



Working with Waterbirds

THE CENTER FOR CONSERVATION BIOLOGY

2013 Annual Report • William & Mary • Virginia Commonwealth University

CCB's

ongoing mission

The mission of The Center for Conservation Biology, through all of its diverse programs, is to provide the global community with the information needed to drive thoughtful, science-based conservation, to educate and train the next generation of conservation scientists, and to make lasting contributions to the natural world through critical thinking, innovation, and ground-breaking research.

The Center for Conservation Biology is a research unit shared by the College of William and Mary and Virginia Commonwealth University. The Center is a part of the VCU Inger and Walter Rice Center for Environmental Life Sciences. Rice Center scientists conduct cutting-edge environmental research on the James River and around the world.



Front Cover: Due to their wide distribution and dependence on aquatic prey, green herons are good indicators of water quality. Photo by Bryan Watts

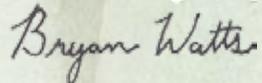
Water is critical to life and prosperity. Loss of water leads to famine, poverty, disease and extinction. But more than just a life-sustaining resource, water ties together all aspects of our existence. From the politics of scarcity, to the sculpting of grand valleys, to the evolution of whale songs, water shapes and reshapes our world.

The Center for Conservation Biology works with all birds but has sustained focused work with waterbird populations since the early 1970s. Waterbirds are those species such as seabirds, shorebirds, herons, and ducks that depend entirely on water resources for some portion of their annual cycle. Because many are top aquatic consumers, their populations integrate entire ecosystems, making them exceptional indicators of water quality.

Rather than including a cross section of our broader research programs, I have dedicated this annual report to our work during the year with waterbirds. If we remain committed to the health of these magnificent birds we will protect the ecosystems that sustain them.

Throughout this year we have continued to dedicate our craft to the betterment of the natural world and our society. We invite you to join the effort. Contribute to our efforts to help birds and the environment we share.

Sincerely,



Bryan D. Watts

Mitchell A. Byrd Professor of Conservation Biology
Director, Center for Conservation Biology



a message from the **Director**

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Gulls are important consumers and scavengers within coastal regions of the world.
Photo by Bryan Watts



*American oystercatcher chick molting its down. The dependence of this species on coastal beaches makes it vulnerable to human development.
Photo by Alex Wilke*

The fruits that result from conservation efforts often require decades to mature. The Center has been committed to working with several dozen species of waterbirds for more than 50 years. Our efforts have shaped not only what we know about these species but also our approaches to managing them. Work has focused on the recovery of some species but also in the use of waterbird populations as ecological indicators of aquatic health.

Legacy Projects

A close-up photograph of a yellow-crowned night heron in a marsh. The bird is shown in profile, facing left, with its long, dark beak pointed towards the bottom left. It has a distinctive white forehead and crown, with a black stripe running through its eye. The background is a dense field of tall, green grasses, some of which are in the foreground, partially obscuring the bird. The lighting is natural, suggesting a bright day.

The yellow-crowned night heron feeds almost exclusively on crabs that it stalks through the marsh. The Center has worked extensively with this species since the 1980s. Photo by Bryan Watts

**Seabird Monitoring
Bald Eagle Monitoring
Black Rail Conservation
Osprey Monitoring
Wader Monitoring
Migratory Shorebirds
American Oystercatcher**

Seabird Monitoring



Breeding colony of brown pelicans on Smith Island, Va. Once listed as federally threatened, this species has made a dramatic recovery and has expanded its range north along the Atlantic Coast.

Photo by Bryan Watts

THE PROBLEM

The vast oceans covering most of the planet's surface, and containing almost all of the available water, represent our most significant life support system. Once considered limitless, this system is increasingly under siege by a broad array of insults including over fishing, climate change, and a wide range of harmful inputs. Some of the best sentinels for ocean and coastal health are the top consumers such as marine mammals, predatory fish and seabirds that depend on full-system output.

On a global scale, seabirds are particularly well suited as oceanic sentinels because many are top consumers that move over large areas during their annual cycle and are relatively easy to monitor. However, monitoring at such a large scale requires coordination between many organizations and geographic areas. Coastal Virginia supports more than 50,000 breeding pairs of 13 seabird species. The Center has led a multi-agency group to monitor these populations on an approximately decade interval since the 1970s.

PRAGMATIC OBJECTIVES

The goals of seabird monitoring are to assess the status of species of conservation concern and to use the seabird community as a barometer of ocean and coastal health.

PROGRESS IN 2013

During the 2013 breeding season the Center led a multi-agency assessment of breeding seabirds throughout coastal Virginia. The effort focused on breeding status and distribution and is part of a much broader initiative throughout the region.



Least terns nest on open beaches and their populations have been declining for 40 years. Photo by Bart Paxton



Adult great black-backed gull. This widespread species has expanded its breeding range along the Atlantic Coast and is now one of the fastest growing populations within the mid-Atlantic. Photo by Bryan Watts



Laughing gulls migrate between Central America and northern breeding grounds. This species has suffered the loss of numerous breeding sites in recent decades due to sea-level rise. Photo by Bart Paxton



Bald Eagle Monitoring

*Adult bald eagle. Over the span of several decades, bald eagles
have proven to be good indicators of water quality.*

Photo by John DiGiorgio

THE PROBLEM

Well beyond their legal status and symbolic representation, bald eagles are top consumers within aquatic ecosystems. Work by the Center has demonstrated that during the breeding season eagles within the mid-Atlantic depend virtually entirely on aquatic prey including fish, muskrat, aquatic turtles and water birds. Dietary requirements make them one of the most sensitive indicators of aquatic health available within many geographic areas.

The bald eagle population within the Chesapeake Bay has proven to be an effective indicator of system-level conditions such as contaminants, fish stocks, and climate change. The bald eagle population has been monitored for more than 50 years and has become a standard for assessing system integrity and recovery. Maintaining the monitoring program is a priority not just for use in the regulatory process but also as a tool for assessing ecosystem health.

PRAGMATIC OBJECTIVES

The goals of the bald eagle monitoring program are to sustain the long-term conservation of the species, to provide information to regulatory agencies and the public to enable responsible land-use decisions, and to provide a metric of aquatic health.

PROGRESS IN 2013

During the 2013 breeding season, the Center conducted the 57th survey of the Virginia bald eagle breeding population. Consistent with our objective to provide information to the public, survey results have been made available within our online mapping portal.



Adult bald eagle basking in the morning sun on a nest along the James River. The breeding population on this historic river reached a milestone of 205 pairs in 2013. Photo by Bryan Watts



Bald eagle chick with fish in a Chesapeake Bay nest. More than 95% of the prey used to raise young eagles comes from the water. Photo by Bryan Watts

Black Rail Conservation



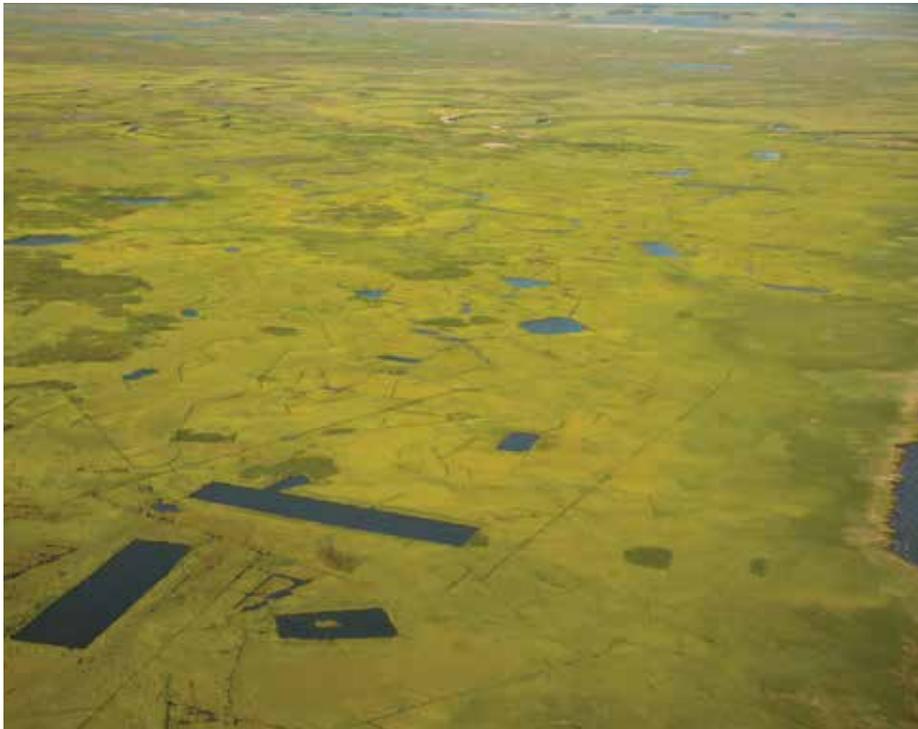
The high marsh, characterized by salt meadow hay and salt grass, is the primary breeding habitat of the black rail. This habitat is increasingly threatened by sea-level rise. Photo by Bryan Watts

Black rails are rarely seen due to their secretive habits and very little is known about their ecology. Photo by David Seibel

THE PROBLEM

The black rail may be the most endangered bird species along the Atlantic and Gulf Coasts. Black rail populations have been declining in eastern North America for over a century resulting in a contraction of the breeding range, a reduction in the number of breeding sites within the core of the range, and a loss or decline of strongholds. Over the past two decades, declines within some geographic areas are believed to exceed 80%. Black rail breeding populations will not persist in many areas without timely management action.

There have been no systematic, range-wide treatments of black rails such that their current status and distribution is poorly known. The species breeds in high-marsh habitats often in remote locations and they are exceptionally secretive breeders. There is an urgent need for a population assessment, an investigation of breeding and winter ecology, and a determination of factors contributing to declines.



Throughout vast areas of the Atlantic Coast, tidal marshes have been ditched and modified for mosquito control. This practice alters the hydrology of the marsh and may be contributing to black rail declines. Photo by Bart Paxton

PRAGMATIC OBJECTIVES

The ultimate objective of work with black rails is to stabilize and recover the population. Immediate goals are to conduct a range-wide assessment of status and distribution and to begin the process of defining limiting factors.

PROGRESS IN 2013

In 2013 the Center began to lay the groundwork for the development of a conservation plan for black rails. Two regional meetings were held including one in Delaware for biologists in the Northeast and one in Savannah, Ga. for biologists from the south Atlantic and Gulf states. The focus of these meetings was to assemble available status information and to receive input from biologists throughout the eastern range.



Sea-level rise is extending the tide into forestlands and killing trees. Where the slope allows, marshes will expand into this void. Understanding marsh migration is key to projecting the impact of sea-level rise on high-marsh species like black rails. Photo by Bart Paxton

Osprey Monitoring



Due to their global distribution and complete dependence on fish, osprey are an ideal ecological indicator of aquatic systems. Photo by Bryan Watts



Osprey chick on the James River in Virginia. The James is a long-term study area where the Center for Conservation Biology monitors nesting success annually.

Photo by Bryan Watts

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THE PROBLEM

Like many osprey populations throughout the world, the Chesapeake Bay population experienced dramatic declines in the post-World War II era. The population fell to a low of 1,400 pairs in the early 1970s but has since recovered to an estimated 8,000 to 10,000 pairs and is by far the largest breeding population in the world. Due to its wide distribution and complete dependence on fish, the osprey is both an indicator of aquatic health and a recognizable symbol of the Chesapeake Bay.

The Center for Conservation Biology has worked with osprey within the Chesapeake Bay since the early 1970s. We continue to be advocates for populations throughout the world and for their use as environmental sentinels within aquatic ecosystems.

PRAGMATIC OBJECTIVES

Our continuing objectives in working with osprey are 1) to learn more about the ecology of the Chesapeake Bay osprey population, 2) to use osprey to educate the public about current conservation issues, and 3) to use osprey to engage and connect the public from around the world to record breeding information on a large enough spatial scale to be useful in monitoring aquatic health.

PROGRESS IN 2013

During the breeding season of 2013 the Center continued fieldwork with osprey within long-term Chesapeake Bay study areas, deployed satellite transmitters on adult males to investigate migration patterns and wintering locations for Chesapeake osprey, and managed OspreyWatch, a global network of citizen scientists recording observations of breeding osprey.



Applying a band to an adult osprey. Center biologists have been banding osprey since the early 1970s. Marking individuals allows for the investigation of movement and demography. Photo by Bryan Watts

Wader Monitoring

THE PROBLEM

Long-legged waders including herons, egrets, and ibises are a diverse group of birds that feed in wetlands and shallow, near-shore waters. They share a requirement for nesting areas isolated from ground predators and most are sensitive to human disturbance. Because they feed on fish and aquatic invertebrates they are also sensitive indicators of contaminants, particularly in streams and estuaries.

Many wader species have experienced dramatic population changes in recent decades. Some species are recovering from deep lows while others are suffering steep declines. Systematic population assessments along the Atlantic Coast were initiated in the 1970s and periodic updates are conducted approximately every decade. Because waders nest in relatively few colonies and are sensitive to humans they are used routinely in land-use decisions.

PRAGMATIC OBJECTIVES

Our objectives in monitoring waders are 1) to evaluate the status and distribution of species of conservation concern, 2) to use waders as biological indicators of ecosystem health, and 3) to provide distribution information to the regulatory community to be used in land-use decisions.

PROGRESS IN 2013

During the 2013 breeding season the Center led a systematic survey of wader breeding colonies within the mid-Atlantic. The survey included 10 species and more than 500 colonies. Consistent with our objective to provide information to the public, survey results have been made available within our online mapping portal.



The snowy egret forages almost exclusively on small fish that are captured in shallow water. The breeding population in Virginia has declined dramatically since the 1970s.
Photo by Cindy Baker



Above: Great egret chicks in nest. Great egrets often nest in large colonies where adults may fly several miles to obtain fish for their broods. Photo by Bart Paxton



Unlike most herons, the green heron nests singly or in small loose colonies. Nests are inconspicuous and broods often go unnoticed in shrubs and small trees. Photo by Bryan Watts



Yellow crowned night heron chicks begin to venture onto limbs surrounding nests around 5 weeks of age but return immediately when it is feeding time. Photo by Bryan Watts

Migratory Shorebirds

THE PROBLEM

Shorebirds are one of the most migratory groups of animals known to science and are declining on a global scale. Many populations that breed in the high arctic and migrate long distances to wintering grounds are experiencing significant annual rates of decline. The underlying causes of these declines are poorly understood. However, due to the extreme movement habits of these species, successful conservation will require the informed collaboration of many countries and cultures.

Shorebird declines are not isolated events but are symptomatic of system-level insults that impact entire natural communities. Because these species range throughout the hemisphere during their annual cycles, conservation will require locating and confronting factors wherever they occur. To meet this challenge, the Center is working on several fronts throughout the hemisphere.

PRAGMATIC OBJECTIVES

The ultimate goal of work with shorebirds is to reverse declines and restore populations to historic levels. An intermediate objective is to identify locations throughout the hemisphere that are critical to these populations. Assessment of risk factors that may be contributing to declines requires an isolation of critical areas. Monitoring programs must continue to be the eyes of conservation.

PROGRESS IN 2013

During 2013, the Center conducted satellite tracking of whimbrel and Hudsonian godwits, conducted aerial surveys within the mid-Atlantic during both spring and fall migration, and conducted a band resight project focused on red knots in Georgia. These efforts have greatly accelerated our understanding of critical areas and maintained important monitoring information.

Sanderling foraging along a beach in the Chesapeake Bay. Sanderlings specialize on beaches of the outer coast and appear to be holding their own.

Photo by Bill Portlock

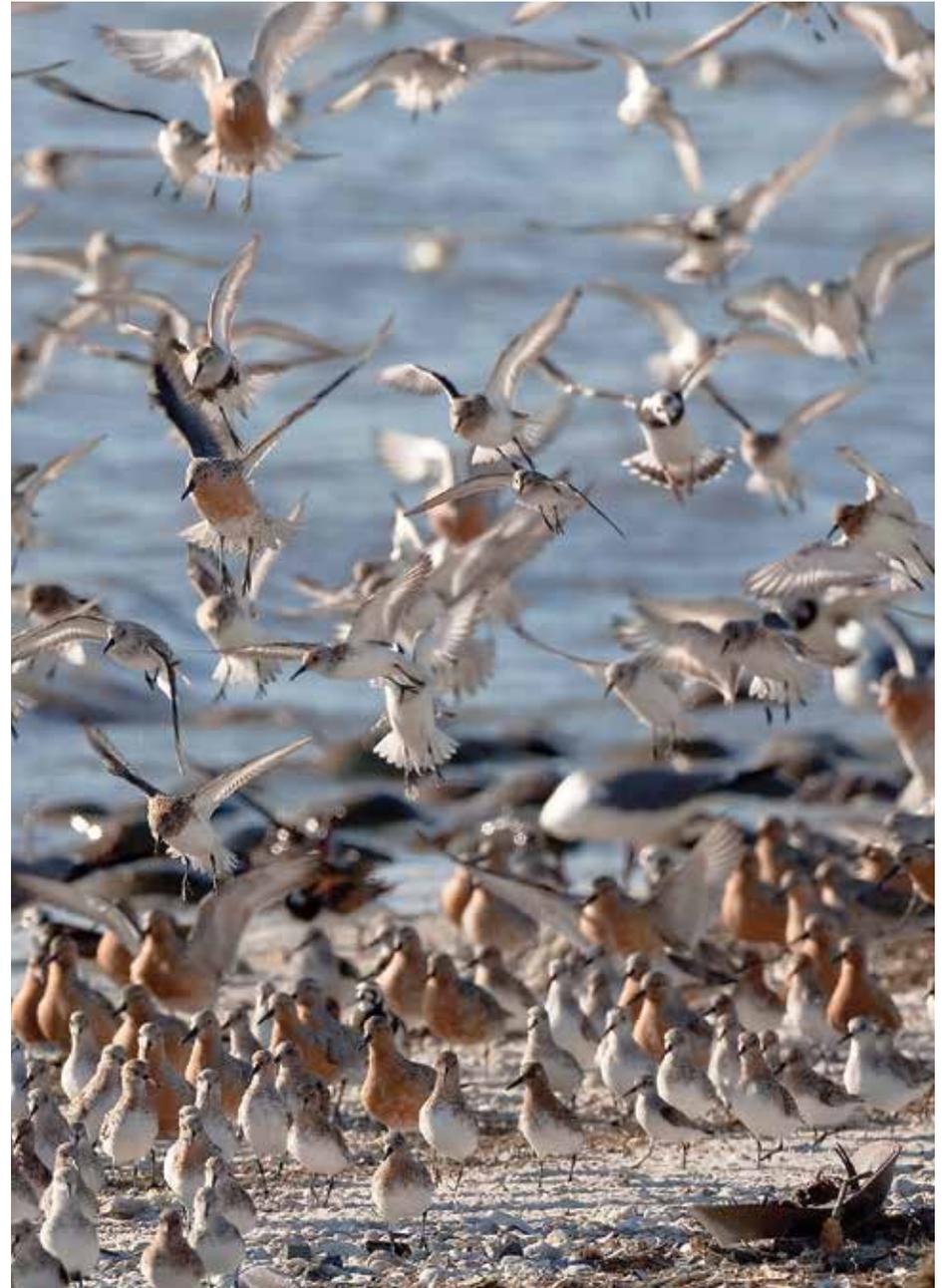




Preparing to release a Hudsonian godwit on the Mackenzie River in the Canadian arctic. In collaboration with the Canadian Wildlife Service, the Center put 5-gram satellite transmitters on three adult godwits. These are the first Hudsonian godwits to be tracked with this technology. Photo by Fletcher Smith



A flock of red knots. During the spring of 2013, the Center conducted a comprehensive project to estimate stopover population along the Georgia coast. Red knots have been proposed for federal listing due to dramatic declines. Photo by Jan van de Kam



Coastal-migrating shorebirds often stage in large numbers within few sites. This pattern implies that relatively few sites have high conservation value and must be a priority for protection. Photo by Jan van de Kam

American Oystercatcher



Left: Watts Island in the Chesapeake Bay. Isolation from ground predators, sandy beaches for nesting and an abundance of bivalves make for ideal oystercatcher habitat. These habitats are threatened by sea-level rise in the Chesapeake Bay. Photo by Bryan Watts

Above: The adult American oystercatcher is brilliantly marked with bright red bills and eyes set on the black head plumage. Birds are spectacular during the breeding season. Photo by Alex Wilke

THE PROBLEM

The eastern population of the American oystercatcher ranges from Nova Scotia south to Mexico but occurs only within a thin ribbon of habitat along the outer coastal fringe. This same habitat is under the most intense pressure for development and recreational activity of any within the Western Hemisphere. Because oystercatchers are sensitive to human disturbance there is a growing focus on how best to protect the population in the face of increasing socio-economic pressure.

Virginia plays a vital role in conservation of the American oystercatcher supporting more than 25% of the entire eastern breeding population and one of the largest aggregations of wintering birds. The Center has played a significant role in population monitoring since the initial assessments in the late 1970s.



American oystercatchers are precocial and soon after hatching move away from the nest scrape. Their down is effectively camouflaged for the beach environment.
Photo by Alex Wilke

PRAGMATIC OBJECTIVES

The overarching objective of work with the American oystercatcher is to stabilize the eastern population. Objectives for monitoring efforts include 1) to assess the size and distribution of the Virginia breeding population, 2) to contribute to range-wide population estimates, and 3) to evaluate the success of ongoing predator management programs.

PROGRESS IN 2013

During the 2013 breeding season the Center contributed to a multi-agency effort to survey and map American oystercatchers in Virginia. The Center's role was to survey the population nesting along the western shore of the Chesapeake Bay.



American oystercatchers nests are simple scrapes in the sand. Eggs are blotched for camouflage. Photo by Alex Wilke

Emerging Issues

A photograph of three shorebirds, likely sandpeeps or similar species, sitting on a nest made of dry, brown grass and twigs. The birds have greyish-brown heads and necks with long, straight bills. The background is a dense field of green grass.

Shorebird Hunting
Menhaden Overharvest
Marshbird Predation

As with most species, the fortunes of waterbirds rise and fall in response to human decisions and activities. Due to their reliance on water and aquatic resources, many waterbirds are frequently caught in the currents of commercial interests. When our activities conflict with the welfare of natural communities, we are ethically compelled to seek balance. The Center for Conservation Biology works to find win-win solutions for waterbirds and to use waterbird populations as ecological indicators of aquatic health.

Left: Brown pelican brood in colony on Smith Island, Va. This species depends on menhaden stocks during the breeding season. Overharvest of stocks impacts many avian consumers.

Photo by Bart Paxton

Right: A tidal marsh in winter along the Rappahannock River. Birds that rely on tidal marshes are confronting increased inundation rates due to sea-level rise, invasive plant species, and increased nest predation by expanding ground predators. Photo by Bryan Watts



Shorebird Hunting

THE PROBLEM

The high latitudes of North America support a diverse assemblage of breeding shorebirds. More than 70% of populations that breed in the eastern Arctic have experienced declines over the past 30 years. The underlying causes of these declines are poorly understood but may include unfavorable conditions within breeding and/or wintering grounds. Because the Western Atlantic Flyway is the primary movement corridor connecting breeding and winter areas, hazards along the flyway may be critical factors.

The loss of two whimbrels, which were part of a Center tracking project, on the same day to hunters on Guadeloupe was a watershed event in shorebird conservation. The shooting of these two birds shined a light on the dangers of migration and heightened awareness of shorebird hunting throughout the conservation community. Follow-up investigations have revealed that as many as 200,000 or more shorebirds may be taken annually within the flyway. Hunting pressure alone may account for observed declines for some eastern populations.



Above: Port Louis hunting swamp in Guadeloupe. Mangrove trees are pruned to allow for a clear shooting field. Shorebirds that encounter severe storms are forced to stop on the island. The small amount of shorebird habitat available is heavily hunted. Photo by Fletcher Smith

Right: A bag of shorebirds from a morning hunt on Guadeloupe. Hunting take often includes yellowlegs, buff-breasted sandpipers, American golden plovers, pectoral sandpipers, and whimbrels. Photo by Anthony Levesque

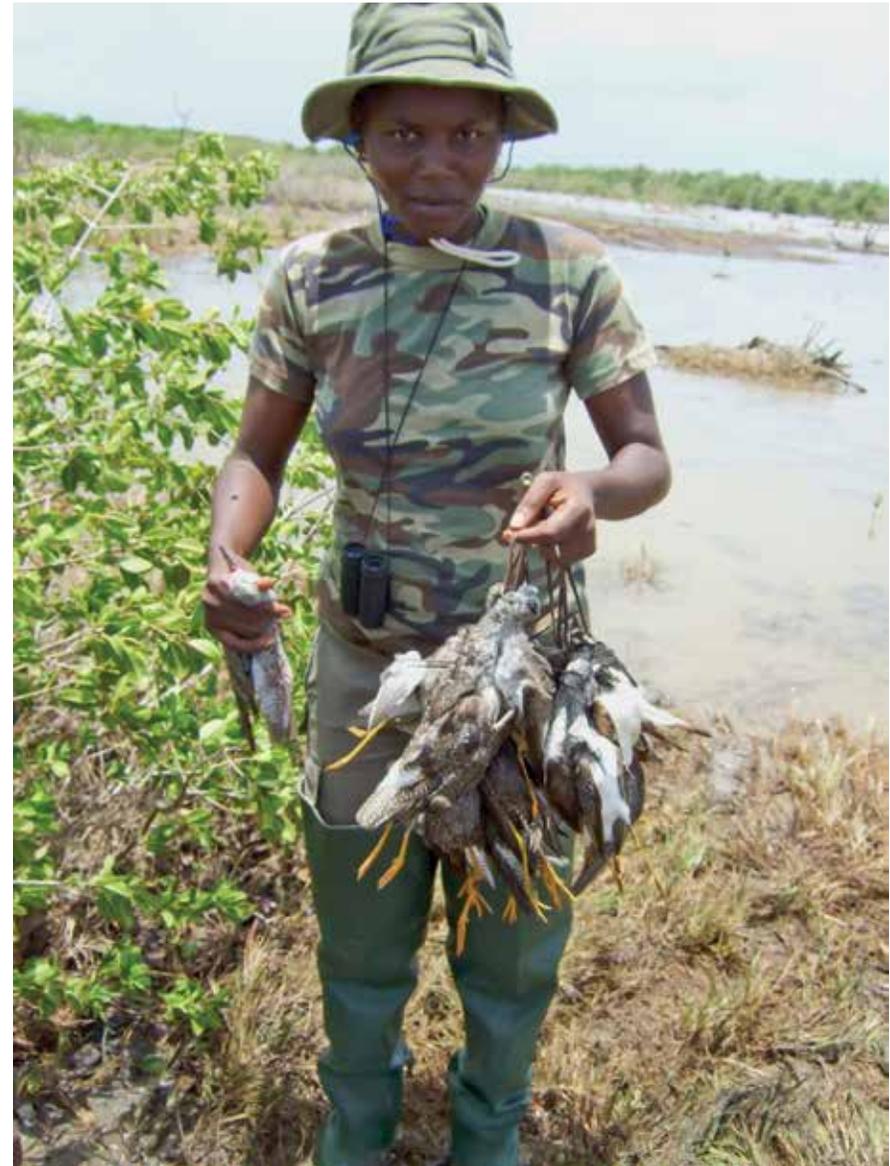


PRAGMATIC OBJECTIVES

The ultimate goal of work with shorebirds is to reverse declines and restore populations to historic levels. With respect to hunting, our goal is to insure that take is below sustainable harvest limits for all species. Work will include establishing sustainable harvest limits, assessing current harvest levels, reviewing hunting policy, and law enforcement.

PROGRESS IN 2013

Shortly after the whimbrels were shot, the Center helped to form an international working group to begin assessing the potential impact of hunting on shorebirds using the Atlantic Flyway. In 2013, the Center entered into a partnership with the U.S. Fish and Wildlife Service to take the lead on estimating sustainable harvest limits for shorebird populations using the Flyway.



Left: Satellite transmitter worn by Goshen the whimbrel that was recovered in shooting swamp on Guadeloupe. Goshen and other whimbrel tracked by the Center have unraveled the mysteries of migration ecology in this species and highlighted some of the dangers such as hunting. Photo by Fletcher Smith

Above: A shorebird hunter retrieves kills from a swamp on Guadeloupe. Shorebird hunting is legal on Guadeloupe but harvest rates are currently unknown. Investigations are just beginning that are intended to evaluate if harvest levels are within sustainable limits. Photo by Anthony Levesque

Menhaden Overharvest

THE PROBLEM

Over the past century, many of the world's great fisheries have been depleted or are experiencing harvest pressures that are beyond sustainable limits. Fish account for 20% of the protein consumed by people around the world and the fishing industry is an important source of employment. However, the growing global demand for wild-caught fish is altering the balance of aquatic ecosystems.

Atlantic menhaden are the focus of the largest fishery on the Atlantic coast and 75% of this fishery is concentrated on stocks from the Chesapeake Bay. The fish are rendered for their energy-rich oil and, from an ecological perspective, have been overharvested for decades. Menhaden are critical prey for many waterbird species such as bald eagles, osprey, great blue herons and brown pelicans.



Menhaden on brown pelican nest in the Chesapeake Bay. Menhaden are a keystone prey species for many waterbirds along the Atlantic Coast. Overharvest threatens this critical resource and the species that depend on it. Photo by Bryan Watts

PRAGMATIC OBJECTIVES

In order to achieve any reasonable ecological balance, non-human consumers must be considered in fisheries management. Our objective is to insure that harvest limits are set not just based on the intrinsic capacity of stocks to sustain take levels but also on the requirements of the broader consumer community. An immediate objective is to collect and provide waterbird population data that may be considered in policy decisions.

PROGRESS IN 2013

During the 2013 breeding season, the Center conducted surveys of more than 25 species of waterbirds including bald eagles, osprey, herons, and seabirds as part of a long-term monitoring program. Because their reproduction is tied directly to fish stocks, these populations represent ideal models for monitoring fisheries health.



Adult double-crested cormorant. Cormorants expanded their breeding range into the mid-Atlantic region in the late 1970s and have continued to increase since that time. They depend on menhaden during the breeding season. Photo by Bryan Watts



Many coastal bird species depend on menhaden stocks. Menhaden are a common prey species for bald eagles nesting along the main stem of the Chesapeake Bay.
Photo by Barbara Houston

Left: Osprey chick giving defensive display. Menhaden appear to be a critical resource for breeding osprey. The decline of productivity for a portion of the Chesapeake Bay population appears to be related to a shortage of available menhaden.
Photo by Bryan Watts

Marsh Bird Predation



The saltmarsh sparrow reaches its southern limit for breeding in Virginia and is contending with both ground predators and sea-level rise. The species depends on the thin ribbon of salt marsh habitat for its entire life cycle. Photo by Bryan Watts

THE PROBLEM

Salt marshes support some of the most recognizable bird species of the coastal zone and species that breed in the highest portions of the marsh are some of the most threatened in North America. Black rails, Henslow's sparrows, sedge wrens, northern harriers and black ducks are all associated with vegetation in the marsh that is inundated infrequently. Declines in these species are both dramatic and ongoing.

Along the Atlantic Coast, local causes of declines in high-marsh bird species likely include impacts from sea-level rise, habitat degradation caused by invasive common reed, and predation. This community may be particularly vulnerable to mammalian predators because their ground nests are easily accessible and their habitat is in close proximity to upland sources of predators.

PRAGMATIC OBJECTIVES

The ultimate objective of marsh bird conservation is to stabilize and recover imperiled populations. Our immediate objective is to identify the underlying causes of imperilment and develop approaches to manage important causal factors.

PROGRESS IN 2013

During the 2013 breeding season the Center conducted a large-scale field project focused on quantifying rates of predation within the high-marsh bird community. The project used a combination of natural and artificial nests to assess site-specific predation pressure.



Raccoons are extraordinarily successful predators and scavengers. Populations in many areas have expanded dramatically over the past 20 years putting pressure on many nesting birds. In addition to sea-level rise, ground predators are believed to be a significant threat to marsh-nesting species. In 2013, the Center conducted the first investigation of rates of predation for this threatened community. Photo by Bryan Watts



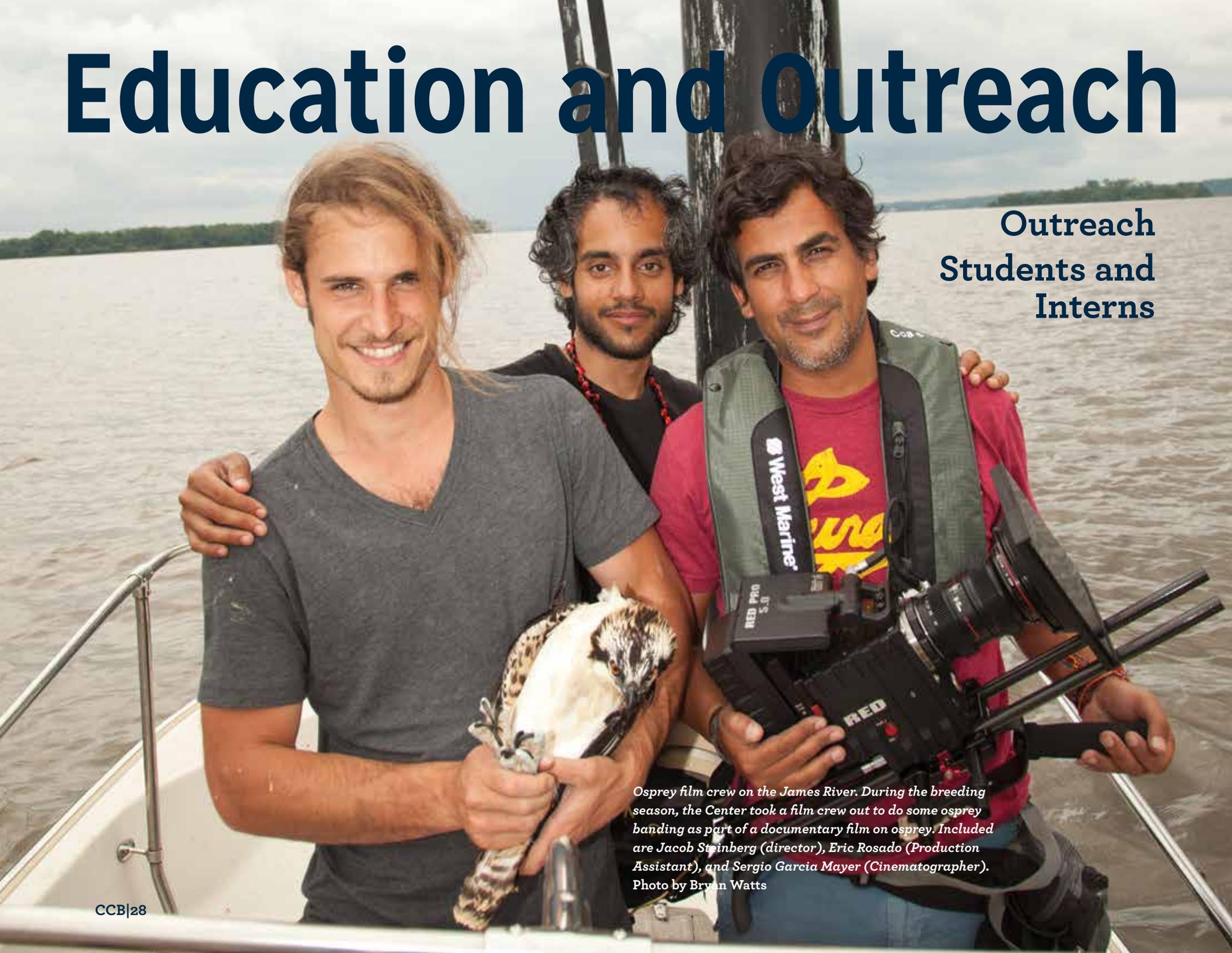
The black duck breeding population in the mid-Atlantic has declined dramatically and is a conservation priority. Pairs nest in the high marsh and are vulnerable to ground predators. Photo by Bryan Watts



Feathers in the marsh from a depredation event. Predators in marshes not only take nests but frequently take breeding adults. Photo by Bryan Watts

Education and Outreach

Outreach
Students and
Interns

A photograph of three men on a boat on a river. The man on the left is smiling and holding a white and brown osprey chick. The man in the middle is looking at the camera. The man on the right is wearing a green life vest and holding a large professional camera. The background shows a wide river and a forested shoreline under a cloudy sky.

Osprey film crew on the James River. During the breeding season, the Center took a film crew out to do some osprey banding as part of a documentary film on osprey. Included are Jacob Steinberg (director), Eric Rosado (Production Assistant), and Sergio Garcia Mayer (Cinematographer). Photo by Bryan Watts

Progress in conservation is short-lived without a strong foundation in education. Education provides the opportunity for understanding and ultimately for the informed decision-making that leads to the wise use of limited resources. Education also provides the training necessary to cultivate the next generation of conservation scientists. The Center for Conservation Biology is dedicated to providing opportunities for students to learn more about current conservation problems and the strategies employed to develop practical solutions.



Graduate student Courtney Turrin with eagle chick. Courtney completed her master's thesis in 2013 focused on interactions between bald eagle breeders and eagle intruders around active nests. Photo by Libby Mojica

THE PROBLEM

The future of species, habitats and entire ecosystems rests with society. For many species the point of decision, or consequential indecision, is close at hand. As conservation biologists, one of our great charges is to spread the word. To convey not only the basic importance of the natural world to our own species but also to illuminate the path forward that will allow us to maintain natural elements.

We value the familiar—those things that we have been told about, seen or experienced. Frequent exposure and familiarity is one key to the social side of conservation. The Center for Conservation Biology has always recognized the overarching significance of public emersion in the conservation process. We have devoted considerable resources and time to making information and findings available to the broader public and to providing expertise where needed.

PRAGMATIC OBJECTIVES

Our broad outreach objective is for the public to be better educated about conservation issues and possible solutions so that our collective society is capable of making prudent decisions about resource use. Our approach is to use all available outlets to communicate timely results and insight to the public.

PROGRESS IN 2013

During 2013 the Center was involved in more than 100 national, regional, and local news stories that were carried by print, radio, internet, and television outlets. Center staff provided expertise on a wide range of topics. Staff also presented dozens of talks to public venues. The Center's e-newsletter was distributed quarterly to more than 6,000 recipients.



National Public Radio correspondent Elizabeth Shogren with graduate student Courtney Turrin out on the James River to do a story on the recovery of bald eagles. The Center participates in media stories on a weekly basis in an attempt to get the conservation message out to the public. Photo by Bryan Watts



Callum Beheler looks for dragonflies along the edge of a tidal fresh marsh. Connecting children to the natural world is a vital element of the conservation mission. Photo by Bryan Watts.

Students and Interns

THE PROBLEM

Just as much as a science, conservation biology is a craft and there is no substitute for practical experience in learning how to effectively solve a complex problem. In addition to the fundamental theories learned through coursework, undergraduate and graduate students need to be shaped by real-world problems and experiences. The process of taking a conservation problem from concept to conclusion requires several stages and many decisions. Consistency in producing meaningful results requires an understanding of several interrelated disciplines.

Since the establishment of the Center, staff members have involved hundreds of students, technicians, and interns in primary research designed to solve real

conservation problems. These students have played an integral role in the success of many projects.

PRAGMATIC OBJECTIVES

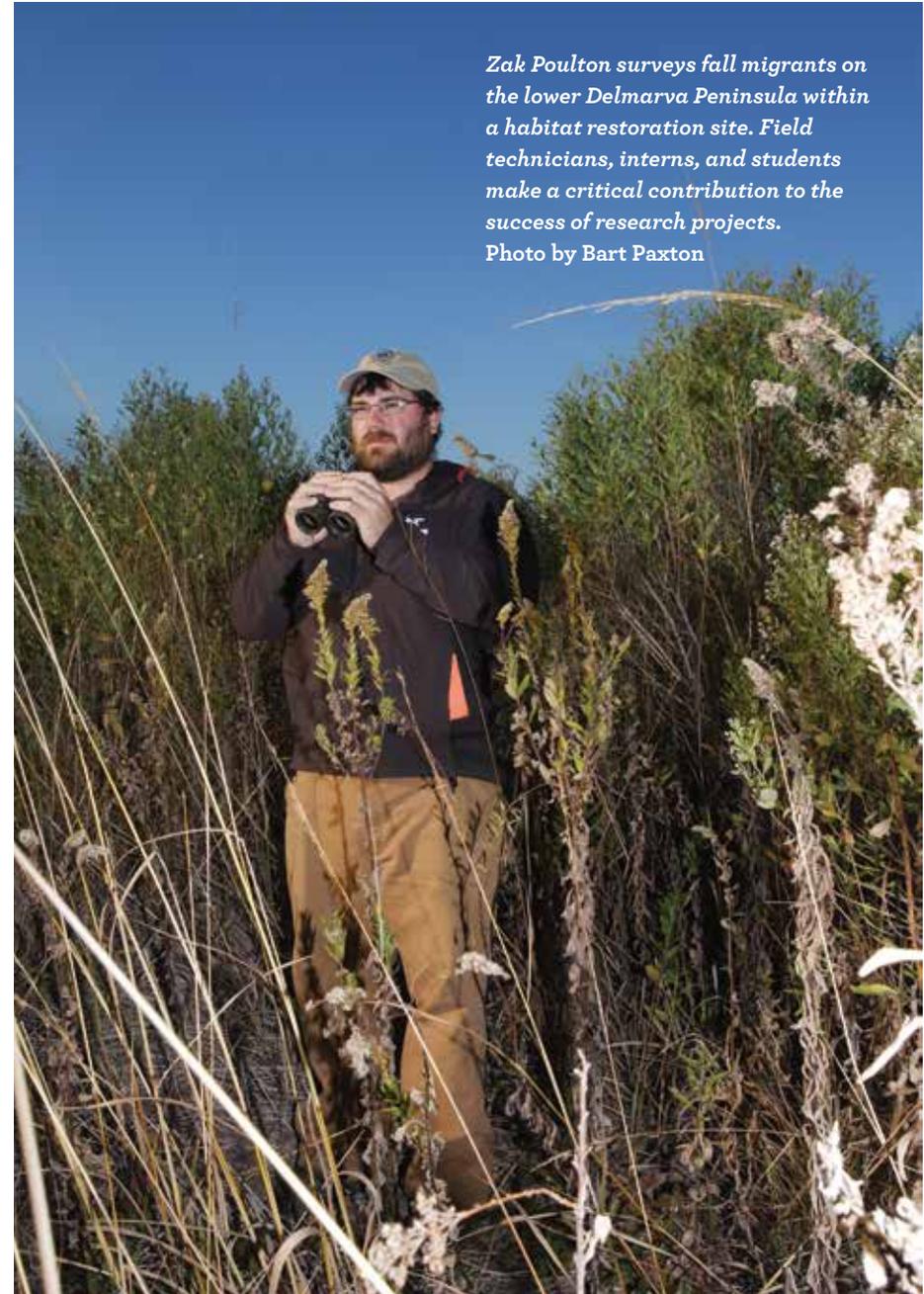
Our objective is to provide opportunities for students and interns to learn field techniques and practical problem solving in the field of avian conservation. Our long term objective is to more fully develop both domestic and international internship programs.

PROGRESS IN 2013

During 2013 the Center provided opportunities for more than 20 students and technicians to be involved directly in fieldwork focused on waterbirds and their problems. In addition to students, hundreds of citizens were involved with Center projects involving key waterbirds.



Undergraduate intern Jake McClain in marsh along the western shore of the Chesapeake Bay. Jake assisted with waterbird surveys during the breeding season. Photo by Bart Paxton



Zak Poulton surveys fall migrants on the lower Delmarva Peninsula within a habitat restoration site. Field technicians, interns, and students make a critical contribution to the success of research projects. Photo by Bart Paxton

Institutional Partners

Aluminum Company of America
American Bird Conservancy
American Eagle Foundation
ARCADIS U.S., Inc.
Arizona Game and Fish Department
Atlantic Coast Joint Venture
Audubon Maryland
Audubon Minnesota
Audubon North Carolina
Avian Research and Conservation Institute
Bird Studies Canada
Birds Caribbean
Boston Productions, Inc.
Brooks Bird Club
Canadian Wildlife Service
Charles City County, Virginia
Chesapeake Bay Bridge Tunnel Authority
Chesapeake Bay Foundation
Clemson University
CLS America, Inc.
Coastal Virginia Wildlife Observatory
Conserve Wildlife New Jersey
Constellation Energy
David and Lucile Packard Foundation
Delaware Division of Fish and Wildlife
Discover the James
Dominion Virginia Power
E. Polk Kellam Foundation, Inc.
EA Engineering
Eastern Mass Hawkwatch Association
Environment Canada
Essex County, Virginia
Exelon Corporation
Florida Fish and Wildlife Conservation Commission
Gannett Company
George Mason University
Georgia Department of Natural Resources
Hampton Roads Bird Club
Hanover Aviation
Idaho Bird Observatory
Illinois Natural History Survey
Institute for Integrative Bird Behavior Studies
James River Association
Jim Reed Enterprises, Inc.
Kentucky Department of Fish and Wildlife Resources
Kleinschmidt Associates
Laramie Audubon
Louisiana Fish and Wildlife
LowCountry Institute
Maine Department of Inland Fisheries and Wildlife
Manomet Center for Conservation Sciences
Martha's Vineyard Raptor Research
Maryland Department of Natural Resources Wildlife and Heritage Service
Michigan Audubon
Michigan Department of Natural Resources
Microwave Telemetry, Inc.
Midwest Coordinated Bird Monitoring Partnership
Mississippi Museum of Natural Science
Mississippi State University
Movebank
National Aeronautics and Space Administration
National Audubon Society
National Park Service
National Public Radio
New Hampshire Audubon
New Jersey Audubon
New Jersey Conservation Foundation
New Jersey Division of Fish and Wildlife
Norfolk Botanical Garden
North Carolina Wildlife Resources Commission
Northern Neck Audubon Society
Ohio Department of Natural Resources
Panama Audubon
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