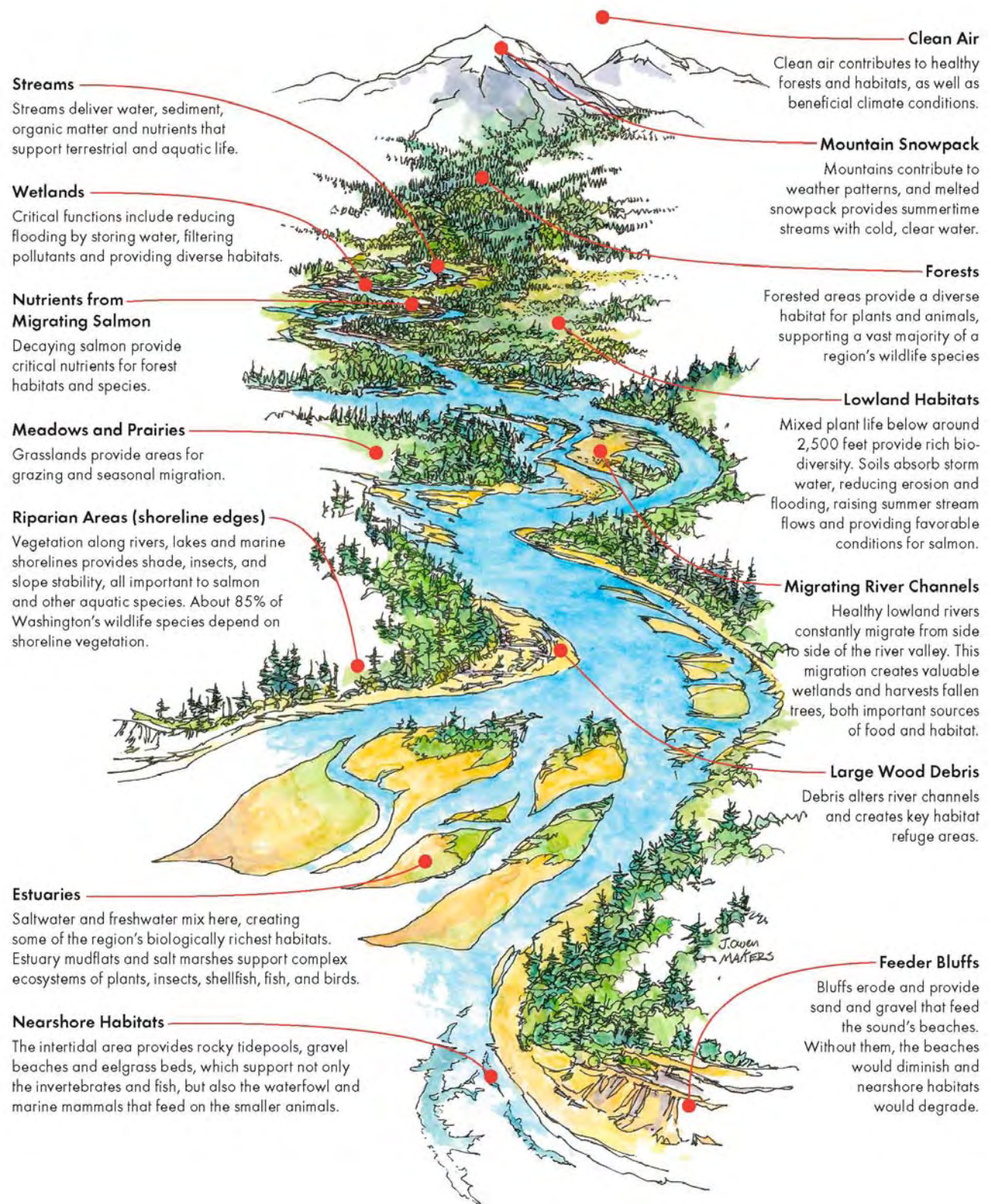
Within the ecoregion, the landscape is a continuous web of interwoven life stretching from mountains to sea. Land, air, water, and living things all interact in highly intricate ways, many of which we are only beginning to understand in full. The Puget Sound ecosystem is a dynamic, ever-changing complex of plants, animals, and their environment, shaped by the climatic and geological conditions that evolved over the millennia. Water has remained a key connecting part of the landscape (see Figure 2-3).

FIGURE 2-3: CENTRAL PUGET SOUND REGION WATERSHEDS



Source: Puget Sound Regional Council

FIGURE 2-4: NATURAL ECOSYSTEM CONDITIONS



Water, in the form of ice age glaciers of the Cascade and Olympic ranges, helped shape the region's form by first depositing rock, gravel, and finer material over the underlying bedrock. Then, when the glaciers retreated, they cut stream channels to the Puget Sound. Even today, the glaciers and snowfields of these ranges help sustain the ecoregion. Water melting from these areas provides a steady and constant release of fresh, cold water to streams and rivers and the Puget Sound.

The actions of glaciers during prior ice ages, as well as the ocean and mountains, resulted in different climate, soils, and geology. These differences created varied ecological communities within the ecoregion, ranging from coniferous forests to open prairies, from oak savannas to various marine and estuarine environments. As a result, the ecoregion is home to a wide variety of fish, wildlife, and plant species.

The Cascade foothills form the eastern flank of the region. Vegetation in the foothills ranges from the lowland forest (western hemlock with western red cedar and Douglas fir) to subalpine forest (mountain hemlock with subalpine fir and Alaska cedar). The foothills are dominated by the ridges and valleys formed around the rivers and streams that rush down from the glaciers and mountains. A complex web of tributaries, streams, and rivers weave their way throughout the ecoregion. Each tributary drains into a larger basin, which is part of a larger watershed.² There are 11 major watersheds in the region (see Figure 2-3).

The present-day water bodies of the region are central to the area's ecosystems — the intertwined networks of plant and animal life that depend upon the landscape for survival. From the mountains and foothills, these water bodies move through the Puget Sound lowlands, which were historically dominated by coniferous forest but also included nonforested lowland habitats such as prairies, wetlands, and lakes.

These rivers and streams ultimately empty into the Puget Sound, which forms the southern end of a larger inland fjord. Here, the marine waters from the Pacific Ocean are diluted by hundreds of rivers, large and small. The tidal, sheltered waters of estuaries³ support unique communities of plants and animals specially adapted for life at the margin of the sea. In 1988, the U.S. Environmental Protection Agency designated the Puget Sound as an "Estuary of National Significance."

The Puget Sound is surrounded by approximately 2,500 miles of shoreline, with a mosaic of beaches, bluffs, bays, estuaries, mudflats, and wetlands. These provide a wide variety of habitats, including coastal lagoons, kelp and seagrass beds, rocky shores, sandy beaches and spits, and salt marsh wetlands. These habitats and surrounding forests support an intricate web of plants, fish, and other organisms. Life in the Sound includes hundreds of fish species and dozens of marine mammals such as harbor seals, Orcas, and porpoises, as well as a hundred species of seabirds, and thousands of marine invertebrate species. Some of these species are migratory, while others reside in the area year-round.

B. What Has Been Happening to the Region's Environment Over the Past 150 Years?

With its natural abundance and temperate climate, the region has been home to native peoples for thousands of years. The first people were nomadic hunters, fishers, and gatherers. The majority of settlements were near salt water, especially at the mouths of the major rivers emptying into the Puget Sound, or in lowland areas near rivers, where native people enjoyed the natural abundance of the lowland forest and inland sea.

Over time, human impacts on the natural environment were limited. When European explorations into the Pacific Northwest began in the mid-sixteenth century, they found a vast primeval forest and water wilderness that seemed to have the capacity for perpetual renewal and continuity. In 1845, the first American settlement on the Puget Sound was established. The settlers, seeking wealth from the region's furs, timber, precious metals, and other raw materials, tested that capacity.

The newcomers, building their cabins where beavers once built theirs, keep a few cows and industriously seek to enlarge their small meadow patches by chopping, girdling and burning the edge of the encircling forest, gnawing like beavers, and scratching for a living among the blackened stumps and logs, regarding the trees as their greatest enemies — a sort of large pernicious weed immensely difficult to get rid of.

— John Muir, *The Wild Parks and Forest Reservation of the West*

² A watershed is a basin-shaped area that drains into a river, lake, or the ocean. It includes fresh water as well as salt water of the Puget Sound.

³ Estuaries are defined as areas where rivers meet salt water.

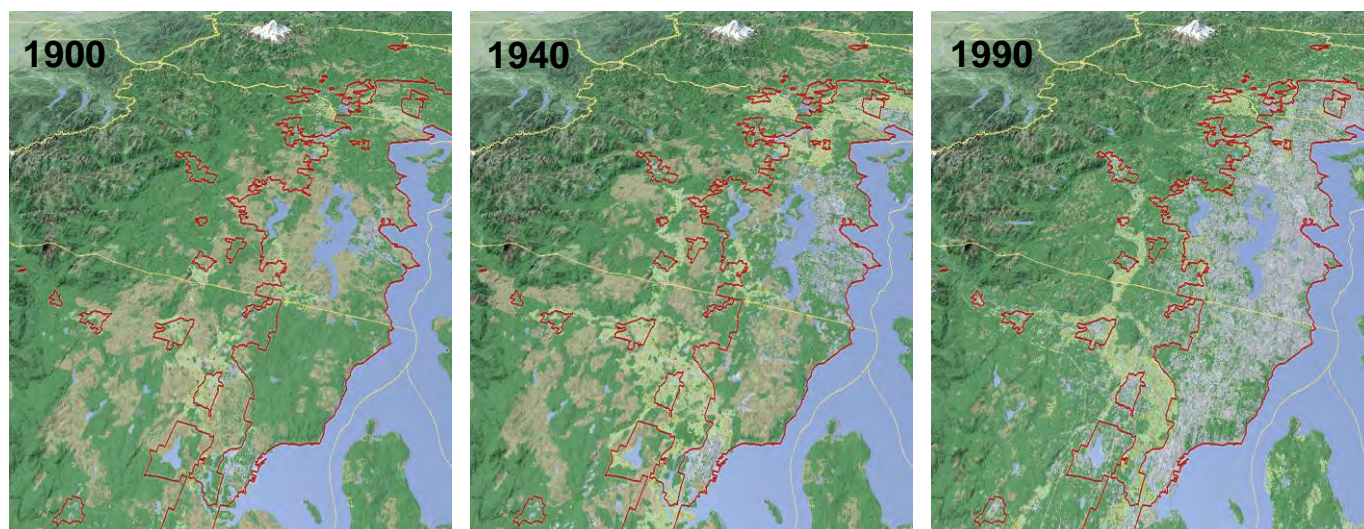
In its earliest days, the Puget Sound economy was based on resource extraction from forestry, fishing, and mining. This provided employment and allowed residents to prosper and the region to grow, but it altered and harmed the environment. Below is a list of development-induced factors that have affected the environment; this is followed by a list of impacts on habitat and species.

DEVELOPMENT-INDUCED FACTORS THAT HAVE AFFECTED THE ENVIRONMENT

Our first priority has been to provide for the direct needs of a growing human population. Those human needs translate to homes, workplaces, food production, recreation needs, services/utilities, and a transportation system. Human actions in providing for these needs have had the following impacts:

- **Loss of forest lands.** Most of Washington's diverse forest lands have undergone massive change through management practices and conversion to agriculture and other uses since the turn of the last century. Only 10 percent of the state's remaining forests are old growth (WDFW, 2005). Over the past 30 years, the central Cascades have lost 1.7 million acres of forest, 28 percent of the areas' forest land (NEW, 2004). In the Puget Sound region, native vegetation in more than 50 percent of the area has been converted to other types of land cover such as concrete, asphalt, and nonnative vegetation (WDNR, 2003).
- **Increases in impervious surface.** During the 1990s, the Puget Sound area lost 10 acres of land a day to development (Dunning, 2002). Impervious surface cover increased by more than 7 percent in an eight-year period in the 1990s (PSAT, 2004). As reported by King County, between 1994 and 2001, the county lost about 2 percent of its forest cover, and the percentage of urban area that has been paved or built increased from 25 to 31 percent (King County, 2004). While we cannot accurately quantify the increase in impervious surface across the four-county region, the region's "urban footprint" has clearly spread across the land. Where urban development has not reached, farming has often altered natural cover, increasing runoff.

FIGURE 2-5: CHANGE IN CENTRAL PUGET SOUND REGION'S URBAN FOOTPRINT



Source: Cascade Agenda, 2005

- **Loss of habitat.** People have modified about 75 percent of Puget Sound's estuaries and their adjacent habitats, such as grasslands, mixed woodlands, and floodplain forests, so significantly that they no longer provide their original functions. More than 90 percent of the coastal wetlands in the greater Puget Sound area have been lost since 1900. An estimated 50 to 90 percent of the state's riparian habitat and 70 percent of native shrub-steppe and arid grasslands have been lost since statehood in 1889 (WDFW, 2005).
- **Overfishing.** North American fisheries have been in severe decline since the late 1980s, with at least one-third of all species overfished. The combined effects of fishing, climate change, and habitat conditions have greatly affected the Pacific Northwest salmon fisheries (United Nations GEO 3 Fact Sheet, 2005).

- **Highways and automobiles.** The completion of major interstates such as I-5 and I-90 in the 1960s and 1970s connected communities that had once been more independent, and allowed people more freedom to work, live and recreate in a much larger geographic area. Growth in automobile use has outpaced population growth for many decades, in a trend that has begun to slow. The combination of freeways and the overall expansion of the automobile-based transportation system have greatly altered both the natural and the social characteristics of the region by encouraging the spread of development in low-density patterns. Recently, as other pollution sources have declined, cars (which are getting cleaner) and transportation impacts have become the primary source of Puget Sound air pollution (Puget Sound Clean Air, 2003, Ecology, 2005a) and the largest contributor to greenhouse gas emissions in the region (Puget Sound Clean Air, 2004).
- **Diversion of water.** People have diverted surface water and groundwater for domestic and agricultural use. The seemingly unlimited supply of surface water and groundwater historically encouraged the growth of cities and the development of irrigated agriculture, as well as the generation of hydroelectric power and production of aluminum, both of which require massive amounts of water. Between 1950 and 1993, in just the Cedar-Sammamish Watershed Resource Inventory Area (a small portion of the central Puget Sound region), the permitted diversion of ground and surface water increased more than 900 percent (Ecology, 1995). These diversions typically alter stream flows and can impact entire riparian corridors.
- **Creation of dams.** By statute, a dam is an artificial structure that can or does impound more than about 3.2 million gallons of water. Over 1,000 dams in the state, including over 250 in the central Puget Sound region, meet this criterion. People have built these dams for a variety of purposes, including irrigation water supply, domestic water supply, recreation, flood control, and hydropower production (Ecology, 2005b). Dams directly impact riparian areas and fish populations.
- **Modification and use of shorelines.** People have filled and armored by concrete and rocks over one-third, or about 800 miles, of Puget Sound's shorelines (Ecology, 1994). The region's shorelines are heavily used, with over 3,500 docks and piers, 29,000 small boat slips, and 700 large ship slips along the greater Puget Sound's shorelines (Shared Salmon Strategy, 2005). These uses can damage estuaries and affect a variety of species.
- **Decreased water quality.** Historical development and agricultural practices have reduced the quality of the region's water. The most common water quality problems affecting fish and wildlife in Washington's waters are: (1) contamination of habitat with fecal coliform bacteria — both from human and agricultural sources — which affects more than 44 percent of the state's polluted waters, (2) contaminated sediments, which are a particular problem in Puget Sound, (3) elevated water temperature, which can quickly alter or destroy an entire aquatic ecosystem, (4) increased sediment in streams, which can blanket important food sources and fish spawning areas, and (5) excess nutrients and pesticides washed into lakes from lawns, golf courses, and agricultural fields, which can directly poison aquatic organisms or contaminate waterways.
- **Emissions of greenhouse gases.** Globally, chiefly by burning coal, oil and natural gas, people have raised the amount of atmospheric carbon dioxide (a greenhouse gas) by 32 percent — the highest levels in at least 20 million years (University of Washington, 2005). Evidence suggests that increases in greenhouse gas emissions since the Industrial Revolution have caused a 1.1 degree Fahrenheit increase in the global average surface temperature, an approximately 40 percent decline in Arctic sea ice thickness during late summer and early fall, and a four- to eight-inch rise in global average sea level. In the Pacific Northwest, the average temperature has increased 1.5 degrees Fahrenheit over the past 80 years. Spring snowmelt is occurring earlier in the year, snowpack levels are declining, and glaciers in the region have lost approximately 30 percent of their girth. Continued global warming is expected to reduce snowpack by another 59 percent by 2050 (Puget Sound Clean Air Agency, 2004). New modeling on climate change has more strongly connected climate change to human-generated impacts, and there is greater consensus regarding the root causes of climate change. The change in temperature is affecting plant locations and species migration, and therefore impacting the food chain.
- **Generation and management of waste.** When the first state hazardous-waste regulations were written in 1977, open burning dumps were the prevalent means of solid-waste disposal in rural Washington counties. More populous counties were using "sanitary landfills" where waste was buried, not burned, and received periodic soil-cover over waste. The need to provide impervious liners at solid-waste landfills to prevent leachate migration was not a requirement of the solid-waste regulations. Industrial waste, including what became classified as hazardous waste, was not restricted as to where it was disposed. Industrial waste was routinely disposed of in dumps at the sites where it was produced (Ecology, 2003), and discharged or dumped into our waterways.

FIGURE 2-6: HUMAN IMPACTS THAT HAVE DEGRADED THE ECOSYSTEM CONDITIONS



IMPACTS ON HABITAT AND SPECIES

The combined effects of these development-induced factors have been responsible for or contributed to the alteration, fragmentation, and loss of fish, wildlife, and plant habitat, resulting in a net loss of biodiversity,⁴ as well as a constant invasion of exotic plant and animal species across the landscape. These impacts have caused the following (WDFW, 2005, others):

- **Loss of species.** The Center for Biological Diversity found that 14 percent of the species resident in the Puget Sound basin are imperiled, including 31 that are on the federal endangered species list or on the waiting list for federal protection (Center for Biological Diversity, 2005).

- *Wildlife and plant species:* A number of terrestrial plant and animal species have shown significant decline in the region over the past 100 years, primarily related to increased human development and resulting habitat loss. Once people convert native habitat to other uses, the remaining habitat often becomes isolated in a fragmented landscape of multiple land uses. Wildlife populations associated with these fragmented habitats are often isolated from other breeding populations and subjected to competition and predation from other species.

At least 19 species appear to be extirpated from the Puget Sound basin, including the Gray Wolf, Grizzly Bear, Pacific Fisher, Yellow-Billed Cuckoo, eight invertebrates, two subspecies of the Mazama Pocket Gopher, and five plants (Center for Biological Diversity, 2005). Populations that have declined include amphibians native to the Northwest, such as the tailed frog and Cope's giant salamander; birds such as the northern spotted owl and marbled murrelet; invertebrates such as Edith's checkerspot butterfly; mammals such as the western gray squirrel; and reptiles such as the western pond turtle. Although populations of declining animals still persist in many areas, their long-term viability may be uncertain as these populations become more isolated from each other by continued development and fragmentation of their habitat.

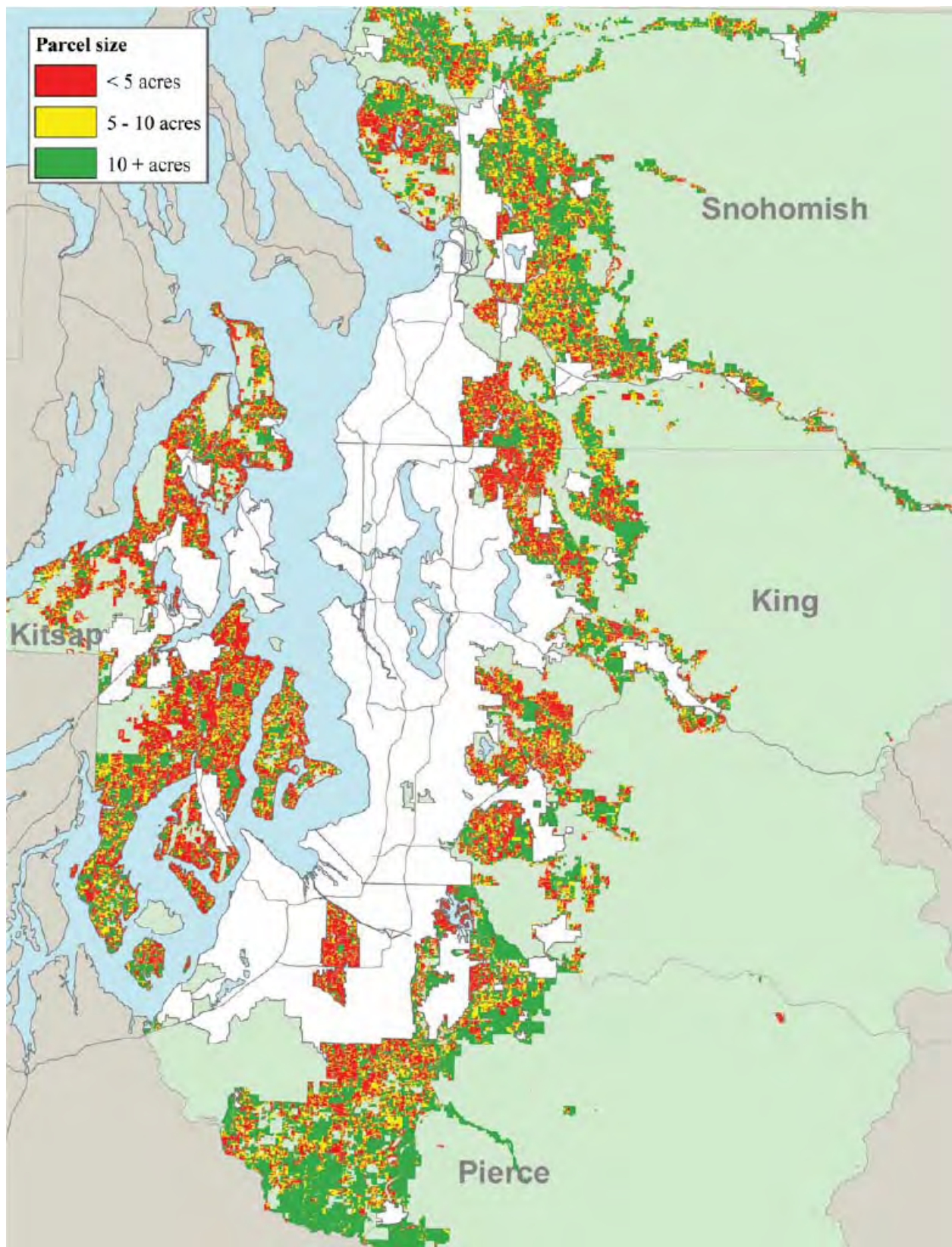
Figure 2-7 (on the adjoining page) depicts parcel sizes in the region's rural non-resource areas. As of 2004, 85 percent of parcels were less than 5 acres in size, and another 10 percent were between 5 and 10 acres in size. This means only 5 percent of the parcels in the region's rural areas were greater than 10 acres in size. On a more positive note, the parcels that are greater than 10 acres in size account for almost half (45 percent) of the land area.

- *Aquatic species:* Aquatic species are affected by decreased water quality and water diversions. Water withdrawals can drain important mainstream habitats as well as pools and quiet backwater areas that provide essential habitat for juvenile fish, amphibians, and aquatic invertebrates. Inadequate flows and water depth in these backwater areas deprive developing fish eggs of oxygen, increase temperature change, make it easier for fish predators to find their prey, and generally interfere with the journey of migrating fish. Interrupting or delaying migration can cause adult fish to resort to spawning in unsuitable habitat. Wild runs of Pacific salmon have diminished in both numbers and diversity with dam construction, water development projects, and land use changes. Currently, Puget Sound Chinook salmon are estimated to be at only 10 percent of historic numbers, and in some river basins that goes down to 1 percent (Shared Salmon Strategy, 2005).
- **Water pollution.** There are a variety of causes and impacts of pollution in the region's waterways and in the Puget Sound: polluted stormwater runoff, sewage seeping onto swimming beaches, contaminated shellfish beds, threatened bird, fish, and Orca populations, and dead zones in Hood Canal (PSAT, 2005). The pollution in the sediments affects all animals, and works its way up the food chain through bioaccumulation,⁵ and may be a factor in the recent listing of Orca whales to the list of endangered species.
- **Climate change.** Over the long-term, a warmer climate will likely mean reduced snow pack and higher tide levels as well as changes in lifecycle for a wide variety of species in the ecosystem. The snowpack provides water to streams, lakes, and the ground, which is particularly important during the drier summer months. A warmer climate could also mean: loss of forests to pests and wildfire; changes in the balance of species as some species thrive and others struggle with changed climate, coastal erosion due to sea-level rise; and more extreme weather events and flooding. Many coastal urban areas could also be threatened.

⁴ Biodiversity means the rich variety of life forms in nature.

⁵ The accumulation of a substance, such as a toxic chemical, in an organism. The substance accumulates through respiration, food intake, skin contact, and/or other means. This accumulation results in the organism having a higher concentration of the substance than the concentration in the organism's surrounding environment.

FIGURE 2-7: PARCEL SIZE IN THE REGION'S RURAL AREAS



Source: Puget Sound Regional Council, 2004



C. Who Are the Region's Environmental Actors and What Are They Doing?

Since VISION 2020 was originally adopted in 1990, knowledge of the region's ecology has grown substantially. Environmental protection and restoration efforts — spurred by the listing of salmon species, damage to sensitive areas, human health objectives, loss of forestlands, and other concerns — have also intensified. Today there are literally dozens of resource management agencies, local governments, research institutions, advocacy groups, tribal organizations, and other non-governmental organizations working to improve the environment.

Actions taken by these stakeholders have made a difference, and the region has had a rich history of success in restoring the environment. Cleaning up Lake Washington in the 1960s, initiating recycling in the 1980s, and creating the Mountain to Sound Greenway in the 1990s are just a few examples (Shared Salmon Strategy, 2005). However, significant challenges remain — from cleaning up the Puget Sound and Hood Canal, to protecting the recently listed Orcas, to implementing the salmon recovery strategy, to reducing greenhouse gas emissions, and to conserving key habitat lands.

To better understand the state of environmental planning in the region, the Regional Council developed an Environmental Issue Paper in 2005 — this paper is included in *FEIS Appendices - Appendix I-F*. This section builds on the paper, and describes the following: (1) ongoing environmental research and management initiatives (i.e., the Environmental Actors), (2) new scientific information generated by these initiatives (i.e., the New Science), (3) the shared understanding of priority regional environmental issues (i.e., the Shared Priorities), and (4) the role the updated VISION should play in environmental planning. Items 1 through 3 are described below, and item 4 is described in the next section (section D).

1. ONGOING ENVIRONMENTAL RESEARCH AND MANAGEMENT INITIATIVES (THE ENVIRONMENTAL ACTORS)

The region's environmental actors form a complex web of activity that, taken together, plays a fundamental role in keeping this region's quality of life high and environment strong. Perhaps the most important actors are the region's citizens themselves, who have had some positive impacts through the choices they make every day. Beyond the general public, the actors include: (a) agencies, (b) counties and local governments, and (c) non-government organizations. Their individual projects and programs represent the core efforts to protect and restore the region's air, habitat, and water. The following text describes these actors and organizations that were assessed in the study, recognizing that they are just a sample of a larger set of stakeholders.

a. Agencies

The following describes some of the key agencies involved in environmental planning in the region. There are many other agencies — federal and state — that are also playing key roles, but were not researched in the Environmental Issue Paper.

- **Environmental Protection Agency.** The Environmental Protection Agency is charged with protecting human health and the environment. The agency does this by developing and enforcing regulations, offering financial assistance, performing environmental research, sponsoring voluntary partnerships and programs, furthering environmental education, and publishing information. In addition to its national headquarters, the agency maintains ten regional offices. Washington, along with Oregon and Idaho, comprise Region 10. The agency has identified the following areas to be national priority concerns: air quality; water quality; protection of land; and assessing overall ecological conditions. *Link: <http://www.epa.gov>.*
- **Puget Sound Clean Air Agency.** The Puget Sound Clean Air Agency is a multicounty governmental body chartered by state law in 1967 (RCW Chapter 70.94). Its jurisdiction encompasses King, Kitsap, Pierce, and Snohomish counties. The agency's mission is to: "ensure that people in King, Kitsap, Pierce and Snohomish counties have clean air to breathe. [The Puget Sound Clean Air Agency] protect[s] your health and improve[s] air quality by: adopting and enforcing air quality regulations, sponsoring voluntary initiatives to improve air quality, and educating people and businesses about clean-air choices." The most pressing air quality challenges identified at the Puget Sound Clean Air Agency Web site include: fine particles from diesel exhaust, other mobile sources, wood smoke; toxic air pollutants; summertime smog; and growth. Another growing area of concern is carbon dioxide and other climate changing pollutants. *Link: <http://www.pscleanair.org>.*

- **Washington State Department of Ecology.** Ecology’s mission is to protect, preserve and enhance Washington’s environment, and promote the wise management of the air, land and water. The department’s goals are to prevent and clean up pollution, and support sustainable communities and natural resources. Ecology consists of the following 10 major environmental management programs: air quality, environmental assessment; hazardous waste and toxics reduction; nuclear waste; shorelands and environmental assistance; solid waste; spill prevention, preparedness, and response; toxics cleanup; water quality; and water resources. *Link: <http://www.ecy.wa.gov>.*
- **Washington State Department of Fish and Wildlife.** Fish and Wildlife serves Washington’s citizens by protecting, restoring and enhancing fish and wildlife and their habitats, while providing sustainable fish- and wildlife-related recreational and commercial opportunities. The Washington Department of Fish and Wildlife has identified the following priority goals: healthy and diverse fish and wildlife populations and habitats; sustainable fish- and wildlife-related opportunities; and operational excellence and professional service. *Link: <http://wdfw.wa.gov>.*
- **Washington State Department of Natural Resources.** Natural Resources is charged with long-term stewardship of millions of acres of lands in Washington state, including a unique mix of public forests, rangelands, farmlands, natural areas, waterways, tidelands, undeveloped urban and rural lands, and commercial properties. The Department of Natural Resources has identified the following to be priority concerns: forest health; maintaining, preserving and restoring unique lands; and biodiversity. *Link: <http://www.dnr.wa.gov>.*

b. Counties

Counties and their respective cities and towns deal with a variety of programs that affect the environment: land use, critical areas, development regulations, and more. The following is brief summary of some programs being undertaken by the counties that were researched in the Environmental Issue Paper.

- **King County.** King County’s Benchmark Program has been assessing the condition of key indicators in order to assess trends and provide information for potential planning actions. King County also has a monitoring program that tracks the relative success of county activities in meeting specified objectives. The Benchmark Program monitors a wide variety of economic, land use, transportation, social, and environmental indicators. The most relevant ones are as follows: land cover changes over time; air quality; surface water quality; groundwater quality; changes in wetland acreage and function; quality of terrestrial and aquatic functions; and change in the number of salmon. *Link: www.metrokc.gov.*
- **Kitsap County.** In the Kitsap County Comprehensive Plan (1998 — currently being updated), Shoreline Management Master Program, Kitsap County (1999), Critical Area Ordinance, and the Landscape Assessment and Conservation Prioritization of Freshwater and Nearshore Salmonid Habitat in Kitsap County (2003), the county has discussed the importance of the following environmental categories: natural systems, shorelines, and critical areas; and freshwater and nearshore salmonid habitat. *Link: www.kitsapgov.com.*
- **Pierce County.** Working with the Department of Ecology, the county has put together a report on biodiversity in Pierce County. It identifies high priority areas for biodiversity conservation. This in turn informs the county’s planning for an open space network, which includes wetlands, rivers, and fish and wildlife areas. As part of this work, Pierce County has identified the following environmental goals: attain full compliance with all existing 1994 state and federal air quality standards by the year 2000; achieve “no net loss” of wetland areas and important fish and wildlife habitat; reach full compliance with existing 1994 state water quality standards by the year 2000; improve water quality and quantity and watershed conditions so that wild runs of fish can be restored to healthy, viable populations; achieve a 50 percent recycling rate; and biodiversity. *Link: <http://www.co.pierce.wa.us>.*
- **Snohomish County.** The Natural Environment section of the county’s comprehensive plan notes that the “Preservation of the natural environment and the quality of life in Snohomish County presents complex challenges in the face of rapid past and future growth.” Symptoms such as declining salmon runs, increasing damage due to flooding, increasing number of days when air quality is rated as poor, and the need to initiate burn bans are all indicators of increasing stress on environmental health and the integrity of natural systems in the county. The plan identifies the following goals and objectives: protect and enhance the natural environment while planning for and accommodating growth; maintain or restore aquatic ecosystems and associated habitats and aquifers through the development and implementation of a comprehensive protection program; protect and maintain elements of the environment including clean water, natural vegetation, and habitat corridors through adopted development regulations and a variety of educational, voluntary and incentive programs; and promote and enhance regional air quality by reducing air pollution emissions associated with land uses and transportation in accordance with national, state, regional, and local policies and standards. *Link: <http://www1.co.snohomish.wa.us>.*



c. Non-Governmental Organizations

The following describes some of the key non-governmental organizations involved in environmental planning in the region. There are many others — such as Trust for Public Land, Mountains to Sound Greenway, Washington Public Research Interest Group, or the Climate Impacts Group at the University of Washington — that are playing important roles in environmental planning in the region, but were not researched in the Environmental Issue Paper.

- **The Nature Conservancy.** The Nature Conservancy is an international nonprofit organization dedicated to preserving the plants, animals, and natural communities that represent the diversity of life on Earth by protecting the lands and waters they need to survive. In the past few years, the Nature Conservancy partnered with the Department of Fish and Wildlife to develop an Ecoregional Assessment that identifies priorities for biodiversity protection based on biological values and conservation suitability in the context of large areas called ecoregions. The Nature Conservancy has identified as a priority concern habitat and species conservation (which necessitates work on a number of fronts to address threats to biodiversity and enhance viability and integrity of natural systems and species through a suite of direct and indirect actions). *Link: <http://nature.org>.*
- **Cascade Land Conservancy.** The Cascade Land Conservancy is a nonprofit land conservation organization, currently working in King, Kittitas, Pierce, and Snohomish counties. Their mission is to protect the region's wild and open space lands to sustain the natural beauty and health of the environment, now and for generations to come. The Conservancy's 100-Year Cascade Agenda proposes protecting and/or restoring significant portions of the region's resource lands, shorelines and open space. Conservation and restoration goals are set for the following areas: forest lands; agricultural lands; parks and recreation; and watersheds. The agenda program calls for voluntary market-based strategies for conserving the region's landscapes. It emphasizes the need to create attractive communities, and to grow these communities with the use of Transfer of Development Rights programs that support the conservation of resource and natural lands. *Link: <http://www.cascadeland.org>.*
- **Puget Sound Action Team.** The Puget Sound Action Team was launched in the mid-1980s. As part of the Governor's office, Puget Sound Action Team's mission is to protect and restore Puget Sound and its spectacular diversity of life, now and for future generations. Puget Sound Action Team is an interagency, intergovernmental body that defines, coordinates, and puts into action the state's environmental and sustainability agenda for Puget Sound. Puget Sound Action Team has identified the following to be priorities: clean up contaminated sites and sediments; reduce continuing toxic contamination and prevent future contamination; reduce the harm from stormwater runoff; prevent nutrient and pathogen pollution caused by human and animal wastes; protect shorelines and other critical areas that provide important ecological functions; restore degraded nearshore and freshwater habitats; and conserve and recover orca, salmon, forage fish and groundfish. *Link: <http://www.psat.wa.gov>.*
- **Shared Strategy for Puget Sound.** The Shared Strategy is a groundbreaking collaborative effort to protect and restore salmon runs across Puget Sound. Shared Strategy has engaged local citizens, tribes, technical experts and policy makers from all levels of government to build a recovery plan for the watersheds of Puget Sound. Shared Strategy works with and builds on existing recovery efforts across the Sound in the belief that local stakeholders are in the best position to find lasting solutions for their communities to complex ecological, economic and cultural challenges. The primary objective of the Shared Strategy is to recover and maintain an abundance of naturally spawning salmon at self-sustaining, harvestable levels. The ultimate outcome will be recovery of the listed species and improved conditions for the entire ecosystem. *Link: <http://www.sharedsalmonstrategy.org>.*
- **Northwest Environment Watch.** Northwest Environment Watch is an independent, not-for-profit research and communication center. Its mission is to promote a sustainable economy and way of life in the Pacific Northwest. Northwest Environment Watch accomplishes this through two research efforts: (1) Cascadia Scorecard, which is "...an index of seven key trends critical to the future of the Northwest... [that] monitor[s] the Northwest's progress toward a sustainable economy and way of life"; and, (2) Northwest Environment Watch identifies "...catalytic reforms,' [which are] high-leverage changes that could redirect business as usual to more sustainable ends, such as compact urban development, tax shifting, and pay-by-the-mile car insurance that rewards consumers for driving less." Northwest Environment Watch has identified the following to be priority environmental problems: clear cutting of forests; human-made pollutants; sprawl; high energy use; a tax system that subsidizes "bads" such as resource depletion and sprawl; and policies that subsidize sprawl and high energy use, such as local off-street parking ordinances and fixed-rate car insurance. *Link: <http://www.northwestwatch.org>.*

- **Northwest Indian Fisheries Council.** The Northwest Indian Fisheries Commission is primarily a support service organization that provides direct services to its member tribes to assist them in their natural resource management efforts. The Northwest Indian Fisheries Commission was formed shortly after the 1974 Boldt Decision, which reaffirmed Northwest tribes' treaty-protected fishing rights. The Northwest Indian Fisheries Commission was created to assist its member tribes "in conducting orderly and biologically sound fisheries." The Northwest Indian Fisheries Commission has identified the following to be priority concerns: water pollution and marine shoreline modifications. *Link: <http://www.nwifc.wa.gov>.*
- **Transboundary Georgia Basin-Puget Sound Environmental Indicators Working Group.** This group of several agencies in both Canada and the United States is focused on the "...bi-national area known as the Puget Sound region in the United States and the Georgia Basin in Canada, including the Strait of Juan de Fuca." It is an effort to pull together many parallel efforts to address "...environmental stresses affecting the... ecosystem..." The Transboundary Working Group has identified the following to be priority concerns: air quality from inhalable particulates; and loss of natural habitat, particularly lowland. *Link: http://www.pyr.ec.gc.ca/georgiabasin/gb-psPartnership_e.htm.*
- **Water Resource Inventory Areas.** The 1998 Legislature passed The Watershed Planning Act, which set a framework for developing local solutions to watershed issues on a watershed basis. There are 18 Watershed Resource Inventory Areas covering the Puget Sound region. The purpose of the Act is to: develop a more thorough and cooperative method of determining what the current water resource situation is in each Watershed Resource Inventory Area of the state and provide local citizens with the maximum possible input concerning their goals and objectives for water resource management and development. *Link: <http://www.ecy.wa.gov/watershed/>.*

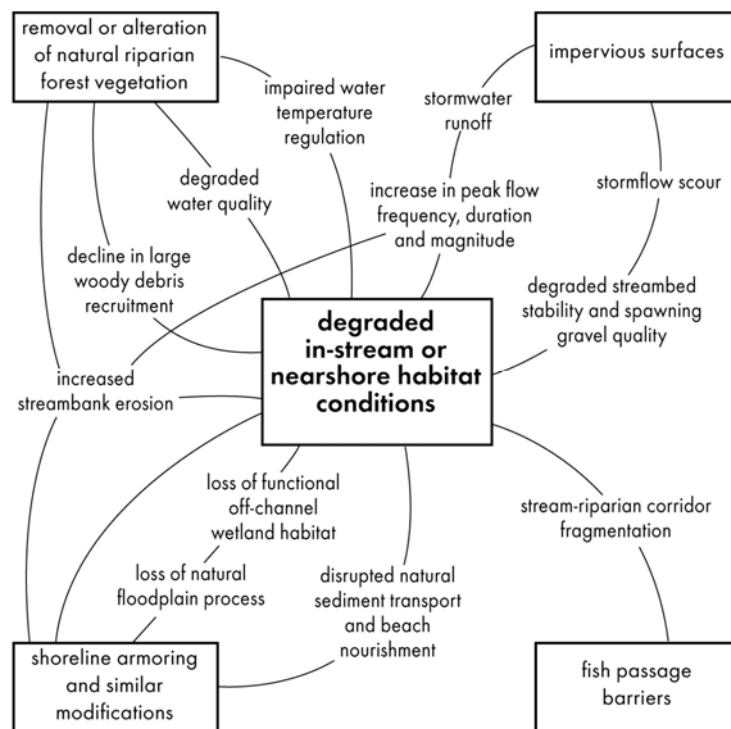
2. UNDERSTANDING THE NEW INFORMATION (THE NEW SCIENCE)

The state of environmental planning in the region has matured, and the methods used by the region's environmental actors are different than in the past. Within the "new" environmental planning science, the following issues seem to recur: (a) planning for an integrated system, (b) managing at a continuum of scales, (c) using an interdisciplinary approach, (d) addressing landscape-scale ecological processes, and (e) incorporating adaptive management techniques into planning and monitoring processes. These issues are described on the following pages.

a. An Integrated System

Ecological processes operate in a complex system of integrated functions, making it problematic to examine environmental problems as isolated issues. And yet, many actions are based on laws dealing with a single topic. The science has recognized that environmental planning needs to work with an integrated environmental framework, such as the one shown on the following figure, which illustrates the relationship between four human-created conditions (in the four corners) and in-stream or nearshore habitat quality.

FIGURE 2-8: EXAMPLE OF AN INTEGRATED ENVIRONMENTAL FRAMEWORK



Source: Adapted from the 2003 Landscape Assessment and Conservation Prioritization of Freshwater and Nearshore Salmonid Habitat in Kitsap County



b. Management at a Continuum of Scales

Achieving consistent and coordinated environmental management at all scales—from the regional policy level to the local site development permit—is a special challenge in regional environmental planning. Local development regulations and standards must be based on regionally based objectives and analysis. For example, the effectiveness of local shoreline development standards and restoration measures depends on their contribution to the larger watershed ecosystem.

Scientists have recognized that regional environmental planning should consider the full range of scales, from regional policies to site development standards, and should integrate the various scientific disciplines and resource management efforts. Conversely, comprehensive regional strategies must recognize the challenges of implementation at the local level on a permit-by-permit and project-by-project basis.

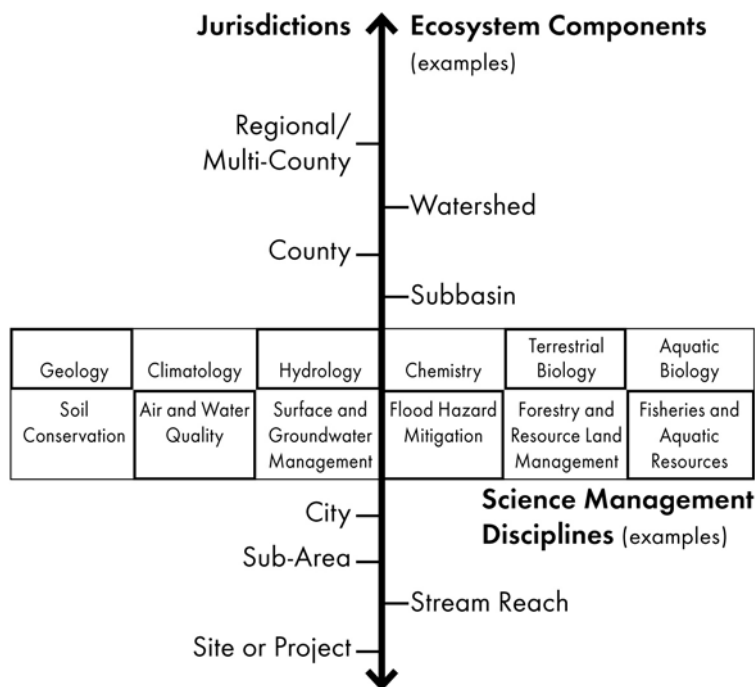
For example, the Watershed Resource

Inventory Area habitat conservation plans depend on the cooperative actions by state, county, and city governments. And the new Department of Ecology Shoreline Management guidelines (Chapter 173-26 WAC) emphasize basing local regulations on a comprehensive ecological characterization rather than a site-by-site analysis that does not account for larger ecological systems. The challenge for any regional environmental planning effort will be to retain a broad, comprehensive perspective when formulating policy, while also understanding the policy's implications at the local implementation level.

c. An Interdisciplinary Approach

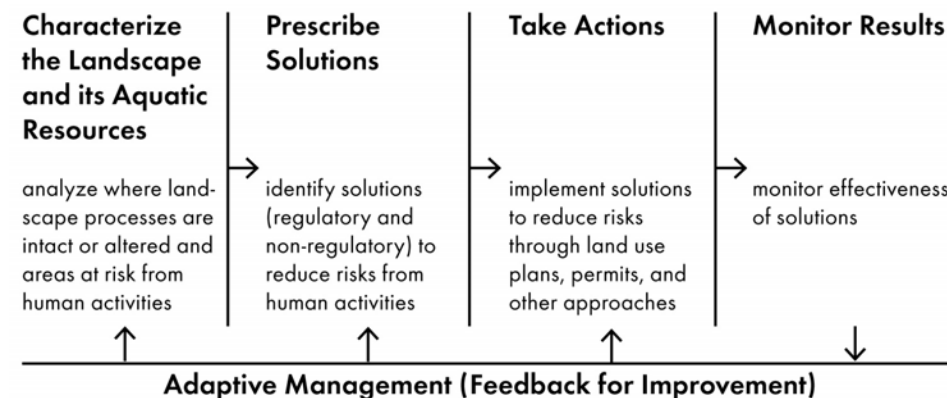
Because ecological systems involve a variety of interconnected physical and biological interactions, analyzing them requires a variety of scientific disciplines and techniques. There are a number of resource agencies and research institutions and organizations working on specific areas within the field. In many cases, the agencies administer laws related

FIGURE 2-9: EXAMPLE OF MANAGEMENT AT A CONTINUUM OF SCALES



Source: MAKERS Architects and Urban Design

FIGURE 2-10: EXAMPLE OF A GENERAL FRAMEWORK FOR PLANNING AT THE LANDSCAPE SCALE



Source: Wetlands in Washington State – Volume 2, Ecology

to a specific objective or issue, such as clean air, flood protection, or wildlife protection. Because these issues are so intertwined by ecological relationships, there is the obvious need for an interdisciplinary approach that incorporates the scientific understanding of the various issues and integrates the efforts of the separate organizations. Given the workload and defined mission of the various organizations, this integration is also a substantial challenge.

d. Landscape-Scale Ecological Processes

Related to the previous issue, environmental scientists are becoming increasingly aware of the effect of landscape transformation on ecological processes and of the importance of maintaining ecosystem processes in order to achieve shoreline management goals, including flood protection, habitat conservation, water quality and erosion control. For example, land use activities can significantly alter the hydrology of streams and rivers, which in turn affects the type of habitat present in these aquatic systems. Clearing forests and paving the land in the uplands can dramatically change the rate of water run-off, alter the watershed's hydrological response, and simplify instream habitats and exacerbate flooding. Filling wetlands impacts the processes/functions of surface water flow (flood water storage) and removal of toxins (removing metals and toxic organics) that wetlands typically perform.

This planning framework has promise as an invaluable tool in making environmental planning and management activities more efficient by: coordinating efforts across a range of geographic scales and locations (e.g., identifying what actions are necessary throughout the watershed to protect and restore estuarial habitats), and by integrating research and management programs between various governments, resource agencies, institutions, and organizations (e.g., shoreline management, salmon recovery, stormwater management, and critical area protection).

e. Adaptive Management and Monitoring

The complexity, gaps in scientific information, and the rapid pace of emerging knowledge in environmental planning ensure that many decisions will be made on the basis of incomplete information. The science is recognizing this and is dealing with uncertainty through what is called “adaptive management principles,” in which many actions are essentially viewed as experiments and the effects are monitored. This allows management measures to be modified if the desired objectives are not met. In this way, actions can be taken without complete certainty and scientific knowledge is advanced in the process. The figure in the previous section (Figure 2-10) demonstrates the role of adaptive management as a component of landscape-scale planning.

3. ASSESSING THE SHARED UNDERSTANDING OF REGIONAL ENVIRONMENTAL ISSUES (THE SHARED PRIORITIES)

The central Puget Sound region currently does not have a highly visible, broadly based, publicly adopted and privately endorsed regional environmental strategy. And, the numerous stakeholders each have their own view of what the priority environmental concerns are within their jurisdictions or mandates.

This section covers some key issues and recommendations as found in the reports and strategies of the organizations and stakeholders listed in the previous section. Based on the interviews and meetings with a number of these stakeholders, an initial picture of the region's priority environmental concerns emerged.

The following matrix identifies these issues. It also includes issues that are just emerging in research but seem not to be fully addressed through current management efforts.

Based on the environmental planning review, the following broad issues are of recurring importance to the environmental stakeholders involved in these studies: (a) air quality, (b) terrestrial habitats and species, and (c) water quality and aquatic habitat. These issues are described on the following pages.

FIGURE 2-11: ILLUSTRATIVE SUMMARY OF PRIORITY ENVIRONMENTAL ISSUES IDENTIFIED BY SELECT ENTITIES

	Agencies					Counties				NGOs			Others				Emerging Issues and Research
	WA Department of Ecology	WA Department of Fish and Wildlife	WA Department of Natural Resources	EPA	Puget Sound Clean Air Agency	King County	Kitsap County	Pierce County	Snohomish County	Cascade Land Conservancy	The Nature Conservancy	Northwest Environment Watch	Northwest Indian Fisheries Council	Puget Sound Action Team	Transboundary Working Group	WRIAs and other salmon recovery efforts	
Air Quality																	
Airborne pollutants	•			•	•	•						•			•		
Traffic congestion hot spots																	•
Terrestrial Habitats and Species																	
Fragmentation of forest habitat		•	•							•	•						
Invasive Species		•	•	•													•
Loss of forest and resource lands		•	•	•		•	•	•		•	•	•			•	•	
Loss of prairies and oak savannahs		•	•					•			•						•
Loss of prime agricultural land		•		•				•									•
Quality of forest habitat		•	•	•				•			•	•				•	
Quality of urban ecosystems				•													•
Terrestrial species sustainability		•	•	•				•			•				•		
Water Quality and Aquatic Habitat																	
Aggregation of impervious surface		•															•
Aquatic species sustainability	•	•	•	•		•	•						•	•	•	•	
Contaminated submerged sediments	•	•	•	•		•							•	•		•	
Impervious surface coverage	•	•		•		•		•		•		•	•	•		•	
Loss of riparian vegetation	•	•					•						•				
Modified shorelines	•	•	•				•	•			•		•	•	•	•	
Nutrients and pathogens		•		•									•	•		•	
Landscape-Scale Ecological Processes																	
Effect of landscape transformation on ecological processes	•	•		•		•				•	•		•			•	•
Ecological connectivity		•	•	•													•
Global Issues																	
Climate change					•												•

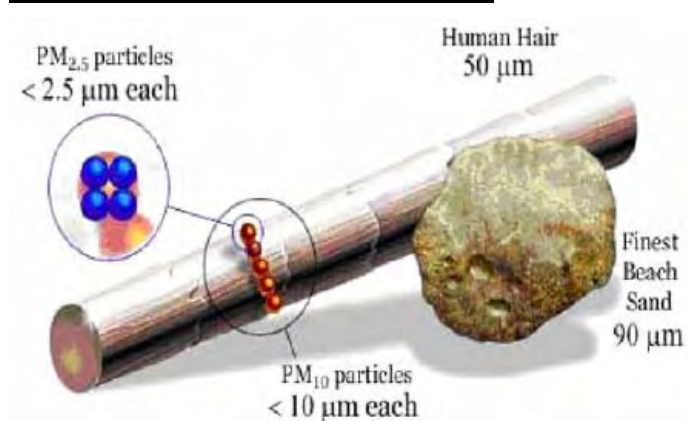
Source: Puget Sound Regional Council, Environmental Issue Paper, 2005

a. Air Quality

Air quality is primarily a public health concern, although air quality can also affect plant and animal life and visibility. **Particulate matter**, a main component of air pollution, is tiny enough to be deeply inhaled and can contribute to various respiratory and cardiovascular ailments. It is appropriate to consider air quality in terms of a **suite of pollutants**, including particulate matter (PM₁₀ and PM_{2.5}), carbon monoxide (CO), nitrous oxides (NO_x), ozone (O₃), sulfur dioxide (SO₂), and air toxics, such as toluene, xylene, benzene, and formaldehyde. Over the last 30 years, the air pollutants of concern have changed. Historically, ground-level ozone, carbon monoxide, and fugitive dust have been the pollutants of concern.

Currently, the pollutants of concern are **fine particles**, **toxic emissions**, and **ground-level ozone**. Adding **climate change**, potential disproportionate **impacts at the micro-scale**, and **visibility** to these pollutants produces the list of current air quality concerns.

FIGURE 2-12: AIR QUALITY AND PARTICLE SIZES



Source: Sandlin, 2005

b. Terrestrial Habitats and Species

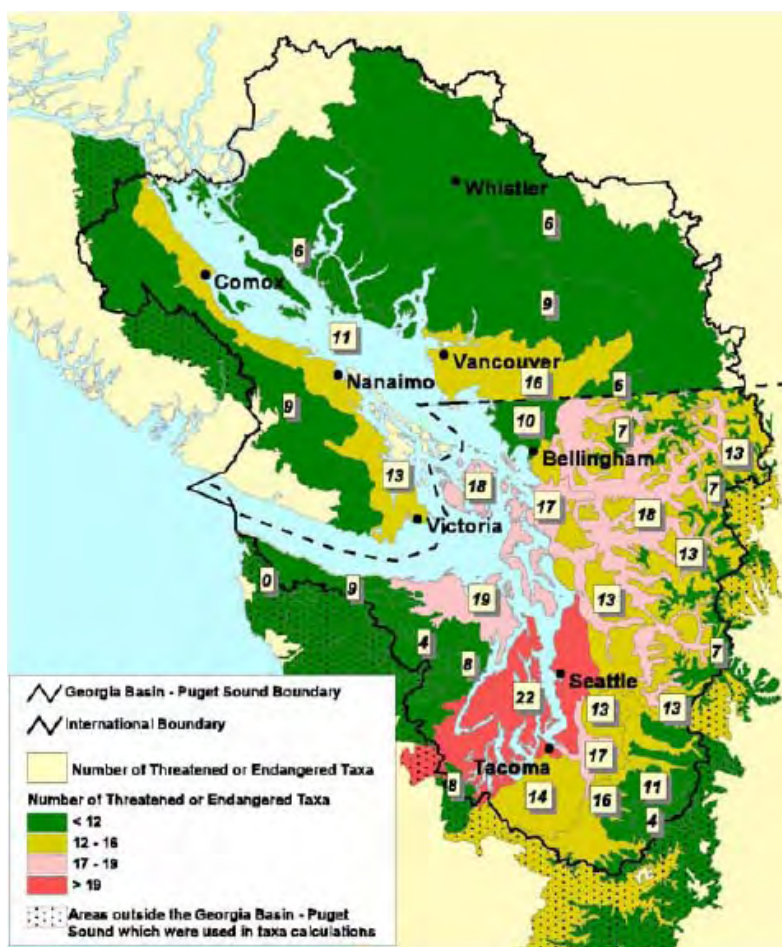
Loss and degradation of terrestrial habitat threaten indigenous wildlife, plants, and biodiversity. Key issues are the **loss of forest and resource lands** and **fragmentation of forest habitat** through development. As patches of suitable habitat become smaller, fragmented, and isolated, the likelihood of long-term species survival diminishes. This has increased the emphasis for on-land and by-water **connectivity**, both in rural and urban areas.

The **quality of forest habitat** can be affected by many human activities. Clear-cutting of forests has a significant negative impact since “virgin forest... is far richer in native biodiversity [than second or third growth forest].” (NEW, 2004). The **sustainability of terrestrial species** depends on several important habitats, including coastal lowlands and lowland forests. The lowland forests of the major river valleys have both high species abundance and correspondingly high numbers of species at risk (Bartnik, 2001).

c. Water Quality and Aquatic Habitat

Of the three issues, water quality and aquatic habitats are currently receiving the most attention. Aquatic environmental issues are not confined to water bodies, as some of the most damaging human impacts to water

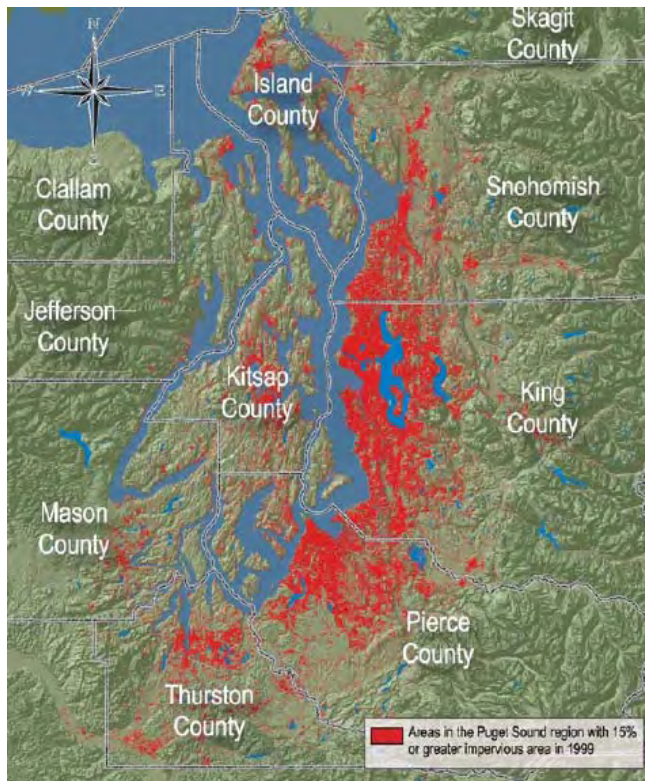
FIGURE 2-13: SPECIES AT RISK IN THE GEORGIA BASIN-PUGET SOUND ECOSYSTEM



Source: Georgia Basin-Puget Sound Indicators Report, Spring 2002



FIGURE 2-14: AREAS IN THE REGION WITH 15 PERCENT OR GREATER IMPERVIOUS COVER



Source: Puget Sound Action Team, 2004

showing up in biota such as marine birds, seals, and Orcas.

Aging or poorly maintained **on-site sewage treatment systems** can contaminate ground and surface waters with **nutrients** and **pathogens**, which directly affect shellfish, which filter large amounts of water as they feed.

All of these issues, which affect the quality of aquatic habitat, can negatively impact **aquatic species sustainability**, including salmon. Habitat degradation, barriers to fish migration, and harvesting have all contributed to declines in salmon returns.

D. What Should VISION 2040 Contribute?

The VISION has the potential to meaningfully impact these issues, both through the collaborative process used in developing the VISION, and through the use of multicounty planning policies. Recognizing its potential role, VISION 2040 should be designed to: (1) strengthen regional environmental planning, (2) emphasize strategies and multicounty planning policies that protect the environment, and (3) encourage the use of specific tools and techniques designed to address environmental concerns.

This unifying vision of the ways in which current environmental planning efforts interconnect at the regional level would be a valuable contribution to environmental management activities. Such a perspective would be an appropriate goal for the VISION.

quality and aquatic habitat occur away from the shoreline. Increases in **impervious surface coverage** within a watershed, especially beyond 10 to 15 percent, can degrade the health of aquatic ecosystems (EPA, 2003).

Similarly, **channeled surface runoff** tends to be of a volume and velocity that easily overwhelms streams and can cause undercutting and erosion of stream banks, depositing excessive sediment, and altering in-stream fish and wildlife habitat.

Modified shorelines lead to several negative impacts, including beach starvation, habitat degradation, sediment impoundment, exacerbation of erosion, and restriction of channel movement. Another form of shoreline modification, **loss of riparian vegetation**, can degrade the health of a watershed by causing bank instability, fluctuating water temperatures, absence of large woody debris, unregulated micro-climates, lack of nearshore terrestrial habitat, and absence of food, such as insects from trees.

Contaminated sediments pose a risk to human and animal health as the toxins can bind to sediments at concentrations far above natural conditions and accumulate in the tissues of living organisms and move up the food web. **Toxics** largely associated with municipal wastewater and stormwater runoff, including PBDEs (or flame retardants), PCBs, heavy metals, pharmaceuticals, and personal care products, are also

1. STRENGTHEN REGIONAL ENVIRONMENTAL PLANNING

During VISION 2040 initial scoping comment period, many comments emphasized a desire for the Regional Council to develop an environmental framework for addressing land use, employment, and mobility. Those commenting said that the VISION should seek to create a regional environmental vision, and unify comprehensive plans and countywide planning policies into a regional environmental framework.

There is a wide range of environmental research and management efforts underway in the Puget Sound region. There is not a single organized entity or forum to coordinate the diverse efforts or “coalitions” of efforts. These actors are working on a variety of concepts and approaches and are addressing similar environmental issues — air quality, terrestrial habitats, endangered species, water quality/quantity, and aquatic habitat issues. Because many actors and organizations are involved, and are often working on single-issue areas, the effort should be better coordinated. Currently, it is difficult for a layperson to engage and examine a cross section of the emerging data, information, and science.

New scientific information is being developed at a rapid pace. New research is identifying problems and trends that are not being adequately addressed, in part because the laws pre-date the current state of scientific knowledge. There are differences in environmental data quality and there are gaps in scientific information across organizations. A broad picture of landscape-scale ecological processes is emerging. Several current initiatives provide insight regarding areas where new development should be avoided.

The Regional Council should expand its “regional table,” which already includes growth management, transportation, and the economy, to include environmental planning. Scientific information exists to support local governments as they seek to implement “best available science” requirements, but disseminating it and coordinating its use remains a challenge.

The Regional Council should play a clearinghouse role in sorting and distributing information and convening stakeholders. The Council should focus its attention on 1) seeking regional agreement on the meaning of emerging data, information, and science, and 2) protecting the environment by establishing guiding policies and strategies to support how and where growth and development occurs.

2. EMPHASIZE ENVIRONMENTAL POLICIES AND STRATEGIES IN VISION 2040

The regional environmental priorities discussed previously — (1) air quality, (2) terrestrial habitats and species, and (3) water quality and aquatic habitats — should be incorporated into the updated plan. The Puget Sound Regional Council has developed Multicounty planning policies to begin to provide a common regional policy framework for addressing development opportunities and preservation goals.

The VISION should be organized around an environmental framework that provides a context for planning, development, and environmental management. The VISION should include measures that encompass the full continuum of urban/rural/resource land areas, and consider how environmental planning and resource management measures can be coordinated at a range of scales, from the local to county, regional, and statewide jurisdictions.

Multicounty planning policies should establish a procedure to incorporate “adaptive management” principles into regional planning and decision-making efforts. Long term, policies should continue to integrate environmental management activities with regional land use, transportation, and economic development planning. The VISION should communicate a consistent, comprehensive message regarding environmental issues, current trends, current management activities, and where additional action is necessary to protect resources.

The VISION needs to place a high value on protection of the natural environment. As noted recently, “Protection is a more certain strategy than restoration because we know that untrammelled habitats are more likely to support species (Shared Salmon Strategy, 2005). Further, protection is a critical part of the Growth Management Act, with the critical area provisions stating, “each city and county adopt development regulations that protect critical areas...” [RCW 36.70.060. emphasis added].



FIGURE 2-15: ACTIONS TO IMPROVE ECOSYSTEM CONDITIONS

Protecting Intact Ecosystems

This is often the most effective and highest priority measure.

Sustainable Forestry and Agriculture

Improved forest and agricultural practices can protect forest and lowland health, stream ecology and retain habitat corridors.

Water Reuse

Treated wastewater and stormwater run-off can be managed and reused for irrigation and groundwater recharge.

Corridor Preservation

River and wildlife corridors can be conserved through better management, conservation easements, and land acquisitions.

Critical Area Enhancement

Better standards for residential bulkheads, piers, and vegetation conservation can protect and restore wetlands, stream channels, and other terrestrial habitats.

Water-Dependent Uses

Standards for marinas and other water-oriented uses can be improved to minimize impacts.

Transfer of Development Rights

Transfer of development rights programs can build stronger urban centers and protect natural resource lands and open spaces.

Diesel Vehicle Replacement

Diesel buses and public vehicles can employ less polluting systems.

Non-motorized Transportation

Increased bicycle and pedestrian transportation can help to decrease congestion, air pollution, and greenhouse gases.

Reducing Greenhouse Gases

Reducing emissions that cause greenhouse gases improves air quality and helps to protect the climate.

Conservation Incentives

Market incentives can encourage retention of commercial forestry and farming activities to protect open space and prevent sprawl.

Innovative Development Practices

Jurisdictions can support best development practices, such as low-impact development, green buildings and streets, and rainwater capture.

Energy Alternatives and Conservation

Energy conservation methods can be employed and alternative energy sources developed.

Focused Growth

Compact development patterns with a mixture of uses and urban centers accessible by a variety of transportation choices can accommodate growth, strengthen the economy, and create more livable communities.

Clean Up Brownfields

Upgraded stormwater management systems, remediation of toxics, removal of unnecessary armoring, and reintroduction of native vegetation can restore shorelines for ecological functions in industrialized floodplains, while creating new development sites.

Link Habitat

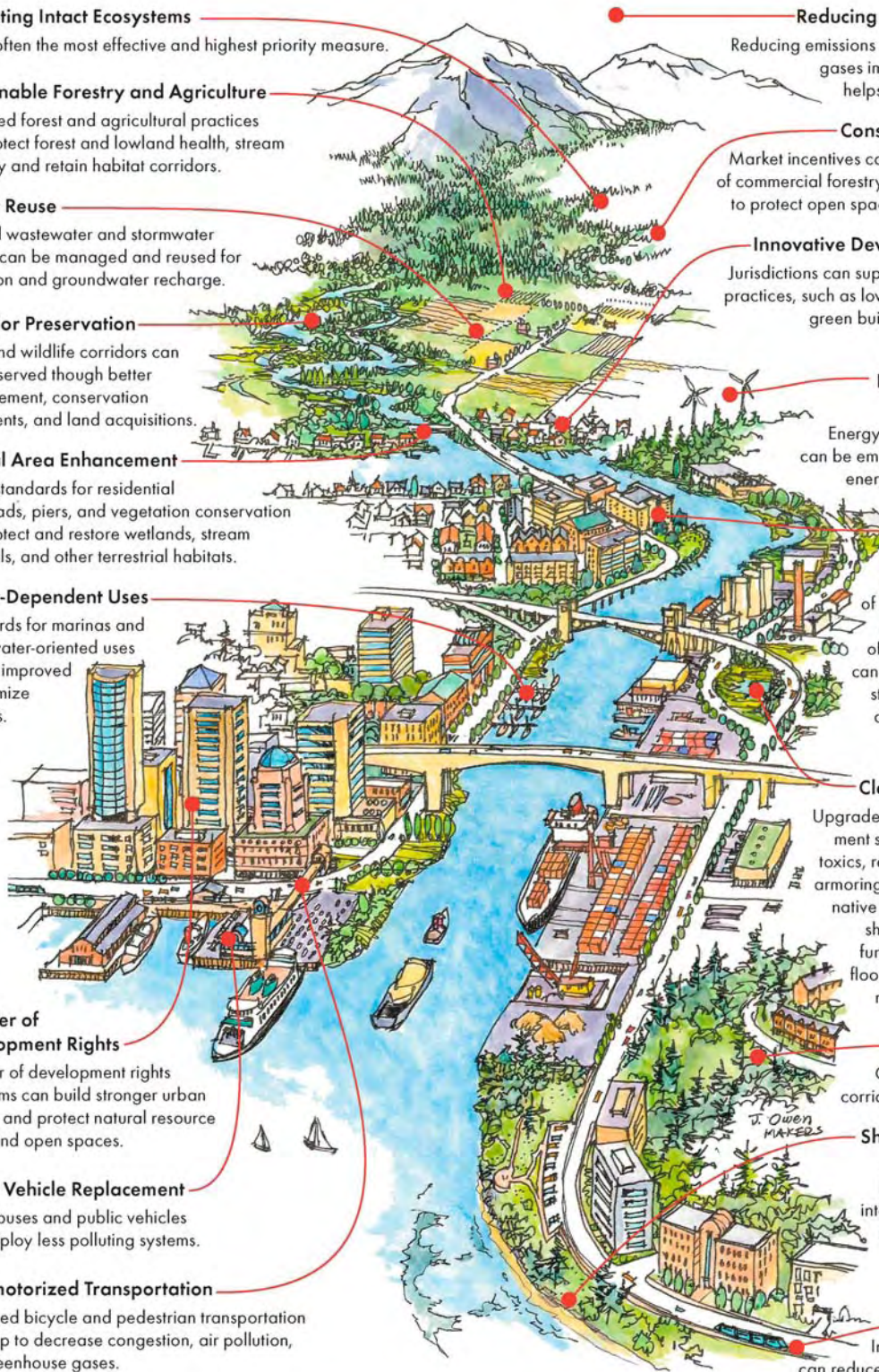
Greenbelts and habitat corridors can be preserved.

Shoreline Restoration

Marine shorelines can be restored to provide intact salmonid migration corridors and increase the general health of nearshore habitats.

Transit

Improved transit service can reduce auto dependence, air pollution, and greenhouse gases.



3. VISION 2040 POLICIES AND STRATEGIES SHOULD SUPPORT THE BEST PRACTICES

Some best practice tools and techniques currently being used in the region are noted below.

- **Develop incentives for “green building.”** The United States Green Building Council defines green building as design and construction practices that significantly reduce or eliminate the negative impact of buildings on the environment and occupants (U.S. Green Building Council, 2003). Green buildings are energy efficient and may even generate their own energy locally. They use fresh water efficiently and may treat and reuse water onsite. They are constructed using recycled, renewable, reused, and non-toxic materials. Washington State Department of Ecology continues efforts with the building industry and local governments to promote sustainable design and construction. Local jurisdictions promoting or requiring green building include, but are not limited to, King, Kitsap, and Snohomish counties, and the cities of Issaquah, Seattle, and Tacoma. In 2005, the Washington State Legislature passed a bill (Senate Bill 5509) requiring that all projects funded in the state’s capital budget meet the LEED (leadership in energy and environmental design) silver certification standard.
- **Use “low impact development” techniques.** Low impact development is an innovative approach to land development and stormwater management. The objective is to manage stormwater generated from new development and redevelopment so there will be no negative impacts to adjacent or downstream property owners and no degradation to groundwater or surface waters, such as streams, ravines, wetlands, potholes, and rivers. Low impact development emphasizes protecting, using, and integrating onsite natural features with small-scale, dispersed engineered controls. Examples include: *clustering buildings* to maximize the amount of native soils and vegetation retained and minimize the amount or effects of impervious surface on a site; designing *shorter, narrower roads* made of permeable pavement to minimize the amount of impervious surface; and managing remaining stormwater runoff by disconnecting impervious surfaces and directing runoff to onsite areas where it can infiltrate the ground. For instance, in 2000, the city of Issaquah adopted an update to the stormwater code that provides a process and criteria for evaluating low impact development proposals. Likewise, in 2005, Pierce County adopted a low impact development chapter for its Stormwater Management Manual.
- **Use “Green Streets” to manage stormwater.** In a green streets program, stormwater systems are designed to protect streams and wildlife habitat by allowing infiltration and limiting stormwater runoff. Design options include street trees, landscaped swales, special paving materials, and planted medians.
- **Manage treated wastewater** as a valuable resource, based on local needs. In some areas, direct discharge of high-quality treated wastewater to a river or stream may be best to augment lower flows. In others, groundwater recharge may be important. In other areas still, the treated wastewater may be used for irrigation to reduce the amount of stream diversions for this purpose. For example, the LOTIT (Lacey, Olympia, Tumwater, Thurston County) Wastewater Alliance is in the process of implementing a plan to gradually transition to reclaimed water production for beneficial uses such as irrigation, commercial/industrial water supply, and groundwater recharge (Adolfson and Brown & Coldwell, 2005).
- **Implement rainwater capture programs** to collect rainwater runoff from roofs for domestic or irrigation uses. Capturing rainwater for a later use provides the dual benefits of reducing demand for municipal water and reducing the amount of water collected in the storm sewer system and treated as pollution. One inch of rainfall on a 1,000 square foot roof can yield 600 gallons of water. For example, Seattle Public Utilities has implemented a three-year pilot program call the Seattle RainCatchers Program in which citizens can voluntarily harvest rain using residential cisterns to help conserve resources and prevent pollution (Seattle Public Utilities).
- **Promote “buying locally” programs.** Among other things, these programs reduce pollution by reducing transport miles for food and goods. Select Kitsap™ and Puget Sound Fresh™ is a marketing program designed for farm products raised, grown or harvested within the borders of Kitsap and King County. Starting in 2001, the Kitsap Food and Farm Alliance developed the first regional identification program undertaken on behalf of farms in the Kitsap region. The program is funded by King, Kitsap, and Snohomish counties and the Washington State Department of Agriculture.
- **Promote clean technology businesses.** “Technological innovation and the emergence of new resource-efficient technologies, in which the private sector plays a major role, provide a source of great hope and increased opportunities to avoid the environmentally destructive practices of the past including through clean technologies” (United Nations, 2000). The region has many of these businesses already and a recent effort brought them together under the auspices of the Prosperity Partnership’s Clean Technology Cluster working group.



- **Consider wildlife movement and habitat connectivity** in developing transportation facilities and assigning land use designations. Animals need to move across the landscape to use different habitats for foraging, dispersal of young, or for seasonal migration. These habitats must be accessible, continuous, and large enough to allow occupancy. Maintaining connected areas of quality habitat is essential for the long-term viability of many species. Washington State Department of Transportation is currently developing a Statewide Habitat Connectivity Plan that will help minimize the effects of transportation projects on wildlife habitat connectivity. This plan will improve connectivity by rectifying existing problems and incorporating guidance into transportation planning, project development, and operation of the transportation system. One option in areas where wildlife mortality is high is to install wildlife-crossing structures (either over or under the road).
- **Use “mitigation banks.”** Many jurisdictions are implementing mitigation banking programs in which larger wetlands are restored in lieu of smaller ones to compensate for multiple projects with wetland impacts. The consolidated mitigation banks can result in wetlands of greater value due in part to their size, commitment to long-term management, and potential for habitat connectivity. King County is among the jurisdictions to have implemented a mitigation bank program, adopting associated administrative rules in January 1999.
- **Use renewable or clean energy.** In May 2005, Washington Governor Christine Gregoire signed a number of energy-related bills into law that will help the state to become a policy leader for renewable energy and energy efficiency. Under one bill, the state’s utilities will pay incentives of 15 cents per kilowatt-hour (capped at \$2,000 per year) to individuals, businesses, or local governments that generate electricity from solar power, wind power, or anaerobic digesters. In return, the state’s utilities will earn a tax credit for those payments. Under another bill, passenger cars and trucks purchased during 2009 or 2010 that run on natural gas, propane, electricity, hydrogen, or hybrid technology are provided a sales tax exemption.
- **Improve car efficiency.** More than half of the region’s pollution comes from cars, trucks, and buses. Growth means this will be a continuing challenge. Washington has become the latest state to adopt “clean car” motor vehicle emissions standards, which include greenhouse gas emission standards (U.S. Department of Energy, 2005). Many additional programs that impact air quality are underway in the region - many of these are described in *Chapter 5.4 – Air Quality*.

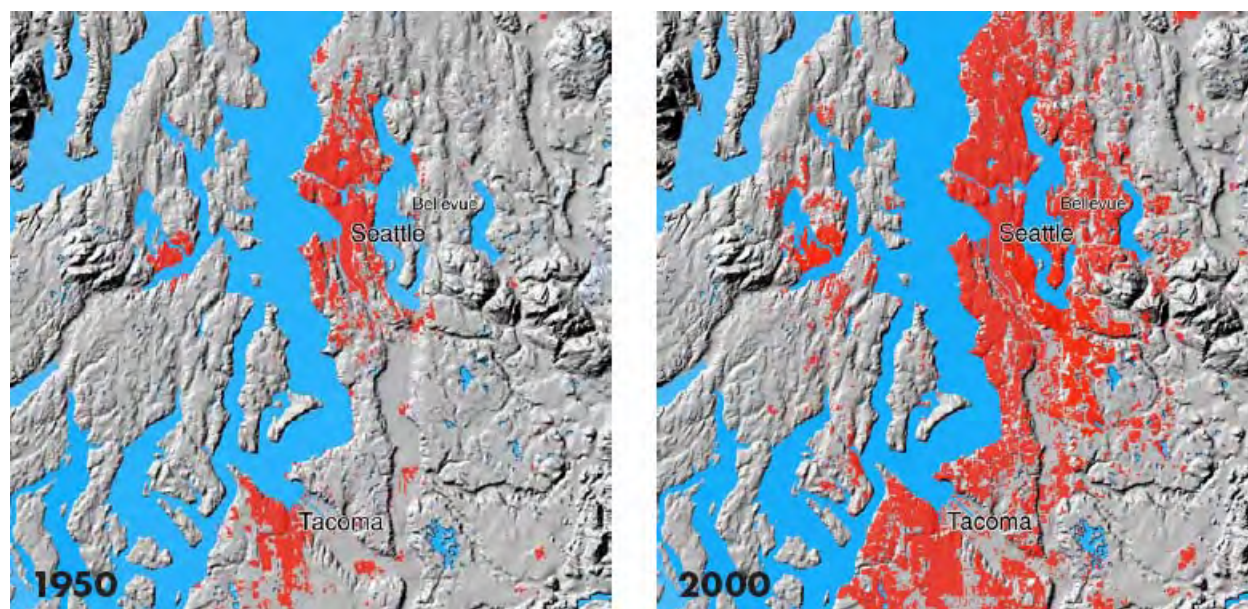
E. Conclusions

The Regional Council recognizes that we live in a fragile and interconnected global and regional environment. Puget Sound communities are connected by ecosystems, transportation systems, and the economy. The region’s economic health is dependent on its ability to get goods to market and people to their jobs. The region’s ability to preserve open space and parks depends on the fiscal health of its communities. The way we develop land affects air and water quality, the character of communities, and the cost of roads and utilities.

As part of a public scoping comment period survey, four out of five respondents (80 percent in the central Puget Sound region) said their town is a “good” or “excellent” place to live; only 4 percent reported that it is “poor.” The largest number of respondents selected factors related to the natural environment and beauty of the area as the thing they like best (Puget Sound Regional Council, 2004).

The primary question is: How and where will we grow in the future? By the year 2040, the region can expect to have 1.6 million new people and 1.1 million more jobs. The Growth Management Act, the proposed VISION, countywide planning policies, and local comprehensives plans have placed the region on a solid path, but we need to continue to work together, strengthen our resolve, and refine our approaches if the region is to be successful in not repeating the growth in the urban footprint that took place between 1950 and 2000.

FIGURE 2-16: GROWTH IN THE REGION'S URBAN FOOTPRINT



Source: United States Geological Survey

The Regional Council desires to help provide leadership and stewardship in protecting this interconnected environment. And, many if not all of the necessary tools already exist. It will be our actions and choice that make the difference.

Future growth provides an opportunity to both implement comprehensive plans and achieve environmental planning goals. As we look towards 2040, we know that our actions can make a positive difference. Using new understanding of environmental science, putting in place the best tools and techniques, and investing in natural capital, the region can grow in a sustainable way.

New development and infrastructure can utilize the best practices and materials. Redevelopment can help retrofit out-of-date systems and restore natural connections. Wise planning can ensure that new growth is not located on, or too close to, important habitats.

We can reduce pollution with cleaner cars, buses, and trucks, cleaner fuels, and fewer vehicle miles traveled. We can reduce impervious surfaces by using low-impact development techniques, green buildings, and green streets. We can leave more water in rivers and streams by capturing rainwater and using it, and by treating and reusing wastewater.

The future of the region's environment will be defined by the tradeoffs and choices we make.

We can transition to a society where waste is viewed as inefficient, and where most wastes and toxic substances have been eliminated. This will contribute to economic, social and environmental vitality.

— Beyond Waste: the State Solid Waste Strategic Plan, Washington State Department of Ecology

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