# Shifting Sands

By Glenda C. Booth Photos by Lynda Richardson

were standing on a broad, flat Cedar Island beach littered with shell bits, an ever-shifting wind-blown strip of sand in Virginia's chain of barrier islands, as waves lapped and a gentle breeze tossed about tangles of seaweed. We zeroed in on a little, white, fluffy cotton "ball" skittering across the sand—a piping plover chick about six days old that had scampered from its nest, which was a barely visible scrape in the sand. On sparsely vegetated beaches like this, fledglings scamper across the dry sand to the surf zone to feed. The only structure in sight is a former Coast Guard Station.

"I'm so lucky to work here," says Coastal Terrestrial Biologist Ruth Boettcher, with the Department (DGIF). "It's really special. It's more unusual to see people than not."

Out on this island, where the relentless beat of the ocean provides a constant soundtrack, the sand is an intermingling of brown, tan, and gray hues, punctuated by black streaks. Bleached shells and shell fragments dot the landscape. Spartina grasses sway at the water's edge along the mudflats. Overhead, least and common terns dive; laughing gulls squawk; oystercatchers

squeak; and arriving willets out-squawk them all. Virginia's pristine barrier islands have some of the most unique habitat on the Atlantic coast. It is "nature untamed," wrote local author Kirk Mariner.

Over 100,000 shorebirds move through the islands each spring. Much of Boettcher's work is focused on three species: the American oystercatcher (Haematopus palliatus), the state- and federally-threatened piping plover (Charadrius melodus), and the state-endangered Wilson's plover (Charadrius wilsonia). Every summer for 16 years she has documented the size of the three breeding shorebird populations, their reproductive success, and their distribution in Virginia, in collaboration with biologists from the Virginia Coast Avian Partnership, the Nature Conservancy's Virginia Coast Reserve, and the Chincoteague and Eastern Shore National Wildlife Refuges. This string of beaches, intertidal sand and mudflats, maritime shrub thickets and forest, and salt marshes create an ideal "outdoor laboratory" for her work because human disturbances are minimal.

Virginia's Wildlife Action Plan designates these three species in "greatest conservation need." The plan considers birds to be in conservation need if, for example, their populations are declining or are at low levels, they face threats, or they occur in a very limited range.

# American Oystercatcher

With its bright orange-red, blade-like bill, the boldly patterned black and white oystercatcher probes the shoreline and marshes for bivalves (hence the bird's name). During courtship, the male and female bow to each other and "there's lots of squawking," chuckles Boettcher. For a nest, they scrape out a shallow, plate-sized depression in the sand amid shell deposits.

Boettcher works with the American Oystercatcher Working Group to help preserve these birds and their habitats across the Atlantic and Gulf coasts. Half of Virginia's oystercatcher population breeds on the barrier islands. On the islands, in 2000 there were 267 pairs; in 2015, 462 pairs, a 73 percent increase.

In terms of breeding success, "American oystercatchers typically have relatively high productivity rates on the islands, enough to maintain a stable or increasing population," observes Alexandra Wilke, a Nature Conservancy scientist. She cautions that reproductive rates are highly variable, though. One intense storm can wipe out nests and many young birds.

# **Piping Plover**

Piping plovers are pale brown and white shorebirds, six to seven inches long, with yellow-orange legs and an orange and black bill. Breeding males have a pronounced black collar, breast band, and forehead marking. Breeding females often have a less noticeable collar and forehead mark. Gender can be difficult to determine. In Virginia, these plovers inhabit wide open beaches and sand or washover flats, make shallow, saucer-type nests above the high tide line, and "decorate" them with shell bits. Currently, these birds breed only on barrier islands.

During courtship, piping plovers fly in Figure 8 patterns and make whistle-like peeps. The male "goose steps" around the nest scrape. Chicks leave the nest within four to six hours. Many Atlantic coast breeding piping plovers winter in the Bahamas.

There are currently fewer than 2,000 breeding pairs in the U.S. and Canada.





Previous page: Appearing idyllic, strong winds, shifting sands, and higher ocean levels can easily destroy important barrier island nesting habitat. Above: Ruth Boettcher continues to scan for plovers, recording her findings. Right: A well-camouflaged piping plover nest scraped into a washover flat will hopefully be safe from rising waters, predators, and careless visitors.

Boettcher is part of a multi-state consortium studying this "well covered shorebird," she says. Piping plover breeding pairs 104 in 1986 to 291 in 2016, an encouryears the birds have had young at a rate that can maintain a stable population in the Atlantic coast area between Delaware and North Carolina, she maintains.

# Wilson's Plover

white underparts, with one dark band on the chest and a heavy, bullet-shaped bill. This shorebird also makes slight depressions **Exceptions?** in the dry sand, including decoy scrapes to confuse predators. They forage for invertebrates in the mudflats and marshes.

than the piping," Boettcher explains. "They are very people shy and they're the smart journal, Nature, on January 4, 2017. The International Biosphere Reserve. ones. They can see you coming. The one 2016 State of the Birds report indicates not incubating will lead you astray." And, she adds, "We never see the courtship."

Virginia is the northern extreme of the experienced the greatest declines. Wilson's plovers' breeding range. The birds are known to winter in low numbers in the are especially challenged because often southern Atlantic and Gulf coasts and in these birds are squeezed into a narrow

greater numbers in the Caribbean, coastal Mexico, and Central and South America.

Boettcher confirmed 23 breeding pairs increased on Virginia's barrier islands from in the state in 1988, 50 in 1991, and 40 in 2016. On the barrier islands, the numbers aging trend. While breeding success has are somewhat stable but do not meet the fluctuated over the last 26 years, in most state's recovery goal of 60 pairs sustained for five consecutive years. "It remains unknown whether their breeding success is sufficient to support a stable or increasing population," she notes.

Boettcher will start marking unfledged young with bands to learn if birds Wilson's plovers have a brown back and originating in Virginia return to breed in the state.

Many North American shorebird species are not faring well. "Shorebird populations have shrunk, on average, by an estimated "Wilson's plovers are more cryptic 70 percent across North America since 1973...," wrote Margaret Munro in the that long-distance migrants, many traveling thousands of miles each year, have ATVs, and bird closure areas."

The health and survival of shorebirds

stretch of coastal habitat, much of it heavily developed. Many shorebird species like the ones Boettcher and her colleagues study require very specialized habitats, areas near salt water or on beaches. An oystercatcher will not nest on a mountain top. A plover will not build a nest in a tree. "Without the barrier island habitats, they could perish," explains Wilke.

The shorebirds nesting in Virginia seem to be bucking the trend of other states' breeding populations. Why? Virginia's barrier islands are probably the most protected islands along the U.S. East Coast, a network of refuges and preserves managed by the Nature Conservancy, the state Department of Conservation and Recreation, and the U.S. Fish and Wildlife Service. The island chain is the longest stretch of undeveloped barrier islands in the global temperate zone, so valuable and sensitive that the United Nations designated it an

"The key is protection," stresses Boettcher, "...no camping, no dogs, no

"We attribute the vitality of Virginia's piping plover population to the combined effects of predator management, public education and outreach, and the unique



An adult Wilson's plover tries to lead a photographer away from its chicks foraging nearby. Chicks are precocial and feed themselves but need to learn the best foraging locations from their parents.



Sometimes confused with the Wilson's plover, this adult piping plover remains alert when leading its chicks to food sources. Right: Perfect nesting habitat makes barrier islands a critical resource.



"One of the major impending threats facing piping plovers and other beach-nesting species is the increase in the frequency of beach flooding..." – Ruth Boettcher

conservation status of the barrier islands that affords plovers a level of protection not found elsewhere within the Atlantic coast breeding range," she wrote in a 2007 paper.

# Challenges

While there might be occasional predators like raccoons and foxes or disturbances from unwitting human visitors, these are manageable threats. But a bigger threat looms: climate change and, with it, sea level rise. The past century has seen an eight-inch rise in global average sea level, reports the National Wildlife Federation. Global sea level could increase another one to four feet by the end of this century, according to the 2014 U.S. National Climate Assessment.

Coastal Virginia is experiencing the second highest rate of sea level rise in the country, after Louisiana. Since barrier islands are dynamic systems, some sea level rise does not adversely affect them, but given the higher rates of sea level rise today and the lack of sand "input," like that from a tidal river, these barrier islands tend to become thin and can overwash or migrate landward during storms. The Virginia barrier islands are migrating and eroding at one of the fastest rates on the East Coast.

"Too much or too fast sea level rise can destabilize the islands," explains Christopher Hein, Assistant Professor in the Department of Physical Sciences at the Virginia Institute of Marine Science. In addition, sea level rise creates conditions that enable storms to cause more drastic change than they would otherwise. Some of Virginia's barrier islands are getting thinner; some are migrating inland.

"Along the Virginia barrier islands, the long-term trend is clearly net erosion on the non-migrating islands," concludes Hein.

Boettcher sees changes such as more washovers and dune loss after storms. With a warming climate, storms will become more frequent, more intense, and more damaging, researchers predict. Severe storms and high tides can flood beaches and nests. Higher sea levels convert beaches to open water. Rising temperatures can affect the timing and availability of food and the timing of migration.

Take the piping plover. Over 80 percent of Virginia's piping plover breeding activity occurs on five Virginia barrier islands. "One of the major impending threats facing piping plovers and other beach-nesting species is an increase in the frequency of beach flooding as a result of global climate change and sea level rise, which may lead to chronic reproductive failure and eventual loss of breeding habitat," Boettcher wrote, adding that rising seas could also affect coastal stopover sites and wintering areas and put invertebrate food supplies at risk. For beach-dependent birds that rely upon a narrow swath of habitat, subtle changes can have dramatic impacts. If suitable habitat shrinks, birds may occupy sub-optimal habitats or abandon nesting areas altogether. Birds forced into crowding can be more susceptible to avian and ground predators.

"Habitat is the single greatest challenge for these birds and our other species of greatest conservation need," explains Chris Burkett, who coordinates Virginia's Wildlife Action Plan for the DGIF.

"Fortunately, there are many things we can do to conserve and manage habitats and give these species the best chance to survive in our rapidly changing world."

Can these shorebirds adapt? "If species are unable to adapt to the new conditions or relocate to suitable habitats elsewhere, extirpations and extinctions will likely occur," DGIF warned in its Wildlife Action Plan.

As the birds' breeding, wintering, and stopover areas are altered, will suitable new sites be created in sufficient time to replace those lost? This is the big question keeping Boettcher and her colleagues awake at night. **\*** 

Glenda C. Booth, a freelance writer, grew up in Southwest Virginia and has lived in Northern Virginia over 30 years, where she is active in conservation efforts.

## RESOURCES

- State of North America's Birds 2016: www.stateofthebirds.org/2016
- Changing Tides, How Sea-Level Rise Harms Wildlife and Recreation Economies along the U.S. Eastern Seaboard, National Wildlife Federation: http://www.nwf.org/News-and-magazines/media-center/reports/archive/2016/08-16-16-Changing-Tides.aspx
- Vulnerability of Shallow Tidal Water Habitats in Virginia to Climate Change, Virginia Institute of Marine Science: www.ccrm.vims.edu/research/climate\_change/COASTALHABITATS\_FinalReport.pdf
- Virginia's Wildlife Action Plan: http://bewildvirginia.org/wildlife-action-plan
- The Nature Conservancy's Virginia Coast Reserve: www.nature.org/vcr
- Atlantic Coast Joint Venture: www.acjv.org