The dramatic contrast of this region's landscapes, from sheer mountain ranges in the Cascades and Olympics to the fjord-like shape and form of the marine environment, makes the Puget Sound basin unique among estuaries in this country. Variation in topography, rainfall, and water movement in and around the Sound result in a corresponding variety of habitat, thereby creating a diverse and productive environment for forests, salmon, and thousands of other species. Rivers coursing down from the mountains to lowland areas have carried the sediment and organic material that formed the fertile soils used for farming and forestry. While parts of the Puget Sound marine environment have wide, flat beaches and bays, much of Puget Sound is characterized by steeply sloping sides that provide only a narrow, shallow fringe where light can penetrate the water and vegetation can thrive. These nearshore habitats support eelgrass, seaweeds, and small fish that form the basis of the Puget Sound marine food web – the chains of life that link tiny creatures such as zooplankton to salmon and orcas.

Scientists report that the Sound's unique features also make this ecosystem extremely sensitive to pollutants and physical changes. The natural underlying topography of the Puget Sound and marine circulation patterns prevent water, sediment, many living organisms, and contaminants from being readily flushed to the ocean. Our location at the interface of land and sea means that changes on the ground can create immediate and lasting impacts to marine areas, as well as to our freshwater rivers, lakes, and streams. Many Puget Sound species of birds and fish migrate between the uplands and marine waters during their lives – some on a daily basis – and the links between freshwater, marine, and terrestrial environments are highly vulnerable. If any one portion of the habitat used by a given species during its life cycle becomes too degraded or disconnected from other habitats, that species cannot continue to sustain itself.

The need to significantly increase the pace and scale of effort

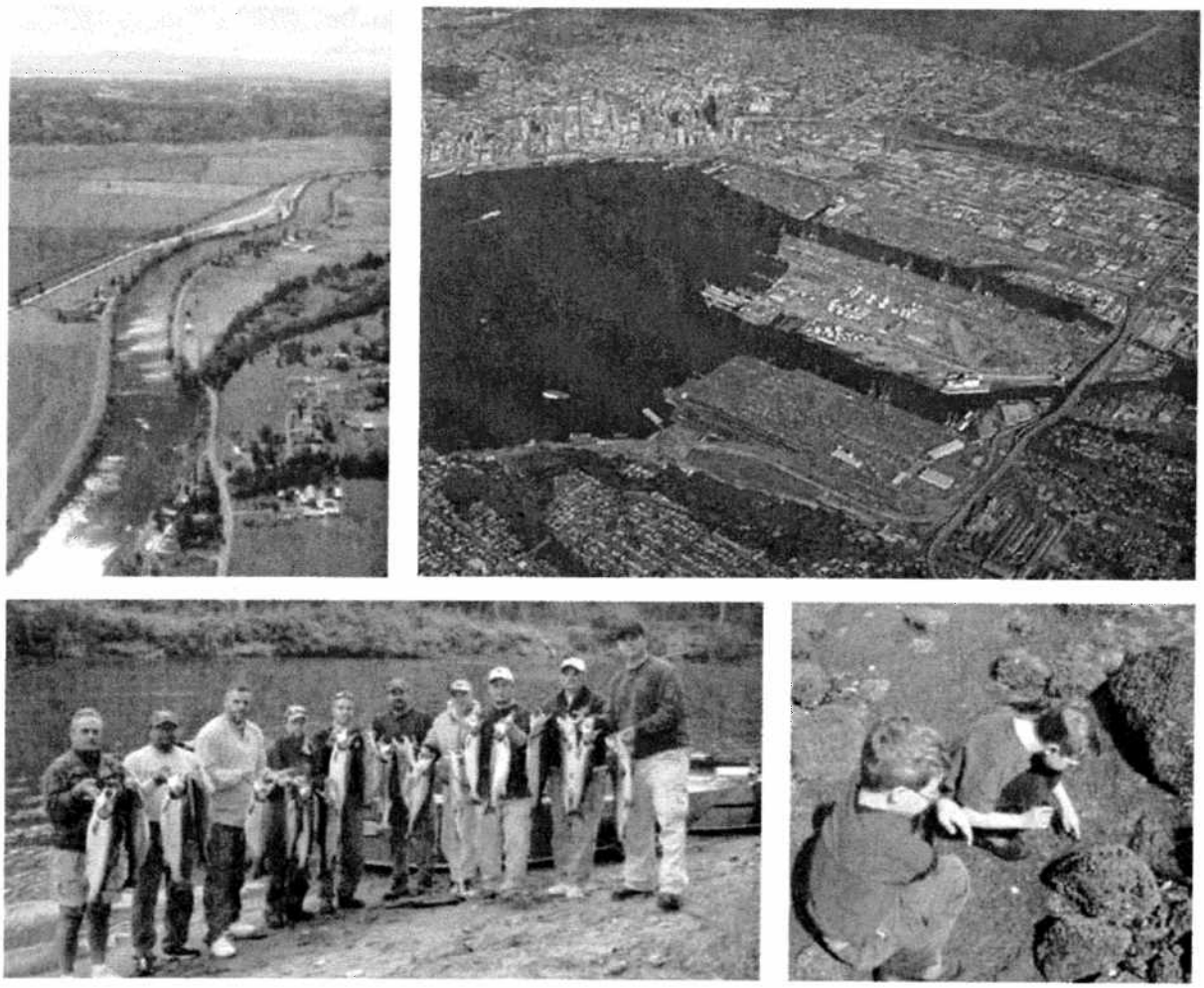
Despite significant investment and many efforts by government agencies, community groups, and individual citizens, we are still not achieving positive momentum on the health and sustainability of the Puget Sound ecosystem as a whole. Two of our foremost icons – Chinook salmon and southern resident killer whales – are now listed as threatened or endangered species. "Dead zones" resulting from low dissolved oxygen are appearing in Hood Canal and other marine areas, resulting in major fish kills. These are not the only indicators of decline in the overall condition of the lands and waters of Puget Sound. Increasingly, we are learning that the many connections within the complex environment of the Sound are at a critical point, and that our current approach to these problems is not capable of protecting the health of the ecosystem over the long term.

What kind of postcards will visitors send from the Puget Sound region in the future?

What kind of postcards will visitors send from the Puget Sound region in the future – will these be fresh pictures of a productive ecosystem, or historic photos of the species we once had? The Puget Sound ecosystem is driven by a complex set of natural processes that work in harmony to produce fish, shellfish, wildlife, clean water, and other benefits that we use and enjoy. Our actions have

disrupted many of these processes, and localized efforts have not been able to address large-scale changes. In several respects, we inherited a heavy burden from the actions of our predecessors in the last century, who built dams and dikes, discharged pollutants, and introduced new species before the full consequences of these actions were known. As more people have moved to the Puget Sound region, our patterns of land development and transportation have changed our environment. The loss of native forests and estuaries in the lowland areas of the Puget Sound region has been dramatic.

While there is still much to learn about the rich complex nature of Puget Sound, it is clear that the health of the ecosystem is compromised. Opportunities to ensure that Puget Sound will be a healthy ecosystem in the future are still at hand, but new challenges are coming that will make it even harder to attain this goal unless concerted action begins now. Moreover, any additional delay in actions to protect and restore the Sound will make these challenges more difficult and more expensive in the



People and the natural environment are closely connected in Puget Sound. Achieving a thriving ecosystem will require meeting the needs of both society and the resources that people depend upon and cherish.

CLOCKWISE FROM LOWER LEFT: SNOHOMISH COUNTY; SNOHOMISH COUNTY; UNKNOWN; KATHY TAYLOR; PUGET SOUND ACTION TEAM

future. Our expected population growth will bring another 1.4 million people to the region by 2020, and climate change is predicted to change the basic pattern of rainfall as well as increase sea levels. Now is the time to address our current challenges and prepare for growth and possible climate changes.

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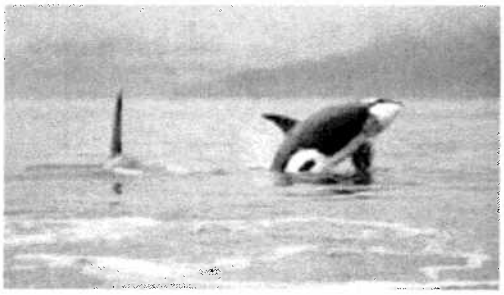
Species are in decline and Puget Sound's web of life is fraying.

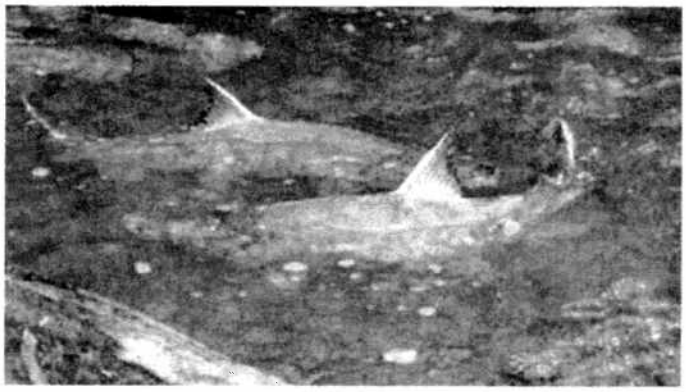
The listings of Puget Sound Chinook salmon, Hood Canal summer chum, bull trout, marbled murrelet, and the southern resident orca population as threatened or endangered have caused considerable alarm, and a great deal of attention is appropriately being focused on their protection and recovery. Salmon and orcas are top-level predators in the food web of the Puget Sound ecosystem, and are fundamental to the identity and culture of the region as well. However, other less iconic species are also in trouble, indicating that our overall ecosystem is stressed. Forty marine invertebrate, fish, bird, or mammal species in the Puget Sound area are considered threatened, endangered, or are candidates for state or federal listing. Assessments of all known species in the Puget Sound region suggest that nearly a thousand species are imperiled, representing approximately 14% of the total species diversity. Some seabird populations have dropped by 50% since the 1970s, while others, such as the western grebe, have plummeted by 90%. Other species of particular concern include rockfish and groundfish, which have declined dramatically in the past 25 years. Human-introduced plant and animal species, particularly those that become invasive, also have created problems for native habitats and wildlife.

It is imperative that we pay attention to these dramatic warnings from the ecosystem, and it is also essential to consider the connection of eelgrass, seaweeds, tiny invertebrates, and small fishes to the food webs of the Puget Sound ecosystem. If we want to reverse the current downward spiral and recover threatened and endangered species, as well as prevent the loss of species, actions to improve the ecosystem's health overall and the implementation of plans to help species in trouble are needed now.

Toxic chemicals and other contaminants pose health risks and further impair the fragile food web of Puget Sound's ecosystem.

Over the past 150 years, we have introduced a wide range of chemicals into the environment at levels that are poisonous to humans, wildlife, and aquatic life. Because of the Puget Sound ecosystem's unique topography and the persistence of some toxins, chemicals that enter the marine waters remain for long periods of time. Despite the outright ban on some harmful chemicals in the 1970s and numerous cleanup efforts, worrisome accumulations of these substances still occur in the bottom of several urban bays and sites around the Sound. Toxic chemicals continue to persist and circulate throughout the environment and build up in fish, shellfish, and people, as well as remain in contaminated sediments. In addition, toxic substances are still being introduced – some as permitted discharges to fresh and marine waters and some as airborne particulates,– and are washing into





Orcas, Chinook salmon and surf scooters are just three species in trouble. Ocras are on the federal endangered species list. Chinook salmon are below 10% of their historic levels and listed as threatened species. In parts of Puget Sound, surf scooters have declined significantly in the past decade.

rivers, lakes, bays, and marine waters. Oil spills, while infrequent, can have catastrophic affects. These pollutants accumulate as they move through the food web, showing up in key forage fish such as herring and bottom fish species such as English sole, and are ultimately affecting salmon, seals, and orcas. Moreover, these contaminants can present a significant concern for human health, especially for individuals who frequently consume the types of food exhibiting high contaminant levels. Without serious measures to address the toxic contamination of the Puget Sound ecosystem now, contaminant loading associated with projected growth and development is likely to increase dramatically in the years ahead, with consequences decades into the future.

Pathogens and concentrated nutrients also enter Puget Sound from municipal sewage treatment plants, septic systems, stormwater runoff, agricultural practices, ship and boat discharges, domestic pets, and even wildlife species. The potential that these pathogens will make people sick has resulted in the closure of shellfish growing areas and swimming beaches in many parts of Puget Sound. Despite the enormous investment in secondary treatment of municipal sewage, the implementation of best management practices by many individual farmers, and multiple programs to encourage responsible septic management, human and animal waste sources remain a problem for our ecosystem.

Along with the obvious risks of bacterial and virus transfer to wildlife and humans, nutrients and pathogens can harm water quality, and have severely impacted some areas of the Puget Sound region. While the majority of nutrients enter Puget Sound from the Pacific Ocean, excess nutrient loading exacerbates naturally low oxygen levels and lead to problems in specific areas. Excessive loading of nutrients such as nitrogen and phosphorus act as fertilizers for algae. Where water circulation is weak, the bloom and die-off of algae results in depleted oxygen levels that kill fish and wildlife. Major kills of fish in Hood Canal in recent years have brought attention to this phenomenon; other locations, including parts of the south Sound and the Port Susan/Saratoga Pass areas, are already experiencing similar problems.

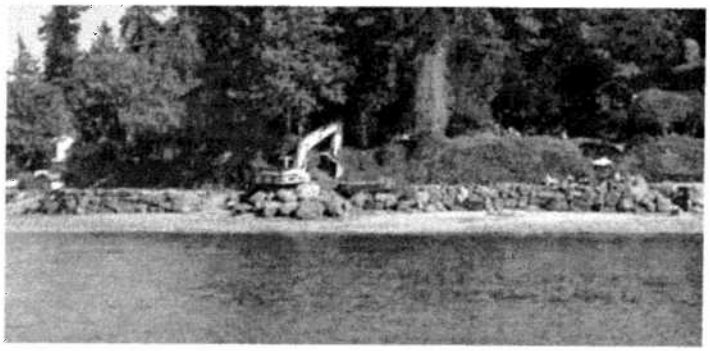
PHOTOS: CLOCKWISE FROM LOWER LEFT: ERIC MARK ANDERSON, DEPARTMENT OF ECOLOGY; JAMIE GLASKOW/WASHINGTON SEA GRANT

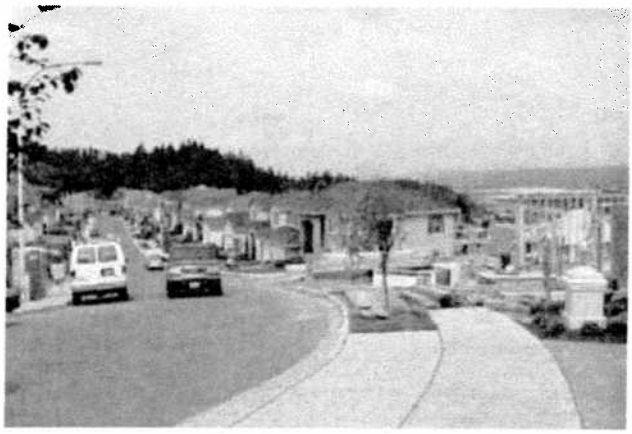
Low streamflows and stormwater surges damage many rivers and streams in the Puget Sound region.

As in most Western states, Washington water law has a controversial and complicated history arising from competing demands for water for cities, farms, industries, recreation, and fish and wildlife. The water running in our rivers and streams may seem plentiful, but current and projected uses indicate that adequate water may not be available to support fish populations and community growth. The lack of sufficient stream flows already limits the recovery of threatened and endangered salmon species in several river basins in Puget Sound.

Additionally, the construction of cities, roads, businesses, parking lots, and homes has removed forest cover and hardened the surface of the landscape, thereby reducing the absorption of rainwater. As a result, high flows in the winter from stormwater runoff damage habitat in rivers and streams. The loss of water retention in the soil from these impervious surfaces can further reduce streamflows during the dry season that are necessary to support sustainable levels of fish and wildlife. Continued population growth, the removal of forest cover, and climate change are expected to intensify these conditions.

Human actions cause and contribute to problems in Puget Sound. Low levels of dissolved oxygen cause fish kills. Hardening of marine shorelines, development and transportation systems destroy and alter habitat and cause pollution.





PHOTOS: CLOCKWISE FROM LOWER LEFT: KATHY TAYLOR PUGET SOUND ACTION TEAM, HOOD CANAL DISSOLVED OXYGEN PROGRAM HAM STUDY TEAM, TONY DROSCHER PUGET SOUND ACTION TEAM, STOCK

We are at a unique and important juncture for ensuring that future generations will continue to enjoy the rich and abundant fishery and shellfish, recreational, commercial and natural resource benefits of Puget Sound. I believe that the people of this region will respond positively to a challenge to undertake the actions necessary to making this goal a reality.

Ron Sims, King County Executive

Our remaining forests, shorelines, rivers, and estuaries are under pressure from growth, further jeopardizing our fish and wildlife.

The spectacular and diverse landscape of the Puget Sound region has given rise to a wide array of habitat types that are necessary for fish and wildlife species to thrive. Many of the original key features of the Sound, such as marine wetlands and fertile estuaries at river mouths, have been lost to growth and development. The changes resulting from chemical contamination, nutrient loading, shoreline development, and runoff make it difficult for the remaining habitat to recover from past disruption. If we continue to develop the land following our past and current patterns, we will intensify pressure and stress on remaining natural areas, and fragment and lose habitat beyond the tolerance point of many species. How and where we restore the lost functions of the ecosystem must be addressed, as well as how we stop further decline of the Sound's capacity to support fish, wildlife, and people.

New challenges to the Puget Sound ecosystem are coming

Our current population of 3.8 million is expected to increase by another 1.4 million people by 2020.

This increase in population will put additional stress on the Sound that will make protection and recovery progressively more difficult and costly. Unless the development, resource use, and pollution associated with this growth are carefully managed, the problems created by our past will expand in the future. However, growth may also create opportunities to help the ecosystem, since the expected economic gains should stimulate wealth that can be invested into the protection and restoration of the environment. How to seize positive opportunities while minimizing negative consequences is one of the biggest challenges facing the Puget Sound region

Predicted changes in climate will magnify our challenges.

According to a study on Puget Sound prepared by the University of Washington's Climate Impacts Group, there is considerable evidence that regional temperatures are rising and precipitation patterns are changing. Projections for the future suggest that sea levels will rise, snowpack is likely to melt off earlier each season, and the damage from winter storms could increase. Continuing climate change will need to be factored in to the region's response to the other serious problems facing the Puget Sound ecosystem.