SAVING PLACES

The Center for Conservation Biology

Annual Report 2017

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 William & Mary and Virginia Commonwealth University. The Center is a part of the VCU Rice Rivers Center. Rice Center scientists conduct cutting-edge environmental research on the James River and around the world.

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ON THE COVER:

A bald eagle looks out over its domain. Habitat has been the key to eagle recovery and is the most basic element of species preservation. Eagles have become an umbrella species and their protection has served to protect others. *Photo by John DiGiorgio*

A MESSAGE FROM THE DIRECTOR

On the high-Arctic tundra we lay on our backs in the summer twilight to feel the long slant of time. In winter we sit in the dunes and watch sanderlings waltzing back and forth with the waves. In spring we walk through the woods to feel the surge of new life reach the outer canopy. These experiences are not just marking time. We take the essence of these places with us. They buoy us through our days of endless meetings and deadlines. Our enduring hope is that the hair of muskoxen will always blow across the tundra, that the sanderlings will always have a beach for winter, and that the warblers will always return to feed on spring caterpillars and sing. Ensuring these outcomes is the business of conservation biology.

To the realtor, land is a commodity to be bought and sold for profit. To many native peoples, land is sacred. To the conservation biologist, land is neither a commodity nor sacred but the stage on which ecological dramas are performed and the most basic element of species preservation. The Center for Conservation Biology (CCB) does not own or manage conservation lands. We produce the information that drives the intricate clockwork of conservation forward.

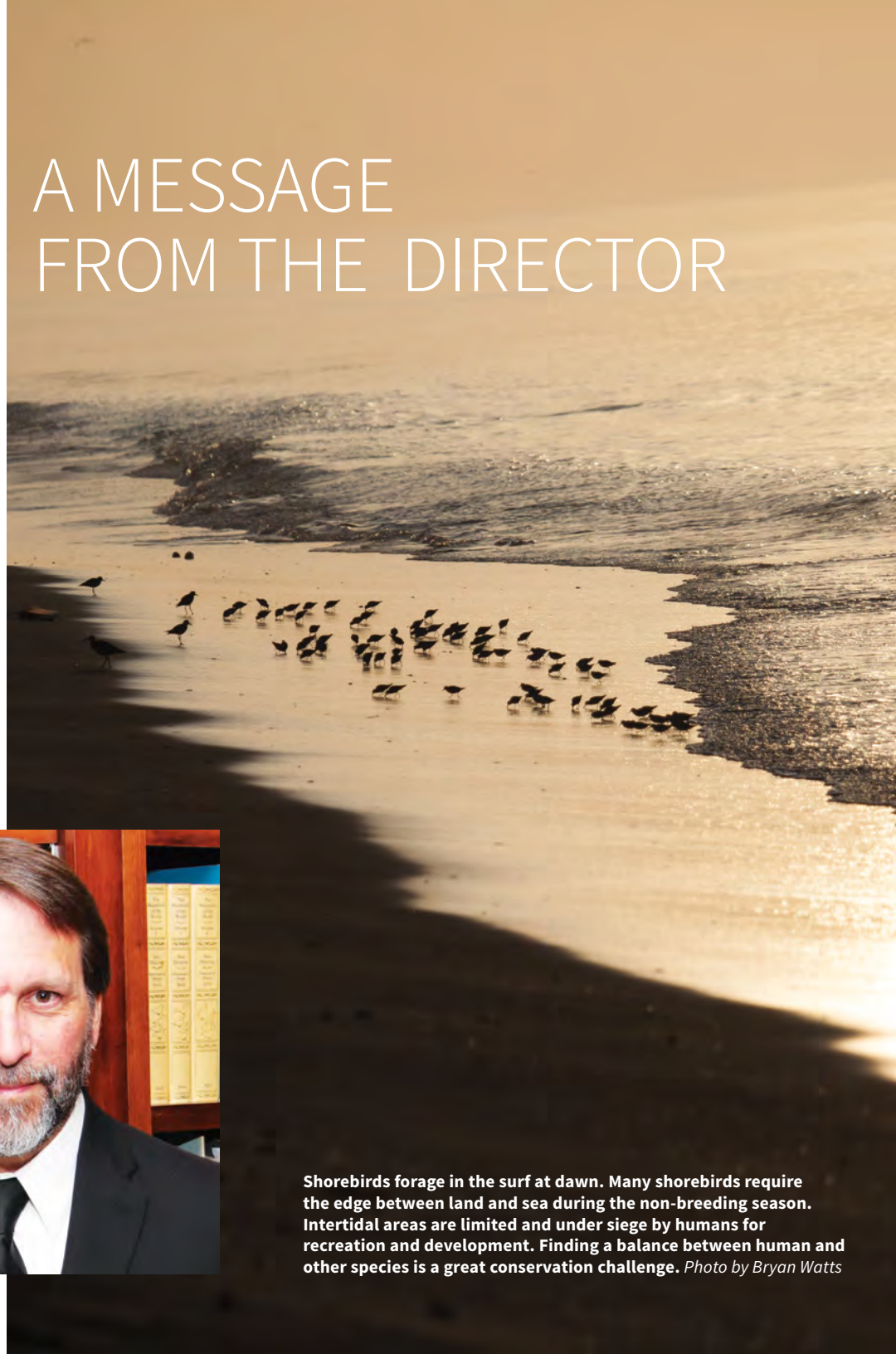
Saving places for bird populations is about protecting the highest functioning lands, restoring species and habitats on degraded lands and finding ways of improving ecological function on our working lands. Addressing questions and information needs related to these activities has accounted for a great deal of the research output of The Center for Conservation Biology over the years. I have included a few examples of this work in the following pages.

Help us to save places for bird populations and the people who enjoy them.

Sincerely,

Bryan Watts

Bryan D. Watts
Mitchell A. Byrd Professor of Conservation Biology
Director, The Center for Conservation Biology



Shorebirds forage in the surf at dawn. Many shorebirds require the edge between land and sea during the non-breeding season. Intertidal areas are limited and under siege by humans for recreation and development. Finding a balance between human and other species is a great conservation challenge. *Photo by Bryan Watts*

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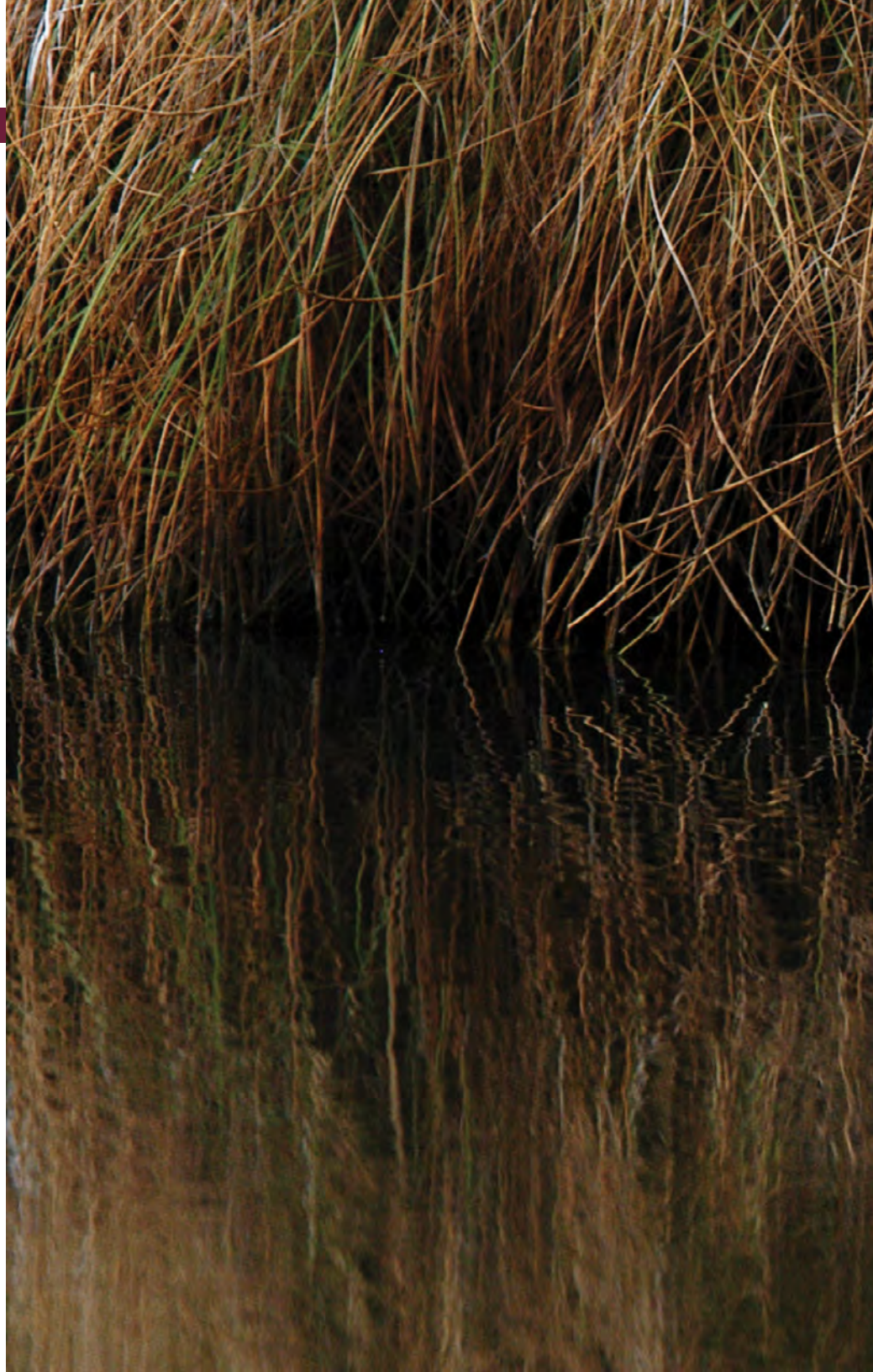
Bryan Watts stands on Swedish climbing ladders in the middle of the night to place a red-cockaded woodpecker in an artificial cavity. CCB and partners have moved more than 50 woodpeckers to Virginia from the Carolinas since the early 2000s in an effort to restore the population. *Photo by Bobby Clontz*

NATURAL TREASURES

Over the past century we have been collecting lands. Like building an ark, this collection of places is intended to carry vulnerable species far into the future. Collectively, these lands represent our green infrastructure, a network of places designed to maintain ecological function in the face of change. Over time, as these parcels become islands within a human-dominated landscape, they will not only support increasingly rare species but will also shape the interaction between future generations and those species. They will become cultural touchstones where people go to interact with and study nature.

Some places are so significant and unique that they are a bargain at any price. For the host of other parcels the cost-benefit tradeoffs may be particularly complex, requiring a view from 40,000 feet. Because CCB has collected much of the information used in the algorithms to make these choices, we are uniquely positioned to advise agencies and institutions on appropriate criteria and selections. It has been an honor to actively participate in the selection of most conservation lands protected in our region over the past few decades.



Little blue heron stalking along a marsh edge. Understanding the nesting and foraging habitat requirements of species is key to finding ways of accommodating those needs on the landscape. CCB has been working on defining these species requirements for decades. *Photo by Bill Portlock*

REFUGES AND WILD LANDS

CHALLENGES

National wildlife refuges and state natural areas are public lands purchased for and dedicated to the management of exemplary landscapes, natural communities, and vulnerable populations. These refuges, along with lands managed by government agencies such as the National Park Service or Department of Defense (where conservation may be a secondary objective), include millions of acres and represent the public-owned portion of our green infrastructure.

The selection of lands that are priorities for acquisition, the establishment of management objectives, the choice of management strategies to achieve objectives, and the monitoring needed to measure success toward objectives represent ongoing challenges for government agencies.

CCB EFFORTS

CCB research and information have been used to establish acquisition boundaries and to evaluate the conservation value of specific parcels for most refuges within the mid-Atlantic region for decades. CCB has also conducted targeted research projects to develop management approaches for refuge lands and frequently conducts monitoring projects to update status and distribution information needed to evaluate progress toward management objectives. ■

Marie Pitts (L) and Bart Paxton (R) process and take a blood sample from an eaglet on Mason Neck National Wildlife Refuge. Monitoring the health of resident populations is an ongoing part of managing lands for wildlife. CCB has conducted many studies focused on assessing the health of species on refuges and preserves. *Photo by Bryan Watts*

Fletcher Smith comes ashore on Watts Island in the Chesapeake Bay to survey birds. CCB biologists have conducted comprehensive surveys throughout the region for decades and the collective information from these efforts is used daily by the broader community to make decisions about land and management. *Photo by Bryan Watts*

Boardwalk through a northern bog. One of the keys to conservation success is public education, and one of the functions of wildlife refuges is to provide public access to habitats and species where appropriate. Understanding the sensitivity of species to human disturbance is an ongoing research theme for CCB. *Photo by Bryan Watts*

PRIVATE PRESERVES

HISTORY

As public funds have become stretched increasingly thin over the past few decades, The Nature Conservancy, The Conservation Fund, and many other national to local non-governmental organizations are using private funds to increase the footprint of conservation lands. These lands are often highly targeted to fulfill an ecological function and represent a privately-owned portion of our green infrastructure.

As with the acquisition of public lands, selection of lands to be included in preserves is highly sophisticated involving finely tuned eco-economic tradeoffs. In recent years we have increasingly recognized that establishing a preserve does not mean fencing off property and walking away but managing property to fulfill its intended ecological function.

CCB EFFORTS

CCB biologists have been directly involved in generating the information streams that are required to make acquisition decisions and to conduct the adaptive management needed to meet conservation objectives for many preserves throughout the region. ■

David Curtiss (L) and Julie Kelso (R) head out along the seaside of the Delmarva Peninsula with crates carrying trapped whimbrel. Hands on research projects have revolutionized what we know about many species in the region and are continuing to inform land acquisition and management decisions. *Photo by Bryan Watts*

(Opposite page) Dunlin sleep on a patch of wrack along a tidal salt marsh. Providing places where birds can forage, rest, and breed is a key function of refuges and preserves. Understanding the distribution of places important to bird populations is a first step toward the wise allocation of land and is a specific contribution that CCB makes to the conservation community on a daily basis. *Photo by Bart Paxton*

IMPORTANT BIRD AREAS

HISTORY

The Important Bird Areas (IBA) program is a science-based initiative to identify, conserve, and monitor sites that provide essential habitat for bird populations. Developed in Europe, the program has expanded to become an international network of conservation sites. Under this initiative, sites that are critical for the long-term survival of bird populations have been identified across the globe using internationally agreed upon criteria. The quality and effectiveness of this conservation network depends directly on the information resources and expertise used in its development.

IBAs are sites that are identified as significant to maintaining bird populations independent of ownership. IBAs often include public or privately held conservation lands but are typically mosaics with varying ownership status. The overarching intent is to promote stewardship across the landscape.

CCB WORK

CCB biologists have used our information resources to delineate more than two dozen IBAs throughout the mid-Atlantic Coastal Plain. The sites represent the most critical bird conservation areas within the region and information integrated throughout the annual cycle was used in their delineation. ■

(From top)

Nest of clapper rail. Birds that nest in tidal marshes are under siege by sea-level rise and ground predators. Marsh communities were given high consideration when delineating coastal IBAs in the region. *Photo by Alex Wilke*

Areas where bald eagles concentrate within the Chesapeake Bay are significant for breeding populations along the entire Atlantic Coast. These concentration areas have been delineated by work conducted by CCB and were considered when delineating important bird areas for the region. *Photo by Bryan Watts*

Northern gannet foraging. The lower Chesapeake Bay hosts between 30 and 50% of the north Atlantic gannet population during the spring each year as they migrate north to breeding grounds. The species is one of many migrant species that were considered in delineating important bird areas within the region. *Photo by Bryan Watts*

INTERNATIONAL RESERVES

CHALLENGES

Although there are several key international treaties focused on species protection and several programs that work to identify significant places for conservation on a global scale, conservation remains primarily a local endeavor. Capacities, attitudes, and policies related to land protection vary from country to country. Largely because of these differences, protecting migratory species that require places across multiple jurisdictions during their annual cycle or establishing reserves that span across jurisdictional boundaries is particularly challenging. Success often requires significant resources and long-term commitments.

CCB EFFORTS

Due to our work with many migratory bird species that depend on habitats outside of the United States and our concern for highly imperiled species, CCB has worked with several partners on projects to protect key locations in the Caribbean Basin, Central America, and South America. ■

(Opposite page) Manu Grande holds a young crowned solitary eagle while wife Isa and daughter Luna look on. CCB has been working with partners in Argentina to understand the habitat requirements of this species. Efforts are ongoing to protect the calden forests for this and other species. *Photo by Bryan Watts*

Mangrove patch in the upper Bay of Panama from the air. These plants stabilize the shoreline, provide habitat for numerous bird species, and provide leaves that partially fuel the food web in the adjacent mudflats. Work by CCB has helped to protect this vital habitat in Panama. *Photo by Bryan Watts*

RESTORATION

Humans have spread out over the globe and are occupying an increasing portion of the habitable space. Much of the landscape has been altered to some degree over time. In some cases the processes that underpin entire ecosystems have been impacted. In others, habitats have been degraded to the point of limiting their capacity to support populations and some landscapes have lost species entirely. Restoration ecology is the practice of restoring degraded, damaged, or destroyed ecosystems and habitats by active human intervention. This includes the restoration of lost species, the improvement of habitat quality through management, and the restoration of ecosystems by repairing function. CCB biologists have spent a large amount of effort over the years attempting to restore species to landscapes where they have been lost. We have also developed strategies for restoring or improving habitat function that has been degraded or lost due to human activities.

Mitchell Byrd watches young peregrine falcons on the wing in Shenandoah National Park after their release from a hack box. CCB and partners have been releasing birds in the park since 2000 with the objective of restoring the mountain population. *Photo by Bryan Watts*

RED-COCKADED WOODPECKER

HISTORY

The red-cockaded woodpecker has a highly unusual breeding system and requires old growth pine savannah. The species experienced catastrophic declines as this habitat type was harvested down to 1% of historic levels throughout the Southeast. By the early 1980s, Virginia was the northern range limit and birds within the state were in trouble. Of 60 active groups identified after 1975, only 2 potential breeding groups remained by 2002. Although the purchase of Piney Grove Preserve by The Nature Conservancy would be a critical turning point for the species, it was also clear by the early 2000s that intensive habitat and population management alone would not be adequate for recovery.

Virginia would require birds from other populations. Translocation is the process of moving individuals from donor populations with the intent of establishing or supplementing recipient populations. For red-cockaded woodpeckers this process is complex, including a large number of moving parts and requiring multiple phases.

CCB WORK

CCB biologists working with many partners have moved more than 50 red-cockaded woodpeckers to Virginia from donor populations in the Carolinas. Birds have been moved to Piney Grove Preserve to boost the population and to the Great Dismal Swamp National Wildlife Refuge to establish a population. ■

(Above) Bart Paxton (L) and Bobby Clontz (R) with a red-cockaded woodpecker captured and placed in a carrying box for translocation to Great Dismal Swamp. CCB and partners have moved 50 woodpecker since the early 2000s in an effort to bolster the Virginia population. *Photo by Bryan Watts*

(Left) A red-cockaded woodpecker in transport box is pulled up into a tree by a biologist. Birds are placed in artificial cavities and screened in for the night. They will be released into their new habitat the following morning. *Photo by Bryan Watts*

Young male red-cockaded woodpecker ready for transport to Great Dismal Swamp. Young birds are selected for translocation because they are less attached to a territory. Translocation is a form of assisted dispersal. Only males have the small patch of red feathers referred to as a cockade. *Photo by Bryan Watts*

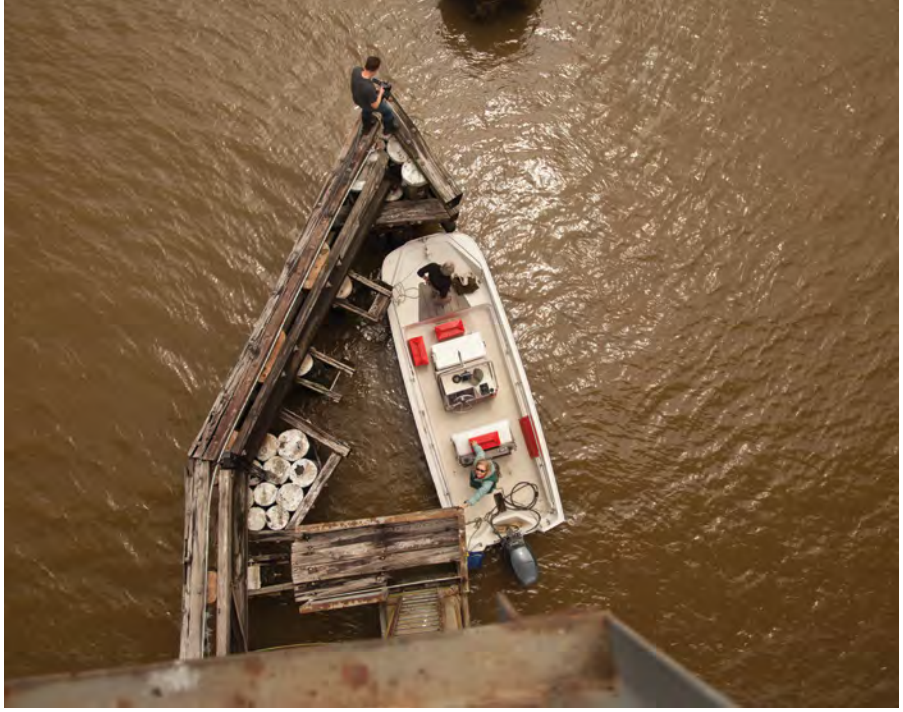
APPALACHIAN PEREGRINE

CHALLENGES

Historically, peregrine falcons bred on open cliff faces throughout the southern Appalachian Mountains. The population breeding in the mountains of Virginia was estimated to include approximately 25 pairs. Between the late 1940s and the early 1960s, this population was completely extirpated due to the effects of DDT. With no wild birds remaining, the only option available to restore the population was to establish a captive breeding program and introduce the birds back into the wild. Between 1978 and 1993 more than 240 captive-reared falcons were released in Virginia. By 2016, the state population had recovered to historic levels (31 breeding pairs). However, known breeding pairs continue to be concentrated within the Coastal Plain with less than 5% of breeding activity occurring within the historic mountain range over the past 30 years. Restoring a viable population within the mountains continues to be a management objective.

CCB EFFORTS

Since 2000, CCB biologists working with state and federal partners have moved more than 250 wild-reared falcons from the Coastal Plain to mountain hack sites. Young birds have been taken from bridges and other sites with a record of poor fledging success to be hacked. Hacking is a labor-intensive process where young raptors are fed in boxes until fledging age, released, then fed until the birds are capable of hunting on their own and disperse. This program has resulted in the establishment of several known breeding pairs in the Appalachians. ■



Boat with young falcons in pet carriers under the Tappahannock Bridge. The birds were lowered to the boat from the eyrie and will be processed and driven to Shenandoah National Park to be hacked and released. *Photo by Bryan Watts*

Peregrine falcon hack boxes positioned on the edge of Franklin Cliffs in Shenandoah National Park. The birds are placed in the box and are able to look out over the valley as if they were in a natural eyrie. They are provided food until they are able to hunt on their own after fledging. *Photo by Bryan Watts*

Female peregrine falcon protecting clutch of eggs on the James River Bridge. This bridge has had a low fledging rate and is a continuing donor of young for the hacking program within Shenandoah National Park. *Photo by Bryan Watts*

INLAND OSPREY

CHALLENGES

Ospreys are fish-eating raptors that reach their highest breeding densities within estuaries and along sea coasts throughout northern latitudes but also occur inland around large water bodies. Osprey breeding populations throughout the world declined dramatically in the post-World War II DDT era, with many reaching lows of less than 10% of historic levels. As populations reached their nadir in the late 1960s and early 1970s, the Chesapeake Bay population continued to be a global stronghold. During this low period, the North American breeding range contracted and inland populations were extirpated leaving only much reduced coastal populations.

The DDT era waned through the 1970s and osprey populations began a slow recovery within coastal portions of the breeding range. Interest in restoring inland breeding populations increased throughout the 1980s. With no remaining inland pairs, several states looked to the Chesapeake Bay as a donor population to fuel hacking programs.

CCB EFFORTS

During the 1980s, 1990s, and into the 2000s CCB was working intensively with osprey in the lower Chesapeake Bay and assisted several states with hacking programs designed to re-establish inland breeding populations. CCB provided more than 200 young ospreys to programs in Pennsylvania, Tennessee, Ohio, and Indiana. All of these states now support self-sustaining osprey populations. ■

Marian Urbi Watts mans the bow as the boat slips up to an osprey nest along the upper James River. CCB biologists have worked with breeding osprey since the early 1970s and have played a significant role in understanding the species and in re-establishing inland populations. *Photo by Bryan Watts*

Car loaded with pet carriers full of ospreys on their way to the airport and destined for a hack site in Ohio. CCB biologists have been able to gather young osprey in the morning and have them placed within hack boxes in distant locations by the same afternoon. *Photo by Bryan Watts*

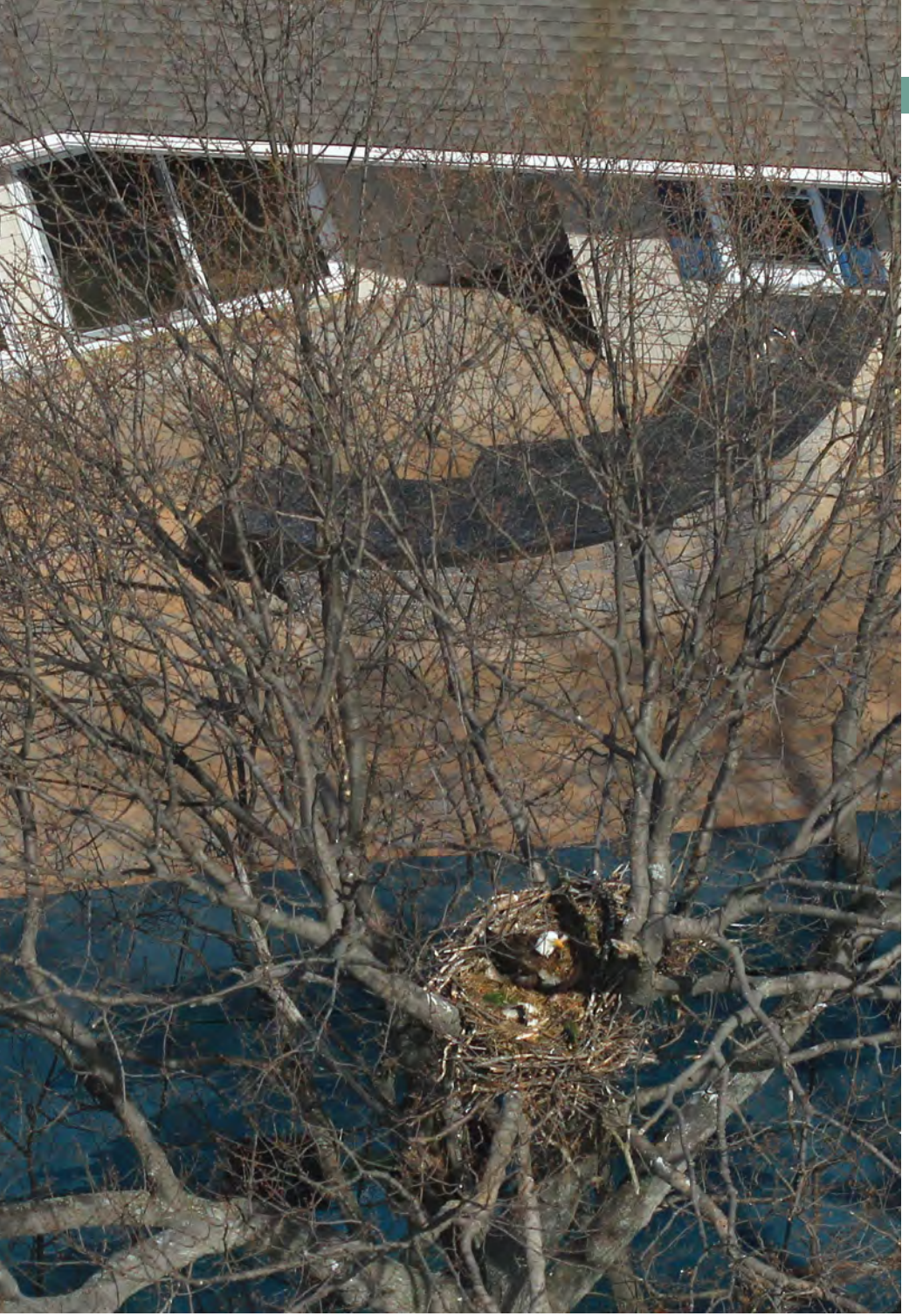
A brood of 6-week-old ospreys in a nest within the lower Chesapeake Bay. Ospreys of this age are ideal for translocation and hacking because they are able to tear food on their own and are near fledging age. *Photo by Bryan Watts*

WORKING LANDS

Much of our land has been put to work in the service of humanity. An increasing fraction has been consumed by urban areas where most of us live and work. Most of the potential arable land has been put to work growing the food needed to sustain us. In selected regions, much of the land is devoted to producing the wood products or other commodities that our modern society requires. One has only to peruse maps of land use to recognize that in order for many species to persist on the landscape we must attempt to accommodate them on working lands. Nature cannot be relegated to some place over there with a sign and a fence and a green space on a conservation plan.

CCB biologists have conducted a large number of research projects focused on squeezing the highest conservation value from lands devoted to other functions. If we are able to accomplish the mission of working lands while accommodating the needs of some species we will effectively unleash vast tracts of land for conservation.

Commercial field of low-bush blueberries along the Acadian Peninsula in New Brunswick. Commercial fields are highly productive and attractive to fruit-eating birds such as whimbrel that stage in the area before making their long transoceanic flight to South America. *Photo by Bryan Watts*



URBAN FRONT

CHALLENGES

Since the 1960s, urban and exurban are two of the fastest growing land-use categories in North America. The urban front has moved across the landscape like a tidal wave consuming all open lands in its path. The growth in living space and infrastructure required by the expanding human population has had an impact on all habitat types. Impacts to bird populations extend beyond the direct loss of habitat. The urban front comes with increases in predator populations, invasive plant species, toxic compounds, and an increased demand for recreational activity focused on fewer open lands. All of these forces reduce our ability to maintain viable populations on the landscape.

Species vary in their tolerance to humans and the built environment. While some species are filtered out of the landscape by urban expansion, many other species will persist if the conditions are appropriate and still others are attracted to urban structures. Given that the urban footprint is large and continuing to expand globally, an urgent challenge is finding ways to manage species within an urban context.

CCB EFFORTS

CCB has conducted several research projects focused on understanding how bird populations are faring within urban environments and how we may better manage them within these settings. Despite monitoring the performance of several species including bald eagles, osprey, peregrine falcons, American kestrels, several herons in urban areas, these efforts remain in their infancy. A large body of work is needed to better inform the management of urban habitats. ■

Bald eagle nest in the backyard of a Washington, D.C. suburb. Eagles are increasingly adapting to urban life requiring a modification to the guidelines relating to the management of human disturbance. CCB biologists have been monitoring urban-nesting pairs to better understand their use of these non-typical habitats. *Photo by Bryan Watts*

A brood of American kestrels in a nest box. Kestrels appear to thrive in urban settings along railroad right-of-ways and within industrial brown zones. Cities represent an opportunity to manage for this species with the establishment of nest boxes. *Photo by Bryan Watts*

COMMERCIAL BLUEBERRIES

Flock of whimbrels circling a commercial blueberry field in New Brunswick. Flocks are prevented from settling to feed using a range of tactics. *Photo by Bryan Watts*

Blueberry scarecrow in a field along the Acadian Peninsula in New Brunswick. Blueberry growers in the region employ a wide range of strategies from passive scarecrows to air canons to shooting in order to reduce perceived crop damage by birds. *Photo by Bryan Watts*

CHALLENGES

The commercial low-bush blueberry industry throughout the Canadian Maritimes and northern New England has rapidly become a 100 million dollar business. This business has been enabled by the development of efficient growing practices and an effective advertising campaign. Success has resulted in an expanding footprint throughout the region to increase production capacity. Some of this expansion has taken advantage of the fruit barrens that are a natural part of the regional landscape. The region represents a terminal fall staging area for several shorebird species including whimbrel, where birds accumulate fat reserves before making a 6,000+ kilometer transoceanic flight to wintering grounds in South America. For thousands of years, the shorebirds have relied on these fruits to build fat reserves to fuel this flight. Commercial blueberry fields represent a windfall to these birds because target production is 3,000-5,000 pounds per acre, well beyond densities within natural habitats.

In recent decades the commercial blueberry industry has considered whimbrel and other birds that feed on fruits to be crop pests and have adopted strategies ranging from deterrents to shooting in order to reduce crop consumption. The conflict poses a possible threat to a migration system that has been in place for thousands of years. A challenge for researchers is to better understand consumption patterns in order to inform management.

CCB EFFORTS

CCB biologists have been working with the Canadian Wildlife Service along the Acadian Peninsula to understand the relationship between whimbrel migration and commercial blueberries. Research questions are focused on clarifying the spatial variation and level of consumption in order to inform industry. The long-term goal is to find strategies where industry and shorebirds can coexist within northern fruit lands. ■

(Opposite page) Blueberry warden in New Brunswick with a screamer gun used to scare away whimbrels from blueberry fields. Fields are monitored throughout the day in the last three weeks running up to harvest to reduce perceived crop damage. *Photo by Bryan Watts*

WINTER GRASSLANDS

CHALLENGES

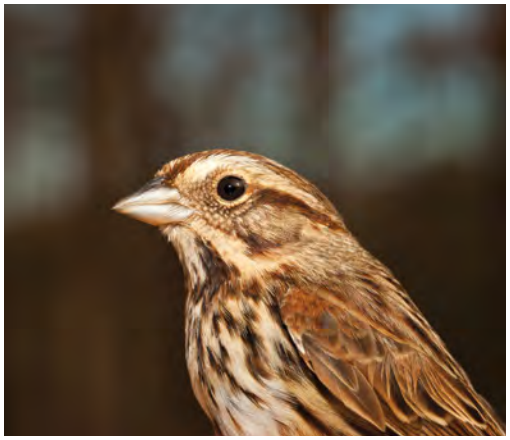
Grasslands are open lands dominated primarily by grasses and grass-like plants. Populations of many grassland birds have experienced significant declines across North America over the past four decades, and declines have been particularly dramatic in the Northeast where most grassland species are temperate migrants that spend the winter months in the Southeast. Grassland habitats in the Southeast are primarily derived from agricultural fields and pasturelands with additional habitats including airport infields, transportation rights-of-ways, industrial brown fields, municipal parks, and urban areas.

Unlike the breeding season, the keys to supporting grassland birds during winter are providing food and cover from the time that birds arrive in the fall until they leave in the spring. Fortunately, winter represents the off-season for most working lands. The challenge here is identifying the specific needs of these species and convincing landowners and managers to manage grasslands for them during winter.

CCB EFFORTS

CCB biologists have conducted more than a dozen research projects focusing on how to effectively manage habitats for grassland birds during the winter months. Results of these efforts are now being used to manage tens of thousands of acres of habitat on wildlife refuges, national parks, and U.S. Department of Defense lands as well as private and corporate lands. Outreach and education are ongoing and necessary to recruit lands for winter habitat. ■

Savannah sparrow during the winter. The savannah sparrow is one of several sparrow species that require vegetative cover and grass seeds for the winter. These species have benefited from improved management of grassland patches during the winter months. *Photo by Bryan Watts*



(L to R) A white-crowned sparrow with seed hulls on its bill that is wet from foraging in the morning dew. *Photo by Bryan Watts*

Song sparrow during the winter. *Photo by Bryan Watts*

Grass clump at sunset. Grasses and forbs provide both cover and a seed crop that is required by an entire community of bird species during the winter months. These species benefit from letting fields remain idle until spring planting. *Photo by Bryan Watts*

(Above) The Acadian flycatcher is one of the most abundant neotropical migrants in late rotation pine plantations. This species benefits from mid-rotation commercial thins that open space within stands. *Photo by Bart Paxton*

(Right) Prescribed burns have become an important management tool for pinelands throughout the Southeast in recent decades. Regular burns move habitat structure toward that of historic pine savannas and benefit species associated with those habitats. *Photo by Bryan Watts*

TIMBERLANDS

CHALLENGES

Beginning in the 1950s, timber corporations converted a significant portion of forest lands throughout the Southeast to working forests designed to maximize the production of wood products. The region now supports nearly 30 million acres of managed pine plantations that supply approximately 15% of the global wood fiber needs. However, industrial forests do not support the abundance or diversity of birds supported by the southeastern forests that they replaced. The short harvest rotation, high stocking rates, and low age diversity that come along with industrial timber management do not promote breeding bird diversity.

In recent decades, timber corporations have embraced the notion that commercial forests should include wildlife management as an important objective for the lands they control. How to adjust timber management practices to benefit wildlife while maintaining production and profit levels represents a significant research question.

CCB EFFORTS

CCB has conducted several research projects with timber corporations and government agencies to understand how bird use changes throughout the harvest cycle and what management decisions are controlling these changes. This research has shown that the balance between initial stocking rate and commercial thinning is critical to holding bird populations through the harvest cycle. Management has been adjusted on millions of acres resulting in the support of tens of millions of bird years on commercial timberlands. ■

(Opposite page) Edge of a mid-rotation pine plantation. High stocking rates used in commercial pine stands lead to rapid crown closure which prevents the development of ground and subcanopy vegetation that many bird species require. Planting at lower stocking rates and conducting early commercial thinning opens up the canopy and promotes the growth of understory vegetation. *Photo by Bryan Watts*

INSTITUTIONAL PARTNERS 2017

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American Eagle Foundation
American Wind Wildlife Institute
Arborscapes, LLC
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Atlantic Coast Joint Venture
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New Jersey Conservation Foundation
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Northern Virginia Conservation Trust
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Tetra Tech, inc.
Texas Parks and Wildlife
The Carolina Bird Club
The Curtis Group
The Hermitage Foundation
The Nature Conservancy
The Peregrine Fund
The Wildlife Center of Virginia
Toronto Ornithological Club
United States Army Corps of Engineers
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United States Dept of Agriculture
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United States Fish and Wildlife Service
United States Forest Service
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Virginia Dept of Game and Inland Fisheries

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Virginia Dept of Transportation

Virginia Institute of Marine Science

Virginia Marine Resources Commission

Virginia Master Naturalists

Virginia National Estuarine Research Reserve

Virginia Outdoors Foundation

Virginia Society of Ornithology

Virginia Transportation Research Council

West Virginia Dept of Natural Resources

West Virginia University

Wildlife Management Institute

Williamsburg Bird Club

Wisconsin Bird Conservation Initiative

CCB

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