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Author: Kushlan, James A.

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A History of Conserving Colonial Waterbirds in the United States

James A. Kushlan

P.O. Box 2008, Key Biscayne, FL, 33149, USA

E-mail: jkushlan@earthlink.net

Abstract.—The commentary follows the story of colonial waterbird conservation in the United States over the past 150 years. Colonial waterbirds, especially egrets and pelicans, played an important role in the founding of the American bird conservation movement. At the beginning of the 20th Century, bird conservation activity self-organized, inspired creation of refuges for colonial waterbirds, protected colonies with wardens, and secured passage of conservation laws. Thereafter Federal and state governments slowly grew in their authorities and commitment to bird conservation. Successes achieved, colonial waterbirds fell from priority during the remainder of the first half of the 20th Century, although legislative, administrative and academic progress was made of considerable subsequent value. In the 1960s and 1970s, colonial waterbirds resumed a significant role, first in contaminant studies and then in population inventories. This engagement encouraged maturation of a colonial waterbird research and conservation agenda in the United States, including founding of the Waterbird Society, which facilitated a blossoming of colonial waterbird research in the succeeding decades. In the national conservation planning initiatives of the 1990s, colonial waterbirds were represented by the North American Waterbird Conservation Plan, later Waterbird Conservation for the Americas. Waterbirds are now well integrated in bird conservation planning and action at multiple scales in the United States. Conservation biology, assessment, protection and site management have progressed well, while population estimation, monitoring and data archiving have not. Appropriate direction seems clear, involving regional coordination of the actions of local stakeholders. *Received 10 June 2012, accepted 31 July 2012.*

Key words.—egrets, herons, monitoring, North American Waterbird Conservation Plan, pelicans, seabirds, wading birds, Waterbird Conservation for the Americas.

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The role of colonial waterbirds in the story of conservation in North America is far from tangential. The bird conservation movement in the United States was born not of mallards or quail, not of shorebirds or migrating landbirds; but rather, it was born of egrets and pelicans. This invited commentary covers the history of a century and a half of colonial waterbird conservation in the United States, from a perspective that is both historical and personal. The history starts about the mid-1800s, after the Civil War. The more personal history is of the last 40 years, the period I was fortunate to witness. As colonial waterbird biologists and conservationists, it is useful that we appreciate where we came from, in order to know where it is we might go in our efforts to conserve colonial waterbirds in the United States. This paper discusses both how we got where we are and suggests how we might best proceed.

The Conservation Era: Civil War to early 1900s

The story of colonial waterbird conservation in the Americas begins just past the mid-1800s. In the several centuries prior, European settlers and newly-minted Americans had more to deal with than bird conservation as there were a seemingly unlimited wilderness to colonize and a seemingly unlimited supply of waterbirds to kill for food, sale, or sport. Scientifically, these centuries had been a time to inventory and name the continent's obvious vertebrate species, which was about completed by the Civil War. After the War, science and technical progress was encouraged by government and society. Natural history became an avocation for the wealthy, who also wanted similar opportunities for the populace at large to be exposed. Great scientific institutions such as the National Academy of Science were founded, and museums to educate the public emerged, the National Museum of Natural History and the American Museum of Natural History being at the forefront. Positions established in these museums assigned to natural history and later to birds provided the foundation of a discipline of ornithology.

By the late 1800s into the early 1900s, attention turned to finding out where and when species occurred. State ornithologi-

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cal surveys and faunistic studies at all scales emerged, keeping very much to the American ideal of specimen collecting. The difference between scientific collecting and sportsman hunting was not very pronounced. Outstanding specimens were hunted and ended up in the taxidermy cabinets and trophy rooms of the wealthy and their public museums. As a sport or for market, killing hundreds of birds a day was a cherished personal practice. Left over from a more subsistence era, hunting wildlife was celebrated as a quintessential aspect of a distinctive American culture. And in this period, animal skins, pelts and other body parts were increasingly used in men's and women's fashion, egret breeding plumes being particularly appreciated in haberdashery.

Fascination of the increasingly educated and wealthy American public with the West, outdoors, hunting and fishing was nearly inexhaustible. To meet the needs, the magazine *Sports Afield* was founded in 1887, followed by *Field and Stream* in 1895, and *Outdoor Life* 1903. Nature was becoming mainstream. Among those making a living writing of hunting and the outdoors was Theodore Roosevelt, who published his first true-to-life outdoor adventure memoire, *Hunting Trips of a Ranchman* in 1888 just before the first of his multi-volume history *The Winning of the West* (1889-1896), these books together demonstrating the tenor of the times. But Roosevelt was a leader of a movement for conservation rather than wanton killing. It was the concern of Roosevelt and his associates for the fate of western wildlife that led to his founding of the Boone and Crocket Club in 1887 to advocate for an ethics of sport hunting in place of wholesale slaughter (Brinkley 2009). He also saw to the founding of the New York Zoological Society and its Zoo in the Bronx in 1895, whose principal mission was to save the American bison.

Known for his engagement with the mammalian megafauna, Roosevelt and his associates were also concerned for the birds. These, he saw as emblematic of nature and not something to be shot. Roosevelt himself began his natural history studies with birds, publishing on bird occurrences in New York as early as 1877 when he was still in college, carefully observing and recording birds throughout his life (including providing a list of the birds he saw while in the White House) and, importantly for our story, becoming acquainted with colonial waterbirds in Florida during the Spanish-American War (Kushlan 2011a).

The American Ornithologists' Union was founded in 1883 and at the beginning was as much concerned with conservation of birds as with their study. Frank Chapman of the American Museum of Natural History (of which Roosevelt's father was a founder) put colonial waterbird bird conservation on the map by emphasizing the plight of egrets. This fashion trend, begun after the Civil War, had by the 1880s reached superstimulus proportions. Because of their inherent beauty and impressive length, egret plumes, particularly those of Great Egrets and Snowy Egrets, were especially appreciated. Famously in 1886, Chapman censused women's hats in Manhattan, tallying over 40 bird species on sartorial display. Contrary to the counter-assertions of the industry, nearly all of egret plumes were obtained by killing nesting birds, which is the message Chapman and others sought to bring to the public. Chapman and other writers such as Herbert K. Job, both correspondents of Roosevelt, began to focus their protests on the killing of egrets in colonies. Chapman in his book *Bird-life* and Job in his book *Wild Wings* not only advocated for egret protection but also for watching and photographing birds in place of shooting them (Chapman 1897; Job 1905).

The impact of plume hunting on colonial waterbird populations is literally inestimable, but clearly dramatic. Estimating the sizes of colonial waterbird populations any time prior to the late 1900s is just not possible, and efforts to do so distort contemporary conservation arguments as evidenced by the history of such attempts in the Florida Everglades (Frohring *et al.* 1988). Given the lack of data on population sizes, it is similarly not possible to calculate with any numerical accuracy the impact plume hunting had on egret populations. Some have tried

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by extrapolating feather weight, which was sometimes recorded, to birds killed, which were not recorded. Estimates that in some years of the 1890s, not all by any means, the take was in the low hundreds of thousands of birds (Kersey 1975) do seem credible. And, it is documentable that in Florida accessible colonies disappeared by 1880s and there exist many reports of colonies being shot out for decades after. What is known is that the number of feathers available for the trade at its peak was huge and that year after year known heronries were shot out. Despite the lack of quantitative data, it seems more than likely that North American populations of egrets, as well as those of other species and in other countries, shrank markedly in the late 1800s and early 1900s. Plume hunting, for example, has been blamed for population decreases in herons that may still be felt (Kushlan and Hancock 2005). Quantitative proof aside, there is no doubt that by the early 1900s the situation for herons in the southern United States, from South Carolina through Florida to Texas, had deteriorated rapidly and was indeed dire.

Publicity was sensational, as stories of shot-out colonies were publicized. The more horrible the tale the better was the response from the public. The campaign for bird protection against an enormously powerful industry, focusing in large part on colonial waterbirds, proceeded on numerous fronts that eventually coalesced into the Audubon movement. John James Audubon's name (one who, in fact, as a man of his time had reveled in killing hundreds of birds a day) came to be associated with anti-bird slaughter initiatives through George Bird Grinnell, the editor of *Field and Stream*, who in 1886 proposed using the name to help organize bird preservationists. Tens of thousands of people joined Grinnell immediately. Also in 1886 the AOU's Bird Protection Committee promulgated the AOU Model Law meant to guide states in enacting bird protection legislation. The new Audubon societies prospered. Massachusetts Audubon Society was founded in 1896, Audubon Society of New York State in 1897, Florida Audubon Society in 1900, and the National Association of Audubon Societies, meant to organized the burgeoning Audubon movement, in 1905. Birds got their own magazine in 1899 when Chapman began publishing *Bird Lore*, which provided space to detail struggles for bird conservation, always with particular attention to egrets. It is not a coincidence that the emblem of the National Audubon Society is a Great Egret. The battle was on to put an end to the trade in plumes, and egrets enjoyed the status of focal species in the public eye. The movement to conserve colonial waterbirds in the United States was in full engagement, mostly by private citizens driven by public sentiment incited by concerned ornithologists.

The political goal of the bird conservationists was to convince states to pass renditions of the AOU Model Law that would protect birds within the state from wanton killing, especially waterbirds in their colonies. The states were targeted because at this time the Federal government had not asserted jurisdiction over birds. William Dutcher, the AOU Committee Chair and later National Association president, led the complex job lobbying individual state legislatures. Florida, containing many of the historically large and highly popularized colonial waterbird colonies, was the first to pass such a law, in 1901. The greatest state-level success was in 1910 when New York's Audubon Plumage Act prohibited sale or possession of feathers from any bird within the same family as a species already protected in New York, which effectively halted the state's feather processing industry.

The Federal role in colonial waterbird protection evolved rather slowly. It began with the Lacy Act of 1900, which prohibited interstate shipment of wildlife, fish and plants that had been illegally taken within a state, thus Federalizing support for protective State laws. In 1901, Theodore Roosevelt unexpectedly became president and, not being beholden to electoral influence, took on bird protection inspired by his personal interest and philosophical perspective. Over his almost two terms he attempted to do what he could to encourage and bully the Federal government into protecting birds,

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for the sole reason that, as he argued, it was the correct thing to do. His greatest successes likely lay in his establishing Federal bird refuges. In 1903, Roosevelt signed an executive order carving out Pelican Island in Florida as a federal bird reservation to protect a colony of Brown Pelicans. Roosevelt had a special fondness for Brown Pelicans, whom he grew to know in Tampa while awaiting transport to Cuba in the Spanish-American War, and was predisposed to agree to the proposal made by Frank Chapman and William Dutcher (Brinkley 2009).

Thus, the first of what later became national wildlife refuges was for a colonial waterbird. Over his terms of office he established 51 refuges, including such colonial waterbird sanctuaries as Passage Key, Key West, Tortugas Keys, Pine Islands, Matlacha Pass and Island Bay in Florida; Tern Islands, Breton Island and Shell Key in Louisiana; Hawaiian Islands in Hawaii; Farallon in California; and Behring and Pribilof in Alaska. In his first term of office, he created reservations by assertion with limited legal or historical foundation. But a sounder mechanism was presented by the Antiquities Act of 1906, meant to protect Indian artifacts, which Roosevelt used by interpreting its provisions broadly.

Federal refuges provided site and species recognition but not protection or management. Actual bird conservation management came slowly to the Federal government. The Division of Economic Ornithology and Mammalogy was established in the United States Department of Agriculture in 1885, simultaneously with the founding of the bird conservation movement. As the name implies, the goal was to evaluate birds as pests to agriculture. By 1905 it had evolved into the Bureau of Biological Survey to which Roosevelt gave responsibility for the Pelican Island Refuge and many of the subsequent reservations. In 1906 the Game and Bird Preserves Protection Act provided regulatory authority for the Bureau, and active management by Federal authorities and their agents was then possible. From this point, trespassing on the bird refuges could, at least technically, be prohibited.

However, the Federal government had little money appropriated for actual protection and management; protection was more locally derived. The work of early wardens was mostly paid for by AOU's Thayer Fund, the purpose of which was to protect waterbirds along the East Coast. The earliest engagement was in 1902, when AOU hired Guy Bradley to protect colonies in extreme south Florida. His death was used as a galvanizing moment in the movement. AOU and later various state and local Audubon societies were instrumental in providing local wardens to protect colonies especially throughout the American south. The real founder of the first refuge was a local resident, Paul Kroegel, who brought the colony to the attention of Chapman (on his honeymoon) and others vacationing in the area and who was later hired by Roosevelt himself as the first refuge warden and paid through the Florida Audubon Society. The conservation of colonial waterbirds in this era, and for decades after, was in the hands of a few dedicated local wardens funded by whatever means could be found. This history illustrates that from the beginning in the United States colonial waterbird conservation has been a partnership among Federal agencies, state government, independent organizations and individuals, as it remains today.

THE WAR YEARS: EARLY TO MID 1900S

Not until World War I and after did the demand for plumes for fashion actually recede. Bird plumes were still being traded in Florida into the mid-1920s, and I recall 30 years later my mother's Sunday hat displaying feathers, albeit from domestic birds. In the post- Roosevelt era, many of the advances in conservation were throttled back once his unyielding hand was released, political interests regained their strength, and concessions were made in park and refuge uses, especially in the run up to World War I. The period of World War I, and after through the Great Depression, World War II, and immediately afterwards was one in which the conservation movement took a back seat to other national priorities. With trade in colo-

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nial waterbird parts concluded, these species fell from national prominence. However, in these years, institutional processes were set in motion that had important effects on colonial waterbird conservation thereafter.

Critical progress was made on the Federal legislative front as the treaty authority of the central government was used to assert a Federal role in bird management. The Migratory Bird Treaty Act of 1918 asserted Federal control of trade and transport of migratory bird species, including most of the colonial waterbirds. Initially between the United States and Canada/Great Britain, coverage was expanded over the decades to include migratory species shared with Mexico, Japan and Russia. Colonial waterbird conservation was moved out of the control of diverse state legislatures and local interests as the Federal government gave itself the authority to appropriate funds to manage refuges and migratory birds. Along with parks and refuges, this Act and its successors have proven to be the most critical Federal tools in colonial waterbird conservation history in the United States.

Responsibility for the Migratory Bird Treaty Act was given to the Biological Survey, later to become the U.S. Fish and Wildlife Service. Protective activity grew slowly over the next decades but speeded up when, in 1934, cartoonist Ding Darling was appointed by Franklin Roosevelt as the Chief of the again reorganized Bureau of Biological Survey. The Fish and Wildlife Coordination Act better defined the state and Federal roles and provided additional authorities. Darling, with his national audience, succeeded in obtaining funds to implement the Act. While colonial waterbirds were not a focus of the Biological Survey outside their bird refuges, another initiative was all about them. In 1934, Everglades National Park was authorized to protect the tropical wilderness of extreme South Florida, which came to the attention of conservationists initially through the struggles to protect colonial waterbirds and the famous South Florida colonies during the plume hunting era.

Another trend of this period, of eventual value to colonial waterbird conservation, was that wildlife management was professionalizing itself in the United States. Aldo Leopold became the first professor of wildlife, at the University of Wisconsin, and by 1939 had founded the first academic wildlife department. The first cooperative wildlife units, placing Federally-paid biologists in land grant universities for the purpose of educating wildlife managers, were established in 1935. The Society of Wildlife Specialists (now Wildlife Society) was founded in 1937, as was Ducks Unlimited, still the primary national waterfowl conservation organization. The building field of wildlife biology had little to do with colonial waterbirds in that it had everything to do with huntable species, but it set the stage for later years when the discipline enlarged to encompass non-game wildlife.

Importantly, this was the period when the scientific study of colonial waterbirds began in earnest. Faunas and diverse studies of colonial waterbird taxonomy, distribution, migration, food habits, feeding behavior, nesting biology and morphology dot the literature of the period. It was found that these species could be used as study models, especially for the developing field of animal behavior: Nicholaas Tinbergen studied gulls; Konrad Lorenz studied night-herons (Lorenz 1938; Tinbergen 1953). Herons, gulls, terns, and seabirds all emerged as subjects for short term and long term study. These studies paved the way for the avalanche of research on colonial waterbirds that was to follow over the next fifty years, which ultimately developed a robust scientific basis for their conservation.

THE ENVIRONMENTAL ERA: 1962-1990

Contaminants

Colonial waterbirds again came to conservation prominence in the second phase of the pesticide revolution. The book *Silent Spring* took the bestseller list by storm in 1962 (Carson 1962). Although slim of facts, the argument that top predators were suffering from food chain magnification of contaminants was accepted widely and inspired

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follow-on study which confirmed the book's assertions. Although raptors were first to be studied in the aftermath of the book, the utility of colonial waterbirds was soon appreciated as these were the top predators in aquatic systems. So by the end of the 1960s and early 1970s colonial waterbirds also were being studied. The poster child was the Brown Pelican, which suffered population collapses in Louisiana and later on the Pacific Coast (Schreiber and Risebrough 1972; Anderson and Gress 1983). These collapses were found to be correlated with eggshell thinning, pollution by DDT and the pelican's particular incubation posture (Blus *et al.* 1970). Great Blue Herons and Black-crowned Night-Herons were also subject of studies of contamination, egg shell thinning and mortality rates (Henny 1972; Faber *et al.* 1972; Ohlendorf *et al.* 1978, 1979).

Federal legislation in response to *Silent Spring*'s wide acceptance among the public backed by subsequent studies came rapidly. The Environmental Protection Agency was organized in 1970 to manage contaminants. DDT was banned in the U.S. in 1972. Dieldrin was soon to follow. The Federal Environmental Pesticide Control Act was passed, also in 1972, resetting responsibilities and the regulatory framework for chemical environmental hazards. Over the years that followed, contaminants that affect birds have been increasingly controlled in the U.S. and, under the Stockholm Convention, worldwide. Contaminant research on colonial waterbirds that started in the late 1960s and 1970s continues today as colonial waterbirds in study after study have been used to track decreasing contamination by persistent bio-accumulating substances as well as effects, some extremely subtle, of other contaminants, particularly heavy metals (Custer 2000).

Endangered Species

Along with contaminants, a second important post *Silent Spring* advance in non-game species conservation was the Federal endangered species engagement. The first Federal legislation on endangered species in 1966 led to the more powerful Endangered Species Act of 1973. Colonial waterbirds were not in the forefront of Federal endangered species activities, but Wood Storks, Least Terns and Roseate Terns were among the earliest species listed. Of course, over the decades to follow, economic and political back pressures have decreased some of the Act's effectiveness on the ground; but where appropriate, colonial waterbirds continue to figure in multi-species plans, landscape plans, and other cooperative ventures.

Inventories

An important outcome of attention to colonial waterbird contamination in the pesticide era was the finding that there was limited evidence for increased adult mortality and that much of the effect, if any, would be sub-lethal to adults, perhaps affecting population sizes and eventually distribution. Catastrophic poisonings that dramatically affect entire populations, such as seen with DDT in Brown Pelicans or dieldrin in Great Blue Herons, would likely be the exceptional situation. Sub-lethal effects sufficient to affect population viability would be seen only gradually over time. However, it would not be possible to infer long-term population scale effects without knowing population sizes and trends. In order for colonial waterbirds to be useful as biological indicators of pollution, there was a need to document their population sizes and distribution.

The start of this process was a survey of colonial wading bird nesting sites along the east coast of the United States, sponsored by the U.S. Fish and Wildlife Service and conducted in 1975 and 1976 out of Patuxent Wildlife Research Center (Custer and Osborn 1977; Custer *et al.* 1980). This inventory resulted in the first ever estimate of wading bird populations over a large section of the United States. In south Florida, as part of this study, I was able to go a bit further than the wading bird focus and censused all the colonies of all colonial waterbirds producing, for the first time, an estimate of populations for the most famous of North American

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wading bird areas, the Everglades (Kushlan and White 1977). I found almost 130,000 colonial wading birds in south Florida at 41 colony sites. Notwithstanding decades of assertions about the size and declines of these populations, actually knowing total nesting populations was unprecedented in south Florida, as it was elsewhere before these inventories. The result in South Florida, as it was elsewhere, was that there were far more birds and far more nesting sites than anyone had suspected. It is surprising that a relatively simple concept, "go out and count the birds" was so long in coming.

Other inventories were conducted over the succeeding years. An inventory of the important colonies in Louisiana identified this region as the new core of North American egret and ibis populations (Portnoy 1981). The Texas Waterbird Survey was likely the longest standing and most comprehensive for a state (Blacklock and Slack 1979). Other states conducted one or more statewide inventories. A binational Great Lakes Survey has now been repeated at four decadal intervals and has established temporal and spatial trends for most colonial species nesting there (Scharf *et al.* 1978; Weseloh *et al.* 1995; Blokpoel and Tessier 1996; Morris *et al.* 2003, 2010, 2011; Cuthbert *et al.* 2010). Patuxent Wildlife Research Center produced compilations of these inventories which provided a snapshot of colonial waterbird population sizes and distribution (Spendelow and Patton 1988).

Data Management

There were a number of historically underappreciated offshoots derived directly from the east coast wading bird colony survey. The first had to do with the data themselves. There had never been quantitative data of this sort gathered simultaneously using more-or-less standard methods over a large geographic area by numerous contributors. There was no way to manage the data trove. National Audubon and the Laboratory of Ornithology took on the need, initiating a "Colonial Bird Register" at Cornell University in 1975. Maintaining such an effort long term was difficult, and the program eventually fell due to a lack of sustainable funding, lack of agency support, as well as a reluctance to participate due to data access issues. In the late 1990s, I was able to re-institute the national register at Patuxent Wildlife Research Center, believing at the time that the Federal government would prove a more reliably persistent custodian. Fortunately, Cornell was able to unearth the archival tapes of the old Register data. Then, only by the barest of luck and computer storage detective skill, were the almost unintelligible bits translated and re-archived. Work on adding information to the new waterbird database continued for several years and remains internet accessible (Patuxent Wildlife Research Center 2012), but like the Cornell database before it, as of this writing, adding new data to and managing the continent-wide database have not been sustained.

Monitoring

One thing that did not result from the inventories of the 1970s and 1980s was a consistent commitment and investment in monitoring colonial waterbird populations nationwide. Other than in the Great Lakes, Texas and a few other areas, few inventories evolved into long-term monitoring programs of any consequence, mainly because no one entity, government or otherwise, took charge. This responsibility was certainly that of the U.S. Fish and Wildlife Service and, after governmental reorganization, that of the U.S. Geological Survey, but it just did not happen. What did happen is that each of the dedicated individuals and organizations that were conducting inventories and monitoring developed its independent history, methodology and sense of ownership, which made efforts in later years to standardize approaches nearly impossible to achieve. The United States is a big, diversely landscaped country with lots of biologists, lots of agencies and NGOs, and lots of independent pots of funding as well as being politically, administratively, and culturally fractionated. These characteristics were not helpful to developing a nationally consistent program of colonial waterbird monitoring.

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To this day, the best data for colonial waterbird population trends over all of the United States are derived from Christmas Bird Counts and Breeding Bird Surveys, neither of which was designed to do that job. There have indeed been some encouraging moves in recent years, such as that recently led by the U.S. Fish and Wildlife Service. After several years of technical debate many of the issues of inventory and monitoring have been discussed, exposed and beaten into submission and consensus on what should be done is at hand (U.S. North American Bird Conservation Initiative Monitoring Subcommittee 2007). There has been much agreement on the characteristics of appropriate monitoring activities, open data access, data management that allows analyses at different scales, and integrating monitoring and management (U.S. North American Bird Conservation Initiative Monitoring Subcommittee 2007). Now, the use of standard methods that are consistent and measure bias are possible (Steinkamp *et al.* 2003; Kushlan 2011b).

Most methods attempt to estimate population sizes, which is the standard for waterfowl management and also needed to calculate some international species and site assessment criteria. What may not yet have been fully appreciated in the U.S. is that adequate and useful monitoring information can be obtained without attempting complete counts. Indices of population size, if properly designed, can be used to infer trends sufficient to track the effects of management and other conservation measures. Estimating population size in order to monitor population trends should not be necessary.

One thing that has become clear that no one entity, even the Federal government, can do all the monitoring; there is not enough money, manpower or persistent commitment. Developing adequate monitoring systems is not insurmountable. Local volunteers, NGOs, park and refuge personnel can do the monitoring for minimal additional cost. An approach for colonial waterbird monitoring in the U.S. seems clear, that of counts being conducted by willing stakeholders each in their own area, using standard methods, operating under common regional guidance, and contributing to a national database. Empowering such self-motivated, locally-based activities should result in nationwide coverage of the most critical populations, the most important sites and areas subject to management intervention. Recent regional partnerships have been encouraging such as that in New England (Lambert *et al.* 2009). At the time of this writing, everything is in place to implement continent-wide monitoring of colonial waterbird populations, should the biological and governmental bird management community choose to do so.

Organization Building

Another result of the 1970s East Coast wading bird colony survey was recognition that there existed a cadre of biologists and their students interested in colonial waterbirds. Not only was there an opportunity to encourage continued engagement in inventory and monitoring but also to better understand the basic biology and ecology of colonial waterbirds, and to encourage their use as study systems.

Participants in the East Coast colony survey gathered at Patuxent Wildlife Research Center in September 1975 to review their work. The participants decided they had an opportunity to assemble a larger group of interested biologists. A working group met at Corkscrew Swamp Sanctuary in Florida in December 1975, and by fall 1976, the National Audubon Society convened a conference on wading birds in Charleston, South Carolina. The Charleston conferees soon expanded their vision from wading birds to colonial waterbirds so as to include such species as terns, gulls, pelicans and cormorants. What emerged from that discussion were the Colonial Waterbird Group and a succession of annual meetings with the presented papers being published in its *Proceedings*. These later evolved into the Colonial Waterbird Society and the journal into *Colonial Waterbirds*,

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and eventually, eventually (occurring during my own presidency) into the Waterbird Society and the journal *Waterbirds*. At about the same time, starting in 1972, biologists working in the seabird colonies and offshore waters of the Pacific Coast were also organizing themselves, into what became the Pacific Seabird Group.

The science questions being asked in organismal biology in the 1980s and into the 1990s tended to be ecological and behavioral: feeding ecology, feeding behavior, food habits, nesting biology, reproductive success and food availability, courtship behavior and energetics. Colonial waterbirds, especially when nesting, lent themselves to such studies. Additionally, it was becoming understood that the relatively crude methods of counting used in the early colony censuses, while adequate for inventory, would not be adequate for long-term monitoring. The inaccuracy of aerial counts, reducing colony disturbance, habituation to disturbance, imprecision, an inability to count most marsh-dwelling species became important research questions. Focus also increased on how colonial waterbirds use wetlands. All of these questions had conservation implications. Over the following few years, research on colonial waterbird and seabird species blossomed. The information flow was such that meaningful summaries and syntheses of colonial waterbird biology became possible (e.g. Sprunt *et al.* 1978; Hancock and Kushlan 1984; Hancock *et al.* 1992; Johnsgard 1993; Nettleship and Duffy 1995; Schreiber and Burger 2002; Kushlan and Hancock 2005; Boere *et al.* 2006), as well as a number of species monographs (e.g. Burger and Gochfeld 1990, 1991; Bildstein 1993; Butler 1997).

As a result, incrementally thoughtful and progressively more complete considerations of colonial waterbird conservation were made possible (e.g. Parnell and Soots 1980; Ogden *et al.* 1980; Kushlan 1983, 1997, 2007; Parnell *et al.* 1988; Nettleship and Duffy 1995; Kushlan and Hafner 2000; Hafner and Kushlan 2002). Science and conservation knowledge also permitted IUCN specialist groups on herons, cormorants, storks and pelicans to emerge to provide international guidance and networking, although most of their focus has been outside of the U.S. (HeronConservation 2012; Pelican Specialist Group 2012; Cormorant Specialist Group 2012; Stork, Ibis, Spoonbill Specialist Group 2012).

In the phenomenal increase in biological knowledge and conservation understanding, the influences of the Waterbird Society and Pacific Seabird Group on colonial waterbird biology and conservation in their over 35 years can hardly be overstated. Through their journals and newsletters, meetings, initiatives and communications, these organizations were the key organizing elements of the advances in colonial waterbird biology and conservation for the last several decades.

NATIONAL CONSERVATION PLANNING ERA: 1990s-2010s

By the late 1980s, bird conservation had been well institutionalized in the United States under the primary authority of the U.S. Fish and Wildlife Service in legally-mandated cooperation with state wildlife agencies and with the engagement of numerous and ever increasing non-government organizations (NGOs). In the lead, as always in North American bird conservation, were organizations in support of the hunted migratory waterfowl. Cooperative waterfowl management in the United States, in fact in North America as a whole, had been required by the Fish and Wildlife Coordination Act. As early as 1948, waterfowl hunt management was organized administratively along four geographically defined migratory flyways, hunting rules for individual states being promulgated within the regional framework. In the 1980s came the initiation of the bi-national (later tri-national) North American Waterfowl Management Plan in 1986 and landscape joint ventures beginning in 1987 (North American Waterfowl Conservation Plan 1998, 2012). The Plan set out goals for waterfowl management; Joint Ventures were to arrange for waterfowl habitat to be protected or created within geographic areas to meet these goals. Buoyed

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by increasing scientific sophistication, waterfowl management was well ensconced in the Federal, state and NGO partnership. Colonial waterbirds benefitted tangentially from traditional waterfowl management, in its emphasis on wetland conservation and acquisition and support for the National Wildlife Refuge System, which traditionally in large part secured waterfowl habitat.

The power of waterfowl conservation both intimidated and inspired those concerned about other birds. In 1990, the Partners in Flight (PIF) initiative arose in response to growing concerns about apparent declines in the populations of migratory landbird species (Rich *et al.* 2004). Also in the 1990s, work began on a conservation plan for shorebirds, the U.S. Shorebird Conservation Plan (Brown *et al.* 2001). This was the relatively well-organized and increasingly effective American bird conservation landscape in the mid to late 1990s. But something was missing from the bird conservation planning matrix: colonial waterbirds.

As Director of Patuxent Wildlife Research Center, I visited our field stations annually. At the station in Vicksburg, Mississippi one winter, I was shown herons all over the place. Going back to the station office, I was shown how Center scientists were working for the local Joint Venture to plot out habitat areas needed for Neotropical migrants and shorebirds in order to overlay these on planning maps for duck habitat. "But," I asked, "What about the herons?" "Well," I was told, "We don't know what they need; they don't have a plan that we need to follow." Clearly all those herons wintering in Mississippi needed to be at the Vicksburg planning table too. A heron plan was needed.

As I went around trying to sell the idea, the heron plan soon evolved into a colonial waterbird plan, then into a colonial waterbird plus seabirds plan (which seem to me to be the same thing), and finally a couple of years later into an all-waterbird minus ducks and shorebird plan. Geographically, the plan started as a U.S. plan, and then after consultation evolved into a tri-national plan, then into a plan for North America including the Caribbean and Central America. The North American Waterbird Conservation Initiative proved improbably successful with over 400 scientists willingly participating in dozens of workshops, meetings and reviews eventually creating the North American Waterbird Conservation Plan (Kushlan *et al.* 2002). Given a primed and receptive audience among Federal and state wildlife managers, colonial waterbirds were, within an amazingly very few years, incorporated into state wildlife plans and state conservation programs, Joint Venture planning, North American Plan funding criteria, and NGO conservation programs. Colonial waterbirds finally had their place at the planning table.

The North American focus of the waterbird conservation planning initiative quickly took on an even broader perspective. The North American Initiative planning process was renamed Waterbird Conservation for the Americas. Recognizing the multinational ranges and migration flyways of many of its species, it immediately adopted a hemispheric approach. Following me and then Katherine Parsons, both from the U.S., leadership of the waterbird conservation initiative were sequentially from Mexico, Panama and Paraguay. Waterbird Conservation for the Americas, now over ten years old, has succeeded in establishing a hemispheric conversation on waterbird conservation, of which colonial waterbirds are a part (Waterbird Conservation for the Americas 2012).

The waterbird planning exercise created an unexpected momentum within the U.S. Prior to the North American Waterbird Conservation Initiative, waterfowl, Neotropical migrants and shorebirds had their planning and implantation bodies, but now so did the other waterbirds. Without our realizing it in advance, this initiative filled a gap in conservation planning among North American bird families (minus the game birds managed by states) and rather overcrowded the planning field. The realization was not long in coming that all this bird conservation planning needed to be better inter-communicated, better coordinated, and from the point of view of the Federal and state agencies,

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better controlled as it was mostly independently self-directed. Discussions among the so called "Initiatives" got underway – actually in a bar in Savannah, Georgia, convened by the U.S. Fish and Wildlife Services' David Smith. It was soon discovered that there was another entity, one with money to share, also thinking that North American bird conservation could be better organized. The North American Free Trade Agreement (NAFTA) had environmental appendices that needed to accomplish something, and one thing NAFTA could do was to help better organize migratory bird conservation tri-nationally.

An interim steering committee gathered at Ducks Unlimited in Memphis to sort things out and write a vision document (Yaich *et al.* 2000). Striking agreements with Canada and Mexico, the North American Bird Conservation Initiative was born (North American Bird Conservation Initiative – U.S. 2012). NABCI-U.S., recognizing that bird conservation in the United States is a partnership among Federal, state and private entities, included all under its tent as relative co-equals. Thus, a huge step was taken in institutionalizing and organizing bird conservation in the United States, in which colonial waterbirds were an integral part.

For historical completeness, it needs to be admitted that there were downsides to colonial waterbirds accommodating to the NABCI (or more correctly the PIF-dominating) collective. Being the latecomer to the bird conservation initiative world meant that waterbirds had to give up some of its own perspective to be on the team. An example is the decision to encourage planning bird conservation (and later implementation) around Bird Conservation Regions (BCRs). These are based on terrestrial biomes quite suitable for organizing landbird conservation but bear nearly no relation to the appropriate geography for colonial waterbird or seabird conservation planning. As of this writing, despite numerous pleadings by Waterbird Conservation for the Americas for over a decade, NABCI-U.S. has yet to add coastal BCRs to accommodate seabird and coastal waterbird conservation. Another example is that in a typically American move, the globally-accepted IUCN Redlist system (IUCN 2012) was deemed inadequate and so colonial waterbird conservation assessment had to be done using a novel American-built system. Despite peer criticism (Beissinger *et al.* 2000), the system did work to demonstrate the high priority of many colonial waterbird and seabird species. But it was not very relevant to a hemispheric approach to waterbird conservation that needed to incorporate dozens of countries, all of which accepted international norms. And finally there was a necessity to pretend to estimate population size and habitat goals because that is what the waterfowl and Joint Venture planners did and required, despite the fact that waterbird biologists admit that there are not adequate inventory data to estimate populations, nor national monitoring data to determine their change, or any general extrapolateable relationship between habitat area and desired population sizes. But what did happen in making these compromises is that waterbirds, including colonial waterbirds, were melded into larger conservation initiatives, much to their benefit. Waterbirds, including colonial waterbirds, are on the all-bird conservation team in the United States.

NABCI-U.S., as a coalition of government agencies, private organizations, and independent bird initiatives, has proven a potent force in advancing bird conservation in the United States. It is led and enabled by the U.S. Fish and Wildlife Service, which retains primary responsibility for colonial waterbird conservation. Service leadership, particularly that of Paul R. Schmidt, enabled NABCI-U.S. to happen and for colonial waterbirds to be part. The NABCI concept has evolved to embrace the approach of integrated bird conservation, which aims to conserve all birds in all habitats simultaneously. This is highly beneficial for colonial waterbirds, whose conservation must, in large part, be about habitat conservation, both preservation of areal extent and management of water to produce appropriate nesting and feeding conditions. Management of wetlands and other aquatic systems for integrated bird conservation, so long as the needs of

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colonial waterbirds are recognized, can only be of benefit to colonial waterbirds.

THE PRESENT AND NEAR FUTURE: 2012

Much has changed since I last reviewed the status of colonial waterbird conservation in the U.S. (Kushlan 1997), but much has stayed the same and certainly perspectives have evolved. Unlike much of the world, in the United States' existing national and state laws, governmental rules and policies, citizen support and enforcement seem, overall, to be adequate to the task of colonial waterbird conservation nationwide. Perhaps the greatest governmental threat is at the local level, where immediate economic gain and the political power of personal self-interests often trump conservation, and decisions bad for colonial waterbirds are being made daily.

The importance of advances in biological knowledge over the past several decades is fundamental to present conservation opportunities. We now have a tremendous background of basic biological and ecological knowledge of the species and their habitats to guide conservation planning and action (cited earlier). In few other countries outside of Europe has the biological basis for colonial waterbird conservation achieved such an advanced state.

We also know our resource, perhaps better than any other large country; we know what colonial waterbird species we have (although more vagrants arrive all the time and there may be some cryptic species in our midst); and we even know how to divide the species into populations of conservation concern (Kushlan *et al.* 2002; Waterbird Conservation for the Americas 2012). Conservation assessments, using several methodologies, have been completed providing understanding of the relative degree of threat the various species face (Kushlan *et al.* 2002). It turns out that one of the most critically threatened groups among all North American birds is the seabirds (North American Bird Conservation Initiative – U.S. Committee 2009, 2010). We know more or less where the major colonial waterbird colony sites are, which species nests where, which colony sites are the largest and therefore most impactful, and to some extent which feeding areas are most important to nesting and wintering birds. The most critical sites for colonial waterbird conservation have been identified as Important Bird Areas (National Audubon Society 2012) and many are safely ensconced in parks and other protected areas. Within sites, we now know how to manage for colonial waterbirds with respect to predators, exotic plants and animals, trespass and visitation, vegetation succession and more (Hafner 2000; Kushlan *et al.* 2002; Mulder *et al.* 2011). And we now know quite a bit about managing wetlands for colonial waterbirds (Frederick and Spalding 1994; Kushlan 2000). Importantly, we know that is it is possible to protect and manage nesting and feeding sites of colonial waterbirds within the context of broader management goals for a site, thus making colonial waterbird conservation a part of larger conservation actions. We know how to count and monitor in ways that show local trends and can scale up to show regional trends as well, although this is seldom actually being done appropriately (Steinkamp *et al.* 2003; U.S. North American Bird Conservation Initiative Monitoring Subcommittee 2007; Kushlan 2011b). Management of birds considered by some to be 'nuisances' remains an issue poorly resolved with respect to conserving regional populations, even though methodologies exist (Marion 2000; Cowx 2003); unfortunately the anti-informational biases of resource user groups continue to hold the political balance in the U.S.

So what now might be needed going forward? I'd like to be specific in recommending a set of colonial waterbird conservation goals.

1. Adopt international protocols. This means evaluating conservation risk of U.S. species through the IUCN Redlist criteria. Risk should be assessed at several scales — global, national, and state, so that the relative responsibilities for population conservation are clear. Continue to identify Important Bird Areas for colonial waterbird using BirdLife criteria. Analyses should continue to be assessed at several scales—global, national

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and state, so that the relative responsibilities for site protection are clear. As importantly, progress needs to continue at all three scales in creating support networks for site conservation stakeholders. Also globally, specialists in the United States need to participate in population size assessments and contribute these data to the Wetlands International Waterbird Population Status database, which feeds into the Ramsar convention site assessments, Unfortunately, United States biologists are not very well involved in the process, which is held in great respect globally. Assure conservation attention is focused on sites recognized as globally and regionally Important Bird Areas and Wetlands of International Importance, not only for their own sake but to model U.S. embracing of these designations for the world conservation community.

2. Treat colonial waterbird conservation as a hemispheric matter. Range-wide conservation approaches are the most efficient way to marshal conservation resources where they are needed most. For example, colonial waterbirds birds with transCaribbean ranges, Reddish Egrets and the white form of the Great Blue Heron are among the more threatened. Actual migration patterns and winter grounds for North American colonial waterbirds remain poorly known (Mikuska *et al.* 1988), requiring rangewide migration studies. Continued participation and development of the Waterbird Conservation for the Americas initiative engages hemispheric stakeholders in the conservation of United States nesting colonial waterbirds.

3. Nationally, it remains imperative to continue engagement of colonial waterbirds with the North American Bird Conservation Initiative – U.S., so that their needs can continue to be recognized in national-scale planning, evaluation, funding, monitoring and management. Habitat Joint Ventures, within their traditional focus on wetlands, continue to hold exceptional potential to deliver colonial waterbird habitat conservation – assuring colonial waterbirds' continued presence at the planning table in Vicksburg and other Joint Venture headquarters. Participation is needed so that advocates can be assured that colonial waterbirds retain an appropriate legal and institutional environment for their conservation, including their place in integrated bird conservation. Both within and outside the NABCI umbrella, Federal funding, continued agency commitment and continued NGO engagement have to be monitored and encouraged by stakeholders in colonial waterbird conservation. Waterbird Conservation for the Americas, Waterbird Society, Pacific Seabird Group, National Audubon Society and American Bird Conservancy are institutionally positioned to shoulder much of this national responsibility in the years ahead.

4. Standardize collection of monitoring data. Also at the national scale, there remains to be achieved the seemingly Quixotic goal of widespread acceptance of nationwide standards for monitoring and of securing Federal funding for an interactive nationwide database for colony census information. It seems, after decades of attempts, dialogue, debate and explication of required standards, that some broad level of acceptance might actually be possible. This can be achieved rather rapidly through a combination of voluntary acceptance by those taking on the tasks of monitoring and insistence within funding and management agencies that such standards be followed within their own programs, or those they fund. Whether through government, citizen science, or some combination, a persistent program that captures monitoring data and makes them accessible remains a requirement for population estimation, monitoring trends and evaluating effects of conservation actions.

5. Assure states conserve colonial waterbirds. All states, at Federal insistence, enabled by the North American Waterbird Plan Initiative, have inserted colonial waterbirds into their wildlife conservation planning. The opportunity now is to influence the actual implementation of conservation action in all states including periodic monitoring, database management, colony site identification and protection, population estimation, and feeding site conservation and management. In each state, it is up to

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the colonial waterbird stakeholders to assure that the state agencies engage and continue to support colonial waterbird conservation, long term.

6. Better organize colonial waterbird conservation regionally. After a couple of decades of solidifying colonial waterbird conservation at the national and state levels, the time has come to develop planning—regionally. In the past decades of effort, we have discovered that the country is too big and states and Bird Conservation Regions are for the most part too small and inappropriately configured to plan and organize colonial waterbird conservation. In most areas, regional approaches would be multi-state although in some, such as the Everglades, ecosystem and management cohesiveness may dictate smaller units be used. The North American Waterbird Conservation Plan identified appropriate regions through a widespread participatory process, which provides a starting point for self-organization. Models such as in New England and the Great Lakes are developing. Although self-organization is required, institutional leadership is as well. Some entity with clout needs to take the lead.

Regional organization can encourage and empower volunteer networks, facilitate communication, provide tools and training, maintain linkages among site guardians, secure dedicated funding, achieve agreement on monitoring methods, assure data collection and archiving, facilitate local site protection and management and encourage local outreach. With modern communication tools, this is all entirely possible without much additional cost, provided respected entities take the lead in organizing and encouraging each regional partnership.

7. Support local conservation action. All conservation is local. Fortunately, most important sites for colonial waterbirds in the United States are nominally protected on refuges, parks, and other public lands or lands owned by conservation organizations. Others do remain on private property, which have various degrees of risk. By far the best approach is for a formal sponsor to take responsibility for each colony site or important feeding and roosting site. Sponsors may be governmental agencies, organizations or private volunteers, the important aspect being formal acceptance of responsibility and empowerment for action by appropriate agencies. Such "adopt a colony programs" coordinated regionally would allow identifiable parties to claim responsibility for specific sites.

8. Create local colonial waterbird working groups. In the U.S., local environmental concerns tend to be expressed through a varying collection of organizations and individuals. This too is what is needed to conserve colonial waterbirds locally, encouraging local constituencies to engage themselves in conservation of colonial waterbirds and sites important to them, or in the local environmental issues that affect the birds. Locally self-organization and intercommunication among stakeholders are keys to effectively marshaling available resources, avoiding redundancy, and assuring coverage of important issues. Local colonial waterbird working groups, informally organized but communicating regularly, can make this happen.

9. Imbed colonial waterbird conservation in large-scale conservation programs. Colonial waterbird conservation is most securely and economically achieved when it is a contributory part of more encompassing conservation programs. Opportunities are near endless. Examples include: international conservation programs (e.g. Redlist assessments, IBAs, Waterbird Population Estimates, Ramsar site management), national bird conservation and bird habitat programs and initiatives (e.g. NABCI-U.S., Federal agency programs such as management of migratory birds, forests, parks and refuges, Joint Ventures, national NGO programs), fisheries management and marine conservation programs (National Plan of Action, endangered species management, marine conservation areas), agricultural programs (Farm Bill, National Resource Conservation Service and U.S. Fish and Wildlife Service private landowner programs), state wildlife plans and operational programs, regional landscape conservation planning, and lo-

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cal conservation planning and activities. By acknowledging that there is not enough time, people, money, institutional capacity, or institutional commitment to address specifically the management needs of every colonial waterbird species, imbedding their conservation priorities within larger scale programs can be both efficient and effective. The charge to colonial waterbird conservationists is to be sure that the needs of colonial waterbirds are at the planning tables, in the management plans and part of resource management actions. The overarching goal is the full integration of conservation and management of local sites for waterbirds with large-scale landscape and consumptive use programs, coordinated at a regional scale.

With a significant history to learn from and extensive scientific knowledge now available, such is entirely possible.

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