



Marine birds in the Puget Sound Basin

A flock of shorebirds lifting gracefully off the beach. The sound of geese calling to each other overhead. A cluster of diving ducks that catches our eye as we wait for our ferry to depart. These were once familiar sights and sounds of Puget Sound, but they are not so common any more. What is happening to marine birds in the Puget Sound Basin?

Marine birds are the diverse collection of species that live on salt water or along its edges. They include diving birds such as sea ducks that forage below the water's surface. They also include the shorebirds, birds that feed along water's edge but stay close to land. True seabirds, birds that only come ashore to breed, are also part of this assemblage. Whether you're a serious birder or a casual beach walker you can probably appreciate the variety of marine birds easily seen around the region.

The greater Puget Sound Basin is an extraordinary center of activity for marine birds of the West Coast. Over the course of a year, more than 100 marine bird species spend time in these waters, some in flocks reaching tens of thousands. A relatively small number nest locally and stay within the Puget Sound basin year round. A few species breed each summer on protected islands in the Strait of Juan de Fuca but leave for deep water as soon as the breeding season is over. The many species that visit this area seasonally make up the largest group. Some pass the cooler months here but leave each summer for nesting sites in forests, wetlands or coastal environments as far north as the Arctic Circle or deep in the interior of the North American



Cormorants
Photo by Judy D'Amore

continent. A few species nest to the south, but move north into the Puget Sound Basin once their parenting responsibilities are over. Each of these birds has its own unique life story and is drawn here to utilize different habitats and food resources. Yet for each species, the productive Puget Sound Basin is a critical link in its life-support system.



Port Townsend Students
Photo by Judy D'Amore

A wave of interest nationally in wildlife viewing, coupled with the biological richness of Washington's inland marine waters has led to a boom in wildlife viewing activities in the Puget Sound Basin. Wildlife cruises, once focused solely on whale watching, have expanded their seasons to capitalize on the diversity of marine birds in these waters during fall and spring migrations. At the same time, there has been gathering evidence that many of these bird species are in trouble.

In an effort to help naturalists and environmental educators in the wildlife viewing industry learn more about these reports, the Port Townsend Marine Science Center, with support from Washington Sea Grant, held a workshop series in 2006, entitled *Marine Birds, Trends and Stewardship* (MBTS). In these sessions, leading researchers¹ working the Puget Sound Basin provided updates on what they are learning about marine birds in our region, information that will be shared with a wide audience through community education programs, new exhibits, nature tours, teacher workshops and newsletters. These sessions also explored ways to promote better stewardship of marine bird populations in the Puget Sound Basin.

Based on information from these sessions, the following pages summarize what we know about declining marine bird species and highlight several things we can do to help them recover.

The Research

Marine Ecosystem Analysis Puget Sound Project (MESA)

The first study of marine bird populations in inland waters was conducted in 1978 and 1979, as part of the MESA Project. Funded by NOAA and the EPA, the MESA Project set out to record the distribution and abundance of a wide range of marine species and habitats over the northern portion of Washington's inland waters. Using a combination of land-based, boat-based and aerial survey techniques, researchers made over 7000 population counts of marine birds of the eastern Strait of Juan de Fuca and Georgia Straits. (Wahl et al., 1981) This study provided important data on the abundance of marine birds of the late 1970s, serving as a point of comparison for more recent population surveys.

PSAMP/WDFW Marine Bird Abundance Surveys

A decade later, the Puget Sound Ambient Monitoring Program (PSAMP) began developing a sound-wide program to monitor marine water quality and biological resources. Washington Department of Fish and Wildlife (WDFW) was contracted to develop a program of marine bird surveys that started in

¹ Speakers in this series included David Nysewander, WDFW; Joe Gaydos, The SeaDoc Society; Greg Schirato, WDFW; Julia Parrish, UW; Annette de Knijf, USFWS; Bob Boekelheide, Dungeness River Audubon Center; Bill Tweitt, WDFW; and John Bower, WWU.

1992. That year David Nysewander and his group at WDFW began conducting regular population counts of marine birds by aerial survey throughout Puget Sound and Strait of Juan de Fuca. Flying 65 meters above the water in small planes, they began a series of summer and winter bird counts along transects that, where possible, included the same tracks as had been flown in the earlier MESA study. When survey data from 1992-1999 was compared with MESA data from 1978-79, some compelling results were seen. Many species, including some formerly abundant winter species, were showing significant declines from their levels in the 70s. All grebes had declined significantly, with western grebes down 95%, loons down 79% and scoters down 57%. Other ducks, alcids and cormorants showed significant declines as well. Only a few species showed stable or rising populations (Nysewander, et al., 2005).

These unsettling results have raised many questions in the minds of researchers:

- Are the declines in these species continuing?
- Are we certain there are fewer birds, or have they simply moved somewhere else?
- What do we know about the life histories of these species? What important information is still lacking?
- What do they feed on in the Puget Sound Basin? What is the condition of their food resources here?
- What local habitats are important to these birds, and what is happening to these habitats?
- What changes are occurring in other parts of their range, such as arctic or inland nesting sites?
- Are certain human activities, such as commercial fishing or spilling oil at sea, causing bird mortality directly?
- What are humans doing that might be harming these species in more indirect ways, activities that result in habitat loss or climate change for example?

Although many of these questions are still unanswered, recent studies are beginning to fill in some of these gaps.

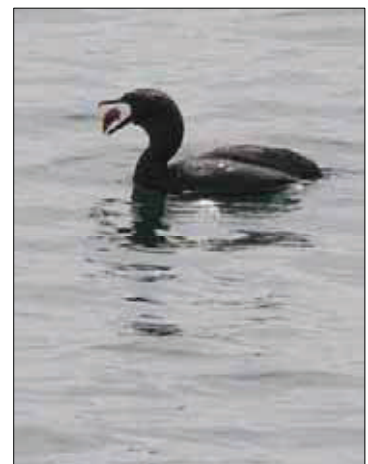
David Nysewander's group at WDFW continues to count marine birds in the greater Puget Sound Basin and the Juan de Fuca Straits through their summer and winter aerial survey program. Their data, now summarized through 2002, show a continuous, gradual decline in marine bird numbers overall since the late 1970s. To learn more about the picture emerging from their surveys, the website of the PSAMP Marine Bird Density Atlas <http://wdfw.wa.gov/mapping/psamp> is a good place to visit. The site features an interactive mapping program that displays population densities throughout the region, species summaries and population trends for selected species.

MESA Project Update

In 2003 John Bower, with Western Washington University's Fairhaven College, proposed a study to replicate survey methods of the original MESA study that were not included in the PSAMP surveys. Bower



Heermann's gulls
Photo by Judy D'Amore



Pelagic Cormorant
Photo by Caroline Littlefield

noted that aerial surveys had only played a small part in the survey techniques of the MESA study, and that aerial surveys may incorporate some inherent biases. He wanted to find out if a different picture would emerge by surveying birds from the shore and the decks of ferries, and comparing those numbers with counts made in the same way back the 70's.

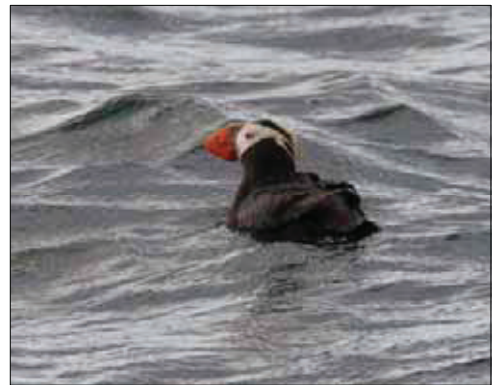
John Bower's study is novel in that much of it was carried out by his undergraduate students at Fairhaven College. Students had to pass a rigorous training exercise in order to participate and show that they could identify more than 90 species in the field with accuracy. In designing his study Bower was able to draw on the considerable experience of Terry Wahl, who had led the MESA Project's marine bird study more than 20 years earlier. From 2003 to 2005, Bower and his students carried out over 3000 monthly bird counts from approximately 100 land-based points along the US and Canadian shoreline and from three ferry runs.

John Bower presented his preliminary results at the 2005 Puget Sound Georgia Basin Research Conference, citing a 47% decline in total abundance of marine birds in inland marine waters since the 1970's. His results were largely consistent with the PSAMP study, however he found upward trends in a few species. John Bower's work also picked up a sharp decline of 91% in the common murre, a bird difficult to recognize in aerial surveys, as well as an 81% decline in wintering brant geese. (Bower et al., 2005)

Why are Many Marine Birds in Decline?

Most researchers agree the reasons these species are declining are complex. Marine birds tend to be vulnerable as a group for a number of reasons.

- Many marine birds are well adapted to life on the water, but they are often poorly adapted for perching or even walking on land. Most species nest directly on the ground. There are very few places these ground nesting birds can raise their young free from predators. Many species form large colonies on offshore islands, while others migrate to remote, semi-arctic locations. When humans take over these places or cause them to degrade, the results can be devastating.
- Marine birds tend to replace their populations more slowly than land birds. They lay fewer eggs and rear fewer chicks per year than land birds. The young take longer to reach reproductive age.
- Marine birds are especially vulnerable to oil spills and interactions with fishing gear.
- Evidence is also building that the food sources marine birds rely on in Washington waters may be declining or becoming contaminated.
- It is also possible that increasing interactions with humans are a source of stress that translates into reduced fitness.



Tufted Puffin
Photo by Caroline Littlefield

Several researchers are working on specific local species to tease out which of these factors are most responsible for these declines.

Some Species of Concern

Population declines have been reported in many species in the greater Puget Sound Georgia Basin. Highlighted below are a seaduck, a seabird and a goose, each of which is currently receiving attention by researchers. Their stories reveal some of the challenges marine birds as a whole are facing.

Scoters

Three species of scoter winter along the coast of North America as far south as Baja California. They arrive in Puget Sound in early fall and are seen in large mixed groups along the shore diving for shellfish. In the spring they move to places known as staging areas where the birds gather before migrating. Scoters nest near lakes in remote northern forests of Canada and Alaska. After rearing their young, scoters molt and re-grow all their flight feathers before returning to the Puget Sound Basin.

Until recently, scoters were among the least studied of local marine birds. In a new program, researchers at WDFW have been tracking the movements of surf scoters and white winged scoters, the two more common scoter species to our area, using implanted satellite and VHF radio transmitters. Working with other researchers along the west coast, they have been following birds outfitted with satellite transmitters as they move from wintering areas to spring staging areas, then north to nesting locations, followed by sites along the coast where the birds molt their feathers, and finally back to winter foraging areas. They have learned that scoters are extraordinarily faithful to the habitats they use; the flock you watch from your waterfront home this winter are the same birds you watched last year. This is also true of other stops they make along their migration route and the places they nest.



Male Surf Scoters
Photo by David Green

Other scoters have been fitted with VHF radio transmitters in Puget Sound to find out where they move locally. This work is showing that the scoters feeding in front of your home during the day move offshore to gather in the middle of large bays every night. Studies on the movements of these birds will be important, especially if it is found that disturbance or degradation is occurring at any of the locations they use.

One more source of trouble for scoters may lie in a dwindling food resource. Although scoters feed primarily on shellfish and other invertebrates, each spring they congregate in Padilla Bay and several other places to feed on the eggs of Pacific herring. Attached to eelgrass and algae by the spawning fish, the eggs are thought to be an important source of energy, giving the birds fitness for migrating and reproducing successfully. In recent years fewer herring have been spawning in northern Puget

Sound. Researchers are trying to determine whether the decline in scoter numbers is related to the decline in this food source.

Ecologists understand that when a prominent species begins to disappear, the entire ecosystem may be affected, as the balance shifts in complex food webs. Perhaps more ominous still, the decline of an abundant species may also signal deeper changes in the ecosystem that have yet to become apparent. For this reason, the surf scoter has been named an indicator species for Puget Sound Ambient Monitoring Program.

Common Murre

The common murre is a deep-diving coastal seabird with a West Coast range extending from central Alaska to California. Although they are highly adapted to life on open water, they are also frequent visitors to the inland waters of Puget Sound.

The common murre only ventures onto land to reproduce. To breed successfully, common murres need exposed, rocky cliffs free of predators. They also require an abundant supply of small, schooling fish such as Pacific herring or sand lance. In June and July, the birds gather in dense, noisy colonies on surfaces and cliff ledges of outer coast islands. The islands used by murres in Washington are part of the USFWS National Wildlife Refuge system, with the exception of Tatoosh Island owned by the Makah tribe, which harbors the largest colony in the state. Since 1979 the USFWS has been recording the number of birds showing up to breed at its refuges. In 1991, University of Washington researcher Julia Parrish began estimating their numbers on Tatoosh Island. These compiled records show just how vulnerable common murres are to environmental threats.

In 1983, during a severe El Niño event, common murre numbers plummeted along the Pacific Coast. By 1987 they had partially recovered and their numbers had leveled out, yet today Washington's murre population is still only 30% of its numbers in the late 1970s.

Nobody knows exactly what is keeping their numbers down, but common murres have faced a series of threats in recent decades. Several oil spills occurred along the West Coast during the 1990s, including two on the Washington coast. More common murres were killed in these spills than any other seabird. Common murres are also the most frequent victims of entanglement in gillnet fishing gear. To help overcome this problem, WDFW began working with commercial fishers on measures that make fishing nets more visible to birds swimming below the surface. Common murres are also very sensitive to disturbance on their breeding colonies. Low flying planes, small boats and bald eagles approaching too closely cause birds to take wing, leaving eggs and chicks easy prey to gulls. Finally there are natural anomalies, years when winds and currents fail and upwelling stops, as happened in 2005. That year, cold nutrient-rich water did not rise to the surface as it normally does, where it stimulates plankton production, the base of the ocean food web. Without plankton, many species didn't show up, including the schooling fish that common murres and other seabirds feed on. There were no chicks that year and many birds starved. The following year was normal; however, a year like that takes a heavy toll on marine birds.



Common Murre
Photo by Caroline Littlefield

For these reasons, the common murre is listed as a State Candidate species. This means that it is under consideration for listing as an endangered, threatened or sensitive species in the State of Washington. Meanwhile Julia Parrish and researchers with USFWS continue to monitor its status.

Brant

Brant geese are a winter migrant to the Puget Sound area. Washington has the largest wintering population of brant on the West Coast outside of Mexico. Since brant feed almost exclusively on eelgrass, it is not surprising that Padilla Bay, Willapa Bay and shorelines of Puget Sound with intact eelgrass beds are important foraging areas for wintering brant. Brant nest in arctic tundra along the northern shores of Canada, Alaska and eastern Russia.

One very small sub-population seen in northern Puget Sound has received special attention. These are known as gray bellied brant or western high arctic brant because of the remote region on the northern Alaskan and Canadian coast where they nest. Reproductively isolated from the larger black brant population for thousands of years, they are a separate genetic stock and among the rarest geese in the world. Although they have not yet received special protection status, they are being watched carefully and may be listed for protection at a future time.

In Puget Sound brant are thought to be highly sensitive to the loss of eelgrass throughout the region, but other factors may be affecting their health as well. A team of U.S and Canadian researchers and the Washington Brant Foundation (WBF) have been working to learn more about the lives of these birds inside and outside the Puget Sound Georgia Straits area. Using leg banding, implanted radio transmitters and genetic testing they are studying interactions between the birds and the habitats they use and untangling the genetic relationships between stocks. WBF is also promoting greater awareness of this bird in Washington where it is forced to share its foraging habitat with a growing human population. They point out that this small timid goose is still largely unknown to Puget Sound residents yet the shoreline and wetland habitats it depends upon are the very places we humans prefer to build upon or use for our own recreational activities. WBF maintains a web site <http://www.washingtonbrant.org> where visitors can access a highly visual presentation on brant biology and some research programs of the multi-agency team working on this species.



Black Brant
Photo by David Green

What Can We Do To Keep Marine Bird Species Healthy?

As the human population in the greater Puget Sound region continues to grow and as people use more and more of its waters and shorelines for human activities, our interactions with marine birds are bound to increase. Are there things we can do to reduce our impact on these species that are already facing so many challenges?

- 
- Three Curlew birds are standing on a dark, rocky outcrop. They have long, downward-curved bills and mottled brown plumage. The background shows a calm body of water under a clear sky.

Understanding and finding ways to reverse the falling populations in marine birds is a challenging problem. It will not be solved by scientists and natural resource agencies working alone. Like the underlying challenge of restoring the health of the Puget Sound ecosystem, it will take the commitment of all of us: teachers, students, business leaders, boaters, property owners and beach walkers, everyone who cares about the exquisite environment we live in and the wild species who share it with us.



PORT TOWNSEND
MARINE SCIENCE
CENTER



Sea Grant
Washington

References

References Cited:

Bower, J., B. Cary, C. Cowles, H. Donovan, K. Dixey, J. Hobart-Crane, D. Poe, S. Preecs, S. Sanborn, M. Staub, M. VanderVen. 2005. Proceedings of the 2005 Puget Sound/Straits Georgia Basin Research Conference.

Nysewander, D., J. Evenson, B. Murphie, and T. Cyra. 2005. Report of Marine Bird and Mammal Component, Puget Sound Ambient Monitoring Program, for July 1992 to December 1999 Period, final revision of 2001 manuscript. For WDFW and PSAT. WDFW Wildlife Management Program, Olympia, WA.

Wahl, Terry. R., S.M. Speich, D.A. Manuwal, C.V. Hinch, C. Miller. 1981. Marine Bird Populations of the Strait of Juan de Fuca, Strait of Georgia, and Adjacent Waters in 1978 and 1979. Environmental Protection Agency, Washington, D.C.

References used but not cited:

Anderson, Eric. M., J. R. Lovvorn, D. Esler, D. R. Nysewander. 2005. The Value of herring spawning events to spring conditioning of scoters in the Puget Sound/Straits Georgia Basin. Proceedings of the 2005 Puget Sound/Straits Georgia Basin Research Conference.

Bower, John. 2003. Assessing Southern Strait of Georgia Marine Bird Population Changes Since 1980: What We Know and What We Need to Know. Proceedings of the 2003 Georgia Basin/Puget Sound/Straits Research Conference.

Evanson, J., D. Nysewander, T. Cyra, and B. Murphy. 1995. Distribution and Characteristics of Nocturnal Resting Areas of Surf Scoter (*Melanitta perspicillata*), White-Winged Scoter (*M. fusca*), and other Seabird Species in Puget Sound. Proceedings of the 2005 Puget Sound/Straits Georgia Basin Research Conference.

Gaydos, Joe. Summary Meeting Notes: 2005 Puget Sound Seabird and Seaduck Research meeting, Marysville Washington. Sea Doc Society, Orcas Island, WA, 2005.

Washington Sea Grant Program. 2004. Watching and Waiting: Sea Grant-funded study tracks changes in western Washington's marine birds. Sea Star: Summer 2004. University of Washington. p. 1-3.