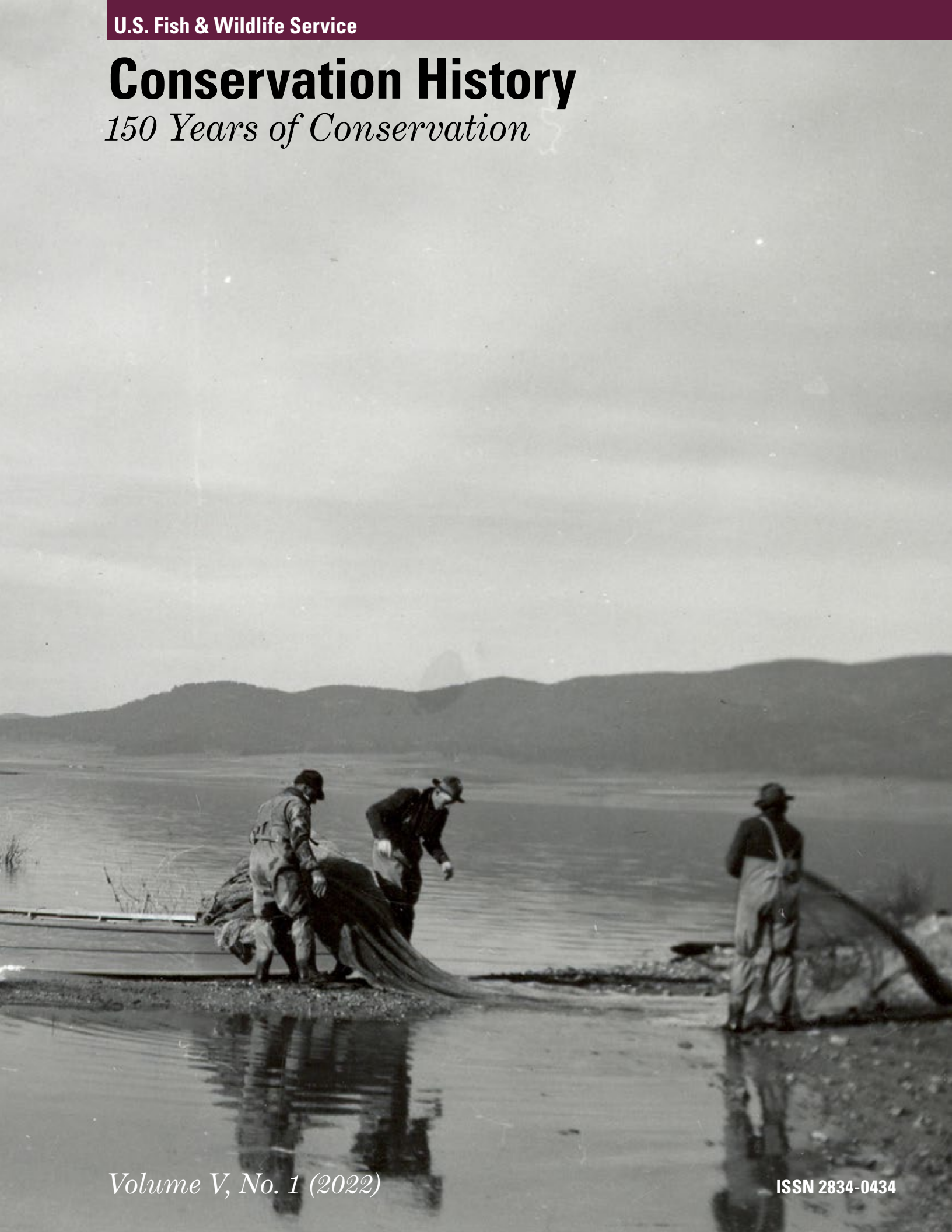
U.S. Fish & Wildlife Service

Conservation History

150 Years of Conservation



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The mission of the U.S. Fish and Wildlife Service is working with others to conserve, protect, and enhance fish, wildlife, plants, and their habitats for the continuing benefit of the American people.

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From the Historian

Welcome to this special sesquicentennial issue of the *Conservation History* journal. Thanks to our tireless editor, creative designer, and brilliant authors, we have an issue that not only celebrates 150 years of the U.S. Fish and Wildlife Service, but also provides an overview of the entire American conservation movement. Our agency began by stocking fish from milk cans transported by horse cart, and today we restore black-footed ferrets using clones. Our tools and techniques have changed immensely in 15 decades, but our noble goal has remained conserving our nation's fish and wildlife heritage. Complete success remains just out of reach, but we continue to strive. Or as Aldo Leopold observed, "Conservation is a bird that flies faster than the shot we aim at it."

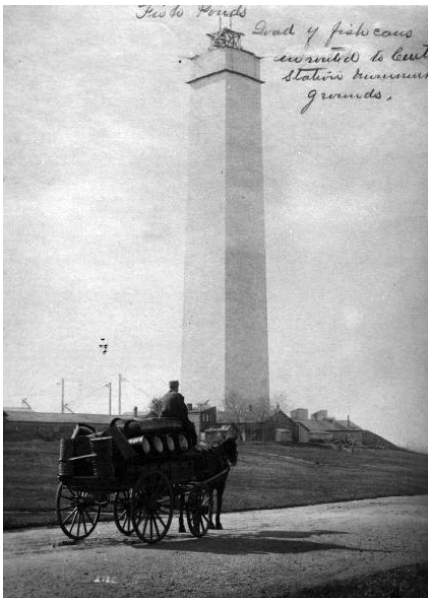
If these wild histories pique your interest, be aware they are just the tip of the historic iceberg. There is a new book on the Service history (*America's Bountiful Waters*), a new online conservation history portal, a new short film on the Service's 150th anniversary to be released shortly, and numerous talks and other celebratory events throughout the year. For those seeking a deeper dive into our history, the D.C. Booth National Fish Hatchery and Archives, in Spearfish, South Dakota, chronicles our enduring fisheries history while the U.S. Fish and Wildlife Service's Museum and Archives, at the National Conservation Training Center, preserves and displays the rest of the Service's history.

There is another sense in which this issue is but the tip of iceberg. As the Service historian, I am painfully aware of the many stories that remain untold about our wildlife conservation work. African Americans, Latinx, Asian and Pacific Islanders, and Indigenous Peoples all have their own rich histories with our agency and the American landscape. Far too few of those stories have been told up to the present. As regards inclusive histories, we have not made as much progress since 1871 as we would have hoped. But as we go forward with this journal, we vow to enhance and enrich our stories and be sure our tapestry of history includes all the multi-colored threads.

If you don't know history, then you don't know anything. You are a leaf that doesn't know it is part of a tree.

—AUTHOR MICHAEL CRICHTON

Cloned black-footed ferret pup. USFWS



U.S. Fish Commission raising fish on National Mall with unfinished Washington Monument in background. USFWS

Mark Madison, U.S. Fish and Wildlife Service Historian and Founder, *Conservation History*, National Conservation Training Center, U.S. Fish and Wildlife Service

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Traveling Back in Time 150 Years

There are two things that interest me: the relation of people to each other, and the relation of people to land.

—ALDO LEOPOLD (1887-1948)

Let's travel back in time, shall we? By 1871, the first transcontinental railroad stretched across 37 states and through territories as the U.S. government continued acquiring land through war or purchase. In 1871, Congress ceased to establish treaties with Indigenous tribes or recognize Indigenous peoples as members of sovereign nations. Ulysses S. Grant, our 18th president, was leading the nation through the Reconstruction Era. He would soon sign the Yellowstone' National Park Protection Act, establishing the first national park on the sacred lands of numerous tribes. All public lands occupy ancestral lands of Indigenous peoples. The 1870s also birthed the Gilded Age—a time of rapid industrial growth and wealth among robber barons. As you'll read in this journal, our destructive habits toward the environment grew as our population grew. We changed the land, we destroyed habitat, we overfished, we hunted species to extinction. This is where the story of the U.S. Fish and Wildlife Service begins.

This journal begins with the "war on wildlife" as our historian and journal founder, Mark Madison, highlights 150 years of conservation. Our agency began with fish restoration and the U.S. Commission of Fish and Fisheries. Madison guides us along our agency's timeline from fisheries management to the leader and trusted partner we are today in fish and wildlife conservation as we steward lands and natural resources.

Fearnow pail for transporting trout fingerlings from Bozeman National Fish Hatchery (est. 1892). USFWS

The mission of the U.S. Fish and Wildlife Service is working with others to conserve, protect, and enhance fish, wildlife, plants, and their habitats for the continuing benefit of the American people.

Feature essays showcase the history of every major U.S. Fish and Wildlife Service (Service) program, beginning with a closer look at our start in fisheries. I'm especially pleased we bring you the first comprehensive histories of the Service's law enforcement and international affairs programs as well as an essay touching on our early history with tribes through today's Native American Policy and the role of our Native American Liaison Offices. To help tell other stories not often told, we reprint a report on the conservation legacy of the Civilian Conservation Corps' Company 3221, the African American unit that cleared swamps as part of a mosquito control program and completed other construction projects at Bombay National Wildlife Refuge during the Great Depression.

We conclude with *Conservation History's* regular features including updates from the Service's retirees' association, treasures from the Service's archives, a spoken history from the Service's national oral history program featuring wildlife inspector John L. Brooks, and a reflection.

I offer gratitude to the dedicated authors and blind peer reviewers who made this journal possible. Imagine, for years to come, your work in the hands of new employees or conservation scholars eager to learn about our history.

Work is underway to publish another journal this year to commemorate the National Conservation Training Center's 25th anniversary. After that, we'll celebrate 150 years of fish conservation.

Maria E. Parisi, *Conservation History Editor, Team Lead, History and Partnerships Branch, National Conservation Training Center, U.S. Fish and Wildlife Service*
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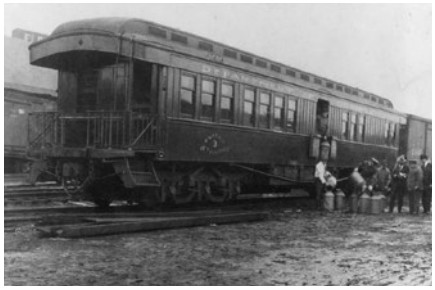
Sunrise over the Antietam Civil War Battlefield in Sharpsburg, Maryland.

The War for Wildlife: 150 Years of Fish and Wildlife Service Conservation (1871–2021)

Mark Madison, *U.S. Fish and Wildlife Service Historian*

Shortly after the end of the Civil War, a new battle drew Americans' attention, the war for wildlife. From 1800 to 1871, the precipitous decline in American fisheries drove the creation of the American conservation movement and the U.S. Commission of Fish and Fisheries. Out of the wanton destruction of all American wildlife—furred, feathered, and finned—arose a popular movement and an agency to help ensure this age of exploitation would never be repeated.

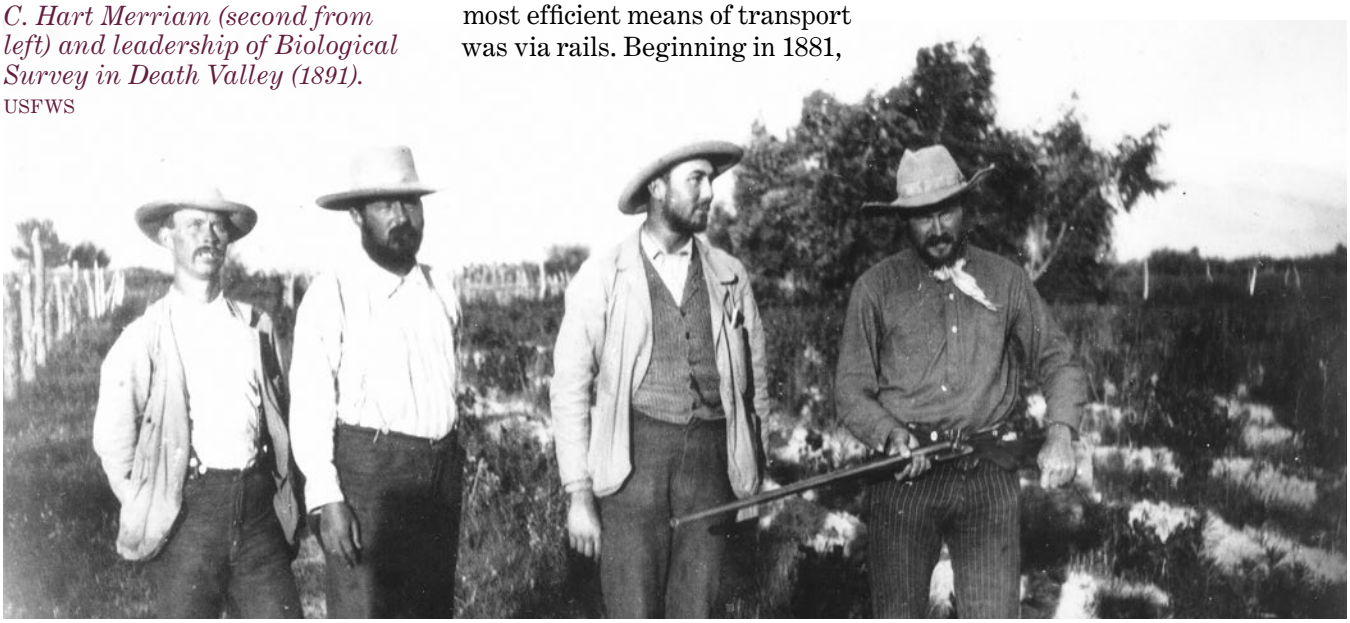
Overfishing and habitat degradation in the eastern half of the United States had noticeably reduced many fisheries in the aftermath of the Civil War. To remedy this early environmental crisis, on February 9, 1871 Congress created an independent U.S. Commission of Fish and Fisheries to investigate the decline in fish stocks and suggest possible remedies. This modest mandate was embraced and expanded by renowned naturalist and Assistant Secretary to the Smithsonian Institution, Spencer Fullerton Baird. As the first Fish Commissioner, Baird set out to build a continental conservation movement based on science and fish stocking. In 1872, Baird sent his assistant, Livingston Stone, across the continent to create the first national fish hatchery on California's McCloud River. Soon the Fish Commission established hatcheries across the nation tasked with stocking lakes, rivers, and streams from Alaska to D.C. As a national restoration effort, the most efficient means of transport was via rails. Beginning in 1881, the Fish Commission worked with railroads to design and construct specially modified Fisheries Rail Cars. Between 1872 and 1940, the Fish Commission distributed more than 200 billion fish and other aquatic species, largely by fish cars traveling 2,029,416 miles. After leaving the tracks fish culturists called "messengers" travelled an additional 8,104,799 miles with their fish cargo. This equals 17 trips to the moon and back. This was truly the first continental-wide wildlife restoration effort.



Unloading fish from Bureau of Fisheries Rail Car #3. National Archives and Records Administration

Baird, a renowned naturalist, supported a strong scientific underpinning for the Fish Commission. The U.S. Fish Commission established the marine biological laboratory in Woods Hole, Massachusetts, in 1882, and it commissioned a small fleet of research vessels from 1880 to 1926, including the U.S.F.C Fish Hawk, Albatross, and Grampus. Baird, during his tenure from 1871 to 1887, had a scout's eye for the best scientific talent. This tradition persisted when, in 1927,

C. Hart Merriam (second from left) and leadership of Biological Survey in Death Valley (1891). USFWS



the agency (renamed the U.S. Bureau of Fisheries in 1903) hired its first permanent female scientist, Louella Cable. She witnessed a revolution in fisheries science during her 43-year career as an aquatic biologist and scientific illustrator. For 69 years, from 1871 to1940, the Fish Commission and its successors built upon their pillars of science, restoration, and national conservation initiatives to help restore fish populations and fulfill the early promise of the conservation movement.

Congress established a parallel agency in 1885 to protect terrestrial wildlife. Its origins were similarly humble, when the U.S. Department of Agriculture (USDA) established a Section of Economic Ornithology. This Section's modest mandate was to study both the "useful" birds (those that ate insects) and "injurious" birds (those that ate crops) in the rather narrow ecological outlook of farmers of the day. Like the early Fish Commission, this little office had a gifted leader to expand its mission, naturalist C. Hart Merriam, one of the premier ornithologists and mammologists of the era. In 1886, Merriam expanded his one office and one clerk into the Division of Economic Ornithology and Mammalogy with a broader mandate to "educate" farmers about all wildlife and conduct studies on the geographic distribution of plants and animals (which a later generation would dub "ecology"). As befit this expanded mission, Merriam and his talented naturalists began to distribute continental studies of wildlife from Canada to Central America in what he called "Life-Zone Maps," which we would recognize today as large-scale ecosystems.

As its mission grew, Merriam advocated for the more encompassing name of Division of Biological Survey in 1896. As its budget, staff, and ecological mapping continued to expand, the Division evolved into the Bureau of Biological Survey in 1905—the last name change until its absorption in 1940 with the U.S. Bureau of Fisheries. With Merriam at its helm from 1885 to1910, the Bureau of Biological Survey flourished as it carried out important conservation studies of wildlife. Merriam was friends with fellow ornithologist Theodore Roosevelt, and together they helped create the first bird reservation at Pelican Island, Florida in 1903, the origin point of the National Wildlife Refuge System. While fish culturists had mastered raising fish in hatcheries, birds and mammals required new forms of management. Theodore Roosevelt established 51 bird reservations and 4 game ranges between 1903 to 1909, a bold new experiment to conserve birds and mammals by protecting their habitat. The Biological Survey combined this early habitat protection with the first federal wildlife protection. The 1900 Lacey Act and the 1918 Migratory Bird Treaty Act both attempted to prevent the wanton destruction of birds and other wildlife working in conjunction with the nascent refuge system in a two-pronged approach to wildlife conservation.

The Biological Survey's early conservation measures were modestly successful, until a combined economic and ecological disaster in the 1930s drove new innovations and a new agency. The drastic decline in waterfowl numbers during the 1930s Dust Bowl led to a reorganization of the entire Biological Survey. President Franklin Roosevelt brought in Jay "Ding" Darling, an editorial cartoonist and avid sportsman, as Chief to revive the Bureau in 1934. A waterfowl hunter, Darling quickly enlisted his fellow hunters to support conservation through the institution of a Duck Stamp; he drew the first stamp that year. As these hunters spent their buck (the original cost of the stamp) for ducks, it created a growing conservation constituency for the

Theodore Roosevelt on Breton Island Bird Reservation in 1915. Library of Congress

CCC enrollees working at White River NWR, Arkansas. USFWS

expanding refuge system. The 1937 Pittman-Robertson Federal Aid in Wildlife Restoration Act further strengthened this sportsman-conservationist partnership. This Act placed a small federal excise tax on firearms and ammunition to greatly expand state wildlife work for both game species and endangered and threatened species.

At the federal level, Darling helped created a series of migratory bird refuges along corridors called "flyways" and, in so doing, created the first systematic expansion of the refuge system since Theodore Roosevelt. The nation's most successful youth-in-nature experiment, the Civilian Conservation Corps (CCC), helped conserve 44 wildlife refuges during the 1930s, and in that decade, the number of refuges expanded from 51 to 170, more than tripling in size.

By 1939, the Biological Survey was the premiere wildlife agency in the world and no longer a particularly good fit for the USDA, which wanted more funds for eradication than for conservation. In that year, Secretary of the Interior Harold Ickes convinced President Franklin Roosevelt and Congress to move both the Bureau of Biological Survey and the U.S. Bureau of Fisheries into the Department of the Interior to create, what he hoped would be, a new "Department of Conservation." That Department never arose, but something nearly as important came out of this reorganization as the two bureaus were combined to form a new agency on June 30, 1940—the Fish and Wildlife Service, renamed again in 1956 as the U.S. Fish and Wildlife Service.

The first director of the newly minted U.S. Fish and Wildlife

Ira Gabrielson, first Director of the newly created Fish and Wildlife Service. USFWS

Farm pond fish stocking at Bo Ginn National Fish Hatchery, Georgia. USFWS

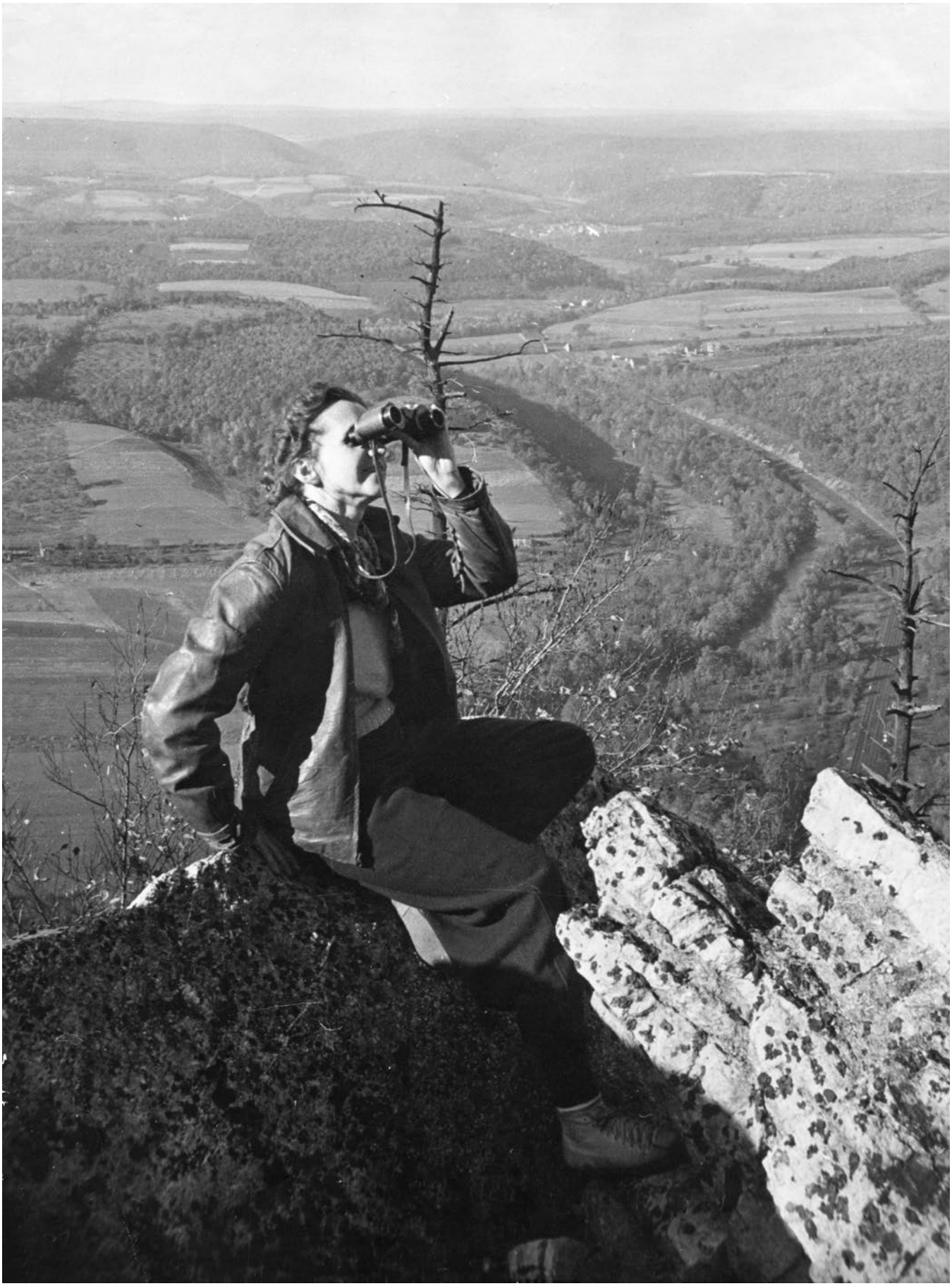
Service, Ira Gabrielson noted, in his 1943 Annual Report and in the midst of World War II, that when the soldiers returned home, millions of Americans would be eager for the relaxation afforded by hunting and fishing opportunities. In preparation for this influx of new and returning sportsmen (many being much better shots after military service), wildlife refuges expanded their access to hunters and anglers in the decades following the end of the war. The most popular post-WWII program involved the farm pond and rural fish stocking programs. The New Deal's Soil Conservation Service sparked the initial interest in expanding farm fish ponds, while Pittman-Robertson funds created new reservoirs and marshes for state wildlife management. By 1949, the U.S. Fish and Wildlife Service managed 99 fish hatcheries in 43 states. For the next 2 decades, federal hatcheries alone consistently raised around 1.5 billion fish, with state hatcheries often exceeding that number. A proliferation of farm ponds created both an insatiable appetite for sport fish and growing political support for wildlife work.

The Dingell–Johnson Federal Aid in Sport Fish Restoration Act (1950) placed a small excise tax on boating and sport fishing equipment, so the U.S. Fish and Wildlife Service could provide financial assistance for state fish restoration, recreation, and management endeavors. Since their enactment, the Pittman-Robertson and Dingell-Johnson Acts have provided nearly $21 billion dollars in financial assistance for wildlife restoration, hunter safety and education, and sport fish restoration in states and territories under the auspices of the U.S. Fish and Wildlife Service's Wildlife and Sport Fish Restoration Program.

In 1945 the U.S. Fish and Wildlife Service created a small Office of River Basin Studies, which would become the origin point for ecological services within the agency. River Basin Studies biologists began to take a more comprehensive look at major public works projects impacting fish and wildlife resources, working hard to find ecological solutions with the Army Corps of Engineers, Bureau of Reclamation, and Soil Conservation Service. The Office's unofficial motto in those early years was "save the dirt!" Innovative ideas emerging from this ecological think tank included the first National Wetlands Inventory (1952 to 1954) and the National Survey of Hunting and Fishing Activity (1955) to take stock of wildlife habitat and those who enjoyed it.

For a brief halcyon 3 decades from 1940 to 1970, all fish and wildlife resources were under the stewardship of one agency, the U.S. Fish and Wildlife Service. However, on October 3, 1970, President Nixon removed marine fisheries from the U.S. Fish and Wildlife Service to the newly created National Marine Fisheries Service in the Department of Commerce. The timing was inopportune as this was shortly before the passage of the Marine Mammal Protection Act (1972) and the Endangered Species Act (1973), effectively dividing the authorities for protecting wildlife resources between two agencies, as it had been prior to 1940.

Other changes were occurring in this era. The Bureau of Fisheries hired Rachel Carson in 1935, and she rose through the ranks to become chief editor for the U.S.



Rachel Carson at Hawk Mountain, Pennsylvania. Shirley Briggs

Wildlife Inspector with seized property. John and Karen Hollingsworth

Fish and Wildlife Service. In that prominent role, Carson first began to describe the dangers of dichloro-diphenyl-trichloroethane (DDT) and other toxins to fish and wildlife resources. The research culminated in her best-selling book *Silent Spring* (1962), in which she laid the framework for the modern environmental movement.

Part of Rachel Carson's legacy was an increasing emphasis on threatened and endangered species, clean water, and habitat restoration in the late 1960s and early 1970s. In 1972, the U.S. Fish and Wildlife Service renamed River Basin Studies to the Division of Ecological Services to better reflect a recently enlarged portfolio of protection, including increasingly sophisticated analysis of water pollution, coastal habitat destruction, and environmental impacts of habitat loss. The addition of the endangered species program to Ecological Services in 1983 greatly expanded its role to protect and restore threatened and endangered wildlife.

In 1969, the U.S. Fish and Wildlife Service created the first national wildlife refuge for an endangered species, the bald eagle, at Mason Neck, Virginia. Shortly thereafter, the agency established a number of endangered species refuges across the country for condors, eagles, and even endangered fish, such as the narrowly endemic desert fishes protected at Ash Meadows National Wildlife Refuge in Nevada and San Bernardino National Wildlife Refuge in Arizona.

Just as the Fish Commission had worked with global partners since the 1880s, so, too, the U.S. Fish and Wildlife Service expanded its role in international wildlife conservation when it signed onto the 1975 Convention on International Trade in Endangered Species of Wild Fauna and Flora. This expanded conservation work beyond our own borders by joining 183 other signatories to help with international conservation of threatened species, such as tigers, great apes, rhinos, and elephants. Changes in the environmental sciences, and a growing environmental political movement, transformed the U.S. Fish and Wildlife Service into an agency that managed wildlife without borders in the most ecologically sensitive manner possible. Ironically, some of these efforts involved removing non-native fish species, unwittingly stocked a century earlier by the U.S. Fish Commission and its successors, to revive native fishes.

As the agency entered its second century of wildlife work, its capacity grew to meet new challenges. The U.S. Fish and Wildlife Service's law enforcement role extended back to the 1900 Lacey Act to provide critical protection to America's wildlife both on and off refuge lands. The agency created a new Division of Law Enforcement in 1972 with the addition of Special Agents in 1973 and Wildlife Inspectors in

Hawaiian Monk seal at Papahānaumokuākea Marine National Monument in the Northwestern Hawaiian Islands. Watt/USFWS

1975 who served at the forefront of combatting domestic and international wildlife trafficking.

Migratory bird conservation took on an early federal role with the Migratory Bird Treaty of 1916, signed between the United States and Canada. Building on the earlier flyways concept of the 1930s to the 1950s, the U.S. Fish and Wildlife Service gradually worked toward a more comprehensive hemispheric conservation of migratory birds that included a North American Waterfowl Management Plan (est.1985) and Partners in Flight (est. 1990), a public-private partnership to conserve all land birds in the Western Hemisphere. A growing realization that birds do not recognize political borders, and that the Service cannot conserve all avians alone, led to the creation of the first joint venture. Beginning in 1987, more than 5,700 joint venture projects brought together regional partnerships of government agencies, non-profit organizations, corporations, tribes, and individuals to conserve habitat for the fish, birds, other wildlife, and people.

The origins of the U.S. Fish and Wildlife Service and the American conservation movement began 150 years ago with one Fish Commissioner and a report outlining the causes of fisheries decline and a blueprint for recovery. Today 8,000 professional conservationists in the agency manage the world's largest fish and wildlife conservation program. From 1 hatchery in 1872, the U.S. Fish and Wildlife Service now manages 70 national fish hatcheries, 7 fish technology centers, and 9 fish health centers across the nation to improve, conserve, restore, and enhance fish and other aquatic resources. From 14-acre Pelican rookery in Florida, the agency now manages 567 refuges and 38 wetland management districts on more than 150 million acres across the country. From the inaugural Alaska's Afognak Islands Forest and Fish Culture Reserve to protect sockeye salmon in 1892, this modern descendent of the U.S. Commission of Fish and Fisheries manages aquatic resources on more than 685 million acres within 5 Pacific and Atlantic marine national monuments. Although the U.S. Fish and Wildlife Service's employees, habitat, and mission have grown and evolved over the last century and a half, its ultimate goal has remained to ensure our rich American fish and wildlife resources are enjoyed by future generations.

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A Fisheries Legacy: 150 Years of Fisheries Work

April Gregory, *National Fish and Aquatic Conservation Archives, U.S. Fish and Wildlife Service, and History Committee Member*

Fish started it all. This isn't a fish tale; our agency started with fish. Fish have also always been important to the United States, first as food and trade, but also recreationally and economically. So, it should come as no surprise that our nation's very first federal conservation agency was focused on fish.

In 1871 Congress established the U.S. Commission of Fish and Fisheries. At the time of the Commissions' creation in 1871, America was not a leader in conservation, at least, not yet. In fact, by the 1890s, market hunters reduced the once prolific passenger pigeon from millions, possibly billions, to only hundreds. It was extinct by 1914. Yet while Americans were still "taming the West" and exploiting resources, East Coast and Midwest fishermen saw declines in the fish populations they depended on for food and for their livelihoods. Much of the support and pressure for the Commission came from fishermen. Scholars and intellects, who enjoyed fishing as a pastime, also noticed the declining fish populations. Public support for such an agency had been growing for some time—and some states had established their own state fish commissions as early as 1855. Independent writers penned thoughts on fisheries protection, and politicians, such as George Perkins Marsh and Robert Barnwell Roosevelt, also brought the topic into popular thinking. Robert Barnwell Roosevelt, future president Teddy Roosevelt's uncle, helped draft the resolution that went before Congress creating the Fish Commission on February 9, 1871, setting the stage for the United States to become a world leader in conservation.

Robert Barnwell Roosevelt was an angler and early conservationist. A member of the U.S. Congress, he originated the bill to create the United States Fish Commission. He founded the New York State Fishery Commission in 1867, and was appointed 1 of the 3 fish commissioners, serving as fish commissioner for 20 years, 1868 to 1888, without a salary. Through the years he also served as president of the Fish Culture Association, the New York Sportsman's Club, and the International Association for the Protection of Game. Roosevelt is credited with influencing his nephew, Theodore Roosevelt, to become a conservationist. National Archives and Records Administration

Senecaville National Fish Hatchery (Ohio) staff knew how to transport fish in style. This September 1964 photo shows one fisheries employee weighing fish, while his co-worker prepares shipping containers in the back of an El Camino. National Fish and Aquatic Conservation Archives/USFWS

The Age of Discovery

Congress charged the Commission with studying and recommending management and restoration of fish. Congress also appointed Spencer F. Baird to serve as the first Commissioner and tasked him, for his first mission, to "ascertain whether any and what diminution in the number of food fishes of the coast and inland lakes has occurred." Baird—who also served as the Smithsonian Institution's

Hatchery workers demonstrate their dedication to working in all kinds of weather and landscapes to get the job done, as shown in this snowy 1934 photo. This fisheries employee worked at Eagle Cliff Fish Station (New Mexico). He is stripping eggs from a trout into an enamel pan. The eggs were then transported back to the hatchery to be hatched, grown out, and stocked. This task remains much the same today—the main difference from this photo to today is the man's wardrobe. National Fish and Aquatic Conservation Archives/USFWS

USFWS Fish and Aquatic Conservation employee Randy Brown gathers up a gill net for a day on the job in remote Alaska. Katrina Liebich/USFWS

Albert Spells holds an Atlantic Sturgeon. Spells is the Project Leader of the Virginia Fish and Wildlife Conservation Office (FWCO) in Charles City, Virginia. FWCO's are part of the Service's Fish and Aquatic Conservation Program: FWCO staff work with partners to conserve fisheries. Kelly Place

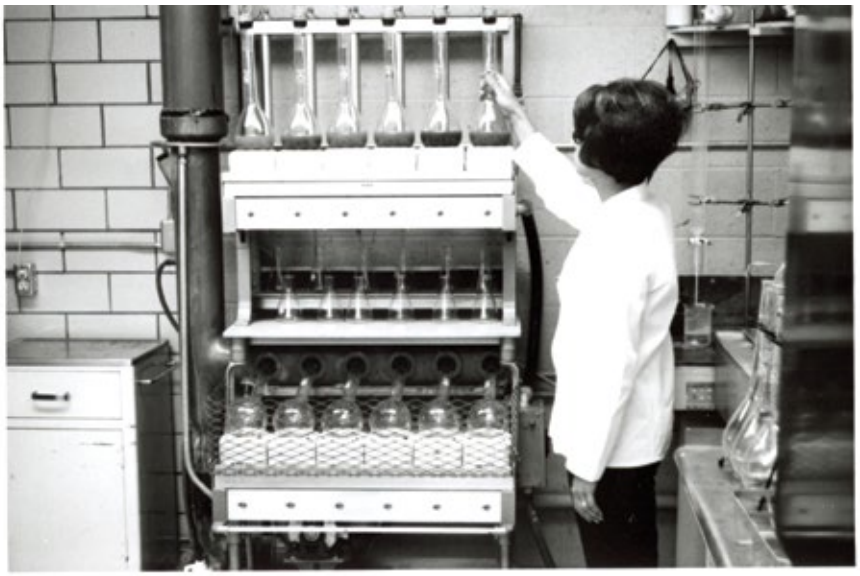
Assistant Secretary and was an internationally acclaimed scientist—was well-respected, keenly aware of the fishermen's concerns, and well positioned for the tasks at hand. He passed away in 1887, but he laid the groundwork for an agency that became a trusted source of fish culture information and a source of fish and fish eggs, not only for the United States, but the world.

As Commissioner, Baird led the exploration and study of the nation's fisheries, as much about them were unknown. He built special deep-sea research vessels, with labs and equipment, including the *Fish Hawk* and the *Albatross*. Biologists aboard the *Albatross* explored waters and conducted research along both coasts, in Alaska, and venturing as far as South America and Asia. The crew also patrolled and protected fur seal herds in Alaska from poachers, the origin point for later wildlife law enforcement efforts. In 1885, he built Woods Hole Laboratory as the nation's first marine science station—more would follow.

Beginning in 1872, the Commission built national fish hatcheries across the nation to raise and stock fish. This stemmed from Congress adding $15,000 to the budget for fish culture and distribution. To improve the transportation of fish for rearing and planting, the Commission developed fish rail cars, which crisscrossed the nation. Fish cars were modified rail cars, designed specifically for transport of fish to waterways across the nation. Fish rail cars remained in use until the early 1940s when trucks become more economical.

With nationwide transportation in place, fish native to the Pacific Northwest soon were swimming in the waters of New England, and vice versa. A large focus of the Commission was fish culture (breeding fish to increase and improve fish stocks) to introduce "useful food-fishes" throughout the country. Fish was an important, and cheap, source of food for a

The U.S. Fish Commission built its first hatchery, the McCloud Hatchery, in 1872 in California. It set the stage for successful salmon rearing and planting for more than 400 other fisheries facilities during the next 150 years. The Service renamed the McCloud Hatchery as the Baird Hatchery after the first Commissioner, Spencer F. Baird. After the installation of a dam, the former hatchery site now lies under the waters of Lake Shasta. National Fish and Aquatic Conservation Archives/USFWS



This 1969 photo from the McNenny National Fish Hatchery (South Dakota) shows a woman working on a study on fish food mixing and analysis in the laboratory. National Fish and Aquatic Conservation Archives/USFWS

growing nation. By 1880, the Commission's fish culture work was internationally famous: their exhibit on international fish culture won first place at the Berlin World's Fair. Many years later, the agency realized stocking readily raised game fish in American waterways was not desirable in all circumstances. In the decades that followed, fisheries personnel worked to reverse some of the early fish plantings to allow native species to thrive. But, in the budding years of the Commission, fish biologists did not know this and saw fish as a food source for the growing population.

An early Commission employee and a skilled fisheries biologist, Livingston Stone, advocated for protection of the Pacific salmon. He feared salmon could meet the same fate as bison. Stone recommended part of Alaska's Afognak Island be set aside. In response, in 1892, Congress established part of the island as a "Forest and Fish Cultural Reserve," our agency's first wildlife refuge, in 1892. Congress also voted to regulate Alaska salmon fishing in 1896 with closed seasons, net restrictions, and other requirements.

New Century, New Name

Not long after the establishment of the fish reserve in Alaska came name and organizational changes. Initially a stand-alone entity, Congress renamed the U.S. Commission of Fish and Fisheries as the U.S. Bureau of Fisheries (Bureau) in 1903 and placed it under the newly established Department of Commerce and Labor.

War inspired more change in how Americans consumed fish. The need to feed soldiers beef in World War I accelerated studies and efforts to promote fish as domestic food. Research into better ways of preserving, canning, and shipping fish increased, as well as promoting the nutritional values associated with eating fish. The Bureau worked with the War Department to promote "Eat Fish and Save Red Meat for the Soldiers." They even hired a cook, Evelene Spencer, who published a book with more than 1,000 fish and aquatic species recipes. A similar campaign was repeated during World War II.

In the 1930s, the Bureau tackled new challenges. Fish biologists began conducting research on salmon passage around new dams and water diversion projects. The

Mitch Adams, an employee at D.C. Booth Historic National Fish Hatchery and Archives, unloads trout into a lake on the Northern Cheyenne Indian Reservation in eastern Montana. D.C. Booth raises trout for various tribal nations in South Dakota and Montana. Stocking fish on tribal lands provides food and recreation in economically depressed areas. Mike Stracco/USFWS

Fish and Aquatic Conservation employees look forward to another 150 years of fisheries conservation work. Lisa Hupp/USFWS

In 1889, the U.S. Fish Commission established the Put-In-Bay Fish Hatchery on South Bass Island in Lake Erie. In 1941, the Service transferred it to Ohio. Early fish hatcheries often had nice homes for the superintendents, as can be seen in the background on this postcard. National Fish and Aquatic Conservation Archives/ USFWS

Bureau built several more fisheries labs and established an official "Division of Law Enforcement." In 1936 Rachel Carson was hired as a junior aquatic biologist in the Bureau. The Bureau continued to build national fish hatcheries, many with the help of the Civilian Conservation Corps or Works Progress Administration. The hatcheries played an important role by raising and stocking fish and through ongoing scientific research. Between hatcheries and research labs, such as those at Cornell University and in Leetown, West Virginia, fish biologists performed studies and gained knowledge on topics such as oysters, haddock, tagging methods, fish disease, fish nutrition, salmon returns, fish growth, and more. By 1939, the Bureau had made great strides in fisheries science, improved fisheries access around dams and water projects, and restored fish and other aquatic populations.

Merging Waters

On June 30, 1940, the Department of the Interior merged the Bureau of Fisheries with the Bureau of Biological Study to create the Fish and Wildlife Service (Service). In the 1970s, the Service created Fish and Wildlife Conservation Offices to protect, restore, and maintain the health of fish and wildlife resources. In the late 1990s, the Service created the Aquatic Animal Drug Approval Partnership Program, which obtains approval of medications used in fish culture and fisheries management from the U.S. Food and Drug Administration. The Fisheries Program also took on new responsibilities for addressing aquatic invasive species, also known as aquatic nuisance species.

Today, there are 70 National Fish Hatcheries, 9 Fish Health Centers, 7 Fish Technology Centers, 65 Fish and Wildlife Conservation Offices, a Historic National Fish Hatchery, and the National Fish and Aquatic Conservation Archives. The Service employees more than 700 fisheries personnel. They work long hours during weekends, holidays, government shut-downs, and even through the COVID-19 pandemic, to ensure the care and survival of more than 100 types of aquatic species onsite at hatcheries, and at other sites.

This very brief history barely touches on the events, personalities, mistakes, actions, successes, and victories of the last 150 years of the Service's fisheries history. Many challenges have been addressed. Many challenges remain. If the dedication, perseverance, creativity, and sheer hard work of the Service's Fisheries employees remains as strong and intact as it has during the last 150 years, our nations' fish and aquatic resources will continue to survive and thrive. It all started with fish. As Loren Eisley wrote, "If there is magic on this planet, it is contained in water." May that magic continue to inspire curiosity and future conservationists for the next 150 years. ■

Four major North American waterfowl flyways. Bob Hines/ USFWS

Migratory Birds – A Legacy of Conservation in the U.S. Fish and Wildlife Service

Robert J. Blohm, J. Bradley Bortner, Jerome R. Serie, David E. Sharp, *all Retired, U.S. Fish and Wildlife Service*

The importance of migratory birds to mankind has been recognized for millennia. Birds serve as sources of food, have both positive and negative impacts on agricultural activities, and provide other tangible benefits that add enrichment to our lives. Their presence and vitality in natural ecosystems have served as an indicator of the health of the environment around the globe. In this country, birds have been a constant source of enjoyment, bringing sound, color, and a sense of comfort to our lives—aesthetic and emotional qualities that have affirmed the importance of the natural world for so many of us. The recognition of their ecological and economic value among the countries that share this natural resource has been a driving force in developing sound conservation and management programs throughout the continent and beyond. In the United States, the federal government, namely the U.S. Fish and Wildlife Service (Service), has been at the forefront of those efforts for many decades.

Our agency's lineage goes back to 1871, with an early focus on fisheries and then fish hatcheries. Efforts on behalf of migratory birds can be traced back to 1885, when a $5,000 appropriation from Congress provided start-up funding for work on economic ornithology within the U.S. Department of Agriculture (USDA). Thus, began the government unit established to study our bird resources. Congress officially designated the unit as the Division of Biological Survey in 1896 and renamed it the Bureau of Biological Survey (Bureau) in 1905—the predecessor agency to the Service.

"There is probably no subject of Nature that has perplexed and intrigued man throughout the centuries as has the movement and flight of birds."

—ALBERT M. DAY, DIRECTOR, FISH AND WILDLIFE SERVICE, 1946-1953

At the beginning of the 20th century, concerns about declines in migratory bird species were widespread and growing. Market hunting of game species and excessive exploitation of many other species for the fashion trade, along with a lack of uniform enforcement of state wildlife laws, prompted several efforts to place all migratory birds under federal control. Congress passed the Lacey Act, in 1900, which prohibited the interstate sale of illegally taken wildlife, including migratory birds. The Weeks-McLean Act (1913), known as the first Migratory Bird Act, offered broader federal migratory bird legislation. However, its failure in the courts the following year further underscored the need for an international agreement or treaty. The signing of the Migratory Bird Treaty with Great Britain (for Canada) in 1916, followed by the passage of the Migratory Bird Treaty Act in 1918 as implementing legislation, finally established broad federal protections for migratory birds over a significant portion of North America. Other international treaties followed, including those with Mexico (1936), Japan (1972), and the Soviet Union (now Russia, 1976), along with various amendments over the years to these agreements. The Bureau, and later, the Service, spearheaded efforts for migratory birds, both nationally and internationally with other countries, on behalf of the U.S. government for the American people.

Prior to the signing of the Treaty, the Bureau was already working to support migratory birds, primarily in assuming responsibility for the sound management of reservations and refuges. When the Bureau began protecting colonial waterbirds at Pelican Island in Florida in 1903, it marked the beginning of the National Wildlife Refuge System. Additionally, efforts to understand birds and their habits were increasing, and the Bureau soon (1920) established the Bird Banding Office (later Laboratory) to provide oversight, as well as a repository, for increasing quantities of banding and recovery information. Personnel within USDA and the Bureau continued enforcing new laws and regulations as part of their federal trust responsibility.

Concern for declining waterfowl stocks during the 1930s, amplified by the extended drought across key breeding areas of the continent, spawned an expanded focus on migratory birds that lasted many years. By the end of the decade,

Figure 1. Photo of Frederick C. Lincoln at his desk. USFWS

Frederick C. Lincoln (1892-1960, Figure 1) began his career as a biologist with the U.S. Biological Survey (later Fish and Wildlife Service) in 1920. He is recognized for his work that focused extensively on trapping and banding migratory birds, including the improvement of field methods as well as development of systematic record keeping procedures for a growing body of biological information. As a result of his efforts, banding soon became a tool used broadly in wildlife research and management programs today, more than 77 million archived banding records and more than 5 million records of encounters are stored in the Bird Banding Laboratory. Lincoln also recognized the value of banding in estimating the abundance of some migratory bird populations. By using band recovery information (bands that were recovered by hunters and reported), along with actual harvest information, an index of continent wide waterfowl abundance could now be determined. This measure is widely known as the Lincoln Index (later known as the Lincoln Petersen Index), and the procedure has been refined and applied extensively over the years to other animal populations. In 1935, Lincoln conducted the first mid winter inventory of waterfowl from the air; this helped establish aerial surveys as a useful and effective platform for estimating their abundance and distribution. Finally, the flyway management system was an outgrowth of his work on north south travel corridors of waterfowl using band information. This concept has been in place since 1948 to help promulgate waterfowl and other migratory game bird hunting regulations and to administer management activities for other migratory birds. Because of his efforts, Frederick Lincoln is widely recognized as the "Father of the Flyways."

the Bureau had directed millions of dollars to benefit waterfowl and their habitats. New federal initiatives—including the Duck Stamp Program of 1934 and the Pittman-Robertson Act/Federal Aid (to state wildlife agencies) Program of 1937—joined those in the private sector, such as newly founded Ducks Unlimited (1937), to cooperatively preserve and manage waterfowl habitat. Ultimately, these efforts extended beyond waterfowl to many other wetland-dependent species of migratory birds. Furthermore, standardized surveys for monitoring waterfowl populations on the continent's wintering grounds were just beginning, thanks to the pioneering work of the Bureau's Frederick Lincoln. He recognized, early in the decade, the potential of fixed-wing aircraft as a wildlife management tool. The Bureau established a data-gathering culture that continues today, as evidenced by some of the best migratory bird monitoring protocols in the world. Overall, migratory birds became the beneficiaries. These were also changing times in the federal government. In 1939 the Bureau changed its home from the USDA to the Department of the Interior (DOI), and in 1940 merged with the Bureau of Fisheries to become the Fish and Wildlife Service. Later, in 1956, Congress organized the Bureau of Sport Fisheries and Wildlife (BSFW) and Bureau of Commercial Fisheries (BCF) within the U.S. Fish and Wildlife Service. Then in 1970, Congress moved BCF to the Department of Commerce, and in 1974, abolished the BSFW yet retained its responsibilities within the Service.

Following World War II, the Service accelerated its migratory bird work. In addition to expanding the number of national wildlife refuges across the American landscape, Service biologists paid more and more attention to the value of wetland habitats, especially small wetlands, to help mitigate the devastating impacts of the Dust Bowl days of the 1930s. Frederick Lincoln's work with waterfowl band recoveries revealed north-south migration corridors that, in 1948, became the basis of a flyway management system that still functions successfully. Coordinating bodies, or Flyway Councils, composed of state and provincial personnel, worked with the Service and other agencies to regulate the annual harvest of migratory game birds. The Councils also provided an effective administrative structure for cooperative management of many other migratory bird species. In 1955, the Service's Waterfowl Breeding Population and Habitat Survey Program became operational, following years of development by U.S. and Canadian biologists, and, today, it is the most extensive, long-term annual wildlife survey in the world. At the same time, large-scale banding operations for waterfowl soon extended across key breeding areas of the U.S. and Canada, serving as a source of information for management decision-making that continues today.

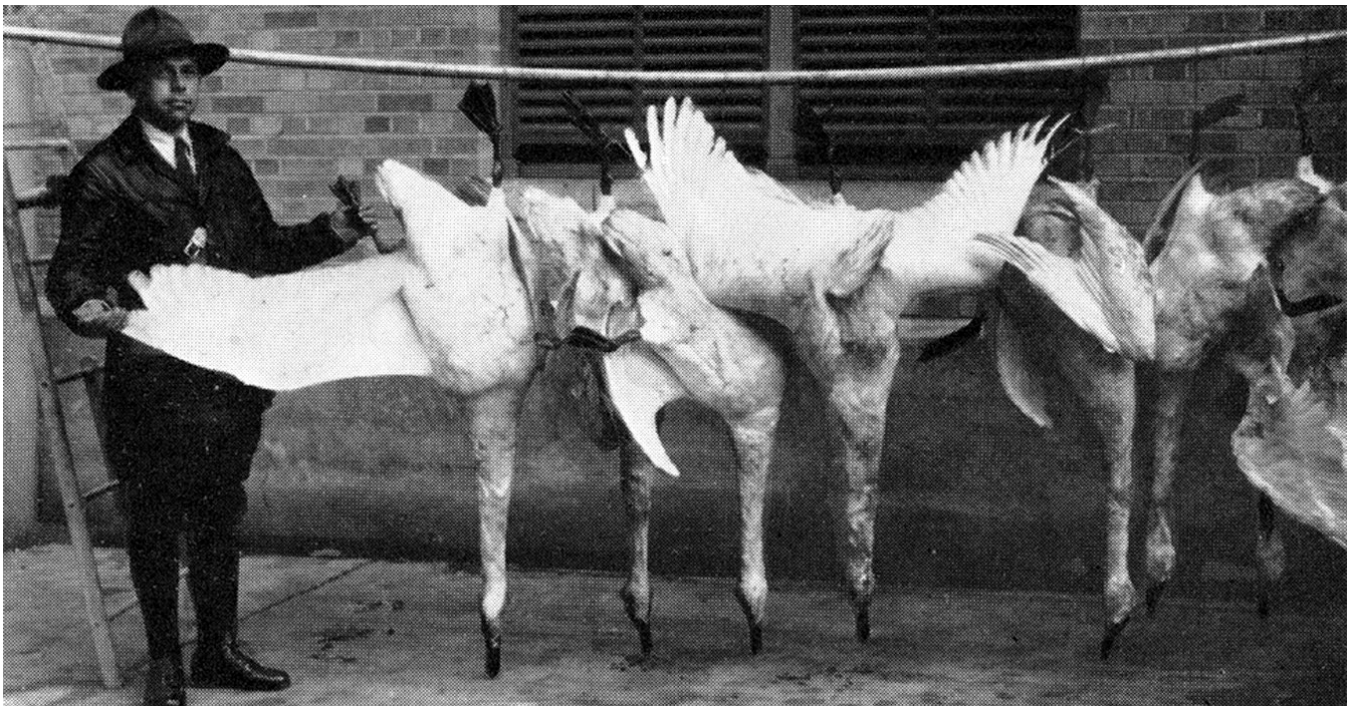
During the 1960s, the Service's wildlife research program

ramped up efforts to answer basic questions about migratory birds, their habits, habitats, and factors affecting the dynamics of their populations, including the role of pesticides, such as dichloro-diphenyl-trichloroethane (DDT), in the environment. The Service's own Rachel Carson published *Silent Spring* in 1962 and introduced the world to the dangers of chemicals to the health and safety of our environment, and to vulnerable migratory bird populations. Also, early in the decade (1961) the Service established the Migratory Bird Population Station (MBPS) within the Division of Research. Located at the Patuxent Wildlife Research Center in Laurel, Maryland, but supervised by Service Headquarters in Washington, D.C., the station's responsibilities merged specific research and management functions and focused on the dynamics of migratory bird populations throughout the continent. In 1965, the Service established another facility, the Northern Prairie Wildlife Research Center, near Jamestown, North Dakota, with primary responsibility for research and management of migratory birds. Its principal focus was directed towards waterfowl productivity of the prairie and parkland regions of the north central United States and Canada. It later expanded studies to Alaska and California. Work on waterfowl dominated much of the Service's effort, but biologists also concentrated on other species, such as migratory shore and upland game birds. New national monitoring programs for species such as mourning doves and woodcock came on board during the last half of the decade as a direct consequence of their efforts. And, in 1966, MBPS biologist Chandler Robbins launched the North American Breeding Bird Survey and enlisted qualified citizen scientists to help fulfill the agency's trust responsibilities for birds. By the end of the busy decade, the Service, including the migratory bird program, was a serious participant in the emerging field of electronic data management. This undertaking would gain momentum in the ensuing years as personnel digitized countless paper records of field data, such as banding and recovery information, along with survey data, some of which had been stored in dusty file cabinets for decades.

Partners in Flight logo.
Partners in Flight

The decade of the 1970s saw the creation of a more compartmentalized migratory bird program within the Service. Gone was the Migratory Bird Population Station (MBPS). In its place on the management side, in 1972, the Service added the Office of Migratory Bird Management (MBMO) to the organizational chart, combining elements and staff from the MBPS and the Division of Management and Enforcement, and including the Bird Banding Laboratory (formerly Office) at Laurel, Maryland, and other management sections. At the same time, on the research side, the Service created the Migratory Bird and Habitat Research Laboratory (MBHRL) from within the agency's Division of Wildlife Research, including staff from the MBPS. Located at the Patuxent Wildlife Research Center, this unit quickly expanded the Service's research capabilities

FWS Director Al Day on aircraft.
USFWS



Lacey Act Agent with confiscated Chesapeake Bay swans. USFWS

for migratory birds, including oversight of the MBPS's Accelerated Research Program for migratory shore and upland game birds. The lab remained a formal entity until 1981, when its functions and responsibilities were absorbed into other parts of the research division. Shortly after the split of management and research functions, the Service established Regional Migratory Bird Coordinator positions to complement MBMO staff and help coordinate an ever-growing workload, while also providing effective support for migratory birds at the regional, state, and local levels.

Soon after its organization as an office, MBMO staff embarked on a comprehensive review of the entire process for establishing migratory game bird hunting regulations, culminating in an environmental impact statement on sport hunting of migratory game birds that was widely reviewed by the public during the drafting process. This document, published in 1975, became the foundation for ensuring that resource agencies and organizations and the public had ample opportunities for involvement in the annual regulations-setting process. At the same time, biologists and staff coordinated an in-depth assessment by outside survey statisticians of the spring waterfowl breeding ground survey that had become operational 2 decades earlier. This would be the first of many comprehensive reviews of field programs to ensure that managers had reliable information to make informed decisions for migratory birds each year.

With the reorganization, a new era for the agency's migratory bird efforts began, following almost a century of dedicated work on behalf of migratory birds. In the nearly 50 years since this formal beginning, MBMO (now the Division of Migratory Bird Management), along with counterpart offices in each of the Service's Regions, has been the face of the agency's efforts to manage a challenging natural resource that, in reality, has little regard for geo-political boundaries during its travels throughout the year. Not surprisingly, some programs that dominated the Service's previous efforts on behalf of migratory birds in the old organizational structure continued, but changes were on the horizon in the years ahead.

The following decade of the 1980s saw the passage of the Fish and Wildlife Conservation Act (1980), which laid the groundwork for more emphasis on nongame bird management that had started during the previous decade by the fledgling management office. It also marked the establishment of the North American Waterfowl Management Plan. Representatives of the Canadian and U.S. governments signed this landmark agreement in 1986 with its focus on waterfowl habitat conservation through on-the-ground partnerships called Habitat Joint Ventures. These were soon followed by a smaller number of Species Joint Ventures. Under the direction of the Service's North American Waterfowl and Wetlands Office (later, administered by the Division of Bird Habitat Conservation), the Plan evolved into a working model for other groups of migratory birds, including nongame birds, dependent on wetland and associated upland habitats. The North American Wetlands Conservation Act (NAWCA), passed in 1989, became a key source of federal cost-share funding for habitat restoration

efforts under the Plan. On the ground, Canadian and American biologists jointly undertook the Stabilized Regulations Study in the early to mid-1980s. The Study would answer many longstanding research and management questions on waterfowl. International cooperation would continue to grow as more opportunities with other countries became available to work on other shared bird initiatives.

In the 1990s, the migratory bird program continued to adapt. Portable laptop computers replaced desktop computers, which arrived in offices during the previous decade. Their versatility and computing capabilities facilitated data entry and analysis by biologists in the field, and in the office, and provided new communication avenues among staff. However, news early in the decade that the DOI would transfer the agency's research function, along with other selected responsibilities, to another part of the Department tempered the excitement that surrounded the digital age and the advantages it offered to program biologists, and ultimately to birds. Following a transfer to the newly created National Biological Survey in 1993, the Service's major research centers, cooperative research units, the Bird Banding Laboratory, the Breeding Bird Survey, and the National Wildlife Health Center, along with their longstanding emphasis on migratory bird work, found a permanent home in 1996 within the U. S. Geological Survey (USGS). Thankfully, bird research continued uninterrupted at centers and cooperative units around the country, and the laboratories provided sustained quality service to the ornithological community, despite these challenging circumstances. The resolve of research and management staff, irrespective of their agency home, to find answers in support of bird conservation would remain unbroken.

Also, in the early to mid-1990s, the Service spearheaded the development and implementation of Adaptive Harvest Management as an accepted process to optimize regulatory choices for harvesting waterfowl. It also structured how biologists would apply knowledge gained each year and learn more about the dynamics of hunted bird populations. Later in the decade, the Migratory Bird Harvest Information Program (HIP) replaced the Service's longstanding harvest survey that was based solely on hunters who had purchased a Federal Duck Stamp. Since then, HIP has provided more reliable estimates of harvest and hunter activity while sampling hunters of all migratory game birds, including the webless species. For migratory birds not hunted, the emerging nongame bird program quickly gained momentum with the hiring of more nongame bird specialists, and additional funding within the migratory bird program brought much-needed visibility and attention to this group of birds. The creation of the Partners in Flight initiative at the start of the decade and the passing of the Neotropical Migratory Bird Conservation Act in

Figure 2. Grumman Goose aircraft in northern boreal forest region. USFWS

Figure 3. The Kodiak, newest addition to Service aircraft fleet. Tim Bowman/USFWS

Starting with the use of fixed wing aircraft as a means of censusing waterfowl on wintering grounds in the 1930s, the Service's aircraft program has grown into a highly effective wildlife management tool used around the globe. After World War II ended, the availability of surplus military aircraft, such as the Grumman Goose (Figure 2), and biologists who had served as pilots in the military, offered a tremendous opportunity to design a survey for counting breeding waterfowl, especially in remote areas of North America. In the late 1940s, these pilot biologists, along with biologists on the ground, conducted experimental surveys in selected areas. Then, in 1955, they began the operational breeding ground waterfowl surveys that covered Alaska, western and northern Canada, and the north central United States. Today, with a cadre of highly skilled flyway biologists/pilots, this survey encompasses more than 2.0 million square miles, has extended into eastern Canada and the northeastern United States, and it involves the use of specially designed fixed wing aircraft (Figure 3), helicopters, and ground crews. The use of aerial survey methodology has also provided estimates of abundance of some migratory birds on key migration and wintering areas of the continent, particularly Mexico. The survey continues to promote international cooperation among the countries responsible for the welfare of this shared natural resource. Recent innovations in remote sensing, in flight data processing, and drone technology will open new doors of opportunity for tracking the abundance and distribution of migratory birds on this continent and around the world.

Bureau of Biological Survey biologist, Frederick Lincoln, banding a duck in the 1920s.
Bureau of Biological Survey

2000 provided ample opportunities for new program staff to interact with avian biologists throughout North, Central, and South America on behalf of migratory birds.

Since the turn of this century, the Service's migratory bird staff has not only improved program function and reliability but focused their reach to new landscapes and audiences. The Service advanced these efforts in the early 2000s when, after being the wildlife part of Refuges and Wildlife for many years, the Service made the Migratory Bird Program a separate entity with its own assistant director. Since then, Adaptive Harvest Management has continued to evolve and benefit both the biological community and the hunting public. Moreover, under the direction of the North American Waterfowl Management Plan, the conservation of wetland and upland habitats has grown to unprecedented levels and has unquestionably improved the outlook for countless migratory bird species across the continent.

Hunters wade through the wetlands while hunting for waterfowl on Lower Klamath National Wildlife Refuge, CA. USFWS

Additionally, migratory bird staff oversight of the Service's Duck Stamp program has ensured that annual Duck Stamp dollars continue to support the acquisition and protection of wetland habitats and the purchase of conservation easements for the National Wildlife Refuge System. Coordinated efforts with others in the avian conservation community have resulted in the development and implementation of management strategies that focused not only on birds in decline, but also those—such as snow geese and double-crested cormorants—whose populations were becoming overabundant and problematic. Collaborative programs, such as Urban Bird Treaties, International Migratory Bird Day, Partners in Flight, and the North American Bird Conservation Initiative, among others, continued to engage agency biologists and managers with other cooperators, especially the public, on behalf of all birds. Recently, incidental take (where birds are unintentionally harmed during the course of carrying out an otherwise lawful activity) has increased in importance for program staff, particularly as man-made obstacles and other potential dangers have become more prevalent and impactful on the landscape. Eagles and their future management have received particular emphasis in light of increasing mortality risks and existing protection statutes. Finally, technological advances of all kinds continue to facilitate changes in survey methodologies and analytical capabilities, all leading to a greater understanding of bird populations and improvements in conservation programs.

Overall, the migratory bird program has a long and storied past, and an unknown but certainly important future, as it grapples with challenges that face our changing world while striving to manage and protect this unique

natural resource. Like many other parts of the Service, the migratory bird program has undergone many changes in organizational structure and staffing over the years; yet its commitment to our migratory bird resource as a time-honored trust responsibility has been unwavering. Many significant milestones have marked its success along the way, supported in countless ways by dedicated staff, some of whom have devoted their entire careers on behalf of birds.

In celebrating the Service's long history, we need look no further than its emblem to grasp how important migratory birds have been to the agency. Although relatively recent in its creation, the Service's widely recognized design nevertheless captures not only the importance of migratory bird work in the early, formative years of the agency, but also reflects the relevance and value of migratory birds to its mission 150 years later. Yet, migratory birds remain extremely vulnerable to a multitude of threats related to human activities, including climate change, despite treaties, laws, and regulations enacted for their protection and a remarkable history of conservation and management activities on their behalf. A recent large-scale study indicated that as many as 3 billion birds, nearly 30% of the continent's avifauna, may have perished on the continent in the last half century—a staggering loss! The agency's emblem serves, therefore, as a constant reminder to all of us, not only to the Service and its conservation partners, but to all those who enjoy this remarkable resource, that there is so much work yet to be done on behalf of birds. The success of these efforts in the years ahead will ultimately depend, as it always has, on how broadly society supports their conservation and invests in their welfare—a sentiment about public ownership of bird conservation already recognized by Frederick Lincoln more than 80 years ago: "*The effectiveness of these conservation laws, however, is increased in the same measure that the people of the country become acquainted with the facts in the life histories of the migrants and interest themselves personally in the well being of the various species… The economic, inspirational, and esthetic values of these migratory species dictate that they be permitted to continue their long-accustomed and still mysterious habits of migration from clime to clime.*"

A flock of Snow Geese in flight at Valle de Oro National Wildlife Refuge, NM. Wenshu Chen/USFWS

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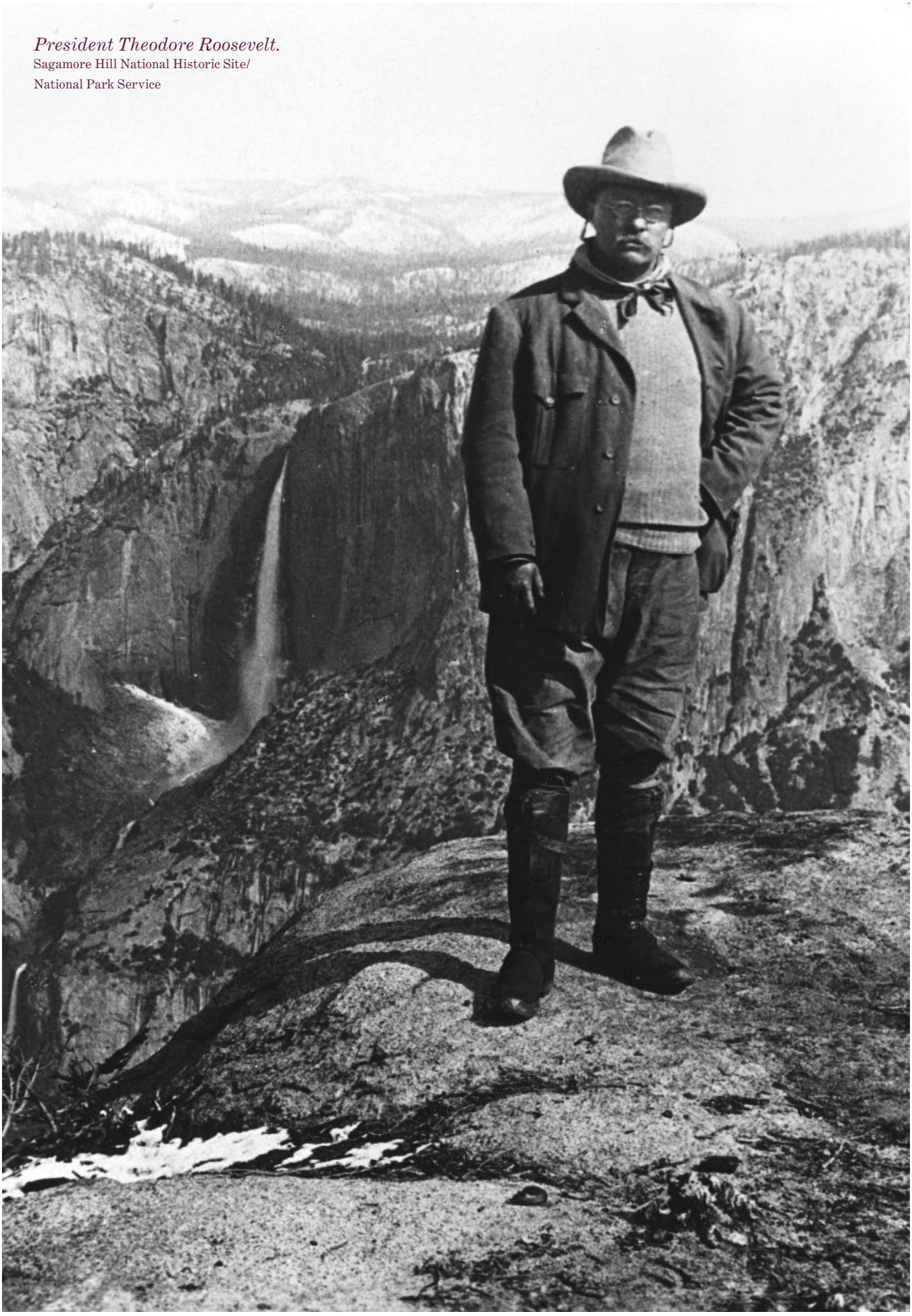


President Theodore Roosevelt.
Sagamore Hill National Historic Site/
National Park Service

The National Wildlife Refuge System: America's Best Kept Secret

Paul Tritaik, *History Committee Member, Retired, U.S. Fish and Wildlife Service*

On March 14, 1903, President Theodore Roosevelt (TR), after cajoling by his luminary Audubon friends William Dutcher and Frank Chapman, as well as his Bureau of Biological Survey liaison Theodore Palmer, convened members of his cabinet to confront the dilemma of the brown pelican's pending demise at their last known rookery on Florida's east coast, a small 5-acre avian oasis called Pelican Island. He asked if there was any law preventing him from declaring Pelican Island a Federal Bird Reservation. Upon hearing none, he said, "I so declare it!" Thus, was born the first national wildlife refuge.

Prior to protecting Pelican Island for the pelican's intrinsic value, there were several federal actions to set aside land to conserve wildlife for economic purposes. In 1868, President Ulysses S. Grant protected the Pribilof Islands in Alaska as a reserve for the northern fur seal and to protect the nation's economic interests in the management of fur resources. In 1892, President Benjamin Harrison created, by Executive Order, the Afognak Island Forest and Fish Culture Reserve in Alaska, to protect sea otters, sea lions, salmon, and other fish and wildlife.

National attention turned towards the plight of migratory birds at the turn of the 20th century. To control plume hunting, the American Ornithologists' Union or AOU (now the American Ornithological Society) and the National Association of Audubon Societies

Paul Kroegel. George Nelson/USFWS

William L. Finley. National Audubon Society

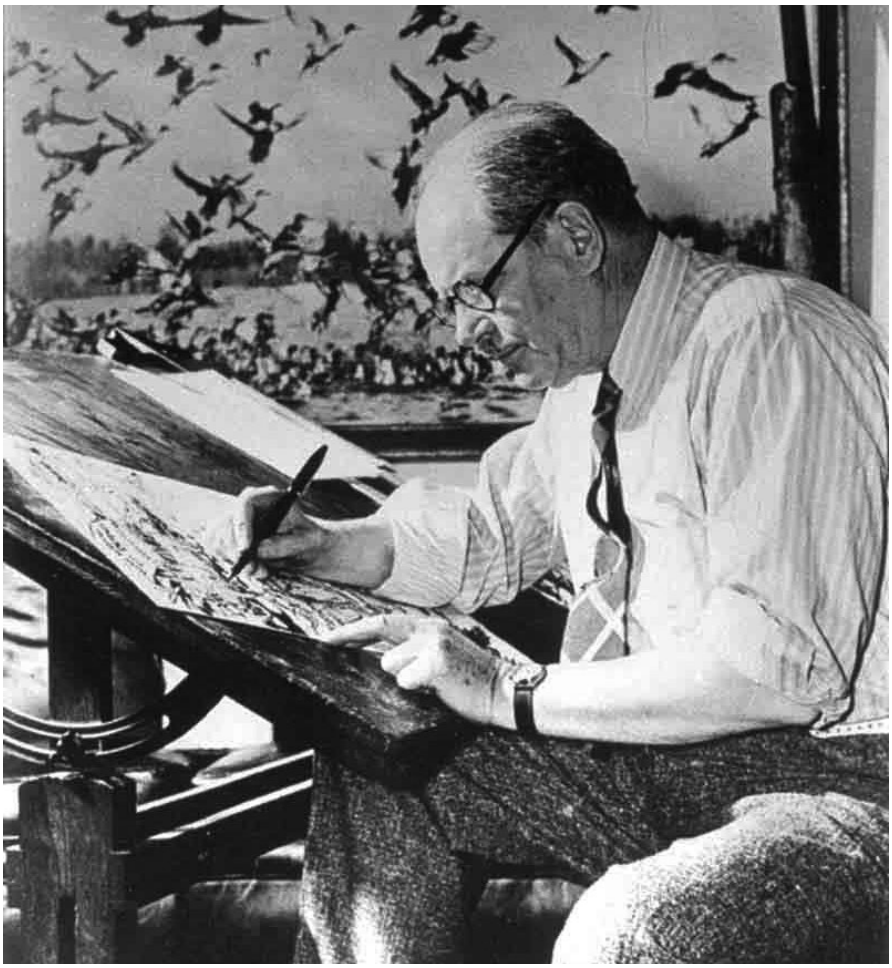
(now the National Audubon Society) pushed for passage of the Lacey Act in 1900, which provided federal authority to protect wildlife from illegal interstate commerce as well as trade in all illegally taken wildlife. They then persuaded 11 state legislatures to pass AOU Model Laws in states under siege from plume hunters, including Florida, in 1901. These organizations then employed Audubon wardens to protect rookeries, like Guy Bradley in the Everglades (the first conservation martyr who was murdered by a plume hunter) and Paul Kroegel at Pelican Island, who became the first federal wildlife warden and refuge manager.

TR continued to rely on the expertise of the AOU and the Audubon Societies to recommend other refuges, like Breton National Wildlife Refuge (NWR) in Louisiana (1904), Passage Key NWR in Florida (1905), Shell Keys NWR in Louisiana (1907), and Key West NWR in Florida (1908) for the protection of colonial waterbirds and waterfowl. On the Pacific coast, TR consulted with intrepid wildlife photographer and conservationist William L. Finley to protect seabird populations from exploitation for their eggs, feathers, and guano. Such remote rocky rookeries as Three Arch Rocks NWR in Oregon (1907), Quillayute Needles NWR in Washington (1907), and Farallon NWR in California (1909) were set aside to protect imperiled seabirds. TR even reserved the far-flung coral atolls of the Hawaiian Islands in 1909 (Hawaiian Islands NWR) to protect endemic species like the Laysan albatross and Laysan duck. Establishment of Lower Klamath NWR in California (1908), the first refuge created on a Bureau of Reclamation reservoir and the first waterfowl refuge, followed by Malheur NWR in Oregon 10 days later, resulted in the protection of extensive wetlands essential for colonial nesting birds and other migratory birds. Photographs taken by Finley and his partner Herman Bohlman played an important role in supporting the establishment of Three Arch Rocks, Lower Klamath, and Malheur NWRs.

TR's commitment to wildlife protection was vast, setting aside

William T. Hornaday. Smithsonian Institution Archives

President Franklin D. Roosevelt. UPI/Bettmann Archive



Jay N. "Ding" Darling. USFWS

land from Culebra NWR in Puerto Rico (1909) to the Pribilof Islands NWR (incorporating Grant's earlier reserve) and the Yukon Delta NWR in Alaska (1909). By the end of his administration in March of 1909, TR had issued 51 executive orders that established bird reservations in 17 states and 3 territories and helped ensure bird populations would survive the millinery menace.

Congressman John Lacey (author of the Lacey Act) helped give TR and the Biological Survey additional authority to create and manage game and bird reservations by passing the Game and Bird Preserves Protection Act in 1906 to provide regulatory authority on game and bird reservations, making it a crime to disturb birds or their eggs on these refuges, and to provide establishing authority for refuges.

TR, whose interest in wildlife was not confined to birds, expanded his focus to protect imperiled big game. Working with zoologist William T. Hornaday of the American Bison Society (ABS), Roosevelt established the Wichita Mountains Forest and Game Preserve (now Wichita Mountains NWR) in Oklahoma (1905) from the existing national forest to restore American bison to this ancestral grazing ground. In 1908, TR again worked with the ABS to create the National Bison Range in Montana to re-establish a herd of bison, using the authority of the Game and Bird Preserves Protection Act (which was the first time Congressional authorization was used to purchase lands for a wildlife refuge). The ABS provided 15 bison to Wichita Mountains (shipped by rail from the New York Zoological Park) and provided 40 bison to the National Bison Range. These actions helped prevent the extinction of the iconic American bison and preserved an essential cultural connection for Native Americans.

President William Howard Taft continued TR's legacy by establishing the National Elk Refuge in Wyoming (1912) to prevent winter starvation and protect one of the last large herds of elk from being killed for their prized teeth. Homesteaders and their livestock encroached on the traditional winter range of the herd, meat hunters took a toll, and "tusk hunters" shot elk just to extract the canine teeth to sell to use for watch fobs and necklaces. Then in 1913, Taft emulated TR's bold actions by setting aside 2.7 million acres of the vast Aleutian Islands (now part of Alaska Maritime NWR) to protect seabirds, caribou, and sea otters.

In 1918, the Migratory Bird Treaty Act (MBTA) implemented the Migratory Bird Treaty of 1916 between the United States and

Great Britain (for Canada). It provided for regulations to control the taking of migratory birds, but more protection was needed on their breeding, wintering, and flyway grounds. In 1924, Congress established the Upper Mississippi River Wildlife and Fish Refuge in Iowa, Illinois, Minnesota, and Wisconsin to protect and manage wetlands along more than 260 miles of the Mississippi River. The Isaac Walton League ambitiously advocated for this endeavor, which required the cooperation of the Army Corps of Engineers to provide suitable waterfowl habitat to offset their dredging and damming activities. The first waterfowl refuge Congress specifically authorized and funded was the Bear River Migratory Bird Refuge in Utah (1928). Congress also funded the creation of marshes with water control capabilities to help reduce disease outbreaks like avian botulism in wildfowl, making Bear River the first great man-made waterfowl marsh.

In 1929, the Migratory Bird Conservation Act (MBCA) authorized the funding of managing and expanding the nationwide system of migratory bird refuges and created the Migratory Bird Conservation Commission to decide new acquisitions. The first migratory bird refuges established under the MBCA included Cape Romain NWR in South Carolina (1930), St. Marks NWR in Florida (1931), Swanquarter NWR in North Carolina (1932), and Blackwater NWR in Maryland (1933).

However, the focus on migratory birds at this time was not exclusive. In 1931, President Herbert Hoover established the Charles Sheldon Antelope Refuge in Nevada for the protection of the dwindling pronghorn. This was the culmination of a decade of work led by E.R. Sans of the Biological Survey, Charles Sheldon of the Boone and Crockett Club, and T. Gilbert Pearson of the National Audubon Society. This action, along with the establishment of the

J. Clark Salyer. USFWS

adjacent Charles Sheldon Antelope Range and the addition of Hart Mountain Antelope Refuge in Oregon (both in 1936), helped save the pronghorn on their summer and winter ranges. Forty years later, the agency combined the two units named after Charles Sheldon into Charles Sheldon NWR.

In 1934, with waterfowl populations plummeting from overharvest and rapidly disappearing wetlands during the Dust Bowl, President Franklin D. Roosevelt (FDR) selected a three-person committee (made up of wildlife management founder Aldo Leopold, Pulitzer Prize winning cartoonist Jay N. "Ding" Darling, and publisher and sportsman Thomas Beck) to recommend solutions to the waterfowl crisis. After 1 month of intensive work, they submitted a 27-page plan to FDR, recommending $50 million to purchase and restore up to 12 million acres of habitat for waterfowl, shorebirds, mammals, nongame birds, and upland game, aligned along the major flyways. FDR then quickly hired Darling to lead the Biological Survey to implement those ambitious recommendations, which was either magnanimous or shrewd, given Darling's public criticism of FDR's New Deal policies. They, of course, agreed on conservation.

Shortly after Darling's hiring, the Migratory Bird Hunting and Conservation Stamp Act (also known as the Duck Stamp Act) was passed and signed into law, providing a future revenue stream for acquiring land for refuges through the sale of Duck Stamps, the first of which Darling drew himself. The Federal Duck Stamp Program would raise more than $1.5 million to protect over 5.9 million acres of wetlands in the ensuing years. However, funding was not immediately available, so Darling cunningly leveraged a congressional amendment to re-allocate $6 million to initiate land acquisition and restoration. This included $2.5 million that needed to be spent within a year. FDR later remarked that, "Darling is the only man in history who got an appropriation through Congress, past the Budget and signed by the President without anybody realizing that the Treasury had been raided."

Needing someone to implement the program, Darling hired a young waterfowl biologist, J. Clark Salyer II, in July 1934 to travel across the country and select essential wetlands for acquisition and restoration. Salyer wasted no time, inspecting lands by day and driving by night, covering 18,000 miles in 6 weeks to draw up plans for 600,000 acres of new refuges. Salyer's efforts resulted in the creation of 55 new refuges during FDR's brief duck restoration period of 1934 to 1936, including Mattamuskeet NWR in North Carolina (1934), Lower Souris NWR (now J. Clark Salyer NWR) in North Dakota (1935), Red Rock Lakes NWR in Montana (1935, to help save the last trumpeter swans in 48 states), White River NWR in Arkansas (1935), Desert Game Range (now Desert NWR) in Nevada (1935), Swan Lake NWR in Missouri (1935), and Yazoo NWR in Mississippi (1936). Salyer's incredible pace would not have been possible without the assistance of equally indefatigable Realty leader Rudolph Dieffenbach. Over

his 27-year career, Salyer led the acquisition of more than 27 million acres, which is why he is often referred to as the "Father of the Refuge System."

The remarkable success of the land protection and restoration program was not enough for Darling, because he knew that illegal hunting was still rampant. Darling had only 28 game agents spread out across the country and Alaska, so he organized teams of agents to successfully bust poaching rings in the Midwest, California, and Maryland. This law enforcement strategy is still employed today. Darling also initiated the Cooperative Wildlife Research Unit program by convincing nine land-grant colleges and their respective state wildlife agencies, along with industrial leaders, to fund the scientific training of wildlife professionals led by unit leaders hired by the Biological Survey. The Cooperative Wildlife Research Unit Program was congressionally authorized in 1960 and has since expanded to 40 universities in 38 states, supporting research by more than 1,000 students and faculty each year.

"Ding" Darling left a legacy of administrative achievement that was uniquely complemented by his artistic talent in creating not only the first Duck Stamp, but also the "Blue Goose" as the symbol of the National Wildlife Refuge System. It is fair to say that Darling accomplished more for conservation in his brief 18-month tenure than anyone ever has in such a short period. However, Darling's conservation work was not done when he left the government. Just months later, he created an effective and lasting wildlife conservation coalition in the private sector now known as the National Wildlife Federation.

FDR not only relied on his outstanding appointees to implement his conservation programs, but he also took personal interest in acquiring some refuges like Okefenokee NWR in Georgia (1936), to protect the swamp's unique beauty and ecology, and creating the world's first national wildlife research station at Patuxent Research Refuge in Maryland (1936). FDR also prioritized the establishment of Aransas NWR in Texas (1937) to save the last 15 to 20 whooping cranes on their wintering ground and Kodiak NWR in Alaska (1941) to save the enormous Kodiak brown bear, which was once of interest to his fifth cousin, TR.

Ira Gabrielson. USFWS

In 1937, Congress enacted the Bankhead-Jones Farm Tenant Act to help farmers and farm workers, but it helped wildlife as well. By authorizing the purchase of degraded land and establishing wildlife refuges on them, the Resettlement Administration designated some of those lands for management as refuges, including Carolina Sandhills NWR in South Carolina (1939), Piedmont NWR in Georgia (1939), Necedah NWR in Wisconsin (1939), and Noxubee NWR (now Sam D. Hamilton Noxubee NWR) in Mississippi (1940). FDR dispatched the Civilian Conservation Corps (CCC) to these and nearly 50 other refuges throughout the country to plant trees, construct buildings, dams and bridges, and restore thousands of acres of land.

For several decades, the Bureau of Biological Survey remained in the Department of Agriculture and the Bureau (formerly Commission) of Fisheries in the Department of Commerce. In 1939, both bureaus were transferred to the Department of the Interior. In 1940, they merged to form the Fish and Wildlife Service (Service) with Darling's successor, Ira Gabrielson, appointed as the first Service Director. Then, in 1956, two bureaus were formed under the Service—the Bureau of Sport Fisheries and Wildlife (which included administration of National Fish Hatcheries, as well as National Wildlife Refuges) and the Bureau of Commercial Fisheries. The Bureau of Commercial Fisheries was later transferred in 1970 to the Department of Commerce and became the National Marine Fisheries Service.

The pace of refuge acquisitions slowed during World War II (1941-1945), but FDR's administration still found time to establish some iconic refuges such as Kenai Moose Range (now Kenai NWR) in Alaska (1941), Parker River NWR in Massachusetts (1941), Santee NWR in South Carolina (1942),

Olaus and Mardy Murie. USFWS

Chincoteague NWR in Virginia/Maryland (1943), Santa Ana NWR in Texas (1943), and Mingo NWR in Missouri (1944). President Harry S. Truman approved the establishment of Sanibel NWR, (now J.N. "Ding" Darling NWR) in Florida (1945), shortly after the war in response to personal appeals from Darling.

In 1956, the Fish and Wildlife Act established a national fish and wildlife policy and broadened the authority for acquisition and development of refuges for any wildlife. In 1957, Congress passed an act establishing the National Key Deer Refuge to protect the last of the endangered key deer. The Boone and Crockett Club funded a federal warden named Jack Watson, a giant of a man, to protect the tiny deer.

Congress passed an amendment to the Duck Stamp Act in 1958, to authorize the Small Wetlands Acquisition Program (SWAP) to acquire Waterfowl Production Areas (WPA) that are grouped into Wetland Management Districts. The first waterfowl production area purchased with Duck Stamp money was McCarlson WPA in South Dakota, which started a race against draining some of the nation's most valuable wetlands. Waterfowl production areas are called the "Prairie Jewels of the National Wildlife Refuge System" because nearly 95% of WPAs are in the Prairie Pothole Region of North Dakota, South Dakota, Minnesota, Iowa, and Montana.

In 1960, President Dwight D. Eisenhower approved the establishment of the Arctic National Wildlife Range (now Arctic NWR) in Alaska to protect a wealth of biodiversity and an unparalleled splendor of wilderness. This action crowned years of study and appeals for its protection led by esteemed biologists Olaus and Mardy Murie, award-winning author Peter Matthiessen, and nature-loving Supreme Court Justice William O. Douglas. The Arctic Wildlife Range then spanned 8.9 million acres, making it the largest national wildlife refuge in the system.

In 1962, Congress passed the Refuge Recreation Act, which authorized the recreational use of refuges when such uses did not interfere with the refuge's primary purpose. One of the most significant laws for wildlife refuges was the

Rachel Carson. Alfred Eisenstaedt/The LIFE Picture Collection/Getty Images

National Wildlife Refuge System (NWRS) Administration Act of 1966. This Act provided for the administration and management of all units in the NWRS including wildlife refuges, wildlife ranges, game ranges, wildlife management areas, and waterfowl production areas.

Some refuges were established, not as fee title owned lands, but as overlays to other federal lands. One unique example of this is Merritt Island NWR in Florida, established in 1963, through a cooperative agreement with the National Aeronautics and Space Administration (NASA). As an overlay to the John F. Kennedy Space Center on Cape Canaveral, the Merritt Island NWR protects a diverse array of wildlife, including the endangered Florida scrub-jay, under the shadow of rockets and space shuttles.

In 1964, the Wilderness Act, advocated by Howard Zahniser and the Muries, established the National Wilderness Preservation System. Since its passage, more than 20 million acres of wilderness have been designated on units of the National Wildlife Refuge System. The first Wilderness Area managed by the Service was designated by an act of Congress at Great Swamp NWR in New Jersey (1968).

On the same day that President Lyndon B. Johnson signed the Wilderness Act into law, he also signed the Land and Water Conservation Fund (LWCF) Act,

President Jimmy Carter. Deb Liggett/Alaska Magazine

Mollie Beattie. Walt Stieglitz/USFWS

first proposed by his predecessor, John F. Kennedy, to help preserve and develop access to outdoor recreation through revenue from offshore oil and gas. The LWCF has become the primary source of funding for land acquisition by four federal agencies—the National Park Service, U.S. Forest Service, Bureau of Land Management, and U.S. Fish and Wildlife Service. Since 1965, $11.4 billion has been appropriated for federal land acquisition, with $2.5 billion for the Service. One of the first refuges acquired with LWCF monies was Coastal Maine NWR (1966). This refuge was renamed the Rachel Carson NWR in 1970 to honor the scientist and author who spent much of her life along the Maine coast and sparked the environmental movement with her revolutionary book "Silent Spring."

The Endangered Species Act (ESA) of 1973, signed by President Richard M. Nixon, not only provided protection for endangered species, but also authorized the establishment of wildlife refuges to protect endangered species. More than 50 refuges have been added to the NWRS with the primary purpose of protecting specific endangered species (before and after ESA), many with the assistance of biologists from the Service's Ecological Services Program. Some of these refuges include Elizabeth Hartwell Mason Neck NWR in Virginia (1969) for bald eagles, Attwater Prairie Chicken NWR in Texas (1972), Hopper Mountain NWR in California (1974) for California condors, Mississippi Sandhill Crane NWR in Mississippi (1975), Hakalau Forest NWR in Hawaii (1985) for endemic forest birds, and Ozark Cavefish NWR in Missouri (1991). Florida has several such refuges including Crocodile Lake NWR (1979), Crystal River NWR (1983) for West Indian manatees, Florida Panther NWR (1989), Lake Wales Ridge NWR (1994) for endemic plants, and Archie Carr NWR (1991) for loggerhead, green, and leatherback sea turtles.

President George W. Bush, with Sylvia Earle and others, establishing the Papahānaumokuākea Marine National Monument, 2006. Eric Draper

In 1980, President Jimmy Carter signed the Alaska National Interest Lands Conservation Act (ANILCA) into law. This Act added 9 new refuges, including Alaska Peninsula NWR and Yukon Flats NWR, expanded 7 existing refuges, and added more than 53 million acres to the NWRS, including more than 27 million acres designated as wilderness. This Act alone nearly tripled the area of lands in the NWRS.

In 1993, Mollie Beattie was appointed by President Bill Clinton as the first woman to lead the Service. That same year, she designated Canaan Valley NWR in West Virginia as the 500th national wildlife refuge. This milestone helped highlight the scope of the NWRS, which began to garner broad interest from across the political spectrum for a unifying framework of purposes and uses, partially because of a legal settlement on incompatible uses in 1990. In 1997, Congress provided organic legislation with the passage of the National Wildlife Refuge System Improvement Act, which amended the National Wildlife Refuge System Administration Act of 1966. Flanked by a bipartisan coalition of legislation sponsors and supporters, President Clinton signed this Act into law. The Refuge System Improvement Act provided a new statutory mission statement and directed that the NWRS "administer a national network of lands and waters for the conservation, management and, where appropriate, restoration of the fish, wildlife and plant resources and their habitats within the United States for the benefit of present and future generations of Americans."

As the National Wildlife Refuge System entered the 21st century, President George W. Bush dusted off an old law to implement a new paradigm of conservation by setting aside vast oceanic areas to protect marine life under increasing threat. Using the authority of the Antiquities Act of 1906, President Bush created four marine national monuments in the Pacific Ocean, including Papahānaumokuākea National Marine Monument (NMM) (2006), the largest conservation area in the United States encompassing 582,578 square miles, and Marianas Trench NMM (2009), encompassing 95,216 square miles and including the third deepest point on Earth at about 6.6 miles. President Barack Obama continued this trend by setting aside Northeast Canyons and Seamounts NMM (2016), encompassing 4,913 square miles—the only marine national monument in the Atlantic Ocean.

The NWRS modernized in a few other ways as it entered its second century in the new millennium. Former military lands with valuable habitat were transferred to the Service to create refuges, like Caddo Lake NWR in Texas (2000), Vieques NWR in Puerto Rico (2001), and Mountain Longleaf NWR in Alabama (2002). The Service also began to emphasize partnering with private landowners to conserve working landscapes, while protecting essential habitat corridors and hydrologic integrity, enabling the Service to improve resiliency against climate change. Rocky Mountain Front in Montana (2006) and Everglades Headwaters in Florida (2012) are part of about a dozen such conservation and management areas established for this purpose.

Another new initiative to broaden our stakeholders is the Urban Refuge Partnership, which resulted in the establishment of Valle de Oro NWR near Albuquerque, New Mexico (2012). This is one of 90 such refuges in or near metropolitan areas that are considered urban refuges and include previously established refuges like America's First Urban Refuge, John Heinz at Tinicum NWR in Philadelphia, Pennsylvania (1972).

The most recent milestones may also be among the most consequential. The John D. Dingell Jr. Conservation, Management and Recreation Act was passed in 2019 to permanently reauthorize the LWCF and the Great American Outdoors Act was passed in 2020 to mandate funding of the LWCF at the full $900 million annual rate, as well as provide $9.5 billion over 5 years to reduce the backlogs of deferred maintenance projects on federal lands. Both were passed with overwhelming bipartisan support and signed by President Donald Trump, signaling once again the unifying appeal of fish and wildlife and land conservation.

For more than 100 years, the National Wildlife Refuge System and the Service have successfully rescued many species from the brink of extinction and ensured a diversity of wildlife. However, that diversity was not always matched by the diversity of the workforce in the Service. A more diverse leadership and workforce, that is reflective of the people it serves, will help usher in a new era of conservation that will continue to be relevant and engender bold new ideas and fresh perspectives along with the passionate commitment to conserve wildlife, that is the hallmark and heritage of the National Wildlife Refuge System.

As we celebrate the 150th anniversary of the U.S. Fish and Wildlife Service and honor our fisheries foundation, we can be proud that the National Wildlife Refuge System shares in that history. The NWRS now contains more than 560 national wildlife refuges in all 50 states and 5 U.S. territories as well as 38 wetland management districts and 5 marine national monuments, encompassing more than 95 million acres of land and 760 million acres of submerged oceanic lands and waters, and including 63 wilderness areas with more than 20 million acres of wilderness. Yet, despite this prodigious investment in conserving and preserving vital habitat for fish and wildlife species in the United States for perpetuity, and the lasting achievements of great conservation heroes who put it into practice, the National Wildlife Refuge System is still America's best kept secret.

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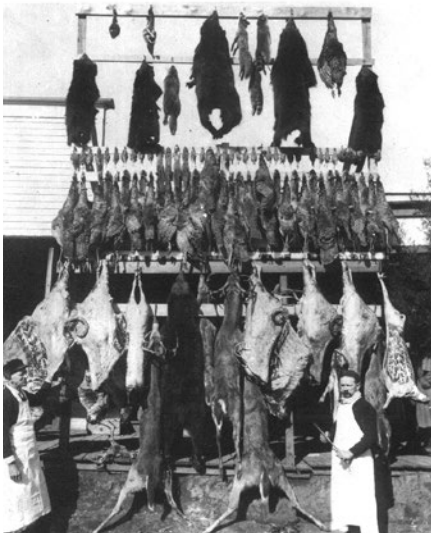
Audubon Warden and Bird Warden Paul Kroegel on Pelican Island Bird Reservation. USFWS

The Thin Green Line: 121 Years of Wildlife Law Enforcement

Mark Madison, *U.S. Fish and Wildlife Service Historian*

Law enforcement agencies often use the motto "to protect and to serve." Wildlife law enforcement might tweak that a bit as "to protect and conserve." For more than 12 decades, our wildlife officers have been at the forefront of the American conservation movement guarding our nation's wildlife heritage.

By the end of the 1800s, a number of sportsmen were becoming very concerned that our wildlife was being hunted to near extinction. They warned the extirpation of passenger pigeons and the near extinction of bison and many other game species foretold a desolate future for the American hunter. Sportsmen's groups like the Boone and Crockett Club decried the wasteful "game hogs" and "market hunters." Meanwhile bird lovers were equally dismayed (both aesthetically and ecologically) by the "feather trade" that was the height of female fashion.



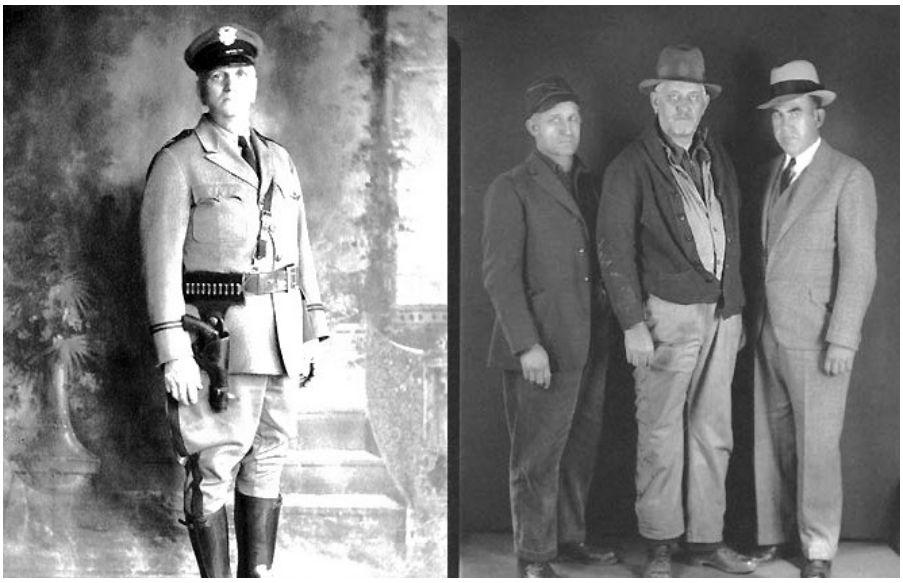
Market hunters with game for sale to restaurants. USFWS

It was in this lawless era that conservation groups began to take the initiative to combat wildlife destruction. Florida was the scene of some of the worst destruction and the Florida Audubon Society passed a Model Law in 1901 to protect birds. Shortly thereafter, a number of Audubon Wardens were hired to patrol for poachers. It was hard and dangerous work. Audubon Warden Guy Bradley was gunned down by poachers in the Everglades in 1905. Paul Kroegel was a contemporary of Bradley, an Audubon Warden who became our first Federal Bird Warden 1903 when Pelican Island was declared the first federal Bird Reservation. Kroegel was hired at $1 a month in 1903, to keep the poachers off Pelican Island. He put his 5'6" frame (made larger by a bushy mustache and big hat) and his 10-gauge double-barreled shotgun between poachers and Pelican Island. When poachers approached, Kroegel would rush to his boat to reach the island before the hunters. Warden Kroegel was the origin point for our ongoing work of Federal Wildlife Officers who maintain this tradition protecting wildlife and habitat and making refuges safe places for staff and visitors.

Protecting Bird Reservations and other early wildlife refuges was critical in the worst killing zones, but broader federal wildlife legislation was needed to protect

Game Management Agents circa 1930s. USFWS

wildlife that journeyed across borders. It was in this context, at the turn-of-the-century when market hunters and feather traders acted with impunity, that Congress passed the first encompassing federal wildlife legislation. The 1900 Lacey Act prohibited the importation of injurious wildlife and the interstate commerce in illegally taken game. Early Lacey Agents were technically called Inspectors for Interstate Commerce in Game, but because this title was so cumbersome, they were often referred to as Lacey Agents. Lacey Agents stationed themselves at rail terminals, ports, and other transport and poaching hubs to foil wildlife robbers.



U.S. Game Protector John Perry in uniform (left) and in disguise as "Dopey" (center right). USFWS

Migratory birds were some of the most endangered wildlife in the early 20th century and in 1913 Congress passed the Federal Migratory Bird Law (Weeks-McLean Act) and the first migratory bird hunting regulations were adopted on October 1. The stronger 1918 Migratory Bird Treaty Act made it unlawful to take, possess, buy, sell, purchase, or barter any migratory bird including feathers, parts, nests, or eggs. A number of states were already unhappy with federal regulation over migratory birds and fought federal jurisdiction. In 1920, federal Game Warden Ray Holland arrested Missouri Attorney General Frank McAllister for violating federal hunting regulations. The Supreme Court Case Missouri vs. Holland firmly and finally established federal control over migratory birds.

With the force of the Migratory Bird Treaty, federal wildlife law enforcement agents were officially called U.S. Game Wardens and unofficially known as Duck Cops. The Game Wardens had a dangerous duty approaching antagonistic and armed poachers.

Sadly, it was in this period of U.S. Game Wardens that our agency lost its first agent, Edgar Albert Lindgren, killed in 1922 at point-blank range by Iowa poachers.

The 24 federal Game Wardens across the nation in the 1920s used innovative techniques to thwart wildlife miscreants. During Prohibition, Al Capone's Chicago was a hotbed of bootleggers and "duckleggers"—smugglers of illegally taken waterfowl for upscale restaurants. In 1929, U.S. Game Protector John Perry went

Early law enforcement agent with confiscated guns and waterfowl. USFWS

undercover as a hobo named "Dopey" to infiltrate Chicago area poachers. It was the beginning of the agency's undercover operations, which persist to the present with Special Agents.

It was dangerous business working on ducklegger cases in the 1920s and perhaps nobody epitomized this more than Ken Roahen. Roahen entered the Biological Survey in 1924 as a Deputy Game Warden. His first assignment was Peoria, Illinois, rife with bootleggers, duckleggers, and illegal fur traders. As Roahen patrolled the marshes alone looking for illegal duck traps, he stumbled upon many armed guards of these illegal operations, and in his first 5 years he ended up in the hospital 6 times from being beaten and/or shot. Roahen summarized these early years in a 1934 letter to the Director of the Biological Survey Ding Darling.

It is a well-known fact, that during the above time, bribes totaling several thousand dollars were offered me to abandon prosecution in several of the big cases, as well as to close my eyes to the gang duck bootlegging rings, and upon my refusal, several attempts were made on my life, by shooting from ambush, three attempts were made to dynamite the Government boats on which I was sleeping, one automobile wrecked and another machine gunned while I was riding in them, and a final attempt was made to assassinate me in my own home in Peoria, Illinois. From the above-mentioned attempts on my life, I am today carrying scars of some eighteen surgical operations for the removal of bullets and other injuries and will remain more or less crippled for the remainder of my life.

The 1920s were a particularly dangerous era for Game Protectors. A combination of new (and sometimes unpopular) laws, large amounts of money to be made in the market hunting trade, and the bad character of many of those engaged in the trade made this a particularly violent era.

Game Warden Ken Roahen. USFWS

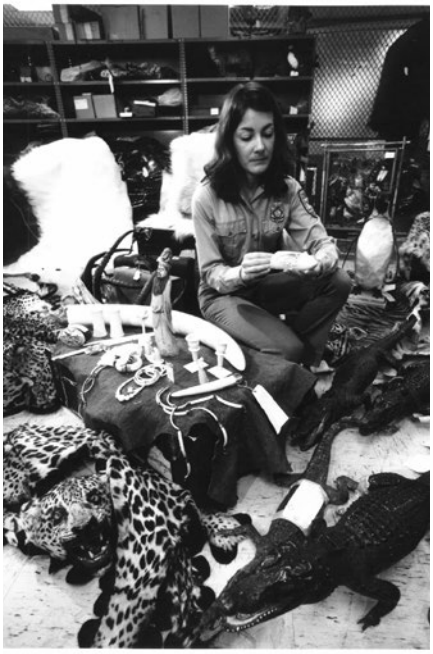
Jay "Ding" Darling purchasing the Duck Stamp which he illustrated in 1934. USFWS

Despite the work of Biological Survey Game Protectors, a combination of illegal hunting, the Great Depression, and the Dust Bowl further threatened our migratory birds in the so-called "Dirty Thirties." In the 1930s, migratory waterfowl numbers reached their lowest point. In 1934, two measures were taken to alleviate this. In that year the Migratory Bird Hunting Stamp Act became law requiring all waterfowl hunters age 16 and older to possess a "Duck Stamp." In conjunction with this duck decline, the Biological Survey finally established a Division of Game Management with responsibility for wildlife law enforcement. This was the predecessor of what became the Service's Office of Law Enforcement. From 1934 for the next 40 years, our officers were hereafter known as U.S. Game Management Agents. It was also the first time the Chief of the Biological Survey, Jay "Ding" Darling, was given a badge as an honorary law enforcement agent. Darling was dismissive of almost every award he won, saying giving "conservationists awards was like giving generals a medal for losing battles." Nevertheless, this honorary badge was actually one item he cherished his whole life and is currently displayed in the U.S. Fish and Wildlife Service (Service) Museum/Archives at the National Conservation Training Center.

The hard work of federal Game Management Agents managed to avert a duck disaster in these fowl times. However, other species began to be threatened in the decades that followed. In 1940 Congress passed the Bald Eagle Protection Act protecting our national symbol. In that same year, a governmental reorganization merged the Bureau of Fisheries with the Bureau of Biological Survey to create the U.S. Fish and Wildlife. After World War II, there was concern about increasing pressures on wildlife and in 1951, Service Director Al Day expanded the program in enforcement by moving funds out of waterfowl management into the Bureau of Game Management allowing a significant increase in agents.

Into the 1960s, Service law enforcement followed a familiar trajectory protecting primarily game species, with a strong focus on migratory waterfowl. However, in the late 1960s a series of endangered species laws expanded this circle of preservation exponentially ushering in the modern era of law enforcement. In 1969, the Endangered Species Conservation Act prohibited the importation into the United States of species "threatened with extinction worldwide." The Service's law enforcement role immediately expanded to the entire world and increased protections beyond birds and mammals to include reptiles, mollusks, amphibians, and crustaceans. The immediate beneficiary of this was the highly threatened American alligator, which was saved from the brink of extinction.

Law enforcement agents with illegal alligator skins in Newark, NJ (1974). USFWS



Wildlife Inspector with wildlife trafficking CITES violations. USFWS

The stronger 1973 Endangered Species Act expanded the scope of prohibited activities to include not only importation but also exportation, take, possession, and other activities involving illegally taken species and interstate or foreign commercial activities. It implemented protections for a new "threatened" category of species likely to soon become in danger of extinction. This greatly expanded the scope and role of our agents, and agency restructuring occurred in this new endangered species era. In 1972 the Service created the Division of Law Enforcement and, a year later in 1973, renamed our law enforcement agents as Special Agents in recognition of their newly expanded roles and responsibilities. This growing concern about globally threatened species reached its culmination in 1975 with the adoption of the Convention on International Trade in Endangered Species of Wild Fauna and Flora (CITES). CITES regulated the importation, exportation, and re-exportation of the large number of globally threatened and endangered species.

To meet this growth in global law enforcement, in 1975 the Division of Law Enforcement hired a biological technician to inspect wildlife shipments in New York—the beginning of the agency's Wildlife Inspectors program.

Having expanded protection to most of the world's animals, plants were next on the list for the nation's premiere wildlife agency. The 1981 Lacey Act amendments added stiffer penalties and more protection for migratory birds while introducing protection of plants for the first time. Then in 1982, the Endangered Species Act was amended to include a prohibition against the taking of plants on federal lands.

With the planet's flora and fauna broadly protected, individual species began to obtain additional protection with the African Elephant Conservation Act in 1988 and, a decade later, stronger protections under the Rhinoceros-Tiger Conservation Act.

Internally the Division of Law Enforcement began to update its infrastructure to meet new challenges. In 1989 the Service dedicated the National Fish and Wildlife Forensics Laboratory in Ashland, Oregon to provide scientific expertise to investigations—the CSI of wildlife conservation. In 1997 the Service moved the Division of Law Enforcement from under Refuges and Wildlife and placed it directly under the Service Director and renamed the Office of Law Enforcement (OLE).

As illegal wildlife traffickers became more sophisticated, so did our agents. In 2002 the Service converted OLE's Special Agents to the new criminal investigator job series. In 2009 the OLE initiated the Digital Evidence Recovery and Technical Support Unit. This added a full-fledged digital forensic laboratory and a highly technical covert surveillance equipment program to our law enforcement toolkit.

As their tools grew more complex, so did their investigations. In 2010 OLE began two major investigations. One was the Deepwater Horizon Oil Spill in the Gulf of Mexico. The second major case was Operation Crash, initiated due to an increase in international smuggling of rhino horn and elephant ivory. Operation Crash eventually tied transnational organized crime to wildlife crime—a sordid tradition going back to Al Capone's gang.

A 2013 Executive Order "Combatting Wildlife Trafficking" was followed by the Service's first Ivory Crush at the Wildlife Repository. This profile-raising event saw 6 tons of ivory, seized by OLE over 25 years, pulverized before the media, creating the Service's single most reported event in its history. A second ivory crush in New York's Times Square 2 years

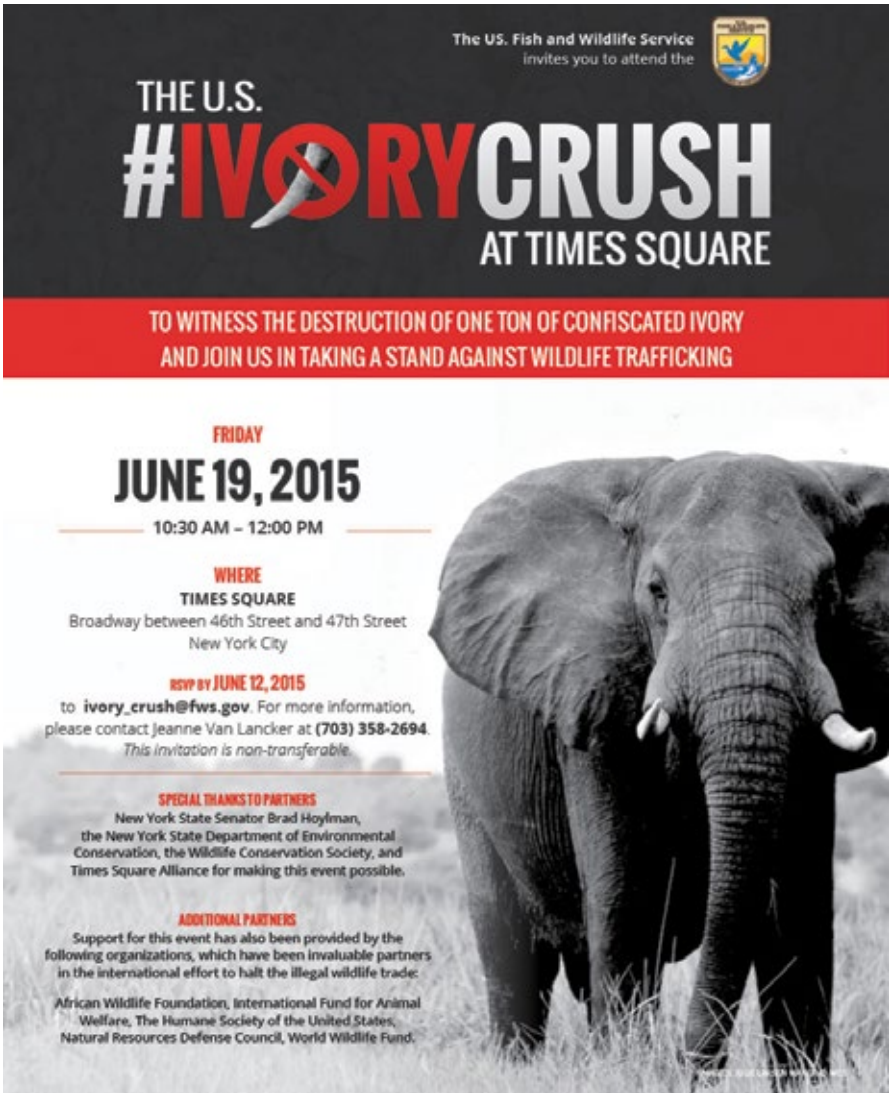
later with an international crowd of spectators led to similar ivory crushes around the world.

Following up on this international momentum to end wildlife trafficking, in 2016 the Service partnered with the National Association of Conservation Law Enforcement Chief to create the first International Chiefs Academy with the first cohort graduating from the National Conservation Training Center. Finally, in 2019, the OLE created the first Wildlife Interdiction Team encompassing Wildlife Inspectors across the nation dedicated to halting the illegal trade in wildlife.

In 2003, the Service established a new Manatee Refuge Officer Program to conduct manatee conservation efforts across the state of Florida. In 2012 these officers were brought into OLE, given expanded roles, and reclassified as Conservation Law Enforcement Officers, creating a third OLE team to join the existing Special Agents and Wildlife Inspectors. A four-legged OLE team was created in 2013 with the introduction of the first Wildlife Inspection Canine Teams trained to detective wildlife scents and teamed up with a human Wildlife Inspector partner.

The agency's law enforcement role has evolved in the last 120 years from reacting to poachers and plume hunters domestically to proactively disrupting transnational wildlife trafficking and organized crime rings. Since John Perry first dressed up as a hobo, the Service's Special Agents have developed sophisticated deep undercover operations using the most advanced intelligence tools. Since the Lacey Agents patrolled rail terminals, our Wildlife Inspectors both facilitate the billion-dollar legal trade in wildlife while elite inspector interdiction teams have broken cases like Operation Hidden Mitten, seizing more than 14,000 live mitten crabs from 137 illegal shipments. Although our federal wildlife officers' names, uniforms, and badges have changed over the last 121 years, the mission has remained to provide the thin green line that ensures wildlife is protected and safely enjoyed by all Americans. ■

Items confiscated in Operation Crash. USFWS



Flyer for Times Square Ivory Crush. USFWS

Dr. Louella Cable, the first female scientist hired by the agency, 8 years before Rachel Carson.
University of South Dakota Archives

Who was Louella Cable?

Ben Ikenson, *Former Employee, U.S. Fish and Wildlife Service*

This essay originally appeared in The Fisheries Blog, April 27, 2020.

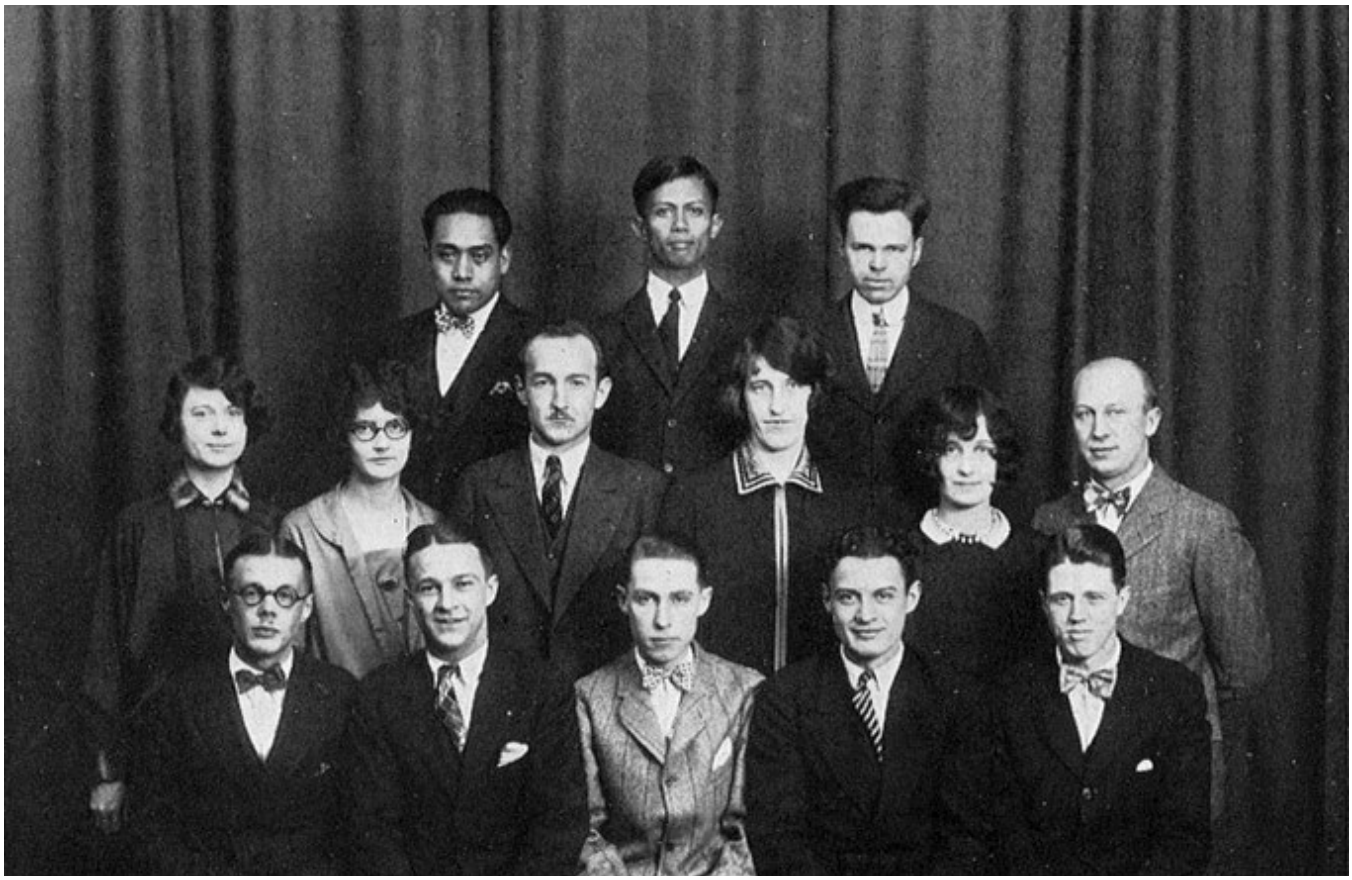
A Google search for "Louella Cable" produces some enthrallingly esoteric results, among the first, a publication available through Amazon, "Plankton (Fishery leaflet) Unknown Binding—January 1, 1966[1]"; or a 1967 prototype for digital fish-measuring calipers[2]; or, perhaps, the fish named in her honor, "Cable's goby,[3]" in 1933.

It's a somehow fitting tribute to Dr. Cable who was, above all, a devoted aquatic biologist—and the first female scientist hired by the U.S. Bureau of Fisheries, the predecessor of the U.S. Fish and Wildlife Service, in 1927.

"Louella was the consummate scientist," recalls Thomas Todd, a retired U.S. Geological Survey fisheries expert who began his life's work on Great Lakes whitefishes with Dr. Cable after she herself had retired from federal service in 1970. "When I was a young fisheries biologist, she was always generous to offer her ear and her expertise, which made a huge impression on me. The work we did together continued to provide fruitful research throughout my career, and we became friends for the rest of her life."

Born and raised in South Dakota, Louella Cable attended the University of South Dakota, where she became the school's first graduate student to study fisheries, earning a master's degree for her work on the foods of catfish.

A superb scientific illustrator,



Group photo of the 1928 University of South Dakota biology club with Louella E. Cable pictured on the far left, middle row. Louella Cable, middle row, far left, earned a master's degree at the University of South Dakota researching the diet of bullhead catfish. Parts of her thesis were later published by the U.S. Bureau of Fisheries. At her passing, she donated her estate of the university to endow a scholarship. University of South Dakota

Cable's goby (Eleotrica cableae). Artwork by Robert Householder

Cable spent her first year with the government sketching fish species at the federal biological laboratory at Beaufort, North Carolina. At the lab, she spent 5 years studying commercial fisheries with Dr. Samuel Hildebrand, a pioneer in the study of systematic ichthyology with whom she published several important articles.

Indeed, Hildebrand and Cable were at the forefront of early fish identification. According to records, in 1929, "twenty-four local fish species had been described 'more or less completely' through a series of drawings illustrating their stages of development. At the time, culture methods had not been developed to enable keeping fish eggs or early larval forms in aquaria through their development—so most of these early series were drawn from individual specimens caught from the wild at various times and at different stages of development."

In the summers of 1929 and 1930, Dr. Cable successfully reared several fish through their larval stages in the lab, a ground-breaking achievement for the study of early life history of fishes. During this period, she helped identify previously unknown larval stages of many species, including the spot, croaker, gray trout, menhaden, and pigfish.

In 1937, Dr. Cable joined the newly organized Atlantic Coast Shad Investigation Team in Charleston, South Carolina, where she worked for several years on various aspects

Charles (Chuck) Bronte, Director, Great Lakes Fish Tagging and Recovery Lab, USFWS. Andrew Muri/USFWS

of the ecology and early life history of the American shad.

In 1950, a decade after the U.S. Bureau of Fisheries became the U.S. Fish and Wildlife Service, she transferred to the Great Lakes Fishery Investigation Center, in Ann Arbor, Michigan, to study ciscoes of the Great Lakes. Here, in 1959, she earned a Ph.D. from the University of Michigan, studying the scales and growth of marked lake trout in Lake Michigan.

As with so much of her work, Dr. Cable's research in Michigan had profound and lasting impacts, according to Charles Bronte, director of the Service's Great Lakes Fish Tagging and Recovery Lab. "As a young Service biologist tasked with working on lake trout restoration, her publication (published the year I was born) on the validity of aging these fish with scales was one of the first papers I read. The level of detail and scholarship she devoted to such a seemingly mundane topic was a model for me to strive for."

Dr. Cable went on to write and illustrate several well-known publications on a range of ichthyology subjects throughout the remainder of her government career. And even after retiring from the U.S. Fish and Wildlife Service in 1970 at the age of 70, she remained active in her research and art, even mentoring protégés like Mr. Todd, the young biologist with whom she worked on issues pertaining to Great Lakes whitefishes. When she died in 1986, an annual scholarship fund was established in her name at her alma mater, the University of South Dakota, for promising undergraduate biology students.

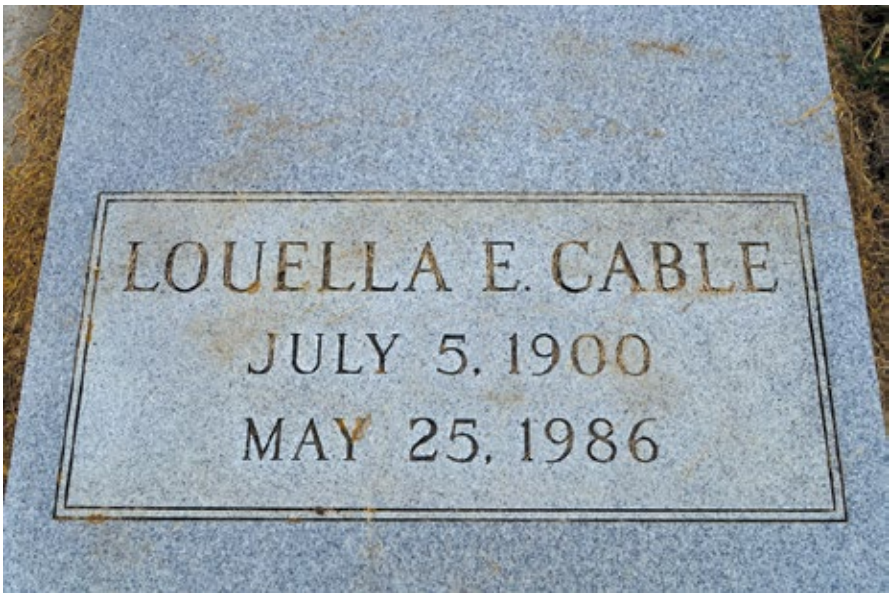
Editor's Note:
This essay appeared in the USFWS' *Open Spaces—A Talk on the Wild Side* blog on March 30, 2020 and on other platforms. A more detailed profile of Dr. Cable and her work appears in *America's Bountiful Waters: 150 Years of Fisheries Conservation and the U.S. Fish and Wildlife Service*, a book released in May 2021.

Endnotes

[1] Cable, L. E. (1966). *Plankton (Fishery leaflet) Unknown Binding—January 1, 1966*. Fishery Leaflet #583 United States Department of the Interior, Fish and Wildlife Service, Bureau of Commercial Fisheries, Washington, D.C. July 1966.

[2] Cable, L.E. (1967). "Digital caliper," in Publication of an Organization Other than the U.S. Geological Survey. Copeia series, v. 1967, issue 3, pp. 683-685.

[3] For taxonomic data about Cable's goby, see this Cabel's Goby link, https://tinyurl.com/y53j9tzl. ■



Louella E. Cable's gravestone. Dr. Cable lies at rest at Riverside Cemetery in Chamberlain, SD.
Tim Cook

Bureau of Biological Survey biologist, Frederick Lincoln, banding a duck in the 1920s.

Bureau of Biological Survey

The Evolution of Wildlife Research of the U.S. Fish and Wildlife Service

Matthew C. Perry, *History Committee Member, Retired, U.S. Fish and Wildlife Service*

The expeditions of Captain John Smith to eastern North America between 1580 and 1631 provide some of the earliest reports on the number and types of wildlife species that inhabited the land we now call the United States. Unfortunately, colonists, and later other immigrants, did not provide accurate, quantified information. The early reports, however, do provide anecdotal information on the vast numbers of wildlife that obviously existed here. Most reports appear to agree that some wildlife populations seemed inexhaustible, but then sadly, human exploitation exhausted populations of many species, and some species became extinct.

The explorations and writings of John James Audubon in the early 1800s provided a fairly good description of wildlife in the newly formed United States during this period. He stated that "innumerable ducks fed in beds of thousands or filled the air of Chesapeake Bay; and that great flocks of swans, looking like banks of snow, rested near the shores." Some authors reported that wildfowl up to 1860 had not been hunted much and were unmolested during the Civil War. But they reported that "from 1865 to 1890, the greatest natural home in the world for wild ducks has been nearly devastated of its tenants." Although some writers disagreed on when the decline began, there are numerous examples that indicate that mortality of wildlife before the Civil War was excessive.

Concern for the wildlife resources of the United States led to the appropriation of $5,000 by Congress in 1886 to study economic ornithology and forming the Division of Economic Ornithology and Mammalogy in the U.S. Department of Agriculture (USDA), emphasizing the interrelations of birds and agriculture. That seemingly tiny appropriation would form the seed for the beginning of the major arm of the U.S. government devoted to the scientific study, management, and regulation of the nation's wildlife resources. Research in fisheries preceded wildlife research in 1871 and readers should see the essay, "A Fisheries Legacy: 150 Years of Fisheries Work."

Upon the recommendation of the American Ornithologists Union, Dr. C. Hart Merriam, physician and lifelong student of natural history, became head of the new project. Subsequently the name changed several times to reflect the growing and changing mission of the division. On 3 March 1905, just 20 years after the date of the first appropriation, it became the Bureau of Biological Survey. It would remain that way until just before World War II in 1939, when the Bureau of Fisheries in the Department of Commerce was merged with the Biological Survey in the Department of Agriculture to form the Fish and Wildlife Service.

Edward Preble reported that thousands of whistling (now tundra) swans were killed on the breeding grounds for their down feathers. Resource exploiters removed eggs from nests for food and for use in making chemicals for the developing photographic industry, although the effect of egg removal on waterfowl numbers is not totally understood. Early in the 1900s, Theodore Roosevelt and John Muir expressed concern for our resources, but differed in the approach, with Roosevelt being an avid sportsman and assiduous ornithologist and Muir being a total protector of resources.

The great decline in waterfowl populations from over-harvest and loss of habitat essentially resulted in the need for aerial surveys, which began in the 1930s. Resource managers expanded surveys nationwide after World War II, when planes became more available, to include all waterfowl species to better document population status.

Although several conservation activities took place in the early 1900s, it was not until the 1930s that federal and state agencies initiated scientific wildlife management and research to support it. An interesting change in the relationship of humans and wildlife took place during the 1930s. Past emphasis of wildlife investigations in the U.S. Department of Agriculture (USDA) had focused on the adverse impact of wildlife on activities of humans, especially farmers. However, the long drought of the 1930s, coupled with decades of wetland drainage by humans, devastated North America's waterfowl and other wildlife populations. Thus, Americans were becoming more aware of the negative impact human activities were having on wildlife. It was appropriate, therefore, that in 1939 the Bureau of Biological Survey transferred from USDA to the Department of the Interior (DOI) and renamed as the Fish

Helen and Clark Webster banding a wood duck at Patuxent Wildlife Refuge, 1950s. Luther C. Goldman.

Researcher measuring the thickness of an eggshell with a micrometer to document eggshell thinning by DDT. USFWS

and Wildlife Service. Further reorganization in 1956 resulted in Congress re-designating the agency as the U.S. Fish and Wildlife Service (Service).

Although many biologists studied wildlife in the early 1900s, the focus was mainly descriptive regarding species behavior, food habits, and distribution. The publication of Aldo Leopold's book entitled *Game Management* in 1933 essentially established the wildlife management profession and the need for good science to support the management. Aldo Leopold became known as the father of wildlife conservation.

The formation of the nation's first wildlife research facility was one of many wildlife conservation activities taking place in the mid-1930s. On December 16, 1936, President Franklin D. Roosevelt signed Executive Order 7514, which transferred 2670 acres of land that had been acquired (or would be acquired) by the United States, to USDA as a wildlife experiment and research refuge. The Order delineated that the site be in Maryland "to effectuate further the purposes of the Migratory Bird Conservation Act." By order of the President the area became "the Patuxent Research Refuge."

Secretary of Agriculture Henry A. Wallace dedicated the Refuge on June 3, 1939, and stated, "the chief purpose of this refuge is to assist in the restoration of wildlife—one of our greatest natural resources." Secretary Wallace recognized "the vision and foresight of Dr. Ira N. Gabrielson, Chief of the Biological Survey." He further stated that the nation's first wildlife research station was "the manifestation of a national determination and a national ability to conserve and administer wisely the organic resources and products of the soil—a priceless heritage to the generations of Americans yet to come." Although Mr. Jay N. "Ding" Darling, former Chief of the Bureau of Biological Survey, was not mentioned in Secretary Wallace's address, many persons also credit his interest in the need for research and support for the formation of the Patuxent Research Refuge.

The location of the Patuxent Research Refuge, adjacent to the National Agriculture Research Center at Beltsville, Maryland, made it an appropriate area, according to Wallace, upon which to conduct "long-time studies on the interrelationships of wildlife with agriculture and forestry." Secretary Wallace and Dr. Gabrielson envisioned an area where wildlife could be studied in relation to the production of agricultural crops and where lands poorly suited for agriculture could be turned back into forests, fields, and meadows, thus again becoming productive for wildlife.

The formation of Patuxent was followed by other research facilities in the United States including Northern Prairie Wildlife Research Center in 1965, National Wildlife Health Center in 1975, and Alaska Science Center in 1975. Others were formed dealing with wildlife, but now have been reorganized with broader focus than just wildlife. There also are 40 Cooperative Research Units in 38 states as part of the Cooperative Research Units program established in 1935 at universities in the United States to enhance wildlife science graduate education.

Endangered species research began in the 1960s with bald eagles and whooping cranes and captive propagation programs attained international prominence. Biologists raised numerous bald eagles and transferred many hatchlings to nests in the wild to replace nonviable eggs. This program helped many states with their bald eagle restoration projects. The first whooping crane used in captive propagation was a bird injured on the breeding grounds in Alberta and was named Canus, to represent the close cooperation between Canada and the United States.

Pesticide research with dichlorodiphenyl-trichloroethane (DDT), which began in the 1940s, was broadened to include studies with other persistent chemicals. The publication of *Silent Spring* by Rachel Carson in 1962 created great concern in the country regarding chemicals and the effects their use was having on wildlife and humans. A breakthrough in DDT research occurred in 1969. Researchers at Patuxent Wildlife Research Center published results of research linking eggshell thinning with DDT in the food of birds. Research clearly indicated that DDT obtained in the food eaten by birds changed to dichlorodiphenyl-dichloroethylene (DDE), and then physiologically affected the process of calcium deposition on the eggshell of the birds' eggs.

Although scientists conducted initial eggshell thinning studies with mallards and black ducks, the findings had major implications with other species, especially fish-eating birds such as the brown pelican, osprey, and bald eagle. Consequently, researchers played influential roles by testifying during Congressional hearings on pesticides that eventually led to the 1972 nationwide ban of DDT and other persistent organochlorine pesticides. Numerous research studies were conducted with other pesticides and heavy metals resulting in efforts to mitigate the adverse effect of these pollutants.

Patuxent Wildlife Research Center[1]

Research expanded on the very controversial subject of lead poisoning in waterfowl, and studies with captive ducks showed how ingested lead shot from shotgun shells of hunters could easily become lethal to ducks. In addition, biologists conducted extensive tests with ducks comparing the lethal efficiencies of shooting lead and steel shot. These studies were the basis for the eventual ban of lead shot for waterfowl hunting, which came in 1991.

In March 1993, DOI Secretary Bruce Babbitt announced plans to form a new National Biological Survey that would combine all biological research and monitoring within DOI into one bureau, separate from existing management bureaus. In late 1994, the name of the National Biological Survey was changed to the National Biological Service to accommodate several concerns including that new research was not supporting historic "customers." In October 1996, the National Biological Service was terminated, and all research staff became part of the Biological Resources Division of the U.S. Geological Survey (USGS).

In recent decades there has been emphasis on research on other issues, such as climate change, epizootic diseases, urban wildlife, etc. Although USGS might take the lead for research on these areas, there are some crossovers to the Service and other agencies. At one time Service and USGS directors used to meet to discuss "emerging issues" and to see where resources should be directed. Hopefully, directors will continue this tradition in the future. In 2021, the Service celebrated their 150th anniversary with discussion about honoring and acknowledging their past, while also showing they are relevant in the future. This is an optimum time to highlight emerging/cutting-edge research areas with cooperation and collaboration among agencies.

The wildlife research period in the United States has been marked by long series of activities and events that sometimes have been disheartening, but many times have been very uplifting. The fact that wildlife is a renewable resource helps alleviate the past mistakes that humans have made. Our knowledge and passion for wildlife has aided humankind in pursuing programs that eventually show success. We can be proud of our conservation efforts, but we need to be mindful that renewable wildlife resources need habitat that is not renewable when it is lost to development. As human population numbers increase, and we continue to degrade and destroy habitat, rather than conserve and restore habitat, we will exacerbate the problems facing wildlife in the future. Research with wildlife has a major role in the future as it had in the past in understanding the problems facing wildlife and mitigating the negative impacts on wildlife.

Endnote

[1] In 2020, the U.S. Geological Survey combined the Patuxent Wildlife Research Center with the Leetown Science Center to create the Eastern Ecological Science Center.

■

Works Progress Administration (WPA) workers lay road gravel at Dexter Fish Cultural Station ca. 1936 from a GMC truck. National Fish and Aquatic Conservation Archives/USFWS

Historic Fisheries Station Waist-deep in Conserving Rare Southwestern Fishes

Craig Springer, *Wildlife and Sport Fish Restoration, Southwest Region, U.S. Fish and Wildlife Service*

This essay originally appeared in New Mexico Wildlife, Volume 62, Number 2, Winter 2020.

Certain places in our collective consciousness seem to exist because they have been the subject of books. The Four Corners belong to Tony Hillerman; the Gila River to Rev. Ross Calvin; and the Pecos Wilderness to the legendary conservationist and former director of the New Mexico Department of Game and Fish, Dr. Elliot Barker.

But no one ever wrote a book about Dexter, New Mexico.

You may have never heard of the little village that exists primarily to service dairy farms and ranches. Dexter sits in the shortgrass prairie in Chaves County, overshadowed by its taller sibling, Roswell, a mere 15 miles distant. State Route 2 bisects Dexter, lying pike-straight on a section line like a yellow-striped gray-black ribbon. Pivot-irrigation sprinklers spin slowly over the rich alfalfa fields that feed local dairy cows. Velvet-green crop circles dot the flat countryside and tilt gently toward the Pecos River that bends within walking distance.

Dexter's obscurity belies its significance in conservation. It is home to the U.S. Fish and Wildlife Service's (Service) Southwestern Native Aquatic Resources and Recovery Center, situated on the east edge of town. It is there because of the water. The federal fisheries facility lays on a rise barely perceptible. On a topo map, the contour lines spread widely. The same map shows a good number of rectangular ponds packed in a small space. The facility sits on a square mile of land where artesian water was the natural defining character. The Service acquired the property in 1931 from the New Mexico Game Commission for the express purpose of raising fish.

For nearly 90 years it has done that, growing fish for stocking waters from west Texas to southern California and points in between. Fish species such as largemouth bass, smallmouth bass, channel catfish, bullhead catfish, bluegill, redear sunfish, and black crappie were long the mainstay.

Through the years, the facility has gone through a few name changes that in true essence reflected its changing mission: "fish-cultural station" became "national fish hatchery," which gave way to "fish technology center." Today, the facility's scientists fully immerse themselves in conserving some of the rarest fish species found in the

WPA workers pose at Dexter Fish Cultural Station ca 1936. National Fish and Aquatic Conservation Archives/USFWS

Anesthetized razorback sucker. Craig Springer/USFWS

American Southwest, says station director, Manuel Ulibarri.

Ulibarri, a native of Santa Rosa, got his start in conservation with New Mexico Department of Game and Fish. He learned trout and walleye culture at Rock Lake Fish Hatchery while still in high school. He studied at Western New Mexico University and New Mexico State University, and then worked at several national fish hatcheries before landing in Dexter nearly 20 years ago. Rare, native southwestern fish species were on station when he arrived.

"This facility started a transition to endangered species dating back to before the Endangered Species Act became law in 1973," said Ulibarri. "It was quite evident back then that some native fishes were in trouble. Today, we hold 14 species that are imperiled to some degree—fishes found in nature in remote desert ciénegas to those in the fast, heavy flows of the Colorado River.'"

These native fishes range from tiny desert-dwelling fish to the world's largest minnow. "Desert pupfish turn a stunning electric blue when they get ready to spawn—they're thumb-sized and they look playful, almost cartoonish," said Ulibarri. "Then there's Colorado pikeminnow, native to the Colorado River and its larger tributaries, including the Gila and San Juan rivers. They have the capability to grow to 6 feet long. What the two fish have in common is their rarity in nature; that's why they're here."

The following fact underscores that rarity: the Colorado pikeminnow shared the same habitats and suffered the same peril as three other Colorado River Basin fishes, the bonytail, humpback chub, and razorback sucker. Habitat loss from altered stream flows have greatly diminished their numbers in nature.

"The only place left that all four Colorado River species swim together is here," said Ulibarri. "The adult fish all have amazing body shapes for life in voluminous river flows. Form follows function. Humps on their nape are a built-in keel, and it's always impressive to see when we spawn the fish."

The sound of running water never ceases inside the hatching house. Continual splashing becomes a murmur akin to a large gathering of people engaged in conversations. The sounds fade to the background. Water percolates through stacks of shallow trays where eggs that look like gobs of farina cereal incubate, their tiny eyes visible through the shells. They soon wiggle free and grow rapidly, eventually making their way to the outdoor ponds. Water flows through 3-foot-deep rectangular concrete raceways and 8-foot-diameter tanks hosting a variety of fish species awaiting time to spawn.

Razorback sucker is the first fish to ripen to spawn in the spring, soon followed by Chihuahua chub, a minnow found only in the Mimbres River flowing through the Mimbres Wildlife Area, managed by the New Mexico Department of Game and Fish. The whole lot of 14 species spawn in captivity in the hands of biologists by the onset of summer.

Geneticists at the station carefully arrange spawning pairs of all species to ensure that parents are not related. That further ensures that offspring are genetically robust, and best suited to face the rigors of the wild where they will eventually go. Health is a principal concern. Fish health pathologists on staff frequently assess the well-being of the stocks

Southwestern Native Aquatic Resources and Recovery Center Director Manuel Ulibarri checks on incubating razorback sucker eggs. Craig Springer/USFWS

Dr. Wade Wilson, a geneticist at the Southwestern Native Aquatic Resources and Recovery Center, working in Dexter, NM.
Craig Springer/USFWS

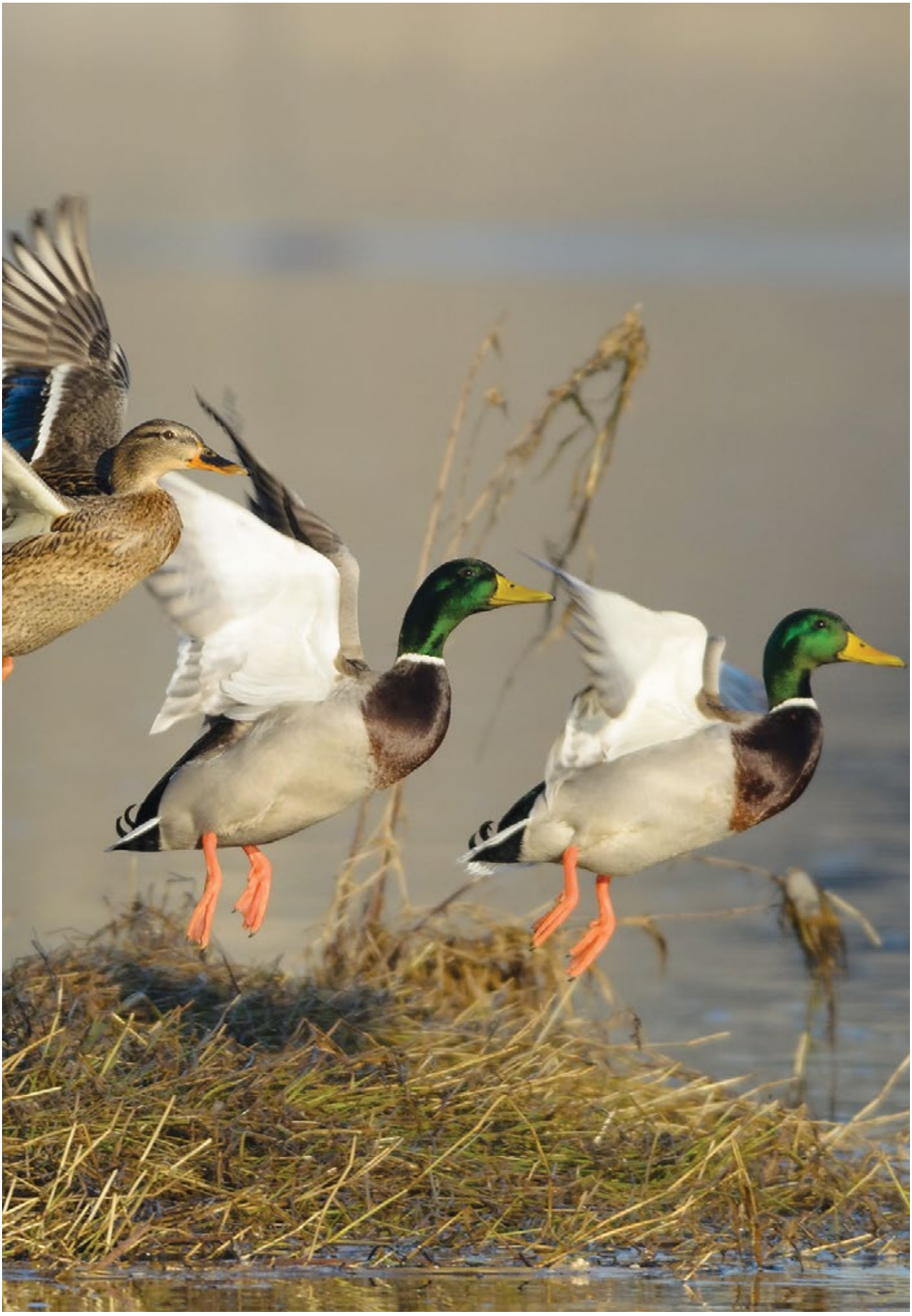
on station. These pathologists, in fact, assess fish heath in state and federal hatcheries and in wild fish populations throughout the Southwest.

The Southwestern Native Aquatic Resources and Recovery Center employs 22 people from a variety of disciplines, folks who keep the water flowing and the fish swimming and breeding. Staff scientists frequently publish their research in rigorous scientific journals that advance knowledge of fish health, genetics, conservation and culture techniques that apply to imperiled, commercial, and sport fish species.

"The fishes we have here are part of our southwestern heritage," said Ulibarri. "They each have a unique intrinsic value. They possess the imprint of nature from the places from which they arose—and that's irreplaceable."

Dexter may not have its Hillerman or its Barker, but the nearly 90-year-old fisheries facility has authored an imprint in conservation all its own.

Editor's note:
Craig Springer edited *America's Bountiful Waters: 150 Years of Fisheries Conservation and the U.S. Fish & Wildlife Service.* The book offers a blend of biography, memoir, cultural and natural history—stories about people and fish—written by those who know them best (330 pages, 400 images). ■



Duck Stamp: What's all the Fuss?

Suzanne Fellows, *Migratory Bird Program, U.S. Fish and Wildlife Service*

Purchasing an annual Duck Stamp, officially known as the Migratory Bird Hunting and Conservation Stamp, is a ritual deeply ingrained into the hearts of many. As a rite of passage, 16-year-olds went to their local post office before the start of hunting season and purchased their first Duck Stamp. Online sales, and a multitude of consignees, provide an alternative to finding a post office. The U.S. Fish and Wildlife Service (Service) encourages everyone—no matter their age—to participate in this annual quest to perpetuate wildlife.

To the uninitiated, it may seem strange that a 1.41" x 1.96" piece of paper has such an exalted standing in wildlife conservation. The obsession with the Duck Stamp also eludes many. Even strong supporters of the conservation dollars the stamp provides are often mystified by conversations with "Duck Stamp groupies." What is it about the Duck Stamp that incites such passion? To help unravel this mystery, let's look at the stamp's purpose, its creation, and why it has become a collectible item.

What is a Duck Stamp?

Simply put, a Duck Stamp is a stamp with a picture of a duck on it. Unlike a postage stamp, Duck Stamps are revenue stamps that cannot be used for mailing letters. A "revenue stamp" is an actual label or seal placed on a product to prove a buyer legally purchased the item. In the case of a Duck Stamp, the Department of the Interior, by legislation, sets a fee for the "use" of the natural resource, which is hunting migratory birds. Waterfowl, such as ducks, geese, and swans, are the most harvested migratory birds and, as such, the Duck Stamp features a different "duck" (or goose or swan) on each annual revenue stamp.

"Your Duck Stamp Dollars At Work" sign at an emergent marsh at the Pondicherry Division of the Silvio O. Conte National Fish and Wildlife Refuge in Jefferson, NH. Friends of the Migratory Bird/Duck Stamp

Decoys, both decorative and working (those that are hunted over), figure prominently in three historic Federal Duck Stamps. Stacy Sanchez/USFWS

Why is there a Duck Stamp?

The history of this unique revenue stamp rests on the principle that there is a national responsibility for natural resource conservation. From 1900 through the 1920s, three major factors laid the groundwork for legislation that protects wildlife and their habitat: federal agencies reserved millions of acres of wildlife habitat under the public trust doctrine; the United States had numerous conversations with international partners on North American resource management; and many influential sportsmen promoted conservation actions and policies. Conservation landmarks during this time include the Lacey Act (1900), establishment of the first national wildlife refuge at Pelican Island (1903), passage of the Weeks-McLean Law (1913), and the 1916 Convention for the Protection of Migratory Bird and subsequent Migratory Bird Treaty Act (1918).

The Roaring Twenties came to an abrupt halt with the October 1929 stock market crash and, subsequently, the Great Depression. In rural communities, especially in the plains and prairie states, years of severe drought, extensive farming, and rampant wetland drainage led to major habitat loss during the "Dirty Thirties." As massive dust storms stripped soil from the land, killing crops and livestock, agrarian communities suffered another economic blow from the "Dust Bowl" phenomenon. Waterfowl populations, still recovering from overharvest by market hunters, were once again decreasing.

Introduced in concept in the early 1920s, Congress finally passed a federal-state partnership approach to providing bird sanctuaries in 1929 with the Migratory Bird Conservation Act. The newly formed Migratory

Joseph Hauptman became the second of three artists with five wins to his credit. His 2016-2017 Trumpeter Swan entry celebrates the conservation success of this species, which was nearly decimated by over hunting and habitat loss. USFWS/all rights reserved

Ding Darling's etching for the first Federal Duck Stamp. USFWS Museum/Archives.

Bird Conservation Commission (MBCC) became responsible, after consultation with affected local and state governments, for approving recommendations of land purchases for what would become part of the National Wildlife Refuge System. However, no permanent funding mechanism existed until influential waterfowl hunters helped craft and pass the 1934 Migratory Bird Hunting Stamp Act or "Duck Stamp Act." It created a self-imposed user-fee, an additional cost to waterfowl hunters' annual licensing requirements, and gave the MBCC access to a permanent funding source to purchase waterfowl habitat.

Today approximately one-third of the MBCC's annual funds come from Duck Stamp sales. The Duck Stamp's success as a conservation

The first Federal Duck Stamp was issued in 1934 and sold for $1. Since its humble beginnings, sales of Duck Stamps have raised over $1.5 billion dollars to conserve habitat in the National Wildlife Refuge System. USFWS/all rights reserved

tool has led to similar programs in other countries. Many states and several tribes still have pictorial waterfowl stamps as well as specific stamps for other harvested fish and wildlife species. Several conservation organizations have also adopted the stamp model for raising funds for their species of interest.

Duck Stamp sales provide restricted conservation program funds that can benefit more than just waterfowl. Bird watchers and photographers, hoping to experience cranes, shorebirds, spoonbills, turtles, or dragonflies, may head to their nearby refuge marsh. These same wetlands offer a buffer from flooding, mitigate effects of droughts, filter and clean water, replenish water tables, and provide economic stimuli to local communities. Refuges afford public access for compatible outdoor recreation for all of us—and Duck Stamps help make this possible.

How do you make a Duck Stamp?

Jay Norwood "Ding" Darling led the charge to craft and pass the Duck Stamp Act. When asked what he meant by a "Duck Stamp," he reportedly sketched a pair of Mallards landing in a wetland. This became the iconic image used on the first Duck Stamp.

In the early years, our predecessor agency invited specific artists to produce artwork for the stamps. However, in 1949 Service artist Robert W. "Bob" Hines, whose Redhead design was chosen for the 1946-1947 Duck Stamp, expanded participation by inviting all artists to enter a formal contest. To this day, the Service coordinates a juried competition and uses the winning art to create the stamp. Each year, the Service releases explicit contest regulations with any mandatory theme, a choice of five or fewer eligible species, and media and size guidelines. Artists must portray their species alive and as the dominant focus on their entry. Some artists are known to submit less representational art styles and use unconventional media. The Service screens artwork and disqualifies entries that violate the rules; we don't allow artists to depict writing, even numbers on bird bands or words on signs. We encourage new artists to enter and try their hand in this prestigious experience.

Artists are definitely passionate about the Duck Stamp. Even with strict rules, more than 190 artists paid to compete in the 2019 contest. Contest judges select only one winner per year. Winning comes with no financial prize and a lot of work. Many artists spend years researching their subject, collecting reference photos and

other materials, developing their composition, and perfecting their entry. The gathering of hopeful artists at the annual fall contest is captivating, friendships and rivalries flourish. Each artist, no matter what their skill or art style, is part of the heart and soul of the Duck Stamp Program. Each may enter for a different purpose, but the outcome is the same—they are sharing their talents and passion to support conservation.

What about the "stamp" part?
Once the judges' choice is final, the Duck Stamp Office spends the next 9 months overseeing the design, printing, and initial distribution to stamp sellers. The Bureau of Printing and Engraving (Department of the Treasury) designed and printed the Duck Stamp through the late 1990s. Private security printers, contracted through the U.S. Postal Service (USPS), perform these duties now.

Printing technology, a science unto itself, has evolved since 1934. Printing vendors now use computerized engraving, instead of hand engraving, to make printing plates. Whereas we once used the intaglio process[1], we now use offset printing. As printing technology changed, rather than limiting stamps to monochromatic colors, we can now print multi-colored stamps.

The actual paper we use for printing has also changed. We moved from ungummed paper to water-activated pre-gummed paper, then to pressure-sensitive adhesive paper. The number of stamps printed per sheet has changed through the years, as has perforation type and gutter positions (margins). Stamp sheets are no longer individually numbered. Computerized printing has also made it more likely that collectors will receive a "well centered" stamp. Micro-printing and the introduction of special inks and tactile features are part of the security printing features. While the Duck Stamp itself has remained the same size, consumers prefer buying a single stamp presented on a dollar-bill sized carrier.

Stamp collectors value philatelic products and historic memorabilia such as this stamp sold to the Director of the USFWS at the First Day of Sale Event. Suzanne Fellows/USFWS

While many of these changes may not be noteworthy to the majority of purchasers, another group of passionate and vocal Duck Stamp enthusiasts is extremely interested in the changes to the stamp printing itself. Philately (the collection and study of stamps and postal history) has a following across socio-economic and cultural boundaries. Duck Stamps are the longest running single-themed stamp in the world and even have their own section in the Smithsonian Institution's National Postal Museum.

Like each postage stamp issued, USPS designates a "First Day of Sale" for the Duck Stamp. A gathering of passionate collectors, hunters, artists, Service officials, and other partners celebrate our collective conservation successes, honor our artists, and launch sales for the new stamp year. During the event, conservation leaders purchase the first stamps sold and artists sign memorabilia for collectors and historians.

Why is a Duck Stamp collectible?
Whether treasured because of what they specifically represent to conservation or because they are stamps, the outcome is the same—Duck Stamp collectors value the stamp and increase annual sales. Hunters may buy two stamps: one for hunting, and one for their album. Many collectors purchase large quantities of stamps as an investment and concentrate on finding perfectly centered stamps; serious collectors even go so far as measuring the gauge and condition of perforations. Many collectors also purchase philatelic products, such as First Day of Sale covers (specially designed envelopes with artwork and stamps cancelled by USPS to celebrate the event) and other commemoratives and products.

As the art itself is what is so attractive about the Duck Stamp, another group of serious collectors has formed. Artists who specialize in drawing conservation stamps have perfected their artistic skill in this genre. Wildlife art has a distinct market; the production and selling of prints allow Duck Stamp artists to market themselves and their talents. Paired with the artist's stamp and perhaps a remarque (an individualized drawing on the stamp or print) and a stamped metal medallion, a collection of framed Duck Stamp prints becomes a prized possession. The ultimate result is that, in their passion, collectors are supporting habitat conservation and are part of the Duck Stamp story.

Our History in Stamps
Some philatelists (stamp collectors) enjoy their hobby because stamps

Artists may use any media to create their work except for computer generated or photography. This 2018 Lesser Scaup entry is by Robert McBroom, who is known for his use of mixed media. Robert McBroom/copyrighted, used with permission.

reflect the history, technology, and issues of the period. Even a cursory examination of Duck Stamps reflects the science and management concerns over almost 90 years and still lends credence to the need for habitat conservation. For example, the change in the name, from the "Migratory Bird Hunting Stamp" to the "Migratory Bird Hunting and Conservation Stamp" with the 44th stamp reminds consumers of the ultimate result of their purchase—habitat conservation. Special themes such as "habitat produces ducks" challenge artists to include other elements in their entries. On the dollar-bill sized carrier, we present accompanying text to further educate our audience, such as information about management issues. Through Duck Stamps, the Service celebrated the 100th anniversary of both the Migratory Bird Treaty with Canada (2016) and the formation of the National Wildlife Refuge System (2003). The sixth Duck Stamp records the change from the Bureau of Biological Survey of the U.S. Department of Agriculture to the Department of the Interior on July 1, 1939. The merger with the Bureau of Fisheries, the following year, formed the U.S. Fish and Wildlife Service as we know it today.

Where is the Duck Stamp Going?

In 2034, the Duck Stamp Program will celebrate its 100th anniversary. What will the Program look like at that time? Does a downward trend in the number of waterfowl hunters threaten its ability to raise adequate funds for habitat conservation? Will there be a new generation of stamp collectors and artists? Have changes in technology dictated that this unique genre of wildlife art become just lines of type on a hunting license?

Fortunately, there are many people deeply invested in the Duck Stamp Program. Wildlife, including many endangered species, benefit directly from the funds raised by the Program. For that alone, conservation partners from both the consumptive and non-consumptive realms are strong supporters of Duck Stamps. The Duck Stamp started selling at $1 per stamp in 1934 and has incrementally increased to the now $25 stamp. Sales have kept steady at an average of more than 1.5 million stamps sold per year for the past 3 decades. Duck Stamp sales have raised more than $1.5 billion since 1934 to permanently protect over 5.9 million acres of wetland habitat.[2] Bird watchers and others who visit national wildlife refuges each year number into the tens of millions. Those not hunting waterfowl—and, therefore, not mandated by law to purchase a stamp—buy Duck Stamps voluntarily to own art, advance conservation, and learn about different wetland species.

To recruit a new generation of wildlife artists, the Junior Duck

Stamp Conservation and Design Program was initiated in the late 1980s by Joan Allemand of California. Dr. Allemand had been a 1987 Federal Duck Stamp Contest judge and received a grant from the National Fish and Wildlife Foundation to implement a pilot youth education program. Working with the National Art Education Association and the Federal Duck Stamp Office, she initiated the first Junior Duck Stamp Contest in California in 1989. Contest rules were formalized, and the second Junior Contest was held in conjunction with J.N. Ding Darling NWR in Sanibel, Florida, and through Ducks Unlimited, headquartered at the time in Illinois. The Junior Contest expanded to 8 states in 1993, followed by a formal authorization of Congress in 1994 with the Federal Junior Duck Stamp Conservation and Design Program Act. Today, the Junior Duck Stamp Program engages K-12th grade students in waterfowl and conservation through the arts in all 50 states, D.C., and U.S. Territories, including Puerto Rico and the U.S. Virgin Islands. Several current federal art contestants submitted entries as children in the Junior Program. We await seeing our first Junior Program winner also win the Federal Duck Stamp Contest.

I believe the outlook is positive. We will continue to have a Duck Stamp and Duck Stamp Contest if the Service shares the message of how we spend Duck Stamp conservation dollars, supports wildlife artists, and makes stamps and stamp products readily available for hunters, collectors, and conservationists. By encouraging sustainable use of our national wildlife refuges and by valuing the wildlife resources the habitat provides, Duck Stamp sales could include more consumers and continue to be a significant conservation tool with a diverse and devoted following.

Learn more about the Duck Stamp.

Maynard Reece
(April 26, 1920 - July 11, 2020)

Maynard Reece is a familiar name among many conservationists. An extremely talented and prolific artist, he shared his talents to foster and support the wise use and protection of wildlife and habitat resources. He found inspiration for his wildlife drawings by spending time outdoors as an active hunter, angler, and naturalist. Born in Arnold's Park, Iowa, Reece knew of the area's importance to waterfowl and its history during the market hunting era.

As a young boy, a neighboring amateur naturalist mentored Reece, who examined butterflies, collecting and studying their flight patterns. He began drawing animals with pencils, using barn paint for color. A grade school teacher introduced Reece to watercolors. When he was 12, he entered a wildlife pencil sketch in the 1932 Iowa State Fair, and took first place, thus establishing himself as a winning wildlife artist.

The Meredith Publishing Company in Des Moines, Iowa, hired Reece out of high school as an artist. He worked at the State Historical Museum of Iowa for 7 years doing taxidermy and improving his understanding of anatomy. In 1938 Reece met Jay N. "Ding" Darling, and they became close, life-long friends. Darling mentored the younger artist, providing him with honest and helpful critiques and advice to help Reece perfect his artwork. As a show of appreciation, Maynard gifted Ding with a painting of three quail flushing, which Ding hung in his office.

After returning from his service during World War II, Reece became a free-lance artist, illustrating wildlife books and magazine articles.

Reece decided to enter his artwork in the Migratory Bird Hunting and Conservation Stamp Program (the "Duck Stamp") at Darling's suggestion. At the time, "invited" artists submitted original designs. Uninvited but undeterred, Reece submitted an entry without invitation. His *"Buffleheads Aloft"* design won, and his artwork became the 1948-1949 Duck Stamp. His second win came with the 1951-1952 Duck Stamp featuring a pair of Gadwalls. His 1969-1970 Duck Stamp features White-winged Scoters. Like his earlier Gadwall

Maynard Reece's 1948-1949 Duck Stamp featuring Buffleheads.

Maynard Reece's 1951-1952 Duck Stamp featuring Gadwall. USFWS/ all rights reserved

Maynard Reece's 1969-1970 Duck Stamp featuring White-winged Scoters. USFWS/all rights reserved

Maynard Reece's 1971-1972 Duck Stamp featuring Cinnamon Teal. USFWS/all rights reserved

Maynard Reece's 1959-1960 Duck Stamp featured King Buck, the only dog that is the central focus point of a Federal Duck Stamp. USFWS/all rights reserved

and Bufflehead stamps, Reece is the only artist so far who has depicted White-winged Scoters on a Federal Duck Stamp. He became the first artist to hold the record for designing three Duck Stamps, and then he broke his record twice after that!

The Service instituted a mandatory theme for the 1958 Duck Stamp Contest. Conservation-minded hunters, concerned about the number of birds that were crippled and lost, suggested that all entries "show a retriever in action." This theme highlighted the importance of a well-trained hunting dog to retrieve wounded game. John Olin invited Reece to meet his retired 10-year-old National Champion black Labrador Retriever, King Buck, who was whelped in 1948 in Iowa. The breeder sold King Buck for only $50, as he was the last of the litter. The young pup nearly succumbed to distemper, which is usually life threatening, but regained his health. A subsequent owner sold King Buck to John Olin of Nilo Kennels in Illinois for more than $5,000 when the dog was about 3 years old. Although only a mid-sized lab, Olin hired Cotton Pershall to train King Buck, who went on to become one of the nation's finest field trial retrievers. Reece met King Buck after Olin retired his dog. Reece featured King Buck's graying muzzle and soulful eyes on his art entry that year. The 1959-1960 Duck Stamp became Reece's third Federal Duck Stamp win. The "King Buck" remains one of the most widely recognized Duck Stamps.

Reece last entered the Duck Stamp Contest with a painting of Mallards in 2014. The sale of more than 10 million of his 5 Federal Duck Stamps raised nearly $25 million dollars to conserve wetlands held in the National Wildlife Refuge System. As the Service also collects royalties from independently produced items (such as t-shirts and mugs) featuring Duck Stamp images, Reece's King Buck stamp continues to increase funds available for habitat conservation.

Reece's talents extended to other wildlife species as well. Reece was also known for his depictions of fish. He illustrated fishing stories in the Saturday Evening Post, painted portfolios of both fresh and saltwater species for Life magazine, and both wrote and illustrated *Iowa Fish and Fishing* (1953, published

Maynard Reece's "Walleye." Courtesy of the State Historical Society of Iowa and Iowa Department of Natural Resources. Artist: Maynard Reece

Upon his death in 1962, the Des Moines Register published Ding Darling's "'Bye Now - It's Been Wonderful Knowing You" cartoon. Among the pictures shown in Ding's cartoon is Maynard's painting of three quail flushing he gave to Ding. "Ding" Darling Wildlife Society owns the copyright of "Ding" Darling cartoons

by Meredith Corporation). The colored illustrations of *Iowa's Fish and Fishing* were drawn from live fish. Trout, saltwater fish, upland game, and other species of birds and mammals from several continents were portrayed using pencil, pen, watercolor, oil, and bronze. His original fish prints are housed at the Rathbun Fish Hatchery in Centerville, Iowa.

Maynard Reece will long be admired as a memorable wildlife artist and for his contributions to wetland conservation.

Endnotes

[1] The intaglio process involves ink placed on the engraved plates. Excess ink is wiped away so that, when the plate is pressed to the paper, only the ink in the recessed areas transfers to the paper. Offset printing is a printing process where the plates transfer ink onto another substrate, such as a rubber stamp, which then rolls the image onto the paper.

[2] FY 2018 Annual Report Migratory Bird Conservation Commission (accessed 2021).

■

Pittman-Robertson Act Came at the Right Time

Craig Springer, *Wildlife and Sport Fish Restoration, Southwest Region, U.S. Fish and Wildlife Service*

It seems odd to say this, but Ohioan Joseph List may have lived much of his adult life without ever seeing a white-tailed deer. This first-generation American, born in 1860, experienced his spring of life at the dawn of the Civil War. This son of German immigrants was Everyman from Anytown, USA—and he was a hunter.

He called Sardinia home, a small town a short distance from the Ohio River, nestled amid the low gentle hummocks and hills left behind by retreating mile-thick glaciers many millennia ago. It was then as it is now, a small town servicing agriculture.

List made a living as a blacksmith. That is what he noted on his 1931 Ohio Department of Agriculture hunter's and trapper's license. It cost him $1 for the privilege to harvest game and furbearer pelts. He was 72 years old when he laid his signature down. The faded ink, its tattered and feathered edges mark the passage of nine decades since he and the township clerk put pen to linen paper. The crease is likely evidence that he folded it to display in an envelope worn on the back of a hunting coat so that conservation officers could easily check it in the field.

The hunting regulations that List carried in his coat speak to prevailing conditions that would soon lead to landmark conservation legislation, the passage of the Pittman-Robertson Act, 6 years away. Its soiled pages of heavy, durable card stock show he thumbed it a time or two, but two lines of text stand out.

Carl Shoemaker.
National Wildlife Federation

Deer: Protected
Ruffed grouse: Protected.

One species is notably absent—wild turkey. There is no mention of the bird in the proclamation. The wild turkey no longer existed in Ohio.

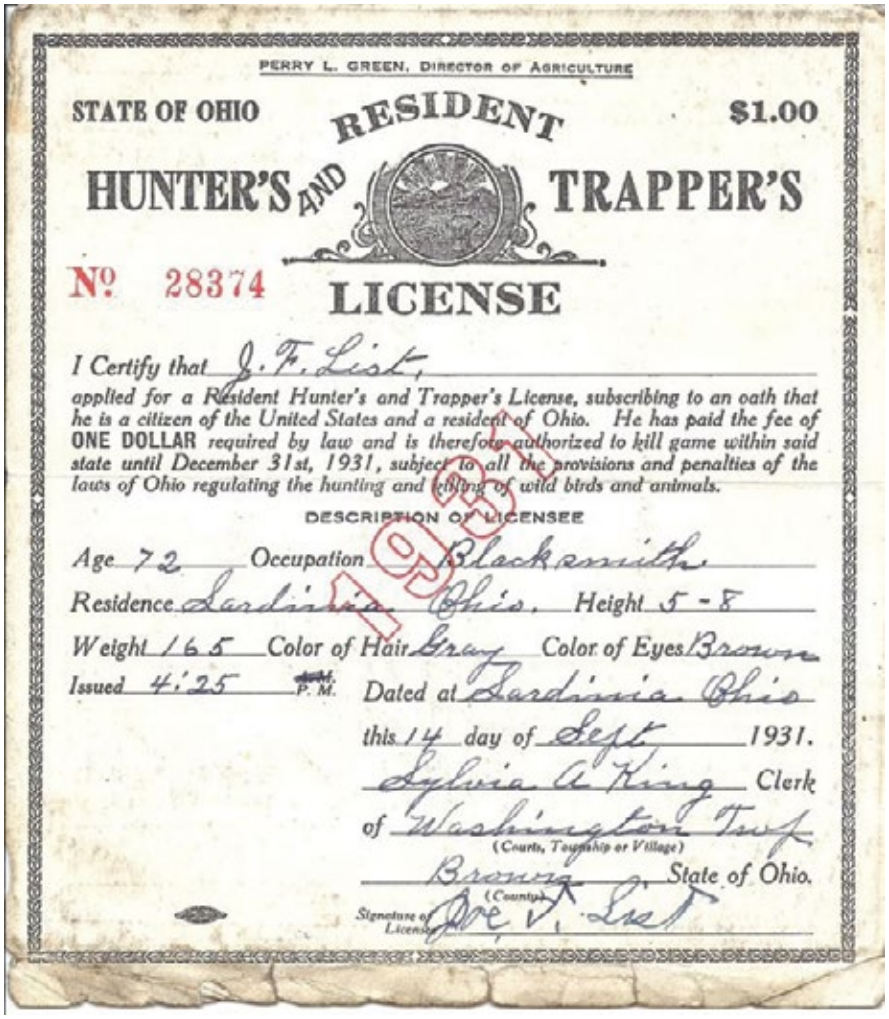
By the time of List's birth, white-tailed deer had already been in great decline over much of its range. Unregulated subsistence and market harvest coupled with habitat loss eventually made white-tailed deer a rarity. The Civil War had an effect on wildlife where List lived.

The hilly Appalachian Piedmont of southern Ohio proved important in saving the Union. The area produced vast amounts of pig iron for ship hulls and bayonets, cannons, and kettles. The place names that dot the map—Ironton, Buckeye Furnace, Scioto Furnace, and Vesuvius Furnace—tell of a precinct in military and conservation history. The literal furnaces were conical limestone edifices that required two things: iron ore and lots of wood. The smelters converted red maple, white oak, and yellow pine into molten dusky metal leaving a denuded forest in ever-expanding concentric rings. The iron industry continued into the late 19th century. By 1900, very little of Ohio's mosaic woodlands remained. Statewide, the deer were gone. A vestige of ruffed grouse remained.

The decline in wildlife experienced in Ohio is but one example of the conditions that prevailed over much of the country when List went afield in 1931. Pronghorn no longer skittered over the short-grass prairies of the West. Wild turkey were rare. Elk in the western United States were nearly a thing of the past by 1910 and had long been extirpated in the East.

While List was the Everyman, fellow Ohioan Carl Shoemaker was a man of uncommon abilities—and he too was a hunter. Shoemaker was born at the other end of Ohio opposite List in Napoleon, so named for Emperor Bonaparte, as its early inhabitants were of French extraction. Shoemaker's mother in fact emigrated from France. Shoemaker was born in 1882 and came of age close to the Maumee River on its downhill course toward Lake Erie.

Shoemaker attended Ohio State University, earning his terminal degree in law in 1907. He hung out a shingle in Columbus, but that proved temporary. He moved west in 1912 to remake himself; he



PERRY L. GREEN, DIRECTOR OF AGRICULTURE

STATE OF OHIO — RESIDENT — $1.00

HUNTER'S AND TRAPPER'S

No. 28374 LICENSE

I Certify that J. F. List,

applied for a Resident Hunter's and Trapper's License, subscribing to an oath that he is a citizen of the United States and a resident of Ohio. He has paid the fee of ONE DOLLAR required by law and is therefore authorized to kill game within said state until December 31st, 1931, subject to all the provisions and penalties of the laws of Ohio regulating the hunting and killing of wild birds and animals.

DESCRIPTION OF LICENSEE

Age 72 Occupation Blacksmith

Residence Sardinia, Ohio. Height 5-8

Weight 165 Color of Hair Gray Color of Eyes Brown

Issued 4:25 P.M. Dated at Sardinia, Ohio

this 14 day of Sept 1931.

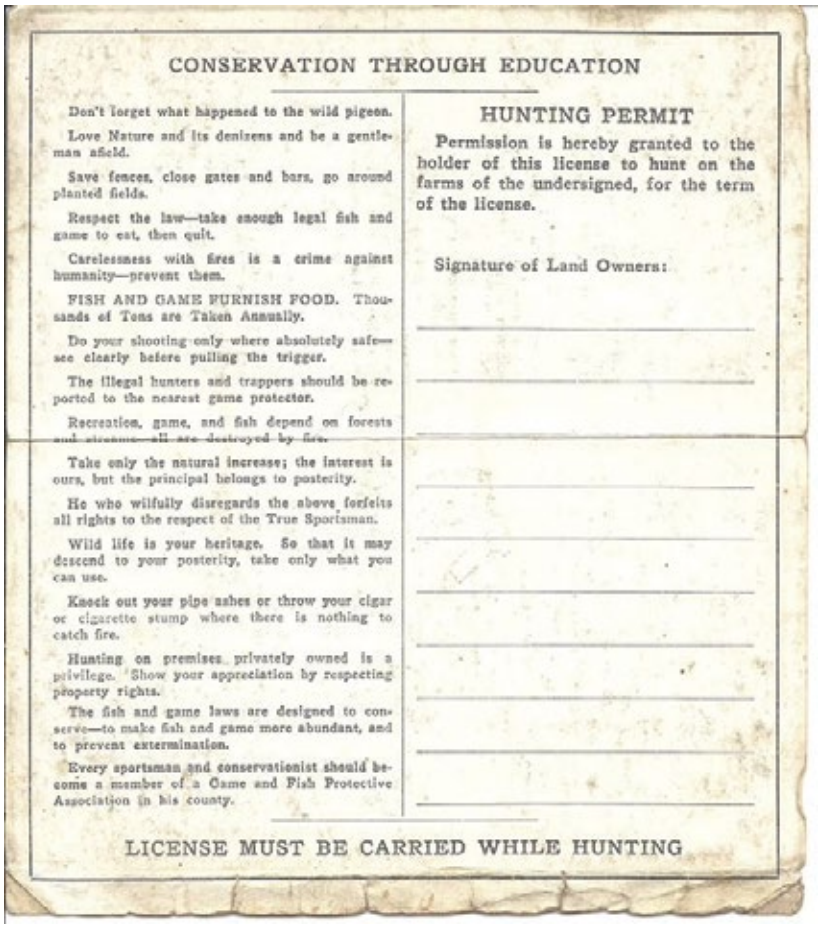
Sylvia A. King Clerk

of Washington Twp.
(Courts, Township or Village)

Brown (County), State of Ohio.

Signature of Licensee Joe V. List

PAID



CONSERVATION THROUGH EDUCATION

Don't forget what happened to the wild pigeon.

Love Nature and its denizens and be a gentleman afield.

Save fences, close gates and bars, go around planted fields.

Respect the law—take enough legal fish and game to eat, then quit.

Carelessness with fires is a crime against humanity—prevent them.

FISH AND GAME FURNISH FOOD. Thousands of Tons are Taken Annually.

Do your shooting only where absolutely safe—see clearly before pulling the trigger.

The illegal hunters and trappers should be reported to the nearest game protector.

Recreation, game, and fish depend on forests and streams—all are destroyed by fire.

Take only the natural increase; the interest is ours, but the principal belongs to posterity.

He who wilfully disregards the above forfeits all rights to the respect of the True Sportsman.

Wild life is your heritage. So that it may descend to your posterity, take only what you can use.

Knock out your pipe ashes or throw your cigar or cigarette stump where there is nothing to catch fire.

Hunting on premises privately owned is a privilege. Show your appreciation by respecting property rights.

The fish and game laws are designed to conserve—to make fish and game more abundant, and to prevent extermination.

Every sportsman and conservationist should become a member of a Game and Fish Protective Association in his county.

HUNTING PERMIT

Permission is hereby granted to the holder of this license to hunt on the farms of the undersigned, for the term of the license.

Signature of Land Owners:

LICENSE MUST BE CARRIED WHILE HUNTING

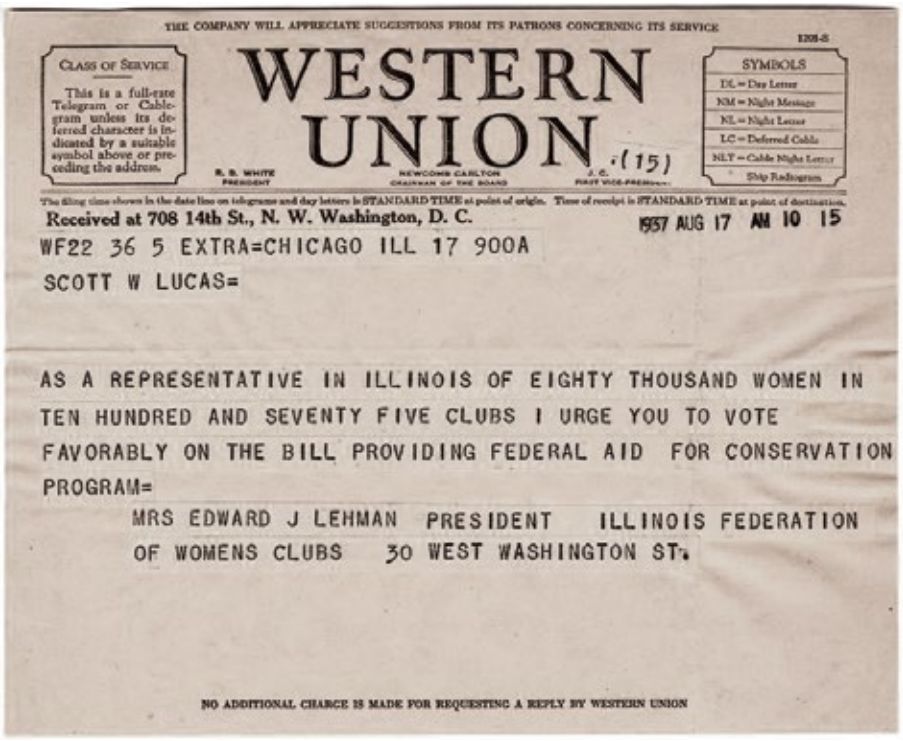
Joseph List's 1931 Ohio Hunter's and Trapper's license. Craig Springer collection

Notes on conservation adorned the back of the 1931 hunting license. Craig Springer collection

landed in Roseburg, Oregon, where he published the *Evening News*. His interest in politics and conservation converged with an appointment as State Game Warden and head of the Oregon State Fish and Game Commission in 1915. He held the position for 13 years. He wended his way back east, and in 1930, he signed on as an investigator with the U.S. Senate Special Committee on Conservation and Wildlife Resources and remained employed by the committee until 1947.

In the spring of 1937, it was Shoemaker who crafted the legislation to impose an excise tax on sporting arms and ammunition manufacturers as a means to pay for conservation. He wrote what would become the Pittman-Robertson Act that profoundly moved wildlife conservation. Shoemaker met with leaders in the firearms industry, and they were agreeable. Commerce would fund conservation. And it still does. Firearms, ammunition, and archery manufacturers pay a 10 to 11% excise tax on select goods.

Shoemaker shepherded the legislation to key Senate staff as well as the House. Rules in the House of Representatives required the bill to go through the Agriculture Committee, as the U.S. Department of Agriculture's Bureau of Biological Survey would have purview of the eventual law. It fell to Rep. Scott Lucas of Illinois to move the bill along. But he stalled. Then a curious thing happened. Shoemaker urged women's groups and garden clubs of Illinois to cajole the representative in reporting the bill out of committee. And it worked. Shoemaker later wrote of the encounter with Lucas near his



THE COMPANY WILL APPRECIATE SUGGESTIONS FROM ITS PATRONS CONCERNING ITS SERVICE

CLASS OF SERVICE
This is a full-rate Telegram or Cablegram unless its deferred character is indicated by a suitable symbol above or preceding the address.

WESTERN UNION

SYMBOLS
DL = Day Letter
NM = Night Message
NL = Night Letter
LC = Deferred Cable
NLT = Cable Night Letter
Ship Radiogram

The filing time shown in the date line on telegrams and day letters is STANDARD TIME at point of origin. Time of receipt is STANDARD TIME at point of destination.

Received at 708 14th St., N. W. Washington, D. C.

1957 AUG 17 AM 10 15

WF22 36 5 EXTRA=CHICAGO ILL 17 900A

SCOTT W LUCAS=

AS A REPRESENTATIVE IN ILLINOIS OF EIGHTY THOUSAND WOMEN IN TEN HUNDRED AND SEVENTY FIVE CLUBS I URGE YOU TO VOTE FAVORABLY ON THE BILL PROVIDING FEDERAL AID FOR CONSERVATION PROGRAM=

MRS EDWARD J LEHMAN PRESIDENT ILLINOIS FEDERATION OF WOMENS CLUBS 30 WEST WASHINGTON ST.

NO ADDITIONAL CHARGE IS MADE FOR REQUESTING A REPLY BY WESTERN UNION

Carl Shoemaker urged Illinois garden clubs and women's groups to encourage Congressman Scott Lucas to support federal aid in conservation, as demonstrated with this Western Union telegram. Courtesy Abraham Lincoln Presidential Library

office: "He threw up his hand and exclaimed, 'For God's sake, Carl, take the women off my back and I'll report the bill at once.'"

The Pittman-Robertson Act became law in September 1937. Within a year, 43 of 48 states passed laws protecting hunting license sales from use other than running the state fish and game agencies. The new Division of Federal Aid would fund three types of projects with excise taxes: land acquisition, habitat improvement, and scientific research directed at wildlife restoration.

In 1938, the first Pittman-Robertson project was underway—a waterfowl habitat improvement project paid for by $7,500 of excise taxes with $2,500 matching monies by the Utah Department of Fish and Game. A year later, state fish and game agencies across the county received their first wildlife restoration grant money. Ohio landed $39,017 in 1939, which likely paid for long-term ruffed grouse research in the southeast part of the state as well as white-tailed deer research. In 1940, the U.S. Bureau of Fisheries, created in 1871, joined the Bureau of Biological Survey in the Department of the Interior. The two combined bureaus became the U.S. Fish and Wildlife Service (Service).

Wildlife and Sport Fish Restoration Program logo.

In 1943, Ohio held its first deer season since 1900. The season lasted 3 days in 3 counties adjacent to where List still lived. In 1950, 40 of Ohio's 88 counties hosted a 3-day-long season where hunters harvested approximately 4,000 deer. In August of that year, Congress passed the Dingell-Johnson Act, modelled largely on the success of Pittman-Robertson, for the benefit of fisheries management, research, and angler and boater access.

Joseph List left his earthly domain nearly 2 months later. He died in late September 1950, having outlived 8 of his 13 children and witnessed a good many events in his 90 years. Today, deer season opens in late-September in the Buckeye State and runs in some fashion to the first week of February. In the 2019-2020 season, hunters harvested 184,465 white-tailed deer. The Ohio Division of Wildlife received, in 2020, $12.2 million in Pittman-Robertson funds administered through the Service's Wildlife and Sport Fish Restoration Program.

Autumn is for remembering, recalling past deer camps, old bird dogs, and friends that have passed through our lives. We also remember that our abundant wildlife has not always been so. October is the fulcrum month that heaves summer fully into fall. Carl Shoemaker was a fulcrum of sorts who heaved the Pittman-Robertson Act into law. The resulting industry-state-federal partnership has been a boon to wildlife conservation and people across the country. ■

Creation of a Legacy—The Story of the Civilian Conservation Corps at Bombay Hook – 1938 to 1942

Robert W. Mayer, *Volunteer, U.S. Fish and Wildlife Service*

Report Reprinted, courtesy of Bombay Hook National Wildlife Refuge

You're standing on a narrow plank laid over the mud in Finis Swamp. Step off the plank and you're thigh deep in oozy muck. It's hot—temperature and humidity about the same, both in the mid-nineties. Swarms of greenheads are joined by hordes of salt-marsh mosquitoes and several species of their freshwater cousins, along with a smattering of ticks, gnats, and chiggers. Your job? Remove the vast growths of poison ivy, cat-briar, and other impenetrable undergrowth covering the swamp that is being cleared to make a freshwater lake.

It is the summer of 1938, and an unusually wet spring seems only to have exacerbated these unpleasant conditions. You are a young black man and an enrollee in the CCC—the Civilian Conservation Corps. You are paid a dollar a day, grand total of thirty dollars per month—of which you get to keep five and the rest is sent home to your family![1]

On April 1, 1938, a newly established CCC company, Company 3269–C, occupied an existing CCC campsite at Leipsic. Delaware.[2] The new company, like all CCC companies, had a specific work assignment. That assignment was to assist in the development of twelve thousand acres purchased or taken under option for purchase by the Federal Government in 1937 to create a migratory waterfowl refuge east of Smyrna, stretching nine miles along Delaware Bay, and called Bombay Hook. Company 3269-C was a segregated African-American unit, the only such company in Delaware, and it worked on the refuge until March 18, 1942, less than one month short of four years, when it was abruptly reassigned to an Army project.[3] In those four years they did create a legacy.

The camp was located off Route 9, along the north side of the Leipsic River, and it had been established in 1935 to house a mosquito control unit, Company 3221. Initially the camp was designated MC-55—camp designations indicated the work assignment of the unit stationed in the camp.[4] The mosquito control company moved out in 1938, and the camp was reassigned to the new African-American company that initially had 166 "enrollees." Its new designation was BF-1.[5] BF was the designation for CCC companies that worked on projects supervised by the Bureau of Biological Survey, an agency under the United States Department of Agriculture until 1939 when it was transferred to the Department of the Interior. The Biological Survey was responsible for planning and overseeing all CCC work done on federal wildlife refuges.[6]

The Civilian Conservation Corps

You're eighteen, with no job and no hope of a job, because there are no jobs. Your father lost his job too, such as it was, and your family is on relief—but that is not enough to pay the rent and put food on the table for your large family. The President talks about a "New Deal," and you sure could use one.

Many consider the Civilian Conservation Corps, established on March 31, 1933, to be among Franklin Delano Roosevelt's most successful Great Depression recovery initiatives. It seems to have met three of its seminal objectives. First, from 1933 until it was disbanded in 1942, it gave employment to over three million unemployed young men, including 250,000 African Americans.[7] But its economic impact went beyond that. Paychecks sent to the homes of its enrollees helped many of these poverty-stricken families to survive. After only one year, more than 72 million dollars were distributed to the families of CCC enrollees. Moreover, many of these young men were given an opportunity to develop employable skills that allowed them to get jobs when they were discharged, and more than 40,000 illiterates were taught to read and write.[8]

As significant as these economic benefits were, the term "conservation" in its name gave the CCC another important objective—the conservation of natural resources. Called "Roosevelt's Tree Army," the CCC planted an estimated three billion trees during its nine-year existence. The Corps did construction work on 53 National Wildlife Refuges, building dikes and dams, planting trees, and erecting buildings. It did similar work in National Forests and National Parks, cutting many firebreaks, erecting fire towers, and building roads and trails. It helped to preserve grazing land in the West and was involved in erosion and flood control projects. So clearly it had a significant impact on the ecology of the United States.[9]

And third, although less obvious, as a quasi-military organization, the CCC provided a cadre' of commissioned and non-commissioned officers that were badly needed in the war that started in 1941. Led by military officers, wearing military uniforms, subjected to military-type discipline, and conditioned to work as a team, the CCC enrollees readily adapted to service in the armed forces in World War II, even though because of pacifist pressure they were not allowed to receive direct military training while in the CCC.[10]

The CCC was unique in its governance structure, in that it involved four Federal departments and was never established as a permanent agency. It was overseen by an advisory council made up of representatives of the Secretaries of War, Agriculture, Interior, and Labor. The Army was responsible for logistics, for equipment, and for organization and leadership. Active, reserve, and retired officers, mostly from the Army but Navy, Marine, and Coast Guard as well, staffed more than 2,700 CCC companies. The Department of Agriculture and the Department of Interior planned and organized the work to be performed by each of the companies, and the Department of Labor recruited and selected applicants. The CCC was divided into nine Corps Areas across continental United States, and camps were found in every state (a total of twelve listed in Delaware). Usually, one company was found in each camp, and each company had between 150 and 200 men.[11]

Young men between the ages of seventeen and twenty-five, who were unmarried, and whose families were "on relief" (the depression-era term for welfare benefits) were eligible to enroll (i.e., to enlist) in the CCC. An enrollment was of six months duration, and the first week was spent at a military base where the enrollees were taught how to wear the uniform, military discipline, and the other basics needed to live in a quasi-military unit. At the end of the first six-month enrollment, the enrollee could either be discharged or could re-enroll for another six months. Three such re- enrollments were allowed, making a total of two years. At the end of the two years, the enrollee was required to leave the service.

The pay was $30 per month; the enrollee got to keep $5, and $25 was sent to his family. But the enrollee also received clothing in the form of Army uniforms; shelter in military-type barracks, albeit sometimes hastily built and with a pot-bellied stove for heat; and food that included three hearty meals per day, although the quality varied with the quality of the cooks.[12]

All You Can Eat – Life in the CCC

A Typical Menu (Table 1)[13]

DAY	BREAKFAST	LUNCH	DINNER
Monday	Fried Eggs Creamed Potatoes Oatmeal Stewed Prunes Toast - Butter Fresh Milk Coffee	Veal Chops Mashed Potatoes Brown Gravy Creamed Cauliflower Lettuce and Tomato Salad Bread - Butter Strawberries – Short Cake	Baked Beans with Ham Macaroni and Cheese Sauerkraut Bread - Butter Coffee Pumpkin Pie Fruit Jello
Tuesday	Bacon and Eggs Browned Potatoes Bread and ButterHot Toast Fresh Milk Coffee	Brown Beef Stew String Beans Whole Boiled PotatoesPickled Beets Cabbage Salad Bread and Butter Lemonade	Veal Stew Baked Beans Coleslaw Iced Tea

This was the typical high caloric diet needed to sustain these men who spent every day in hard labor. In fact, the company that worked at Bombay Hook may have been more fortunate than some of the others in Delaware. The camp was close enough to the refuge so that, except for those working far out in the marshes, they could return to the camp for a noon meal in the mess hall. The enrollees at Bombay Hook, therefore, usually were able to have a full, hot dinner at noon as well as a full supper at night. Some companies that worked far from their camps and in many different locations, such as the mosquito control units, often had cold boxed dinners for their noon meal.

The pick, shovel, crosscut saw, and ax were the standard equipment of the CCC. At Bombay Hook they also used carpentry and masonry tools for construction of the several of buildings they erected on the refuge. Additionally, they had some power equipment—a dragline, two dredges (one that they built themselves), bulldozers, and trucks, but such equipment seemed always in short supply, suffered frequent breakdowns, and sometimes was shipped to other camps when it seemed it could have been used to advantage at Bombay Hook.[14]

Health and safety were emphasized in the CCC camps. In many cases, one of the Army officers who were assigned to each camp was in the Medical Corps, either a physician or dentist, probably in recognition of the fact that most of the enrollees came from backgrounds that did not provide the best of health care. Safety, particularly fire safety, was an important concern, as was accident prevention. Despite the difficult working conditions at Bombay Hook, the Leipsic Company received an award in 1940 for completing more than 500 days without an accident. Unfortunately, that record was broken in July of 1940 when two of the enrollees were drowned in the Leipsic River when they fell from a boat located just off the CCC dock.[15]

The commanding officer of the unit at Bombay Hook was a lieutenant in the Army Reserve. His assistant, the subaltern, also was a lieutenant in the Army Reserve for the first two years and after that was a civilian employee. In 1938, the camp had an officer in the Army Medical Corps, first a physician and then a dentist. In the years following there was no medical officer on the staff, although the camp continued to have an infirmary and enrollees were placed on daily sick call. There was an education officer and a safety officer, both civilians. The staff had heavy equipment operators for the dragline and dredge, and the remainder of the staff was made up of civilian members of the building and construction trades who served as instructors for the enrollees.

While hard work characterized the lives of the enrollees, educational opportunities were available, but not uniformly so, and usually were after hours on the enrollee's own time, not during the workday. Over its nine-year history, several hundred thousand enrollees completed high school, and some took college courses. The enrollees at Bombay Hook were able to take special evening classes taught for them by public school teachers at a local "colored" school—public schools also were segregated at that time. A few who were illiterate were required to take reading and writing classes. They also got on the job training in the construction trades from the camp staff until 1940 when most of the building program was completed. After that, they were able to take classes in the construction trades offered in the evenings at Delaware State College.

It wasn't all work, however. Passes to nearby towns and cities were popular weekend activities, and Wilmington and Philadelphia were within reach by train for members of the Leipsic Camp. A traveling troupe of the WPA Federal Theatre Players (the WPA or Works Projects Administration was another "New Deal" depression recovery program) toured Delaware CCC camps in 1937, putting on plays in which some enrollees had the opportunity to play minor roles.15 It was sports, however, that provided real relief from the daily grind. Boxing was a camp favorite, but baseball was probably the most popular—remember this was an era when every small town in America had its own amateur baseball team. There often was competition between camps, and in 1938 the Leipsic softball team won the Delaware CCC Title.[16]

The CCC in Delaware

There were CCC camps at eight locations in Delaware. Camps in Lewis and Milford, both started in 1933, had companies assigned to work in private forests. In 1936 the assignments were changed, and both became mosquito control units. A company based in Georgetown in 1935 did soil conservation work, as did a company based in a camp in Wyoming. In 1936 another company at the Georgetown camp worked at Redden State Forest. A special company made up of military veterans was located in a camp at Fort DuPont beginning in 1935. Two other mosquito control units were started in 1935, one at Magnolia and one at Leipsic, and both were terminated in 1938.[17]

The mosquito control unit at Leipsic, Company 3221, may have done drainage ditching on a small area of privately owned marsh that later became part of the southernmost section of the Bombay Hook refuge. The camp in Magnolia, which had housed Company 1295, was abandoned in 1938. Materials from this camp, lumber, and stone, were salvaged by the Bombay Hook enrollees and used in construction work on the refuge.[18] For two months in the fall of 1941 the company left Bombay Hook to dismantle the soil conservation camp at Wyoming, the one started in 1936.

Mosquito control was the largest single CCC activity in the State of Delaware. One third of the CCC companies in Delaware were mosquito control units. Until the advent of the use of chemical control methods in the 1960s, mosquitoes were a serious health problem in coastal areas of the state that were near tidal salt marshes, the breeding grounds of the salt-marsh mosquito. Actually, this included a substantial portion of the state since the salt-marsh mosquito routinely flies up to ten miles in search of a meal. During mosquito invasions in the 1930s most outdoor activities were cancelled in these areas.[19]

In the 1930s the preferred method for mosquito control was to drain the small, shallow pools in the salt marshes

that remained on low tide, thus reducing the breeding habitat of the mosquito. The CCC enrollees cleaned several thousand miles of existing ditches and tidal streams in Kent and Sussex Counties, but their specialty was parallel-grid ditching.[20] Parallel ditches, each ten to twenty inches wide and up to thirty inches deep were spaced 150 feet apart through the marsh, draining into a gut or tidal stream. The ditches were dug by a two-man team, one using a long, heavy spade, the other a hook (sometimes called a potato hook). The marsh sod was cut and pulled out in clumps, each weighing sixty to eighty pounds. A two-man team could do about 235 feet of ditch a day.[21]

Although draining of marshes continued until the 1960s, it was found to be only marginally effective. Changing the marsh environment adversely effected wildlife, and in 1938 biologists from the Division of Wildlife Research, with help from the refuge staff, began studies on Bombay Hook Island to find mosquito control measures that would be compatible with wildlife conservation.

The theory being examined was that mosquito larva can be controlled by introducing killifish and other natural predator fish in marsh ponds. The CCC enrollees assisted in deepening some of the marsh ponds using dynamite. The blasts created craters more than four feet deep so that the ponds, deeper than the water table, would be fed from ground water, not just by tidal flow, thereby retaining water through the summer dry season and sustaining fish that eat mosquito larva—essentially the opposite of the parallel-grid ditching approach.[22, 23]

The CCC at Bombay Hook[24]

It's difficult to imagine what Bombay Hook was like before the construction projects began. Just as it is today, the salt marsh with its tidal streams and guts was the dominant feature. Fortunately, most of the marshes that were purchased in 1937 escaped the CCC mosquito control program and were not subject to parallel-grid ditching. Ninety percent of the salt marshes between Maine and Virginia were ditched between 1930 and 1940, making Bombay Hook's marshes a rarity.[26] However, these salt marshes had been used by their previous owners, not only for hunting and trapping, but also for an annual harvest of salt hay.

Some of the upland area, the "hard ground," was farmland, some still under cultivation, some abandoned. There were a number of old barns and other farm buildings that later were removed by the CCC. There were other areas that were forested. Wooded freshwater swamps and brackish bogs made up another major component of the refuge, covering nearly one thousand acres.

The total area that was planned for freshwater impoundments in 1938 was estimated at 1,592 acres[27] of which 824 acres were salt marsh and 778 acres were wooded freshwater swamps and brackish bogs. The dike creating Raymond and Shearness Pools was to be built across the tidal salt marsh. What now is Raymond Pool and a large part of what now is Shearness Pool was salt marsh. The remainder of Shearness and all of what is now Finis Pool was one continuous brackish bog and wooded swamp. Bear Swamp, as its name implies, also was a swamp, again with some intrusion of the brackish salt marsh, but it remained a swamp until 1961 when Bear Swamp Pool was established.

So that's roughly what they had to work with.

Initially attention was given to the salt marsh environment, particularly to find ways of improving it as habitat for breeding ducks. The CCC workers helped to drill freshwater wells in the salt marsh. The idea was that fresh water could be used to maintain water in tidal pools and flood areas that became dried mud flats in hot summer months. By putting planks over the marsh to get a footing, the enrollees were able to set up well drilling rigs on Kent and Kelly Islands, and a year later on Bombay Hook Island, in order to drill artesian wells that provided a constant flow of freshwater. The pools retained water, but it was not determined if they had much effect on waterfowl.

Another plan was to place water control structures on [28] guts and ditches in the marsh that enter into Delaware Bay or its tributaries from the north side to Leipsic River to the northern boundary of the refuge, turning this area from a tidal salt marsh into a brackish marsh, again in a belief that this would enhance the habitat for breeding ducks. The first attempt was to build a water control structure at the mouth of Shearness Gut where it enters Duck Creek. After great effort they were able to drive pilings on both sides of the gut and then place a sill or low dam across the mouth, thus reducing the tidal flow from the creek into the gut—but tidal action quickly washed to out almost as soon as it was installed. They made one other effort, this time where Slooch Ditch enters the bay. This one was even more difficult because they had to work entirely from boats and work barges. Again, they were unsuccessful, and that ended to plan for controlling the tidal action in this part of the marsh.

These efforts soon gave way, however, to the largest single project in the creation of the waterfowl refuge, the construction of freshwater lakes or pools—Raymond, Shearness, and Finis. That effort had two components, building dikes and a causeway to create the impoundments that would form the freshwater lakes, and clearing the wooded swamps that would become the lake bottoms. While there was much "pick and shovel" work involved in building the dikes and causeway, the massive earth moving job was accomplished with mechanical equipment—the dragline[28] and dredge.

Not so the clearing of the swamps. That was hard, tough manual labor, probably the most difficult job the CCC performed on the refuge.

Actually, swamp clearing required several steps, almost all without aid of any mechanical equipment. First, the trees, mostly sweet and black gum, swamp maple, and several species of swamp oak, were cut and the logs were pulled from the swamp, leaving the stumps.

The stumps along the edges were pulled out using trucks, but those deeper in the swamp had to be removed by hand. Finally, the heavy undergrowth had to be removed.

By the time the enrollees left in 1942, only a portion of the swampland was cleared, primarily at Shearness, while most of the clearing at Finis was along the edges. At the end of their tenure the reports said that the CCC clearing operations at Finis resulted in "little or no progress."

Weather was part of the problem. In 1938 and 1939, unusually wet conditions in the spring and summer months increased water levels, particularly in Finis. When, finally, they had an unusually dry season in the summer of 1941, the number of CCC enrollees was depleted, and there was not sufficient manpower to make much headway. Actually, the best progress in the swamp clearing operation was made during the winter months when the ground was frozen.

The Refuge Manager wrote in his Quarterly Report of January 1940: "*Swamp clearing went by leaps and bounds as conditions were the very best. The swamp froze solid, and cutting operations were not hindered by the moving of foot-walks and occasional encounters with thigh- deep muck. Moderately cold weather has a definite paralyzing [effect] on these Negro enrollees, and cold weather confines them to their barracks, so the progress on the clearing was due to the perseverance, tolerance, and patience of the camp foreman.*"[29]

A different problem was encountered in building the dikes that formed the freshwater impoundments. Here the problem was settlement. The dikes were built across upland areas using the dragline to pile material taken from borrow pits along the way. The brackish pool at the entrance to the Boardwalk Trail was one such borrow pit.

When they reached the salt marsh, a dredge on a barge was used to cut a ditch across the marsh which was then filled with clay that had been dug from borrow pits and dried. This clay formed a base on which mud and peat dredged from the marsh was piled to construct the dyke. Unfortunately, the settlement and shrinkage of this dredged material was underestimated, and overall, the rate of settlement was about eighty percent, seriously slowing the project. A pile of dredged material ten feet high would shrink as it drained and dried to two feet!

Dike construction began at the south end of Raymond Pool, using the dragline, in the summer of 1938. Raymond Pool was fully enclosed in November 1939 by a dike fifteen feet above the level of the marsh and creating an impoundment of 100 acres that was allowed to fill with rainwater. The dike, however, was far from finished. Settlement continued and erosion of the banks became a serious problem. The CCC workers began the pick and shovel job of dressing the banks and building a roadway on top of the dike, only to discover that the top was thirty inches below specifications. Finally, in the fall of 1941 the dragline was placed on top of Raymond dike to complete the roadway at the specified elevation.

"*This season the waterfowl appear to have forsaken the mud flat areas of the marsh for the stable water areas in the new pool. The greatest number of waterfowl seen on the refuge to date was an estimated 16,500, and about one-fourth of these were on the new 100-acre impoundment. The new Raymond Pool is by far the most heavily populated 100-acre section of the refuge. The Herons, Egrets, and Bitterns, which formerly occurred in small, scattered numbers throughout the refuge, or wherever their particular habitat prevailed, have also shown a preference for the new impoundment. Every night the croaks, squawks, and hoarse guttural screams of Great Blues, American Egrets, and Black crowns can be heard as never before on any section of the refuge. This is something entirely new, and very much a spectacle to us as well as to our Natural-History minded friends*"—Refuge Manager John Herholdt[30]

In the meantime, work continued on the impoundment across the marsh to create Shearness Pool. Again, a dredge working from Raymond and Shearness Guts was used to build the impoundment, but this work was not completed when the enrollees left in 1942. Another part of the Shearness project that the CCC workers were able to complete was construction of a causeway through the freshwater swamp to separate Shearness Pool from Finis. This causeway was constructed partially by manual labor and partially by using the dragline. Fill to form the causeway was taken from two natural depressions, creating small freshwater pools, now known as Big Woods Pond.

The enrollees built water control structures in the dikes and causeway, difficult work that required building forms and pouring concrete in the mud and muck of the marsh. They also hand dug connecting ditches between the impoundment pools and between the pools and the salt marsh to allow freshwater to flow from one pool to another and to allow the pools to be drained into the tidal guts.

Reforestation, although less vigorous, was another important task in transforming the former farmlands of the upland areas into a wildlife habitat.

In 1938 the enrollees helped to create a tree nursery that had nearly forty-two thousand seedlings, and then in 1939 they added fifteen thousand more—and all the young trees that survived eventually were transplanted to the refuge. The initial planting included Norway maples, honey locust, green ash, black locust, persimmon, hackberry, yellow and red pine, and horse chestnut seedlings; the second planting dogwood and cedars. All seedlings were provided by the Soil Conservation Service.

In the fall of 1938, nearly twenty thousand black locust seedlings were transplanted from the nursery to permanent locations on the refuge. In the following spring, five thousand cedar seedlings were planted on the refuge, and nearly three thousand black locusts were planted to replace those killed by mice over the winter. By the spring of 1939, nearly thirty-four thousand seedlings had been planted on the refuge; however only eleven thousand survived because of rodent damage and poor planting practices. The CCC foremen who supervised the planting were experienced in mountain reforestation projects, but not in the conditions found in Kent County, Delaware.

Another major CCC task was construction of refuge buildings, including a headquarters building, an equipment shed, a boathouse and marine railway, houses for the manager and patrolman, and an observation tower. They also built a barge to carry a dredge and several small boats.

In the spring of 1939, the headquarters building,[31] which included offices and shops, was completed. Except for electrical work, construction was by the enrollees. During the following summer they completed a one-room overnight patrol cabin in the salt marsh at the junction of Duck Creek and Dutch Neck Canal. In April 1940 they completed a house for the Refuge Manager and a house for the Patrolman-Laborer (the two service employees at the refuge). A garage was later added to the Patrolman-Laborer's residence. In the fall of 1939 lumber was received for construction of an observation tower. The tower was completed early in 1940, despite the enrollees' difficulties in building it. Later they build an oil shed and grease rack at headquarters and rebuild a small shed at headquarters that was struck by lightning in September 1940.

The enrollees also were involved in marine and waterfront construction projects. In the spring of 1939, they built a marine railway at Whitehall Landing, the start of major construction at this site. Construction was begun on a boathouse in the fall of 1940, and at the same time a raised roadway to the boathouse site was started. By 1941, the boathouse, docks, and road to Whitehall Landing all were completed.

But they also built boats! In the spring of 1939, they remodeled three work boats, installing new rudders, shaft logs, engine beds and motors, and they also hauled, cleaned, and painted a fifty-foot hull received from the Coast Guard. In 1940 the enrollees built a barge on which they installed a small dragline, and they used this vessel to replace the rented dredge that had been used on the Raymond dike.

Owners of the salt marshes north of the refuge annually burned their marshes to encourage new growth of marsh grasses. There was concern that these marsh fires would spread to the refuge, so it was decided to create a firebreak. It's not clear, but the CCC may have helped to dig parallel ditches 150 feet apart for a distance of 1½ miles along what was then the northern boundary of the refuge from Duck Creek to the Delaware Bay. The ditches were filed with water, and the marsh between them was burned, thus creating a barren firebreak in the marsh. This break was maintained at least during the CCC tenure, and the ditches are still visible today.

Actually, the enrollees first recorded project at Bombay Hook was to construct a display pool at the headquarters site. This pool, covering an area of about 375 square feet and with a depth at its center of 2½ feet, was completed later in the year. At the same site they also installed a sewer line, helped drive a well, and buried a telephone cable along Whitehall Road for a distance of nearly two miles. Because a cooperative farming program with local farmers was not yet in place, the refuge staff planted thirty-seven acres of corn which was cultivated, thinned, and weeded by the CCC after their arrival, and they also assisted with planting of buckwheat in eleven small food patches throughout the upland area.

In addition, the enrollees completed an array of smaller projects including demolition of old farm buildings and maintenance of the roads that constantly needed stone fill.

Then suddenly on April 18, 1942, all the enrollees left, reassigned to a new, unspecified Army project. All of the CCC presence that was left at Bombay Hook was the camp superintendent, one foreman, and four contract employees.

Do you suppose that in their wildest dreams these young black men could have imagined a hundred thousand snow geese or tens of thousands of shorebirds on the freshwater impoundments and tidal marshes? Could they have anticipated a herd of seven hundred deer? Would they believe what was planned as a waterfowl refuge would become home to such a diversity of plant and animal species? Would they really believe one hundred thirty thousand human visitors to this refuge each year? Truly they did create a living legacy!

Endnotes

[1]Drawn from descriptions in the *Narrative Report for the Bombay Hook Wildlife Refuge*, May 1 to July 31 and August 1 to October 31, 1938, John F. Herholdt, Jr. Refuge Manager, Bombay Hook Migratory Waterfowl Refuge, Bureau of Biological Survey, United States Department of Agriculture.

[2]*Index of State Listings*, *National Association of Civilian Conservation Corps Alumni*., URL: http://www.cccalumni.org/index/html. (URL accessible prior to 2022).

[3] Herholdt, John F., Refuge Manager, *Bombay Hook National Wildlife Refuge, Quarterly Narrative Report, February, March, and April, 1942.*

[4] *Op. Cit., Index of State Listings.*

[5] Eldred, Tom. *Mosquito Control and Much More*, Delaware State News, Volume 99, Number 332, June 29, 1999.

[6] Friend, Milton, *Conservation Landmarks: Bureau of Biological Survey and National Biological Service.* (URL accessible prior to 2022).

[7] Thurston, Thomas. *African Americans in the Civilian Conservation Corps New Deal Network.* (URL accessible prior to 2022).

[8] *Roosevelt's Tree Army. National Association of Civilian Conservation Corps Alumni* URL: http://www.cccalumni.org/history1.html. (URL accessible prior to 2022).

[9] *Ibid.*

[10] Morrison, Samuel Eliot. *The Oxford History of the American People.* (Oxford University Press, NY, 1965) p.955

[11] Op. Cit. *Roosevelt's Tree Army.* URL: http://www.cccalumni.org/history1.html. (URL accessible prior to 2022).

[12] Justin, James F., Civilian *Conservation Corps Museum.* URL: http://members.aol.com/famjustin/ccchis.html. (URL accessible prior to 2022).

[13] Based on a weekly menu reported in: Justin, James F., *Camp Inspection Report, 6/8/37, Typical Menu, C01295, Camp MC-54, Magnolia, DE.* URL: wysiwyg://58/http://www.geocities.com/jkjustin2/1295b6.html. (URL accessible prior to 2022).

[14] Herholdt, John F., Refuge Manager, *Bombay Hook National Wildlife Refuge, Quarterly Narrative Report, July 31, 1938; April 30, 1940.*

[15] CCC Camp BF-1 superintendent's report, May 1 to August 31, 1940 (unpublished report on file at Bombay Hook NWR)

[15] Justin, James, CCC Museum Newspaper Article, taken from *Profress*, a Delaware WPA magazine, circa 1936

[16] E-Mail note from Donna Broome, Associate Archivist, National Association of CCC Alumni.

[17] *Op. Cit., Index of State Listings.*

[18] Herholdt, John F., *Refuge Manager, Bombay Hook National Wildlife Refuge, Quarterly Narrative Report, January 31, 1939.*

[19] Meredith, William H., *Controlling Salt-Marsh Mosquitoes*, in Bryant, Tracey L. and Jonathan R. Pennock, Editors, *The Delaware Estuary: Rediscovering a Forgotten Resource.* (University of Delaware Sea Grant Program, 1988) p. 106.

[20] *Loc cit*, Eldred, Tom.

[21] Justin, James F., *Biography of James F. Justin.* URL: http://members.aol.com/famjustin/Hystin1/html. (URL accessible prior to 2022).

[22] Herholdt, John F., *Narrative Report for Bombay Hook Wildlife Refuge, May 1 to July 30, 1939. p. 8.*

[23] *Op. Cit*, Meredith, William H.

[24] All references and descriptions of CCC projects at Bombay Hook are taken from *Quarterly Narrative Reports* from May 1, 1938 through April 30, 1942, prepared by the Refuge Manager, John F. Herholdt, Jr. and reports by the Superintendent, CCC Camp BF-1, Leipsic, Delaware, 1938 to 1941. These reports are on file at Bombay Hook National Wildlife Refuge. Specific citations in this section will be made only to direct quotations taken from these reports.

[25] Herholdt, John F., Jr., *Report of Activities for the Fiscal Year 1941.* Bombay Hook National Wildlife Refuge. p. 10

[26] *Loc Cit*, Meredith, William H.

[27] The freshwater impoundments, as finally constructed were considerably smaller than what was initially planned. Total area of these impoundments today is 1,100 acres, including Bear Swamp as well as Raymond, Shearness, and F'inis.

[28] A dragline had a long boom with a winch and cable to which was attached a scoop or bucket, and this was mounted on a tracked vehicle. The boom was lowered, and the scoop dropped to the ground. Then the boom was raised, dragging the scoop toward the rig, and filling the scoop with earth. The winch was used to lift the scoop, and its contents then were deposited, in this case, on the dike.

[29] Herholdt, John F., Jr. *Quarterly Narrative Report, Bombay Hook National Wildlife Refuge, January 31, 1940.* p. 17

[30] Herholdt, John F., Jr. *Quarterly Narrative Report, Bombay Hook National Wildlife Refuge, October 31, 1940.* p 22.

[31] The headquarters site and former headquarters buildings are now the maintenance center.
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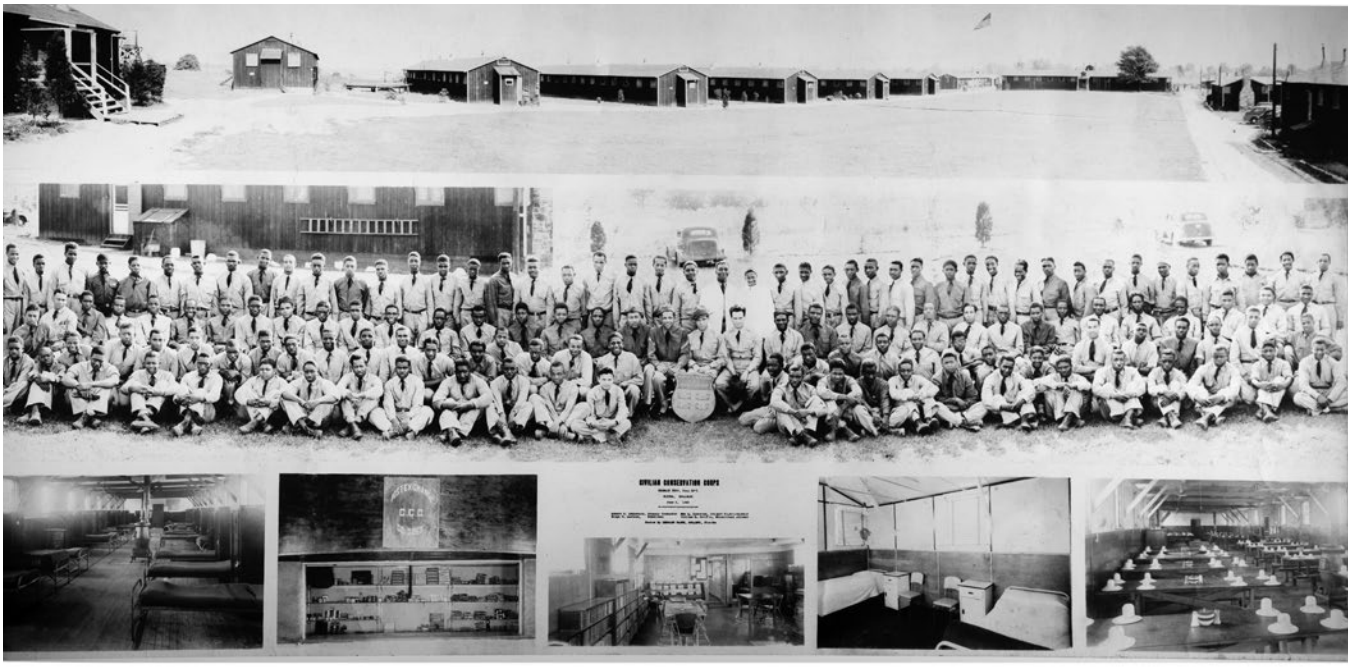

CCC Company 3369-C BF-1 Smyrna, Delaware, 1940. Courtesy of Flavia Rutkosky/USFWS

Robert W. Mayer—A Brief Bio
The Friends of Bombay Hook NWR

Robert W. (Bob) Mayer was a scholar, an educator, a patriot, a devout church goer, and a dedicated volunteer.

Having earned advance degrees in psychology and education, he joined the U.S. Army and became a special agent in the Counterintelligence Corps, serving on the German-Russian border during the cold war. After being discharged, he pursued a career in education—first in the Newark (Delaware) Special School District, and subsequently at the University of Delaware. Here, he spent the rest of his professional life as both a faculty member and an administrator.

Upon his retirement in 1990, Bob brought his interests and talents to Bombay Hook National Wildlife Refuge. He served on the board of directors of the Friends of Bombay Hook, Inc. for many years, including several terms as president of the organization. Being a lifelong learner, he became knowledgeable about the habitat, fauna, and flora of the refuge. He put this knowledge to work in his volunteer activities on the refuge, which included conducting tours of the refuge and of the Allee House (a mid-eighteenth-century farmhouse located on the refuge); staffing the Visitor Center; and authoring brochures, pamphlets, and other documents to educate the public about the refuge and its inhabitants. His wife, Mary, also a refuge volunteer, worked with him in some of his endeavors.

A meticulous researcher, Bob was inspired to delve into the history of Bombay Hook and to publish his findings. The results were two significant publications: "The History of Bombay Hook" and "Creation of a Legacy: The Story of the Civilian Conservation Corps at Bombay Hook—1938 to 1942."

For his many hours of volunteer work, Bob was awarded the Jefferson Awards Foundation's Jefferson Award for Public Service.

Bob Mayer passed away in 2015 at the age of 86.

Caribou at Arctic in 1952. USFWS

Arctic Reflections

Jim Kurth, *Retired, U.S. Fish and Wildlife Service*

When I daydream about my time at the Arctic National Wildlife Refuge, my thoughts always return to Last Lake along the Sheenjek River. It's where Olaus and Mardy Murie made their field camp in the summer of 1956 as they planned the campaign to establish the Arctic Refuge.

Alaska in 1956 was still very much America's last frontier with only 225,000 people living there. There wasn't a road directly connecting Anchorage and Fairbanks. The discovery of oil on the Kenai peninsula would not come until the following year, the discovery well at Prudhoe Bay wouldn't be drilled until a dozen years later. How could they have envisioned the need to protect this last great wilderness from threats others couldn't imagine?

Olaus and Mardy had already seen Alaska beginning to change. The population had nearly tripled from what it was before the war. They saw the construction of the Alaska Highway provide road access from the lower 48 states. They witnessed the construction of large military bases and the rise of modern aviation. The Alaska Constitutional Convention had produced a new constitution, a requisite for the final push for statehood. If Alaskan's were to be successful in their quest for statehood, they would need to develop her natural resources and build an economic foundation. The search for oil and gas in the central arctic held promise. The Muries connected the dots of what they had already seen with what was unfolding and they knew that more development was coming. They

Olaus and Mardy Murie during 1956 Sheenjek Expedition. The Murie Center

Dall Sheep at Arctic Refuge. USFWS

knew that action was needed to protect this special place. In his book, *The Last Great Wilderness*, Roger Kaye chronicles the details of the campaign to save this place from development.

On December 6, 1960 Secretary of the Interior Fred Seaton issued four public land orders. One established Izembek National Wildlife Refuge, another established the Kuskokwim Refuge (now the Yukon Delta National Wildlife Refuge). He ordered the withdrawal of 8-million acres of northeast Alaska as the Arctic National Wildlife Range to protect its wildlife, wilderness, and recreational values. He issued an order that released the central arctic from a previous withdrawal, allowing the new State of Alaska to select the area as state lands under the Statehood Act. Conservationists got the Arctic Refuge, Alaska's development interests got access to Prudhoe Bay.

When the Alaska National Interest Lands Conservation Act was passed on December 2, 1980, the range was enlarged to more than 19-million acres. Eight million acres were designated as Wilderness, but the fate of the coastal was left for a future Congress to decide after a series of studies and seismic exploration. Congress after Congress rejected industrial development of the area. In 2017, a provision was included in a massive tax cut bill that authorized leasing and development of the coastal plain. The upcoming election will likely determine her fate.

Many have asked over the years why this place matters, why should we forgo the potential riches that oil might bring. There are many answers, as the refuge has many meanings to different people. For the Gwich'in, the coastal plain contains the calving grounds of the Porcupine caribou herd. They call the coastal plain "the sacred place where life begins." The caribou are central to their culture and their way of life.

I have met wilderness explorers who have travelled the world who are awestruck by the unparalleled beauty and wildness of the place. I've met hunters from Midwest auto factories who saved money for a decade to make the trip of their life to hunt Dall sheep in the Brooks Range. I've listened to dozens of expert biologists explain how important the refuge is for conserving biological diversity.

I've struggled at times to explain why it matters to me, why this place is so important, how I feel when I go there.

I heard an Irish Catholic priest at my church tell a story many years ago about visiting family in Ireland. He had heard of a beautiful lake up in the high country. He had some free time and decided to go find the place and explore it. Without a map or precise directions, he

Polar Bear in Arctic. Steve Hillebrand/USFWS

headed out thinking he could find it. After several hours of searching in vain, he saw an older man walking along the roadside. He was sure the man would know of the place and he stopped to ask him for help. After describing the place, he asked the older man if he knew of it. He replied, "Oh yes, Father. It's a skinny place." The priest was puzzled and explained he wasn't familiar with the term "skinny place." The old man smiled and replied, "It's a place where the boundary between heaven and earth is very thin."

The Arctic Refuge is a skinny place. It helps us to understand that our species isn't far removed from the forces that shaped us. This wild place helps us to feel small and believe, perhaps, that there is something bigger out there. Skinny places remind us we are not in control. They evoke humility. They make us feel alive in the same way we did in our early evolution. They kindle in us what we were at the beginning. They are more than pretty, so much more than fun. They are our primeval past and our evolutionary destiny. A hawk owl on the Firth River told me that one day a long time ago.

I last visited the refuge 11 years ago to celebrate the 50th anniversary of the refuge. I went with my friend and former colleague Fran and my lovely bride. We travelled to a far corner of the refuge to the place where, legend holds, the idea of an arctic refuge was first pondered. When we exited the plane, my wife spun on her heel taking in a 360-degree view of the place. She simply said, "wow." She was in her skinny place.

The scenery was stunning, the hiking exhilarating. We saw a single grizzly bear. Sign of moose browsing was abundant, but they leave the area and migrate to the Yukon territory to calf. They will be back in the fall. I was surprised at how many American robins there were. I guess there are certain types of robin that are happier to bypass a sea of manicured lawns to find refuge in the mountains of wild Alaska. There are certain types of people who feel likewise.

I believe enduring value of the Arctic Refuge as a world class natural area and the preeminent remaining American Wilderness far exceeds the short-term gain that would be garnered by industrial development of the coastal plain. Others differ with that view. We shall see.
■

Young Whooping Crane

Whooping Crane Research and Propagation at Patuxent

Matthew C. Perry, *History Committee Member, Retired, U.S. Fish and Wildlife Service*

"When we hear his call, we hear no mere bird. He is the symbol of our untamable past…"

—ALDO LEOPOLD

It all started with a whooping crane named Canus. In September 1964, a biologist conducting aerial surveys spotted a young crane on the breeding area of Canada with a broken wing. Fortunately, field biologists rescued the bird in the Canadian tundra and took it to Edmonton for x-rays, where, unfortunately, its broken wing had to be amputated. It was then taken to Colorado State University.

The crane was initially named Lady Bird, but when it was determined to be a male, received the name Canus as an abbreviation of Canada and the United States, because of the fledgling relationship between our countries regarding conservation of this magnificent species. What began with one bird with disabilities became a continental-wide project to save this species from extinction. But there was more at stake than one species and one continent. The story of Canus electrified conservationists around the world concerned with cranes and other endangered species.

Canus started its captive life in Colorado at the Monte Vista National Wildlife Refuge, but soon received another plane ride to the Patuxent Wildlife Research Center[1] in Laurel, Maryland. The Research Center is co-located on Patuxent Research Refuge, a unit of the National Wildlife Refuge System. The refuge provided a large, safe, secure area for the whooping crane complex to be constructed, free from outside influences.

Canus in pen at Patuxent Wildlife Research Center, Laurel, MD. USFWS

Dr. Ray Erickson, Mr. Ernie Kuyt, and Mr. Glen Smart in Canada with whooping crane eggs. USFWS

Dr. Ray Erickson, senior scientist with the U.S. Fish and Wildlife Service in Washington, DC, initiated the Endangered Species Propagation Program there, and Canus became the first and most famous resident of the program. Along with the propagation program, Dr. Erickson envisioned and established research laboratory and field studies to learn about the biological needs of whooping cranes and other species to help restore their populations in the wild.

Patuxent needed more cranes, so Dr. Erickson and Mr. Glen Smart arranged with Canadian Wildlife Service biologist Mr. Ernie Kuyt to fly to Wood Buffalo National Park in Alberta and remove one egg from the two-egg nests of the wild whooping cranes. Although this remnant breeding population had only been discovered accidentally in the 1950s, it was known that only one of the young from the two eggs typically survive to the fledgling stage. Special holding crates were developed, and the 12 collected eggs received tender loving care for the long trip to Patuxent. The first transfer occurred in 1967 and continued periodically until 1996 when Patuxent had enough cranes for research and propagation.

Dr. Erickson selected a large secluded fenced area at Patuxent for the construction of large pens where the cranes would reside and could be propagated. Staff equipped the chain-linked enclosures within the compound with a double row of electric wire (livestock fence chargers) to deter predators. The cranes had one wing altered to prevent flight in the large pens with no netting on top of pens. Clipping primaries must be conducted annually, so veterinarians on the staff developed techniques called tenotomy and tenectomy to make the cranes permanently flightless. Occasionally, when there was a strong wind, the cranes could get airborne and fly out of the pens. However, they were eager to get back in, and caretakers could easily corral them to the door of the enclosures.

Despite cranes at Patuxent having reached sexual maturity, the birds produced no eggs. There was concern that selecting pairs randomly was not satisfactory. Behaviorist wildlife biologist, Dr. Cam Kepler, then conducted extensive observations of the subtle behaviors of cranes. When whooping cranes are together in large numbers there can be displays of aggressive behavior making paired birds hard to recognize. To determine natural pairs Dr. Kepler used three "dating cages" with a female in the middle cage and a male on both sides. If the female seemed receptive to one of the males, crane caretakers separated the pair into another pen by themselves. Progress was made, but egg production was not optimum, so Patuxent scientists initiated artificial insemination with the cranes.

Although U.S. Department of Agriculture (USDA) scientists used artificial insemination with domestic birds and mammals at that time, it was not common with wild birds. Research physiologist Dr. George Gee, working with a physiologist Dr. Thomas Sexton studying turkeys at USDA's adjacent Beltsville Agricultural Research Center, collaborated on the new science and developed a new technique. Dr. Gee was also working closely with the International Crane Foundation in Baraboo, Wisconsin. In 1975, Dr. George Archibald, Director of the Foundation, visited Patuxent. He became intrigued with a female crane, named Tex, who would not dance or mate with any of the male cranes. Surprisingly, when Dr. Archibald raised his arms and jumped in the air in front of Tex, the previously unresponsive Tex began to dance with Dr. Archibald.

Dr. Gee decided to transfer Tex to Baraboo, which did not have any whooping cranes. Dr. Archibald danced with Tex during the 1977, 1978, and 1979 breeding seasons, but egg production did not occur. Other researchers tried to dance with Tex during the 1980 and 1981 breeding season when Dr. Archibald was busy on other issues. Tex did not respond to these surrogate imposters. In 1982, Dr. Archibald decided to make one last effort to get Tex to lay an egg. On April 1, he moved in with Tex and conducted daily dances with his avian friend. On May 1, Tex laid an egg. Tex had been artificially inseminated with semen that Dr. Gee provided from a male whooping crane at Patuxent, so when the egg hatched on June 1, 1982, the chick received the appropriate name of Gee-Whiz!

Back at Patuxent, eggs continued to be produced by way of artificial insemination and caretakers raised young cranes, but the technique was time consuming and capture of the adults was stressful and had the potential of damaging the long legs of the cranes. Staff agreed that the preferred procedures for raising cranes was natural courtship followed by copulation.

Veterinarian, Dr. James Carpenter, and research scientist, Dr. Paula Henry, conducting health checks on whooping cranes. Matthew C. Perry

Crane colony supervisor, Ms. Jane Chandler, holding whooping, crane while veterinarian, Dr. Glenn Olsen, conducts health check. Laurel Leader newspaper photographer Sherry Dibari

Serendipitously, at that time the young biologists on the Patuxent staff were meeting Friday after work in what was called SOB (Seminar Over Beer). Interesting discussions prevailed, which seemed to get more bizarre as the hours passed. On one of the SOB meetings, a young typically quiet crane caretaker, possibly influenced by the spirits, said he knew why the cranes did not conduct natural mating. He claimed that because one wing was altered the males had trouble balancing on the females for successful copulation. He even claimed the male sometimes used the fence as an aid to balance on the female. Everyone had a good laugh at the perceived sight of the poor cranes. I was intrigued with his comments and passed them on to Dr. Gee, who oversaw the program. The caretaker's comments were discounted, but it was not long after this reported observation that staff covered crane pens with netting and all future cranes remained fully flight capable. In 1991, Patuxent reported the first egg laid resulting from natural copulation and many eggs followed from full-winged cranes in the covered pens.

Over the 4 decades of the expensive propagation program, there were setbacks caused by disease and other maladies. There were leg problems early in the program believed to be caused by diet. A nutritionist, Dr. John Serafin, studied various experimental diets with the cranes. His findings determined that the diet was too nutritious, and bone growth was exceeding muscle growth. Young cranes were then forced to swim daily in swimming pools near the propagation pens to help develop their leg muscles.

West Nile virus and equine encephalitis were two diseases that caused death of captive cranes at Patuxent in the 1980s. During the same period, a mysterious death occurred, which veterinarians at first thought was a toxin occurring in plants growing in the pens. After extensive research scientists discovered the malady was due to a toxin from fungus in the commercial diet the

Patuxent animal caretaker, Barbara Clauss, in white costume teaching young crane to feed in captivity. Kathy O'Malley

cranes were being fed. Groups of bobwhite quail in cages were established to test the food for toxins, but the quail were also used to monitor the transmission of mosquito-borne diseases. All cranes subsequently received periodic health examinations from the staff veterinarians, Drs. James Carpenter and Glenn Olsen, and preventative medicine and vaccines were given when appropriate. Canus, who had become the biological parent of hundreds of cranes, died of natural causes in January 2003 at the impressive age of 39. The taxidermy remains of Canus now rest at the Smithsonian Institution alongside its wing that was amputated in 1964.

The first attempt to establish a new population of whooping cranes in the wild occurred in 1975 when eggs produced at Patuxent were placed in nests of sandhill cranes at Grays Lake National Wildlife Refuge in Eastern Idaho. The project was headed by Service researcher, Dr. Rod Drewein, with the hope the eggs would hatch, and the young follow their surrogate parents to the sandhill crane's wintering area at Bosque del Apache, New Mexico. The early optimism subsided after the whoopers reached sexual maturity and appeared to have no interest in mating due to the young whooping cranes having been imprinted on adult sandhill cranes. The findings resulted in the termination of egg transfers, and later Patuxent research biologist, Dr. David Ellis, stated the project wasted a very valuable amount of eggs and genetic diversity of the species.

One important lesson learned from the egg transfer was the importance of imprinting for young cranes on adults of their species. Patuxent biologists still were not confident in leaving eggs with adult whoopers in the pens. Biologists were also interested in double-clutching, and sometimes triple-clutching with the captive cranes to maximize egg production. Caretakers subsequently dressed in white costumes when around the young cranes and refrained from any human communication as a compromise. In addition, adjacent pens contained adult whooping cranes so young cranes could see and hear adults of their own species. The costume-rearing project seemed to be relatively successful at first and many cranes were raised in this manner.

Knowing that cranes and most other avian species learn migration from their parents, the costume-rearing technique led to the use of ultra-light aircraft to lead cranes in migration. Young cranes were first trained to follow a costumed caretaker on land. Costumed caretakers then trained cranes to follow them while they drove a pick-up truck, and finally in the air with an ultralight aircraft. It was a long process with many mishaps, but in the end a new population of whooping cranes migrated between Wisconsin and Florida. The problem was that the program was expensive and not sustainable. In 2016, Patuxent terminated the costume-rearing program and developed a parent-rearing program through research conducted by Dr. Glenn Olsen at Patuxent.

In 2018, with decreasing federal expenditures for wildlife research and other projects needing attention by a declining staff of

Ultralight on the ground with costumed caregiver imprinting young cranes to the machine. USFWS

biologists, Patuxent managers decided to end the whooping crane propagation project and to disperse all cranes to research facilities that were able and willing to maintain the birds. It was a sad period for the caretaker staff, some employed for decades, to end their endeavors on a less than totally successful climax.

The Patuxent program was releasing 10 to 20 whooping cranes yearly in Wisconsin and another 10 to 12 in a non-migratory flock in Louisiana before the closure in 2018. The closure has been catastrophic for the Wisconsin program, as only half as many whooping cranes have been released in the subsequent years. None of the whooping cranes that were moved to new facilities have returned to producing chicks. This has resulted in a theoretical loss of 30 to 60 whooping cranes over the last 3 years. Another sad setback to whooping crane propagation was that Gee Whiz, who fathered of a family of 178 genetically diverse whooping cranes through 4 decades at the International Crane Foundation facility, died in February 2021.

The cranes and the crane staff at Patuxent were dispersed over a 1-year period, and now the huge crane breeding facility is mostly in a fallow condition waiting for the next challenge where the land can be put to good research use. The cranes and all nature lovers can be thankful for the dedicated staff at Patuxent and other areas, who worked hard to save this great white bird. Even though the world population of whooping cranes had increased to more than 500 birds, the species is still classified as endangered, and in the opinion of several crane managers, the abandonment of this successful propagation program will take years to correct.

Endnote:

[1] In 2020, the U.S. Geological Survey combined the Patuxent Wildlife Research Center with the Leetown Science Center to create the Eastern Ecological Science Center.

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An Insider's View into the History of the Service's International Affairs Program—Lessons Learned from 40 Years of Federal Service

Marshall Jones, *Retired, U.S. Fish and Wildlife Service*

Robust international relationships have always been important to the U.S. Fish and Wildlife Service (Service). For more than a century, the 1916 Migratory Bird Treaty with Canada (later replicated with Russia and Japan) has formed the cornerstone of the world's most effective migratory bird program. Staff from every region have a long history of reaching out across land borders, lakes, seas, and oceans to join global partners in the conservation of species and their habitats. Wildlife conservationists from around the world have a long tradition of looking to the Service for its expertise and passion for migratory bird conservation, national wildlife refuges, habitat management, national fish hatcheries and disease research, law enforcement, wetlands conservation, and every other facet of the Service's complex conservation mission.

But when my Service career began in 1975, the agency was in the midst of a series of dramatic changes that brought an entirely new focus to the need for centrally coordinated international programs. My first job was in the old Office of Endangered Species or OES, and our work was rightly concentrated on U.S. species. But we were also initially co-located with the small but amazing group of Service experts who were the nucleus of what became today's International Affairs Program. From them I got my first look at what it took to be successful working across our borders.

During all of my subsequent 32 years in the Service—and beyond, in 14 subsequent years with the Smithsonian—I have worked with or in international programs[1]. This essay is my attempt to capture the lessons I learned from those decades of international conservation.

1. The 1970s Shaped the Service's International Affairs Program for Decades to Come

After the birth of the Earth Day movement in 1970, new laws and treaties came with dizzying speed. It started in May of 1972, when the United States and the Union of Soviet Socialist Republics (USSR) signed the Agreement on Cooperation in the Field of Protection of the Environment and Natural Resources (US-USSR Agreement, later US-Russia Agreement). The Service was to be the lead agency to implement the nature conservation provisions of that groundbreaking agreement. Later that year came the U.S. Marine Mammal Protection Act, which established federal responsibility for marine mammals and gave the Service its mandate for sea otters, manatees, polar bears, and walrus—the latter two species also being central to the new US-USSR Agreement.

In February of 1973, the United States convened representatives of 88 countries at the State Department to negotiate what became the Convention on International Trade in Endangered Species of Wild Fauna and Flora (CITES). They designed an innovative, two-tiered system to ban commercial trade for species "threatened with extinction" (Appendix I), and to ensure that only sustainable trade was allowed in species that "may become threatened" (Appendix II). Then, near the end of the year, Congress passed the Endangered Species Act (ESA), whose purposes were not limited to U.S. endangered species: it also included implementation of CITES and the Convention on Nature Protection and Wildlife

Preservation in the Western Hemisphere (Western Hemisphere Convention)—a little-used but visionary 1940 treaty—and gave the Service new authority for a broad range of international conservation work.

Each of these new laws and treaties would require Service staff with their attention fixed on bringing the words on paper to life for the benefit of species and their habitats beyond our borders. This resulted in the expansion of the existing International Affairs staff (which became today's Division of International Conservation or DIC), as well as the creation of the predecessors to today's Division of Management Authority (DMA) and Division of Scientific Authority (DSA). But each of these offices followed its own twisting path, with many lessons learned along the way.

2. There is No Substitute for Innovation

Service staff have always been major innovators. The National Wildlife Refuge System, for example, is legendary for how much its staff can accomplish with funding that is a small fraction of the budget given to some other land managing agencies. The same is true for the Office of Law Enforcement and other Service programs. This same spirit of innovation also pervaded the Service's early Division of International Conservation work. Although the ESA gave almost unlimited authority for new programs, it didn't bring any new funding. One example I saw firsthand was the work of Dave Ferguson in what is now the Division of International Conservation. He realized that the opportunities created by the ESA dovetailed with provisions of Public Law (PL) 480, an agricultural act that gave federal agencies access to huge accumulations of foreign currencies accumulated by U.S. embassies from payments for U.S. surplus grain. India, one of the world's megadiverse countries, was one of these PL 480 countries, as was its neighbor Pakistan. Under this program, for the next 3 decades,

Peter Ward, in International Affairs' Eurasia Branch, at Black Earth Federal Biosphere Reserve in Kalmykia, Russia, home to the critically endangered saiga antelope, a species that received grant support from International Affairs. Courtesy of Peter Ward.

Dave became legendary in South Asia for building local wildlife capacity and fostering projects with partners like the highly respected Bombay Natural History Society. The results included surveys of India's megadiverse birdlife, studies of the charismatic mammals of the Western Ghat mountain range, tiger surveys, and conservation programs for high mountain sheep in Pakistan.

That same ability to innovate—to build incredible programs with very slim initial resources—also marked the early history of the Service's work under the US-USSR Agreement, but to me there was an even larger lesson that it taught.

3. Shared Conservation Values Can Transcend Political Conflict

The 1972 US-USSR Agreement was negotiated at the height of the Cold War and the War in Vietnam, showing that even the most dangerous conflicts could be put aside for the benefit of the environment. The Service was responsible for Area 5 of the Agreement, involving nature and natural areas. The Division of International Conservation, working initially with Legacy Region 7, started a series of exchange programs on species and habitats of mutual interest. Walrus and polar bears were early cornerstones, but the collaboration expanded to address everything from sea birds to black-footed ferrets and Siberian masked polecats. Cumulatively, between 2003 and 2016, 301 Americans visited Russia or China under these programs, and 484 Russian and Chinese officials came to the United States, according to reports compiled by International Conservation's Peter Ward.

1980 brought the first major test of the Agreement, after the United States (and 64 other countries) boycotted the Summer Olympics in Moscow because of the Soviet invasion of Afghanistan. Despite this chill, work under Area 5 continued, and it actually took a huge step forward with the arrival of Steve Kohl from the U.S. Environmental Protection Agency (EPA). The program prospered due to his fluent Russian, enormous energy, and uncanny ability to create rapport between Soviet biologists and Service staff. Yet another challenge came in 1991 with the dissolution of the USSR, putting its existing international commitments in doubt. However, recognizing the importance of environmental protection and nature conservation, within 3 years the United States and Russia had signed a replacement Agreement, and the Service kept the program vibrant and growing. Over the ensuing decades, even as the other areas of cooperation lost their steam, exchanges with Russia under Area 5 remained strong. These exchanges have benefitted not only generations of Service biologists, but also staff from the National Park Service, the United States Geological Survey (USGS), and other agencies, who recognized the unparalleled opportunity provided by the Service's International Affairs Program to facilitate work

with Russia to achieve their own missions.

The US-USSR Agreement also produced another benefit. In 1986, China and the United States signed a parallel Nature Conservation Protocol, putting Steve Kohl's Chinese skills to work. This led to exchanges on protected areas, conservation and rational use of wild flora and fauna, migratory birds, wetlands management, cooperative research, and one new area not included in the USSR agreement: cooperation on the regulation of import and export (i.e., CITES implementation). Political rivalries once again were put aside due to shared concern for wild species and their habitats.

4. Organizations Need to Evolve with Changing Conditions and Needs

Another ramification of the new treaties and laws of the 1970s was the requirement for an expanded international permitting program. CITES required each member country (in CITES terms, the Parties) to designate a Management Authority, the official channel for communicating with the Secretariat in Switzerland and other Parties around the globe. It would also be the national permits office, and the effectiveness of the treaty would depend in part on how well it implemented an intricate system of permits, with differing standards for import, export, re-export, bred-in-captivity, scientific exchanges, and other activities. The Marine Mammal Protection Act required another complex permit system, as did the ESA, which also put the teeth into CITES in the United States. When I joined the Service in 1975, a team was already scoping out all these new responsibilities, and from this the original Wildlife Permits Office (WPO), precursor to today's Division of Management Authority, was born.

This came just in time for the first meeting of the CITES Conference of the Parties (CoP) in Switzerland in 1976. WPO organized a U.S. delegation that included Service Director Lynn Greenwalt, young Interior lawyer Don Barry (a future Assistant Secretary for Fish, Wildlife, and Parks), International Affairs Chief Gerry Bertrand, WPO Chief Rick Parsons and his staff, and the Office of Law Enforcement, as well as the State Department. The delegation also needed scientific support, but there was yet no designated U.S. Scientific Authority, the body required by CITES, parallel to but independent from the Division of Management Authority, to make scientific determinations. They looked for a zoologist who could be spared from other duties for several months and incredibly, they found me (maybe because I was still the newest and most expendable staff member in the Office of Endangered Species). Participating in that first CITES CoP was an extraordinary experience in some unexpected ways, as shared later in this essay. It also helped to prepare me for the day, a dozen years later, when I became the Chief of the Office of Management Authority.

After that first CoP, an Executive Order finally established the formal Endangered Species Scientific Authority (ESSA), staffed by the Service but reporting to an interdepartmental board. However, the ESSA got snared in controversy about export findings, and the 1979 ESA amendments vested clear responsibility for both the Division of Management Authority and the Division of Scientific Authority to the Department of the Interior alone, delegated to the Service. This led to the creation of a Scientific Authority within the Service's old Research Region, led by Charlie Dane, but that arrangement also was transitory. In 1992, when the Research Region ultimately became the Biological Resources Division of USGS, the Scientific Authority remained with the Service. It had a critical science mission, but not a research mission.

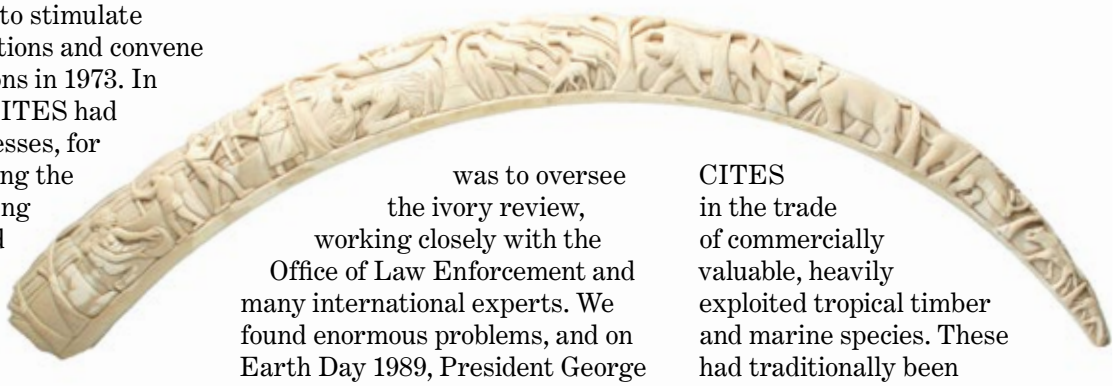
The Division of Scientific Authority decision came as part of a larger Service reorganization in 1994. Director Mollie Beattie decided that the Service needed a more coordinated international approach and a dedicated international voice within the Directorate. This unified the Office of Scientific Authority (now the Division of Scientific Authority or DSA), the Office of Management Authority (now the Division of Management Authority or DMA), and Office of International Conservation (now the Division of International Conservation or DIC), then led by the sagacious Larry Mason, under a single Assistant Director. I was selected to fill this new role, moving from my job as Management Authority Chief. It was a mind-expanding experience for me to move beyond CITES and permits to start learning the intricacies of Division of International Conservation's complex programs and to think about how to integrate the Service's international presence.

Another evolution of a core function of International Affairs has been announced as I'm writing this essay—the processing of permits. From the inception of WPO, it (and other Service offices) processed permit applications the old-fashioned way: applications delivered in each day's mail, envelopes laboriously opened by a staff of diligent clerks, checks for permit fees collected for deposit, papers moved from desk to desk as biologists and managers reviewed them, got Division of Scientific Authority advice, made decisions, and ultimately put signed permits back into the mail. But over the past year, Management Authority Chief Pamela Scruggs spent months working fulltime with other Service permit experts on a team that created the new ePermits application and payment system. Now that it's live, Service permit-issuing programs finally are moving into the 21st Century.

5. U.S. Leadership Can Make All the Difference

The CITES treaty would likely never have come into being without

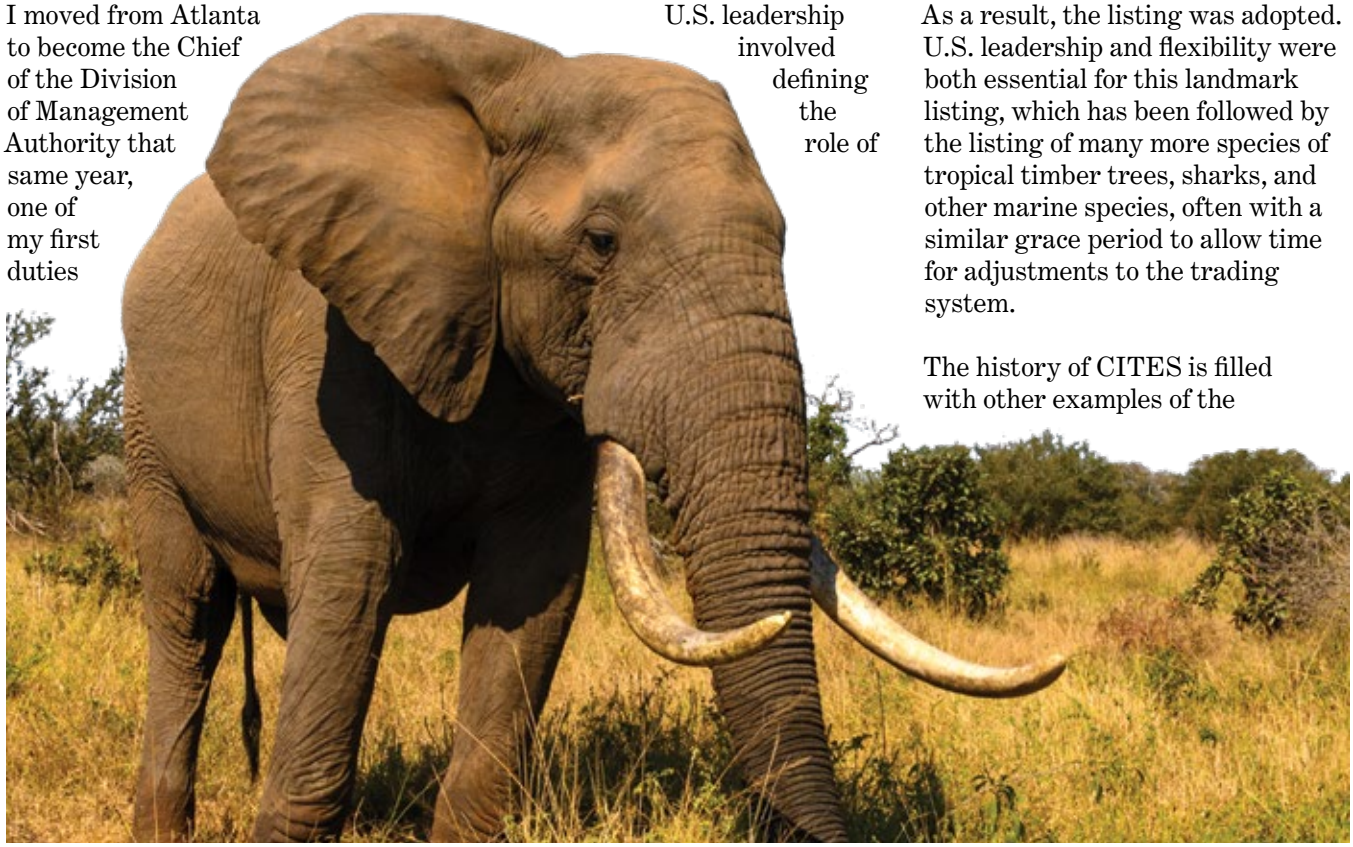
the U.S. initiative to stimulate months of preparations and convene the final negotiations in 1973. In its early history, CITES had some notable successes, for example establishing the international trading system that played a crucial role in the Service's ability to delist the American alligator in 1987 (a project that I worked on in the Endangered Species Program in Atlanta, with many state partners). However, in the 1980s the African elephant was not one of them. A CITES ivory trade control system for the elephant's Appendix II listing had failed, and they were being heavily poached for the black market. Concern about this unsustainable poaching led to Congressional passage of the visionary African Elephant Conservation Act of 1988, which not only authorized the establishment of a fund to support elephant conservation in range states, but also required a comprehensive review of the ivory trade system and authorized U.S. moratoria on the import of ivory. When I moved from Atlanta to become the Chief of the Division of Management Authority that same year, one of my first duties was to oversee the ivory review, working closely with the Office of Law Enforcement and many international experts. We found enormous problems, and on Earth Day 1989, President George H.W. Bush imposed a moratorium on U.S. imports of African elephant ivory.



That was unilateral U.S. action, but a comprehensive halt to the global trade was also needed. Later that year, at the Seventh CITES CoP in Switzerland, the Service and its delegation partners led a coalition of East and West African countries in a successful proposal to uplist the African elephant from Appendix II to Appendix I, and a cheer broke out in the huge meeting room. It wouldn't have happened without U.S. leadership. But, as noted below, the battle was far from over, for this was not a win-win decision.

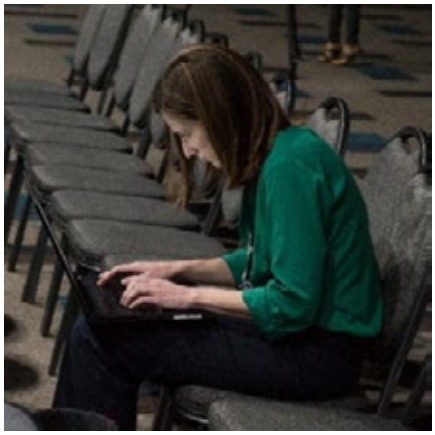
Another CITES initiative launched in the 1990s with strong U.S. leadership involved defining the role of CITES in the trade of commercially valuable, heavily exploited tropical timber and marine species. These had traditionally been the province solely of trade negotiations, but unsustainable trade was rampant, and they needed a conservation advocate. The United States led a coalition at the 1994 CITES CoP in Florida to list big-leaf mahogany in CITES Appendix II; this would require that all exports must be accompanied by permits showing they had been legally acquired and not detrimental to the species. Throughout the 2-week conference, the United States maintained a daily dialogue with Central and South American countries on both sides of the issue. Ultimately, we proposed a new idea never tried before by CITES: a full year's delay in the effective date of the listing, to give range countries and traders alike time to prepare for the change. As a result, the listing was adopted. U.S. leadership and flexibility were both essential for this landmark listing, which has been followed by the listing of many more species of tropical timber trees, sharks, and other marine species, often with a similar grace period to allow time for adjustments to the trading system.

The history of CITES is filled with other examples of the

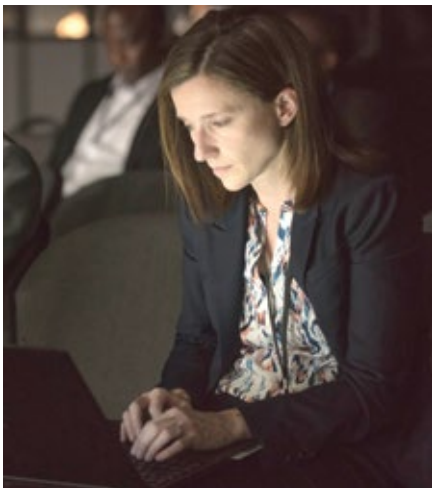


Conference of the Parties (CoP) 17, South Africa. Frank Kohn/USFWS

critical role the United States can play. My Division of Management Authority successors, Ken Stansell and then Teiko Saito, Peter Thomas, Roddy Gabel, Craig Hoover, and Pamela Scruggs, knew this well, and they worked tirelessly to make CITES a strong force for conservation. Back then, CITES also consistently needed better strategic direction. Rising to the challenge, Ken first chaired a strategic planning working group, and then in 2000 became the Chair of the full CITES Standing Committee (the executive body which oversees all CITES activities during the 2- or 3-year interval between full CITES CoPs). His firm leadership guided CITES through many storms. Ken's successor, Bryan Arroyo, told me about an especially moving moment. He received approval to deliver a major U.S. intervention on an issue of special importance to Latin American Parties at CoP17 in South Africa, in Spanish, emphasizing to the world our close ties to our neighbors to the South. Craig Hoover has now taken his Service-honed leadership skills to the Association of Zoos and Aquariums in their efforts to make U.S. zoos and aquaria even greater forces for global species conservation. Former Division of Management Authority Branch Chief, and then Division



Danielle Kessler at the Conference of the Parties (CoP) 17, South Africa. Frank Kohn/USFWS



Danielle Kessler working late at the Conference of the Parties (CoP) 17, South Africa. Frank Kohn/USFWS

of Scientific Authority Chief, Sue Lieberman has taken her CITES experience with the Service to the Wildlife Conservation Society, where she also is a conservation advocate within the International Union for the Conservation of Nature. And today, under the leadership of Assistant Director Anna Seidman[2] and her Deputy Assistant Director, the recently retired Gloria Bell, the Service is making a statement to the world about the importance of having women in senior management positions.

6. We Don't Always Have All of the Answers

During my serendipitous participation in the First CITES CoP in Switzerland, I had a life-changing experience. International delegations are traditionally arranged in alphabetical order, and so, in the scientific committee, we were seated between the United Kingdom and Zaire (now the Democratic Republic of the Congo). I soon noticed the earnest but perplexed faces of the two young Zairian delegates next to me; they had no reference materials except a 19th century French textbook on fauna of the Belgian Congo. Embarrassed by the meticulously organized, confidential U.S. briefing book in front of me, I began

Scarlet macaw puppet theater for elementary school children at the Los Tuxtlas Biosphere Reserve, Veracruz, Mexico, 2016. Bosque Antiguo, A.C.

Ocelot. U.S. Fish and Wildlife Service, Arizona Game and Fish Department, Autonomous University of Queretaro, and Texas Parks and Wildlife and Autonomous University of Nuevo Leon worked jointly on The Ocelot Recovery Plan. Tom Smylie/USFWS

surreptitiously showing our briefing papers to my African colleagues. They were very appreciative, but once I found that their fluent English was far better than my fractured French, we began talking quietly about the issues. To my amazement, I learned many things from them that were not in our supposedly thorough briefing materials. My assumption that lack of elaborate cheat sheets somehow meant lack of knowledge was totally unfounded; they had as much to share with them, a lesson I have never forgotten. (Hopefully the statute of limitations has run out on my major breach of U.S. document handling rules!)

Work across our southern border with Mexico has been another learning experience for biologists on both sides of the border, and by the 1990s, the Service and our southwest border states had developed a strong bilateral program. Its success led Canada to propose formalizing a total North American effort, so in 1995, the Service and its counterparts signed a Memorandum of Understanding to establish the Trilateral Committee for Wildlife and Ecosystem Conservation and Management. Herb Raffaele, who had succeeded Larry Mason as International Conservation Chief, had the Service lead, working with Legacy Region 2, to work with Mexico and Canada on the first Trilateral meeting in Oaxaca, Mexico, in 1996. I was able to attend that first meeting, and it was truly extraordinary to participate in exchanges at working tables on a host of wildlife issues. As Herb noted to me recently, one of the reasons for the Trilateral's success was that the Service approached it as a forum of three equal partners, each having things to learn from the others. Twenty-four Trilateral meetings later, this is a formula that still serves the Service well today, not only for the Division of International Conservation, but also for a broad range of other Service programs.

7. There are No Short-term Victories in Conservation

The 1989 success in halting legal commercial ivory trade seemed like an enormous victory at the time. Elephant poaching declined, and populations slowly began to rebound in Kenya and other countries. However, it did not solve the long-term problem of continuing ivory demand, fueled by ignorance and greed. Furthermore, the uplisting also created an intense backlash from prominent Southern African countries (Botswana, Namibia, South Africa, and Zimbabwe), who argued that they were being denied the benefits of sustainable trade from their healthy, well-managed elephant populations. After several unsuccessful tries to overturn the ban, at the 1997 CITES CoP in Zimbabwe, Southern African countries got a partial victory: approval for a one-off sale of existing ivory stockpiles, repeated 5 years later following the CoP in Chile. These sales fueled a furious global debate about their

Protecting the Monarch butterfly along its migratory route from Canada to Mexico has provided a venue for successful international collaboration.

effects on illegal killing of elephants elsewhere in Africa.

Eventually, even the Southern African countries turned out not to be safe from the relentless scourge of elephant poaching. Although U.S. policy still supports the ban, current Scientific Authority Chief Rosemarie Gnam recently told me that the United States also continues to try to referee the increasingly hostile conflict between the Southern Africans, who feel that they are being chastised despite success in managing their elephant populations and their neighbors in East, Central, and West Africa. Maintaining respectful dialogue is essential, and all Parties look to the United States to be the facilitator.

Recognizing that CITES by itself cannot solve the elephant's problems, the U.S. approach has included incentives as well as regulation. One of the great breakthroughs of the 1988 African Elephant Conservation Act, as alluded above, was to combine authority for the ivory moratorium with establishment of the African Elephant Conservation Fund to support protection and management programs in range countries. Following the passage of the law in 1988, Service Law Enforcement Chief Clark Bavin—an enormous force in global conservation until his tragic death following a stroke in 1990—deserves huge credit for finding some carryover funding to jumpstart the assistance process. After that, regular appropriations enabled first Division of Management Authority, and then Division of International Conservation, to build the only sustained, global grant program devoted exclusively to African elephants. This was so successful that, in 1994, Congress replicated it in the Rhinoceros and Tiger Conservation Act, followed by parallel laws creating dedicated financial assistance programs for Asian Elephants, Great Apes, and Marine Turtles. Although none of these has been enough to produce total solutions to the threats these iconic species face, over time

Amur tiger cub premium first-class stamp.

FWS staff (left to right): Heidi Ruffler, Frank Kohn, Nancy Gelman, and Keri Parker at FWS headquarters, Falls Church, VA, celebrating World Pangolin Day. Courtesy of Frank Kohn/USFWS

White-bellied or Tree pangolin (Manis tricuspis, also known as Phataginus tricuspis). Frank Kohn/USFWS.

they have had terrific cumulative effects—and they will continue to do so as long as funding is secured. In 2011, Congress, recognizing the need for innovative additional revenue sources, authorized the U.S. Postal Service to issue the "Save Vanishing Species" postage stamp. It features a stunning image of an Amur tiger cub and includes a small premium over first-class postage. Sales of these stamps raise additional funds to supplement Congressional appropriations to the Multinational Species Conservation Funds. For conservation initiatives to be successful, they must include long-term commitments.

But the Multinational Funds together only cover a limited group of large, charismatic mammals in Africa and Asia, plus marine turtles; many more CITES-listed species also need more than just trade regulation for their survival, and imperiled habitats also need attention. The International Conservation division, throughout the years, has developed innovative capacity-building programs covering tropical species in every continent. This brought life into the Western Hemisphere Convention and gave special attention to management of protected areas and endangered species in Latin America and the Caribbean. Across Central Africa, investments through the Central Africa Regional Program for the Environment (CARPE) have resulted in important gains for species and habitat conservation and have established a network of transdisciplinary conservation leaders through the MENTOR (Mentoring for ENvironmental Training in Outreach and Resource Conservation) Program led by the Africa branch's Nancy Gelman. In addition, returning to the original roots of the multinational funds, the Division of Management Authority also has developed a "Combating Wildlife Trafficking" branch, under the leadership of Daphne Carlson-Bremer,[3] and a grant program for projects to help critically endangered species like pangolins, freshwater turtles, smaller primates, and even tropical timber. This new program has garnered an innovative mix of support from Congressional appropriations, the State Department, and the U.S. Agency for International Development support under the Foreign Assistance Act.

8. International Programs Benefit "Us" Just as Much as They Benefit "Them"

I firmly believe that international work is not just for the benefit of other countries. We have as much to gain as they do from these programs. Just ask people who have been to India or Russia or China or attended Trilateral meetings or CITES CoPs. These programs

All International Affairs staff, 2019. Frank Kohn/USFWS

also have an extraordinary ability to bring Service staff together in pursuit of greater goals. Don Morgan,[4] who took over the reins of the International Conservation Division in 2020, clearly understands this well, emphasizing in a recent conversation with me that he views cross-collaboration as the key to conservation. His previous experience with Endangered Species State Wildlife Grants has helped shaped his view that conservation must be a rooted in respect and cooperation.

Here's one closing example from my own Service history.

In 1986, the United States became a member of the Ramsar Convention on Wetlands of International Importance, informally named for the city in Iran on the shores of the Caspian Sea where it was negotiated. The Ramsar Convention provides a global metric and process for recognizing wetlands that meet the highest standards and coordinating U.S. involvement is one of the services that the International Conservation division provides.

There are now 41 U.S. Ramsar sites that have met the Convention's criteria and been listed as "Wetlands of International Importance." The majority include national wildlife refuge lands, and during my Service career, I was able to visit many of them. Every site was inspiring, but one visit stands out to me today. It was a crisp afternoon in October 2000, at Sand Lake National Wildlife Refuge in South Dakota, the newest U.S. Ramsar site. I saw the pride that refuge staff, conservation organizations, and local community leaders took in knowing that this area was now internationally recognized for its wetlands and waterfowl. They had worked hard to complete the arduous application process and demonstrate that it met Ramsar's strict standards. I was impressed at the time, but now the bigger significance of their work is clear. Did the Ramsar designation bring any guaranteed new funding to the refuge or the community? No—but it brought something more. Their cooperative effort to put Sand Lake on the international wetlands map has spurred innovation, transcended local political disagreements, responded to a new opportunity, showcased U.S. leadership, helped them learn from others around the world, and created one more reason to ensure that this special place is preserved forever. Now that is a long-term victory for conservation!

Endnotes

[1] After working for the Service for 33 years, including 7 years as Deputy Director or Acting Director, I've served as Senior Conservation Advisor and Smithsonian Institution Focal Point for the International Union for Conservation of Nature, as well as Senior Advisor to the Director of the Smithsonian's National Zoo and Conservation Biology Institute, among other projects.

[2] As this journal goes to print, Bryan Arroyo is again serving as Assistant Director for International Affairs, succeeding Anna Seidman.

[3] As this journal goes to print, Daphne Carlson-Bremer is now Chief, Division of International Conservation.

[4] As this journal goes to print, Don Morgan is now the Deputy Assistant Director of International Affairs.

■

We Have A Winner

New Service Flag Selected

November 30, 1987 marked an important day for the Service. For the first time in nearly 15 years, it again was to have an official flag to fly on its vessels and over its field stations from Maine to Hawaii. And the day was to prove important to a second-generation Service staffer in Washington as well: Cynthia ("Cindy") K. Uptegraft of the budget office emerged the winning designer over 23 other entrants to the *Fish & Wildlife News*-sponsored "Design the Flag Contest" (see FWN, April–May, 1987 issue).

Cindy's winning entry—as judged anonymously by a panel of three Assistant Directors—depicts the Service logo centered in a white field within a circular text of the agency's mission statement; at the base of the logo is the founding date of the modern Service, June 30, 1940. The judges accorded points in five criteria: 1) incorporation of the logo; 2) overall design impact; 3) suitability of the theme i.e. does it reflect the Service mission?; 4) feasibility, i.e. could it be effectively and economically rendered into a flag?; and, 5) dignity and distinctiveness, i.e. would the flag serve to enhance the overall image of the Service and help promote greater employee esprit?

Steve Stewart, DOI

Director Frank Dunkle congratulates Flag Design Contest Winner Cynthia K. Uptegraft, budget analyst in the Washington office.

Uptegraft's entry scored 280 out of a possible 300 points. The second- and third-place entrants were, respectively,: Larry P. Hartis, Chassahowitzka National Wildlife Refuge, with 245 points;and Carol Smith Hale, Bosque del Apache National Wildlife Refuge, with 225 points.

The winner received a $500 award, and a limited edition print of the Robert Bateman work "Pride of Autumn," donated by Chip Collins, director of the National Fish & Wildlife Foundation.

Further details about availability and use of the new flag will be found in future editions of *Fish and Wildlife News.*

Editor's Note: On behalf of the Director and Fish & Wildlife News, we wish to offer again our sincere thanks to all who took the time and effort to enter the contest.

Steve Stewart, DOI

Design for the Service's new flag. Cindy Uptegraft's flag design prevailed over 23 others in the Design-the-Flag Contest, judged November 30, 1987.

Steve Stewart, DOI

Second Place Winner, designed by Larry P. Hartis of Chassahowitzka National Wildlife Refuge in Florida.

Steve Stewart, DOI

Third Place Winner, designed by Carol Smith Hale of Bosque del Apache National Wildlife Refuge in New Mexico.

Flag Winner Grew Up With the Service

"My earliest childhood memories are of beach patrols and horseshoe crabs on Morton refuge on Long Island, then of building dikes on Erie refuge in Pennsylvania," recalls flag design winner Cindy Uptegraft, budget analyst in the Washington, DC, office.

Her father, Darrell ("Dick") Uptegraft, who retired from the Service's Minneapolis regional office last year, joined the agency in 1959 after receiving master's degrees in wildlife management and forestry. He was refuge manager at Morton National Wildlife Refuge in New York, and then the first manager of Erie National Wildlife Refuge in Pennsylvania. Subsequent assignments took the family to the Job Corps Center at Tamarac refuge in Minnesota (where, recalls Cindy, her school was a 50-mile bus ride, one way) and to Crab Orchard refuge in Illinois.

Cindy attributes her appreciation for wildlife and the outdoors to her childhood experiences on refuges, an upbringing she says she "wouldn't trade for anything." Pursuing those interests, she got her bachelor of science degree in both biology and parks and outdoor recreation.

After working for the National Park Service and the Army Corps of Engineers, she "came home" to the Service in 1977, landing a job as outdoor recreation planner at the Tinicum National Environmental Center in Philadelphia. She worked in a similar position in the Boston regional office before joining the budget office in Washington, DC, in 1986.

On her design for the Service's flag, Cindy says, "I grew up with the Service's mission statement. I lived it. It seemed only natural to put it on the Service flag."

Cindy, age 5, and younger brother Darrell, Jr. Her earliest memories include finding horseshoe crabs at the beach on Morton National Wildlife Refuge on Long Island.

New Service Flag Selected, and The Rest of the Story

Cynthia Uptegraft Barry, *History Committee Member, Retired, U.S. Fish and Wildlife Service*

After you've read the article in the January-February 1988 edition of the Fish and Wildlife News, here's the rest of the story…

Several months passed, with no further word on the availability of the new U.S. Fish and Wildlife Service (Service) flag. I was often asked, "Hey, how do we order one of those flags?" The Service was building new offices (e.g., Headquarters at Arlington Square, the National Conservation Training Center [NCTC]) with three flagpoles specifically to display three flags—the United States, Department of the Interior (DOI), and Service flags. Clearly, External Affairs, sponsor of the flag contest, wasn't in the business of sewing flags, so I volunteered to scope out next steps.

I discovered that the Service had gone ahead with this contest without having Departmental clearance to do so. However, Departmental officials had long been aware of Director Frank Dunkle's flag contest, and therefore considered the Service's flag to be "previously authorized" and exempt from the new DOI regulation requiring statutory authorization. So, how does one go about manufacturing flags for every Service installation?

I was given the go-ahead to meet with staff at the U.S. Army's Institute of Heraldry to request them to produce manufacturer's drawings. The Service had previously contracted with them to provide Service's patch and badge drawings. Yes, this place really exists, formerly at Cameron Station in Alexandria, but now at Fort Belvoir, with a dazzling display of military regalia. I drafted the Acquisition Request to provide $750 for their manufacturing drawings for an outdoor flag and for an indoor flag (with border fringes). The flags were to be readable from both sides. By June 1989, the Institute completed the drawings.

I received a list of flag manufacturers, but had no idea how many flags to order, or who would pay. The initial estimate was $800 to produce the first flag (at $100 per color), then each outdoor flag would cost $20 to $30 each, and indoor ceremonial flags would cost $40 to $50 each. The fee ranges depended on whether they would fill individual or bulk orders. I assumed the Director's Office could come up with $10,000 to fund a bulk order of outdoor and indoor flags. (I worked in the Service's Budget Office so I had a pretty good idea where some funds could be found!) After all, why would the Director suggest a new Service flag be developed if he had no intention of seeing them flying? One call to the Service's Office of Contracting and General Services (CGS), and it would have been done! Well, that didn't happen.

After the contest, the flag project lacked an office having the responsibility for carrying this project through to completion. Frank Dunkle resigned from the Service in 1989. That fall, I moved from Headquarters to a position in External Affairs in the Portland Regional Office. I suggested that the Directorate be polled to ask how many flags should be in the initial order. Refuges, hatcheries, research stations, Ecological Services offices, vessels, and Regional Offices might have flagpoles or other ways to display a flag. A survey could identify potential station interest. Well, that survey never happened, either.

It was decided that Headquarters would fly the Virginia state flag in the new building at Arlington Square, and NCTC would fly the West Virginia state flag on their third flagpole. The years go by, and still I am asked, "Cindy, what happened to the Service's flag?"

The manufacturer's drawings reside as the official flag of the Service at the Institute of Heraldry and in the Service's archives at NCTC in Shepherdstown, West Virginia.

In 1997, I received an email from staff at NCTC, with the news that one flag would be produced as part of an historical exhibit. To date, only this one flag has ever been manufactured, and it hangs from one of the horizontal beams in the front lobby of the Entry/Auditorium building at NCTC. My two sons and I have seen it, and I have proudly told them this story!

If flags were to be produced today, my original drawing would need to be updated since the Service's mission statement now includes the words (in bold) "Working with

Service flag, hanging at the National Conservation Training Center, designed by Cindy Uptegraft Barry. USFWS

Cindy Uptegraft Barry smiling proudly and gesturing to show her Robert Bateman artwork displayed on her wall with other awards in her home. Courtesy of Cindy Uptegraft Barry

others to conserve, protect, and enhance fish, wildlife, plants and their habitats for the continuing benefit of the American people."

Notes from a July 1998 Directorate meeting state, "Service flag… several folks have asked why we don't have one… contest several years ago yielded a winning design but no flag… short discussion… focused on cost for a flag and pole for every unit… do we really need to spend valuable funds on a flag when we are doing so on signs, which are better to see by the public… decision: no flag is needed."

To this day, I proudly display the Bateman print in my home office, awarded to me for winning the "Design the Service Flag Contest." ■

Greater white-fronted goose flock flying. Greater white-fronted goose is known locally by Koyukon people as "Speckle Bellies," of which they hold tremendous traditional ecological knowledge.

Conservation Endeavors of the U.S. Fish and Wildlife Service with Native American and Alaska Native Governments

Scott Aikin, *National Native American Programs Coordinator, U.S. Fish and Wildlife Service*

When many people think about wildlife management, often the agencies that readily come to mind are the U.S. Fish and Wildlife Service (Service), state fish and game departments, and the U.S. Forest Service. What many overlook, however, is that one of the largest and most important fish and wildlife conservation management endeavors in the United States is the collective work undertaken by Native American and Alaska Native tribal governments.

Currently, there are 574 federally recognized tribes in the United States, half of these tribes have significant land bases that require modern professional fish and wildlife management. Together with Alaska Native Corporations, their aggregate holdings exceed 105 million acres—an area nearly 10% larger than the entire National Wildlife Refuge System.

To grasp and appreciate the scope and diversity of fish and wildlife conservation activities on tribal lands, it is helpful to explore the historic background out of which these programs emerged.

Throughout much of the early 20th century, conservation activities on most tribal holdings were quite limited or absent. Systemic poverty, underemployment, and pressing social needs weighed far more heavily on tribal governments than did establishing tribal conservation departments. To be sure, many lands were virtually without wildlife due to unchecked and unregulated poaching. Moreover,

Native High School students learn about heavy equipment and facilities management at NCTC. Alejandro Morales/USFWS

Snowshoe hares are trapped and collared by the Leech Lake Band of Ojibwe Division of Resource Management. The Leech Lake Band of Ojibwe uses science and their traditional ecological knowledge to assess snowshoe hare and fisher populations on their reservation located in north-central Minnesota. Alejandro Morales/USFWS

Golden eagle talons being evaluated at the National Eagle Wildlife Property Repository. USFWS

during the mid-1960s, the federal government terminated more than 100 tribes (many of which have been or are in the process of being reinstated). Thus, significant political ill has hampered fish and wildlife program development.

Yet fish and wildlife had always been of vital importance to Native American and Alaska Native peoples, not just for food and sustenance, but also because of the deep and intrinsic connection of wildlife to tribal religious beliefs and cultural values.

A New Era

Mindful of tribal cultural needs, many tribal governments began in-earnest conservation initiatives in the early post World War II era. But if funding was tight for many state fish and wildlife agencies at that time, it was almost nonexistent for tribes. To make matters worse, tribes could not share in direct access to then-recent Federal Aid in Wildlife and Sport Fish Restoration Act programs. A few tribes made tentative overtures to state fish and wildlife agencies to explore possibilities for mutually beneficial conservation programs. Concurrently, the U.S. Bureau of Sport Fisheries and Wildlife (later to be known simply as the U.S. Fish and Wildlife Service) responded to queries from tribes, particularly in the west, for technical assistance in matters ranging from fish husbandry and stocking to big-game range restoration.

During the period from the 1950s through the early 1980s, the Bureau of Sport Fisheries and Wildlife made some significant overtures to tribal governments, particularly in expanding recreational fisheries on tribal lands. The Service issued a "Policy on Fish and Wildlife Assistance to Indians" in May of 1980. This policy was among the first formal articulations made by the Service to delineate its roles and responsibilities regarding tribes and cooperation with the Bureau of Indian Affairs (BIA). But progress under the policy was constrained by the extensive budget cutbacks affecting the fisheries program that resulted in the closure of the fisheries assistance office and hatcheries during the early 1980s.

Throughout the 1970s and 1980s a growing number of tribal governments evinced a strong concern for improving overall environmental quality on their lands. Out of this expanding interest, more and more tribes began creating and investing in their own conservation staffs. Soon, these like-minded tribes began an informal communications network. The network established the Native American Fish and Wildlife Society (Society) and several local Indian resource-oriented commissions such as the Great Lakes Indian Fish and Wildlife Commission and the Northwest Indian Fish Commission. One of the very first goals on which the new Society arrived at consensus was professional education and training. Member tribes of the Society began working with the Service to identify training needs and opportunities. Among the first endeavors were workshops in professional fish and wildlife law enforcement.

Similarly, a result of Alaska's focus on protecting the Indigenous customary and traditional way of living, as well as conservation,

Caribou, an important species for Gwich'in, on the Arctic National Wildlife Refuge. USFWS

Congress enacted several pieces of legislation. The 1990s to 2000 brought on the Federal Subsistence Management Program, the Alaska Migratory Bird Co-Management Council, and numerous agreements to co-manage marine mammals with Alaska Native Organizations.

Beginnings of Partnership

For many years there was a potentially contentious issue in the background that posed threats to tribal and federal conservation progress: feathers, particularly those of protected bald and golden eagles. The passage of the Endangered Species Act in 1973 served only to enhance possible tensions.

While some national conservation groups called for strict observance and enforcement of all federal statutes protective of eagles, hawks, owls, and migratory birds, the federal government, through its government-to-government relationship with tribes, recognized the deep significance of these feathers to Native American and Alaska Native people. Thus, the Service was authorized to establish a National Eagle Repository (Repository) to provide Native American and Alaska Native people with feathers of golden and bald eagles needed for religious purposes.

Now, tribal governments are afforded the opportunity to possess eagle feathers and parts that are found in Indian Country; however, the Repository still serves as the main collection center for eagle carcasses and responds to requests from enrolled individuals from federally recognized tribes. Most of the dead golden and bald eagles received by the Repository have been salvaged by state and federal wildlife personnel. Many of these birds have died because of electrocution, vehicle collisions, secondary poisoning, zoonotic diseases, or from natural causes. If it is suspected an eagle was involved in an illegal take (trapping, shooting, intentional poisoning), then Special Agents from the Service's Office of Law Enforcement investigate the cause of death. After the eagle is cleared, it is sent to the Repository to distribute to tribal members.

Native American and Alaska Native people who request feathers and parts commonly face a 2 to 3-year wait, or more, depending on the age and species of eagle requested and the current inventory, to receive them. However, the Repository system has proven fair and workable. In recent years the Service has made wide-reaching efforts to increase its eagle collection network through outreach to federal, state, and tribal field wildlife personnel, as well as to private organizations, such as wildlife rehabbers and zoos regarding collecting and shipping eagles to the Repository.

Formal Steps

Throughout the late 1980s and early 1990s, the Service and a host of tribes began dialog and projects on how to advance mutual conservation

programs and interests. In June 1994, under then Director Mollie Beattie, the Service drafted and issued its current national Native American Policy, for guiding the agency's growing involvement with tribal conservation partners. Among the Policy's tenets were these 10 guiding principles:

- Sovereignty–The Service recognized Native American governments as governmental sovereigns.
- Conservation–The ultimate goal is to effect long-term fish and wildlife conservation.
- Government-to-Government Relations–The Service will strive to maintain government-to-government relationships with Native American governments and will pursue formal agreements that clearly identify roles, responsibilities, and obligations for each party in conservation ventures.
- Self-Determination–The Service favors empowering Native American governments and supporting their missions and objectives, and further supports the authority of Native American governments to manage, co-manage, or cooperatively manage fish and wildlife resources. In recognition of 1975 Indian Self-Determination and Education Assistance Act (Public Law 93-638), the Service is committed to entering contracts, cooperative agreements, and grants with Native American governments at their request for the administration of fish and wildlife conservation programs.
- Communication–The Service will consult with Native American governments on fish and wildlife resource matters of mutual interest and concern to the extent allowed by law. The Service will also encourage and facilitate communication and cooperation among Native American governments, states and federal agencies, and others to ensure that common conservation interests and goals are addressed and discussed.
- Funding–The Service will assist Native American governments in identifying federal and non-federal funding sources that are available for fish and wildlife resource management activities.
- Culture and Religion–The Service will involve Native American governments in all Service actions that may affect their cultural or religious interests, including archaeological sites.
- Law Enforcement–Service law enforcement agents will assist with the cooperative enforcement of federal wildlife laws. The Service will encourage the use of cooperative law enforcement as an integral component of Native American, federal, and state agreements relating to fish and wildlife resources.
- Technical Assistance–The Service will make available expertise from all Service program areas to assist Native American governments in the management of fish and wildlife resources.
- Training and Education–The Service will pursue cultural awareness training of its own staffs to ensure their understanding of Native American traditions, cultures, and values. The Service will strive to provide Native American governments the same access to fish and wildlife resource training programs as provided to other government agencies, and the Service will continue in its specialized training endeavors, such as those in law enforcement.

As an outgrowth of the issuance of its Native American Policy, the Service appointed its first national Native American Liaison Officer in 1994. The responsibilities for the Office of the Native American Liaison include:

- Providing counsel to the Director of the service concerning Native American issues that impact Service operations;
- Serving as point-of-contact for tribal conservation issues;
- Serving as liaison to tribal governments for wildlife conservation issues that impact federal and tribal resources;
- Developing guidance materials, such as handbooks, Director's and Secretarial Orders, as well as legal and policy memoranda regarding tribal/Service issues; and
- Serving as non-BIA lead for Departmental tribal initiatives, e.g., Self-Governance Act application, Self-Determination Act contracting, sacred sites access, tribal colleges cooperative education program, and water rights.

A collective group of tribal and Service key staff updated the National American Policy on January 20, 2016. They were instrumental in articulating an enhanced policy that incorporates stronger language and definitions and includes an overall responsibility section describing key responsibilities for the Director of the Service on down to field staff employees. For details about the current policy, see the Services policy manual section 510 FW 1.

New Programs and New Opportunities

Since the late 1990s, the Service has maintained Native American Liaison offices in each of its geographic regions. The roles of these offices parallel and support national missions and goals. Additionally, each serves as "eyes and ears" for their regions to identify mutual resource opportunities or help avert potential resource conflicts.

One of the greatest strides forward for Service/Native American conservation endeavors occurred early in Fiscal Year 2002 (October 2001) when Congress initiated and funded two new conservation programs expressly for tribal governments. The Tribal Landowner Incentive Program (TLIP) and the Tribal Wildlife Grant Program (TWG) were intended to provide tribal governments up to 100% funding

Southeast Alaska Tribal Ocean Research (SEATOR) partners at the 2018 workshop shellfish survey demonstration in Sitka, Alaska, a project, supported by Alaska Tribal Wildlife Grants. Sitka Tribe of Alaska

for qualifying conservation programs. For the TLIP grant program, Congress provided up to a 75% federal share of funding to tribes for actions and activities that protect and restore habitats benefiting federally listed species, as well as those species that are proposed or candidates for listing, or other species deemed at risk on tribal lands. Though the TLIP portion sunsetted more than a decade ago, the TWG program continues today with Congressional support. Congress allowed for up to 100% federal funding for tribal conservation activities that develop or implement new programs to benefit wildlife and their habitat, including species that are not hunted or fished. Early in 2004, the Service made its first grant awards under these programs. Since its inception, the competitive TWG program has awarded more than $94 million to federally recognized Native American tribes throughout the United States, providing support for approximately 506 conservation projects throughout Indian Country benefitting a wide range of fish, wildlife, and habitat, including species of Native American cultural or traditional importance and species that are not hunted or fished.

The Road Ahead

While the above two programs are specific to tribes, the Service also strongly encourages tribes to apply for grants under the North American Wetlands Conservation Act and the Cooperative Conservation Initiative. More about these programs is available at the National Native American Programs website.

The past few decades have seen remarkable growth in Service/Native American conservation partnership. Professionalism in tribal fish and wild conservation management has grown steadily and impressively. The accomplishments of tribal conservation programs have been wide-ranging and nationally significant. The examples range from restoring coaster brook trout along the shores of Lake Superior to enhancing Apache trout habitat in Arizona; from managing Boone and Crockett Club quality elk populations in New Mexico to helping re-establish grey wolves in central Idaho; from restoring black-footed ferret in Montana to the Penobscot Indian Nation of Maine's work to conserve and restore habitat on nearly 100 islands in the Penobscot River; from recovering the white fronted goose population in Alaska thanks to Koyukon elders' wisdom to polar bear traditional ecological knowledge conservation strategy.

Many species have been restored where they had not occurred for decades. Outstanding hunting and fishing programs have been established for tribal members—and increasingly, for fee-based non-tribal participation as well—from one corner of the country to the other. Ecologically significant and culturally important native plant communities have been safeguarded and brought back. Most importantly, the deep and resonant cultural worth of wildlife is restored not only to many Native people but is now widely shared in the broader community as well.

U.S. Fish and Wildlife Service conservation endeavors with Native Americans and Alaska Native people have come a long way in recent decades. The Service as a whole continues much of its historic activity to assist tribes, especially now through the Tribal Wildlife Grants Program. With the continuing commitment, dedication, and hard work of tribal conservation departments, Native American and Alaska Native people can be justly proud of their increasingly significant role in long-term wildlife restoration—endeavors for which all citizens should be appreciative. ■

The Origin of the Service's History Committee

Steve Chase, *Director, National Conservation Training Center, U.S. Fish and Wildlife Service*

In the spring of 1993, I had just joined the U.S. Fish and Wildlife Service's (Service) Office of Training and Education. At that time, efforts to plan and design the National Conservation Training Center (NCTC)—its mission, its structure, and its campus—had been underway, in earnest, since January 1990 with weekly Project Definition and Program Planning meetings.[1] Rick Lemon, who was leading the entire project, felt strongly that to be successful, NCTC needed to be considered the "Home" of the Fish and Wildlife Service, a place where all employees and partners would feel comfortable, welcome, and ready to learn. This feeling of home would be enhanced and amplified with a design that included images and artifacts of the Service's rich conservation history.

Thus, an important part of planning NCTC was the museum design and a series of historical exhibits, campus wide.[2] We felt it was critical that our employees understood what challenges, and solutions, their counterparts in previous decades faced and used. An archive would also be developed to house the documents, photographs, and objects that we would exhibit. Many Service employees at that time did not know much about the Service's history. I was assigned to work with the "Heritage Committee" to plan the museum and campus-wide exhibits.

One afternoon in spring of 1993, I walked into the conference room in our, then, Arlington, Virginia-based Service headquarters, to meet with an informal network (the Museum/Exhibit Design Task Group, in essence, an early iteration of the Heritage Committee) interested in protecting the history of the Service. Seated around the table were a mix of active and retired Service employees including Russ Earnest, Denny Holland, Tom Olds, Dave Hall, Chuck Tinsley, Al Gardner, and Arden Trandahl, Ron Anglin, Earl Baysinger, George Podpaly along with Rick Lemon (NCTC's new director) and Kevin Kilcullen (the Service's archeologist and cultural resources manager).[3] For the next several years, the Committee consulted with Rick, Kevin, and Frank Zaremba, our museum designer, on the hundreds or thousands of exhibit details for the museum and the campus. I went about the task of doing research, writing hundreds of captions and text boxes, finding photographs, and searching out historic artifacts. After NCTC opened (October 1997), the Service soon formalized the Heritage Committee with a charter (1998) and charge from the Service Director to preserve our Service history. The Service also provided modest funding to allow NCTC to bring on a Service Historian. We hired a History of Science professor, then teaching in Australia, who became a key player in preserving the heritage of the Service.

Throughout the design and construction of the historic elements, we relied on these now retirees to help us find objects and give advice on important historical details. It was obvious that Service retirees were key to the success of future history-based endeavors that we planned, like building the archive and starting an oral history program. Before these projects, the Service had not engaged much with retirees—truly a missed opportunity.

In 1998, with the NCTC open for business, we hosted a Heritage Committee meeting chaired by the first official Heritage Committee Chair, Dale Hall, one active Service member from each Region, three recent retirees who had become official members of the Committee, and several staff from NCTC. We talked about how we could better engage retirees of the Service—we all felt they were valuable assets for the Service. Our discussion led to retirees creating the U.S. Fish

USFWS Heritage Award Winners
Craig Springer, 2022
Jerry Grover, 2021
Al Gardner, 2020
Dr. Matthew C. Perry, 2019
Steve Chase, 2018
Randi Smith, 2017
Douglas Brinkley, 2016
Jeanne Harold, 2015
Dave Hall, 2014
Lynn Greenwalt, 2013
Jim Kurth, 2012
Lou Hinds, 2011
Steve Brimm and Arden Trandahl, 2010
John Juriga, 2009
Rick Lemon, 2008
Jerry and Pat French, Jerry and Judy Grover, Denny and Kathy Holland, 2007
Kent Olson, 2006
Norm Olson, 2005
DC Booth Society, 2004
Dale Hall, 2003
Kip Koss, 2002

History Committee members at the 2019 meeting and retirees' reunion in Annapolis, MD: (left to right, front to back): Sandy Tucker, Maria Parisi, Cindy Uptegraft Barry, Eugene Marino, Linda Friar, Peggy Hobbs, Deborah Holle, Nate Hawley, Libby Herland, Paul Tritaik, Dick Coon, John Cornely, Jerry Grover, Matt Perry, Tom Worthington. Not pictured: Charlie Wooley (Chair), Vicki Finn, Amber Zimmerman, Greg Dehmer, Debbie Steen, Debbie Corbett, Mendel Stewart, Mark Madison, Mamie Parker, Steve Chase, Carlos Martinez, Elisa Dahlberg, John Schmerfeld, Bennie Williams, April Gregory, and Steve Floray. USFWS Retirees Association

and Wildlife Service Retirees Association (Association)—a valuable partner to collect and protect the history of the Service. In 1999, we began our tradition of hosting Heritage Committee meetings during Association retiree reunions, when 13 gathered with us. The Service's partnership with retirees really came together in Spearfish, South Dakota, in 2002 with a joint Heritage Committee meeting, Service Directorate and Deputies meeting, and Association reunion. Hundreds of retirees joined active-duty Service folks to celebrate the history of the Service at the D.C. Booth Historic Fish Hatchery.

During its almost 30-year history, the Service's Heritage Committee has worked to engage Service staff in our history, linked the Service to our retirees, and helped build the museum collections of both D.C. Booth and NCTC. The Committee has planned four important historic symposia that focused on Aldo Leopold, Olaus and Mardy Murie, Rachel Carson, and the Arctic National Wildlife Refuge. The proceedings from these events are much sought-after texts in the conservation history community. The Committee has also done extensive oral history work—collecting the important stories from more than 1,500 Service retirees. These transcribed histories recall the details that make the Service's conservation story so important. We share, to date, 600 transcripts online in our National Digital Library.

The Heritage Committee also presents the annual U.S. Fish and Wildlife Service Heritage Award. Committee members nominate and select an individual(s) who has contributed significantly to the preservation and enhancement of Service heritage and history. The list of awardees, inside and outside the Service, serves as an honor roll for those who have contributed greatly to the protection and collection of our history.

Today the Committee is comprised of active-duty representatives from across the Service regions and Service retiree representatives. Based on a request from leadership, the Committee voted for a new name—the History Committee—and members are updating the charter. Two active subcommittees work with Service staff, retirees, and historians to continue to collect, protect, and interpret the history of the Service—the Oral History and Artifacts Subcommittees.

Committee members appear on the back inside cover of this journal. For more information on the work of the Committee, contact the Service Historian, Dr. Mark Madison.

Endnotes

[1] Planning for NCTC occurred in these phases: planning and design (1990-1994), construction (1994-1997), opening (October 1997).

[2] The earliest mention of a Heritage Committee was in an April 10, 1990 Project Definition Meeting to brief Deputy Directors Dick Smith and Bruce Blanchard, and various Deputy Regional and Assistant Directors. In addition to training classrooms, lodges, etc., it was noted., "A FWS heritage component could be included." In late 1992 and early 1993, as plans for a heritage component, including a museum and displays became more detailed, a group of Service employees and retirees interested in the history and heritage of the Service stepped forward and were assembled to assist in planning the heritage component of NCTC.

[3] July 28, 1993 Exhibit Planning Meeting notes indicated, "Heritage Committee to meet with the Exhibit Task Group at the next meeting." ■

Retiree News
The Origin of the Retirees Association

Jerry Grover, *History Committee Member, Retired, U.S. Fish and Wildlife Service, Retired, Retirees Association Board Member Emeritus*

The U.S. Fish and Wildlife Service Retirees Association (Association) began shortly after the formation of the U.S. Fish and Wildlife Service (Service) Heritage Committee in 1996.[1] The Service established the Heritage Committee to provide operational guidance to the museum and archives at the brand-new National Conservation and Training Center (NCTC), the new "Home of the Service."

The Heritage Committee's charter directed a group of current and retired Service employees from various programs across the United States to develop and implement programs to identify, document, and preserve important historical materials and information associated with past, present, and future wildlife and organizational programs, and to educate Service employees and the public about its heritage of conserving natural resources.

It was during the early Heritage Committee meetings when it was noted there was a larger and important role for one of the Service's most valuable resources—it's retired employees! With momentum from Committee Chairman Dale Hall and Center Director Rick Lemon, the Service mailed invitations to the few retirees with known addresses to gather for a reunion at NCTC. And, in early October 1999, 13 retired Service employees plus spouses and support staff gathered.

It was an informal gathering, in the Rachel Carson Lodge lounge area, after dinner, that set the stage. The focus was on getting to know one another, and we explored how retirees might interact and contribute to the Service. One thing we agreed upon was to "do it again." A gathering at NCTC in 2000

First Service retiree gathering October 9, 1999 at the National Conservation Training Center. Front, left to right, Judy Grover, Denny Holland, Jo Quinnter. Second row: Mrs. Charlie Culp, Jerry Grover, Jim Gritman, Bill Ashe, Judy Greenwalt. Third row: Charlie Culp, Dick Huber, LeRoy Sowl, Lynn Greenwalt. Back row: Rick Lemon, Jack Hemphill, Dale Hall, Ron Anglin, Mrs. Sowl. USFWS

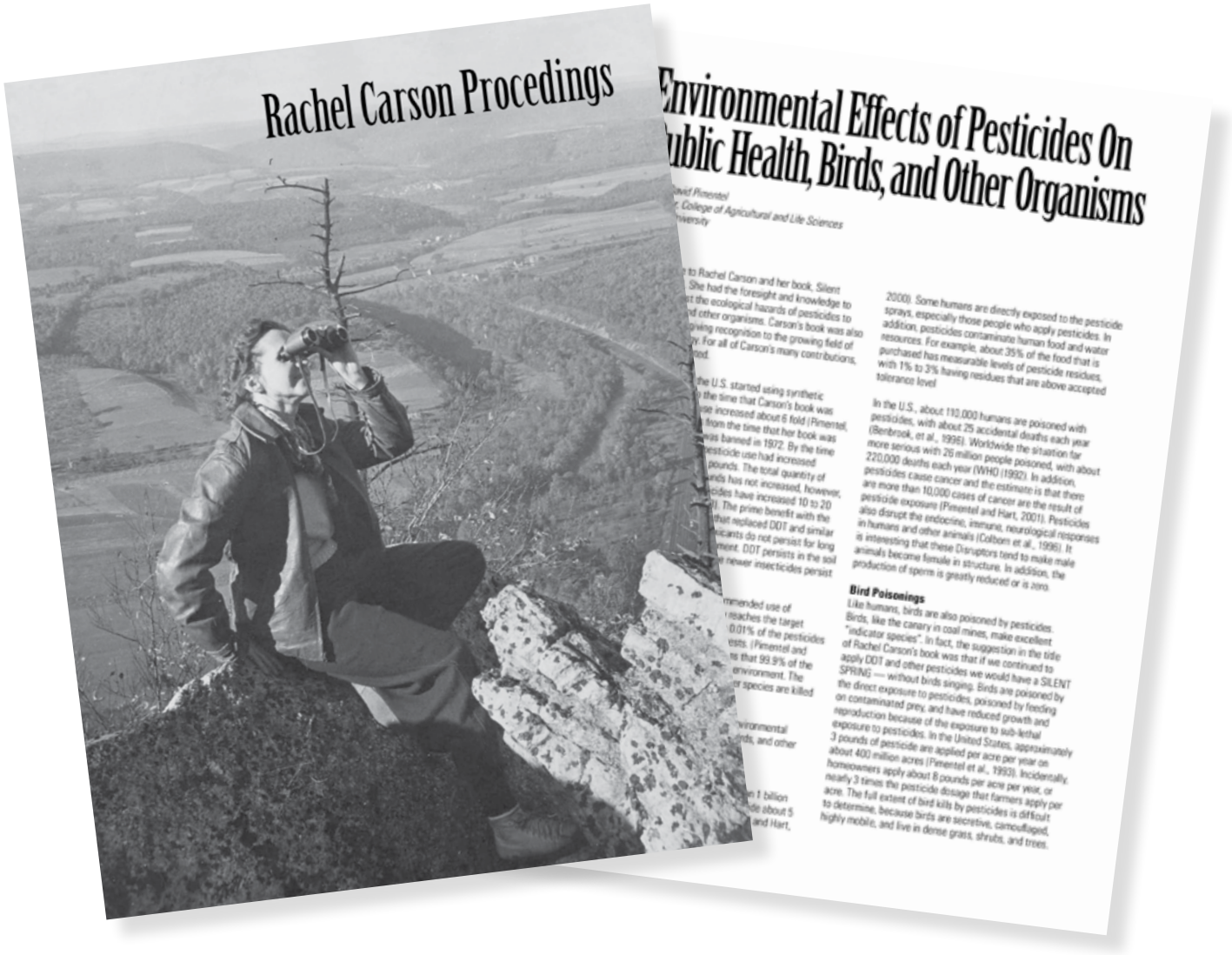
2017 USFWS Retirees Association Reunion at NCTC during a field trip. USFWS Retirees Association

2019 USFWS Retirees Association in Annapolis, MD. Courtesy of USFWS Retirees Association

brought together some 35 retirees and their spouses, and by 2001, 63 folks gathered at our reunion. In addition to informational programs presented by Service leaders, there was a celebratory social banquet. It was after this third gathering that the Heritage Committee suggested that the retiree members seek to establish a formal retirees association. With that Jerry Grover, Denny Holland, and Jerry French accepted the challenge and worked to establish a new nonprofit organization for Service retirees.

With NCTC's support, through the Heritage Committee, the U.S. Fish and Wildlife Retirees Association was chartered in West Virginia. The Association is a chartered, non-profit membership organization of former colleagues who are now retired. The Association is also known as the FWS Retirees Association. Association activities are directed by a nine member-elected Board of Directors. The main purpose of the Association is to recognize and preserve the Service's rich history and the many contributions of its present and past employees, to foster the preservation and use of the historical treasures, documents, objects, and information of the Service's unique history and values in world leading natural resource conservation, and to involve present and past employees in the history and heritage of the Service. The Association (DLN 17053289033043) qualifies as an organization under Section 501(c)(3) of the Internal Revenue Code, meaning it meets the requirement of a tax-exempt, non-profit entity and can also accept grants and contracts to further its goals.

This Association helps assure that one of the Service's most valuable resources, its retirees, are neither discarded nor forgotten and are a source of pride and motivation for future Service policy and actions. Members accomplish this through their direct contributions to the Service's archival collection, by participating in the oral history project of digital or video accounts of Service history in the making, and through their social reunions.



Helping Field Stations Celebrate Milestone Anniversaries with Matching Grants
The Association awards small matching grants to Service Friends Organizations to help support major anniversary events that promote the rich heritage and mission of the Service.

Supporting Retirees' Volunteer Work with Mini Grants
Retirees working at their favorite field stations can identify small project needs and apply for funding to purchase materials or meet other needs to complete a volunteer project at the site.

Learn more about the Association's grant programs and applications at the *FWS Retirees Association website.*

Retired employees interact by serving on panels and committees when requested, by assisting in current employee development, training, and knowledge of the past through the experiences of retirees during their active-duty assignments, by contributing their expertise in times of national natural resource emergencies, and by shared funding with Service offices celebrating major events.

From an initial address list of 360 retirees the Association now counts more than 2,500 retirees who have shared their contact information with 1,600 connected to the Internet.

Among its various accomplishments, the Association: acquired artifacts, including the shotgun that once belonged to Paul Kroegel, the first manager of the first national wildlife refuge, and some of Service artist Bob Hines' original artwork; helped fund field station Friends' group projects and anniversary events; conducted numerous oral histories supporting History Committee goals; and helped fund youth conservation leadership programs at NCTC.

More information regarding the FWS Retirees Association may be found at www.fwsretirees.org.

Endnote
[1] In 2021, the Service renamed the Heritage Committee as the History Committee.
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Illegal Trade in Wildlife
Wildlife Inspectors
The History of Ivory
The Economics of Elephants

From the Archives

U.S. Fish and Wildlife Service Museum and Archives, Shepherdstown, West Virginia

The National Conservation Training Center (NCTC), known primarily for educational excellence, also serves as a steward of American conservation history. Annually, since NCTC opened in 1997, thousands of Service staff, students, partners, visitors, and members of the public have viewed its museum exhibits, taken a museum tour, attended a lecture, or conducted research in the archives.

Today, the U.S. Fish and Wildlife Service (Service) Museum and Archives at NCTC preserves, protects, and provides public access to a museum collection of more than 40,000 objects and archives that document the history of the Service and the American conservation movement. Among these many treasures are some especially noteworthy artifacts: Rachel Carson's magnifying glass; Paul Kroegel's badge; the printing plate for the first Duck Stamp; the first refuge sign featuring Ding Darling's "blue goose"; and the National Wildlife Federation Art Collection.

Recently, the Museum launched a major expansion that includes:

1. New Museum Storage: This facility in the renovated laboratory building is double the size of the old space and features compact mobile storage.

2. New Museum Workspace: The new work area, twice the size of the old, is located next to the new storage facility, and can accommodate all museum management functions, including room for training and researchers.

3. New Exhibits: A complete renovation of the museum—additional exhibits, more objects on view, and enhanced graphics, interpretive text, labels, and audiovisual elements—provides for an enriched visitor experience.

For more than 2 decades, the U.S. Fish and Wildlife Service Museum and Archives has preserved and shared the rich history of both the Service and conservation in America. As we observe the Service's sesquicentennial, we look forward to continuing this mission—using the artifacts and stories entrusted to our care—to celebrate and chronicle the preservation of our nation's natural heritage.

USFWS Archives. USFWS

Various exhibits showcasing items from the National Fish and Aquatic Conservation Archives are on display in the original 1899 hatchery building at the D.C. Booth Historic National Fish Hatchery. April Gregory/USFWS

Multiple aisles of rolling shelves contain more than 1.8 million archival records pertaining to our agency's fisheries history at the National Fish and Aquatic Conservation Archives. Archival items include reports, photos, blueprints, and more. April Gregory/USFWS

National Fish and Aquatic Conservation Archives, Spearfish, South Dakota

Housed on the grounds of D.C. Booth Historic National Fish Hatchery in Spearfish, South Dakota, the National Fish and Aquatic Conservation Archives (NFACA) is a national program within the Fish and Aquatic Conservation Program of the Service. The NFACA collection collects, preserves, and shares the stories of the history, culture, management, resources, challenges, and successes of the Fish and Aquatic Conservation Program. The artifacts and records encompass the breadth and depth of its history, which goes back to 1871 with the U.S. Commission on Fish and Fisheries—our oldest federal conservation agency and the origin of the Service.

The D.C. Booth hatchery staff established the NFACA Collection in the early 1970s. In the early 1990s, Congress appropriated funding to build a state-of-the-art collection management building,

More than 14,000 fisheries objects are housed and cared for in the collection at the National Fish and Aquatic Conservation Archives such as these different types of live fish shipping containers. April Gregory/USFWS

which was completed in 1995. The 10,000 square foot Collection Management building includes a 5,000 square foot storage area, conservation lab, accession and receiving area, and Service offices. Today the collection comprises more than 2 million objects and archival documents from our fish stations, past and present, across the United States. A sampling of artifacts is on display in the Von Bayer Museum of Fish Culture on the D.C. Booth hatchery grounds.

National Eagle and Wildlife Property Repositor, Commerce City, Colorado

The Service's National Wildlife Property Repository (Repository) began at the Service's National Forensics Laboratory (Lab) in Ashland, Oregon. Starting as a small storage space of adjudicated wildlife property used for education and outreach, the collection eventually surpassed the Lab's mission. In early 1995, the Special Agent in Charge for the Mountain Prairie Region was directed to devise a plan to prepare and successfully transport the collection to a central location within the region. Through successful partnering with Service regional leadership and the U.S. Army, a suitable building was found at the Rocky Mountain Arsenal, which had recently transitioned from a

Exotic cat rug and mounts seized by USFWS Office of Law Enforcement Special Agents and Wildlife Inspectors stored at the National Eagle and Wildlife Property Repository. USFWS

Sea turtle products seized by Wildlife Inspectors now housed at the National Wildlife Property Repository. USFWS

DeSoto National Wildlife Refuge houses the Steamboat Bertrand Collection. It features textiles, clothing, household goods, building materials, medicine, liquor, and food, including butter, nuts, pickled vegetables, and canned fruit and oysters. USFWS

Display of artifacts recovered from the Bertrand. USFWS

super fund cleanup site to a premier urban national wildlife refuge. With a small group of dedicated staff and volunteers, the Repository, co-housed with the National Eagle Repository, opened in July 1995 at the newly minted Rocky Mountain Arsenal National Wildlife Refuge (Refuge).

In 2001 the Service moved the Repository to its present building on the Refuge. The facility underwent renovations in 2003 by adding a large education room, modernized processing areas for both the eagle and property programs, and office space for staff expansion. During 2021, the Repository is undergoing a second renovation. This project will greatly improve collections storage management by enhancing environmental and pest control measures, adding new safety measures and a new dermestid beetle colony room to the eagle laboratory, and expanding the education room and studio. Today, the 22,000 square foot facility houses a collection approximately 1.2 million wildlife property items and continues to grow an education and outreach program supporting the Service's mission of wildlife trafficking messaging.

Steamboat Bertrand Collection, Missouri Valley, Iowa

Bound for the newly discovered goldfields of Montana, the Steamboat Bertrand sank to the depths of the Missouri River. On April 1, 1865, the sternwheeler hit a submerged log, 30 miles north of Omaha, Nebraska. The ship sank rapidly, yet all the passengers survived. After the initial salvage efforts, the cargo was abandoned as a complete loss. A century later, modern treasure hunters Sam Corbino and Jesse Pursell located the wreck on DeSoto National Wildlife Refuge in 1968, using historical documents and a flux gate magnetometer. By 1969, the vessel's cargo was completely excavated from its mud tomb 30 feet deep. Unfortunately for the salvors, the treasure they sought eluded them. Insurance company divers had apparently removed most of the mercury and other valuables soon after the ship sank. What remained was a diversity of tools, clothing, and food items.

As the boat was on federal property, the salvors agreed, under the requirements of the American Antiquities Preservation Act of 1906 and the terms of their contract with the government, to turn all recovered artifacts over to the Service for permanent exhibition and preservation in a public museum. DeSoto National Wildlife Refuge, located near Missouri Valley, Iowa, is home to a premier archeological collection of more than 250,000 artifacts excavated from the buried wreck. The Bertrand's cargo was remarkably well preserved, and the refuge's collection is a unique time capsule for researchers and visitors interested in America's 19th century material culture. ■

Secretary of the Interior Dirk Kempthorne shaking hands with John Brooks. USFWS

Oral History Program
John L. Brooks, March 22, 2007 (excerpts)

I started as a Refuge Manager Trainee in Moiese, Montana, at the National Bison Range. I received a cooperative education student program grant, if you will, from the University of Montana. I attended the University of Montana between 1976 through 1981. So, I believe in 1977 I started working for the Service at the National Bison Range for that summer, and that was my first exposure to the Fish and Wildlife Service. From there I went back to school to finish my degree in wildlife management.

In '81 I was picked up full time by the Service as an Assistant Refuge Manager at Des Lacs National Wildlife Refuge in North Dakota—Kenmare, North Dakota. Enjoyed it enormously. Unfortunately, a week after… into the job, I had a very serious car accident and was in the hospital for a month. Broke my wrist. Broke my legs. Glass in my eye. I was really in bad shape. So, it was at the same time Reaganomics had taken over, so my position was cut.

And I remember thinking "wow, that would be really cool to do [indecipherable] endangered wildlife." So, when he brought it up, I said "yeah, yeah, I want to do that." So, I applied for the job in Dallas/Fort Worth, Texas, and Brownsville, Texas. I received the job in Dallas/Fort Worth, and then I started my career in law enforcement.

I was there for 3 years, I believe, and while I was there the other two inspectors and I, we, had the highest seizure rate in the nation, as far as for stopping endangered species from coming into the country. I learned a lot about international trade, about people who pass through customs—what they bring. I was amazed. And I recall the first time I seized something on my own after being trained. Was a lady coming in with a pair of sea turtle boots. Customs inspector called me over and said, "This lady has some sea turtle products." And so, I looked at them and I identified them as spring sea turtle. I advised her what the laws were and that it was illegal to bring in. And she was all "if I'd have known, I never would have done this." And I believed her. And I said, "Well, it's okay. Do you have anything else?" She goes. "Oh, no. No. That was it. Believe me, I never would have done this if I would have known." I said, "Okay. Well, if you just want to sign this abandonment form, you know, we'll get this taken care of." And I could see out of the corner of my eye the customs guy looking at her, and he was raising an eyebrow. And he said, "Wait a minute." He said, "Open that bag." And opened the bag, and there was another pair. And I just looked at her and my mouth dropped. I couldn't believe that she lied to me. That was the first time I was lied to—and it was the last time I really trusted anybody. Unfortunately, I lost my innocence at that point.

And I recall thinking that I was over my head. It was just so much. I mean, I went from a biologist, where I was comfortable; I went from a wildlife inspector, where I was the best; and now, something and I'm just a number and really not comfortable. Because my whole essence was not about law enforcement—it was about conservation. Come to learn out… come by… I come to find out later that the law enforcement component is just a great integral part of what conservation is all about.

The highlight of my career in Newark, I would have to say, would have been a songbird investigation we had. People back in that area who were trading in songbirds—cardinals, bullfinches, siskins, everything of that nature. So, I paired up with a state officer. We did a quasi-undercover operation where I was the undercover agent, and he was the uniformed officer. And I would go in, and I would question people and I'd see what they had. And I looked more like a college student back at that time, and also, at that time, a black officer in the Fish and Wildlife Service was unheard of. So, these people didn't think that I was an agent, or an undercover agent, so it worked well. They had their inclinations, but they just did not… no way it was going to happen.

So, after Chicago, I decided to go into the Washington Office as a senior special agent. Now, at this time in my career, I don't know—10-15 years on, did I want to go back to school. I really had considered, and actually applied for, the Kennedy School of Government, to receive a degree in public administration. But I also applied for this position in D.C. in a newly formed branch of International Affairs. International Affairs totally appeals to me. So, I applied. I got the job. So, I decided not to go back to school. And from there I was able to take trips to Bangladesh, India, England, several other countries, giving lectures on wildlife law enforcement techniques, training, this, that, and the other. And it was a great experience. I did outreach with the local schools,

inner city schools in D.C., schools for the deaf, I mean, everything. And not bragging—someone's looking at this—but at that time, if you mentioned law enforcement in the Fish and Wildlife Service, that was synonymous with John Brooks. Because I was everywhere. Everyone knew law enforcement because of what I was doing. I was trying to actually bring us out of the closet, if you will, and bring us more into the fold of what the Fish and Wildlife Service was doing. That we were an integral part. And it worked.

As an inspector they were regulars. We dealt, in Dallas, with commercial wildlife trading, mainly. And so, the big shipments of live animals, or boot products, whatever, were commercial dealers. And they knew the routine. But, as in any criminal case, I still have to prove knowledge. And so, they could easily say, "I didn't order that." And then my job was not to take it to that level. I would turn it over to a special agent, and that special agent would investigate it further. But on my level, I was to identify the wildlife and either approve it for entry, or refuse clearance, or seize it.

…the biggest disappointment for me for the…Service, is that we don't tell enough about who we are and what we do, to the public. It's a small segment of the population that know who we are. And that segment either has some dealings with law enforcement, or they live near a refuge—they have some nexus to a wildlife refuge, or they're a developer and they deal with the [indecipherable]. But the general public, as a whole, has no clue. So, when I get the question,

USFWS Oral History Program
Would you like to nominate a retiree to tell their story? Reach out to one of the History Committee members listed on the inside back cover of this journal.

"Well, what do you do? Are you like a forest ranger and you sit in a tower and you look over the…?" That's generally their… still their conception: that I'm Smoky the Bear /Ranger that sits up in the tower and looks over the wildlands. And I say, "No, it's more than that." And then I go into, "We protect endangered species, domestic animals, …" I give them some examples of something they can relate to—smuggling. In San Diego I'd say, "You know, people who smuggle wildlife across the border—it's my job to arrest them." "You arrest people? Do you carry a gun?" They have no clue. So, you're really educating them in that: number one—that wildlife is important, there are laws that protect them internationally and domestically, and it is taken seriously. It's just not some crime that is placed on the books just to make people feel happy.

We've gone from a 'division of law enforcement' to an 'office of law enforcement,' therefore we have line authority with the Director. That's the biggest change. We went from an 1812 grade series—game management—to 1811, which is truly criminal investigator. We are now beholding by all of the rules and regulations that other criminal investigators have. We are truly criminal investigators now. There is no disputing that.

With big changes comes great responsibility. So, we need to step up to the plate, as an office, and do our job to the best of our ability. Basically, what I'm saying is, the changes I've seen was—more relaxed, we were still sort of in that game warden mentality—just doing waterfowl work, just doing Lacey Act deer cases—where now we are truly looking at the big picture—international wildlife trade, commercialization, the things that are going to have great impact on species worldwide—not just in the United States. In addition to still doing the more traditional work that we've done in the past. We are doing forensics works with computers. I'm actually a forensics scientist. Where we go off to seize… we do execute a search warrant, and there's a computer in there, [and] that computer has to be imaged in accordance with the rules set out, set forth, in the federal regulations. And it's just a whole new ball game. We are definitely a player now. The only change that needs to be made is the public needs to recognize that.

John Brooks' full oral history transcript is available in the USFWS National Digital Library ■

Gallery

Rachel Carson's magnifying glass, from the collection of the U.S. Fish and Wildlife Service Museum and Archives, catalog number NCTC 558. USFWS

Original "Blue Goose" refuge sign, from the collection of the U.S. Fish and Wildlife Service Museum and Archives, catalog number NCTC 788. USFWS

Engraved printing plate, used to print the first Duck Stamp, from the collection of the U.S. Fish and Wildlife Service Museum and Archives, catalog number NCTC 1083. USFWS

Silent Spring and accompanying letter, both signed by Rachel Carson, from the collection of the U.S. Fish and Wildlife Service Museum and Archives, catalog number NCTC 1747. USFWS

Paul Kroegel's badge, from the collection of the U.S. Fish and Wildlife Service Museum and Archives, catalog number NCTC 4000. USFWS

Polar bear skin by American explorer Matthew Henson, from the collection of the U.S. Fish and Wildlife Service Museum and Archives, catalog number NCTC 387. Ryan Hagerty/USFWS

Reflection
On a Conservation Culture

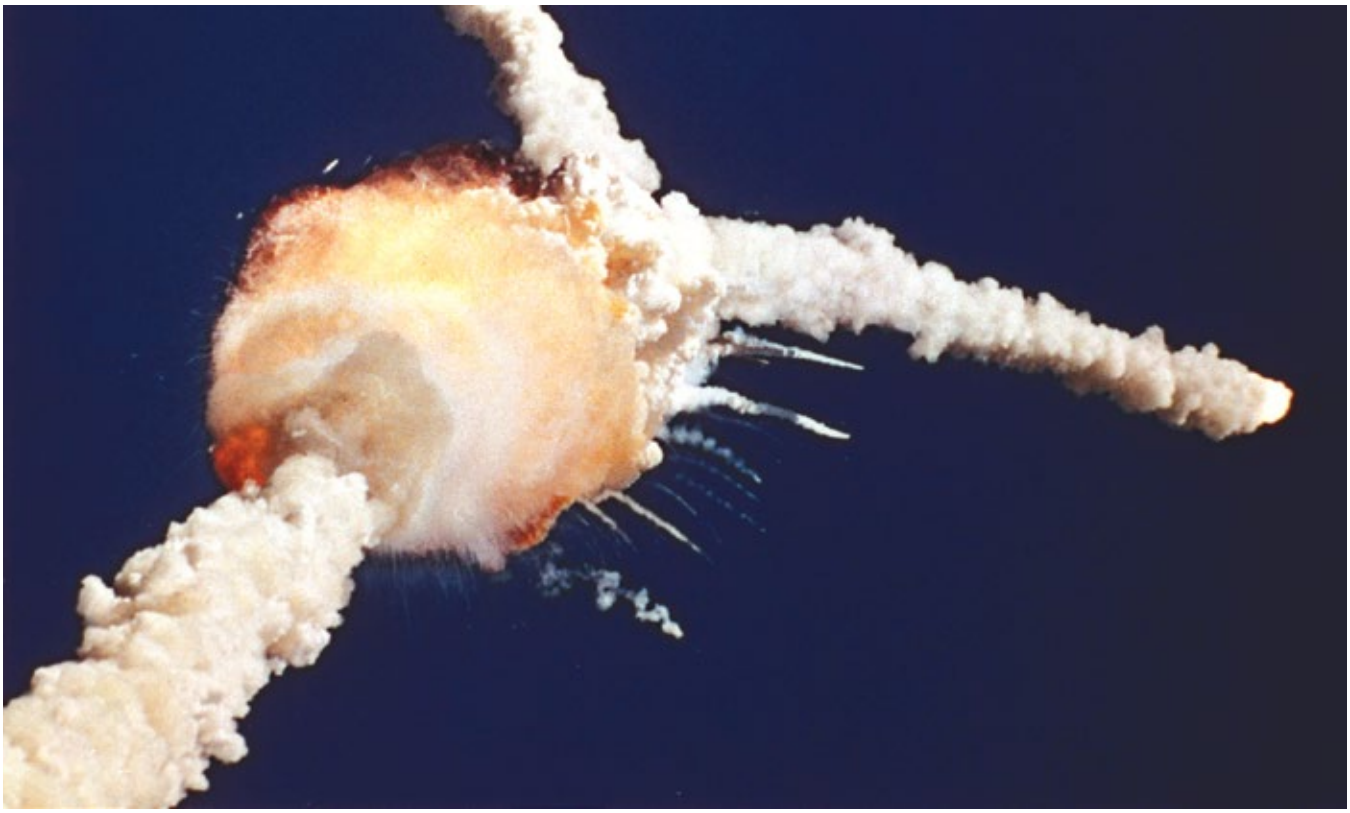
Mendel Stewart, *Retired, U.S. Fish and Wildlife Service, History Committee Member*

This photo appeared in the 1986 Merritt Island National Wildlife Refuge annual narrative report. The caption read, "Josh Kirkland and Mendel Stewart are our two newest refuge employees," with Mendel (right) standing next to the animated fictional refuge manager exhibit housed at the Kennedy space Center Visitor Center. USFWS

The U.S. Fish and Wildlife Service (Service) culture is "so thick you can cut it with a knife." That is what I wrote in the early 1990s, while a graduate student in Public Administration. Even then, I recognized that the Service has a strong, or what some scholars refer to as "thick," culture consisting of a set of shared values, norms, and beliefs. Unlike many graduate students, I had almost a decade of experience working for the Service before undertaking a Master's program, and because I had already worked in a regional office and on two national wildlife refuge complexes, I felt I had a good enough understanding of the agency to focus most of my research on my perceptions of the people and the organization and what I believed was a very special and unique culture.

In one paper I discussed how apparent the conservation ethic was among Service employees and how it served as the foundation of our organizational culture. I wrote about how symbols, customs, and habits tied us together in our identity as conservationists, and I tried to describe how important that culture was to me at the time. I wrote about how identifying as a biologist and conservationist generates commitment and reasons for devoting energy and loyalty to our agency. I mentioned how the Service uniform and sleeve patch, with its representative wildlife species, was an example of a symbol that meant much to me, which I recall was surprising considering that, in my youth, I never wanted to be in scouting because I thought I was too cool to wear a silly uniform—for the record, I wasn't. Somehow though, in my career, the uniform meant so much more, and I wore it with considerable pride. I wrote about other symbols such as the vehicles, or rigs, we drove that represented the rugged, outdoorsy aspects of our jobs and the boats, all-terrain vehicles, and other equipment we operated—with our emblem proudly displayed to illustrate to the public who we were and for what we stood. How, unlike many other organizations, we so closely identified with these symbols because our mission was more a calling than just a job. I discussed how we had a unique language, often involving wildlife species, habitat types, ecosystems, biomes, wildlife management techniques, along with similar subjects that we shared, and how our conversations often expressed, in one way or another, our deep and passionate conservation commitment. Even early on in my career, I valued this culture because it fit my world view formed from the environmental movement of the 1960s and early 1970s, a time when significant environmental legislation was enacted, and it seemed the land ethic of Aldo Leopold was alive and well. My recognition of our culture was influenced from some of my first career experiences.

I began my career as a volunteer in the Atlanta Regional Office, and after only a few months, was lucky enough to get a full-time permanent position as a Biological Technician working on refuge land acquisition planning. It wasn't until years later I realized just how rare it was to start with a permanent position. My first field job was as an assistant refuge manager at Merritt Island National Wildlife Refuge, the buffer surrounding



Space Shuttle Challenger explosion. AP Photo/Bruce Weaver, File

the Kennedy Space Center just outside Titusville, Florida. It was the height of the space shuttle program, and launches were increasing in frequency. Because the refuge staff worked closely with the National Aeronautics and Space Administration (NASA), I had the chance to observe their culture and recognized similarities, particularly regarding the passion their employees displayed for the mission of space exploration. This passion was put in full view on January 28, 1986, when the Space Shuttle Challenger exploded 73 seconds after launch. I was at the refuge office on the island less than 10 miles from the launchpad. Standing on our back deck gave us a great view of the launch once it got only a couple hundred feet in the air. The launch was like others I had seen, and as it climbed higher, it was time to use my binoculars to have a clear view. As I was pulling them to my eyes, the shuttle burst into a huge white cloud. I stood there with my colleagues in confusion and disbelief. I recall many voices asking what had happened and some wondering if we were watching the separation of the solid rocket boosters. Because I knew how the shuttle worked and understood the launch and flight sequences, I recognized something terrible had occurred. I stood there, frozen to my binoculars, in what clearly became a false hope of seeing the shuttle emerge from the gigantic plume.

For the next almost 3 years, I observed the resilience of the NASA culture as they endeavored to return to launch status and reinitiate their manned spaceflight exploration mission. Looking back, it was clear to see the efforts NASA made to rebuild and strengthen their organizational culture. NASA leadership talked of the imperative of mankind's future in space that reminded me of how we spoke of the significance of wildlife and ecosystem conservation to the health of our planet. In the case of NASA, they had to overcome technological and managerial challenges to achieve a safe return to flight. NASA ramped up a redesign of important shuttle components and implemented changes that reprioritized astronaut safety in flight decision making. They did each of these things in an open and transparent manner that reengaged NASA employees in a safety-first culture that was lost due to flight schedule pressure contributed to by public apathy. Our organization must also constantly navigate economic pressures confounded by public apathy that constantly threaten wildlife species and habitats.

I was there for the return to flight of STS-26 and witnessed the pride of an agency some questioned would ever fly again. It is clear they recognized a safety culture was indeed critical to successful space exploration and that without it, they risked losing more human life, along with the stars. In the resilience of NASA, I recognized similarity with the Service and its mission of wildlife conservation—both are important, and both require great effort to maintain and perpetuate. In my estimation, saving plant and animal species is even more important and difficult because there are few technological solutions.

Migratory bird pilot biologist Doug Benning (left) and Wildlife Management Biologist Mendel Stewart (right) take a break from conducting aerial waterfowl surveys in northern Saskatchewan Canada. Circa 1993. Courtesy of Mendel Stewart

USFWS assistant refuge managers Steve Gard (left) and Mendel Stewart (right) unveil the Merritt Island Wildlife Refuge's visitor information center sign as part of the center's dedication in Titusville, Florida, October 11, 1985. USFWS named the center for Scott J. Maness and Beau W. Sauselein, who died in the line of duty fighting wildfires on the refuge. National Aeronautics and Space Administration

As I recall that paper with almost 30 years of perspective, I now see more clearly what I was trying to describe. In summary, maintaining an organizational culture, whether for space exploration or wildlife conservation, is critical for long-term success. I now also recognize that most Service employees, not just "biologists," share commonalities around a deep concern for wildlife and species. Some of the most passionate, and often knowledgeable, employees are on the maintenance or administrative staff at a refuge, hatchery, or in Headquarters or regional offices. This was, and remains, a significant part of the organizational culture of the Service. All of these components that form the Service family make up our organizational culture.

Looking forward, the culture of conservation must be perpetuated and nurtured and an important element of that is not forgetting the past. This goes hand in hand with the celebration of the Service's 150-year conservation history and the proud contributions countless individuals have made to wildlife conservation. Throughout my career, I recognized the importance of our culture, and, fortunately, others did as well. In 1998, the Service formed the Heritage Committee (now known as the History Committee) to help maintain an understanding and appreciation of the Service's history and values. Perhaps more importantly, the Committee is charged with perpetuation of the Service's unique conservation culture. Without it, I believe we are at risk of losing the very thing that holds us together in our wildlife conservation effort. While our failure will not go up in a massive explosion, the loss of plant and animal species will have a much longer and more devastating impact on the ecosystems that sustain us. By maintaining our "thick" conservation culture, perhaps we can help prevent that outcome. ■

USFWS History Committee Mission and Members

U.S. Fish and Wildlife Service
History Committee
Chartered 1998
The mission of the History Committee is to preserve the cultural heritage and history of the U.S. Fish and Wildlife Service, reinforcing the mission of the agency to ensure that fish, wildlife, plants, and their habitats are preserved for the continuing benefit of the American people.

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Deborah Holle, Retired Project Leader, Balcones Canyonlands National Wildlife Refuge

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Tom Worthington, Retired Deputy Regional Chief of Refuges, Twin Cities Regional Office

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Cover image: Workers from the Leadville National Fish Hatchery—established in 1889 and still operating today—ready a net to capture trout from a Colorado lake to collect eggs.

USFWS National Fish and Aquatic Conservation Archives