

Published by:

 Canadaway Press
Fredonia, New York 14063
www.canadawaypress.com

© 2018 by Alberto Rey
All Rights Reserved

www.extinctbirdsproject.com

Essays, illustrations, and paintings: Alberto Rey unless otherwise noted

Photography unless otherwise noted: Diego and Alberto Rey unless otherwise noted

Photographs of paintings: IMG_INK, Buffalo, New York

Copyediting: Natalie Gerber

Proofreading: Janeil Rey

Book Design and Typesetting: Jason Dilworth

Sponsoring venues:

Roger Tory Peterson Institute of Natural History in Jamestown, New York

Benjaman Contemporary in Buffalo, New York

Printed in the United States of America

SHAPCO PRINTING, Inc. 1109 Zane Ave

North Minneapolis, MN 55422

ISBN 978-0-9979644-1-7

GRATITUDE

The Extinct Birds Project which includes this book, its accompanying exhibition and website (www.extinctbirdsproject.com) took around three years to come together and throughout that period there have been several individuals whose support was important to the project's success. These individuals included but are not limited to Lauren and Dave Benson, Holly Cumberland, Jason Dilworth, Michele and Jeffrey Goldfarb, Jane Johnson, Kate Keldridge, Twan Leenders, Stephanie Lewthwaite, Doug Manly, Diego Rey, Janeil Rey, Zach Schneider, Jim Sutton, Jeremiah Trimble, Emily Tucker, Dana Tyrrell, and Megan Urban. I would also like to thank my family for their patience and understanding which provided solace through this and past projects.

“In the end we will conserve only what we love; we will love only what we understand; and we will understand only what we are taught.”

Baba Dioum, a Senegalese forestry engineer, made this statement during his presentation at the General Assembly meeting of the International Union for Conservation of Nature (IUCN), New Delhi, India, 1968.





iv

EXTINCT BIRDS PROJECT

Black Mamo . . . . .	.26
Bachman's Warbler . . . . .	.38
Alaotra Grebe . . . . .	.45
Atitlán Grebe . . . . .	.53
Laughing Owl . . . . .	.60
Kaua'i 'O'o. . . . .	.70
Santa Barbara Song Sparrow . . . . .	.78
Ivory-billed Woodpecker . . . . .	.87
Imperial Woodpecker . . . . .	.96
Eskimo Curlew	105
Labrador Duck	112
Pink-headed Duck.	119
Glaucous Macaw	128
Paradise Parrot.	135
Passenger Pigeon	145
Carolina Parakeet	155
Dusky Seaside Sparrow.	166

Introduction by Twan Leenders . . . . .	.ix
Beginning of the Extinct Birds Project . . . . .	.1
Evolution of the Paintings . . . . .	.4
Politics Of Extinction . . . . .	.9
Collecting.	15

← Birds

Conclusion by Stephanie Lewthwaite.	172
Contributors' Biographies	181
Timeline	182
Research	189

Ornithology Archives, Museum of Comparative Zoology, Harvard University





Ornithology Archives, Museum of Comparative Zoology, Harvard University

Introduction vii

“Birds have wings; they’re free; they can fly where they want, when they want.”

“Birds... are sensitive indicators of the environment, a sort of ‘ecological litmus paper.’ The observation and recording of bird populations over time leads inevitably to environmental awareness and can signal impending changes.”

“The truth of the matter is, the birds could very well live without us, but many—perhaps all—of us would find life incomplete, indeed almost intolerable without the birds.”

- Roger Tory Peterson (1908-1996)

INTRODUCTION

Today is May 3, 2018. As I write this introduction, eight famished Rose-breasted Grosbeaks are raiding the bird feeders outside my window, replenishing their energy reserves after a long, challenging journey to their summer breeding grounds. They're back! After months of snow, cold, and relative lifelessness, the Grosbeaks' striking black, white, and rose-colored plumage brings a much longed for splash of color to the yard. Warblers, orioles, flycatchers, and a variety of other birds flit through the tree-tops, filling the early morning soundscape with their song. Today marks the day that the migratory bird floodgates have been opened and all these tropical jewels return from their exotic homes, having sometimes traveled thousands of miles to reach my yard.

Birds brighten our days with their colors and song, but there's something more visceral to the pleasure they bring. Maybe, in part, it is the excitement of reuniting with long-lost friends? Or the reliable confirmation they provide that spring, and life, is returning to our surroundings? Certainly, for those in the know, there is awe that something as small and delicate as, say, a Ruby-throated Hummingbird, whose males weigh as much as a penny, can simply fly here from Central America on its own strength. Or maybe there is the subconscious understanding that by having these birds return, we're privy to something ancient, something much bigger than anything we think is important in our lives; a ritual that has been going on since the days long before our yards, parks, cities, and even we existed in the landscape.

Roger Tory Peterson (1908-1996) was one of the great naturalists, artists, educators, and conservationists of the 20th century. Born, raised, and inspired in Jamestown, NY, he followed his childhood curiosity as he explored his hometown's parks and open spaces, as well as the surrounding fields and woods, to look for birds, moths, wildflowers, and anything else natural that sparked his interest. Using his impressive artistic skills and keen powers of observation, this self-taught youngster started documenting the natural world in his backyard, and all the fascinating creatures that inhabited it. In spite of growing up eventually, Roger never lost his child-like fascination with all things living, and he never stopped looking for plants and animals wherever he went.

Roger Tory Peterson combined all his skills into his 1934 book *A Field Guide to the Birds*, the very first modern-day field guide. Today, an updated version of this book is still in print. Over time, it has introduced millions of readers to the diversity of birds in their backyards. Encouraged by the success of his bird book, publisher Houghton Mifflin Harcourt started the Peterson Field Guide Series, with Roger at the helm as editor-in-chief; the series includes dozens of titles on just about any natural topic possible, becoming the go-to resource for nature study for generations. Roger Tory Peterson's work enabled everyday folks to become educated about nature in a time when the study of biology and natural history was entirely the domain of academics at universities and museums, and he is credited with being one of the most influential environmental educators of the 20th century.

I listed three quotes by Roger Tory Peterson at the top of this piece that I think are critical to our relation with birds, and also to this Extinct Bird Project. They are certainly instrumental in how I approach my work as a biologist, primarily focused on conservation of threatened animals and their habitats. Allow me to elaborate on each, to provide some context to this project...

“Birds have wings; they’re free; they can fly where they want, when they want.”

On an emotional level, this quote often strikes a chord with people because this ability to fly symbolizes a kind of freedom that humans don’t possess and many of us desire. On a biological level, this statement seems more like stating the obvious, because of course they do! Without getting into the mechanical marvel of it all, there is one important point that I would like to make, and that is that birds do fly where they want. Apart from periods of migration where birds can be in transit and show up in unusual places, birds generally tend to spend time only in areas where the necessary living conditions, food resources, and other factors critical to their survival are present. Unlike most other animals, birds have the ability to flap their wings and leave, so finding certain birds in certain habitats tells us something about the quality and availability of the natural resources present there. The more we know about the needs these birds have, the more that can tell us about the quality of the habitats that they choose. For conservation biologists like me, birds are excellent barometers of environmental quality – biological indicators, if you will. For example, watching a warbler successfully fledge a nest of young in an area tells me that there are sufficient numbers of insects available within a relatively short distance from its nest, without ever needing to count the bugs that live there.

x Extinct Birds Project

“Birds ... are sensitive indicators of the environment, a sort of “ecological litmus paper. The observation and recording of bird populations over time leads inevitably to environmental awareness and can signal impending changes.”

Watching birds is a wonderful way to connect with nature, and knowing that birds are sensitive indicators of environmental health is important, but it is arguably even more important to record the status of local birds’ populations. In most cases, there is not enough known about the size and health of local bird populations to adequately assess whether their numbers are stable, increasing, or declining. More often than not, it is not until populations are declining to the point of nearly disappearing before we notice that something may be amiss. At which point, it may very well be too late to interfere, no matter how well-intentioned or well-funded our efforts may be.

To some degree, research and museum collections of birds are critical to our understanding of bird populations and the changes they have undergone. Study skins and other historical bird collections give us a unique glance at birds of the past, and provide in essence a virtual time capsule of species that inhabited a place and a time. Museum specimens not only show us what now-extinct species looked like, they also confirm historical presence, they document physical attributes of species that may have changed over time, or they can exhibit signs of environmental contaminants or other factors that may have impacted them in the past. Museum specimens are priceless research assets that can help move a study’s baseline back in time to gauge environmental changes against the now, rather than having to start a study now in hopes of seeing an impact in the future.



A good example of the value of studying historic bird skins to garner answers to contemporary, on-going environmental challenges can be seen in a recent study by Shane DuBay and Carl Fuldner (2017). Bird specimens track 135 years of atmospheric black carbon and environmental policy. Proceedings of the National Academy of Sciences. 14 (43) 11321-11326, who were able to document the changes in black carbon emissions in the rustbelt over the past 135 years by comparing more than 1,300 preserved bird study skins from natural history museum collections. Atmospheric soot levels as a result of incomplete combustion of coal peaked in the late 19th century and caused economic and health problems, while clouding cities in the Manufacturing Belt in thick coal smoke. Early efforts to mitigate these unsightly and unhealthy conditions helped lay the ground work for the modern day conservation movement. In recent times, black carbon pollution has been identified as a contributor to anthropogenic climate change, and understanding the effect of these historic emissions on temperature changes in the region can help with the development of future climate models. Emissions data is virtually non-existent pre-1950s, but the authors of this study were able to reconstruct atmospheric black carbon levels dating back to 1880, based on soot accumulations on the feathers of birds collected throughout the 135-year study period. A photograph of bird skins utilized in this study shows an example of a Field Sparrow collected in 1906 - during the time of peak black carbon emission; It looks to be nearly uniform sooty gray, rather than the pale grays, browns and reds that define this species now.

Roger Tory Peterson's plea to study and document bird populations obviously is meant to encourage people to engage in the serious study of natural history. However, I would urge anyone interested enough to do so, to not forget about the priceless collections that our natural history museums curate and protect.

I have worked in natural history museum collections for more than 20 years, and am a Curatorial Affiliate at Yale University's Peabody Museum of Natural History because of my contributions to collection-based research. During these past decades I have participated in many expeditions and collecting trips to generate additional specimens for such collections. As a conservation biologist, and a human being, it always pains me to collect living, breathing organisms for science, but I also know that natural history collections are incredibly valuable resources that hold critical information for our future, as well as for the future of the animals and plants that are present in collections. Without the historical perspective and baseline they present, we would be heading into the future blindfolded. In the aggregate, these collections allow us to retroactively find answers to questions that may sometimes be more than a century in the making. Questions that we may not have ever anticipated we would need to ask ourselves. As long as we have well-curated, well-maintained natural history collections we may be able to find answers to such questions. In a sense, all preserved specimens in a museum collection are ambassadors for their respective species, as well as repositories of all sorts of critical information about that species at a given place and time.

In the case of the preserved bird skins in the Roger Tory Peterson Institute of Natural History's collections, those are all ambassadors on a much higher level still. The individuals included in this Extinct Bird Project came from Dr. Peterson's personal reference collection. This extensive collection of primarily North American birds was assembled by commercial collectors, prior to when the implementation of the Migratory Bird Treaty Act and Lacey Act made it illegal to shoot birds for pleasure or for commercial purposes. Peterson used these bird specimens, mostly collected in the late 1800s, well before he was born, as his models to create scientifically accurate illustrations of all North American birds for his field guides. Peterson's first



Field Guide to the Birds, released in 1934, was revolutionary. For the first time ever, there was an accessible tool for anyone to use; a tool that allowed non-academics and non-museum folks to study natural history and understand better the natural world in their backyards. Peterson's field guide was such a success that a regularly updated version of his 1934 book is still in print now; the amazing bird art, based on his reference collection of study skins and his own personal observations, photographs and film, have since inspired millions of people, educating them on the lives and plights of birds, and making them better stewards of our environment.

Study skins and other preserved museum specimens of course serve as reminders of the species we've lost; they prove tangible reminders of animals and plants that would have been long lost in time if not for these last remaining ambassadors. But they are so much more.

“The truth of the matter is, the birds could very well live without us, but many — perhaps all — of us would find life incomplete, indeed almost intolerable without the birds.”

Alberto Rey's hauntingly gorgeous paintings and fascinating narratives provide a powerful intellectual and emotional connection to these once-living and breathing creatures; each in their own right a thread of a story that in the aggregate spells out the history of life. Life on Earth has clearly gone on without the birds featured here in it, but it lost some of its richness, some of its complexity, some of its value. Through this project, Alberto exposes a critical part of our natural world that usually remains unseen by most people – because it is no longer visible - and he gives the silent ambassadors of these gaps in nature a powerful voice again.

Only armed with a sense of stewardship that comes from understanding and compassion will we ever mourn the loss of species and realize that life is incomplete. Inversely, without such awareness, we will never realize what is missing, nor care. Roger Tory Peterson is gone, and several of the birds featured in this project were lost during his lifetime, in spite of his efforts to educate the world. However, I am a firm believer that many more people feel, as he did, that “life is incomplete and almost intolerable without the birds.” This project shows how Alberto Rey is one of those people - someone who is applying all his artistically expressive talent and dedication to fill a niche left by Roger Tory Peterson, as a vocal advocate for life on Earth. Watching this project come alive, so to speak, has filled me with intense joy. Alberto's work effortlessly combines stories of loss with messages of hope, examples of failure to do the right thing with stories of love and dedication, all in a perfect reflection of the non-linear nature of life. Above all, I think that his work conveys clearly that environmental awareness needs to be everyone's responsibility if we want our natural world to remain complete. Let's all heed the critically important messages that these silent ambassadors carry through Alberto's art and writing, and celebrate their life over their death.

Twan Leenders
President, Roger Tory Peterson Institute of Natural History
Jamestown, NY



Roger Tory Peterson Institute of Natural History, Jamestown, NY

THE BEGINNING OF THE EXTINCT BIRDS PROJECT

On the morning of June 30, 2015, Jane Johnson, the Director of Exhibits & Special Collections at the Roger Tory Peterson Institute of Natural History, in Jamestown, New York, began her tour of the museum's archive. The tour was part of Children in the Stream: An Interdisciplinary Fly Fishing Conference, which explored ways to integrate fly fishing into school curriculums and communities. I had been to the museum countless times but had been to the archive only once before, so it was a thrill to explore the tools and research materials used by the conservationist and artist Roger Tory Peterson.

After walking into one of the museum's climate-controlled rooms, Ms. Johnson started pulling out long, deep drawers from a metal cabinet. Inside each drawer were rows of carefully arranged bodies of deceased birds. Everyone in the group took time to carefully examine the skins (i.e., preserved bodies). Then, just as we were about to leave, Ms. Johnson mentioned that the Institute also had a few specimens of extinct birds. While I had seen the birds we had just viewed in the drawers on a prior occasion,

I'd had no idea that there were any extinct birds in the collection. I thought the extinct birds were too rare to be in this collection, and I had also thought that most of the extinct birds had died long before Roger Tory Peterson's lifetime (1908-1996). But, apparently, Mr. Peterson had acquired some of the centuries-old specimens from other collections.

As Ms. Johnson pulled out a metal drawer, I was unprepared for what I was about to experience. On the clean white sheet of paper that covered the inside of the drawer were the bodies of seven extinct birds as well as another dozen or so threatened species. I was transfixed by these skins. I sensed a tremendous sense of sadness and finality, as I carefully looked at the last specimens of each species. A flood of questions raced through my mind: How did these skins get here? How did the Institute acquire the birds? I guess I was glad the specimens were collected, so I could experience this, but should they have been collected if the species became extinct? Where was each bird collected? What was its life





Jane Johnson and Alberto Rey photographing specimens at the Roger Tory Peterson Institute of Natural History, Jamestown, NY

like? Who collected the birds and how? What were the collectors thinking as they acquired the birds? What were the collectors' lives like? Had the birds' bodies been gutted and filled with cotton? How was that done? Why was I not as moved by the other birds in the other drawers?

While I have become more emotional as I have grown older and have become more sensitized to my environment, I did not expect to be moved as deeply as I was by the small, lifeless, feathered bodies. I was almost in tears, as I bent over to look carefully at each specimen. Each skin had its feet tied together with string or wire, and although the feathers looked remarkably well-preserved, some were ruffled, out of place, and faded. Cotton was also filling in the cavity where one would expect to find eyes. The tied feet and cotton were particularly disturbing because they made clear how much each body had been violated in the interest of preservation. Even though I understood that it was precisely because these skins had been so carefully preserved that I was able to experience what remained of each species, the experience was nonetheless disheartening. These skins seemed to be a perfect metaphor for, and reflection of, the brutality that led to each species' elimination. These birds, which had been killed, gutted, stuffed, and laid out in a metal drawer, were a better reflection of their species' story than were the specimens that had been carefully mounted with glass eyes and perched on a branch. Those specimens were creating an aesthetic yet anesthetized depiction of the birds' lives and contributed to the inaccurate impression that the species remained alive somewhere.

THE EVOLUTION OF THE PAINTINGS IN THE EXTINCT BIRDS PROJECT

From that moment when I saw the extinct birds' bodies laid out in a row, I tried to analyze why I was so moved. I asked myself how I could create a body of work that would both capture the emotions I felt and answer some of the questions that went through my mind that afternoon at the museum. It would take me two years to start this series of paintings, mostly because I was working at the time on another project, one set in Nepal. It was that project and that book, about a river in Kathmandu, that helped shape how I now research and write about complicated issues and complicated lives. That publication also changed how I and Jason Dilworth, the book's designer and a colleague of mine, envision the role of a publication as an aesthetic object that can also transmit complicated content.

These two years gave me the opportunity to carefully plan how the paintings would be exhibited, to research how to construct each panel, and to calculate the size and format for each painting. At first, I intended to present the birds in a vertical format; each would be painted from an aerial view looking down at the skins. After realizing, however, that in the larger paintings, the head of each bird would be too distant from the viewer in a gallery, I decided to change the format to a horizontal composition and to use a profile view of each bird. This way, the viewer would look into the eyes of the birds or, in this case, at the cotton that had replaced the eyes. The viewer's ability to investigate the bodies more closely would also provide each viewer with a stronger connection to each specimen. This connection was important because it would encourage the viewer to examine the informational plaque accompanying

the painting. In this publication, the horizontal format would, hopefully, have the same effect, engaging the reader to delve further into the issues related to each specimen. This change in format, however, meant that I would need to return to the Roger Tory Peterson Institute of Natural History to re-photograph the specimens.

Those two years also gave me the opportunity to consider increasing the breadth of the species that would be investigated for inclusion in both the painting series and in the book. With the assistance of Dr. Twan Leenders, the president and executive director of the Roger Tory Peterson Institute, I was able to contact Dr. Jeremiah Trimble, the curatorial associate and collection manager in the Ornithology Department at the Museum of Comparative Zoology at Harvard University. Through the efforts of Dr. Trimble and of the curatorial assistant, Dr. Kate Keldridge, over two dozen extinct bird skins, eggs, and nests were made available for my son, Diego, and me to photograph. Other museums were also contacted and their collections considered, but, ultimately, we decided to limit our investigation to the eighteen bird specimens, which represent seventeen extinct species. In making these decisions, we took into account a number of factors, including the range of global locations, reasons for the species' extinction, the range in popularity of different species, and contrasts in size among the different species.

The painting series began in May 2017 and was finished seven months later, in November of the same year. Each painting was a devotional and emotional patronage to each specimen. I tried to

remember the emotions I experienced during my initial viewing of the extinct birds' skins, and I tried to incorporate those feelings through brushwork, accuracy of information and proportion, controlled lighting, composition, and background color. It was also important to make the birds iconic in size and in importance. For these reasons, in each painting, each bird was magnified 2.61 times. I also included an object in each painting so that there would be a consistent sense of size and scale across the series. A burnt match was selected, both for its common nature and for its resonance as a metaphor for the finality of each species' fate; to preserve scale, each match was also magnified 2.61 times. The matches and matchboxes made for the exhibition served several purposes: during the exhibition, the audience could make use of these objects; afterwards, the audience could take the objects with them as souvenirs of their experience and as reminders of the content.

The research for the series and publication began in 2015, with some of the writing taking place in 2016, but most of the essays and the illustrations for the book were completed later, from 2017 to early 2018. The essays were sent for proofreading to Natalie Gerber, a colleague in the Department of English, in early 2018. Jason Dilworth, a colleague and a collaborator on the environmental art project in Nepal, began designing the book in early 2018. The matchbook was designed by Megan Urban, another colleague and an envi-



ronmentally conscious graphic designer. The book was finished and sent to the publisher in late June 2018.



Panels being built for the Extinct Birds Series paintings





Ornithology Archives, Museum of Comparative Zoology, Harvard University





Ornithology Archives, Museum of Comparative Zoology, Harvard University

POLITICS OF EXTINCTION

One would think that classifying a species as extinct would be a simple matter, but whenever decisions have financial repercussions, everything becomes complicated. As long as a species remains “endangered,” there is often financial and legal support for the protection of the species and of its habitat. If a species is classified as “extinct,” all support for the species and its habitat is usually terminated. Such decisions have repercussions for other species as well, since the protection of an endangered species’ habitat results in the protection of that habitat for all other species sharing the same environment. Thus, a species is often not classified as extinct unless every possible habitat that the species could survive in its extended region has been explored and every possible sighting has been investigated. Funding for these investigations is not always available, and expeditions to specific areas might be very difficult due either to the terrain, or to political or territorial unrest, or to both. As another precaution, a species cannot be categorized as “extinct” until a specific number of years or decades has passed since the last confirmed sighting. The number of years required depends on a number of factors, including the results of prior search expeditions, the credibility of the prior sightings, and the mathematical models used to calculate the probability of the species’ survival. The final determination is the result of a very complicated process. Consequently, many species can remain in the “endangered” category for decades, even though most scientists might believe that a specific species is extinct. The species selected for this

publication were considered to be either extinct or most likely extinct by the experts at the institutions where the specimens were documented.

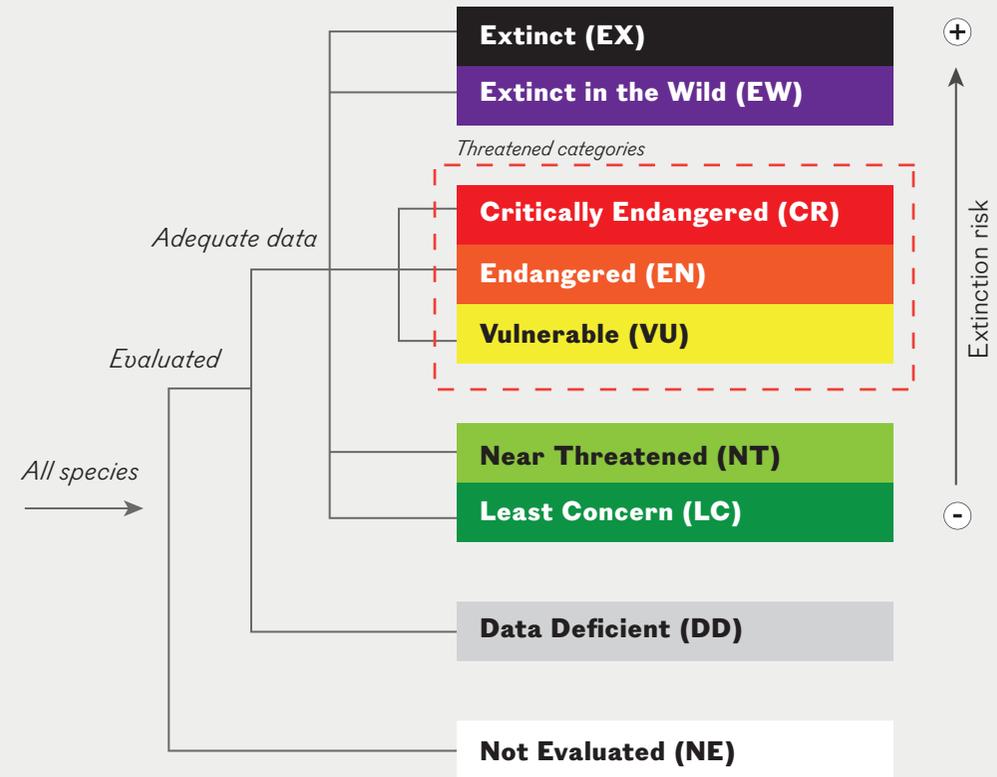
To further complicate matters, there is also a lack of equality regarding the support that each endangered species receives from conservation organizations, governments, and policies. The more charismatic species, as well as the larger mammals and fish, usually receive the bulk of financial support. The rationale behind the inequity in support is that the more popular species are more likely to secure support for their habitats, which also in turn benefits other species. Support for popular species also helps secure funding for conservation organizations’ efforts, which can result in increased research funding, increased ecotourism, and increased support for policies that also help protect other less popular species. The reality is that there is never enough support to protect all endangered species, and therefore the less attractive species, like insects and rarely seen species, go extinct without much support or attention. Since each species is important to the balance of an ecosystem, its loss is often noticed only after the effects have rippled through an environment, and by then it is too late.

Most of the birds’ extinctions discussed in this publication occurred in the mid-1700s through the 1800s. Before this period, the abundance of most species warranted little concern for restraining collection practices or hunting. Theories in conservation practices were just starting to be developed during this period in the mid- to late-nineteenth century. It was only after the most abundant and

well-known species went extinct due to mankind's thoughtless actions that the public and policymakers realized the need for laws and conservation practices to protect other species. Change was slow in coming, and, when it did arrive, it was often too late for many species. Support for the protection of species has never come easily. There remains to this day inconsistent financial and political support for their conservation, even though laws have been written to protect endangered species and their habitats. Over the years, these laws have been amended periodically to reflect the will of the political leaders in power. As has been the case for well over a century, there still remains as wide a gap between facts and values as between science and policy.

Several organizations in countries around the world have continued to lobby policymakers, private companies, and individuals for support of conservation efforts. However, there is really only one global organization established specifically to monitor species' numbers and threats to their existence. The (IUCN) International Union for Conservation of Nature is, arguably, the most respected and most frequently consulted organization used by international governments to create their own conservation policies. Like many other countries, the United States has its own organizations and policies to protect its endangered species. The Endangered Species Act, which is monitored by the U.S. Fish and Wildlife Service, is the main federal conservation and government policy to monitor and protect the country's threatened species. While the IUCN and the U.S. Fish and Wildlife Service are far from perfect, their positive work in protecting endangered species has far outweighed any controversies that have occurred in the past.

IUCN Structure of the categories



IUCN (International Union for Conservation of Nature)

The International Union for Conservation of Nature is the oldest and largest international conservation organization. It was started in 1948 when it was known as the International Union for the Protection of Nature. Later, it became known as the World Conservation Union. It was originally created by UNESCO (United Nations Educational, Scientific, and Cultural Organization) to promote international cooperation in gathering scientific information toward the protection of nature. It is an organization that collects and distributes data rather than implementing conservation plans.

The IUCN is perhaps best known for its Red List (The Red List of Threatened Species). This list, which is a classification of species by extinction risk, is used by many countries for many different purposes. Countries that have not devised their own method for classifying their threatened species use the list. Countries that have created their own endangered lists use the Red List to compare data. Many countries also consult the IUCN and its Red List when they create conservation plans and determine funding allocations. Consequently, the IUCN has become a very powerful and useful organization, although there have been some controversies regarding the transparency of its decision-making process in classifying species for the Red List.

The heart of the IUCN database is the Species Survival Commission (SSC), which consists of a network of 7,500 volunteer experts and scientists from around the world. The SSC provides a complex set of data on the conservation of biodiversity, the value and role of species in ecosystems, and the threats to 20,000 species that have been classified as threatened. The IUCN's mission is to support "a just world that values and conserves nature through positive action to reduce the loss of diversity of life on earth."

Endangered Species Act

Extinct



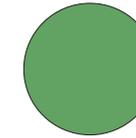
Endangered



Threatened



Delisted



The Endangered Species Act (ESA) was signed into law in 1973 by President Richard Nixon. It was signed during a national movement to improve the country's environment and followed the signing of the Clean Air and Clean Water Acts. The ESA requires the federal government to work with other countries, states, government agencies, and landowners to protect species facing extinction as well as their habitats. The Act provides the U.S. Fish and Wildlife Service (USFWS) with the responsibility and power to classify and protect the almost 1,400 species listed in the Act. However, the USFWS has never been appropriately financed and its budget fluctuates dramatically depending upon the president and the political party in power. By limiting financial and legislative support, the opponents of the ESA have been very effective in curtailing the efforts in monitoring and protecting endangered species and their habitats.

The structure of ESA policy has also met with some resistance from parties on both sides of the conservation issue. As one would expect with most policies, the ESA is found by one side to not go far

enough, while the other side finds it to be too burdensome. Here are a few of the concerns with the ESA:

- Adding a species to the list can be a long and complicated process that endangers the timely protection of vulnerable species. Also, an estimated 7 to 18 percent of animals and plants in the United States are near extinction, and many of these species have not been added to the list.
- The criteria for removing species from the list can be very burdensome, and the process for doing so can be both lengthy and slow. This process usually ensues only after a review that takes place every five years.
- Restrictions on land development and land use have been seen as too restrictive by landowners who feel they should be compensated for their loss of income.
- Lobbying by hunters and by the oil, construction, mining, and logging industries has influenced amendments to the Act, which have weakened the policy over the years.
- Some critics mention that the Act is too expensive to maintain because it costs between \$50,000 and \$100,000 to protect each species.
- To be placed on the list, an animal or plant needs to be championed by an individual or group who will complete all the onerous requirements needed for the species to be considered by the USFWS. Often, the animals and plants being championed are the most charismatic and popular species, leaving other lesser-known and less popular species unprotected.
- The USFWS has, at times, been criticized for not making tough decisions to protect habitats and species for fear of the political controversies that might result and the subsequent effects on the agency's future budget.

12 Extinct Birds Project

While some people and groups question the value of the ESA, 90 percent of Americans support the Act, but many agree that it could be improved. Two of the suggestions supported by most politicians are providing financial restitutions to landowners and developers through tax incentives to nurture the protection of endangered species' habitats and providing more educational opportunities to sensitize the public about endangered species and the complicated issues that are related to their protection.

While the IUCN and the USFWS both provide valuable resources in protecting endangered species and their habitats, these organizations' contributions do not come without controversy or cost.



Ornithology Archives, Museum of Comparative Zoology, Harvard University

Images courtesy of Twan Leenders



14 Extinct Birds Project

COLLECTING

Throughout the 1800s and early 1900s, as new species were regularly being discovered, a feeding frenzy developed among institutions and private collectors to acquire as many different specimens as possible. The farthest reaches of the world were becoming accessible to a wider range of the world's naturalists, and as certain species became rare and endangered, the collecting frenzy intensified. Institutions accepted specimens from anyone if the price was right. A surplus in one species was traded for other species from other institutions and collectors. The abundance in most species provided little cause for thought about conservation practices, but by the end of the 1800s, it was clear that something needed to be done to restore the dramatically declining populations. A small contingency of conservationists spurred a new movement around the world. Each continent had its own small group of naturalists who tried to convince policy makers to start refuges and to establish new laws to protect growing numbers of endangered species. Still, old habits were difficult to change, and laws were often created too late for many of the extinct species. Collecting for the advancement of science provided institutions, ornithologists, and collectors a continued guilt-free license for unrestrained collecting.

Throughout the 1800s and the start of the 1900s, there were many examples of this excessive unrestrained collecting carried out by collectors for institutions. Most collectors felt that the abundance of many of the species could not be affected by mankind's intrusion. Extinction also seemed to be regarded by many as a natural process; seemingly, all that could be done was to collect as many of

each species as possible before it went extinct. Even the most respected naturalists and ornithologists could not see their role in the extinction of species; the idea of being able to preserve or protect a species was unheard of in most scientific circles in the early to mid-1800s. Henry Henshaw, who collected specimens for several institutions, was one example of a well-known ornithologist with a zeal for collecting. Henshaw once wrote to Robert Ridgway, who would later become the curator of birds at the Smithsonian Institution, that the condor "appears to be practically extinct in most parts of California, and may be entirely annihilated before many years, so if you haven't got it I would advise you to make every effort to secure one." Henshaw again wrote to Ridgway from Arizona in 1873, "I took a sufficient number of specimens and then confined myself to shooting every bird about which there was the least doubt. I took no chances w[ith] the little chaps but slaughtered them remorselessly. I have about sixty specimens." Henshaw's attitude toward collecting specimens was common among ornithologists. There is no shortage of instances where this type of documentation is found in journals, field notes, and publications of the period.

This current publication will provide a brief survey of the many reasons why each of the seventeen species featured herein became extinct. It will also present information about the collector of each specimen when the collector is known.

Illustration by Charles Johnson Maynard, *Birds of Eastern North America*, 1896

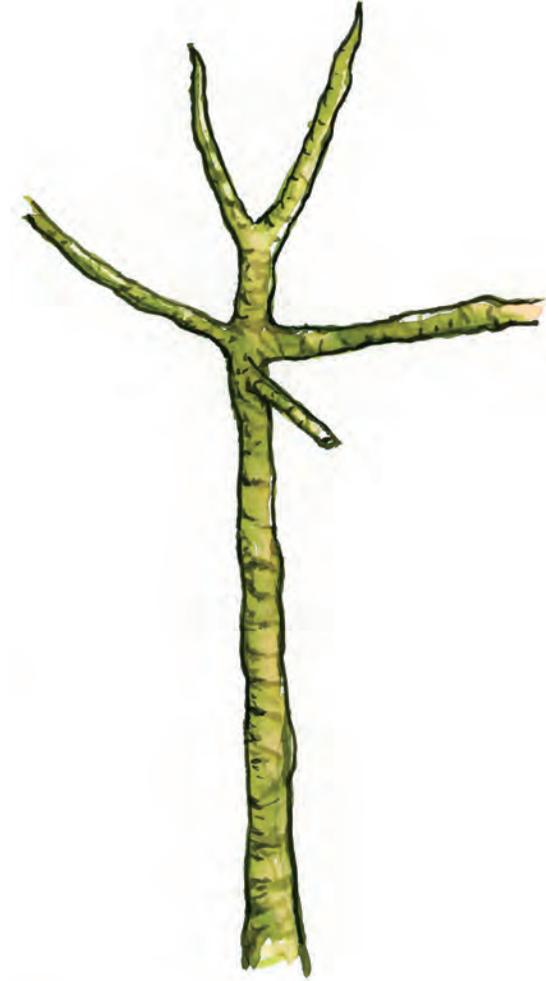
Collecting 15

Collecting Techniques

Birdlime

Hawaiian kings had armies of bird hunters that were sent out to collect the 80,000 birds needed to provide the 250,000 colorful feathers used to cover a single one of the kings' ceremonial cloaks. The kings also accepted colorful plumage as payment for land tax. The highest prices were given for the colorful 'o'o and mamo birds. The ancient bird hunters in Hawaii used the simplest method for acquiring birds without a weapon or a tool. Each spring and fall when specific flowers attracted the most colorful birds, each hunter performed a prayer service and made an offering, called *amakihī*. Then, he ventured forth on an outing that might last many days. Wearing a thatched cloak for protection from heavy tropical rains, he went on his own into the forest. When he arrived at a location known to have many flowering plants and much bird activity, he lay down and covered his body with vegetation. After attracting a bird with a specific call, he then placed a flowering plant around his head and a single flower between his lips. When the bird came to feed on the plant's nectar near his head, he snatched his prey.

Over time, the hunters adjusted their technique by applying birdlime, a sticky plant concoction, to the branches where the birds sat as they fed on the nectar. When birds became stuck to the branches, hunters left them there to attract other birds to feed on the same flowering plants and so to land on the same sticky branches. After the branches had a few birds adhered to them, the hunters killed all the birds, except for the 'o'os, by applying pressure to the birds' thoraxes, which suffocated the birds. The 'o'os, which were considered too culturally important to kill, were kept in cages after they were captured. Even before the first Europeans arrived in the 1700s, the Hawaii 'o'os were especially prized for their bright yellow plumage and were excessively collected, to the point of extinction, by the native Hawaiians. The kings believed that although the birds belonged to their forefathers, the birds' feathers belonged to them. Unfortunately, most of the birds did not survive the live plucking of their feathers.



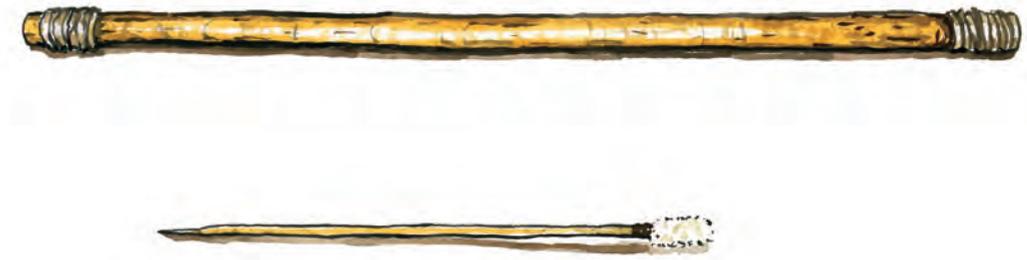
Hunters also added birdlime to the nearby branches of flowering plants and to long poles that they brought with them. The poles were decorated with cultural iconography and flowering buds and were blessed with indigenous prayers.

Birdlime was used around the world and was even mentioned in the writings of Aristotle and Pliny. The natural sticky application was used to capture insects and rodents as well as small birds. Versions of this technique are still used today to control rodents in many households and offices.

Blowgun

The blowgun has been used by hunters since the Stone Age. It was used by tribes in North and Central America, South Asia, and in South America, especially around the upper Amazon, where the practice of hunting with a blowgun was known as *zarabatana*. This weapon was also used by other indigenous populations around the world. John James Audubon, a respected and well-known American ornithologist and painter, described how indigenous populations in North America cut sections of cane and then repeatedly forced a hickory rod through the partitions inside the cane until the inner chamber was completely smooth. They also fashioned darts to be propelled through the hollow cane. One end of the dart was made from a sharpened splint of cane; the other end of the dart was attached to squirrel hair, which moved easily through the inside of the cane pipe when the darts were propelled through it. A quick puff of air from a hunter's mouth could accurately kill a small bird from twenty feet away. Other tribes around the world used their own native plants and materials to fashion similar devices to achieve the same results. For example, some tribes applied poison to the ends of the darts or fashioned small

arrows to kill larger species. Indigenous people were often hired by bird collectors for their ability to acquire hummingbirds with this technique. Other techniques usually mutilated much of the tiny bird's plumage.



Slingshot



While it is believed that the Mayans were the first to use latex to make the *pelote*, or ball, used in their ballgame, *pitz*, the slingshot using an elastic band was not introduced until Goodyear accidentally spilled latex into a pot of hot sulfur to make rubber. By the end of the 1800s, several collectors used the slingshot as their preferred method of acquiring birds. Many slingshot handles were made of tropical hardwoods and were very durable, although the elastic bands wore out over time. Since collectors using

slingshots could get fairly close to their prey and since these handmade weapons were very accurate, collectors were able to kill thousands of specimens on their expeditions. They also were able to hire many locals to collect additional specimens for them. The benefit of the slingshot was its silent nature, which enabled an expedition member to kill a single specimen without spooking the entire flock. The wooden weapon was also light, cost-effective, and easy to replace if it was damaged. In contrast, the shotgun, which lacked the previously mentioned benefits, was able to kill many more specimens if a flock was grouped together, which may be why it was the preferred weapon of many collectors.

Snares and Traps

There is no shortage of methods used to create snares and traps to collect birds. The snare is one of the trickiest to set, but once it is set it needs no further attention. In contrast, the boxtrap is very effective, but it demands a great deal of patience as well as constant attendance. There are several other kinds of traps that use bait to lure a bird through an opening that diminishes in size; once the bird reaches the bait, the prey discovers it cannot escape back through the very small hole that led it into the trap. Again, there are countless other traps and snares that can be made to capture or to kill birds. While most do not require much attention to operate, there is no certainty as to which species will be collected.

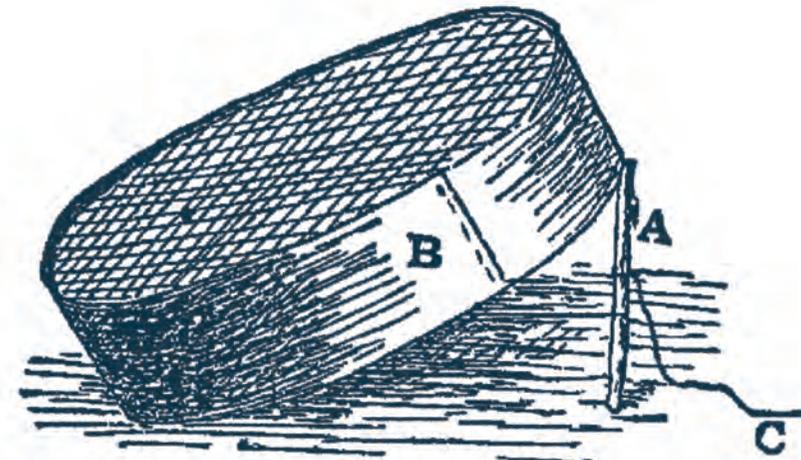
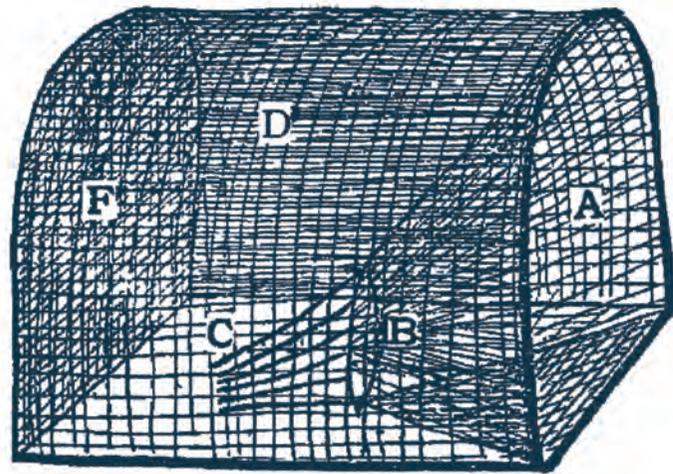
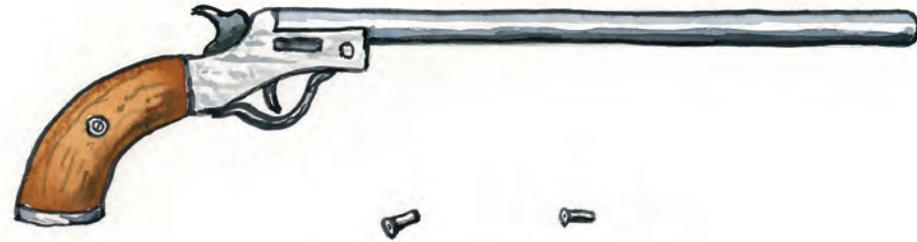


Illustration by Charles Johnson Maynard, *A Complete Guide in Collecting and Preserving Birds and Mammals*, 1883

Shotgun

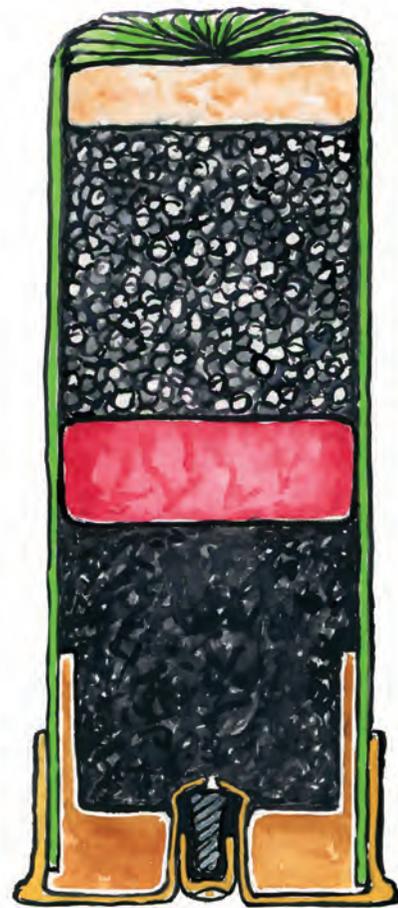


Most bird populations decreased dramatically as collectors and hunters began to use, first, the musket in the 1500s and then, in the late 1800s, the shotgun. These firearms made it possible not only to collect birds at much greater distances but also to collect several specimens with one shot. The firearms, however, often mutilated many of the specimens in the process, making the need to collect more specimens a necessity. The hope was that, out of several specimens shot, a few usable bodies could be preserved. C. J. Maynard, who collected the Carolina Parakeet and Dusky Seaside Sparrow, published in 1883 the *Manual of Taxidermy: A Complete Guide in Collecting and Preserving Birds and Mammals*. In this manual, he describes a five-shot pistol with a customized 15-inch-long barrel that he invented specifically for collecting specimens. The barrel consisted of two brass tubes; the smaller tube was situated inside the larger one with an air space between them to dampen the sound of the shot. These pistols were

available in either 22 or 32 gauge, and they were effective at fifteen to twenty yards' distance. These pistols also used extralong rimfire cartridges that were loaded with equal quantities of smokeless gun powder and very small "dust shot," or no. 12 shot. The secret to being a good collector was knowing the right distance to maintain from the bird so that it could be killed without damaging its feathers. No. 12 shot is about the size of a sand grain. It was used during shooting demonstrations in Wild West shows, which became popular between 1885 and 1900. Those demonstrations were conducted at close quarters inside tents, so the shot needed to be small enough not to penetrate either the tent or the spectators. Dust shot has also been used to kill snakes and rodents inside cabins without damaging pipes or other hardware. This shot is effective only at a short distance and will literally bounce off cardboard at fifty yards.

The recommended size of the shot (i.e., the round pellets in the shells) increases in size as the size of the bird being collected increases. For collecting small birds, dust shot, no. 14 or no. 12, was used. For birds as big as a crow, no. 10 was used. For hawks, owls, and grouse, no. 8 shot was used. For ducks and slightly larger birds, no. 7 was used. No. 2 shot was used to kill swans.

C. J. Maynard also recommended a method for killing injured specimens that was similar to what the ancient Hawaiians used to do. To suffocate a wounded bird, he recommended slipping a forefinger and thumb underneath the bird's wing and then squeezing the chest to compress the lungs until the bird died. As Maynard pointed out, it was important to kill the bird as quickly as possible, not only to put the

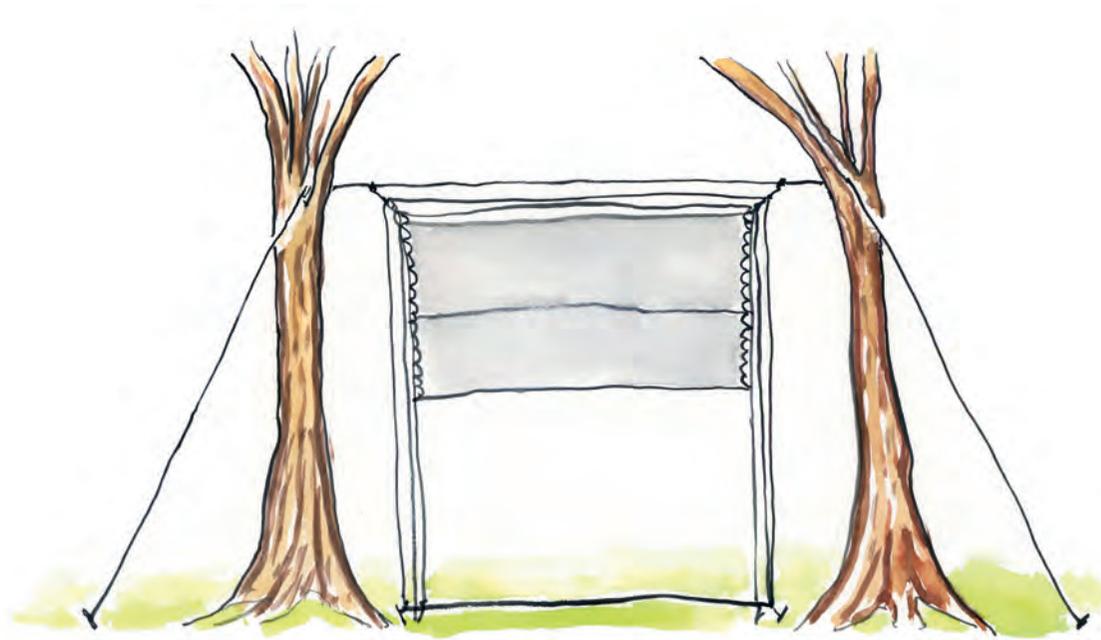


bird out of its misery, but also to stop the leaking blood flow that might damage and stain the feathers and thus require more work to clean the stained feathers.

Collectors usually hunted at dawn and dusk when birds were most active and readily available to be shot. By eight or nine o'clock in the morning through the middle of the day, birds hid from the sun and heat and thus were harder to find. Maynard also recommended, as did other naturalists, to kill only as many birds as could be preserved as skins in a twenty-four-hour period since specimens tended to decompose quickly. This decomposition was noticed first as the feathers on the belly began to fall out and then as the feathers on the front of the bird fell out as well. To keep the birds from dirtying or bleeding on each other, the feathers of each bird were smoothed out and put in place before the bodies were wrapped in paper. Cotton was twisted around the beaks to keep the mouths closed and protected.

Mist Nets

Records show that mist nets were used as early as the 1600s by Japanese bird hunters, but these nets were not introduced in the United States until 1947. Over the centuries, monofilament nylon and terylene (a synthetic polyester fabric) nets have come to replace nets made from silk and cotton. These nets have now become the most popular way to collect and study bird species. The lightweight black mesh nets have small openings that when measured diagonally are around 32-38 mm, or 1.25 - 1.5 inch. The nets are forty feet wide and are held up with six-foot poles. Larger nets can be hung up with ropes and pulleys in openings in forest canopies. The nets have deep pockets, which are especially helpful for capturing larger birds, which drop into these pockets after flying into the nets.



Today, the less invasive use of mist nets, photography and video, and blood sampling for DNA testing has replaced many of the more destructive collecting practices of the past. The killing and collecting of specimens is much more carefully considered by scientists in contemporary society, but the illegal trade in collecting rare specimens continues to prosper.

Bird Preparations

Collectors would measure, describe, and skin the birds. Collectors also subcontracted locals to collect specimens for them, but the collectors did not mention the institutions they worked for to avoid being charged higher prices by the subcontractors. A collector could shoot and prepare up to fifty birds a day, although averages were closer to a fourth of that number. The more skilled taxidermists could skin ten birds in an hour, but the average for most collectors was around half that number.

The preparation and preservation of dead birds' carcasses has changed little over time.

Now, as then, once a specimen that has the least amount of damage has been selected, an incision is made in the breast, and then the internal organs, ribs, and spine, as well as the fat from inside the skin, is removed. The brain and other internal parts are also removed from the skull; all that remains of the original bird are the legs, skull, beak, wings, and the skin with attached feathers. The collector then stuffs the body and skull with cotton, while being careful to preserve the specimen's unique contours. Finally, the collector sews up the initial incision. The entire process needs to be done in a manner that will preserve the specimen for decades, if not centuries. Several different powders and chemicals have been used over the decades to help preserve specimens from rotting and from infestation by insects.

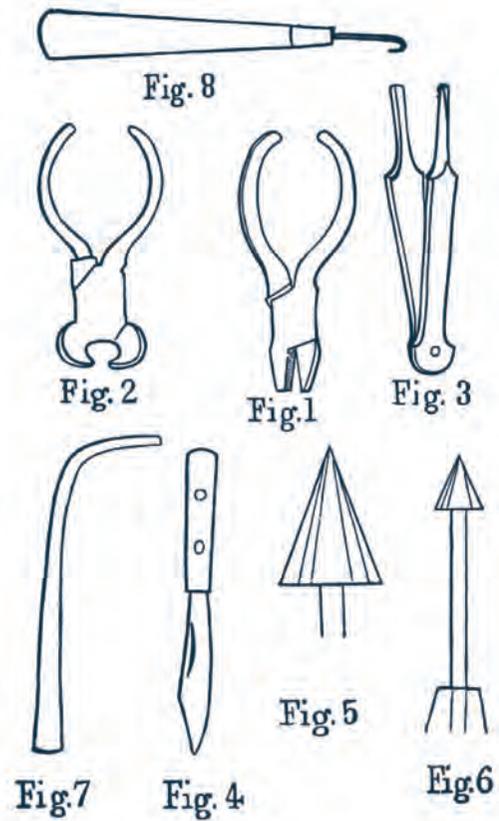


Illustration by Charles Johnson Maynard, *The Naturalist's Guide in Collecting and Preserving Objects of Natural History*, 1870

The most toxic additive used was arsenic. Use of that highly toxic chemical resulted in a wide array of ailments and health conditions for collectors, who absorbed the chemical through their hands and lungs. Over time, collectors came to use other substances, such as Maynard's Dermal Preservative, borax, salt, ground pepper, potassium carbonate, sulfur, alum, and alcohol, but the results were mixed. Today, most institutions do not use any chemicals.

While some scientists still debate whether the collecting practices of the past were excessive or not, there is no doubt that the specimens collected have proven to be valuable in the classification of species and subspecies. They have also served as the foundation for research that has stretched, in some cases, over centuries. These same specimens have also been used by artists in the production of artwork for field guides; and, as is the case with this publication, as an occasion to reflect back on not only the species that no longer fly in our skies, but also on the eclectic lives of the collectors who shot and preserved their corpses, and on the social, cultural, environmental, and economic conditions that led to the species' extinction.

Illustration by Charles Johnson Maynard, *Birds of Eastern North America*, 1896



24 Extinct Birds Project

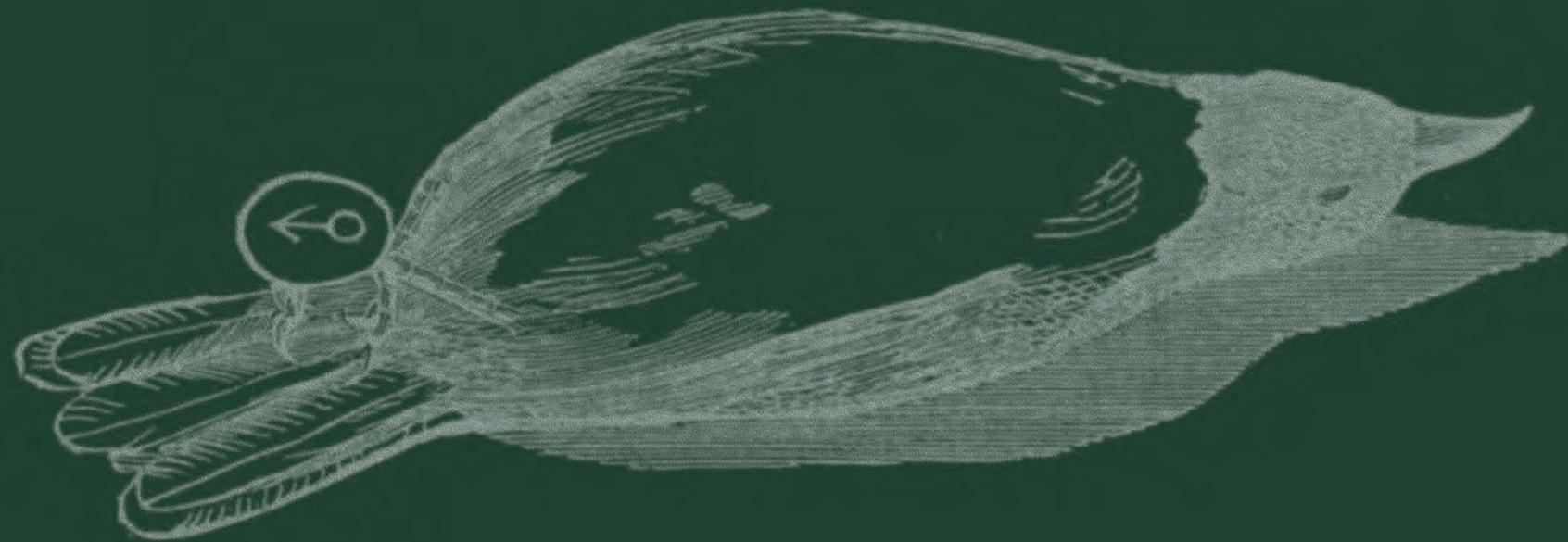


Illustration by Charles Johnson Maynard, *The Naturalist's Guide in Collecting and Preserving Objects of Natural History*, 1870



BLACK NANO

Collection Number and Description: . . . Ornithology 237987 - skin (dry) - male - 7.5 inches long

Scientific Name: *Drepanis funerea*

Collection: Museum of Comparative Zoology, Harvard University, Cambridge, MA

Site of Retrieval: Pelekuna Valley on the island of Moloka'i in the Hawaiian Islands of the United States

Retrieval Date: September 9, 1893

Collector: R. C. L. Perkins - Robert Cyril Layton Perkins

Last Confirmed Sighting or Collection: . June 1907

Conservation Status: **Extinct** - 1988 - IUCN Red List of Threatened Species



Black Mammo 27

Explorers of the island MOLOKAI

- 1864 or 1865. Brigham (Olson 1992; MCZ)
- 1888 June. Wilson
- 1892 Dec-1893 Feb. Palmer
- 1893 May-June, July-Sept, Oct-Nov.
Perkins
- 1894. R. Meyer
- 1896 June. Perkins
- 1896. Meyer (UMB)
- 1898. Meyer (UMB)
- 1902 Feb. Perkins
- 1907 Apr-June. W.A. Bryan
(Bryan 1908 BPBM)

Inventory Ledger, Museum of Comparative Zoology, Harvard University

Catalogue Number.	Name.	Sex and Age.	Taken at, or near	Date of Capture.	Taken by	Skinn
237951	<i>Tringa flavipes</i>	♀	Conn. Saybrook	Aug 2. 1872		
237952	<i>Tringa s. solitaria</i>	♂	Mass. Needham	Oct. 7. 1874	T. Otis Fuller	
237953	<i>Dryobates v. villosus</i>	♂	"	Oct. 15. 1874	"	
237954	<i>Agelaius ph. predicator</i>	♂	"	July 30. 1874	"	
237955	<i>Hylocichla u. swainsonii</i>	♀	"	Oct. 3. 1874	"	
237956	<i>Sayornis phoebe</i>	♂	"	May 8. 1875	"	
237957	<i>Sitta canadensis</i>	♂	"	Sept. 3. 1874	"	
237958	<i>Sitta c. cooki</i>	♀	"	Oct. 2. 1874	"	
237959	<i>Mniotilta virens</i>	♂	"	Aug. 26. 1874	"	
237960	<i>Regulus c. calendula</i>	♂	"	Apr. 28. 1875	"	
237961	<i>Vireo g. griseus</i>	♂	"	Sept. 9. 1874	"	
237962	<i>Vireo s. solitarius</i>	♂	"	May 7. 1874	"	
237963	<i>Vireo olivacea</i>	♂	"	Sept. 16. 1874	"	
237964	<i>Parus a. stricapillus</i>	-	"	Oct. 1. 1874	"	
237965	<i>Aythya rubripes</i>	♀	Is. Sable Island	Mar. 12. 1888	W. W. Worthington	
237966	<i>Telmatodytes p. palustris</i>	♀	N. C. New River	Nov. 18. 1900	C. J. Maynard	
237967	<i>Zonotrichia leucophrys</i>	♀	Dakota, Clay Co.	May 18. 1882		
237968	<i>Zonotrichia albicollis</i>	♂	N. C. New River	Nov. 24. 1900	C. J. Maynard	
237969	"	-	Mass. Needham	Oct. 2. 1874	T. Otis Fuller	
237970	<i>Passerella i. iliaca</i>	♂	"	Apr. 6. 1875	"	
237971	"	-	"	Sept. 10. 1875	"	
237972	<i>Passerculus i. gramineus</i>	♂	"	Oct. 6. 1874	"	
237973	<i>Junco h. hyemalis</i>	♀	"	Oct. 19. 1874	"	
237974	"	-	"	Oct. 19. 1874	"	
237975	<i>Astragalinus t. tristis</i>	-	"	Oct. 3. 1874	"	
237976	"	-	"	Oct. 9. 1874	"	
237977	<i>Scutellus l. livaria</i>	♂	"	Feb. 17. 1873	"	
237978	<i>Spinus p. pinus</i>	-	"	Nov. 26. 1874	"	
237979	"	♀	Mass. Plum Island	Nov. 12. 1905	C. J. Maynard	
237980	<i>Ammodramus a. australis</i>	♀	Fla. Guttersville	Mar. 8. 1901	"	
237981	<i>Passerherbulus h. missouri</i>	♀	Fla. Lake Okech	Mar. 18. 1901	"	
237982	<i>Passerculus s. savanna</i>	♀	Fla. Lake Jessup	Feb. 20. 1901	"	
237983	"	♂	Mass. Needham	Oct. 6. 1874	T. Otis Fuller	
237984	<i>Spizella p. pusilla</i>	♂	"	Apr. 24. 1875	"	
237985	<i>Pediocetes p. phoenicurus</i>	♀	Mackenzie, Fort Hood, N.Y.	June 17. 1864	Chas. Bendire	
237986	<i>Spizella t. venneri</i>	♀	Sierra, Montana, Cameron, Mad. Idaho	Sept. 14. 1927	Ludlow Griscom	
237987	<i>Troglodytes pinus</i>	♂	Molokai	Sept. 13. 1873	R. P. Z. Perkins	
237988	<i>Polioptila u.</i>	♂	Big Island, Mt. Sore, Lake		J. Reid	
237989	<i>Lanius l. migrans</i>	♂	Illas, West Newton	Oct. 31. 1872	H. A. Purdie	
237990	<i>Troglodytes pinus</i>	♂	Chypsinia			
237991	<i>Sitta l. britannica</i>	♀	England, Twickenham	Jan. 29. 1889		
237992	<i>Regulus x. anglo-rum</i>	♂	" Surrey, Clarendon	Oct. 30. 1889		
237993	<i>Chondestes bairdii</i>	♂	Peru, Prov. Iquitos	Dec. 20. 1919	N. Watkins	

Skinned by Sex Determined by Special Locality.

Remarks.

Presented by T. Otis Fuller

"

"

"

"

"

"

"

"

"

"

"

"

"

"

"

"

"

"

"

"

"

"

"

"

"

"

"

"

"

"

"

"

"

"

"

"

"

Old skin, presented by Boston Soc. of Nat. Hist.
Presented by Ludlow Griscom
Exch. from Univ. Mus. of Zool. Cambridge, England
Old skin, presented by Boston Soc. of Nat. Hist.
In the Brewster coll.
Old mount, taken long, perhaps had a red already
Presented by Saml. Henshaw.

Exch. from Am. Mus. of N. H. N. Y.

Information about the Specimen's Extinction:

Robert Cyril Layton Perkins first described the Black Mamo on June 18, 1893. The Black Mamo became extinct for several reasons, which were mainly introduced by foreign populations. The most critical reasons were caused by the introduction of invasive ground predator species, such as rats and mongooses, that fed on the eggs, the young, and the adult birds. The mammos were mostly found on the ground cover and under the protection of the underbrush. The introduction of the deer and cattle, which destroyed much of the birds' habitat, was another major factor in the species' demise. The deer were introduced in 1868 when eight axis deer (three bucks, four does, and one male fawn) were released on Moloka'i Island to improve hunting opportunities and tourism on the island. By 1903, R. C. L. Perkins, who had originally discovered the Black Mamo, noted that the deer population had so increased that these animals had stripped a good deal of the birds' habitat in the mountain's forest understory. Another major cause of the Black Mamo's extinction was the introduction of mosquito-borne diseases, for which the birds had no immunity. Yet another cause was the excessive number of birds killed by commercial collectors and by some early naturalists. George C. Munro noted that private collectors had depleted most of the Black Mammos in Moloka'i before Perkins, a naturalist, had collected the specimen we have documented here in this chapter. Not all naturalists were known as ethical collectors. Sustainable collecting was not a concept that was practiced by most collectors in the 1800s and early 1900s. William Alanson Bryan, who was also a respected naturalist, museum curator, and professor in Hawaii, is a good example of a renowned, zealous collector. When Bryan realized that the last Black Mammos were depleted from the northern forests of Pelekuna Valley on the island and that the species



MOLOKA'I, HAWAII

- Approximate collection site of species
- Recorded range of species

Pelekuna Valley on the island of Moloka'i



was on the verge of extinction, he traveled to the eastern part to the Moanui Valley and shot the last three Black Mamos in June 1907. He was later criticized by a fellow naturalist, Andrew John Berger, for his excessive collection practices. After shooting one the last of the Black Mamos, Bryan wrote in his field notes, "To my joy I found the mangled remains hanging in the tree in a thick bunch of leaves, six feet or more beyond where it had been sitting. It was, as I feared, very badly mutilated. However, it was made into a very fair cabinet skin."

Fourteen years after Perkins had discovered the species, the last Black Mamo was collected. Even though extensive expeditions were launched in 1944, 1949, and 1986, none were ever found again.

More Information about the Black Mamo:

Although fossils of the Black Mamo were found on the island of Māui from when the islands of Māui, Moloka'i, Lāna'i, and Kaho'olawe were joined together as one land mass, the only live specimens of the bird have been found on the island of Moloka'i. The rest of what is known about the Black Mamo comes mostly from R. C. L. Perkins, who was the preeminent early naturalist in Hawaii from 1893 to 1901 and who also discovered the bird in the Pelekuna Valley on Moloka'i on June 18, 1893. The Black Mamo's scientific name is *Drepanis funerea*. Perkins named the bird "funerea," after the word "funeral" due to the birds' "somber plumage and the sad fate that too probably awaits the species." Clearly, he was already aware of the dramatic drop in the population of native birds in the Hawaiian Islands. Perkins described his first encounter with the Black Mamo in his field notes: After, "wading all day in knee-deep mud," he heard, "a very different sound, a cry as clear as a bell" It was said that the Black Mamo's song sounded like a group of flute whistles followed by a long, held-out trill. After collecting two of the new species, he, "saw at once that I had no 'O'o, but a Hemignathus-like creature with shortened mandible, and the excessively strong smell which is characteristic of the Drepanididae." The Black Mamo was the only species Perkins discovered. He collected two Black Mamos that day and, later that year, he acquired another ten. The specimen that is featured and painted for this chapter is one of the five specimens remaining from that period.

The Black Mamo's unique, long, curved beak and its rarity made the species a highly desirable specimen for many commercial collectors and naturalists. The bird's beak had evolved over time to fit perfectly inside the long lobelia flower to reach its nectar, which was the bird's primary food source.

Perkins noted that the tops of the birds' heads were often encrusted with white or purple-white pollen from their attempts to reach deep inside the flowers. After the elimination of the mamos and the introduction of deer, cattle, and rats, many types of lobelia either became extinct or remained endangered. The naturalist also noted that, after feeding, the birds sat quietly and comically preened their feathers by stretching their necks to reach the furthest parts of their bodies with the tips of their long beaks.

The mamos' and the 'o'os' unique features and calls held a prominent place in Hawaiian culture and, in some areas, these species were forbidden to be eaten. However, other species, like the Hawai'i 'O'o, due to their bright plumage, were hunted to extinction by native Hawaiians and foreign collectors. These 'o'os' unique bright yellow rump and overwing feathers were collected for covering Hawaiian nobility's cloaks. Some cloaks used around 450,000 feathers from approximately 80,000 birds. It has been noted that some of the birds were released after being defeathered, but their survival rate is questionable. The nobility rationalized the birds' suffering by saying that while the birds belonged to the spirit of their forefathers, the feathers belonged to them. The Hawai'i 'O'o was rarely found even before the European arrived on the island in the late 1700s; the species became extinct around 1898. The Black Mamo survived longer, perhaps because its less colorful feathers and its remoteness (the birds resided on a part of the island with the world's highest sea cliffs) provided fewer initial incentives to collectors and settlers. However, those deterrents lasted only a few decades; eventually, the thirst for unique specimens compelled collectors to make the trek into the steep mountains and brought settlers to the undeveloped island.

More Information about R. C. L. Perkins, the Collector of This Specimen:

Robert Cyril Layton Perkins was born in Gloucestershire, England, on November 15, 1866. Perkins was interested in entomology from an early age and began collecting insects when he was seven years old. He attended Jesus College, Oxford, enrolled in zoology. Two years after graduating from college, he was chosen by the British Association for the Advancement of Science and the Royal Society to investigate the fauna of the Hawaiian Islands. His research lasted ten years, and even after Perkins returned to England, he made a couple of trips back to Hawaii to conduct more research. While he was in England, Perkins published a book on his research and was awarded the Linnean Society's Gold Medal for his work in zoology. He worked for the agricultural department for a couple of years and conducted research for the sugarcane industry in Hawaii. After a couple of decades doing more research both on the island and in England, Perkins passed away in Devon, England, on September 29, 1955, at the age of 88.



Ornithology Archives, Museum of Comparative Zoology, Harvard University



Lobelia flower









BACHMAN'S WARBLER

Collection Numbers and Descriptions: . . . E6 3.0.6 - skin (dry) - male - 5 inches long

Scientific Name: *Vermivora bachmani* / *Helminthophila bachmani*

Collection: Roger Tory Peterson Institute of Natural History, Jamestown, New York

Site of Retrieval: No Data

Retrieval Date: March 14, 1914

Collector: No Data (possibly Robert Day Hoyt)

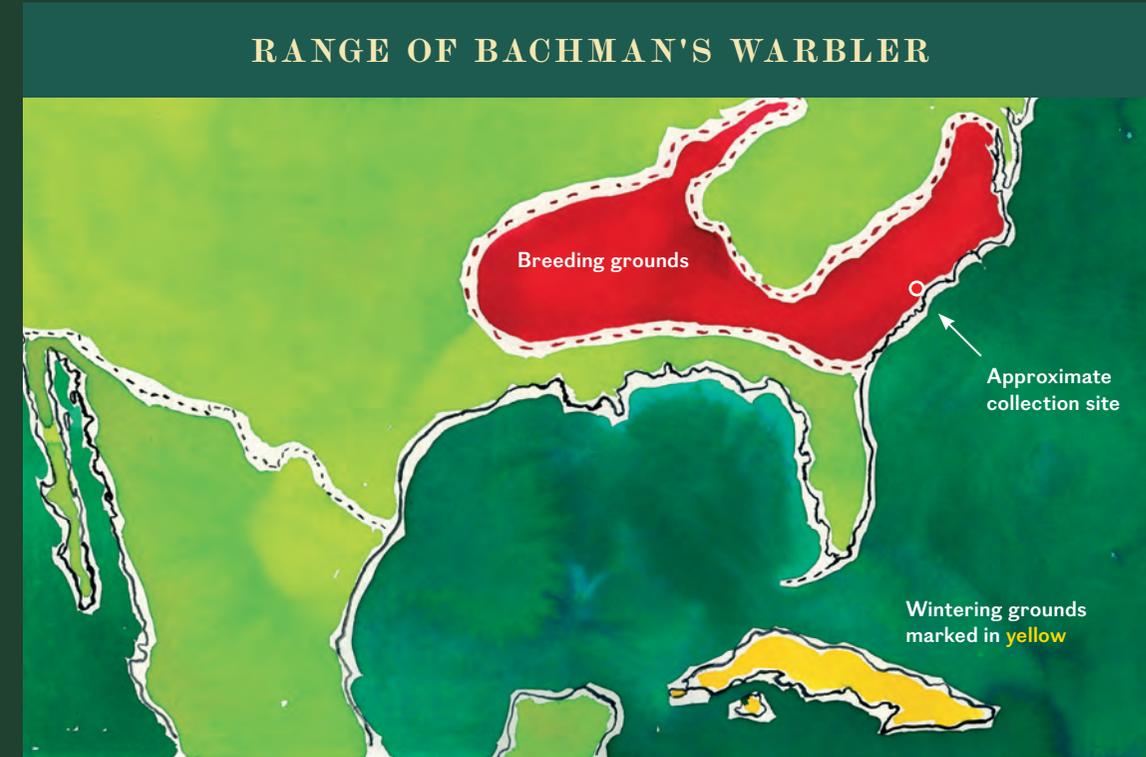
Last Confirmed Sighting or Collection: . . . 1937

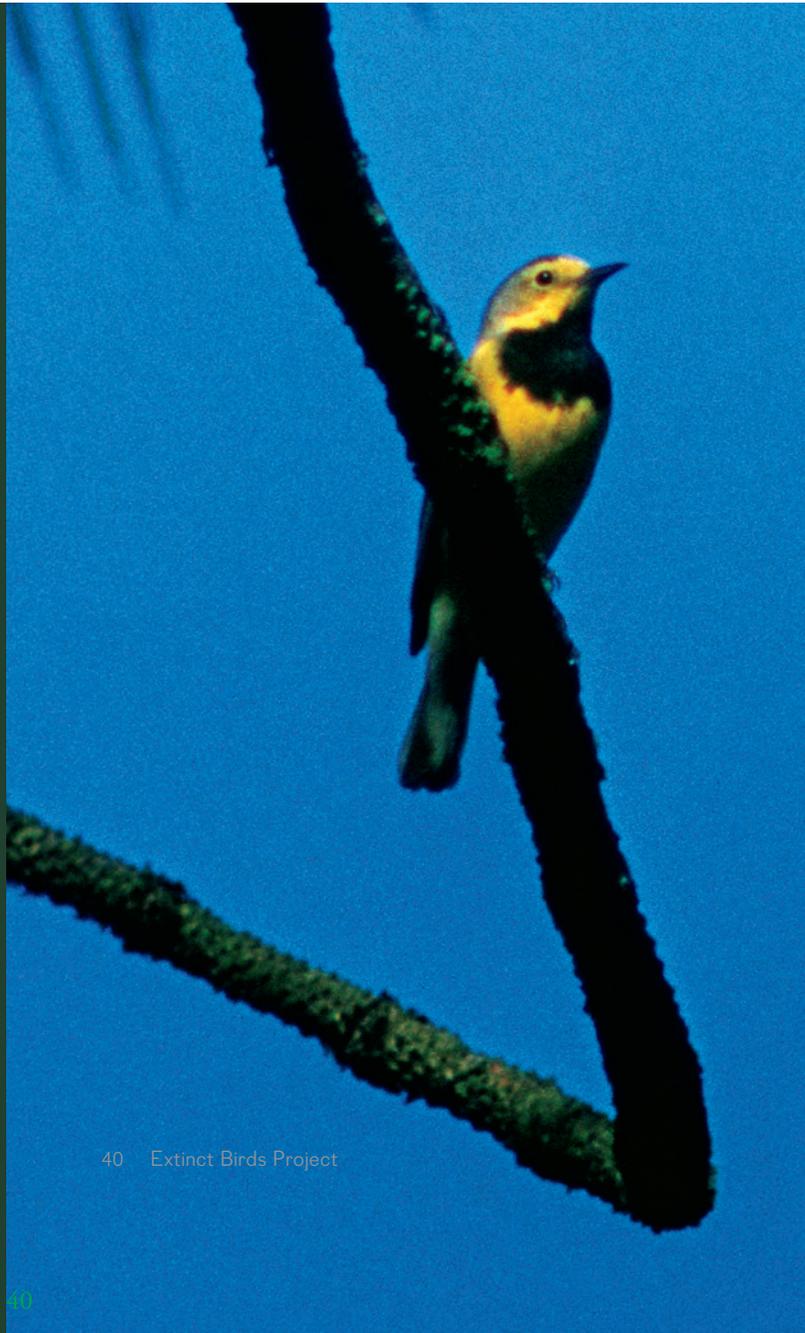
Conservation Status: **Critically Endangered (Possibly Extinct)** - 1994 -
IUCN Red List of Threatened Species

Information about the Specimen's Extinction:

The first description of a Bachman's Warbler was made by John James Audubon in 1833 after the Reverend John Bachman sent him the skin of one of the birds he had discovered near Charleston, South Carolina. These warblers were seen mostly in the Southern states between 1880 and 1910. Clear-cutting of their habitat, especially of the canebrakes, was a major reason for the birds' extinction. Canebrake is a very tall bamboo-like grass that was once found throughout the wetlands in the Southern United States, but today is found only in small tracts that are a few acres in size and are limited to select areas. Since canebrake grows as tall as fifteen to thirty feet, when it was abundant, it provided the birds with protection and a place to nest. Another major change to the warblers' habitat was the drainage of the swamplands through the use of canals. The warblers' habitat in Cuba, where the birds wintered, was also destroyed as the grounds were converted to sugarcane fields. Hunting of the birds for their plumage also contributed to their extinction. The last chance for the species' recovery vanished on November 4, 1932, when Cuba was hit by Hurricane Santa Cruz del Sur, which devastated the island with 140 mph winds. (As Cuba's deadliest hurricane, it also accounted for more than 3,000 human deaths.) By the 1930s, sightings of the Bachman's Warbler were rare. The last specimen, a male, was collected on Deer Island, Mississippi, on March 21, 1941. In the years since, there have been multiple unconfirmed reports of sightings and bird calls dating to 1953, 1954, 1962, 1977, and 1988.

A few months before this publication went to press, however, Twan Leenders, the President of the Roger Tory Peterson Institute of Natural History, shared with us evidence of the two last-known reliable sightings of the bird. The evidence was in the collection of Noble Proctor, one of world's most



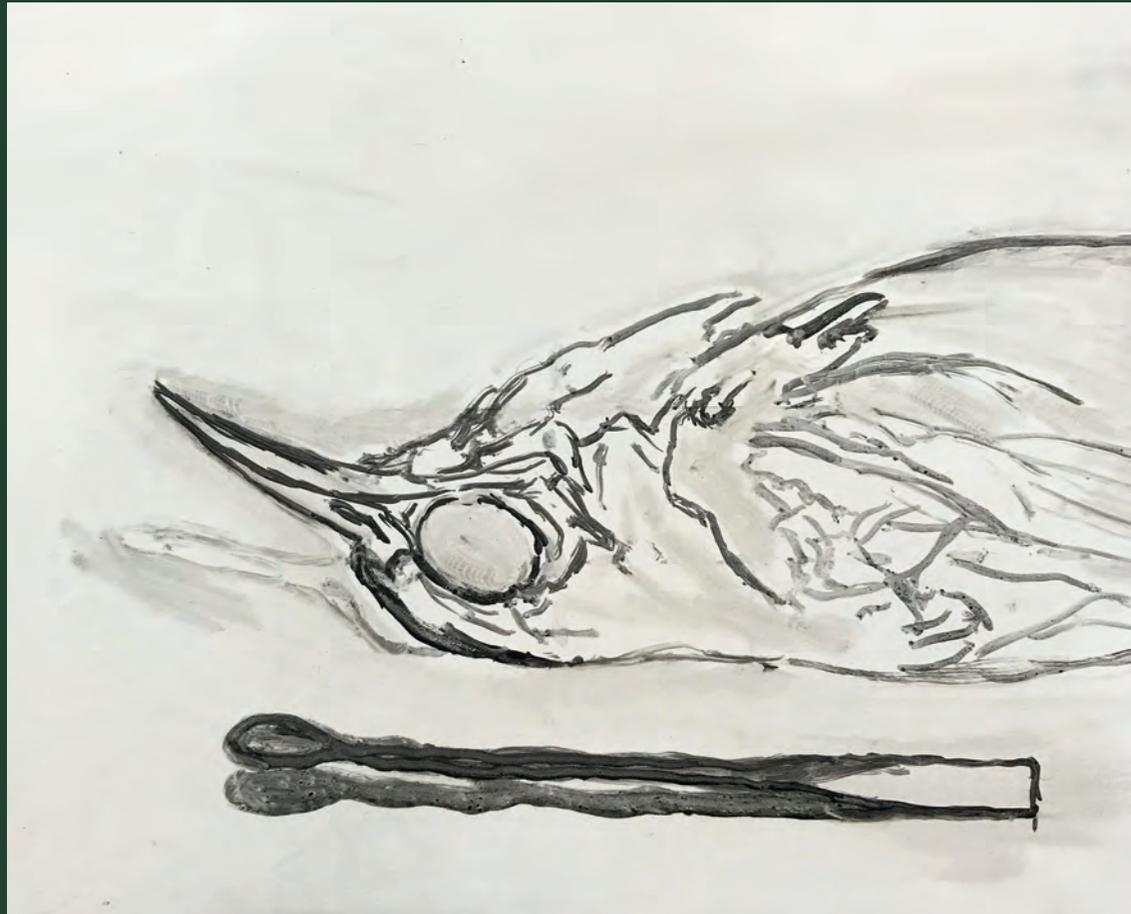


accomplished authorities on North American birds and a founding member of the Institute. The evidence was not well publicized because Proctor refused to relinquish the location of both sightings as a way to protect the remaining birds. After Proctor's death in 2015, his widow passed along the 1958 photograph of the Bachman's Warbler by John H. Dick (1919-95), an American naturalist and artist, and 1966 field notes of the last sighting of the bird by Proctor and his colleague, Wayne R. Peterson, another recognized expert on North American birds. The field notes, written by Proctor, outline their discovery on May 7, 1958, outside of Moores Landing, South Carolina, in the cane thickets of a nearby cypress grove. After following directions provided by a local, Harlan Mills, the two respected ornithologists trekked along an old fire road, where they heard an unfamiliar bird song. They followed the song through a path in the pine oak woodlands. They remarked of their experience, "Then it flew up and landed on a dead limb not more than 10 feet from us, threw its head back and sang. Our Bachman's! A full adult male in perfect plumage." The warbler was not shy and continued to sing and fly around them, not more than 25 feet away. Proctor finished his notes by stating in bold letters, "A fantastic sighting!"

Although there have also been several somewhat reliable reports since the 1980s, expeditions to the warblers' breeding areas have not found any evidence of the species; however, it is unknown if Proctor and Peterson's site has been investigated.

More Information about the Bachman's Warbler:

As is the case with many extinct species, little is known about the behavior of the Bachman's Warbler, but what we have learned has come from ornithological reports of the time.



The Bachman's Warbler is known to have bred in Missouri, Arkansas, Kentucky, Alabama, South Carolina, Florida, and a few other Southern states. The warblers tended to breed between March and June in swamp-forest habitats. Unlike some other extinct birds discussed in this publication, the Bachman's Warbler did not need forests that contained large trees since the birds built their nests in the dense bushes and grasses (i.e., the canebrakes) instead. In late spring and summer, the birds were found in Florida. Occasionally, the species wintered in Florida as well, but, mostly, the birds spent the winter in Cuba, where they were found in wooded areas populated with hibiscus trees; it is believed that the species fed on the nectar of the hibiscus tree's flowers.

After winter, the birds migrated north to reach their breeding grounds, where they built nests out of dead leaves, lichen, Spanish moss, and grasses. These nests, which were situated near the water, were constructed at least one foot above the ground. The species' white eggs were incubated by the female while the male foraged for caterpillars and insects. The birds could be heard from the tops of the forests' canopies.

There are only a few recordings of the extinct bird's calls. They can be heard through a link provided by Cornell University's Macaulay Library.

More recently, *Doonesbury* comic strip referenced the rarity of the species in a 1986 strip in which Dick Davenport, an avid birdwatcher, had a heart attack and died after seeing a Bachman's Warbler.

More Information about Robert Day Hoyt, the Collector of This Specimen:

The specimen of the Bachman's Warbler used in this chapter comes from the R. D. Hoyt Collection in Seven Oaks, Florida. Although we don't know whether Hoyt collected the specimen himself or purchased it, we thought it would be of interest to provide some information about Robert Day Hoyt.

Robert Day (R. D.) Hoyt was born on November 18, 1857, in New York City. From a young age, he regularly went to Florida and collected birds in the Jacksonville and Gainesville areas. Over time, he became trained as a taxidermist, in Gainesville, and developed an interest in horticulture. He started a profitable winter vegetable business near the city, but the business was destroyed in a frost in April 1881. The following year, at a friend's recommendation, Hoyt moved further south along the warmer Gulf Coast to Clearwater, a settlement that had only one store and one hotel. Clearwater had been traditionally free of freezes, and Hoyt started another profitable business, selling tropical plants, around six miles from the town. He built a house in a grove of seven oaks and was married in 1882. Over time, Hoyt's nursery business, which became known as American Exotic Nurseries, expanded, and a small settlement called Seven Oaks sprung up around it. The nursery grew and sold tropical and semitropical plants, fruit trees, palms, ornamental plants, orchids, and greenhouse plants. At the same time that Hoyt ran this very profitable nursery, he also worked as the town's postmaster. In 1894, when a freeze hit the area and destroyed his business, Hoyt gave up the nursery, but, through his international connections, he started another business preparing dried palmetto plants for a German company that manufactured artificial plants. Throughout this entire period, he practiced taxidermy and conducted some ornithological research. This research, which focused on the nesting habits of the Ivory-billed Woodpecker

and the Roseate Spoonbill, was made possible by a permit issued by the state of Florida to collect rare birds. Hoyt also investigated the migration patterns of the American Robin. In 1908, Hoyt was hired by the Iowa State Department of History and Archives to remount 159 birds in its collection. Robert Day Hoyt died in Seven Oaks on November 23, 1918. His collection of eight hundred birds and four hundred sets of eggs was donated to the University of Florida in Gainesville.



Bachman's Warbler 43



A world map with a red location pin on the island of Madagascar. The text 'ALAOTRA GREBE' is centered over the map. The map shows the outlines of the continents in a light blue color.

ALAOTRA GREBE

Collection Numbers and Descriptions: . . . Ornithology 78207 - skin (dry) - female - 13 inches long

Ornithology 78208 - skin (dry) - female - 12 inches long

Scientific Name: *Tachybaptus rufolavatus* (originally identified as *Tachybaptus pelzelni*)

Collection: Museum of Comparative Zoology, Harvard University, Cambridge, MA

Site of Retrieval: 15.5 miles east of Ambatondrazaka on the Sahabe River, which flows into Alaotra Lake
off the southeast coast of Africa

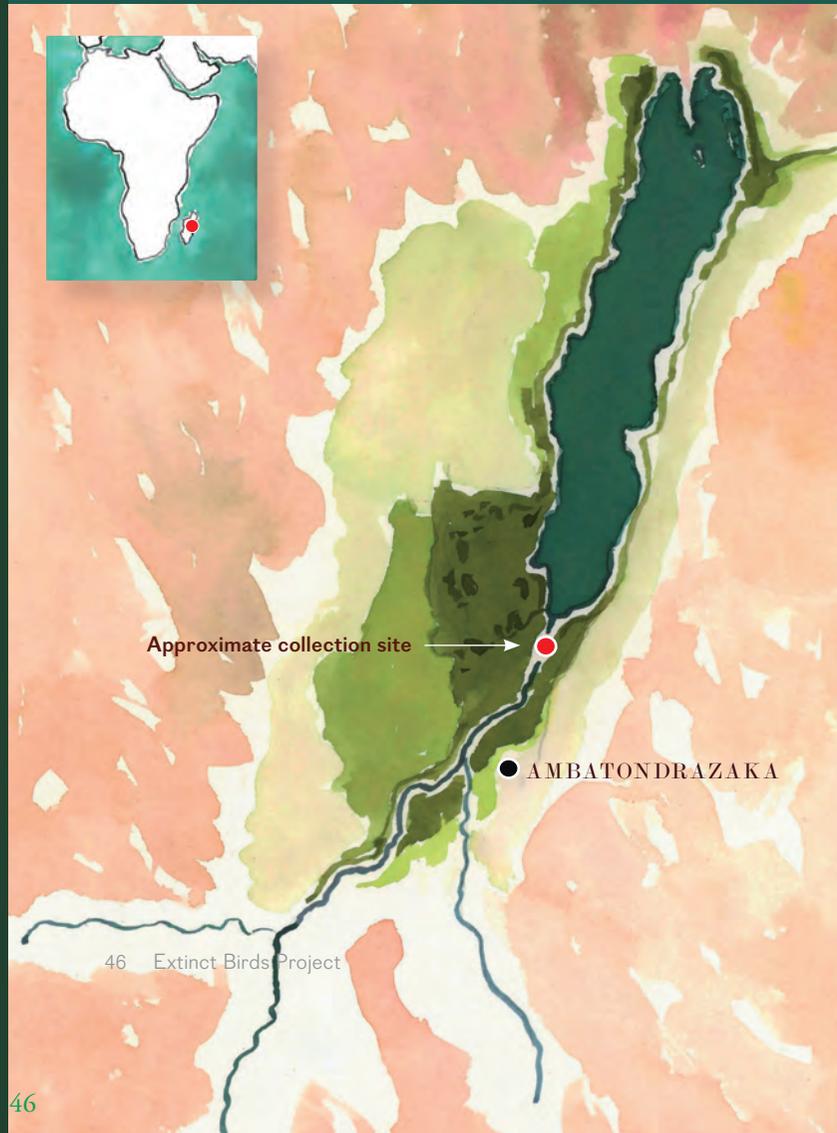
Retrieval Date: September 25, 1915

Collector: Frederick R. Wulsin

Last Confirmed Sighting or Collection: . 1985

Conservation Status: **Extinct** - 2010 - IUCN Red List of Threatened Species

ALAOTRA LAKE, MADAGASCAR



Information about the Specimen's Extinction:

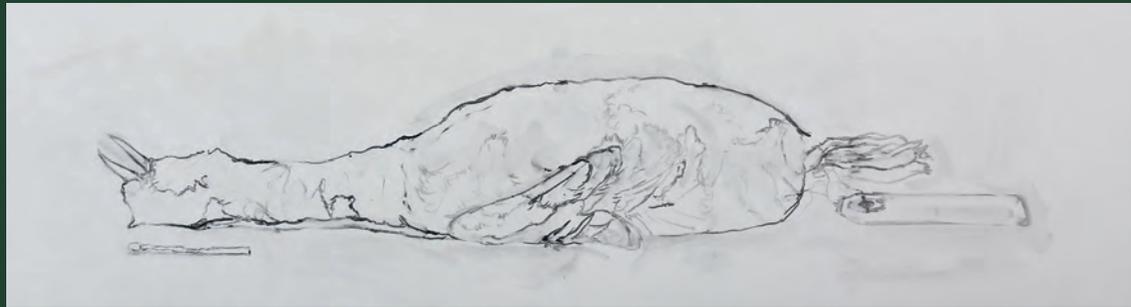
There is little that is known about the Alaotra Grebe, which was first described by Jean Théodore Delacour in 1932. The species stayed close to the region around Alaotra Lake on the island of Madagascar. Several factors led to the extinction of the Alaotra Grebe. These factors included: excessive collecting by hunters and poachers, the transformation of major sections of the species' natural habitat to rice fields, the burning of this habitat, and the introduction of invasive species that negatively affected the species' ability to obtain its food source. Fishermen who were familiar with the region of the lake that was the birds' habitat were largely responsible for poaching the birds. One of the methods used by the poachers and hunters was to throw nets over roosting areas at night and then slaughter the birds by beating them with sticks. A single poacher could kill 120 ducks in an evening. Also, as development and agricultural businesses increased along the lake, soil erosion from deforested hillsides affected the quality of the water in the lake; the subsequent transformation of marshes into rice fields eliminated much of the birds' roosting areas. In addition, the burning of fields and marshes regularly occurred during this period. It is also believed that the Alaotra Grebe species hybridized with the migrating Little Grebe. This hybridization was detrimental to the Alaotra Grebe's gene pool and decreased its fitness and chances for surviving its changing habitat. The migration of Little Grebes into the lake region also created competition for diminishing food sources in an already suffering ecosystem. Around the time that the Alaotra Grebe species was on the brink of extinction, gill-netting was introduced to the lake. Gill-netting had the potential to kill many of the remaining Alaotra Grebes since the birds became entangled in the nets as they foraged for baitfish in the water. Unlike other species, the Alaotra Grebe's small wings prevented it from traveling long distances to find other, healthier habitat; consequently,



Aloutra Grebe 47

the species was not found anywhere else on the island. In the past forty years, the human population in this region has increased fivefold, and the region has become both the country's largest producer of rice and its largest inland fishery. All these factors have been detrimental to the health of the wetland and of the country's largest lake.

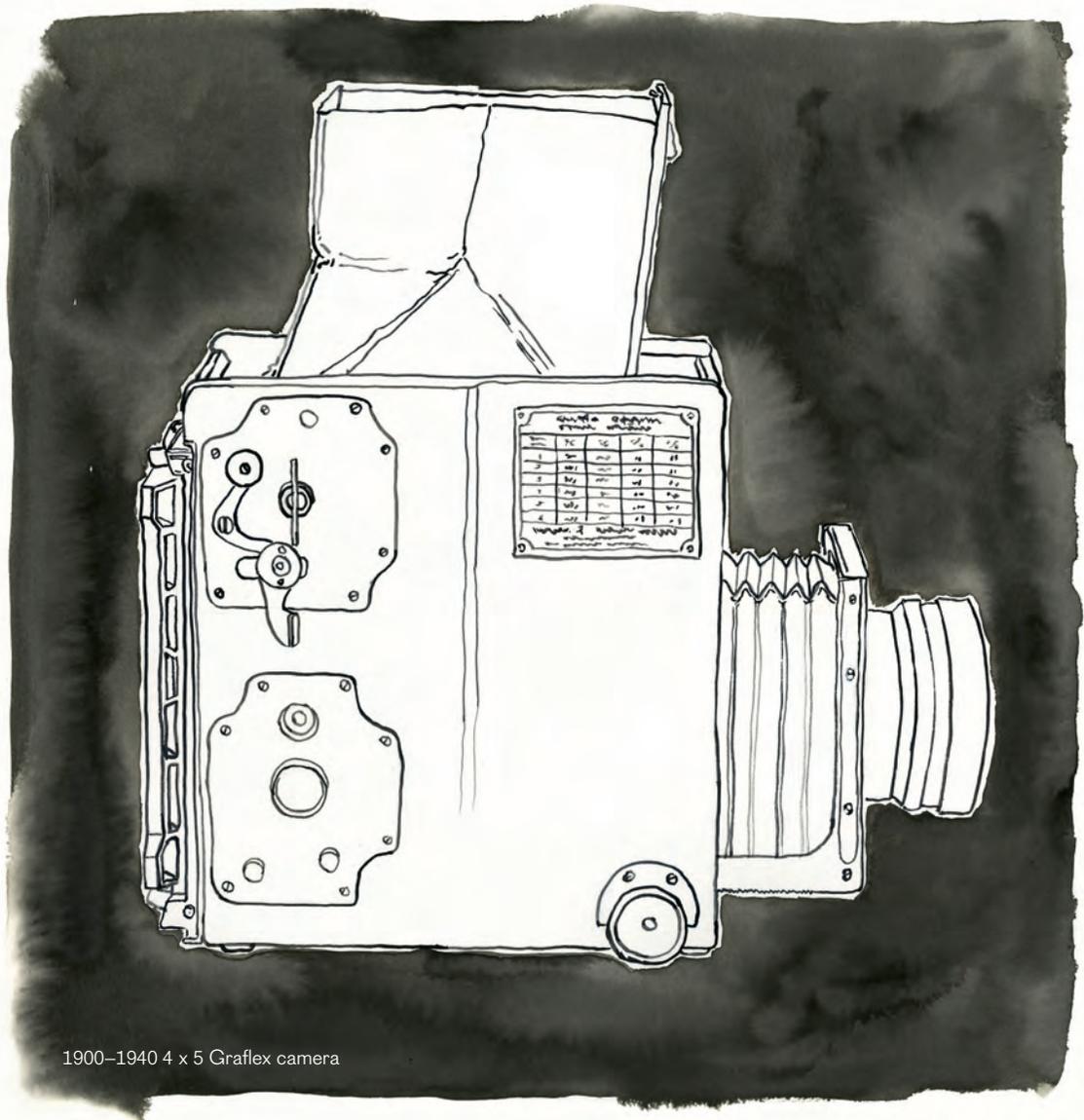
The population of Alaotra Grebe decreased quickly in the 1970s and '80s. Twelve grebes were reported in 1982. The last two were sighted nearby and photographed by Paul Thompson in 1985; this photograph became the only image of the species. Hybrids were seen in 1985, 1986, and 1988, but by 2000, two expeditions had not found any more Alaotra Grebe, and the species was declared extinct in 2010.



48 Extinct Birds Project

Inventory Ledger, Museum of Comparative Zoology, Harvard University

CATALOGUE OF BIRDS IN THE					
Catalogue Number.	Original Number.	Name.	Sex.	Locality.	Nature of Specimen.
7818	6	<i>Hypsipetes madagascariensis</i>	♀	Madagascar, Morondava	Alia
	7	" "	♀	" "	"
	8	" "	♀	" "	"
	9	" "	♀	" "	"
7819	0	" "	♂	" "	"
	1	" "	♀	" "	"
	2	" "	♀	" "	"
	3	" "	♂	" "	"
	4	" "	♀	" "	"
	5	" "	♂	" "	"
	6	" "	♂	" "	"
	7	" "	♂	" "	"
	8	" "	♂	Alia R. Berro, Sib-	"
	9	" "	♂	" "	"
7820	0	" "	♀	" "	"
	1	" "	♀	" "	"
	2	" "	♀	" "	"
	3	" "	♂	" "	"
	4	" "	♂	" "	"
	5	" "	♂	" "	"
	6	<i>Tachypaptus pelzofui</i>	♂	Selabe River	"
	7	" "	♀	" "	"
	8	" "	♀	" "	"
	9	" "	♂	near Malakasy Morondava	"
7821	0	" "	♂	Miandrivazo	"



1900-1940 4 x 5 Graflex camera



More Information about Frederick R. Wulsin, the Collector of This Specimen:

Frederick Roelker Wulsin was born on July 8, 1891, in Cincinnati, Ohio. In 1913, he graduated from Harvard University with a bachelor's degree in philosophy and then enrolled in a year's worth of graduate classes in civil engineering. He collected specimens for Harvard's Museum of Comparative Zoology in East Africa, in 1914, and in Madagascar, in 1915, which is where he collected the skin we have featured in this publication. From 1916-17, he worked for a machinery export company before serving as a lieutenant in the U.S. Army, in intelligence, during World War I. Wulsin was stationed in France with his fiancée, Janet January Elliott, a 24-year-old Red Cross nurse, who was the daughter of Howard Elliott, an affluent railroad executive from New York. The couple was married in 1919. After World War I, the Wulsins went on an ambitious and extensive scientific expedition to China with another couple, Henry and Susanne Emery. In 1923-24, the National Geographic Society sponsored the Wulsins' next trip to China, Laos, and Vietnam. On this trip, Frederick produced over 2,000 photographs with his 4x5 Graflex camera; twenty-eight of these photographs were featured in the "The Road to Wang Yeh Fu," an article for *National Geographic* magazine in February 1926. In 1924, Janet left China to give birth to their son, Frederick Jr. Before heading home to witness the birth, Frederick Sr. finished one more expedition. The couple had two more children, Howard Elliott Wulsin and Janet January Wulsin. During their expeditions, the couple collected 1,400 botanical and zoological specimens and took thousands of photographs. The Wulsins donated their specimen collection to Harvard's Museum of Comparative Zoology. In 1925, Frederick Roelker Wulsin returned to Harvard to get his master's; he received his degree the following year. He continued with his studies and earned his doctorate in anthropology in 1929. The following year, he became the anthropology curator at the University of Pennsylvania

Museum (later known as the University of Pennsylvania Museum of Archaeology and Anthropology) in Philadelphia and then briefly taught anthropology at Boston University from 1935-36. Frederick and Janet later divorced, and Frederick married Susanne Emery, who had recently become a widow; she and her husband, Henry Emery, had accompanied the Wulsins on their first expedition to China. Wulsin returned to his research and writing for the next decade, and in 1945, he began teaching sociology and anthropology at Tufts College (Tufts University), where he stayed until 1957. Fredrick Wulsin died a few years later on February 26, 1961.



Alaoetra Grebe 51



52 Extinct Birds Project



ATITLÁN GREBE

Collection Numbers and Descriptions: . Ornithology 263963 - skin (dry) -
male - 20.25 inches long

Scientific Name: *Podilymbus gigas*

Collection: Museum of Comparative Zoology,
Harvard University, Cambridge, MA

Site of Retrieval: Santa Catarina Palopó on Lake
Atitlán, Guatemala, Central America

Retrieval Date: September 30, 1958

Collector: Jorge Alfonso Ibarra

Last Confirmed Sighting or Collection: 1989

Conservation Status: **Extinct** (1994) – IUCN Red List
of Threatened Species

LAKE ATITLÁN, GUATEMALA



Approximate collection site of specimen

54 Extinct Birds Project

Inventory Ledger, Museum of Comparative Zoology, Harvard University

CATALOGUE OF BIRDS IN THE

Catalogue Number.	Original Number.	Name.	Sex.	Locality.	Nature of Specimen.
263051		<i>Sporophila lineola</i>	♂	Brazil, Goiás, Goiânia	skin
263052		" "	♂	" "	"
263053		" <i>castaneiventris</i>	♂	" Amazonas, Mandos	"
263054		" "	♂	" "	"
263055		" "	♂	" "	"
263056		" "	♂	" "	"
263057		" "	♂	" "	"
263058		<i>Scalis flaveola palzeani</i>	♂	" Goiás, Edeia	"
263059		" "	♂	" "	"
263060		" "	♀	" Goiás	"
263061		" "	♀	" Edeia	"
263062	143	<i>Sterna fuscata</i>	♀	Mass., Chatham	"
263063		<i>Podilymbus gigas</i>	♂	Guat., Santa Catarina	"
263064		<i>Zonotrichia leucophrys</i>	♂	Mass., Barnstable Co., Chatham Mts.	"
263065		<i>Ploceus intermedius</i>	♂	Kenya, Dist. Machakos, Makueni Mts., Lat. 1° 50' S., Long. 37° 18' E.	"
263066		" "	♂	" "	"
263067		" "	♀	" "	"
263068		" "	♀	" "	"
263069		<i>Cossypha natalensis</i>	♀	" Lat. 3° 00' S., Long. 39° 30' E., Shimba Hills, Coast Province	"
263070		" "	♀	" "	"
263071		<i>Pycnonotus xanthopygus</i>	♀	" Lat. 1° 30' S., Long. 37° 48' E., Dist. Machakos, Makueni Mts.	"
263072		" "	♀	" "	"
263073		" "	♀	" "	"
263074		<i>Othyphantes teichemowi</i>	♂	" Lat. 4° 47' S., Long. 37° 15' E., Kiuu Mts.	"
263075		" "	♀	" "	"
263076		" "	♀	" "	"
263077		" "	♂	" "	"
263078		<i>Symplectes bicolor</i>	♂	" Lat. 3° 00' S., Long. 39° 30' E., Shimba Hills, Coast Province	"
263079		<i>Uraeginthus benghalus</i>	♂	" Dist. Machakos, Makueni Mts., Lat. 1° 50' S., Long. 37° 18' E.	"
263080		<i>Hypargos niveiguttatus</i>	♀	Kenya, Province, Lat. 3° 00' S., Long. 39° 30' E.	"
263081		" "	♂	" "	"
263082		" "	♂	" "	"
263083		" "	♀	" "	"
263084		<i>Chlorocichla flaviventris</i>	♂	" "	"
263085		" "	♂	" "	"
263086		" "	♂	" "	"
263087		" "	♂	" "	"
263088		<i>Phyllastrophus fischeri</i>	♂	" "	"
263089		" <i>strapians</i>	♂	Kenya, Dist. Machakos, Makueni Mts., Lat. 1° 50' S., Long. 37° 18' E.	"
263090		" "	♀	" "	"
263091		" "	♀	" "	"
263092		" "	♂	" "	"
263093		<i>Trachyphonus darnaudii</i>	♂	" "	"
263094		" "	♂	" "	"
263095		" "	♀	" "	"
263096		<i>Cameroptera brevicaudata</i>	♂	" "	"
263097		" "	♀	" "	"
263098		<i>Serinus atrogularis</i>	♂	Kenya, Dist. Machakos, Kiuu Mts., Lat. 1° 45' S., Long. 37° 15' E.	"
263099		" "	♂	" "	"
264000		" "	♀	" "	"

Collector	When collected	Received from	When Received	Number of Specimens	Remarks
José Hidasi	5 Jan. 1965	José Hidasi	Nov. 1965		Purchased
"	25 Apr. "	"	"	"	"
"	7 June "	"	"	"	"
"	"	"	"	"	"
"	"	"	"	"	"
"	"	"	"	"	"
"	11 Sept. "	"	"	"	"
"	11 " "	"	"	"	"
"	14 Mar. "	"	"	"	"
"	11 Sept. "	"	"	"	"
Francis G. Shaw	11 Aug. 1962	Dr. Charles Walcott	May 1956	1	Gift
J. A. Ibarra	30 Sept. 1965	Dallas Mus. Nat. Hist.	Feb. 1964	1	Gift
K. Anderson	9 Oct. 1965	James Baird	9 Feb. '66	1	"
David M. Sillu	22 Jan. 1966	David M. Sillu	25 Mar. 1966		Purchased
"	18 " "	"	"	"	"
"	19 " "	"	"	"	"
"	22 " "	"	"	"	"
"	16 Nov. 1965	"	"	"	"
"	18 " 1965	"	"	"	"
"	21 Jan. 1966	"	"	"	"
"	24 " "	"	"	"	"
"	24 " "	"	"	"	"
"	8 " "	"	"	"	"
"	12 " "	"	"	"	"
"	15 " "	"	"	"	"
"	12 " "	"	"	"	"
"	23 Nov. 1965	"	"	"	"
"	26 Feb. 1966	"	"	"	"
"	20 Oct. 1965	"	"	"	"
"	19 Nov. "	"	"	"	"
"	13 Oct. "	"	"	"	"
"	date ?	"	"	"	"
"	26 Nov. 1965	"	"	"	"
"	4 Dec. "	"	"	"	"
"	30 Nov. 1965	"	"	"	"
"	30 " "	"	"	"	"
"	18 " "	"	"	"	"
"	20 Jan. 1966	"	"	"	"
"	25 " "	"	"	"	"
"	25 " "	"	"	"	"
"	23 " "	"	"	"	"
"	23 " "	"	"	"	"
"	24 " "	"	"	"	"
"	22 " "	"	"	"	"
"	22 " "	"	"	"	"
"	15 " "	"	"	"	"
"	15 " "	"	"	"	"
"	12 " "	"	"	"	"

Information about the Specimen's Extinction:

The first Atitlán Grebes were collected in 1926 by Osbert Salvin, an English ornithologist who had participated in four expeditions to Guatemala between 1857 and 1874, but the species was first described by Ludlow Griscom, an American ornithologist, in 1929. The extinction of the Atitlán Grebe occurred over a thirty-year period for a multitude of reasons. It is surprising that a 1934 travel book by Aldous Huxley described Lake Atitlán, bordered by the snow-capped Atitlán, Toliman, and San Pedro Volcanoes, as one of the most beautiful bodies of water in the world. Only a few decades later, the lake's ecosystem would change forever. The dramatic downward spiral of the Atitlán Grebe's habitat began in 1958 when a Pan American World Airways Sikorsky seaplane flew low over Lake Atitlán, dropping largemouth bass (*Micropterus*) in its waters as a way to increase tourism, thus benefiting both area hotels and the airline. While this same bass species is the state fish of Alabama and Florida, it had no predators in this lake and so immediately depleted much of the food source that the grebes had depended on. The loss of crabs, which were the grebes' dietary mainstay, was the most disruptive change. The bass also ate young grebes that wandered off the nests into the waters; the diminished population of baitfish also led to the species' decline. By 1960, there were only two to three hundred grebes, and by 1965, only eighty remained in existence. Due to the efforts of Anne LaBastille and her grebe refuge, the species' numbers increased to 210 by 1973. Unfortunately, the collecting of specimens for museums and private collections continued; one respected naturalist alone collected five specimens in one year during the species' decline.

On February 4, 1974, at three a.m., a 7.5-magnitude earthquake hit the region, killing 22,000 residents and fracturing the lake's bed. The lake's water began to drain out and the water level dropped by twenty feet. The reed beds, which were a major part of the grebes' habitat, dried out. The remaining reeds were cut by locals both to improve access to the lake for tourists and to supply the materials needed for the growing mat-making industry. The grebes' nests and eggs were abandoned by the birds and many of the grebes were also poached by the locals. The water quality of the lake was also degraded as a result of the government's distribution of chemical fertilizer to nearby farmers. As deforestation continued along the lake, the runoff from the six-month-long rainy season flushed the chemicals and loose soil into the lake.



By the early 1980s, the grebes were facing additional perils. Many grebes were drowning in the newly introduced gill-nets, and their nesting sites were increasingly disturbed by growing boat traffic on the lake. The species' recovery was also affected by the 1982 murder of Edgar Bauer, the only lake-patrolling game warden and environmentalist. This murder occurred during the country's civil war, and the civil war also made it more difficult to conduct any additional research or conservation efforts. The Atitlán Grebe's numbers dropped to thirty as the Pied-billed Grebe (*Podilymbus podiceps*) invaded the lake. These numbers continued to drop as the Atitlán Grebe competed with the new species for feeding and breeding grounds. In time, the two species bred with each other and the hybridization weakened the Atitlán Grebe's genetics. The Pied-billed Grebe's ability to fly allowed the species to move to healthier habitats while the number of Atitlán Grebe in existence dropped to four by 1989. The species became extinct in 1994. All that remains of the species in the lake are hybrid populations of the two grebes.

One of the main reasons that most species of flightless grebes around the world are going, or have gone, extinct is the fact that the grebes cannot fly or migrate to healthier habitats. As a result, these species have become stranded on wetlands that are continually degraded.

The fate of the Alaotra and Atitlán Grebes might also befall both the Junín Grebe (*Podiceps taczanowskii*, of Peru), which is listed as critically endangered, and the Titicaca Grebe (*Rollandia microptera*, of Peru and Bolivia), which is listed as endangered. These are the only two remaining flightless grebe species in the world.

More Information about the Atitlán Grebe:

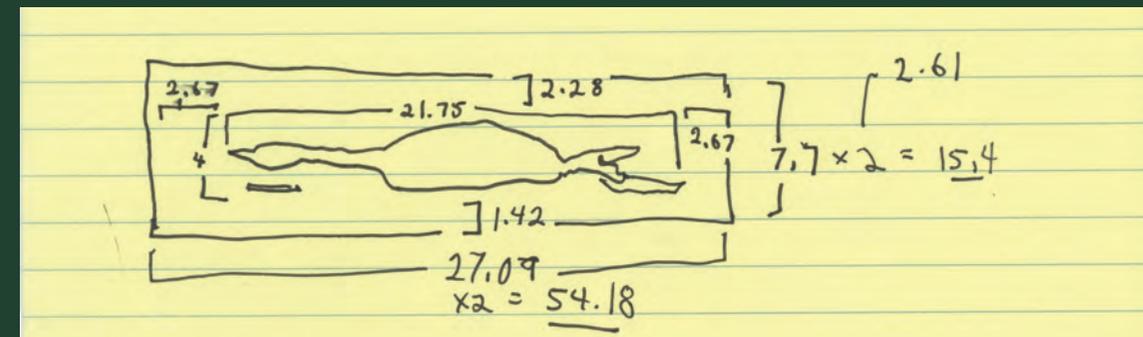
The Atitlán Grebe's only habitat was Lake Atitlán, which is located in southwestern Guatemala; the species was situated there since before the last ice age. The volcanic lake, a collapsed caldera, was created around 84,000 years ago. It is 1,115 feet deep, 12 miles long, up to 7.5 miles wide, and is located 5,125 miles above sea level. The volcanoes that surround the lake rise sharply to 9,000 feet. The brown-eyed, small-winged Atitlán Grebe species, which inhabited the lake's wetlands, laid clutches of four to five 2-inch-long white eggs on nests built on reed beds near the water's edge. If a nest was disturbed by onlookers or researchers, the grebes abandoned the nest and eggs. The eggs were also often poached by the locals in the evenings. Each mating pair of grebes that created a nest shared the ten- to twelve-week period of caring for the young. Both grebes searched for insects, especially dragonflies, and snails to feed their young.

More Information about Jorge Alfonso Ibarra, the Collector of This Specimen:

The Atitlán Grebe specimen featured in this chapter was collected by Jorge Alfonso Ibarra, a Guatemalan naturalist, in 1958. He was born in 1920 in the Mayan city of Quetzaltenango, which is

around sixty-two miles from Lake Atitlán. He was the son of another naturalist, Carlos Ibarra Larrave, and was part of a family of naturalists. At the age of thirteen, Ibarra took over the operation of the zoological museum in his town. By sixteen years of age, he headed the Zoological Museum, Faculty of Natural Science. He continued to supervise the museum for the next decade. He then started working on the creation of the National Museum of Natural History in Guatemala City, which had previously been situated in the Tea Room of the Zoological Park La Aurora. The collection included either specimens that had been donated or animals that had died in the La Aurora Zoo; the collection included a striking skeleton of the zoo's first elephant. Ibarra became the director of the museum in 1952. In 1985, after he had supervised the museum's relocation and new building, the institution was changed to Jorge A Ibarra Natural History Museum. That same year, Ibarra also founded the *Pro Natura* magazine. He is also the author of fourteen books, including the *Fauna and Flora that Colón [Christopher Columbus] Saw 500 Years Ago*. Jorge Alfonso Ibarra died in 2000.

Initial drawing of proportions for Atitlán Grebe painting





Ornithology Archives, Museum of Comparative Zoology, Harvard University



Ornithology Archives, Museum of Comparative Zoology, Harvard University

Atitlán Grebe 59



LAUGHING OWL

Collection Numbers and Descriptions: . Ornithology 232022 - skin (dry) - male - 16 inches long

Scientific Name: *Sceloglaux albifacies*

Collection: Museum of Comparative Zoology, Harvard University, Cambridge, MA

Site of Retrieval: Coastal North Otago Region, South Island, New Zealand

Retrieval Date: 1895

Collector: Walter Lawry Buller

Last Confirmed Sighting or Collection: . 1924

Conservation Status: **Extinct** - 1988 - IUCN Red List of Threatened Species

Painting: Collection of Holly Cumberland



Laughing Owl 61

Recorded range of species in red

Approximate collection site of specimens

Blue Cliffs Station

NEW ZEALAND

Catalogue Number.	Name.	Sex and Age.	Taken at, or near	Date of Capture.	Taken by
232000	<i>Anthus spraguei</i>	♂	Texas, Ogdenville	Feb. 16, 1878	H. Ridgway
232001	<i>Actopus rubescens</i>	♀	France, Ispanide	Feb. 1872	C. J. Maynard
232002	<i>Actopus capensis</i>	♂	S. Africa, Nakuru	Apr. 1, 1917	J. A. Turner
232003		♀		Apr. 1, 1917	"
232004	<i>Fuligula fuligula</i>	79	England, Hampshire	June 17, 1890	"
232005	<i>Charadrius pecuarius</i>	♂	Transvaal		T. S. Cooper
232006	<i>Callinago leucipennis</i>	♀			"
232007	<i>Charadrius tricollaris</i>	♀	S. Africa, Potchefstroom	Oct. 25, 1871	T. S. Cooper
232008	<i>Falco t. bairdii</i>	♂	"	June 30, 1877	"
232009	<i>Gymnopus v. amurensis</i>	♂	"	Mar. 15, 1877	"
232010	<i>Falco tuficollis</i>	♂	"	June 1, 1882	"
232011	<i>Circus n. nanus</i>	♂	"	Feb. 8, 1878	"
232012		♀	"	Mar. 2, 1878	"
232013	<i>Glanis c. caeruleus</i>	-	"	June 4, 1875	"
232014		-	South Africa		Stevens
232015	<i>Accipiter n. nivalis</i>	♂	England, Agrolise	June 1853	"
232016		♀	Idron	Nov. 5, 1879	R. P. Nicholas
232017	<i>Plectrophenax n. nivalis</i>	♀	Wat. Zetina	Apr. 22, 1875	See below H. Brown
232018	<i>Otocoris leucostriata</i>	♀	Himalayas	July 1874	Jordan
232019	<i>Otocoris leucostriata</i>	♂	Sikhim		"
232020	<i>Otocoris leucostriata</i>	♂	Libanon	May 3, 1881	H. B. Priestman
232021		♀	"	May 3, 1881	"
232022	<i>Sceloglaux albifacies</i>	♂	New Zealand, Otago	May 1875	Buller
232023	<i>Cathartix novaeseelandiae</i>	♂	"	"	"
232024	<i>Sula sula</i>	♀	Bay of Panama, Abasco	Apr. 2, 1904	W. W. B. Stone Jr.
232025	"	♀	"	Apr. 2, 1904	"
232026	"	♂	"	Apr. 2, 1904	"
232027	"	♀	"	Apr. 2, 1904	"
232028	"	♀	"	Apr. 2, 1904	"
232029	"	♂	"	Apr. 2, 1904	"
232030	"	♂	"	Apr. 2, 1904	"
232031	"	♀	"	Apr. 2, 1904	"
232032	"	♀	Bay of Panama, San Miguel	Apr. 21, 1904	"
232033	<i>Phalacrocorax c. maculirostris</i>	♂	Anatolia	Nov. 4	Filrod
232034	"	♀	"	July 31	"
232035	"	♀	"	Aug. 24	"
232036	"	♂	Tasmania		"
232037	<i>Phalacrocorax c. carbo</i>	♂	Mass. Warcham.	Spring 1871	F. P. Woodhouse
232038	<i>Ardea americana</i>	♂	"	Nov. 1892	"
232039	<i>Ardea americana</i>	♂	Kamoyun, Korumu	July 28, 1909	Riggenbach
232040	<i>Cathartix leucostriata</i>	♂	Spania, Baina	Sept. 26, 1906	"
232041	<i>Salpinctes obsoletus</i>	♂	"	May 24, 1877	"
232042	<i>Cosmopsarus uicolor</i>	♀	Satele East Africa		"
232043	<i>Troglodytes jobensis</i>	♀	New Guinea	Dec. 5, 1912	"
232044		♂	"	July 19, 1912	"
232045	<i>Meliphaga cinerea</i>	♂	"	June 13, 1913	"
232046		♀	"	May 28, 1913	"
232047	<i>Meliphaga cinerea</i>	♀	"	June 13, 1913	"
232048		♂	"	June 13, 1913	"
232049	<i>Philemonopsus inopis</i>	♀	"	Aug. 8, 1913	"





Ornithology Archives, Museum of Comparative Zoology, Harvard University

More Information about the Laughing Owl:

While most of the documentation relating to the Laughing Owl is found on the South Island, Stewart Islands, Chatham Islands, and Little Barrier Islands, there is some controversy over the possible existence of a subspecies, *Sceloglaux rufifacies*, on the North Island. There are records of two specimens of the *rufifacies* being collected, but both skins were later lost. Subfossils, the partly fossilized remains of an organism, have also been found, but many ornithologists doubt the likelihood that this subspecies ever existed.

Eyewitness documentation made by naturalists notes that Laughing Owls lived mostly either in rocky, low rainfall areas in open country or on the edges of forested areas. The species made its nests in cracks in rock faces, rock ledges, and under boulders, as well as in caves. The nests were constructed on the ground with dried grasses and debris collected from the birds' prey. Eggs were laid between September and October; layings were usually composed of two white eggs, each around two inches by one inch in size. The eggs were incubated by the female owl for roughly three to four weeks, and then the nestlings were fed by the male during the rearing period, which lasted through November, the end of New Zealand's springtime. The owls secured their prey by foot instead of hunting by air. The adult owls, which could live up to eighteen years, weighed as much as twenty-one ounces and reached a wing span of nearly two feet. Their eyes were large and brownish-orange in color.

The name Laughing Owl refers to the owls' loud, high-pitched, repeated shrieks, which were most often heard when the owls were flying on rainy nights.

More Information about Walter Lawry Buller, the Collector of This Specimen:

Walter Lawry Buller was born on October 9, 1838, in Pakanae, which is situated on the northwestern part of the North Island in New Zealand. His father was Reverend James Buller, a Methodist missionary from Cornwall, United Kingdom. In 1854, Walter Lawry Buller moved to Wellington, the capital of New Zealand, where he met a well-known naturalist and artist, William John Swainson. Buller later practiced law in England and earned his doctorate in natural history at the University of Tübingen, Germany, before returning to Wellington. He married Charlotte Mair, and the couple had four children. In 1873, Buller published *A History of the Birds of New Zealand*, a book that would have many subsequent editions as Buller continued to write papers for the New Zealand Institute's *Transactions* journal. Strangely enough, Buller felt that much of New Zealand's flora and fauna would be inevitably replaced by invasive species, and he rejected much of—what were then—new visionary conservation efforts being pioneered by naturalists like T. H. Potts. Perhaps as a result of these beliefs, Buller provided lackluster support for sanctuaries and continued to collect rare birds for his personal collection and for others' collections as well. In 1889, Buller was awarded the National Order of the Legion of Honour by France for his scientific display that year at the Paris Exhibition, a world's fair. Buller made three unsuccessful attempts to be elected to New Zealand's parliament, after which he moved to England, where he died on July 19, 1906, in Fleet. A play about his life, *Dr. Buller's Birds*, was written and performed at the New Zealand International Arts Festival in 2006.

Image by Cuthbert & Oliver Parr, Raincliff Station, Opihi River, South Canterbury, 1909



Laughing Owl 67



68 Extinct Birds Project





KAUA'I 'O'O

Collection Numbers and Descriptions: Ornithology 34872 - skin (dry) - female - 8 inches long

Scientific Name: *Moho braccatus / acrulocercus braccatus*

Collection: Museum of Comparative Zoology, Harvard University,
Cambridge, MA

Site of Retrieval: Kapa'i, Hawaiian Islands

Retrieval Date: September 1888

Collector: Scott Barchard Wilson

Last Confirmed Sighting or Collection: 1987

Conservation Status: **Extinct** - 2000 - IUCN Red List of Threatened Species

Inventory Ledger, Museum of Comparative Zoology, Harvard University

CATALOGUE OF BIRDS IN THE

Catalogue Number.	Original Number.	Name.	Sex.	Locality.	Nature of Specimen.
3486	1	<i>Acrulocercus nobilis</i>	♂	Hawaii	Not d.
	2	<i>Hemignathus olivaceus</i>	♂	"	"
	3	<i>Bernicla sandvicensis</i>	♀	"	"
	4	<i>Phalaropus fulvipes</i> <i>Phalaropus fulvipes</i>	♂	" Waimia	"
	5	<i>Chasiempis dolei</i>	♀	" Kauai	"
	6	<i>Himatione virens</i>	♂	"	"
	7	<i>Oreomyza Bairdi</i>	♂	" Kauai	"
	8	<i>Chrysomitris caeruleiventris</i>	♀	" "	"
	9	<i>Phaethon obscura</i>	♀	" Waimia	"
34870		<i>Loxioides Bailleui</i>	♂	"	"
	1	<i>Himatione sanguinea</i>	♂	Oahu	"
	2	<i>Acrulocercus braccatus</i>	♀	Kauai	"
	3	775 <i>Sialia arctica</i>	♂	Rocky Mts.	Not d.
	4	" "	♀	"	"
	5	971. " "	♂	El Paso Co. Col.	"
	6	774. <i>Sialia mexicana</i>	♂	California.	"
	7	841. " "	♀	" ?	"
	8	970 " "	♂	White Mts. Arizona.	"
	9	912. <i>Sialia sialis</i>	♂	Cook Co. Ills.	"
34880	929.	" "	♀	Madison Co. N. Y.	"
	1	1343 <i>Lariccola oenanthe</i>	♀	Disco Isl. Greenland.	"
	2	1550 " "		Chamisso Isl. Alaska.	"
	3	1551 " "		?	"
	4	1572 <i>Merula migratoria propinqua</i>			"
	5	916 <i>Merula migratoria</i>	♂	Madison Co. N. Y.	"

MUSEUM OF COMPARATIVE ZOÖLOGY.

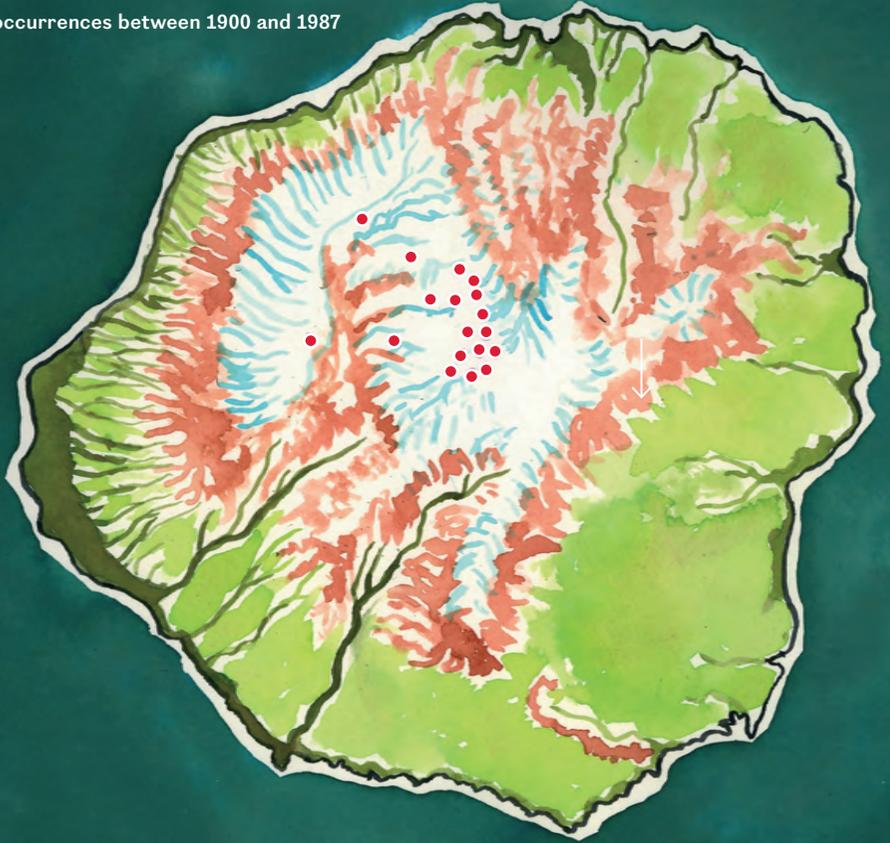
Catalogued by _____ in _____

When Collected.	Received from	When Received.	REMARKS.
May '87	A. Agassiz	Aug 92	
March '87	"	"	
Nov '87	"	"	
Feb 1888	"	"	DISCARDED
Sept '88	"	"	
June '87	"	"	
" '88	"	"	Bill pinkish brown, upper mand darker, legs very light brown yellowish underfoot.
" "	"	"	
Jan '88	"	"	
June 1877	"	"	
Oct '88	"	"	
Sept '88	"	"	
	Mrs. Irene Smith	1892	709 a
	1876	"	768
C. E. Aiken	Oct 16, 1877	"	765 DISCARDED
F. Gruber	1892	"	769
J. G. Bell	April	"	767
C. E. Aiken	Oct 5, 1876	"	762 DISCARDED
	May 1878	"	766 DISCARDED
	"	"	768 DISCARDED
Ludwig Kunze	Aug 5, 1878	"	765 DISCARDED
T. H. Bean	Winter	"	765
J. G. Bell	Summer	"	765
	"	"	767 a DISCARDED
	June 78	"	761 DISCARDED

KAUA'I, HAWAII



● Incidental occurrences between 1900 and 1987



Data sourced from Hawaii Natural Heritage Program and Hawai'i Department of Land and Natural Resources

Kaua'i 'O'o 71

Detail of 'Ōhi'a Lehua tree



Information about the Specimen's Extinction:

While eight bird species were declared extinct in the two hundred years before Captain James Cook arrived on the Hawaiian Islands on January 18, 1778, twenty-seven more birds have been added to that list since, and five more birds are currently on the verge of being considered for that distinction. The Kaua'i 'O'o is among the twenty-seven birds declared extinct since Cook's arrival. The species' extinction may in large part be attributed to foreign intervention. The species is also the smallest one of a group of five nectar-feeding honeyeaters, all of which have also gone extinct. John Cassin was the first to describe the species to the scientific community in the "Proceedings of the Academy of Natural Sciences of Philadelphia" in 1855.

While little is known about the species since its discovery, the Kaua'i 'O'o is the only one of the honeyeaters that has been recorded and filmed. The other birds in the group became extinct shortly after they were discovered and even less is known about their behaviors and habits.

Moho braccatus (Kaua'i 'O'o) was native to, and could be found only on, the island of Kaua'i, Hawaii. In the 1800s, the birds were very common throughout the island. But by the 1890s, a noticeable decline in numbers was observed. There were several reasons for this decline. Initially, the decline was caused by the introduction to the Kaua'i lowlands of rats, pigs, and mosquitos carrying avian diseases. But the species' decline continued as the result of ongoing deforestation and habitat destruction. The establishment of feral goats further degraded habitat conditions. The *Moho braccatus* moved to higher elevations to escape the mosquitos, but the forest in that region had trees with smaller cavities, which affected the species' building of its traditional nests. The substitute habitat also offered fewer of the

plants needed for nutrition. The species' decline was also accelerated by a major increase in collecting during the 1890s. Over eighty specimens collected during this period can, to this day, be viewed in institutions. One collector alone—Henry Palmer, a collector for naturalist Walter Rothschild in England—collected twenty specimens in a single year, 1891. Palmer's apparent greed in collecting such a large number of specimens prompted Alfred Newton, a naturalist from Cambridge University, to criticize Palmer for, "pillaging the avifauna during his sojourn from December 1890 to August 1893." While institutional records show an indiscriminate amount of collecting occurring during a period when the birds' existence was most vulnerable, there is, unfortunately, no documentation of the many additional birds killed by commercial collectors for private collections or of the countless specimens lost in the field or mutilated during the process of collecting. We will never know those figures.

Thus, by the beginning of the 1900s, the species' population had decreased even more. By 1920 it was rare to find a Kaua'i 'O'o, and by 1940, the species was believed to be extinct, although a few birds were sighted in 1950. Surprisingly, collecting by naturalists continued during this period, and, in 1960, two males were collected for institutions. Between 1968 and 1973, only thirty-six birds were estimated to remain on the island. Even this number continued to decline, and soon the only remaining birds were found in valleys of the central Alaka'i Wilderness Preserve. It was also during this time that the only footage of the bird in the wild was shot; several sound recordings were also collected. By 1981, only a single pair remained. The female is believed to have perished during Hurricane Iwa, which hit the island on November 23, 1982. The male survived and was seen again in 1985. The last sound recording of a Kaua'i 'O'o in the wild was made by David Boynton in 1987; the recording was of that last remaining

male as it performed a mating call to its female partner, which had presumably died in Hurricane Iwa. Surveys in 1989 found no evidence of the species, and the final blow to the species' recovery occurred when Hurricane Iniki struck the island on September 11, 1992, with sustained winds of 130 miles per hour. As a result, most of what remained of the species' habitat was destroyed and, with it, the hope of ever seeing a Kaua'i 'O'o again. Survey expeditions in 1994, 1996, and 2000 confirmed the extinction of the species.

The Macaulay Library of Cornell Lab of Ornithology has digital files of audio recordings and footage of the *Moho braccatus*, and these files are available online to the general public. This is a rare treasure since there is no such documentation for most of the world's extinct birds, and there are very few people still alive who have ever heard the species' calls in the wild.

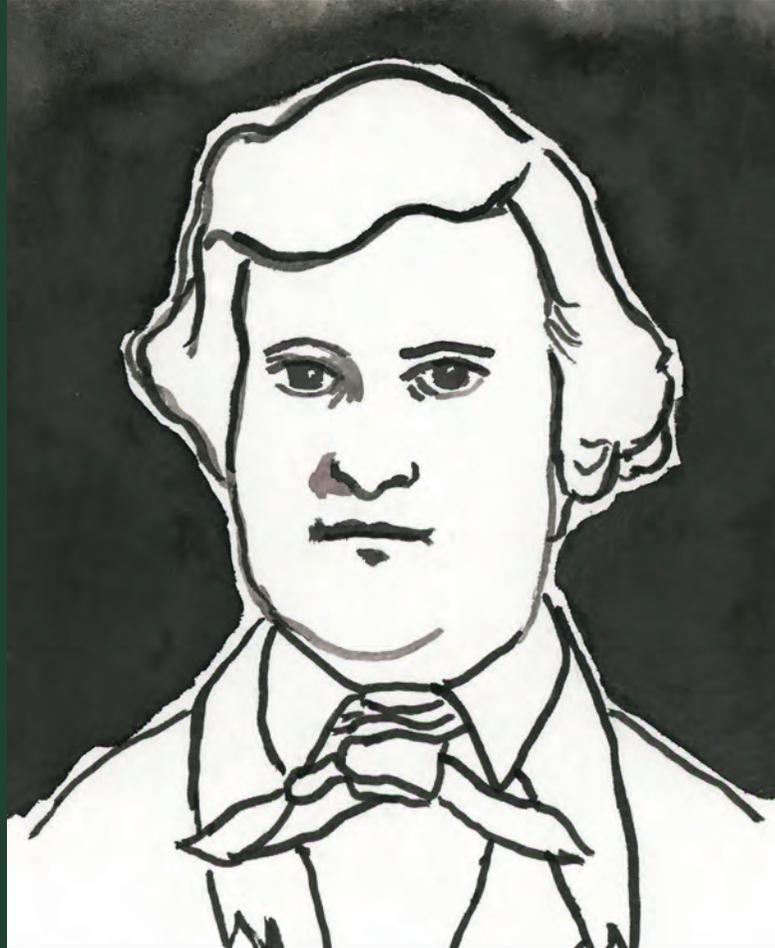
More Information about the Kaua'i 'O'o:

As previously mentioned, little is known about the Kaua'i 'O'o or about Hawaii's four other species of honeyeaters. The Hawaiians called the honeyeaters "Ö'ö" and the natives of Kaua'i named their bird "'ō'ō 'ā'ā," meaning 'dwarf.' Like other honeyeaters, the Kaua'i 'O'o possessed a slightly curved beak, which helped the species to better access the nectar of the long tubular flowers of the lobelia plants. The birds' beaks could also penetrate through the mass of bright red stamens of the 'Ōhi'a Lehua tree and into the large bulky stamens of the lowland 'Ie'ie or *Freycinetia arborea*. The birds also fed on small snails, cockroaches, and spiders.

The species' nests were usually found in the cavities of large trees, such as the 'Ōhi'a Lehua tree. While little is known about the birds' breeding behavior, both parents were observed to feed their nestlings, and both were capable of singing.

More Information about Scott Barchard Wilson, the Collector of This Specimen:

Scott Barchard Wilson was born in 1865. He was the son of a renowned chemist and successful commercial candlemaker, George Fergusson Wilson. In 1887, while attending Magdalene College in Cambridge, England, Scott Barchard Wilson was sent by his zoology professor, Alfred Newton, to collect and explore the birds of the Hawaiian Islands. On this trip, Wilson explored the highlands of Kalae in Moloka'i and discovered the Moloka'i creeper. He later described his process, "While we were wandering about and searching for the trail, I heard a curious sound--a continued chip, chip, chip, not unlike the sound of chopping wood. At first I did not think it could belong to a bird; soon, however, I was undeceived, as a flash of brilliant orange colour passed us in the fog. ... The continuous metallic note enabled me to get within range and I fired, bringing down two birds, which proved to be male and female. Soon afterwards I shot another of the bright-colored males. We had by this time hopelessly lost our way, and the consequences might have been serious; so we were extremely glad to hear revolver shots at no great distance, which proved to be fired by Mr. Meyer's sons, who had come in search of us." Rudolph Wilhelm Meyer was the owner of a local sugar mill and food supplier of the nearby leper colony.



John Kirk Townsend

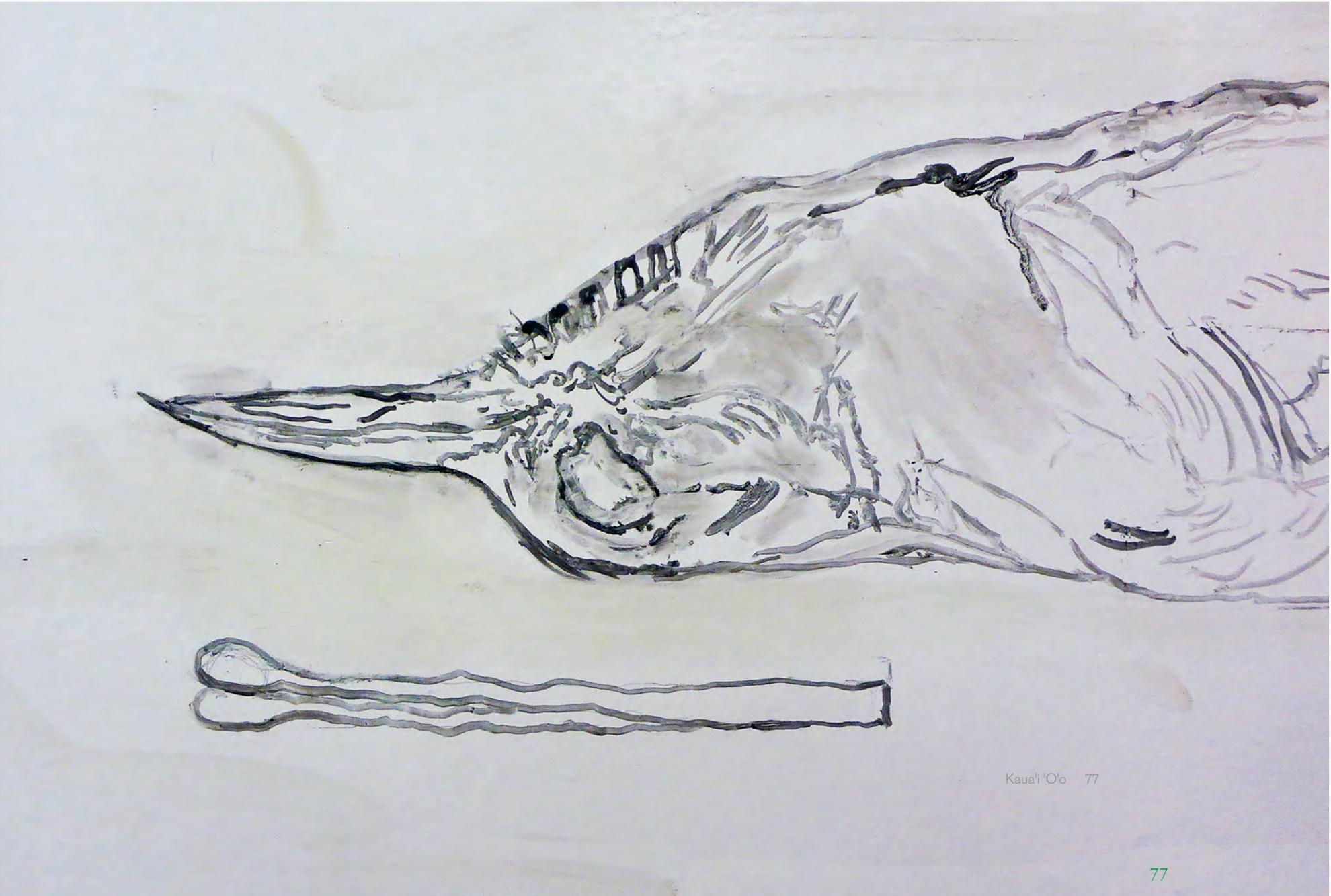
Explorers of the island KAUAI

- 1778 January - Townsend and Nuttail (Townsend 1839)
1840 October - United States Exploring Expedition
(Wilkes 1845, Peale 1848, Cassin 1858)
1866 Knudsen (Ridgeway 1882)
1886 - 1893 . Knudsen (Stejneger 1887, 1888, 1890)
1888 April / September - Wilson
1890 December - Palmer
1891 April - Palmer
1891 April - Wilson
1892 February / November - Wilson
1893 January / November - Hans Isenberg
1893 June - August - Palmer
1894 May - June - Perkins
1895 April - May and October - November - Perkins
1895 / 1896 . Han Isenberg
1896 July - August - Perkins
1897 January - February - Perkins

After several months of research and collecting, Wilson returned to England to publish his research with the assistance of the artist Frederick William Frohawk. Together, they put together the publication *Aves Hawaiienses: The Birds of the Sandwich Islands*. The Sandwich Islands was what Captain Cook had called the Hawaiian Island when he landed there in 1778; the islands were named after one of his sponsors, John Montague, the Earl of Sandwich. The book that Wilson and Frohawk assembled is considered one of the great ornithological works on the Hawaiian Islands. It was published in seven parts over a dozen years and was provided to those who subscribed to the publication. The publication, which documented many of the species that have since become extinct, included sixty-four hand-colored lithographed plates, three photogravure plates of nests, and three plain lithographic anatomical plates.

Wilson's successful research trip motivated another of Professor Newton's students, Lord Lionel Walter Rothschild, to pursue his own discoveries before the bird's habitat on the Hawaiian Islands was irreversibly altered and the birds were permanently replaced by their predators. As the Second Baron Rothschild of Tring, Lord Lionel Walter Rothschild was wealthy enough to hire Henry Charles Palmer, as well as a New Zealand assistant, George C. Munro, to collect specimens for him in Hawaii. Palmer's zeal for collecting provided him with many discoveries on the island, but his unethical collecting practices earned the scorn of many naturalists working in the region. It was in 1893, on one of his trips collecting specimens in the humid rain forest in Kaua'i, that Palmer developed a severe lung infection, which ended his time in Hawaii. He later battled chronic bronchitis for two years before his death.

Even though Wilson returned to Hawaii several times and discovered a dozen bird species, he often had to battle the ridicule of his colleagues, the aforementioned Lord Lionel Walter Rothschild, Alfred Newton, and Henry Palmer, who perceived Wilson's lack of exuberance for collecting as a weakness and who were never satisfied with his diligence in research. Later in life, Wilson endured years of despair, living in the shadow of his father, facing a stagnant career, and working through financial struggles caused by poor investments. In late January of 1923, in the small village of Everton, England, Wilson committed suicide with a gunshot wound to his head.



Kaua'i 'O'o 77

A world map with a red pin on the California coast. The map is light blue and white, showing the outlines of continents. The red pin is located on the west coast of North America, specifically on the California coast.

SANTA BARBARA SONG SPARROW

Collection Numbers and Descriptions: . . . Ornithology 149910 - skin (dry) - male - 5.75 inches long

Scientific Name: *Melospiza melodia graminea* / *Zonotrichia melodia graminea*

Collection: Museum of Comparative Zoology, Harvard University, Cambridge, MA

Site of Retrieval: Santa Barbara Island, California

Retrieval Date: August 10, 1930

Collector: Adriaan Joseph Van Rossem

Last Confirmed Sighting or Collection: 1960s

Conservation Status: **Extinct** - October 12, 1983 - U.S. Fish and Wildlife Service



Santa Barbara Song Sparrow 79

Information about the Specimen's Extinction:

The first specimen of the Santa Barbara Song Sparrow was collected on February 13, 1890, by C. H. Townsend and was later described by him in the Smithsonian Institution's publication "Proceedings of the United States National Museum" that same year. This sparrow lived only on Santa Barbara Island, which is the smallest of the Channel Islands and is situated roughly thirty miles off the coast of Los Angeles. The diminutive size of this 639-acre island made a more vulnerable habitat for all its species since, unlike a larger body of land, the tiny island could not provide alternate habitats if needed. Despite this risk, reports from 1889 noted that the number of Santa Barbara Song Sparrows was extremely abundant, and these numbers remained stable up until 1944. Soon thereafter, however, the species' numbers diminished for multiple reasons. Clear-cutting had begun in order to prepare the land for farming, and the sparrow's nesting habitat of sagebrush and coreopsis was diminished. The habitat was further affected by the introduction of goats and European rabbits. In the 1950s, the rabbit population exploded, and, from 1954 through 1958, the National Park Service tried to control the population by poisoning (with strychnine) and shooting the rabbits. In addition, the species was already facing threats posed by its natural predators (the American Kestrel, Common Raven, and Loggerhead Shrike) when the recently arrived settlers to the island introduced domesticated cats to this habitat, further threatening the sparrow's nesting areas. The final blow came in the summer of 1958 when a large fire destroyed much of what remained of the sparrows' habitat. It is believed that the Santa Barbara Song Sparrow became extinct in the 1960s. Intensive surveys since have not found any remaining birds. The U.S. Fish and Wildlife Service removed the species from its endangered species list and classified it as extinct on October 12, 1983. The Santa Barbara Song Sparrow was the first American bird to become extinct since the federal Endangered Species Act was passed in 1973.

CATALOGUE OF BIRDS IN THE

Catalogue Number.	Original Number.	Name.	Sex.	Locality.	Nature of Specimen.
149901		Motococcyx e. erythropycus	imm. ♀	Salvador: Isla Union, Pine Peaks	Skin
149902		Crotophaga a. sulcirostris	♂	" : San Salvador	"
149903		" " "	♀	" " "	"
149904		Carpodacus mexicanus clementis	♂	Californiam: San Clemente Is.	"
149905		" " "	♀	" " "	"
149906		" " "	♂	" " "	"
149907		" " "	♀	" " "	"
149908		" " "	♂	" " "	"
149909		" " "	♀	" " "	"
149910		Melospiza melodia graminea	♂	" : Santa Barbara.	"
149911		" " "	♀	" " "	"
149912		" " "	imm. ♀	" " "	"
149913		Myioborus miniatus comitatus	♂	Salvador: Los Escamiles, Chalatenango	"
149914		" " "	♀	" " "	"
149915		Yeornivora s. superciliosa	♂	" : P. Sonsonate, Vol. Santa Ana	"
149916		" " "	♀	" " "	"
149917		Basiluterus rufifrons delattrei	♀	" : San Salvador	"
149918		" " "	♂	" " "	"
149919		" " "	?	" : San Miguel, L. Olomega	"
149920		" " "	?	" " "	"
149921		Chamaethypis c. caninucha	♀	" : Sitio del Niño	"
149922		" " "	♂	" : San Salvador	"
149923		" " "	♂	" : Sitio del Niño	"
149924		" " "	♂	" : P. Sonsonate, Sonsonate	"
149925		Lophozosterops dohertyi	♂	Sumatra: Tambora	"
149926		Lophozosterops suberistata	♂	S. Flores Is. 3300 ft.	"
149927		Eremophila alpestris atlas	♂	Marocco: above Harou, middle Atlas	"
149928		Nestor notabilis	-	Died at Franklin Park Boston	"
149929		Pandion h. carolinensis	♀	Bahamas : Off Watlings Id.	"
149930		Spinus cucullatus	167	-	"
149931		" " "	-	-	"
149932		Chaemepelia passerina navassa	-	Navassa Island.	"
149933		Coscinatus africanus	-	Namur, Zululony	"
149934		Regulus l. europaeus	♂	Prunigena, Stralauwald	"
149935		" " "	♀	Germany, Peitzig bei Frankfurt	"
149936		Parus a. salicarius	♀	" " "	"
149937		Colinus leucos. turvini	♂	B. Z. Africa, B. u. a. G. M. I.	"
149938		Rhinopomantus s. minor	♂	Ethiopia, Dire Dawa	"
149939		" " "	♀	" " "	"
149940		Rhinoptilus c. cinotus	♀	" Malata	"
149941		Alcedo p. diubata	♂	Reuzé Colony, HDI	"
149942		" " "	♀	" " "	"
149943		Pterocles sug. senegalensis	♂	" " "	"
149944		" " "	♀	" 10 m. S. Cape Ruff	"
149945		Pterocles sug. senegalensis	♀	Ethiopia, Curas	"
149946		" " "	♂	" Dire Dawa	"
149947		Trochiloides l. abramis	♂	" Hawaiian River	"
149948		" " "	♀	" Vasa Bridge, New York	"
149949		Pterodroma l. littoralis	♂	" Black Lake, Cuba	"
149950		" " "	♀	" Bato River near Bardula	"

MUSEUM OF COMPARATIVE ZOOLOGY.

Number of specimen.	Collected by	When Collected.	Received from	When Received.	Number of Specimens.	Remarks.
"	H. J. van Rossem	4 Mar. 1926	Exch. fr. D.R. Pichey			
"	"	24 Feb. 1912	"			
"	"	" " "	"			
"	R. B. Howell	23 Mar. 1915	"			
"	"	23 " "	"			
"	"	29 " "	"			
"	"	31 " "	"			
"	"	2 Apr. "	"			
"	"	3 " "	"			
"	H. J. van Rossem	10 Aug. 1930	"			
"	"	" " "	"			
"	"	" " "	"			
"	"	24 Feb. 1927	"			
"	"	5 Mar. "	"			
"	"	8 May "	"			
"	"	17 " "	"			
"	"	28 Feb. 1912	"			
"	"	12 Mar. 1925	"			
"	H. Miller	6 Aug. 1925	"			
"	"	7 " "	"			
"	H. J. van Rossem	15 May 1912	"			
"	"	18 Apr. "	"			
"	"	15 May "	"			
"	H. Miller	13 July 1925	"			
"	"	Apr. - May 1916	Exch. fr. Tring			
"	"	Oct. 1876	"			
"	"	1-2-1925	"			
"	"	22 Aug. 1920	"			
"	Frank Hens	12 Oct. "	"			
"	"	"	Boston Museum			
"	"	"	"			
"	Rhader	"	"			
"	Simon Jacob	1926 Exch. from Berlin	"			
"	"	May 21, 1911	"			
"	"	Oct. 20, 1911	"			
"	"	Feb. 25, 1911	"			
"	"	July 29, 1911 Exch. from U.S. Nat. Mus.	"			
"	"	Dec. 14, 1911	"			
"	"	Oct. 1911	"			
"	E. A. Mearns	June 22, 1912	"			
"	"	June 21, 1912	"			
"	"	June 20, 1912	"			
"	"	June 19, 1912	"			
"	"	June 18, 1912	"			
"	"	June 5, 1911	"			
"	"	July 1, 1911	"			
"	E. A. Mearns	Feb. 6, 1912	"			
"	"	Feb. 4, 1912	"			
"	"	Mar. 27, 1912	"			
"	"	Apr. 2, 1912	"			

Inventory Ledger, Museum of Comparative Zoology, Harvard University

SANTA BARBARA ISLAND, CALIFORNIA



30 miles to Los Angeles

Santa Barbara Song Sparrow 81

More Information about the Santa Barbara Song Sparrow:

Not a great deal is known about the Santa Barbara Song Sparrow, especially when we compare what we know about this species to what is known about other song sparrows. It is believed that the Santa Barbara Song Sparrow was descended from the coastal birds of Ventura County. The sparrow's habitat on Santa Barbara Island included sagebrush, coreopsis, shrubby buckwheat, chicory, and other shrubs, which the birds used for nesting and cover. The sparrows fed on plant seeds, beetles, caterpillars, ants, flies, bees, and wasps. The island provided plenty of fresh running and standing water for the birds.

More Information about Adriaan Joseph "Van" Van Rossem, the Collector of This Specimen:

Adriaan Joseph "Van" Van Rossem was born in Chicago on December 17, 1892, to Adriaan Cornelis Van Rossem and Josephine Williams Van Rossem. The family had moved from London to Chicago so that the elder Adriaan Van Rossem could expand his international business exchange. He had been quite successful in Europe and proved to be successful in the United States as well, but he died at an early age in 1895. Josephine Van Rossem then moved the remaining family, which consisted of her and the couple's two young sons, to Pasadena, California, where she had a house built overlooking Arroyo Seco. At eight years old, Adriaan Joseph Van Rossem, also known as "Van," met Joseph Grinnell, a naturalist who taught at Adriaan's school at the Throop Institute (now, the California Institute of Technology). After Grinnell left the school to move to Berkeley, Van Rossem corresponded with him for more than a decade. By the time he was nineteen, Van Rossem had published five articles about his trips to Coronado Island, Salton Sea, and El Salvador. By the time he was twenty-one years old, he had

collected thirty thousand bird specimens. A couple of years later, he married Grace Burr Coolidge; the couple later had two sons, Donald Richard and Adriaan Peter. A year after the wedding, Van Rossem met another naturalist, Donald R. Dickey, whom he then worked for over the next thirteen years. Soon after their meeting, Dickey persuaded Van Rossem to go to college, and so "Van" finally began his academic education, enrolling at Occidental College in Los Angeles. Van Rossem and Dickey had a very successful relationship, but when Dickey died, financial support for Van Rossem's research was cut off. During this time, Van Rossem also got divorced from his first wife. He married his second wife, Florence S. Stevenson, in 1934. Van Rossem continued his research and, six years later, Dickey's widow made a deal with University of California, Los Angeles, to donate her husband's collection of sixty thousand birds if Van Rossem would be hired to manage the collection. The university agreed, and "Van" became the curator of the Dickey Collection (a position now called senior museum zoologist). Four years later, Van Rossem's second wife, Florence, passed away. He re-married, and his new wife, Dorothy Sanderson, was someone who had worked with Donald Dickey for many years. Unfortunately, she died two years later. During his time at UCLA, Van Rossem continued with his research. He was awarded the Brewster Award for his book *The Birds of El Salvador*, which became his finest accomplishment. "Van," by this point, was recognized as one of the world's experts on Mexican and Central American birds and had written over two hundred articles and books. In 1948, the year before he died at age fifty-six, he was awarded an honorary Doctor of Science degree from Occidental College. Loye H. Miller, a colleague who had worked with Van Rossem in his later years, named an extinct shorebird after him. It is called the *Limosa vanrossemei*.



No. 581.A. $\frac{2}{3}$ Duct

Name *Melospiza melodia*
Santa Barbara

Locality Santa Barbara
see Duct



M. C. Z. 11635

NAME OF BIRD		A. O. U. No. 5874
<i>Melospiza cinerea graminea</i>		Set Mark 7/4H
LOCALITY	Santa Barbara Is., Cal coast	
COLLECTOR	O. W. Howard	DATE April 6th 1906
Incubation	fresh	Nest in green bush
well concealed - 4 feet above ground - nest made of mud stems, lined with vegetable fibers		
bird shot - nest with set		Altitude 200 Feet

X

FROM COLLECTION OF O. W. HOWARD, P. O. BOX 484, LOS ANGELES, CAL.

84 Extinct Birds Project

Ornithology Archives, Museum of Comparative Zoology, Harvard University

Santa Barbara Song Sparrow eggs and nest
Ornithology Archives, Museum of Comparative Zoology, Harvard University



Santa Barbara Song Sparrow 85



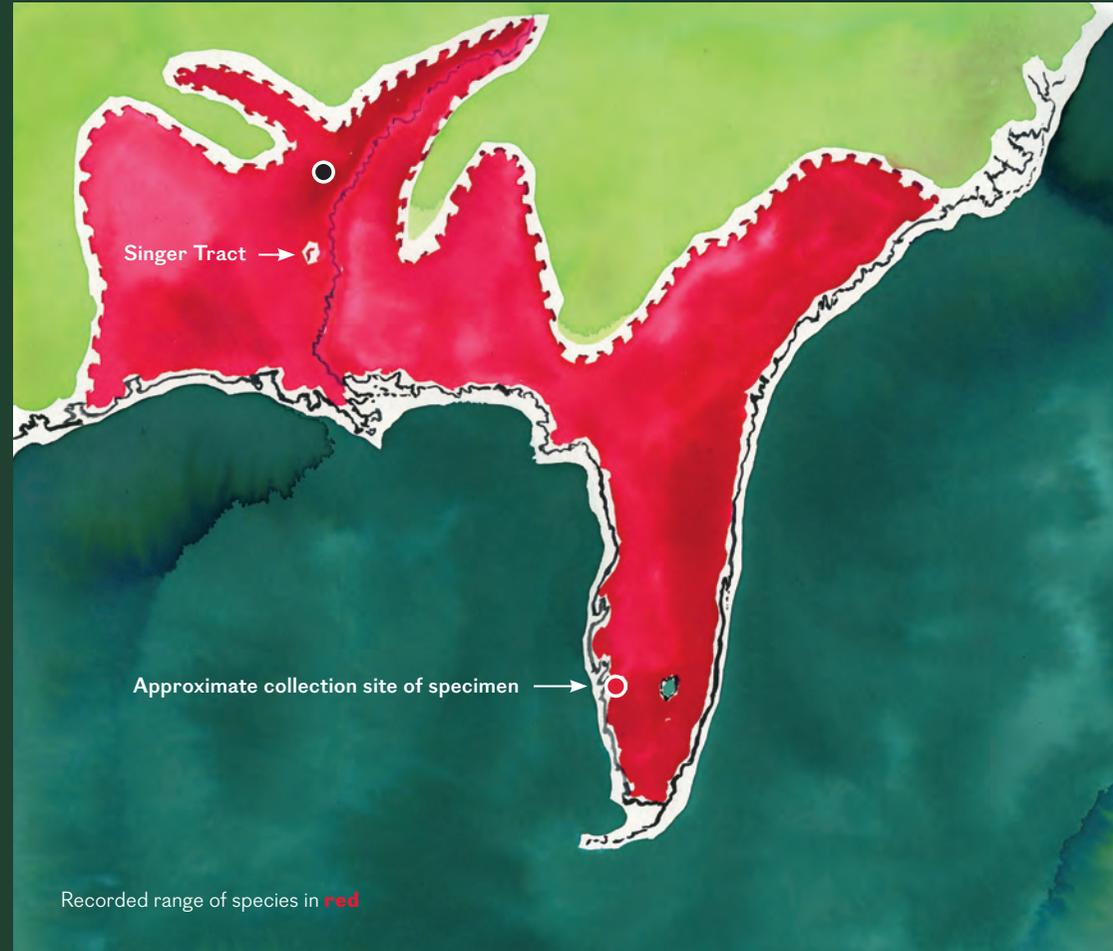
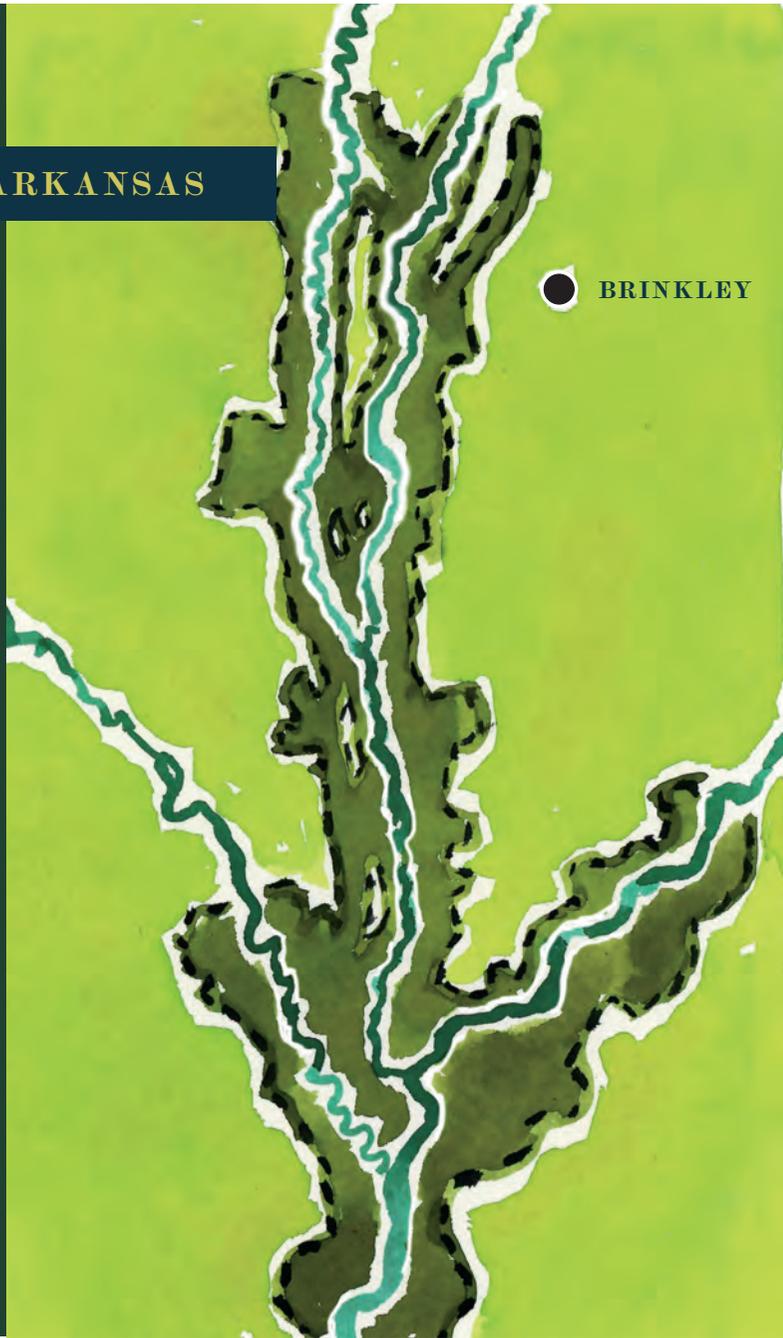


IVORY-BILLED WOODPECKER

Collection Numbers and Descriptions: . . . Ornithology 181795 - skin (dry) - male - 19.5 inches long
Scientific Name: *Melospiza melodia graminea* / *Zonotrichia melodia graminea*
Collection: Museum of Comparative Zoology, Harvard University, Cambridge, MA
Site of Retrieval: Lee County, Florida
Retrieval Date: February 15, 1908
Collector: Walter P. Henderson
Last Confirmed Sighting or Collection: . . . 1944
Conservation Status: **Extinct** - 1994-96, **Critically Endangered** - 2004-15 -
IUCN Red List of Threatened Species
Painting: Collection of James Sutton

Ivory-Billed Woodpecker 87

BRINKLEY, ARKANSAS

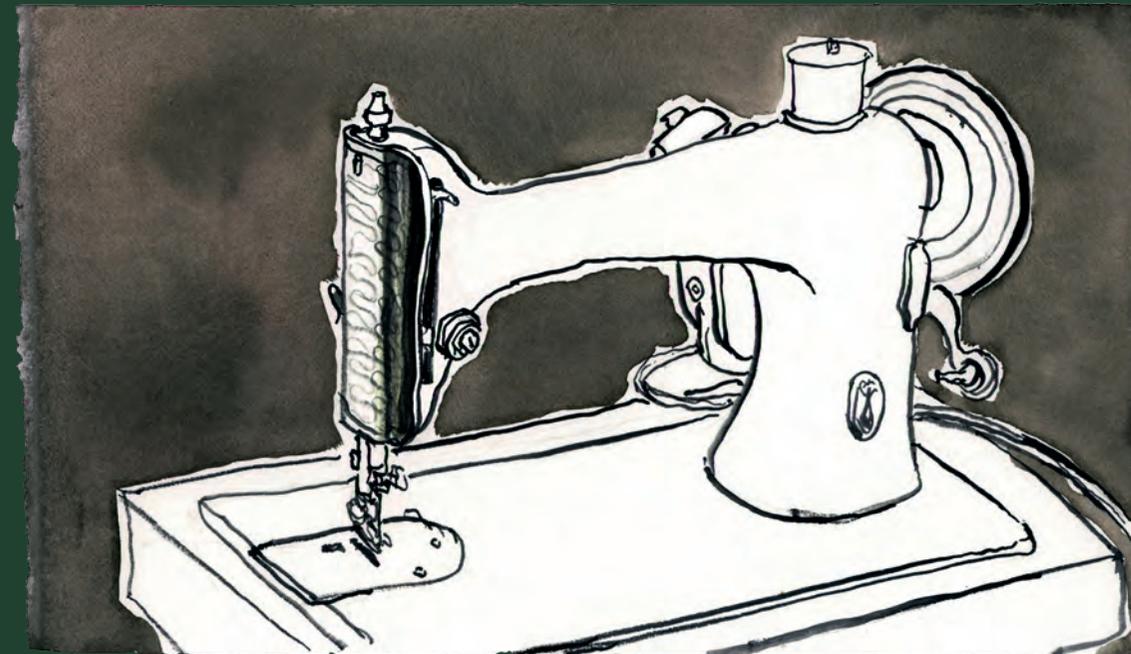


Information about the Specimen's Extinction:

The Ivory-billed Woodpecker was originally described by Carl Linnaeus in 1758 in his tenth edition of *Systema Naturae*. At the time of Linnaeus's publication, the United States looked very different. Enormous tracts of old-growth forest were available and were used as an ideal habitat by the abundant population of Ivory-billed Woodpeckers. By the early 1800s, however, these old-growth forests were being depleted due to large-scale logging. This logging increased during Reconstruction (1865-77). By the 1930s, only a few isolated swaths of the original Southern forests remained. Additional habitat loss in the lower Mississippi Valley occurred as more land was cleared for agriculture. The main reason for the extinction of the Ivory-billed Woodpecker was the concurrent impact of both the loss of these forests and excessive collecting practices. For example, while the birds' bills and plumage had been collected by native and colonial Americans, as well as by naturalists, since the 1800s, these practices increased rapidly with the introduction of logging roads and settlements, which gave hunters, trappers, and commercial collectors ready access to the woodpeckers' habitat. Records show that at least four hundred specimens were collected in the thirty-year period between 1880 and 1910. There are no records of the countless other woodpeckers killed for trade or hunted by locals and natives. By 1924, the species was considered extinct, but then a couple of taxidermists found an extremely rare pair of nesting Ivory-billed Woodpeckers. Tragically, these taxidermists were granted a permit to kill the pair, which they did, for use as specimens. In 1932, a state legislator from Louisiana, Mason Spencer, wanted to disprove reports of the species' demise. Spencer was able to find a rare member of the species, which he killed and then took to his state wildlife office in Baton Rouge to prove his point. The specimen

he killed had been found along the Tensas River in the largest tract of virgin forest left in the South, the Singer Tract. In 1935, the Brand-Cornell University-American Museum of Natural History Ornithological Expedition interviewed Mason and later found a nesting pair of woodpeckers. The expedition created the first film footage and sound recording of the birds. By 1938, naturalists believed an estimated

1938 Singer sewing machine



Ivory-Billed Woodpecker 89

twenty Ivory-billed Woodpeckers remained in the entire United States, six to eight of which were living in this tract of virgin forest. The National Audubon Society and four Southern governors offered to buy the land from the Singer Sewing Machine Company, which owned the land, and the Chicago Mill and Lumber Company, which had the rights to log the land. Both companies refused these offers, and much of the tract was logged soon after. As the number of Ivory-billed Woodpeckers continued to dwindle, natural events like tornadoes, hurricanes, and ice storms destroyed many of the species' remaining nests and roosting trees. The species' low numbers also increased the dangers of inbreeding and unhealthy genetics. The last confirmed sighting of a single female Ivory-billed Woodpecker occurred in 1944 by an artist, Don Eckelberry, on what remained of the Singer Tract of virgin forest. Eckelberry spent the next two weeks blissfully sketching the bird.

Since 1944, there have been several expeditions to Arkansas, Louisiana, and Florida, where an estimated twenty-eight locations have been searched for evidence of the species. A few of these expedition teams claimed to have sighted the birds, recorded their sounds, and photographed them. Some of the teams even shot what they believed to be film footage of the birds, but to date there is no confirmed evidence that the bird exists. The evidence the teams provided either was unclear or left open the possibility that the birds observed might be from a similar species like the Pileated Woodpecker. The Ivory-billed Woodpecker is the only North American bird that has been thought to be extinct only to be rediscovered multiple times. The body of evidence collected over the years, nonetheless, convinced the U.S. Fish and Wildlife Service and the IUCN that some Ivory-billed Woodpeckers might have survived, and so the agencies listed the species as "endangered" and "critically endangered," respectively, instead



of “extinct.” Although the U.S. Fish and Wildlife Service had classified the birds as endangered since 1967, the agency did not develop a recovery plan for the species until 2010, following the publication of promising results from a 2004-05 Cornell Lab of Ornithology expedition in Arkansas. The plan will come into effect if there is confirmed evidence either of the existence of a nest or roost or of repeated sightings of the birds themselves. The U.S. Fish and Wildlife Service has spent over twenty million dollars to document and protect the species.

The hope that the Ivory-billed Woodpecker can be rediscovered again, and the controversy that has followed each expedition’s findings, has made the species very popular. An anonymous reward of \$10,000 was offered in 2006 to anyone who could document the existence of the bird. The Nature Conservancy offered its own \$50,000 reward in 2008 for the same purpose. These incentives have spurred continued attention to the species. Nonetheless, even after all the expeditions and notwithstanding the species’ popularity with birdwatchers, irrefutable evidence of the birds remains elusive. Experts today believe that the very habitat that protects the species could also be assisting in its demise since the multiple difficulties of accessing this habitat impede the efforts of birdwatchers and scientists to locate and to protect the species. The problem is that the woodpeckers are generally found in old-growth forests that are both very difficult to reach and that generally have a limited number of bird species; as a result, these areas may not be as popular with birdwatchers as are other regions with easier access and with a wider range of birds to document. The species’ habitat is also surrounded by swamps, which makes the habitat difficult to reach on foot. At the same time, these swamps have a lot of fallen trees in them, making the birds’ habitat equally challenging to reach by water. In addition, the

groundcover and water are filled with alligators, wild boars, and venomous snakes. Extreme temperatures in the summer and winter can also make it dangerous for birdwatchers and scientists. In short, the obstacles to seeing the birds may provide the species with protection from illegal collectors, but these same obstacles also make it difficult for the species to be protected through government support. If the birds’ existence cannot be confirmed, then it is very difficult to protect them and their habitat.

While the American Birding Association (ABA) continues to list the Ivory-billed Woodpecker as “definitely or probably extinct,” Cornell University and the Nature Conservancy have purchased 120,000 acres of the habitat explored in the 2004 eastern Arkansas expedition and have added this land to the protected part of the Big Woods area.

More Information about the Ivory-billed Woodpecker:

The Ivory-Billed Woodpecker was once one of the largest species of woodpeckers in the world. The species came in two types. One type was found in the Southeastern and South Central United States. The other was found throughout Cuba and was called the Cuban Ivory-billed Woodpecker, or the Carpintero Real, as named by the inhabitants of the island. Unfortunately, the Cuban Ivory-billed Woodpecker is also believed to be extinct or nearly extinct and was last seen in 1987. The North American Ivory-billed Woodpecker preferred to live in significant tracts of four- to five-foot diameter hardwood trees, like those found in old-growth forests. The species used the trees for nesting and roosting. Trees like the Bald Cypress trees, which are found near pine forests, the Nuttall Oak, Sweetgum, and Green Ash were the species’ favorites. Decaying trees were important because the

wood-boring beetle larvae and other insects found under the bark of these trees provided an important food source for the species, which used its beaks to remove the tree bark to reach the insects. The species also supplemented its diet with seeds, fruit, and nuts. Breeding pairs, which mated for life, required around ten square miles of forest to provide enough food for their young and for themselves. Because of the large amount of area needed, Ivory-billed Woodpeckers were usually not found together in large numbers.

Breeding pairs usually mated annually between January and May. Both parents worked together to carve holes into the dead or partially dead trees inside which they built their nests. The openings in the trees for the nests were usually around four by five inches in diameter and were positioned about twenty to fifty feet above the ground. The female usually laid two eggs, and both parents took turns incubating the eggs for three to five weeks as the other parent foraged for food. Although the young could fly after seven to eight weeks, the parents continued to feed them for an additional two months. The female usually foraged for food in the morning through the afternoon while the male looked for food in the late afternoon through the early morning. By early winter, the families split up. It is believed that the woodpeckers might have lived up to thirty years.

The Ivory-billed Woodpeckers have become part of Southern lore and have been called the “Lord God Bird,” after the phrase, “Lord God,” people were believed to have exclaimed upon seeing these large, colorful birds. In the early twenty-first century, the woodpeckers also provided parts of eastern Arkansas, especially around the city of Brinkley, with some economic stability, however short-lived. That city proclaimed itself as “The Home of the Ivory-billed Woodpecker,” and during a six-month period in

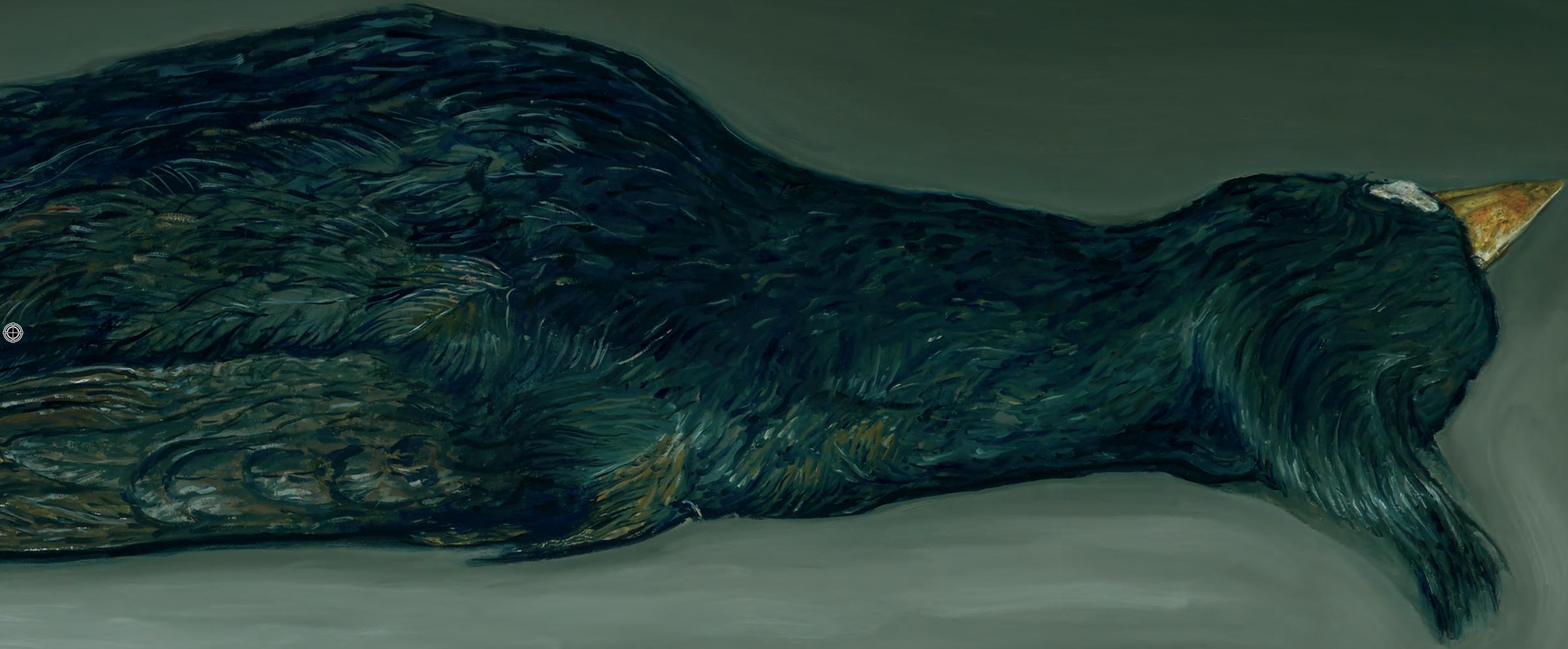
2004, following the controversial rediscovery of the bird, a single restaurant owner there was able to sell \$20,000 in t-shirts. “The Call of the Ivory-billed Woodpecker Celebration” was initiated as a way to increase tourism to the city. The city also promoted the Mohawk-style haircut of red, white, and black (the Ivory-billed hairstyle) and the 100 percent beef Ivory-bill Burger. Children’s books and songs were also written about the birds, and the state gave its residents the option to apply for a Game and Fish Ivory-billed Woodpecker license plate. Interest in the Ivory-billed Woodpecker has waned over the past decade, however, as stockpiles of Ivory-billed tourist items have begun to collect dust since expeditions no longer go to the Big Woods area to find the elusive woodpecker.

More Information about Walter P. Henderson, the Collector of This Specimen:

Very little is known about Walter P. Henderson, the collector of the specimen featured in this chapter. Henderson was born in 1869 in Lima, Peru, and graduated from the Massachusetts Institute of Technology in Boston in 1891. He was a successful architect who lived in Boston. He designed the city’s Union Boat House and became the captain of the Union Boat Club. Henderson was also a resident of Dover, a village located on the outskirts of Boston. Dover’s records reference the importance of the architectural design of his cottage, which Henderson built there in 1907. Another home he designed in the village, the home of Dr. W. T. Porter, was featured in the July 1922 issue of *House Beautiful*.







IMPERIAL WOODPECKER

Collection Numbers and Descriptions: . Ornithology 224290 (previous number: 24290) -

skin (dry) - female - 20 inches long

Scientific Name: *Campephilus imperialis*

Collection: Museum of Comparative Zoology,
Harvard University, Cambridge, MA

Site of Retrieval: Pinos Altos, Chihuahua, Mexico

Retrieval Date: July 7, 1888

Collector: Marston Abbott Frazar

Last Confirmed Sighting or Collection: . 1956

Conservation Status: **Critically Endangered (Possibly Extinct)** - 1994 -

IUCN Red List of Threatened Species

Catalogue Number.	Original Number.	Name.	Sex and Age.	Taken at, or near	Date of Capture.	Taken by	Shin
✓ 24250		<i>Tasha latirostris</i>	♂	Alamos Mexico	Mar. 15, 1888	M. Abbott Frazar	M. Abbott
24251			♀		" 16 "		
24252			♂	Hacienda de San Rafael	May 8 "		
24253			♂		" 16 "		
24254	339		♂	Nacuari	Mar. 21, 1887	John G. Cooper	John G.
24255	340		♂		" "		
24256	489		♂		" 20 "		
✓ 24257	490		♂		" "		
24258	341		♂		" 21 "		
24259	361		♀		" 22 "		
✓ 24260	707		♂	near Opauca	Apr. 25 "		
24261	701		♂		May 13 "		
24262	1177		♂		June 11 "		
24263		<i>Hemiprocne semicollaris</i>	♂	Jesus Maria	June 5 "	R. B. McLeod	R. B. McLeod
✓ 24264		<i>Caprimulgus vociferus arizonae</i>	♂	Mama	July 27, 1888	M. Abbott Frazar	M. Abbott
24265			♂	Mina Abundancia	Apr. 25 "		
24266			♀		" "		
24267			♂	Pinos Altos	June 5 "		
24268			♀		" 19 "		
24269			♂	Bravo	July 31 "		
24270			♂		" 26 "		
24271			♀		" "		
24272			♀		" "		
24273			♂	Jesus Maria	Aug. 25 "		
24274	892	<i>Thalassophilus nuttalli</i>	♂	near Opauca	May 15, 1887	John G. Cooper	John G.
24275	1212		♂		June 17 "		
24276	1213		♂		" "		
✓ 24277	1221		♂		" 18 "		
24278	139		♀		May 11 "		
24279	1209		♀		June 16 "		
24280	1155	<i>Chondestes v. henryi</i>	♂		" 10 "		
24281	800	" <i>alirensis</i>	♂	Granadas	May 6 "		
24282	809	" "	♂	" "	" 7 "		
24283	805	" "	♂	" "	" "		
24284	810	" "	♀	" "	" "		
24285	1211	" "	♀	near Opauca	June 17 "		
24286	1220	" "	♀	" "	" 18 "		
24287			♂	Alamos	Mar. 2, 1888	M. Abbott Frazar	M. Abbott
24288		<i>Campephilus imperialis</i>	♂	Alamos	May 1889	R. B. McLeod	R. B. McLeod
24289			♀	Pinos Altos	July 7, 1888	M. Abbott Frazar	M. Abbott
24290			♂		" "		
24291		<i>guatemalensis</i>	♂	Alamos	Mar 14 "		
24292			♀		" "		
24293			♀		" 21 "		
24294		<i>Oxypleurus scopularis</i>	♂		" "		
24295			♀		" 16 "		
24296		<i>Oxytalus v. hylaeus</i>	♂	Pinos Altos	June 5 "		
24297			♂		" 16 "		
24298			♀		" "		
24299			♂		" 19 "		

Catalogued by *S. W. Denton*

by	Skinned by	Received from	When Received.	By	Remarks.
Traylor	M. Mott Traylor	M. Mott Traylor	1885	Enshaw	Exch. to Count Seilern
Traylor	John G. Babcock	John G. Babcock	1887		
					(Bridg. to G. A. Wetmore)
Traylor	R. R. McLeod	R. R. McLeod			Brought home by a boy who killed it with a stone. There was one another
Traylor	M. Mott Traylor	M. Mott Traylor	1884		L. 9 1/2 to 13 1/2 Eyes black. GONE IN EXCH. TO L. C. SANFORD
					16 1/2 to 19 " "
					17 1/2 to 21 " "
Traylor	John G. Babcock	John G. Babcock	1887		
					GONE IN EXCH. TO L. C. SANFORD
Traylor	M. Mott Traylor	M. Mott Traylor	1888		
Traylor	R. R. McLeod	R. R. McLeod			
Traylor	M. Mott Traylor	M. Mott Traylor	1885		
					L. 14 1/2 to 23 1/2 Eyes dark color
					14 1/2 to 23 1/2 " "
					12 1/2 to 23 1/2 " "
					L. 18 to 21 1/2 " white

Inventory Ledger, Museum of Comparative Zoology, Harvard University

RANGE OF IMPERIAL WOODPECKER



Information about the Specimen's Extinction:

The Imperial Woodpecker was first noted by John Gould in 1832 from a specimen collected in northern Mexico by Damiano Floresi. Gould named the species *Picus imperialis* in "Proceedings of the Committee of Science and Correspondence of the Zoological Society of London." The Imperial Woodpecker's scientific name was later changed to *Campephilus imperialis*. The species was found throughout the Sierra Madre Occidental mountain range in northwestern Mexico and extended into the states of Sonora, Chihuahua, Durango, Nayarit, north Jalisco and possibly Zacatecas, and Michoacán. The rugged, isolated mountainous terrain, which has provided recent discoveries of new trout species, may be the only positive factor remaining to support the possible rediscovery of a tiny population of Imperial Woodpeckers. The Imperial Woodpecker species has traditionally been found in small numbers (four to eight) due to the amount of open old-growth pine-oak forest needed to support the food supply for each pair. It is also believed that the population never numbered more than eight thousand birds. The species' prime terrain was flat or slightly hilly plateaus that were found at elevations at or above six thousand feet. Unfortunately, this terrain also made the old-growth forests it contained accessible to logging, and by the 1930s, logging of these old-growth forests was underway. Large pine trees were cut for use as lumber, and the standing dead trees—the ones that the woodpeckers used to build nests and to find insects to eat—were ground for use as pulp. As has been the case with many other now-extinct species, logging roads into remote areas made the endangered species' habitat more accessible to hunters, collectors, and local tribes, speeding the demise of the species. The natives used the beaks and feathers for rituals and remedies; the woodpeckers' nestlings were also

considered a delicacy. The stunning color and size of the Imperial Woodpecker, which was the world's largest woodpecker species, made it a prize for hunters and collectors. The final blow for the species came in the 1950s when the Mexican logging companies began poisoning the trees where the woodpeckers roosted and fed. The companies also encouraged locals to do the same if they saw any of the birds. Since groups of woodpeckers fed on a single large, decaying old-growth tree, poisoning this food source meant that all the resident woodpeckers, as well as any future migrating groups, would be killed.

The species' numbers dropped dramatically during this period. The last confirmed sighting was in 1956, when William L. Rhein made a short 16mm film of a female Imperial Woodpecker in the Sierra Madre Occidental mountains in Mexico. This footage, which is the only photographic documentation of the woodpecker, was not found until forty-one years later in 1997. Today, it is available online for public viewing through the



Cornell Lab of Ornithology's Macaulay Library. The site of Rhein's documentation, in Durango, was revisited in 2010, but the area had been logged several times since his trip in 1956; no evidence remained of the species. Locals mentioned that the species had been killed off by 1960. Sightings of the woodpeckers were reported from other regions of the Sierra Madre Occidental mountains in 1965, 1993, 1995, and 1996, but none have been confirmed. There are no longer any old-growth tracts of forest that are large enough for the woodpeckers to breed or to forage for food. It is believed that, even if any of the birds had survived past 1960, the continued hunting and logging would have led to the species' extinction.

In recent times, expeditions to rediscover the Imperial Woodpecker in unlogged tracts of land have had to traverse steep, rugged mountainous terrain and face patrols of armed guards protecting the secrecy of marijuana and poppy fields. Researchers, nonetheless, are continually trying to follow up on anecdotal sightings and continue searching areas of old-growth forest where the woodpeckers have been reported in the past.

There are about one hundred and sixty specimens of this species reported in institutions around the world.

More Information about the Imperial Woodpecker:

As is the case with many other extinct species discussed in this publication, there is a limited amount of information known about the Imperial Woodpecker. In the 1800s, the toy-trumpet-like calls of the species could be heard throughout the large tracts of old-growth pine forests that were its habitat in

northwestern Mexico. Each mating pair usually needed around sixteen square miles of forest to forage, while small groups of Imperials needed closer to sixty square miles. Breeding usually occurred between February and June, and between one to four eggs were laid in nests that were made in old, large, dead Durango pines.

More Information about Marston Abbott Frazar, the Collector of This Specimen:

Marston Abbott Frazar was born in 1859 in Massachusetts to George Frazar and Caroline Marston Frazar (Sampson). He was one of four children. Frazar's father, George, was from Duxbury, Massachusetts; his mother, Caroline, was from Plympton, Massachusetts. Frazar himself lived in Watertown. In 1886, he went on the first of many collecting trips for William Brewster, who was the specimen curator at Harvard University's Museum of Comparative Zoology. Like many other institutions at the time, the Museum of Comparative Zoology sent collectors to specific parts of the country and the world to bring back as many specimens as possible. The collectors were an interesting group of professionals who had to endure enormous hardships in their quest to find and collect specimens. Many collectors regularly discovered species and were paid around twenty dollars (in today's dollars) per specimen. Given their substantial financial commitment to these expeditions, the institutions expected collectors to provide large numbers of specimens that were well prepared and accompanied by carefully labeled tags and notes on the birds' behaviors. It was rare, though, when the institutions received everything they wanted, because many collectors were more concerned about acquiring large numbers of specimens than about documenting each bird's specific location and its behaviors. For example, on one



Male



Female

100 Extinct Birds Project

13



Imperial Woodpecker 101

expedition for Brewster in the southern part of Baja California, Frazar was able to collect and prepare 4,400 specimens in a nine-month period. Brewster wrote, in a scientific paper, that he was very pleased with the number of skins Frazar had collected but that he was disappointed that Frazar had not collected enough eggs, nests, or documentation of the birds and their locations. In 1888, during a collection expedition to Sonora and Chihuahua, Frazar collected the specimen that is featured in this chapter. Frazar became so disillusioned with collecting specimens during this trip that he sent in his resignation to Brewster; however, Frazar changed his mind several months later and returned for additional collection expeditions. Brewster and a few other naturalists noticed, though, that Frazar collected a diminishing number of birds during these expeditions. A few years after he shot the last Passenger Pigeon he ever saw, Frazar stopped collecting birds altogether.

After completing his expeditions, Frazar returned to Boston, where he started a business specializing in taxidermy and sales of naturalist supplies. In 1890, at the age of thirty, Marston Abbot Frazar married Helen F. Frazar. The couple had one child, Nelson A. Frazar.

Adriaan Joseph Van Rossem, who collected the Santa Barbara Song Sparrow specimen featured in this publication, read Marston Abbott Frazar's letters to William Brewster to get a better perspective on what to expect on his own collecting expeditions in Mexico.

Head of female Imperial Woodpecker
Ornithology Archives, Museum of Comparative Zoology, Harvard University



Imperial Woodpecker 103





ESKIMO CURLEW

Collection Numbers and Descriptions: . . . Ornithology 247826 (previous number: 47825) - skin (dry) - male - 13 inches long

Scientific Name: *Numenius borealis*

Collection: Museum of Comparative Zoology, Harvard University, Cambridge, MA

Site of Retrieval: Ipswich Neck, Massachusetts

Retrieval Date: September 14, 1879

Collector: W. B. Dowse

Last Confirmed Sighting or Collection: . September 1963

Conservation Status: **Critically Endangered (Possibly Extinct)** - 1994 -
IUCN Red List of Threatened Species

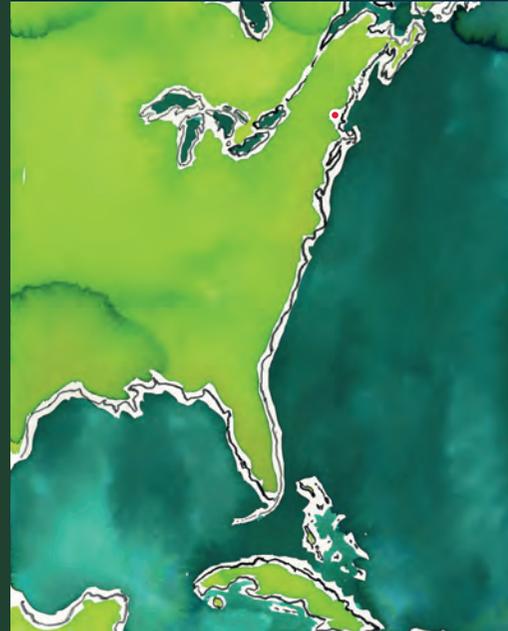
Painting: Collection of Holly Cumberland

Eskimo Curlew 105

105



IPSWICH NECK, MASSACHUSETTS



Catalogue Number.	Original Number.	Name.	Sex and Age.	Taken at, or near	Date of Capture.	Taken by	Shipped
47800	551	<i>Fturnella magna</i>	♀	Off Chatham, Massachusetts	Mar. 23, 1880	Henry F. Colburn	W. B. D.
47801	514	<i>Troglodytes carolinus</i>	♂	Weyland,	Sept. 20, 1879	W. B. Douse	
47802	420	<i>Quiscalus quiscula ceneus</i>	♂	Chatham,	May 24, "	E. S. Brackett	
47803	571	<i>Mysarchus carinatus</i>	♂	Hyde Park,	June 3, 1880	W. B. Douse	
47804	574	<i>Empidonax minimus</i>	♀	Milton,	" 7, "	"	
47805	191	<i>Trochilus colubris</i>	♂	Fomerset Co., Maine	Aug. 7, 1878	"	
47806	170	"	♀	"	3, "	"	
47807	591	<i>Coccyzus virginianus</i>	♀	Walcham, Massachusetts	30, 1880	Ed. Merrill	
47808	412	<i>Falco columbarius</i>	♂	Chatham,	May 23, 1879	Lon Nye	
47809	370	<i>Agelaius meloda</i>	♂	"	17, "	Dr. Fuller of Charleston	
47810	557	"	♂	"	Mar. 25, 1880	John E. Henshaw	Mar. 25, 1880
47811	355	"	♂	"	29, 1879	Tom M. Marshall	W. B. D.
47812	405	"	♂	"	May 22, "	Lon Nye	
47813	407	<i>m. circumcincta</i>	♂	"	"	W. B. Douse	
47814		<i>Micropalama himantopus</i>	♂ ad	Cape Cod,	July 28, "	"	
47815	401	<i>Tringa caerulea</i>	♂	Chatham,	May 21, "	W. B. Douse	
47816	569	<i>" alpina pacifica</i>	♂	"	17, 1880	Lon Nye	
47817	393	<i>Ereunetes pusillus</i>	♂	"	18, 1879	W. B. Douse	
47818	391	"	♂	"	"	Dr. Fuller	
47819	392	"	♂	"	"	W. B. Douse	
47820	397	<i>Calidris acronaria</i>	♂	"	20, "	"	
47821	399	"	♂	"	"	"	
47822	415	<i>Tringa fuscicollis</i>	♂	"	23, "	"	
47823	411	<i>Lymphiemia semipalmata</i>	♂	"	22, "	"	
47824	410	"	♀	"	"	"	
47825		<i>Numenius borealis</i>	♂	Ipswich,	Sept. 14, "	"	
47826		"	♂	"	"	"	
47827	505	"	♂	"	"	"	
47828		<i>Thryothorus leucophay</i>	♂	San Clemente Mar, California	Mar. 22, 1877	"	
47829		<i>Dendroica chrysoparia</i>	♂	Central Texas	June 9, "	H. P. Altwater	H. P. Altwater
47830		"	♂	"	11, "	"	
47831		<i>Vireo huttoni stephensi</i>	♂	Sierra Laguna, Lower Cal.	July 4, 1896	Loye Miller	Loye Miller
47832		<i>Ammodramus sanctorum</i>	♂	Abasco Point,	Apr. 19, 1877	"	
47833		<i>Junco bairdi</i>	♂	Sierra Laguna, Lower Cal.	June 15, 1896	Loye Miller	Loye Miller
47834		<i>Melospiza fasciata clementis</i>	♂	Cape Clemente Isl., California	Mar. 31, 1877	"	
47835		<i>Pipilo maculatus magnirostris</i>	♂	Sierra Laguna, Lower Cal.	June 18, 1896	J. F. Abbott	J. F. Abbott
47836		<i>Icterus maculatus huttoni</i>	♂ juv	San Jose del Cabo, "	July 30, 1896	"	
47837		<i>Empidonax cinereus</i>	♂	Sierra Laguna,	3, "	"	
47838		"	♂	"	June 30, "	Loye Miller	Loye Miller
47839		<i>Melanerpes f. angustifrons</i>	♂	"	22, "	J. F. Abbott	J. F. Abbott
47840		<i>Megascops asio albiventris</i>	♂	Bendish, Colorado	Apr. 11, 1897	D. P. Ingraham	D. P. Ingraham
47841		<i>Buteo borealis harlani</i>	♂	Wilder, Minnesota	Oct. 11, 1894	P. B. Deabody	P. B. Deabody
47842		<i>" abbreviatus</i>	♂	Cameron Co., Texas	25, 1896	"	
47843		<i>Cathartes aura</i>	♂	Dominica Isl., West Indies	Apr. 10, 1896	"	
47844		<i>Urubitinga anthracina</i>	♂	Cameron Co., Texas	Nov. 4, 1896	"	
47845		<i>Falco sarsatorius gyrfalco</i>	♂	Karasanda, Lapland	Apr. 14, "	"	
47846		<i>" s. gyrfalco</i>	♂	Ukuaipi,	June 1898	"	
47847		<i>" richardsoni</i>	♂ ad	Karameer Co., Colorado	Dec. 9, 1899	"	
47848		<i>Puffinus obscurus</i>	♀	Neapat Landing, California	23, 1886	F. Stephens	F. Stephens
47849		<i>Puffinus tenuirostris</i>	♀	San Benedicto I., N. Pacific	Apr. 27, 1897	"	

father were hunting in Clarks, Nebraska, when they scared up around seventy curlews. They followed the birds into a plowed field where they killed thirty-four birds with four shots. Hoagland came across another eight curlews in 1911 and killed seven of them with one shot. Hunting for Eskimo Curlews was outlawed five years later, but the damage was already done.

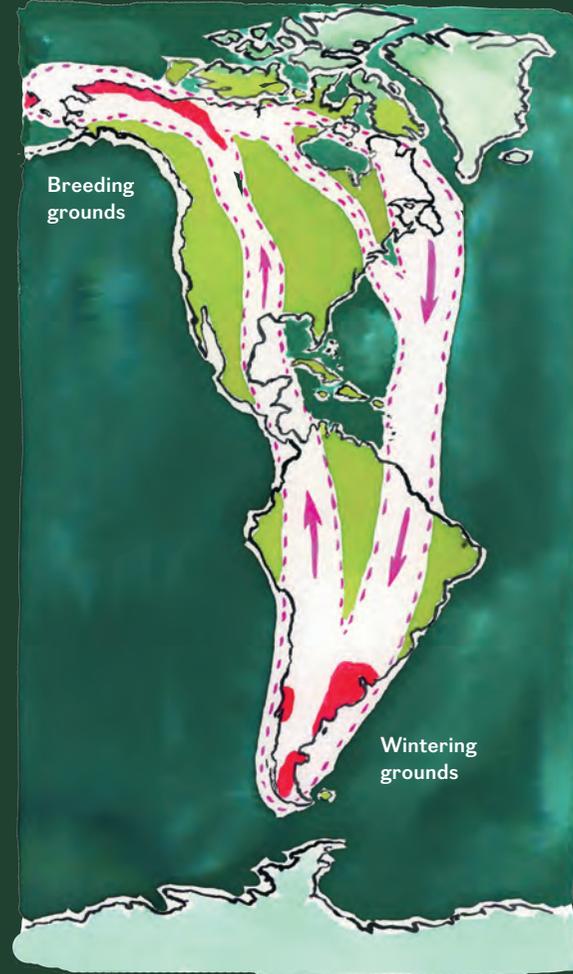
The species' inability to recover was compounded by the ongoing loss of its habitat and its breeding grounds. Much of the prairie grasslands in the Southwest region of the United States, which the species needed to recuperate and gain nourishment from during its northward migration to its breeding grounds, was being converted into farmland. By 1994, only 4 percent of the birds' original habitat remained. The species' prime breeding areas in northern Alaska and Canada were also being taken over by a larger shorebird, the Whimbrel, making it more challenging for the Eskimo Curlew to breed and increase its numbers. Likewise, the species' wintering grounds in the South American lowlands, which the curlews used when they flew south for the winter, were being converted into tree plantations.

The final blow for the species was the eradication of one of its main food sources, the Rocky Mountain Locust (*M. spretus*). Like the Eskimo Curlew, the Rocky Mountain Locust had once been abundant. The locusts could be found in swarms, and in 1875, one particular swarm, which became known as Albert's Swarm, numbered over twelve trillion insects and covered a land mass equivalent to the state of California. (The event was named after the physician who calculated the number and size of the grouping.) This swarm is believed to have been the greatest concentration ever of any species; nonetheless, fewer than thirty years later, the last swarm of Rocky Mountain Locusts, much smaller in number, was sighted in southern Canada. Little is known about the cause of the species' extinction.

However, changes in farming practices may in part have been responsible. Crops that were more resilient to insects were introduced, and these crops were then harvested before the locusts arrived. An increase in plowing and irrigation in the Great Plains and along the Mississippi River also destroyed many of the egg cases that the locusts laid in those regions. These egg cases were a prime food source for the curlews during their migration north to their breeding grounds.



Rocky Mountain Locust



The Eskimo Curlew was believed to be extinct by 1905, but a confirmed photograph of the species was taken in 1962 on Galveston Island, Texas. A last specimen was collected in Barbados in 1964, and a sighting of twenty-three birds occurred in Texas in 1981. Three reliable sightings also occurred in 1987. These sightings of single birds occurred in Nebraska, Canada, and Maine. Additional unconfirmed sightings occurred in 1983 in Alaska, in 1990 in Argentina, in 1996 in Canada, and in 2006 in Nova Scotia. There has been no confirmed evidence of the species in South America since 1939, and expeditions sent to Argentina and Uruguay in 1992-93 found none of the species. The Eskimo Curlew depended on the sheer size of its flocks for protection, so there is little chance that a tiny population could have survived against its predators.

More Information about the Eskimo Curlew:

The Eskimo Curlew was one of the smallest of the four species of Western Hemisphere curlews. The Eskimo Curlew bred between May and August in the treeless tundra found in both the Northwest Territories of Canada and western Alaska. Once a year, from late June to early July, the female laid a clutch of eggs, which were green with brown splotches. The clutch, which consisted of up to four eggs, was laid in a nest made of dried grass and leaves. These nests were built in depressions found on the dry tundra. Both parents incubated the eggs and took care of the young. In the fall, the birds flew east across the Hudson Bay to Labrador and New England to feed on small crustaceans. They then flew through the Caribbean and on to South America, where they wintered on the pampas grasslands found in the southern regions of Chile, Argentina, Brazil, Uruguay, and Paraguay. (On their way south, however,

the curlews would periodically get lost because of storms, and they would occasionally appear in Britain instead.) In March, they began their northern migration by flying up the Pacific coastline of South America, through Central America, over the Gulf of Mexico and Texas, and on to the Central Plains of the United States. There, the birds fed on the Rocky Mountain Locust egg cases and nymphs as well as on berries. In May, the curlews worked their way further north to their breeding grounds in Alaska and Canada.

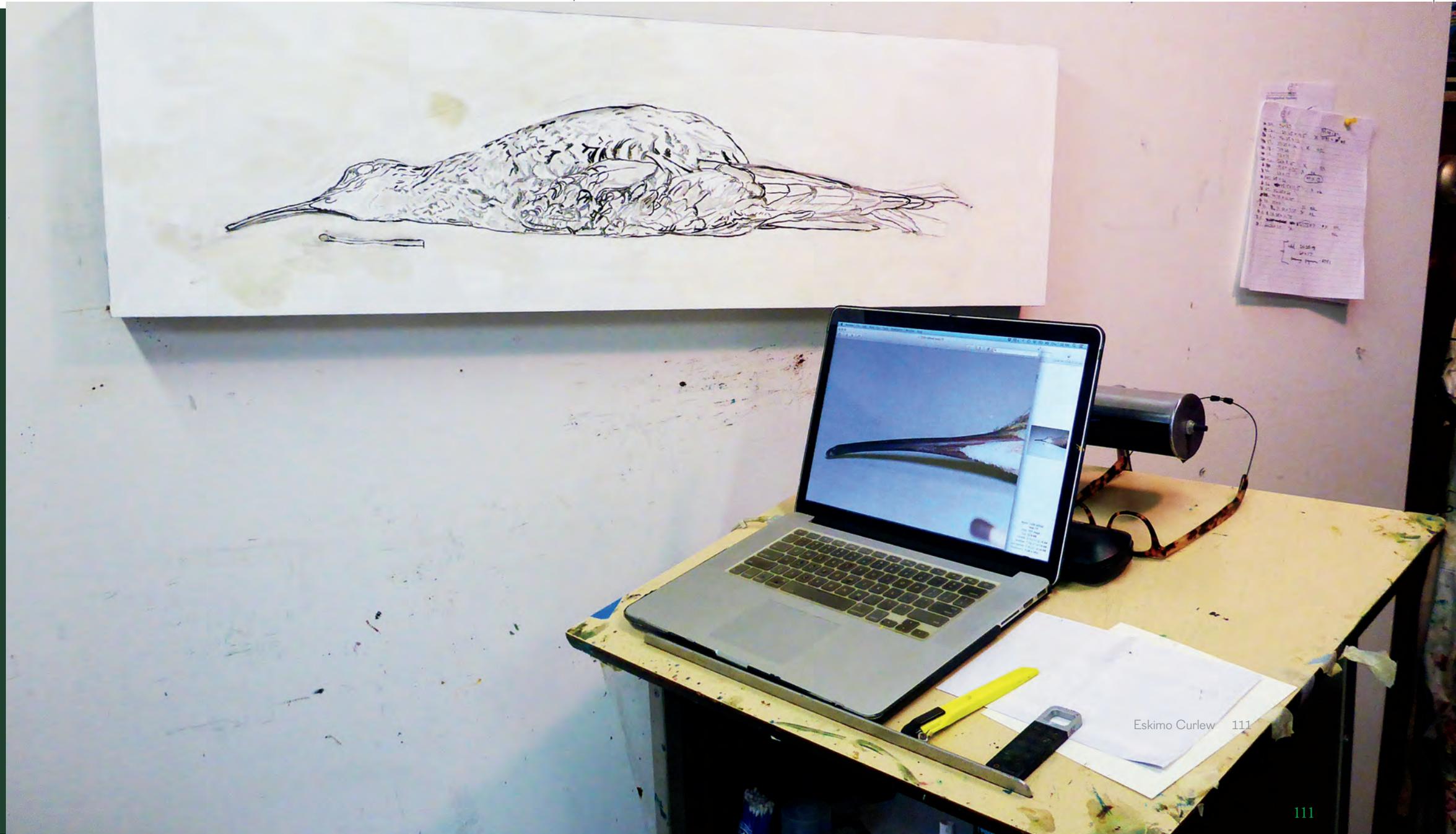
The species' extinction was the subject of a 1954 novel by Fred Bodsworth, a naturalist and reporter. The *Last of the Curlews* was turned into an animated film by Hanna-Barbera Productions and was released in October 4, 1972, in the first "ABC Afterschool Special." The film depicted the sad life of a single curlew as it waited, unsuccessfully, on the tundra for a mate and then finally began its long migration by itself. The film won an Emmy for Outstanding Achievement in Children's Programming in 1973.

A comparison of dates and migratory patterns has led some to conjecture that Eskimo Curlews and American Golden Plovers were the shorebirds that attracted Christopher Columbus to nearby land after sixty-five days at sea on his first voyage.

More Information about W. B. Dowse, the Collector of This Specimen:

Very little is known about W. B. Dowse. Records indicate that he was a respected ornithologist who collected birds for William Brewster, the curator of mammals and birds at the Museum of Comparative Zoology at Harvard University. Dowse's main residence was in Boston, but he also lived for a period in Connecticut and in New York City. It was while he was living in New York City in 1894 that he placed an ad in the *Scientists' International Directory* to sell his collection of more than 600 bird specimens and related notes.





Eskimo Curlew 111



LABRADOR DUCK

Collection Numbers and Descriptions: . . . Ornithology 80164 - skin (dry) - juvenile male - 16.25 inches long

Scientific Name: *Camptorhynchus labradorius*

Collection: Museum of Comparative Zoology, Harvard University, Cambridge, MA

Site of Retrieval: No data

Retrieval Date: No data

Collector: No data

Last Confirmed Sighting or Collection: December 12, 1878

Conservation Status: **Extinct** - 1988 - IUCN Red List of Threatened Species



Labrador Duck 113

Information about the Specimen's Extinction:

The Labrador Duck was the first bird to become extinct in North America after the arrival of the Europeans. It was first described by Johann Friedrich Gmelin in *Systema Naturae* in 1789. Fewer than forty years later, in 1826, ornithologist Charles Lucian Bonaparte described the duck as rare; so did John James Audubon, the famous American ornithologist and artist, in 1840. Between 1840 and 1860, a great number of scientific and commercial collectors pursued the species; consequently, more Labrador Ducks were found, shot, and collected. Not only were specimens placed in institutions, but many were also sold at public markets, such as the Fulton Market in New York, where it was not unusual to find a half-dozen birds hanging on racks. One of the collectors during this period was Colonel Nicolas Pike, who wrote the following about a day on the water when he collected three specimens: "The specimen of the Labrador Duck presented by me to the Long Island Historical Society, was one of two specimens, both male birds, that I killed in November, 1844, at the mouth of the Ipswich River, south end of Plum Island, Massachusetts Bay. I was paddling in my float or sneak boat, covered with salt hay, when I saw three of these birds, two males and a female, bedding on a shoal spot near a sand-spit. I shot the males, but the female escaped then. I killed her however, later in the day, on the same spot. A male and female were given to John Bell, then a taxidermist, on Broadway, New York, and John Akhurst mounted the fine male I gave the Historical Society."

The same taxidermist mentioned above, John (Graham) Bell, was also the individual who collected the last specimen of this extremely rare species. That specimen was an immature male, and it was collected in the autumn of 1875 on Long Island, New York. The bird is now in the Smithsonian National Museum of Natural History. Bell, who was also regarded as a respected collector, worked closely with John James Audubon for many years, and Audubon named the Bell's Vireo after him.



Inventory Ledger, Museum of Comparative Zoology, Harvard University

Catalogue Number.	Original Number.	Name.	Sex.	Locality.	Nature of Specimen.
80161		<i>Acas rubripes</i>	♀	Mass. Tuckermuck Val.	Skinned
2		" "	♂	" "	"
3		<i>Clangula c. americana</i>	♂	" "	"
4	14368	<i>Campylorhynchus labradorius</i> (♂)		No data	"
5	4060	" "	♀	Nova Scotia	"
6	14366	<i>Psaltriparus californicus</i>	♂	Cal. Julian	"
7	48286	" "	-	Monterey Co.	"
8	10041	" "	♂	Jolan	"
9	13539	" "	♂	El Casca	"
80170	48285	" "	♂ juv.	Monterey Co.	"
1		<i>Agelaius phoeniceus</i>	♂	Costa Rica, Pozo del Rio	"
2		" "	♂	" "	"
3		<i>Nyctanassa violacea</i>	♂	San Pedro	"
4		" "	♀	" "	"
5		" "	♂	" "	"
6		" "	♂	" "	"
7		" "	♀	" "	"
8		" "	♂	" "	"
9		" "	♀	Boruca	"
80180		" "	♀	" "	"
1		" "	♀	" "	"
2		" "	♂	" "	"
3		" "	♀	" "	"
4		" "	♀	" "	"
80185		" "	♀	" "	"

MUSEUM OF COMPARATIVE ZOOLOGY.

Catalogued by

Nature of Specimen.	Collected by	When Collected.	Received from	When Received.	Number of Specimens.	Remarks.
Skull	M. H. Noble	Feb. 5, 1877	John C. Phillips			Exch. to Hachisuka
"	"	Feb. 5, 1877	"			
"	"	Feb. 5, 1877	"			
"			Wm. Brewster			From coll. of W. Brewster
"		1857	"			"
"	Wm. Seabor	May 11, 1858	"			"
"	H. Noykins	Mar. 1858	"			"
"	N. W. Newshaw	Oct. 12, 1858	"			"
"	N. Z. Bull	—	"			"
"	S. Castro	June 16, 1858	"			"
"	C. J. Underwood	Aug. 12, 1856	Purchased			
"	"	Aug. 6, 1856	"			
"	"	Oct. 1, 1855	"			
"	"	Nov. 5, 1856	"			
"	"	Oct. 1, 1856	"			Exch. to Court Seiden
"	"	Oct. 27, 1856	"			
"	"	Oct. 1, 1855	"			
"	"	Oct. 21, 1856	"			
"	"	Jan. 22, 1856	"			
"	"	May 15, 1856	"			
"	"	Jan. 18, 1856	"			
"	"	May 21, 1856	"			
"	"	May 21, 1856	"			
"	"	May 25, 1856	"			
"	"	May 30, 1856	"			



While the last specimen was collected in 1875, the last known interaction with a Labrador Duck occurred on December 12, 1878, when a young hunter from Elmira, New York, mistakenly shot one, which he then brought home for his family to eat. The town's pharmacist, Dr. W. H. Gregg, who was also an amateur birdwatcher, had heard about the incident, and he went to the house, on Robinson Street, where he inquired about the possibility of preserving the duck as a skin. Unfortunately, all that was left of the bird was the head and part of the neck. Nonetheless, Gregg recognized the head to be that of a Labrador Duck and sent it to William Dutcher, a respected ornithologist, for confirmation. Dutcher confirmed Gregg's identification and kept the head for a number of years. However, the specimen disappeared when Dutcher hired someone to move his collection to his new home in New York City. What remained of the specimen never arrived, and it was never seen again.

The lowland site in Elmira where the last Labrador Duck was shot and killed by the young hunter (the site had been previously called the Buttonwoods) has been memorialized in 2009 by a bronze sculpture of the Labrador Duck that was placed along the Chemung River.

Apart from hunting and collecting, other causes for the Labrador Duck's extinction included the loss of the species' habitat and the impact this loss had on the species' food supply. As the Northeast coast of America became developed, mussels and shellfish, which were the ducks' major food source, began to decline. Additionally,



when the ducks migrated north to breed, the overharvesting of its eggs also affected the species' chance of recovery.

Fifty-five Labrador Duck specimens remain in institutional collections. *The Curse of the Labrador Duck*, an amusing book about the travels of Glenn Chilton and his 82,000-mile quest to see each of these specimens, is an interesting read.

More Information about the Labrador Duck:

While there is no data on who collected the specimen that is featured in this chapter, we do have documentation that it came from William Brewster's collection, which was later acquired by the Museum of Comparative Zoology. William Dutcher's 1891 essay, "The Labrador Duck: A Revised List of the Extant Specimens in North America, with Some Historical Notes," gives us some insight into how this specimen ended up in the museum and then in this current publication. The original Labrador Duck skin is believed to have been acquired by a dealer or taxidermist from Quebec, Canada, which is situated near the species' breeding grounds. George B. Warren, a dry-goods merchant and railroad president, who collected birds as well as vintage Chinese porcelain, coral, shells, and Old Master etchings, acquired the specimen from the Canadian dealer. Warren had been collecting and studying birds for forty years, and his collection had grown in prominence. It had been visited by several renowned naturalists, including Audubon. When Warren passed away on May 8, 1879, at the age of eighty-two in Troy, New York, he left his collections to his wife, Eugenia. She donated 220 mounted birds and 500 shells to Rensselaer Polytechnic Institute. Warren's collection of bird skins, which numbered in the hundreds, was evenly



divided between the city of Troy, H. N. Camp, and Thomas B. Heimstreet, who resided in Troy. The skin of the Labrador Duck was among those given to Heimstreet, although he was not aware that he had acquired the skin of the extinct duck until a few months later when he was going over his inventory. William Brewster purchased this Labrador Duck from Heimstreet on May 8, 1887. On February 10, 2017, one hundred and thirty years later, my son, Diego, and I went to the museum and photographed that specimen. On June 23 of that year, the Labrador Duck painting was finished, and now it is in the pages of this publication.

As was mentioned before, very little is known about the Labrador Duck species. What we do know is that it was also called pied duck, skunk duck, and shoal duck. The ducks migrated annually between the sandy northeastern coast of the United States in the winter and the northern shores of Canada in Labrador and Quebec, where, in the summer, the species bred and laid its eggs along sandbars and sheltered bays.





PINK-HEADED DUCK

Collection Numbers and Descriptions: . . . Ornithology 76182 - skin (dry) - male - 23 inches long

Scientific Name: *Rhodonessa caryophyllacea*

Collection: Museum of Comparative Zoology, Harvard University, Cambridge, MA

Site of Retrieval: No Data

Retrieval Date: No Data

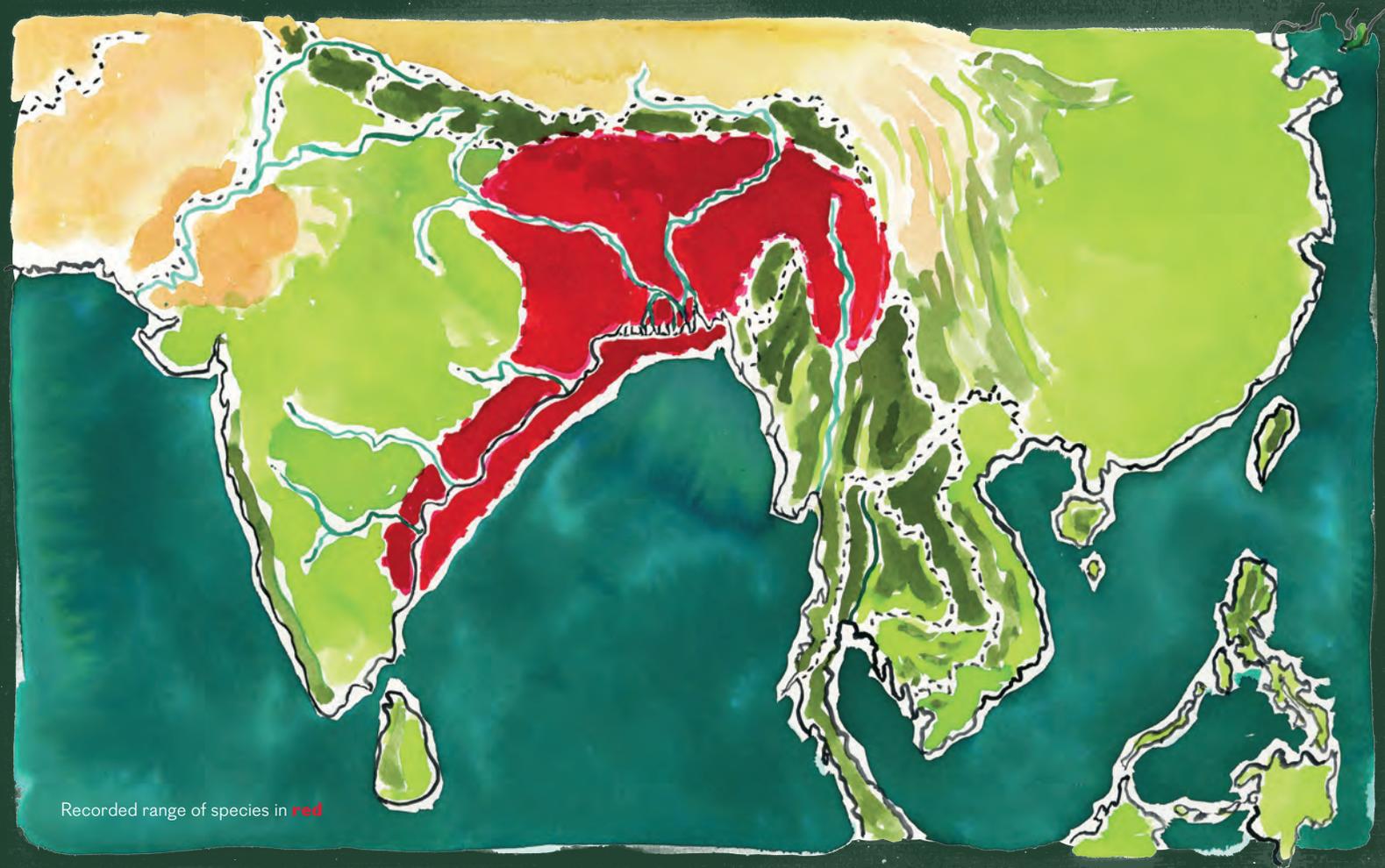
Collector: No Data

Last Confirmed Sighting or Collection: . . . 1936

Conservation Status: **Critically Endangered (Possibly Extinct)** - 1994 -

IUCN Red List of Threatened Species

Pink-Headed Duck 119



Recorded range of species in red

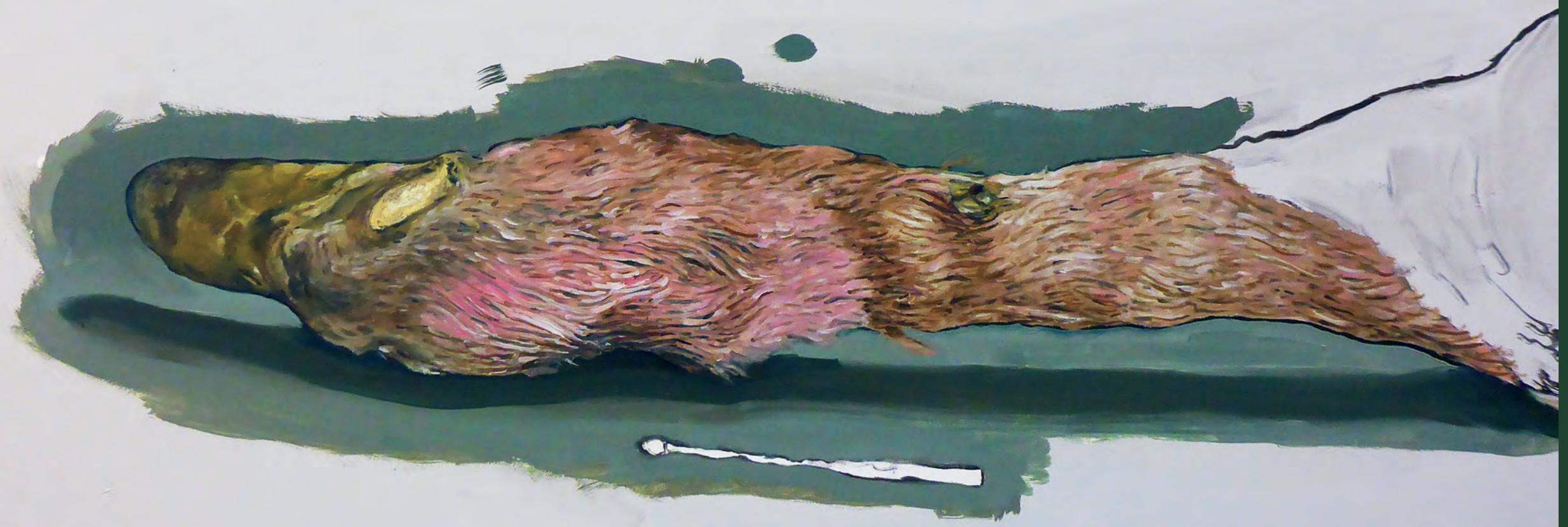
120 Extinct Birds Project

CATALOGUE OF BIRDS IN THE

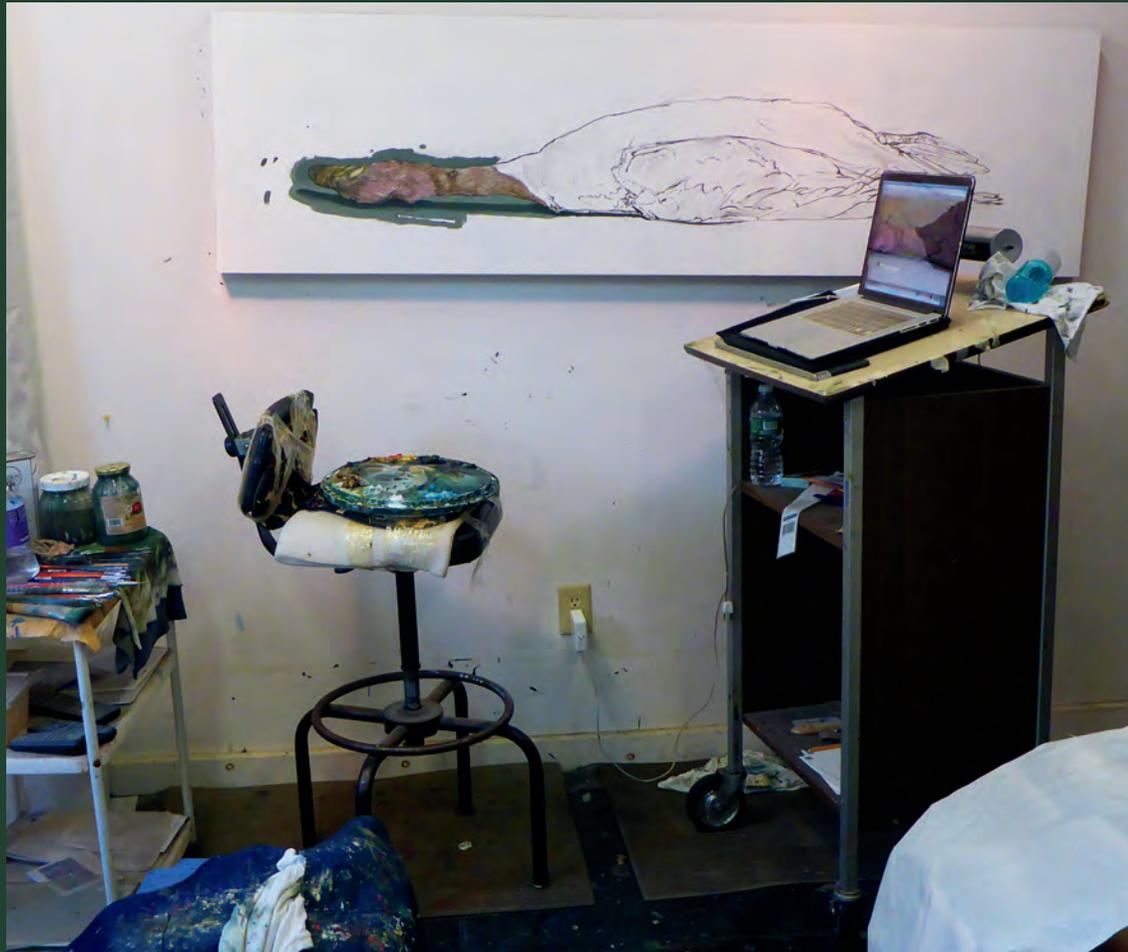
Catalogue Number.	Original Number.	Name.	Sex.	Locality	Nature of Specimen
76161	2622	<i>Zenaidura macroura</i> Lf.			Skin
2	2625	<i>Zenaidura macroura</i> Lf.		Ecuador	"
3	2627	" "		"	"
4	2672	<i>Troglodytes h. brunnicollis</i>		[Mexico]	"
5	2673	" " "		[Mexico]	"
6	2647	<i>Thryothorus rufalbus</i> Lf.		"Mexico or Colombia"	"
7	2648	" "		"	"
8	2649	<i>Thryophilus r. castaneotus</i>		"	"
9	2657	<i>Thryothorus maculipennis</i> Lf.		Mexico.	"
76170	2158	<i>Thryothorus fasciatus</i> Lf.		Bogotá	"
1	3254	<i>Alauda ferruginea</i> Lf.		Africa.	"
2	2637	<i>Thryothorus modulator</i> Lf.		Bolivia.	"
3	2635	<i>Leucolegia modulator</i>		"	"
4	2636	" "		"	"
5	1200	<i>Aulacorampus carolinensis</i> Lf.		Bolivia	"
6	1201	" "		"	"
7	1307	<i>Cuculus gabonensis</i> Lf.		"	"
8	1256	<i>Sayornis boninensis</i> Lf.		"	"
9	1156	<i>Buceros preitorhynchus</i> Lf.		Seyoal.	"
76180	1156	" "		"	"
1	8214	<i>Neochen sandvicensis</i>		"	"
2	8266	<i>Phodopus carolinensis</i>		"	"
3	835	<i>Myctibius aethereus</i>		"	"
4	836	" "		"	"
76185	3046	<i>Piranga h. fasciata</i>		S. Venezuela	"



122 Extinct Birds Project



Pink-Headed Duck 123



sightings spurred five expeditions, which took place between 2003 and 2006. Additional searches were conducted in 2014 and 2017 in the largely unexplored wetlands of Kachin state in northern Myanmar. To date, none of the sightings have been confirmed.

As of 1960, there were seventy-one specimens in institutional collections. The oldest specimen dates from 1825 and is held at the Muséum National d'Histoire Naturelle in Paris; the youngest specimens had been held at the U.S. National Museum and are now housed at the Smithsonian National Museum of Natural History in Washington, D. C., and at the American Museum of Natural History in New York.

The main reasons for the Pink-headed Duck's extinction were habitat loss and hunting. The tremendous growth of human population, coupled with the subsequent clear-cutting of forests and conversion of wetlands to agricultural lands, destroyed most of the ducks' environment. The introduction of invasive plant species, such as the water hyacinth (*Eichhornia crassipes*), further altered the ducks' territory. During the late 1800s and early 1900s, the species also suffered from year-round hunting and ceaseless egg collecting due to the birds' unique pink-colored plumage and the uncommon round shape of the eggs. Hunting of the species and collecting of its eggs were both outlawed in 1956, but it was too late by that point for the birds to recover.

More Information about the Pink-headed Duck:

The Pink-headed Duck featured in this chapter originally came from the collection of Baron Noël Frédéric Armand André de Lafresnaye, a French aristocrat, ornithologist (someone who studies birds),

and entomologist (someone who studies insects). He was born on July 24, 1783, and passed away on July 14, 1861. In 1865, Henry Bryant, a Harvard University graduate, physician, and naturalist, purchased the Baron's collection of almost 9,000 skins. The collection was unpacked and organized by a young Charles Johnson Maynard, who would later become a respected naturalist, as well as the collector of two of the other specimens featured in this publication, the Carolina Parakeet and the Dusky Seaside Sparrow. Two short years after Bryant purchased the collection, he died in Puerto Rico from an illness he acquired while collecting. Bryant's collection was then donated to the Boston Society of Natural History; from there, it was transferred, in 1914, to the Harvard University Museum of Comparative Zoology, where it was documented more than a hundred years later for this publication and project.

The non-diving Pink-headed Ducks were believed to have eaten mollusks and water plants. When the species flourished, flocks of thirty to forty Pink-headed Ducks inhabited secluded marshes, lagoons, and swamps in lowland forests and grasslands. It is believed that the ducks performed short regional migrations in these areas and then paired up to breed in April. To attract a female, the male duck, which usually weighed around a pound, lowered its head onto its back and then moved its head back and forth as it stretched its neck, puffing up the pink feathers around its neck by inhaling and holding air before releasing this air to create a weak low-pitched whistling call. The interested female responded with a low quack. In June and July, each breeding pair built a circular nest; these nests consisted of dry vegetation and feathers and were hidden among tall grasses located not more than five hundred yards from water. The nests, which were about nine inches in diameter and about four to five inches deep, could hold a clutch of five to ten of the ducks' roundish eggs. Each egg was around 1.7 inches in diameter and

flat white in color. The eggs hatched and the nestlings began to mature in September; as they did, they produced a dulcet, two-part call. If a person approached a nest, a breeding female drew the intruder away by pretending she was injured and squawking loudly as she fluttered and dragged herself away from the nest.

Raman spectroscopy has been used by Daniel Thomas and Helen James of the Smithsonian National Museum of Natural History to study where the Pink-headed Duck got its color. Their work suggests that the pink came from a type of carotenoid, an organic pigment produced by plants, algae, bacteria, and fungi. This pigment is also found in flamingos.





A world map with a red location pin in South America, specifically in Brazil. The map is light blue and white, showing the outlines of continents. The text is overlaid on the map.

GLAUCOUS MACAW

Collection Numbers and Descriptions: . . . Ornithology 74173 - skin (dry) - 29.5 inches long

Scientific Name: *Anodorhynchus glaucus*

Collection: Museum of Comparative Zoology, Harvard University, Cambridge, MA

Site of Retrieval: Brazil, South America

Retrieval Date: No Data

Collector: No Data

Last Confirmed Sighting or Collection: . . . 1960s

Conservation Status: **Extinct** - 1994 then changed to **Critically Endangered (Possibly Extinct)** - 2000 -

IUCN Red List of Threatened Species



Information about the Specimen's Extinction:

The first description of a Glaucous Macaw was provided in 1767 by José Sánchez Labrador, a Jesuit father, who wrote, "Hay muchísimas de estas aves en los bosques de la orilla oriental del río Uruguay; en las selvas del río Paraguay se ven raras." (There are many of these birds in the forests on the eastern bank of the Uruguay River; in the jungles of the Paraguay River, they are rare.) The scientific name, *Anodorhynchus glaucus*, was provided by Louis Pierre Vieillot in 1818. The macaws' decline began shortly thereafter; hunting for the birds was increasing and development was destroying their habitat. On August 1, 1854, while he was collecting botanical specimens on the La Plata Expedition, Captain Thomas Page noted that "I was fortunate in obtaining some rare birds..." He collected three of the endangered species, which are now in the collection of the Smithsonian Institution. Today, there are very few specimens in institutional collections. The last living specimen is believed to have died in the London Zoo in 1912, although there is some question as to whether the Zoological Gardens in Buenos Aires, Argentina, held a Glaucous Macaw (some believe it was a Lear's Macaw instead) that died in 1936. Furthermore, although there was a reliable sighting in the 1960s and several unconfirmed sightings were reported in 1951, 1970, and 1988, it is believed the Glaucous Macaw became extinct in 1930. Expeditions in southern Paraguay in the 1990s and in 2008 found no evidence of the species in its former habitat range, and that habitat has changed dramatically.

Several factors, all of which occurred around the same time, are believed to be responsible for the Glaucous Macaw's decline. One factor was the widespread loss of the species' prime habitat in river basins, which were being clear-cut for farming and ranching. By 1828, settlers were moving into the middle of a great yatay forest in Corrientes, a province located in the northeastern region of Argentina, near Paraguay. As these settlers sowed the region's fertile soil, they cut down the yatay palms, whose nuts were believed to have been the Glaucous Macaw's main food source. Alcide

Charles Victor Marie Dessalines d'Orbigny, a French naturalist, feared that the development already underway would never slow down. He lamented the irreversibility of these actions and the inevitable loss of the forest. The species' decline has also been linked to the destructive wars between Paraguay, Argentina, Brazil, and Uruguay throughout the 1800s and early 1900s. These wars are believed to have killed 90 percent of Paraguay's male population and thus made it dangerous to survey the region in hopes of restoring the macaws' population. Hopes for the species' survival were further diminished in the 1970s by the construction of a large hydroelectric plant on the Uruguay River, which flooded the lowlands and destroyed more of the macaws' habitat. The Glaucous Macaw's unique size and colorful plumage also made the birds a trophy specimen for hunters and collectors, who also collected the species' eggs and some of the young, which were captured alive for use as pets. All these factors, together with the birds' slow reproductive rate, contributed to an unsustainable number of obstacles for the species' survival.

More Information about the Glaucous Macaw:

The Glaucous Macaw featured in this chapter originally came from the collection of Baron Noël Frédéric Armand André de Lafresnaye, a French aristocrat, ornithologist, and entomologist. Just about every specimen from his collection, which numbers in the thousands, is documented in his handwritten inventory list. The list,

Yatay palm tree fruit



CATALOGUE OF BIRDS IN THE

Catalogue Number.	Original Number.	Name.	Sex.	Locality	Nature of Specimen
74161		<i>Euphonia gouldi</i>		Guatemala Trade skin	Specimen
2		" "		"	"
3		" "		"	"
4		" "		"	"
5		" "		"	"
6		" "		"	"
7	787	<i>Speotyto g. guadeloupenis</i>		Guadeloupe	"
8	7358	<i>Otis tarda</i>		Europe	"
9		" "		"	"
74170		<i>Phoenicurus minor</i>		[Africa & India]	"
1		<i>Tyrannus m. chloronotus</i>		Belize	"
2		1. <i>Aurorhyzuchus laticinctus</i>		Brazil, back of Rio St. Fran. ¹⁸⁰⁰	"
3		2. <i>Aurorhyzuchus glaucus</i>		Brazil.	"
4		3. <i>Zanopsisitta spixi</i>			"
5		6. <i>Ara macas.</i>			"
6		12. <i>Ara macroura</i>			"
7		15. <i>Ara nabilis</i>			"
8	2244	" "		Brazil	"
9		<i>Ara bluei</i>		Guiana	"
74180	209	<i>Calyptrorhynchus bairdii</i>			"
1	204	<i>Calyptrorhynchus bairdii</i>			"
2	207	<i>Calyptrorhynchus viridis</i>			"
3	206	" "			"
4	207	" "			"
74185	172	<i>Cacatus alba</i>			"

MUSEUM OF COMPARATIVE ZOOLOGY.
Catalogued by

Number of specimen	Collected by	When Collected	Received from	When Received	Number of Specimens	Remarks
1			General Coll. skins			Boston Soc. of Nat. Hist.
"			"			"
"			"			"
"			"			"
"	L. H. Silliman		Zepherus Coll.			Type "
"			"			"
"			No data at all. From the Old Pa. Coll. Museum			"
"	Dr. H. Brandt		Zepherus Coll.			"
"			"			"
"			"			"
"			"			"
"			"			"
"	T. R. Prall		U. S. Nat. Hist.			"
"	Dr. F. W. Craigie		Zepherus Coll.			"
"			"			"
"			"			"
"			"			"
"			"			"
"			"			"
"			"			"
"			"			"

Inventory Ledger, Museum of Comparative Zoology, Harvard University

however, provides very little data regarding where each specimen was collected, when it was collected, or by whom it was collected. (See the chapter on the Pink-headed Duck for more information about the history of this collection.)

Anodorhynchus glaucus was formerly widespread but became localized to northern Argentina, southern Paraguay, northeastern Uruguay, and southern Brazil (i.e., from the Paraná state southward). The species was endemic to the middle reaches of the major rivers (i.e., the Uruguay, Paraná, and Paraguay Rivers) and adjacent areas, with most records coming from Corrientes, Argentina.

The bird was native to the subtropical forests of the Uruguay River, the Paraná River, and the Paraguay River, as well as their tributaries. Most of the reported macaw sightings occurred along these rivers, but most travel also occurred along these same rivers, since it was very difficult to travel into the forests.

The Glaucous Macaw was named after the bluish color of its plumage, which changed in hues as light shifted on its feathers. The macaws lived in palm savannas and in wooded forests that held the species' favorite nut, the yatay, which came from the bluish-grey fronded yatay palm tree (*Butia yatay*). The macaws also fed on fruits and berries. The species needed old-growth forests to accommodate the size of its nests, which the birds built either in the hollow trunks of dead or decaying trees or in the holes and crevices of nearby cliffs. Each nest accommodated the two eggs that comprised the birds' clutch. The macaws were thought to live approximately fifty years.





Glaucous Macaw 133



PARADISE PARROT

Collection Numbers and Descriptions: . . . Ornithology 74281 (Previous number Lafr 144) - skin (dry) - male - 10.5 inches long

Scientific Name: *Psephotus pulcherrimus*

Collection: Museum of Comparative Zoology, Harvard University, Cambridge, MA

Site of Retrieval: Darling Downs, Queensland, Australia

Retrieval Date: July 10, 1844

Collector: John Gilbert

Last Confirmed Sighting or Collection: . . . 1928

Conservation Status: **Extinct** - 1994 - IUCN Red List of Threatened Species

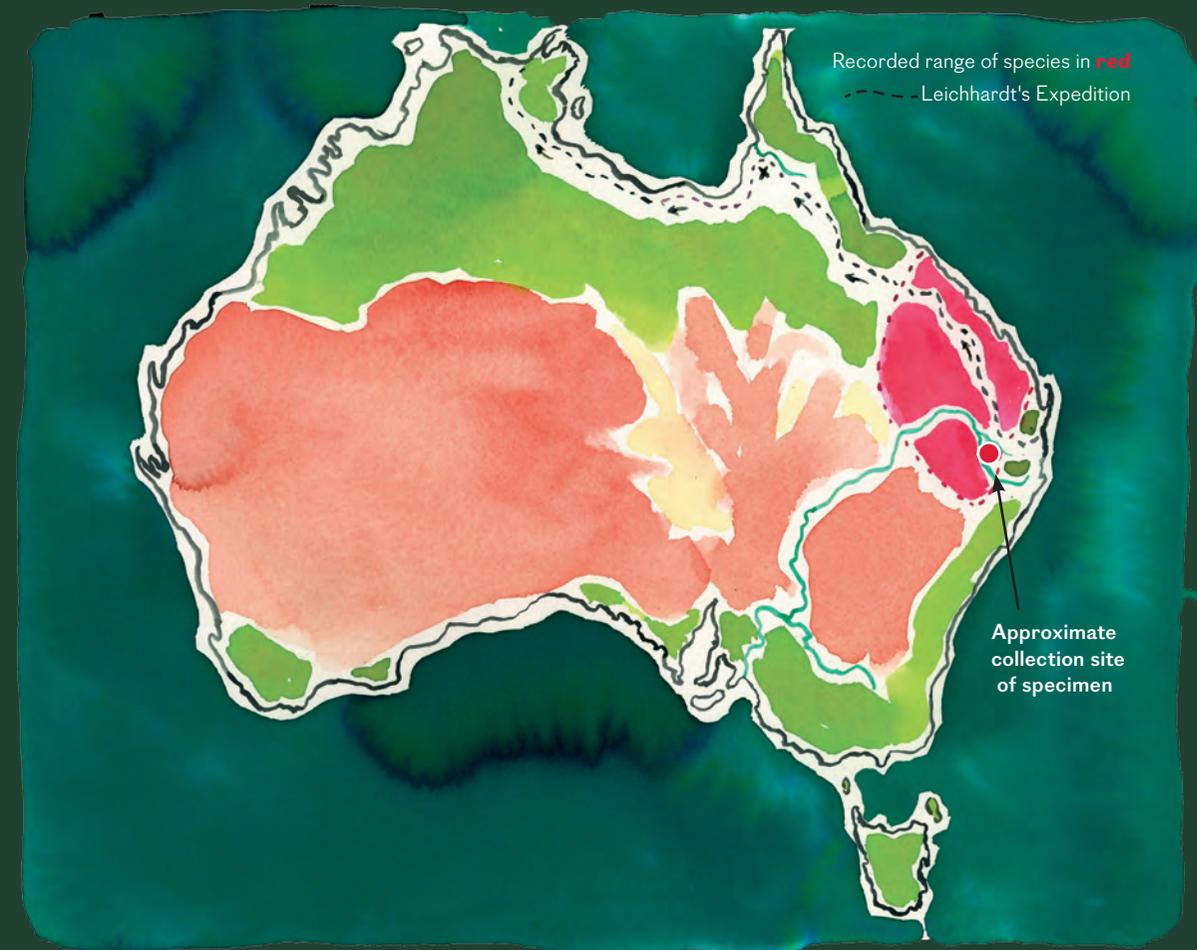
Paradise Parrot 135

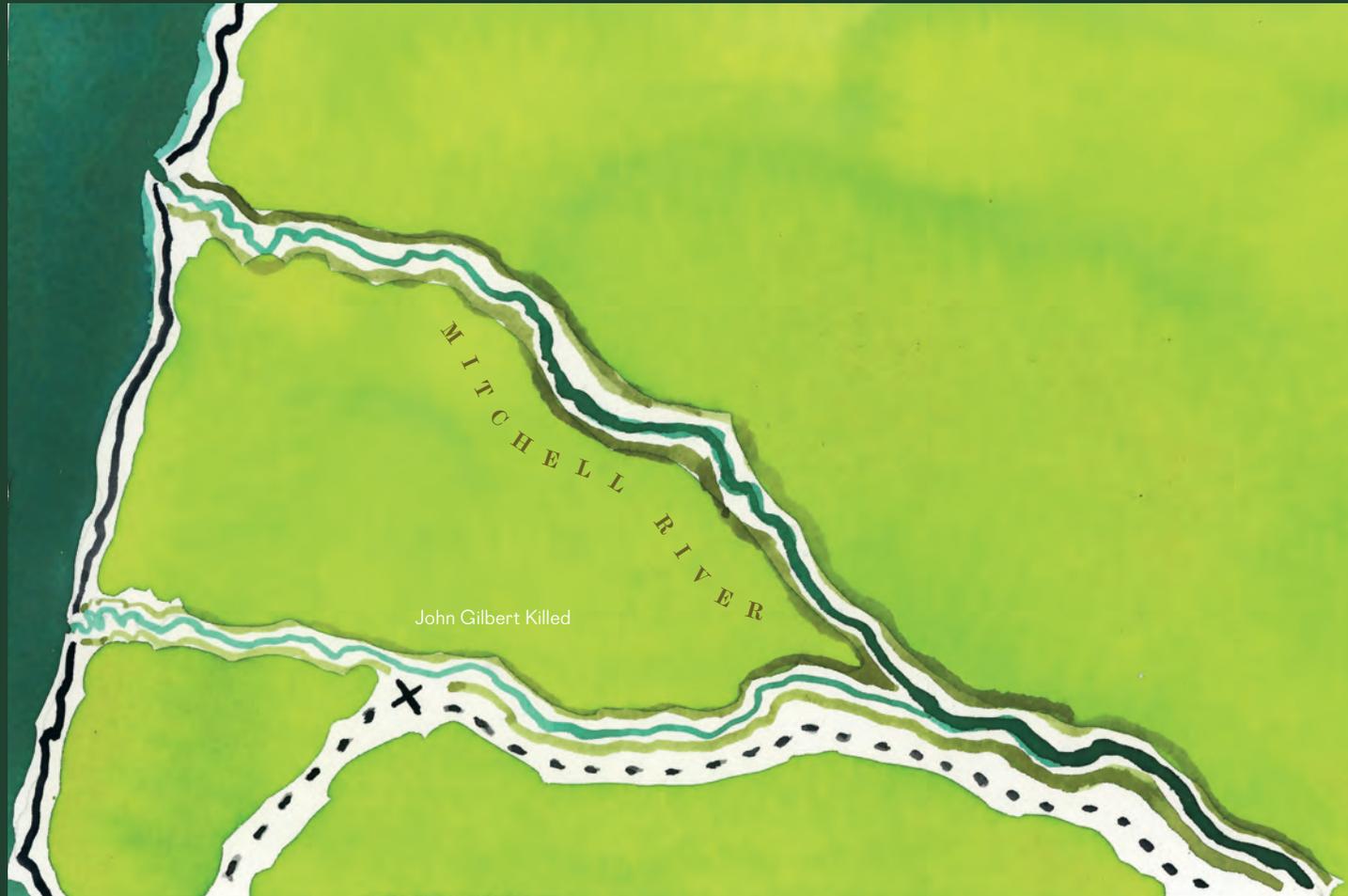
135

Information about the Specimen's Extinction:

John Gilbert was the first to take note of the Paradise Parrot. He collected a specimen for John Gould, a collector and naturalist from England who hired him. The adult male specimen was collected on June 17, 1845, on the Darling Downs on the Condamine River between Tummaville and Yandilla Stations in northeastern Australia. Although Gilbert wanted the parrot to be named after him, Gould decided to call it "Beautiful Parrot" and *Psephotus pulcherrimus*. The birds were common during the mid-1800s, but their population declined quickly between the 1880s and 1920s. Cyril H. H. Jerrard took photographs of the birds in 1922 and continued to see them until 1927. His neighbor saw a single male on November 20, 1928, which was the last confirmed sighting. By the 1940s, the Paradise Parrot was considered extinct. There were several unconfirmed and unreliable sightings during the 1960s and 1990s, and several expeditions to investigate reported sightings returned with no evidence of the species. The commercial popularity of the species fueled efforts to breed the Golden-shouldered Parrot with the Mulga Parrot. The resulting hybrid parrots have been successfully sold at very high prices as a counterfeit Paradise Parrot.

Like other extinct species, the Paradise Parrot's demise was due to several simultaneous factors that prevented the species' recovery. The dramatic change and loss of grassland habitat was a major issue that itself had several causes: cattle grazing; the building of homes, ranches, and, oddly enough, tennis courts; and the annual burning of fields when plants were in seed. In addition, the drought of 1902 prevented the growth of any plant or seed for several years. At the same time that the parrots' breeding grounds and food supply were being destroyed, there was also a high-rate of collecting since





the colorful birds were highly desired by collectors. The collecting was also fueled by fears that the species was near extinction. Since male specimens were more colorful, collectors' preferences created a shortage of breeding males, which affected the recovery of species, as did egg collecting. Although many birds were taken for the live-bird trade, none survived. Other factors that affected the parrots' habitat included the introduction of invasive plant species from South America, like the Prickly Pear, which grew out of control until the early 1900s. Another practice that destroyed the parakeets' grasslands was the practice of ring-barking, or girdling, which killed many trees and also increased erosion and the removal of topsoil. In later years, the introduction of feral cats and foxes also contributed to the deaths of young and adult parrots.

Alexander Chisholm, an Australian journalist, shared Carl Lumholtz's description about his encounter with a pair of Paradise Parakeets. Lumholtz, who was a respected explorer and researcher of native cultures, wrote the following: "An hour before sunset I left the camp with my gun, and soon caught sight of a pair of these parrots that were walking near an ant-hill ... After I shot the male the female flew up into a neighbouring tree. I did not go at once to pick up the dead bird - the fine scarlet feathers of the lower part of its belly, which shone in the rays of the setting sun, could easily be seen in the distance. Soon after the female came flying down to her dead mate. With her beak she repeatedly lifted the dead head up from the ground,

and walked to and fro over the body, as though to bring it to life again; then she flew away, but immediately returned with some fine straws of grass in her beak, and laid them before the dead bird, evidently for the purpose of getting him to eat the seed. As this, too, was in vain, she finally flew into a tree as darkness was coming on. I approached the tree, and a shot put an end to the faithful animal's sorrow.”

More Information about the Paradise Parrot:

John Gilbert, who discovered the species, was also the individual who collected the specimen that is featured in this chapter. This specimen was shot near Oakey Creek, a tributary of the Condamine River, twenty-three days after he had first encountered the species, in June 1845, not far from the site of discovery. Gilbert spent May and September collecting specimens near this area. He described the Paradise Parrot as “without exception the most beautiful of the whole tribe I have ever yet seen in Australia.” Although records for the specimen in this chapter do not include the specific site where it was collected, Gilbert’s diary mentions that he shot another specimen at Oakey Creek three days after this chapter’s specimen was collected. The Paradise Parrot from the creek is now in the World Museum, which is part of the National Museums Liverpool situated in Liverpool, U.K. Not even a year later, Gilbert was killed during another expedition.

In Australia, the Paradise Parrot is also known as the ground parrot, ground rosella, and the anthill parrot because breeding pairs built their nests inside termite mounds. These nesting grounds were often found in river valleys and in open forests that had understories of short native grasses. The male



parrot remained outside the nest. The female, which gained access to the nest via a 9-inch by 1.5-inch tunnel the parrots created, incubated the three to five eggs, which were laid in September, December, or March. These light pink eggs were less than an inch in size. Periodically, both birds would go out and forage on the ground for seeds of native grasses. The fearless birds were swift flyers but spent most of their time on the ground looking for food.

A breeding pair used the same nest repeatedly for several years. It is believed that the Paradise Parrot's nest was co-inhabited by a *Trisyntopa* moth, which laid its eggs in the nest area during the birds' breeding cycle. The moth's larvae developed at the same time the parrots' eggs were hatching and the



Ornithology Archives, Museum of Comparative Zoology, Harvard University

larvae fed on the feces of the nestlings. As the parrots developed into fledglings, the larvae pupated on the walls of the nest opening.

Chisholm described a male Paradise Parrot's calls as a "sweet, plaintive piping, not unlike that of a young bird."

More Information about John Gilbert, the Collector of This Specimen:

John Gilbert was born on March 14, 1812, in Newington Butts in south London, England. His parents, William and Ann, were from a village three miles away in Kent. At the age of sixteen, John Gilbert worked as a taxidermist for the Zoological Society of London, where he was trained by John Gould, the respected naturalist and collector previously mentioned in this chapter. At the age of 23, Gilbert married Catherine Crump, a widow. The following year, he became the first curator of the Museum of The Shropshire & North Wales Natural History Society in Shrewsbury. He received a salary of around \$15,000 (in today's value), plus living quarters, and coal for heat and cooking. That same year, he remarried, to Esther Dadler, but the Trustees forbade the couple from living together in the museum. Gilbert resigned, and the museum offered him a part-time job at lesser pay, which he rejected. Instead, Gilbert and his wife moved in with John Gould in London, and Gilbert became Gould's assistant. Gould was working on a seven-volume publication called *The Birds of Australia* (1842-48), and he needed Gilbert to find as many species as possible on the island. The publication ended up containing six-hundred colored lithographs of species and became one of the most important ornithological publications in history.



Blacks about to attack Leichhardt's Camp, near the Gulf of Carpentaria, 1845.

John Macfarlane, *Blacks about to attack Leichhardt's Camp, near the Gulf of Carpentaria, 1845*, painted from descriptions supplied by C.R. Long in 1890's, Ed. Dept. Vic <http://nla.gov.au/nla.obj-140395909>

In 1838, as part of their research for the book, Gilbert and Gould traveled together to Tasmania, an island south of Australia, to collect specimens before continuing on to Australia. Gould returned to England after a short while, but Gilbert remained and continued collecting for Gould in Tasmania and Australia. Gilbert briefly returned to England in 1841, for four months, before Gould sent him back to Australia to collect more specimens at a salary of \$17,400 per year (in today's value), plus expenses. Gilbert arrived in western Australia in August 1842 and collected specimens of birds, fish, and mammals, including sea lions and kangaroos, for the next two years.

In January 1844, Gilbert arrived in eastern Australia and, after collecting specimens in the region, settled into the Darling Downs area for the next six months; it was here that he discovered the Paradise Parrot, of which he collected seven specimens. He also collected several new species of small mammals. He begged Gould to name the parrot after him, but Gould declined, having already named Gilbert's Whistler, Gilbert's Dunnart and Gilbert's Potoroo after him.

After finishing his collecting for Gould in September, Gilbert sent his extensive collection of specimens to his employer in England and began looking for the next region to explore. Gilbert met Ludwig Leichhardt, who was planning the first European expedition to cross from the east coast of Australia through the bush to Port Essington on the northern coast. Gilbert and Leichhardt began their expedition on the coast of Darling Downs with seventeen horses, twelve pack steers, another four steers for food, seven pairs of hunting dogs, and supplies for six months. They started with ten members, but Leichhardt sent two expedition members back when he realized that they did not have enough provisions. Gilbert soon became second in command due to his extensive experience in the field.

The expedition averaged around nine miles per day as they explored and collected specimens over the next nine months. In 1845, as they approached the northern coast of the island and neared the end of their trek, events transpired that led to Gilbert's death at the age of thirty-three.

On June 21, 1845, the expedition came across two Aboriginal groups of Murri that had been collecting food by diving into a nearby lagoon for lotus seeds. Most of the Murri ran away when they saw the explorers, but it is believed, from testimonies reported well after the event, that a Murri woman was raped by the two Aboriginal members of Leichhardt's expedition. The expedition also took the seeds that the group had been harvesting and had left behind. That night, the expedition members, while at their camp, could hear the Murri making vocal sounds to warn of their approach and to announce their interest in meeting together. The expedition felt threatened and fired a warning shot, which scattered the Aborigines.

From June 24 to 27, the Murri stayed out of sight of the collectors but signaled their presence to other Murri by setting small circular grass fires around the expedition.

On June 27, the two Aboriginal expedition members fired on the Murri.

On June 28, after working through four miles of wooded area, the party settled in for the evening on the edge of a lagoon along Dunbar Creek, near the Mitchell River. Gilbert, by this point, noticed many rings of fire around them. The expedition built a large campfire and finished their dinner of ten ducks. The eight members of the expedition retired to their tents or ground cover around 7 p.m. Fifteen to twenty minutes later, the men were awakened by a shower of spears coming from all directions. The men arose and fired four shots in the general direction of the Murri, and the attackers scattered. Two

expedition members had been badly wounded, and Gilbert was found on the ground. Realizing that his body was still warm and blood was coming out of his mouth, one of the expedition members opened the veins in both of Gilbert's arms, as well as his temporal artery, but noticed that the stream of blood had stopped. Although it took a while to find the wound, the expedition members eventually located a small wound between Gilbert's shoulder blade and neck. From the positioning of the hole and the testimony of his tentmate, who had seen Gilbert drop immediately to the ground, they calculated that he was hit in the heart as he stooped to come out of the tent. There is still some controversy whether the small wound was caused by a spear, which was not found by the body, or by friendly fire from one of the expedition members. The wounds of the other two expedition members were described by Leichhardt as follows: "Several spears were barbed and could not be extracted without difficulty. . . . I had to force one of them through the arm to break off the barb; and to cut another out of the groin of Mr. Calvert." One expedition member had multiple wounds from spears, two or three of which had hit his scalp; another spear had pierced his cheek and continued up through his eye socket; still another had gone through his left arm, and the last spear had pierced through his loins. The other expedition member had one spear go through his left testicle into his groin and another spear wounded his knee.

On June 29, at about 4 p.m., John Gilbert was buried with a service performed by Leichhardt. The shallow three and one-half foot grave was dug into the hard ground and disguised by a large fire that was built over it. Gilbert's name and age were carved into a tree hanging over the site. One of the Murri from the attacking group had also died, and the cries of his group members could be heard as they departed with his corpse.

Many expeditions have searched for Gilbert's burial site and, although his body has never been found, a probable site has been identified on the remote Rutland Plains.

On June 30, Leichhardt packed up Gilbert's specimens, gun, sewing kit, and diary and continued with the expedition. Gilbert's diary was lost for almost a century before it was discovered by Alexander Chisholm, who became an authority on Gilbert's life. The two wounded members of the expedition survived the remaining six months of their trek.

Leichhardt named several geographical features, including the Gilbert River, as well as Gilbert's Dome and Gilbert's Range, after his deceased comrade. Leichhardt and the rest of his party survived this first expedition, but on Leichhardt's fourth collection trip, back to the region where Gilbert first discovered the Paradise Parrot, the entire party, including Leichhardt, was lost and never heard from again.



Paradise Parrot 143





PASSENGER PIGEON

Collection Numbers and Descriptions: . . . Ornithology 73216 - skin (dry) - Nestling - 13 inches long
Scientific Name: *Ectopistes migratoria / migratorius*
Collection: Museum of Comparative Zoology, Harvard University, Cambridge, MA
Site of Retrieval: Wisconsin - perhaps in Lac Courte Oreilles Reservation
Retrieval Date: No Data
Collector: Aaron Ludwig Kumlien
Last Confirmed Sighting or Collection: September 1, 1914
Conservation Status: **Extinct** - 1988 - IUCN Red List of Threatened Species
Painting: Collection of Michele and Jeffrey Goldfarb

Information about the Specimen's Extinction:

There is no story about a species' extinction quite like that of the Passenger Pigeon's. The species was first mentioned by Jacques Cartier, a ship captain, in 1534 when he was sailing along Prince Edward Island. Cartier noted "an infinite number of wood pigeons." The reference to "wood" relates to the pigeons he was familiar with in Europe. The next mention of the bird was in Mark Catesby's *The Natural History of Carolina, Florida and the Bahama Islands* in 1754, in which the species was called *Palumbus migratorius*. The species was more accurately reclassified as *Ectopistes migratorius*.

At its height, the Passenger Pigeon population was believed to be the most numerous of any bird ever. The number of birds was estimated to be as high as ten billion, and the species was believed to account for 40 percent of all birds in the United States. The birds were believed to fly through the United States and Canada in flocks comprised of a few hundred million pigeons. These flocks, which were reported to be a mile wide and 310 miles long, could take anywhere from three hours to three days to move through an area, even though each bird could fly up to sixty miles an hour. People who experienced the flocks were frightened by the deafening sound made as the birds passed over an area and blocked out the sun for days at a time; they were also shocked by the strange sight of the pigeons' dung falling like wet snow through the air. An eyewitness account from a resident in Columbus, Ohio, described the scene in 1855, "As the watchers stared, the hum increased to a mighty throbbing. Now everyone was out of the houses and stores, looking apprehensively at the growing cloud, which was blotting out the rays of the sun. Children screamed and ran for home. Women gathered their long skirts and hurried for the shelter of stores. Horses bolted. A few people mumbled frightened words about

CATALOGUE OF BIRDS IN THE

Catalogue Number	Original Number	Name	Sex	Locality	Nature of Specimen
73211		<i>Aphriza virgata</i>	♂	Alaska, Sitka	Skin
2		<i>Thaumophilus d. jucat-</i>	♀	Jucatan	"
3		<i>Trazopau catot(ouid)</i> [Clusia]			"
4		<i>Ectopistes migratorius</i>	-		"
5		"	2 juv	Wisconsin	"
6		"	juv	"	"
7		<i>Coccyzus punillus</i>	-		"
8		<i>Ostrelata jamaicensis</i>		Jamaica, St. Andrew's, Christ Church Ph.	"
9	8003	<i>Ostrelata nasitata</i>		Saint-Denis	"
73220	8004	"	"	"	"
1	8005	<i>Ostrelata diaboli</i>		"	"
# 2	8002	"	"	"	"
3		<i>Comptosia c. interior</i>	-		"
4		<i>Dendroica auricapilla</i>	♀	W. I. Brand, Cayman	"
5		<i>Dendroica pettiei</i>	♀	Jamaica	"
6		<i>Dendroica b. bryanti</i>	♂	Belize	"
7		"	♀	"	"
8		<i>Dendroica ac. aestiva</i>	♂	"	"
9		"	♀	"	"
73230		"	♀	"	"
1		"	"	Guatemala, Trade Skin	"
2		"	"	"	"
3		"	"	"	"
4		"	"	Panama	"
73235		"	♂	Iowa, Zion City	"
*		{The Bird Cottage, Lohr, No. 8001, ex Chicago 31 Dec. 1886			



Reference
M. C. Z. 73216

41

the approach of the millennium, and several dropped on their knees and prayed.” The flocks were so thick that one shot from a shotgun could drop a dozen birds, and a pole could be used to drop several birds as they flew low overhead. When the pigeons landed, by the hundreds, in trees, their weight broke the branches, and the ground below the trees turned white from the inch-thick covering of dung. Understandably, no one imagined that this species would someday become extinct and thus, even when the birds were no longer to be found, naturalists and ornithologists believed that the species had moved somewhere else. No one could fathom that man could create such mass-scale destruction.

The demise of the Passenger Pigeon began with the introduction of the railroad in the Northeast in the early 1800s, followed by the expansion of the railroad to the Midwest and the West several decades later. The railroad, along with the introduction of the telegraph in the mid-1800s, sped the birds’ demise by enabling large groups of hunters to cover large swaths of land while tracking the flocks’ migration. With the invention of the refrigerated train car in the 1870s, the species’ numbers became critical. These new refrigerated train cars made it possible for hunters to transport large quantities of pigeons to cities. As a result, birds that had once been left in the field to rot now had a commercial value, and the wanton slaughter of the birds intensified; for example, one hunter during this period was reported to have killed and shipped three million birds. Many of the birds were sold for three cents apiece (\$0.75 in today’s value), to be used as cheap meat for slaves and servants in urban centers. The birds that were not sold for meat were milled down for pig food, oil, and fertilizer, and their feathers were used for stuffing.

The live-trade market for the birds was also very profitable, although many of the birds died of dehydration during the several-day-long transit to the cities. To capture the birds alive, many of the six hundred registered netters used various means to secure their catch. While some netters spread alcohol-soaked grain on the ground to net the intoxicated birds, others captured the birds in nets that were positioned to surround the trees where the birds were nesting. The netters burned the grass under these trees, and as the smoke filled the trees and the birds flew out, they became trapped in the nets that had been placed between long poles positioned around the trees. Often, the trees were then chopped down, and the nestlings taken for use as delicacies. Another method of capturing the birds gives us the origin of the phrase “stool pigeon.” By this method, hunters captured an adult pigeon and sewed the bird’s eyes together. The bird was then secured by strong string to the top of a circular stool. This stool, with the bird attached, was then positioned high on top of a pole. As a flock of pigeons flew overhead, the stool was shaken off the pole and, as it toppled downward through the air, the attached bird fluttered behind it to the ground. A portion of the flock, which was tricked into thinking that one of its group had found food, followed the captured bird to the ground, where they were themselves netted.

Passenger Pigeons were also killed for sport. Competitive pigeon shoots were very popular, and many respected ornithologists and naturalists participated in them. The results, which were often listed in the *New York Times*, showed the winners to have shot between 20,000 and 30,000 birds. The last pigeon-shoot competition occurred in Chicago in 1886; the number of birds remaining was already too small to sustain the sport. By 1896, the population had dropped to a single flock of 250,000 birds. A well-organized group of hunters followed the flock, killing its members, until only five thousand birds

remained. Four years later, in March 1900, the last recorded pigeon, a female, was shot by a fourteen-year-old boy, Press Clay Southworth (1886-1979), on his family's farm in Pike County, Ohio. The poorly mounted bird was stuffed with buttons used for eyes and was later donated to the Ohio History Center in Columbus, where it remains to this day.

When the species' extinction became inevitable, several of the Passenger Pigeons were captured and kept alive in Milwaukee, Chicago, and Cincinnati. By 1909, however, only three specimens remained alive; all were in the Cincinnati Zoo. Several attempts to breed the remaining birds failed. Two of the three specimens were called George and Martha (after President Washington and his wife). By 1910, only Martha remained. In her later years, she suffered from a form of paralysis that made her tremble. Martha passed away at 1:00 p.m. on Tuesday, September 1, 1914, when she was found lifeless on the floor of her cage. Strangely enough, Martha died in the city that is considered the home of organized Passenger Pigeon shooting competitions. She was believed to be twenty-nine years old. Her body was frozen in a block of ice and shipped to the Smithsonian Institution; her internal organs are now stored in alcohol, and the rest of her body has been preserved and mounted. The specimen has left the Institution only twice; on both occasions, it was transported by plane, with an escort, in first class.

In a matter of five decades, the number of Passenger Pigeons in existence dropped from the billions to zero. Many naturalists experienced this dramatic extinction during their lifetimes. Still, many ornithologists were surprised at the birds' extinction; some believed the birds had migrated somewhere else, were killed in a major storm at sea, or had died from diseases. It was, however, becoming painfully clear that the massive decline in the species' numbers was caused solely by man. William

Brewster, who was one of the most respected ornithologists of the time and the curator of the Museum of Comparative Zoology at Harvard University, had noticed as early as 1869 that a flock of Passenger Pigeons flying overhead contained only fifty birds, a clear sign of the species' decline. The idea, however, that a species could be conserved was still novel for the time, and very few naturalists promoted conservation. For example, even though Brewster realized that the population was rapidly declining, he still found it difficult to not shoot down a Passenger Pigeon in 1875. He later wrote of that last Passenger Pigeon he saw and killed, "It was the last Pigeon I have seen, or am likely to see, alive in the Cambridge region." Brewster's colleagues were also unwilling to change their collecting practices when they met for the 1910 meeting of the American Ornithologists' Union. By this point, several members had declared the Passenger Pigeon extinct. Nonetheless, the group approved a plan that included a directive to kill the Passenger Pigeon and to use its carcass as evidence for the species' existence. It took the organization a year before it realized that this might not be the best way to preserve the species; the organization eventually removed the recommendation to kill any remaining pigeons for scientific proof.

Nonetheless, the species was never able to recover for several reasons. Not only did hunting and collecting continue, but the pigeons also faced loss of their habitat, exposure to Newcastle Disease (a contagious viral bird disease), and a slow breeding rate; the Passenger Pigeon laid only one egg at a time. Surveys in 1910-11 found no evidence of the species, and the Passenger Pigeon was then declared extinct in the wild.

The dramatic decrease of the Passenger Pigeon's population and other birds' population inspired George Bird Grinnell, the editor of the magazine *Forest and Stream*, to start the National Audubon

Society in 1886. As a child, Grinnell was tutored by Lucy Audubon, the wife of the famous ornithologist and artist. Grinnell named the organization after the couple. The organization's membership grew very quickly and lobbied government representatives to create laws to protect birds and other declining wildlife species. The first significant conservation law was the Lacey Act in 1900, which was introduced by a Republican Congressman from Iowa, John F. Lacey, who pleaded to his colleagues, "We have given an awful exhibition of slaughter and destruction, which may serve as a warning to all mankind. Let us now give an example of wise conservation of what remains of the gifts of nature." The Act prohibited the trade, sale, purchase, or possession of any wildlife and plants acquired illegally in the United States. In 1916, the Passenger Pigeon's extinction prompted the governments of the United States and Canada (Great Britain) to create the Migratory Bird Treaty Act for the protection of migratory birds. The Act currently protects over 800 species. In 1947, in Wisconsin's Wyalusing State Park, which is near one of the species' largest recorded nesting sites, the conservationist Aldo Leopold dedicated a monument to the Passenger Pigeon. The following text is inscribed on the monument: "This species became extinct through the avarice and thoughtlessness of man."

Records today indicate that 1,532 Passenger Pigeons and 16 skeletons are held in institutional collections; countless others are likely held in private collections.

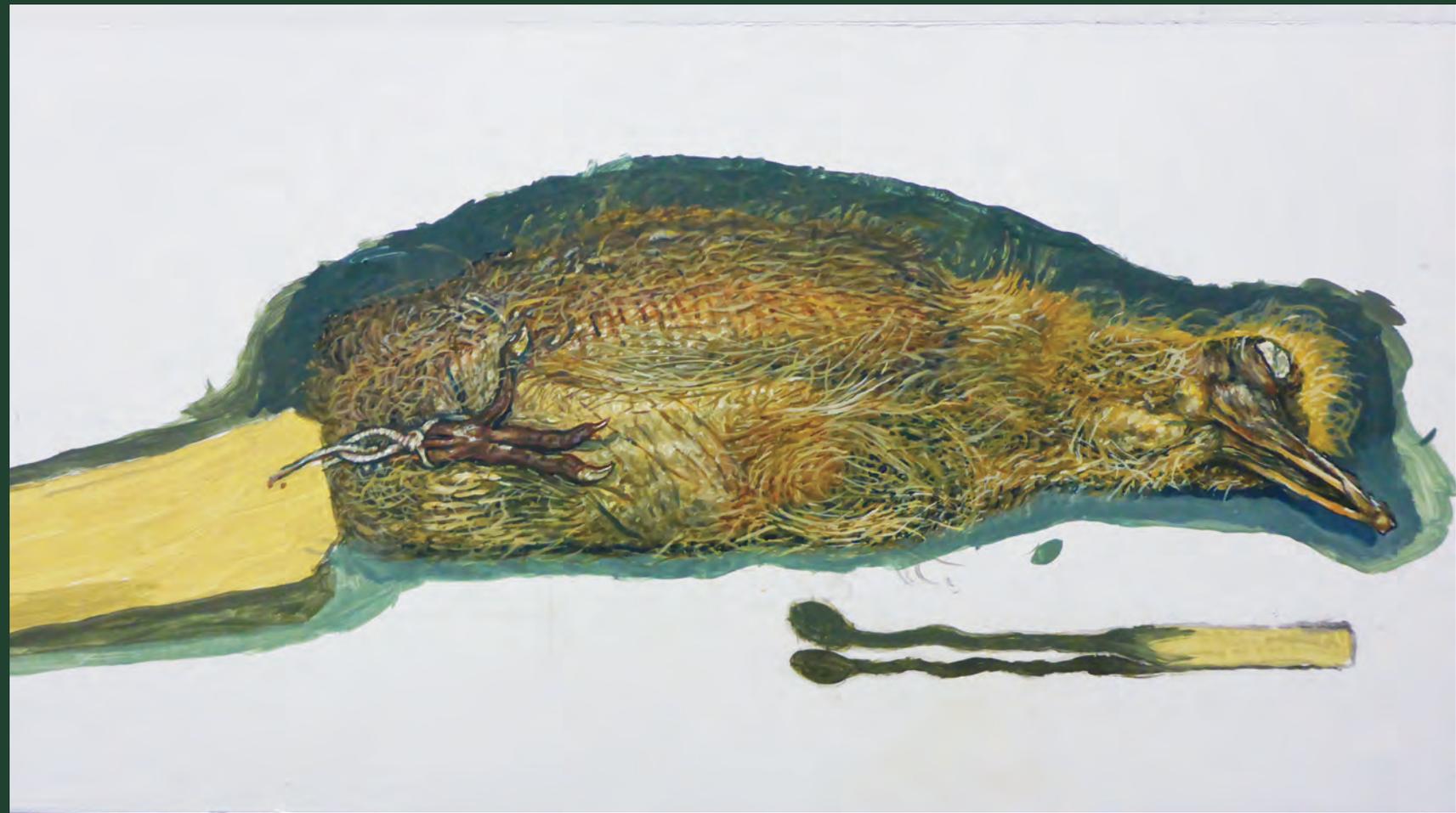
More Information about the Passenger Pigeon:

The specimen of the Passenger Pigeon featured in this chapter is the only known nestling in any recorded collection. The specimen belonged to the Boston Society of Natural History before it was transferred to Harvard University's Museum of Comparative Zoology in 1914.

The Passenger Pigeon was found mainly in hardwood forests located in the central and eastern regions of both Canada and the United States, although additional sightings were noted in Mexico and Cuba. From April through May, an enormous flock of pigeons built as many as one hundred nests per tree. Typically, the nesting sites encompassed an area of thirty square miles, but the area could be even larger as it had to accommodate as many as a hundred million breeding adults. Each breeding pair created a single twig-encrusted nest, and each nest held one white egg. This egg hatched in about twelve days. Afterwards, one of the parents fed the nestling for a few days with the cheese-like crop milk from its enlarged esophagus, which was part of the bird's digestive tract. The nestling was then left to find food for itself. The flock's sheer number and incredibly loud noise scared away most predators, except for hawks, owls, weasels, skunks, and tree snakes, which became acclimated to the din and devoured the birds at various stages of development.

Currently, there is a very controversial effort to bring back the Passenger Pigeon by modifying the genetic code of a Band-tailed Pigeon to resemble that of the Passenger Pigeon. The resultant pigeons would be bred and released into the wild. The project, the Great Passenger Pigeon Comeback, is headed by Stewart Brand and Ryan Phelan of Revive & Restore.





Passenger Pigeon 153

More Information about Aaron Ludwig Kumlien, the Collector of This Specimen:

Aaron Ludwig Kumlien was born in a log cabin near Busseyville (now Sumner), Wisconsin, on March 15, 1853. He was the son of Christina Walberg and Thure Kumlien, a naturalist, collector, and professor of zoology and botany at Albion Academy. From an early age, Aaron Ludwig was a naturalist and artist, and he was thoroughly engaged by his environment. He attended the University of Wisconsin (UW) from 1873 to 1877. During this period, his watercolors of native flora and fauna were exhibited at the 1876 Centennial Exposition in Philadelphia. Kumlien never finished his degree at UW because he left to work as a naturalist on the Howgate Polar Expedition. During his arduous fifteen months in the Arctic, Kumlien created reports for the Smithsonian Institution, collected various specimens, discovered a new species of seagull, *Larus kumlieni*, collected indigenous peoples' artifacts, and took notes and drawings of the indigenous peoples' cultural and daily activities. He continued to work on various projects until 1889, when he taught at Albion Academy. In 1891, he accepted a position as professor of physics, physiology, and natural science at Milton College in Wisconsin, where he worked until his death. In 1892, Kumlien married Annabel Carr; the couple had three children. He was a member of the American Ornithologists' Union and an assistant to the United States Commission of Fish and Fisheries; he also wrote for many journals, including *Auk*, *Forest and Stream*, *Nidologist*, and *Osprey*. On December 4, 1902, Kumlien died at his home in Milton, Wisconsin, from throat cancer. He was forty-nine years old. Kumlien never got to see his most important contribution to ornithology. The book that he and Ned Hollister co-authored, *The Birds of Wisconsin*, was published a few months after his death.

By the end of his life, Kumlien had collected five to six thousand specimens of North American bird and mammal species, as well as eggs from five hundred North American birds. Ned Hollister purchased his collection.



CAROLINA PARAKEET

Collection Numbers and Descriptions: . . . E5 3-0.5 - skin (dry) - 11.75 inches long
Scientific Name: *Conuropsis carolinensis*
Collection: Roger Tory Peterson Institute of Natural History, Jamestown, New York
Site of Retrieval: Blue Water, Florida
Retrieval Date: March 21, 1874
Journal Entry Image: No Data
Collector: Charles Johnson Maynard
Last Confirmed Sighting or Collection: 1904
Conservation Status: **Extinct** - 1988 - IUCN Red List of Threatened Species
Painting: Collection of Lauren and Dave Benson

Passenger Pigeon 155

155



Information about the Specimen's Extinction:

Sir Humphrey Gilbert arrived in Newfoundland in 1583. He was the first explorer to note the existence of parrots on the continent, which he had learned of from other explorers he had encountered. Soon after his arrival, Gilbert headed back to England but only made it as far as the Azores before his ship disappeared in a storm; he and his crew perished. We now know that the Carolina Parakeet was the only parrot that was native to the continent. The first scientific mention of the bird did not occur until 1731, when it was made by another Englishman, Mark Catesby. At that point in history, the parakeets numbered in the millions. However, their population quickly diminished in the early 1800s as European settlements increased and the East became more developed. The parakeets moved further west toward the Mississippi River and southwest Florida. By 1881, Charles Johnson Maynard, the collector of the specimen in this chapter, wrote about the species in his *Birds of Eastern North America* as follows, "The ranks of the few survivors are being rapidly thinned, for, in Florida, their enemies are legion; birdcages trap them by hundreds for the northern market, sportsmen shoot them for food, planters kill them because they eat their fruit, and tourists slaughter them simply because they present a favorable mark."

Later in the 1880s, sixteen Carolina Parakeets from Florida were purchased by the Cincinnati Zoo at \$2.50 each (\$55 in today's value). The only pair that survived to the beginning of the 1900s was Incas and Lady Jane. The London Zoo had offered \$400 (\$8,800) for them, but the offer was rejected. In the summer of 1917, Lady Jane passed away. Incas, who had been with Lady Jane for over thirty years, grieved for a few months before he died on Thursday, February 21, 1918. The last of the Carolina



Parakeets thus died in the same zoo and aviary where the last Passenger Pigeon had died some four years earlier. Like the last Passenger Pigeon, Incas, the last Carolina Parakeet, was frozen in a block of ice and sent to the Smithsonian Institution, but the shipment never arrived, and there is no record of the bird being seen again.

The last Carolina Parakeet killed and collected in the wild was in Okeechobee County, Florida, in 1904. Additional unconfirmed sightings were reported in the 1920s in Okeechobee County, Florida, and footage of three parakeets was filmed in Okefenokee Swamp in Georgia in 1937, but the images of these three parakeets were dismissed by the American Ornithologists' Union as feral, domesticated, nonnative parrots. In 1938, an unconfirmed sighting of a flock of parakeets was recorded by ornithologists on the Santee River in South Carolina. The birds were never seen again, and the area was destroyed by the installation of power lines.

The Carolina Parakeet's extinction was caused by a number of factors. The first was the reduction of its habitat, which resulted from clear-cutting the tracts of large trees needed for the species' nesting grounds. The forests were cut down since more agricultural land was needed by the increasing human population in the Eastern and Southern United States. The species' habitat was also threatened by the introduction of honeybees by the colonists. The bees infiltrated the hollowed-out cavities of the trees that the parakeets used for nests and forced out the birds. The parakeets' plumage also made them highly prized specimens not only to collectors and to merchants in the live-trade market, who sold the birds as pets, but also to the purveyors of women's hats, who used the birds' feathers for decoration. Although the parakeets helped control the cocklebur plants, which were poisonous to livestock,

farmers also killed the birds in large numbers because of a flock's ability to consume large quantities of fruit and grain. According to Audubon, a flock of parakeets covered an entire tree or cornfield like a "brilliantly colorful carpet" as they devoured its contents. Because they ate cockleburs, the birds were also poisonous to predators like cats. The birds were easy prey for hunters, however, because of their tightly packed flocks and because, like some other species discussed in this book, they remained on site to assist their injured companions. Maynard commented that "This is not a mere liking for company, as they are actually fond of one another, for, if one out of a flock be wounded, the survivors attracted by its screams, will return to hover over it and, even if constantly shot at, will not leave as long as their distressed friend calls for assistance; in fact, I have seen every individual in a flock killed one after the other, and the last bird betrayed as much anxiety for the fate of its prostrate friends which were strewn upon the ground, as it did when the first fell."

Arthur Cleveland Bent, a renowned American ornithologist, similarly wrote, "The gun is kept at work; eight or ten, or even twenty, are killed at every discharge. The living birds, as if conscious of the death of their companions, sweep over their bodies, screaming as loud as ever, but still return to the stack to be shot at, until so few remain alive, that the farmer does not consider it worth his while to spend more of his ammunition. I have seen several hundreds destroyed in this manner in the course of a few hours."

Collecting for museums and private collections continued as the species teetered on the edge of extinction. Even respected ornithologists and naturalists found it difficult to change their ways. Frank Chapman, the curator of birds at the American Museum of Natural History in New York City, came up

with the idea of having a Christmas bird count instead of holiday shooting competitions; those competitions killed large numbers of random birds just to see who could accumulate the most bodies. The bird count, which came to replace the shooting competition, provided a census of bird populations. In his memoir, Chapman recounts an event that occurred a decade before he started the bird count; this event may have persuaded him to initiate the conservation effort. In March of 1889, after he had shot and killed nine very rare parakeet specimens, he wrote, "Now we have nine specimens and I shall make no further attempt to secure others, for we have almost exterminated two of the three small flocks which occur here, and far be it from me to deal with the final blows. Good luck to you poor doomed creatures, may you live to see many generations of your kind." Chapman, however, found the third flock two days later and shot these birds also. He later reflected, "Good resolutions like many other things are much easier to plan than to practice. The parakeets tempted me and I fell; they also fell, six more of them making our total fifteen."

Today, around 720 skins and 16 skeletons remain in institutional collections. Many more are held in private collections or have been discarded over the past century as poorly prepared skins have decomposed.

Perhaps more than any other species, the absence of Carolina parakeets affects me most. As a Cuban immigrant, I can only imagine the rare tropical flavor that these birds would have presented in the upper regions of the Midwest and Northeast. We will never again see the great colorful flocks that inhabited the regions near my home in western New York.



Carolina Parakeet 159

More Information about the Carolina Parakeet:

The Carolina Parakeet specimen that is featured in this chapter came from the John D. Smith Collection and was later purchased by Roger Tory Peterson. The specimen collection site was written on the bird's label as "BlueWater, Florida." Although there is no record of such a location in the nineteenth century, it might refer to the cypress swamps off St. Johns River near Blue Springs in Florida, where the collector C. J. Maynard had an encampment set up and where he had noted flocks of the Carolina Parakeet.

The northernmost range of the Carolina Parakeet was documented in the late 1700s when large flocks of parakeets flew past Buffalo and West Seneca on their way to an area twenty-five miles north-west of Albany. Some of these reports occurred even in the winter months, which is atypical for most parrot species. The parakeets were also common as far west as the edge of the Rocky Mountains. They were also found throughout the Eastern and Southern states. The birds were powerful flyers and traveled long distances in search of food and nesting grounds, although some flocks, especially in the South, remained somewhat regional. The flocks sought large trees situated in lowland forests along rivers; these forests contained oak, elm, sycamore, and beech trees. The species also sought out cypress swamps in the South. Using holes made by larger woodpecker species like the Ivory-billed Woodpecker, the parakeets took advantage of large communal nesting areas inside these large, hollow trees. Several females placed their eggs together in the bottom of the cavities, which was an uncommon practice among birds. The selected cavities were usually between five and thirty feet above the ground. These colonies of birds numbered as many as a thousand birds, but those numbers diminished quickly in the



middle of the 1800s when flocks of two hundred to three hundred birds became more common. The parakeets' unspotted glossy eggs were yellowish-white, oval, and pointed on one end. Some ornithologists reported a greenish color to the eggs. The eggs' size was generally an inch by an inch and a half. The shells were deeply pitted and thick. After the young hatched, they were covered in a gray down. The young birds molted every fall, re-growing their full plumage some six weeks later. It took the birds two years to acquire the full range of colors in their plumage.

The birds were also known for their loud calls, as Maynard noted in 1896, "I have remarked that the Parakeets scream very loudly when flying; so loudly, in fact, that their shrill cries can be heard for miles. They come dashing along, moving in a most eccentric manner; now near the ground, then high over the tree tops, seeming about to alight a dozen times but still without settling, each in the company endeavoring to excel the other in producing the most discordant yells, when they will all pitch, at once, into some tree and a sudden silence ensues. So great had been the din but a second before that the comparative stillness is quite bewildering."

More Information about Charles Johnson Maynard, the Collector of This Specimen:

Charles Johnson Maynard was born on May 6, 1845, in Newton, Massachusetts, to Samuel Maynard and Emeline Sanger. Charles Johnson Maynard worked on his family farm from a young age and started the C. J. Maynard & Company in Boston when he was only twenty years old. He specialized in practicing taxidermy, collecting and dealing specimens, publishing books, and selling naturalist supplies. In 1870, at the age of twenty-four, he married Pauline Thurlow Greenwood, the daughter of a lighthouse

Illustration by Charles Johnson Maynard, *Birds of Eastern North America*, 1896

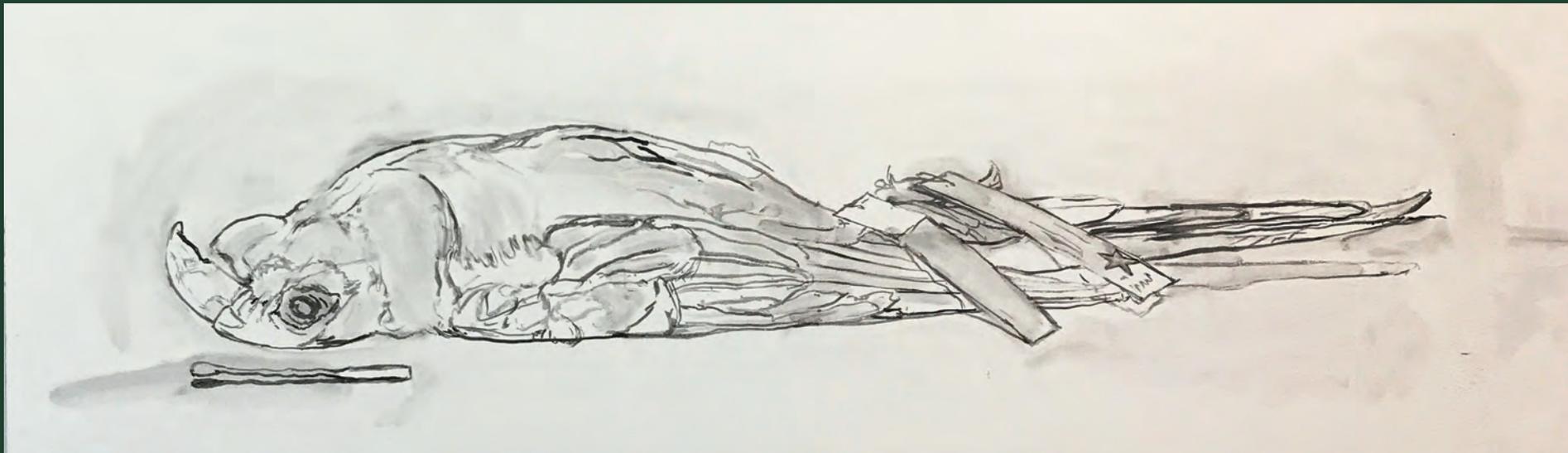
Carolina Parakeet 161

keeper in Ipswich, Massachusetts. That same year he published *The Naturalist's Guide in Collecting and Preserving Objects of Natural History*. The publication promoted his business while becoming the country's first comprehensive guide to collecting and preserving specimens. As the editor of the Nuttall Ornithological Club, Maynard ruffled some feathers when he went on expeditions for long periods of time, abandoning his administrative duties with the organization. A few years later, he was forgiven and became the vice president of the organization and the president of the Newton Natural History Society as well.

Charles and Pauline Maynard had two children, Maude and Vivian. Maynard remarried in 1883 to Elizabeth Cotter, and the couple had a daughter, Pearl. Maynard, like many of his colleagues, noticed the diminishing numbers of many of the birds that they were collecting but did not make a connection between his and his colleagues' practices and the species' extinction. In 1896 when the Carolina Parakeet was critically endangered, he wrote, "I cautiously approached the tree, ready to slaughter half the flock

at a single discharge, if possible..." Then, a page or two later in his *Birds of Eastern North America*, he stated that the parakeet "is being surely exterminated, yet ornithologists and others who could prevent this calamity, can but look upon the destruction, powerless, under the present state of affairs, to stay the ruthless hand of the destroyer." Maynard is sensitive to the dwindling numbers of the species and finds fault with the farmers, hunters, sportsmen, and tourists, but he is willing to pardon his own actions' contribution to this and other species' extinction. In another instance in the book, he laments the Labrador Duck's being extinct for the past fifteen to twenty years and describes his dismay at not being able to collect the one he saw off Plum Island in Massachusetts a few years prior.

During his lifetime, Maynard also studied mollusks, insects, mosses, and gravestones. By the time he died in Newton on October 15, 1929, he had become a respected naturalist and an expert on the vocal organs of birds. He has twenty-one species or subspecies, many of which he had discovered, named after him. He also published fourteen books and one hundred and twenty-nine articles.





Caroline Parakeet 163



164 Extinct Birds Project

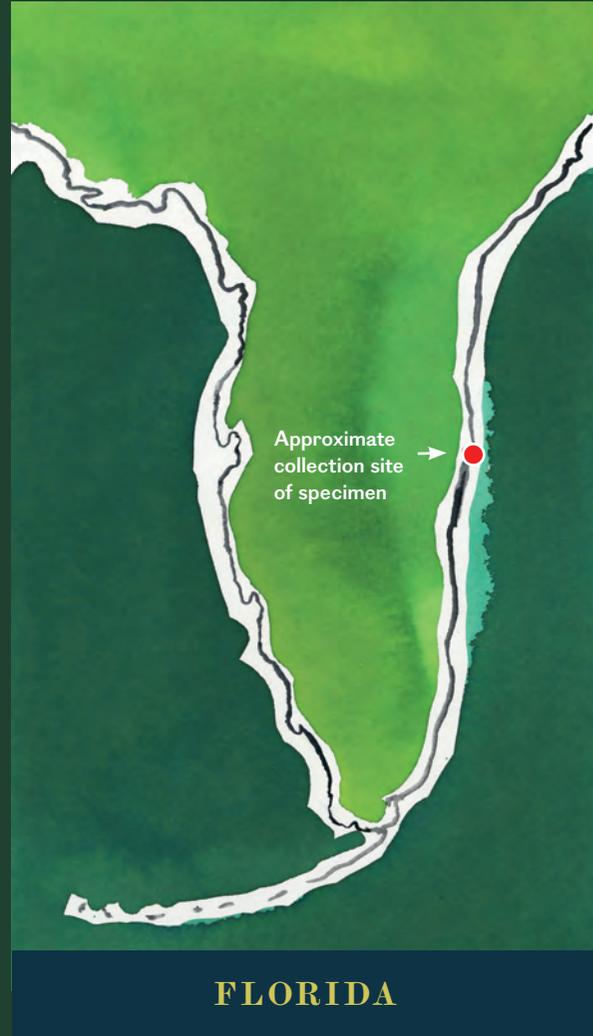


Carolina Parakeet 165



DUSKY SEASIDE SPARROW

Collection Numbers and Descriptions: . . . E9 3.0.9 - skin (dry) - male - 5 inches long
Scientific Name: *Ammospiza maritima nigrescens*
Collection: Roger Tory Peterson Institute of Natural History, Jamestown, New York
Site of Retrieval: Indian River, Florida
Retrieval Date: May 1, 1886
Journal Entry Image: No Data
Collector: Charles Johnson (C. J.) Maynard
Last Confirmed Sighting or Collection: . . . 1987
Conservation Status: **Extinct** - 1990 - IUCN Red List of Threatened Species



Information about the Specimen's Extinction:

The Dusky Seaside Sparrow was discovered on March 17, 1872, near Salt Lake on the St. Johns River in Florida by Charles Johnson Maynard. Maynard also collected the specimen featured in this chapter, which he shot fourteen years later, in 1886, on the Indian River, which is located near the St. Johns River. It was noted by Maynard and other collectors that the birds were common along these rivers and on Merritt Island. In fact, the birds' population was fairly stable and abundant for almost a century afterwards, but by 1955, biologists warned that the species' population had dropped dramatically. This dramatic change was caused by the aerial spraying of DDT between 1946 and 1951. The insecticide was being sprayed to control the mosquitoes in the area. By 1951, however, the mosquitoes became resistant to DDT, and so a different insecticide combination, BHC (benzene hexachloride), was used instead. BHC, which was mixed with diesel fuel and other chemicals, was sprayed until 1957. By this point, the population of Dusky Seaside Sparrows had dropped by 70 percent. From 1957 to 1962, malathion, another pesticide, was sprayed. By the early 1960s, the sparrows had disappeared from much of their former range and were, consequently, listed as part of the Endangered Species Preservation Act of 1966 by the Bureau of Sport Fisheries and Wildlife, which was part of the U.S. Fish and Wildlife Service (USFWS). However, this Act did not carry any power for enforcement until it was replaced by the Endangered Species Act, which became a federal law in 1973. Even then, the new act faced many political obstacles that limited its ability to protect species. The National Aeronautics and Space Administration (NASA), which had purchased Merritt Island as part of its space center complex, made an agreement with the USFWS to have the bureau create and manage the Merritt Island National

Wildlife Refuge. This refuge was the last large tract of habitat remaining for the sparrows. In 1969, three years after the Dusky Seaside Sparrow had been listed as part of the Endangered Species Preservation Act, the USFWS made an agreement with Brevard Mosquito Control District in Brevard County, Florida, to create dikes and impoundments throughout the sparrows' habitat. The flooding that the dikes facilitated was used as a means of controlling the mosquito population; unfortunately, over time, this same flooding also destroyed the sparrows' habitat and killed the plants that the birds depended on for food. Any hope that the sparrows living in the refuge could survive these developments was further dashed since insecticide spraying continued and the newly built impoundments and dikes gave new predators access to the endangered birds' habitat.

The Dusky Seaside Sparrow never strayed too far beyond a radius that included Merritt Island and the upper St. Johns River. Thus, the only other remaining habitat for the Dusky Seaside Sparrow was located a few miles away from the refuge, but it was a much smaller tract of swampland that lay along the St. Johns River, and it housed a much smaller colony of birds. This population of sparrows also declined significantly by the early 1970s as the birds' habitat was drained to create an extension of the Beeline Expressway (State Route 528), which provided a faster tourist connection between Orlando's Disney Resort and NASA's Space Center. Two major housing projects and a succession of fires in the region further destroyed the birds' habitat. By 1976, only eleven sparrows were found in what remained of the St. Johns marshes. By the time the USFWS decided to capture what remained of the species in an attempt to breed them, only six males and no females were found. It was clear at that point that there would never be another pure Dusky Seaside Sparrow.

In 1980, five males were captured and taken to Gainesville, Florida, to breed with a female Scott's Seaside Sparrow (*Ammodramus maritimus peninsulae*). It was estimated, from genetic examination, that the last time that a Dusky Seaside Sparrow had mated with a Scott's Seaside Sparrow in the wild was approximately 250,000 to 500,000 years ago. During this time, the Dusky Seaside Sparrow had developed its unique plumage and call. In 1983, only four male Dusky Seaside Sparrows remained. They were taken to Disney Resort to continue crossbreeding; the offspring, to be known as Dusky Scott's hybrids, would possess a varied percentage of each species' genetics. While crossbreeding presented a brief hope that a portion of the Dusky Seaside Sparrow's genetics might survive in the hybrid species, these efforts failed for several reasons. For one, the U.S. Fish and Wildlife Service does not, as a rule, permit new or hybrid species in its refuges; thus, any crossbred offspring could not return to its traditional range, which enjoyed the protection of the agency. In addition, for the hybrid offspring to be released elsewhere, a minimum of one hundred Dusky Scott's hybrid birds was needed. In the end, the crossbreeding program produced only a few hybrids, far from the number required to establish a population in the wild.

The last Dusky Seaside Sparrow, which was called Orange Band, because of the tag on his foot, died in captivity on June 17, 1987, at the Disney Resort. Orange Band was estimated to be between nine and thirteen years old. He was blind in one eye and had been infertile during the latter part of his life. He can now be found in a glass bottle in the Ornithology Collection of the Florida Museum of Natural History at the University of Florida in Gainesville. The Museum also houses the R. D. Hoyt Collection of birds and eggs (See the chapter on Bachman's Warbler).



Dusky Seaside Sparrow 169

The Dusky Seaside Sparrow was classified as extinct in 1990. It was only the second bird listed on the Endangered Species Act to become extinct. The first bird to receive that classification was the Santa Barbara Song Sparrow.

More Information about the Dusky Seaside Warbler:

The Dusky Seaside Sparrow was found in roughly a ten-mile radius around Titusville, Florida. It was differentiated from other seaside warbler populations by its dark coloration and distinctive call. This call can be heard online at Cornell University's Macaulay Library.

This part of Florida, especially the Merritt Island area, had, at one point, an abundant supply of cordgrass (*Spartina bakeri*), which was needed by the species for its nests. The cordgrass grew in narrow strips of land between the low, wet swamps and the drier, higher grounds. By late April, the birds usually built their nests, which were situated some ten to fifteen inches off the ground, into thickets of these tall grasses, both for concealment and for protection of the eggs from direct sunlight; at times, the grasses were also arranged to create an arch above the nest, providing even further protection. The inside of each nest was usually lined with finer grasses and could hold up to four eggs. The nests were also often populated by ants, but these insects did not disturb the eggs. The eggs were elongated, with rounded ends, and had brown markings with subtle variations of grey and lavender. Prolonged exposure to the flooding that followed the construction of the dikes (previously described in this chapter) eventually destroyed this fragile habitat of cordgrass. Without the cordgrass to build its nests and to offer protection to both the birds and their eggs, the species could not survive.

The Dusky Seaside Sparrow has, in recent years, been part of an art controversy. In 2009, Victor H. Hall, a U.S. Army veteran, was walking around a flea market in Jacksonville, Florida, when he came across an interesting old painting. It depicted two birds standing over a nest of eggs surrounded by pink flowers. The back of the frame had the word "Heade" written on it. Hall, who had served as an army sergeant for twenty-two years, had regularly visited art museums in Europe and the United States. Based on his experiences, he thought the painting might be by Martin Johnson Heade, a renowned painter, who had spent twenty years in the area and had painted many regional scenes up until his death in 1904. Jacksonville was also 134 miles from Titusville, where the Dusky Seaside Sparrows had been found. Hall purchased the painting for a couple of dollars and began doing research on the painting and its purported artist. Hall soon discovered that commercial galleries were not interested in the work unless it could be authenticated, so he spent the next several years trying to establish proof of its origins. Dr. Theodore E. Stebbins Jr., a curator of American art at the Fogg Museum at Harvard University and an expert on Heade's work, dismissed the idea that the painting was, in fact, painted by the famous artist. The Atlanta Art Conservation Center, however, concluded through its forensic evidence and historical research that the painting was created by Heade. Following this turn of events, Hall sent out a press release listing himself as an independent arts-and-crafts professional and placing the value of the painting in the millions of dollars. Hall also trademarked the painting and created a slogan for a candy bar, Dusky's Chocolate Candy, named after the two Dusky Seaside Sparrows portrayed in the controversial painting. In the years since, the art collector has moved on to other projects, including authenticating another painting by Martin Johnson Heade, *The Maria Sanchez Creek*. As of press time, he was

also finalizing his research on a newly discovered painting by Frida Kahlo, the famous Mexican artist.

**More Information about Charles Johnson Maynard,
the Collector of This Specimen:**

The Dusky Seaside Sparrow specimen featured in this chapter was collected by Charles Johnson Maynard for the Collection of John D. Smith. Maynard also collected the Carolina Parakeet specimen featured in this publication (See description of Maynard's life on page 161).



Dusky Seaside Sparrow 171

Artists continue to stand as society's conscience and critics. They disrupt our complacency and broadcast calls for change. Increasingly, they are reflecting the disappearance of the animal world ... forcing us to confront our kinship with other animals, to acknowledge how we are diminishing them, and to see the world as it is, was and could be.

Linda Nowlan, "Extinction Art," *Alternatives Journal* 41.5, December 2015,¹

¹ Linda Nowlan, "Extinction Art," *Alternatives Journal* 41.5, December 2015, accessed 2 April 2018, <http://www.alternativesjournal.ca/people-and-profiles/extinction-art>.

CONCLUSION FOR EXTINCT BIRDS

STEPHANIE LEWTHWAITE

I first encountered Alberto Rey's work during my research for a book about the representation of place, memory, and trauma in contemporary Latino art. I had become familiar with Rey's Cuban-inspired artwork, particularly his series *Las Balsas* (The Rafts, 1995-99), in which he remembered the tragic loss of Cuban balseros (rafters) at sea on their journey from the Caribbean island to the United States. Fascinated by Rey's use of the raft as a motif to work through his own family's history of Cuban exile and loss, I was most struck by his description of the painted, lifeless rafts as "silent remnants to great human tragedies."¹ In his *Las Balsas* paintings, the empty raft had become a memorial object. When asked to write an essay for this project, I feared my lack of training in the natural sciences and the fields of environmental art and environmental history, feeling more at home with studies of human culture and migration. Yet, as I peered closely at the exquisitely textured yet lifeless birds in Rey's paintings—birds that once had their own complex histories of migration—I saw powerful connections between Rey's earlier and later works, and between nature and humanity. Rey's personal experiences of exile, loss, and migration permeate his more recent, environmentally-focused artwork. In *Extinct Birds Project* we encounter new paintings of remembrance: here are "silent

¹ Rey, "Las Balsas: Artist Statement," accessed 6 June 2014, <http://albertorey.com/paintings/artist-statements-on-earlier-series/las-balsas-the-rafts/>.

remnants” of another “great tragedy”—that of species extinction. And yet these memorials to lives lost in the natural world are somehow inextricably linked to our fate as human beings living through what Elizabeth Kolbert (2014) and others call the “sixth extinction,” one generated not by natural catastrophe or evolution, but by the interventions of humankind.²

My first memories of extinction involve visiting my home city’s museum as a child. Here, I found archaeological remains of ancient Egypt as well as a replica of the Dodo and various stuffed birds and animals sequestered away in dimly-lit glass cases. The wonder and sadness I experienced on these visits anticipated a thirst for knowledge of the natural world beyond the museum doors. (I later devoured a second-hand set of illustrated animal encyclopedias.) As reminders of my early museum visits, the paintings and narratives in *Extinct Birds* bring these lost species out of their darkened museum cases and into a new discourse about the importance of human responsibility, knowledge, and action in relation to the environment. The ecological history at the heart of *Extinct Birds Project* reminds us of our “kinship” with animals, our shared mortality in the face of a tragedy that connects us all, and how art might play a vital role in “seeing the world as it could be.”

Alberto Rey

Alberto Rey was born in Havana, Cuba, in 1960. Following Castro’s Revolution, the Rey family went into political exile in 1963, moving first to Mexico and then to the United States where they lived in Miami and later Barnesboro, a small mining town in Pennsylvania. Developing a fascination for both art and biology at

² Elizabeth Kolbert, *The Sixth Extinction: An Unnatural History* (London: Bloomsbury Publishing, 2014).



Las Balsas, Oils on Plaster, 19.5" x 14" x 11.5", 1995

his childhood while rooting himself in the American present. Rey has always been interested in connections of various kinds—between different cultures, nations, regions, and between different species—an interest that perhaps reflects his own multiple migrations and travels across different geographies and cultures: by the age of twenty-five, Rey had moved sixteen times, and he has lived and worked in Cuba, Mexico and the United States (including Miami, Pennsylvania, Boston, and New York) while travelling across Europe, North Africa, and the Americas. After settling in New York State, Rey took up fly-fishing in the 1990s. Studying fish in his local rivers and streams (alongside insects and entomology), Rey revived his fascination

college, Rey completed degrees in fine art at Indiana University of Pennsylvania and the University of Buffalo, New York. In 1989, he accepted a teaching post at State University of New York, Fredonia, where he works today as Distinguished Professor for Research and Creative Activity. Rey’s artworks are in numerous permanent gallery collections and books about Cuban American visual culture, memory, and environmental art.

The natural landscape as a real, imagined, and sometimes nostalgic place has long featured in Rey’s artwork. Painting the landscape became a way for Rey to remember and connect to the Cuban past of

for water as an original island inhabitant. (Before turning to fine art, he had planned to become a marine biologist.) Rey saw his engagement with nature through the act of fly-fishing as a form of meditation. As the world changed around him, Rey found sustenance and a sense of “spirituality” in the natural environment of New York State. Yet, instead of interacting with his environment in an isolated or individualistic fashion, Rey has always encouraged the next generation to experience the value of reflection and connection through nature, for example, by setting up his fly-fishing program for young people, many from the city and without experience of rural life, and by fostering change through intergenerational education and action.

After 2000, Rey made his first forays into the realm of environmental art. In the ongoing series *Biological Regionalism* (2000-present) and *The Aesthetics of Death* (2006-present), Rey began researching biodiversity and native fish species in his home environment of New York State. He focused particularly on the steelhead trout in a bid to understand the health of the ecosystem and promote a model of bioregionalism.³ The fish that appear in these two series extend Rey’s fascination with water, life cycles, and the migratory patterns of native species. Rey undertook extensive research for both series: after collecting samples of water and dead fish from polluted local rivers that endangered the life of native species, Rey exhibited his findings in multimedia installations composed of monumental oil paintings, video documentary, and charts providing scientific data about local water sources. In blending art with science, Rey made connections back to earlier traditions of piscatorial art, nineteenth-century landscape painting in the vein of the Hudson River School artists, and models of scientific research epitomized by key figures, such as naturalist, explorer, and

3 For more, see Lynette M.F. Bosch and Mark Denaci, “Conclusion: Bioregionalism and Animal Studies,” in *Life Streams: Alberto Rey’s Cuban and American Art*, eds. Lynette M.F. Bosch and Mark Denaci (Albany: State University of New York Press, 2014), 201.



Aesthetics of Death 8, Oils on Plaster, 72" x 120", 2008



forerunner of the field of biogeography, Alexander von Humboldt who traveled the Americas, mapped the interconnections between nature and humankind, and warned of climate change as far back as the early 1800s.⁴

Although the worlds of art, science, and conservation have never been disconnected, Rey sought to understand the environment not as a pristine, uninhabited wilderness or a romanticized place based on the separation of human society and nature, the local and the global. Just as his fly-fishing involved traveling to multiple geographical locations, Rey took his biological regionalist model further afield, across North America and on to Cuba, Iceland, Wales, and later Nepal, to show how damaged ecosystems affect us all. In mapping the intersections and networks between different disciplines, species, and regions, Rey emphasised “a need to rediscover the connection between nature and culture,”⁵ and he outlined a model of political ecology in which nature and the development of an urban-centred human society are inextricably entwined. Importantly, Rey drew links between his own existence and the dead fish that appeared in his epic *Aesthetics of Death* paintings: “As I looked more closely at the remains, I would search for details that would indicate what had led to their demise. I often saw these deserted or discarded bodies as metaphors for my own life. The majestic creatures had, at one time, led noble battles in their attempts to survive and prosper. They now had become silent still-lives that were slowly being broken-down by the same elements that had once

4 See Rey’s references to these influences in Alberto Rey and Jason Dilworth, *The Complexities of Water—Biological Regionalism: Bagmati River, Kathmandu Valley, Nepal* (Fredonia, New York: Canadaway Press, 2016), 6.

5 Alberto Rey, “Biological Regionalism: Artist Statement,” accessed 26 March 2018, <https://albertorey.com/paintings/biological-regionalism-artist-statement/>.

supported them.”⁶ *The Aesthetics of Death* series was a commentary on loss and memory, on what and especially who had been lost over the course of Rey’s life, as well as a warning about the human-driven degradation of the environment. For scholars Lynette Bosch and Mark Denaci, Rey’s fish paintings reveal the “life experiences” that bind us all; his fish are at once fundamentally different species yet animate beings that we can affiliate and “empathise” with.⁷ This interspecies model would underpin Rey’s later work. Yet as Rey drew on earlier forms of art, science, and natural history, he became a different type of artist-naturalist, what critic Johanna Drucker calls an “artist-ecologist” and Lynette Bosch a “citizen-artist,”⁸ a person committed to environmental activism who stimulates dialogue across different regions and forms of disciplinary knowledge, and the active participation of others in these important efforts. In these spaces of collaboration, activism, and intersection, Rey encountered like-minded Jason Dilworth, the designer of the *Extinct Birds Project* book.

Jason Dilworth

Trained in visual communication and graphic design in Utah and Virginia, Dilworth grew up in rural western America sharing Rey’s passion for the environment. In 2010, Dilworth joined Rey in the Department of Visual Arts and New Media at SUNY, Fredonia, where he continues to teach graphic design and typography.

6 Alberto Rey, “Aesthetics of Death: Artist Statement,” accessed 26 March 2018, <https://albertorey.com/paintings/aesthetics-of-death-artist-statement/>.

7 Lynette Bosch, “Introduction—*Life Streams: The Cuban and American Art of Alberto Rey*,” in *Life Streams*, eds. Bosch and Denaci, 10; Bosch and Denaci, “Conclusion,” 204.

8 Johanna Drucker, “*A New Naturalism: Biological Regionalism and the Work of Alberto Rey*,” accessed 2 April 2018, <https://albertorey.com/paintings/a-new-naturalism/>; Bosch, “Introduction,” 11.

Living and working in western New York State, Dilworth has applied his art, design, and research-based practice to ameliorate environmental damage in numerous locales across North America and Europe. And like Rey, he works across different disciplines, travels extensively, and promotes education, community participation, and the transnational sharing of knowledge and expertise as a way of tying creativity to environmental activism and economic sustainability. For example, in 2011, Dilworth and fellow activist bike riders traveled across Alabama on bamboo cycles in a campaign to encourage sustainable bamboo production as part of the local economy; in 2017, Dilworth collaborated with an Icelandic village to design a set of pictogram plexiglass tiles that represented the local natural history and folklore of the community.⁹ This last project was organized by the collective Designers and Forests, which Dilworth co-founded with Megan Urban to promote the health and diversity of forests and understand the historical and intimate connections between forests and local communities.

Just as Rey’s encounter with dead fish stimulated *The Aesthetics of Death* series, Dilworth co-founded Designers and Forests after witnessing “dead or dying pine and aspen trees” on a bike tour across the United States.¹⁰ The collective’s first project was *Beetle Kill and Aspen Die-Off* (2013), a series of workshops that connected New York and Swedish designers with activists, foresters, designers, artisans, and local community residents in Utah. Having first been inspired by the role that the creative economy played in stimulating Iceland’s economic revival after the 2008 crash, Designers and Forests went on to participate in afforestation

9 For more, see Jason Dilworth, “The Alabamboo Make and Ride,” accessed 30 March 2018, www.RideAlabamboo.com and “Neskaupskóða/Norðotype,” accessed 30 March 2018, <http://www.xn--norotype-52a.com/>.

10 Gathering Forest and Community/Hidden Frontiers, “History of Designers and Forests,” accessed 30 March 2018, http://hiddenfrontiers.designersandforests.us/?page_id=48.

projects in rural Iceland, as well as more local, research-based projects, such as *Hidden Frontiers* (2015), which explored historical links between utopian reformers and environmental change in New York State. Hidden Frontiers ran workshops to promote the region's biodiversity and creative economy and called for the support of "designers, architects, foresters, ecologists, biologists, historians, artists, anthropologists, sociologists, builders, woodworkers—professionals and students."¹¹ Dilworth regularly promotes interdisciplinary collaboration and a model of exploration and localization based on "immersion in a place or problem," taking knowledge and education into the outdoors and applying his political ecology and "experiential, research-driven" practice to other locales.¹² In 2017, Dilworth won a Frontier Fellowship to research Utah's Green River region (a place he knew from childhood) and design an index of "icons and symbols" associated with the river as part of a network of towns, cities, and local economies. Drawing on educational programs, walking tours, and scientific data mapping the local ecosystem, this water-themed project followed Dilworth's first collaborative adventure with Rey, the *Bagmati River Art Project* begun in 2016.

This project focused on the sacred Bagmati River in Nepal's Kathmandu Valley. In a 2016 study, Kathmandu was rated as the world's third most polluted city.¹³ In collaboration with local communities, artists, educators, musicians, scientists, and water specialists, Rey and Dilworth followed the Bagmati River's sacred and biological currents, exposing the interdependence of water and human life, but also the damaging

impact of the river's pollution on local communities, which stemmed from insufficient planning, regulation, investment, and political decisions. By focusing on Kathmandu in the Global South, Rey and Dilworth jettisoned an earlier type of Euro-American environmentalism based on an insular model of nationalism, regionalism, purity, and wilderness in the more prosperous Global North.¹⁴ The project's findings were designed to "empower [local] communities" and inspire global change elsewhere using multiple forms—an illustrated book rooted in scientific research and the collection of water samples; a documentary film; a website; and a touring exhibition featuring installations, sketchbooks, oil paintings, testimonies, and public health posters designed for the local community.¹⁵ The project's exhibition and book design exemplify what scholar T. J. Demos calls "hybrid artistic-activist models that bring the critical and creative together." These models lie at the heart of political ecology.¹⁶ The *Bagmati River Art Project* experimented with "a publication as an aesthetic object that could transmit complicated content," and it directly shaped Rey's and Dilworth's next collaborative undertaking, *Extinct Birds Project*.¹⁷

Extinct Birds

At the end of the Bagmati River introduction, Rey notes a "lingering sadness for what ... [the river] had become," adding that Kathmandu Valley "remains a location that forever haunts those who visit it."¹⁸ Haunting

11 Hidden Frontiers, "Call for Participants," 18 March 2015, accessed 30 March 2018, <http://hiddenfrontiers.designersandforests.us/?p=53>.

12 Gathering Community and Forest/Hidden Frontiers, "Our Creative Process," accessed 30 March 2018, http://hiddenfrontiers.designersandforests.us/?page_id=30; Jason Dilworth, email correspondence with author, 7 March 2018.

13 Rey and Dilworth, *Complexities of Water*, 18.

14 T.J. Demos, *Decolonizing Nature: Contemporary Art and the Politics of Ecology* (Berlin: Sternberg Press, 2016), 11-12.

15 Rey, *Complexities of Water*, 129.

16 Demos, *Decolonizing Nature*, 260, 13.

17 Rey, *Extinct Birds Project*, 1.

18 Rey, *Complexities of Water*, 15.

and loss also permeate *Extinct Birds Project*: there are aesthetic and thematic continuities with Rey's earlier series as Rey experiments again with the aesthetics of disappearance and remembrance. From the rafts in his Las Balsas series to the dead fish in *The Aesthetics of Death*, Rey has long experimented with living and inanimate objects as "metaphors of life." Rey described his rafts as "minimal altarpieces" and "silent remnants of great human tragedies," and his dead fish as "silent still-lives." His paintings of extinct birds function in a similar way, as memorials to species who are silent and no longer able to sing, but whose presence in absence and death invokes a form of witnessing and remembrance on the part of artist and viewer. Rey has often used objects in his paintings as carriers of traumatic memory, as signifiers or "icons,"¹⁹ and his art combines distinct yet related trajectories by moving across the landscapes of human exile, loss, and species extinction. The reference to icons, altars, and memorials underscores a religious or spiritual element in Rey's paintings. Indeed, Rey has often experimented with the formal and spiritual qualities of devotional art, such as retablo and ex-voto paintings, which are dedicated to particular saints and those who have been lost. Likewise, in *Extinct Birds Project*, Rey claims that "[e]ach painting was a devotional and emotional patronage to each specimen."²⁰ Rey's use of light, and especially the juxtaposition of illumination and darkness, invoke a sense of mystery, awe, and perhaps even the divine. These paintings are smaller in scale than Rey's monumental fish paintings, and they provide an intimate, immersive experience for the viewer: the birds are bathed in a spectral light and they appear to glow like apparitions, haunting the artist and viewer in their afterlife.

19 Drucker, *A New Naturalism*

20 Rey, *Extinct Birds Project*, 4.

The paintings draw our attention to the role of emotion and affect in Rey's work. For example, his paintings present us with the shock, disorientation, and grief associated with violence and trauma, for these birds have been "mutilated," "violated," and torn from their natural surroundings.²¹ In the accompanying text, Rey describes the brutal implements used to kill these birds, explaining how such weapons were perfected over time. The stuffed, bound, and eyeless birds evoke a sense of trauma through their repetition and Rey's paintings differ markedly from the romanticized, utopian settings sometimes found in earlier ornithological art, for example, in the paintings of Martin Johnson Heade and John James Audubon. The use of light, composition, and the framing of the birds as displaced objects emerging from the darkness beside an extinguished match that can never illuminate or bring them back to life, demonstrate the affective qualities of Rey's paintings and his attempt to relay the emotions he felt on first seeing the birds. The paintings bring about a form of witnessing and mourning on the part of artist and viewer; although we have not witnessed the birds' deaths, we are compelled to use our imagination and ask questions about who did this and why, for the birds' lifeless bodies carry important stories about the relationship between humankind, nature, and mortality.

The repetition of the burnt match in each painting gestures toward a genre of still-life painting called the *vanitas*, which developed primarily in the Netherlands during the seventeenth century. The *vanitas* served to remind the viewer of the fragility and impermanency of life and to warn against the immorality and excesses of humankind. Instead of the extinguished candle found in the *vanitas* painting, we find Rey's burnt match, and instead of a human skull and flowers, we find a lifeless bird skin. As metaphors of life and

21 Rey, *Extinct Birds Project*, 3, 20.

death, Rey's birds remind us that nature's loss is also about human loss, for we too are subject to elimination in this current age of the sixth extinction. Extinction is no longer tied to natural catastrophes or evolutionary processes, but to the untrammelled interventions of humankind. Species extinction is part of a broader network of human-made ecological crises—climate change, resource extraction, pollution, overconsumption—that will potentially overwhelm human life. As the scholars Robert Emmett and David Nye argue, “The arts can help us acknowledge and confront the melancholic, dark side of humanity's impact on the global environment.”²² Certainly, Rey's images and narrative fit within a developing body of scholarship and visual culture known as extinction studies and extinction art respectively. *Extinct Birds Project* responds to ongoing ecological crisis not by offering nostalgic or romanticized images of birds set amidst the wilderness. Rather, these darkly illuminated scenes provide a warning while also invoking sympathy, affiliation, and perhaps even action.

In uncovering the history of extinction, *Extinct Birds Project* is more broadly a work of environmental history and political ecology, and it fits within a burgeoning interdisciplinary field known as the environmental humanities. In this sense, we cannot understand Rey's paintings without the accompanying text, for as in the fields of environmental humanities and extinction studies, modes of storytelling, research, and historical ecology help to explain and critique human-induced extinction. The accompanying text reveals a history in which birds and nature were “colonized” through the process of European imperial expansion and the development of capitalism, urbanization, and industrialization over the succeeding centuries. Patterns of

²² Robert S. Emmett and David E. Nye, *The Environmental Humanities: A Critical Introduction* (Cambridge, Mass.: MIT Press, 2017), 107.

global conquest, trade, voluntary and involuntary migration stemming from the Columbian exchange after 1492 brought new species and modes of human settlement to the so-called “New World,” creating a form of “ecological imperialism” in which human exploitation and foreign species endangered the lives of Indigenous peoples and native species.²³ John Gilbert's fateful search for the Australian Paradise Parrot is a case in point. Likewise, Rey's anecdote concerning the role of the now extinct shorebird, the Eskimo Curlew, which first attracted Christopher Columbus to land in the Americas, is also very telling. Above all, the wide geographical reach of *Extinct Birds Project* documents species from various continents and maps out a global network of exploration, trade, and collecting between the Americas, Africa, Asia, Australia, and Europe. The text's narrative also features European and Euro-American men as less than benevolent naturalists, collectors, and hunters who fostered extinction—sometimes unwittingly—through practices of excessive consumption and commercial greed. Indeed, some of these men fell by the wayside trying to fulfill the expectations of white male mastery and accumulation, their lives mirroring the fates of the birds they collected. For example, Englishman Scott Barchard Wilson committed suicide in 1923 after a lifetime researching the Kaua'i 'O'o, during which his counterparts mocked him for his “lack of exuberance” in collecting birds.²⁴

In exposing the ‘why’ of extinction, *Extinct Birds Project* also draws our attention to capitalist expansion and resource colonization, particularly the impact of railroad construction, logging, farming, ranching, agribusiness, and chemical fertilizers and pesticides in decimating forests and feeding grounds and polluting waterways and larger ecosystems. Rey narrates the complexity of these larger processes with an ironic

²³ For example, see Emmett and Nye, *Environmental Humanities*, 15.

²⁴ Rey, *Extinct Birds Project*, 24.

account—how a human-made bird, a Pan American World Airways seaplane, facilitated the extinction of the Atitlán Grebe in 1958 by dropping largemouth bass into the bird’s Guatemalan water habitat to boost tourism; this invasive fish species then went on to exhaust the food supply of local grebes.²⁵ Rey’s narrative is tied to a longer process of environmental erosion in which the powers of neo-colonialism and neo-liberal capitalism—banks, multinational corporations, and misguided governments—behave recklessly. Scholar Rob Nixon calls this process “slow violence,” and it involves climate change, deforestation, and pollution brought about by radioactive waste, pesticides, and oil spillage, which also damage poorer sectors of society.²⁶

Conclusion

Ultimately, the histories in *Extinct Birds Project* are about the entwined lives of the birds and the men who studied, killed, and collected them. Our fates today are also entwined with the present and future of species extinction. Importantly, *Extinct Birds Project* promotes the rights of all species and challenges the idea that we as humans are somehow unique, exceptional, superior to and separate from the non-human species that we share the planet with. Certainly, Rey has always claimed that “nature is a part of society, and how we interact with it or not is reflective of other issues related to economy, culture, and perception.”²⁷ The historical and political ecology at the heart of *Extinct Birds Project* reveals the “entangled significance of extinction,” to

²⁵ Rey, *Extinct Birds Project*, 55.

²⁶ Rob Nixon, *Slow Violence and the Environmentalism of the Poor* (Harvard, Mass.: Harvard University Press, 2013).

²⁷ Alberto Rey quoted in Jorge J. E. Gracia, “The Construction of Identity in Art: Alberto Rey’s Journey,” in *Life Streams*, eds. Bosch and Denaci, 62.

quote recent extinction studies scholars, and how extinction is a form of “collective death.”²⁸ Here, we return to the theme of the vanitas painting and its associated Latin phrase, *memento mori*—remember you must die.

However, if we see only darkness, violence, and death in *Extinct Birds Project*, we must also see light and hope for art has always played a critical role in imagining alternative futures, and where there is loss there is also the prospect of reflection, re-evaluation, and change. Importantly, the histories in *Extinct Birds* present us with a seeming paradox: the collection of the birds caused death and extinction, but also the creation of new knowledge in the field of natural history. In his book *Ghosts of Nature*, Mark V. Barrow, Jr., traces how naturalists from the late nineteenth century educated the public about the human causes of extinction and went on to pass laws designed to challenge this process. As both a book and an exhibition, *Extinct Birds Project* will contribute to this process of building knowledge across the generations.

Ultimately, Rey’s birds share much in common with the life of spiritual icons and memorials: they invoke mourning and despair, but also hope, devotion, and healing. In building bridges between the living and the dead, the past and the present, *Extinct Birds Project* compels us to arm ourselves not with weapons that kill, but with knowledge and reverence for those we share the planet with so that we might—to return to this essay’s epigraph—“see the world as it is, was and could be.”

²⁸ Deborah Bird Rose, Thom van Dooren, and Matthew Chrulew, “Introduction: Telling Extinction Stories,” in *Extinction Studies: Stories of Time, Death, and Generations*, eds. Deborah Rose, Thom van Dooren and Matthew Chrulew (New York: Columbia University Press, 2017), 3, 5.

CONTRIBUTORS' BIOGRAPHIES



Stephanie Lewthwaite is Associate Professor of American History in the Department of American and Canadian Studies at the University of Nottingham, UK. She is the author of *Race, Place, and Reform in Mexican Los Angeles: A Transnational Perspective, 1890-1940* (Tucson: University of Arizona Press, 2009) and *A Contested Art: Modernism and Mestizaje in New Mexico* (Norman: University of Oklahoma Press, 2015). She researches and teaches U.S. Latina/o history, culture, and visual art. She is currently working on a monograph about the connection between place, memory, and historical trauma in contemporary Latina/o visual culture.



Twan Leenders is a former researcher at Yale University's Peabody Museum and taught biology at Sacred Heart University in Fairfield, CT. Leenders led the Science and Conservation Office of the Connecticut Audubon Society. He is currently the President of the Roger Tory Peterson Institute of Natural History in Jamestown, NY. Leenders is the author of *Amphibians Costa Rica: A Field Guide* (2016), *Notes on a Collection of Amphibians and Reptiles from El Salvador* (2004), and *A Guide to Amphibians and Reptiles of Costa Rica* (2001).

TIMELINE OF THE EXTINCT BIRDS PROJECT

The Extinct Birds Project includes the Extinct Birds Series, the series of eighteen paintings; the traveling exhibition; the website; and the current publication.

- June 30, 2015: Alberto Rey first sees the extinct bird specimens, which are housed in drawers, at the archives of the Roger Tory Peterson Institute of Natural History (RTPH), in Jamestown, New York. He photographs the specimens, not knowing what, if anything, will come out of it.
- August 6, 2015: Alberto photographs the extinct specimens again. This time, he envisions the paintings as vertical and photographs all the specimens directly from above.
- September 29, 2015: Twan Leenders, President of the Roger Tory Peterson Institute of Natural History, helps Alberto find other extinct bird specimens by getting him in touch with Kristof Zyskowski, Collections Manager of the Division of Vertebrate Zoology at the Yale Peabody Museum of Natural History. Alberto and Kristof discuss possible dates to meet to photograph the collection, but because of upcoming research trips for each of them, they cannot schedule a date.

- January 15, 2016: A phone conversation is held with Bob Stine, Vice President of Maryland Match Corporation, about the design of the matchboxes for inclusion in future exhibitions of the Extinct Birds Project.
- May 28, 2016: Since Alberto is already heading to Gloucester, Massachusetts, for a week, he asks Twan for possible connections to extinct bird collections in Boston. Twan introduces him to Jeremiah Trimble, the curatorial Associate/Collection Manager for the Ornithology Department at the Museum of Comparative Zoology (MCZ) at Harvard University.
- August 4, 2016: A meeting is held with Emily Tucker, Director of the Benjamin Contemporary Gallery, and Dana Tyrrell, the gallery's curator, about working together on a future exhibition of the Extinct Birds Project at the gallery's new space, which is planned to open in 2020.
- August 30, 2016: Copyright permission forms are filled out, and twenty-seven extinct bird specimens from the MCZ database are selected. This ornithological collection contains 400,000 specimens. It is the fifth largest in the world and includes over 85 percent of the species of birds, roughly 8,300 species.



WILD-
LIFE
IN
AMERICA

by
Peter
Matthiessen

- 1. IVORY BILL WOODPECKER - 18.5" - R
- 2. IMMATURE PASSERINE - 13" - R
- 3. ... - 13" - R
- 4. ... - 11.75" - R
- 5. BACHMAN WARBLER - male - 5" - R
- 6. BACHMAN WARBLER - female - 4.5" - R
- 7. DUSKY SEALID SPARKLE - 5" - R

20. ... - 8" - H

25. ... - 18.5" - H

31. ... - 12" - H

November 2016: After returning from a research trip to Nepal together with Alberto, graphic designer and colleague Jason Dilworth commits to designing the publication to document the Extinct Birds Project.

January 31, 2017: Alberto and his son, Diego, return to the Roger Tory Peterson Institute of Natural History to re-photograph the extinct bird specimens after Alberto decides to make the paintings horizontal instead of vertical so that the viewer can look into the eyes of the birds. They photograph profiles of each of the birds' bodies as well as details of each of the birds' heads, torsos, and feet.

February 10, 2017: Alberto and Diego fly from Buffalo, New York, to Boston, Massachusetts, to photograph the selected specimens at the MCZ Ornithology Department at Harvard University. They meet Jeremiah Trimble and Katherine Eldridge, Curatorial Assistant, who help them locate the appropriate specimens for the project.

March 2017: This month is spent organizing and labeling all the photographs from the MCZ and the RTPI and doing the initial research on each species that will be represented in the project.

May 14, 2017: A consistent ratio for magnifying the size of the specimens is determined to render the extinct birds as larger than life for the viewer. Based on this ratio, consistent spacing around each of the specimens is determined and therefore the size of each canvas.

May–June 2017: This time is spent constructing, finishing, sealing, and priming twenty painting structures.

June 14, 2017: The first painting in the Extinct Birds Series, *Laughing Owl*, is finished.

June 23, 2017: The *Labrador Duck* painting is finished.

June 27, 2017: Twan Leenders and Jane Johnson, the director of exhibits & special collections at RTPI, commit to host the premiere of the Extinct Birds Series and related programming in September 2018.

July 13, 2017: The *Imperial Woodpecker* painting is finished.

July 18, 2017: The first *Atitlán Grebe* painting is finished.

July 25, 2017: The *Pink-headed Duck* painting is finished.

July 30, 2017: The *Glaucous Macaw* painting is finished.

August 3, 2017: The second painting of the *Atitlán Grebe* (with a crooked neck) is finished.

August 9, 2017: The *Carolina Parakeet* painting is finished.

August 14, 2017: The *Eskimo Curlew* painting is finished.

August 17, 2017: The *Alaotra Grebe* painting is finished.

August 24, 2017: The *Paradise Parrot* painting is finished.

August 28, 2017: The *Kaua'i 'O'o* painting is finished.

September 7, 2017: The *Bachman's Warbler* painting is finished.

September 11, 2017: A letter of interest for the 2018 A Blade of Grass (ABOG) Fellowship is submitted. ABOG supports socially engaged art projects.

September 13, 2017: The *Dusky Seaside Sparrow* painting is finished.

September 18, 2017: The *Passenger Pigeon* painting is finished.

September 28, 2017: The *Santa Barbara Song Sparrow* painting is finished.

October 11, 2017: The *Black Mamo* painting is finished.

November 6, 2017: The *Ivory-billed Woodpecker* painting is finished.

December 1, 2017: Notification is received that the ABOG application is declined.

January 4, 2018: Alberto begins writing essays for the present publication.

January 11, 2018: All paintings are photographed by Biff Henrich from IMG_INK in Buffalo, New York.

January 14, 2018: The Extinct Birds Project website is designed and published.

January 16, 2018: Exhibition inquiries are sent to thirty curators around the country.

January 25, 2018: Stephanie Lewthwaite, associate professor of American History in the Department of American and Canadian Studies at the University of Nottingham, United Kingdom, agrees to write the conclusion for the publication.

February 14, 2018: A meeting is held with Jane Johnson from RTPI to tentatively lay out the work and to discuss programming for the Extinct Birds Project exhibition. The exhibition date is moved up to mid-August, and plans are made for the exhibition to extend through late December 2018.

February 15, 2018: Essays are emailed to Natalie Gerber, a professor in the Department of English at the State University of New York at Fredonia and an associate editor for the *Wallace Stevens Journal*, to begin editing as Alberto continues to write the last essays.

February 18, 2018: By this date, the *Carolina Parakeet*, *Eskimo Curlew*, *Ivory-billed Woodpecker*, and *Paradise Parrot* paintings are sold. The *Black Mamo* and *Laughing Owl* are placed on hold.

February 19, 2018: Emily Tucker and Dana Tyrrell from the Benjamin Contemporary Gallery review the series and confirm interest in showing the work in Buffalo, New York, in their new space in 2020.

March 15, 2018: The essays and bibliography are finished.

March 18, 2018: A meeting is held with Jason Dilworth to discuss the layout for the publication and to review publishers' quotes for the book. During the meeting, the sizes of the illustrations that need to be created for the publication are also discussed.

- April 7, 2018: Thirty sheets of 300 lb. hot press watercolor paper are ordered; they will be used to create illustrations for the publication.
- April 13, 2018: Thirty illustrations are started.
- May 5, 2018: Jason Dilworth returns from Thailand and begins to design the publication.
- May 14, 2018: Illustrations for the publication are finished.
- May 21, 2018: Met with Jova Lynne, Curatorial Fellow at the Museum of Contemporary Art at Detroit.
- June 10, 2018: Janeil Rey completes final proof reading.
- June 11, 2018: The publication files are sent to the publisher.
- July 20, 2018: The publication arrives.
- August 6, 2018: Artwork is delivered to RTPi for installation.
- August 17, 2018: The Extinct Birds Project premieres at the Roger Tory Peterson Institute of Natural History.

Studio shot of water samples collected by Alberto Rey





Image from Alberto Rey's studio

188 Extinct Birds Project

188

RESEARCH COLLECTED FROM THE FOLLOWING SOURCES

Swainson, W. (1840). Taxidermy, bibliography and biography. [online] Google Books. Available at: https://books.google.com/books?id=Q8AUAAAQAAJ&pg=PA5&pg=PA5&dq=historical+use+of+dust+shot+for+bird+collecting&source=bl&ots=tzgjZ6h8Dw&sig=vGwoST7SmG7Mil10kzTj0d48WA0&hl=en&sa=X&ved=0ahUKEwiii6Ozi5_SAhUKcCYKHR98AB8Q6AEILzAE#v=onepage&q=historical%20use%20of%20dust%20shot%20for%20bird%20collecting&f=false [Accessed Jan. 2018].

Swainson, W. (2014). Taxidermy: With the Biography of Zoologists (Cambridge Library Collection - Zoology). Cambridge: Cambridge University Press. doi:10.1017/CBO9781107049307 Also available at: <https://play.google.com/books/reader?id=Q8AUAAAQAAJ&printsec=frontcover&output=reader&hl=en&pg=GBS.PA1>

Ethan Linck. (2015). Burke Museum 2015 collecting trip: SE Washington and central Idaho. [online] Available at: <https://beyondtheranges.wordpress.com/2015/07/22/uwbm-collecting-expedition-wa-and-idaho/> [Accessed Jan. 2018].

Cefo.cornell.edu. (n.d.). Cornell Expeditions in Field Ornithology. [online] Available at: http://cefo.cornell.edu/fieldwork_mist_netting.html [Accessed Feb. 2018].

Wethearmed.com. (2010). Low penetration/range 12 gauge specialty ammo - WeTheArmed.com. [online] Available at: <http://wethearmed.com/shotguns/low-penetrationrange-12-gauge-specialty-ammo/> [Accessed Jan. 2018].

Shootersforum.com. (2015). #12 dust shot opinion poll - Shooters Forum. [online] Available at: <https://www.shootersforum.com/shotguns-shotgunning-shotshell-reloading/99746-12-dust-shot-opinion-poll.html> [Accessed Jan. 2018].

N.B., E. (1894). Bird Hunters of Ancient Hawaii. [PDF] Honolulu, Hawaii: Press Publishing Company Steam Print, pp.101-114. Available at: <https://evols.library.manoa.hawaii.edu/bitstream/10524/660/2/Thrums-1895.pdf> [Accessed Feb. 2018].

Henshaw, H. (2012). Birds of the hawaiian islands.]. Rarebooksclub Com.

Low, S. and Grue, E. (1957). Banding With Mist Nets. Vol. Xxviii. [Pdf] Bird-Banding - A Journal Of Ornithological Investigation Banding With Mist Nets. Available at: <https://sora.unm.edu/sites/default/files/journals/ifo/v028n03/p0115-p0128.pdf> [Accessed Feb. 2018].

Keys, B. and Grue, C. (1982). Capturing Birds with Mist Nets: A Review. Vol. 7. No.1. [PDF] North American Bird Bander. Available at: <https://sora.unm.edu/sites/default/files/journals/nabb/v007n01/p0002-p0014.pdf> [Accessed Feb. 2018].

Reed, C. and Reed, C. Worchester,MA, (1914). Guide to Taxidermy. [ebook] Worchester, Mass.: Chas. K. Reed, pp.22-23. Available at: <https://ia600203.us.archive.org/2/items/guidetotaxidermy00reed/guidetotaxidermy00reed.pdf> [Accessed Feb. 2018].

Macpherson, H. (1897). The Art Of Bird Trapping - An Account of Devices For Capturing Wild Eagles, Hawks and Owls. Read Books Ltd.

Malleson, A. (2016). Collecting Guatemalan Slingshots: Coleccionando Hondas Guatemaltecas. [ebook] Available at: <https://books.google.com/books?id=ek28DAAAQBAJ&pg=PA1&pg=PA1&dq=Collecting+Guatemalan+Slingshots:+Coleccionando+Hondas+Guatemaltecas+By+Andrew+Malleson++2016&source=bl&ots=ikl0vcU1s8&sig=roGrn0HoYbAEXjptwqLrbC3plD4&hl=en&sa=X&ved=0ahUKEWjZq57d8NfZAhVQb60KHewFD-VkQ6AEIKjAB#v=onepage&q=Collecting%20Guatemalan%20Slingshots%3A%20Coleccionando%20Hondas%20Guatemaltecas%20By%20Andrew%20Malleson%20%202016&f=false> [Accessed Mar. 2018].

Maynard, C. (1883). Manual of Taxidermy - A Complete Guide in Collecting and Preserving Birds and Mammals. Boston, MA: S.E. Casino (republished by Read Books Ltd). Also Available at: https://books.google.com/books/about/Manual_of_Taxidermy_for_Amateurs.html?id=essZAAAAYAAJ&printsec=frontcover&source=kp_read_button#v=onepage&q&f=true

Lewis, D. (2012). The feathery tribe. New Haven, CT: Yale University Press.

Iucnredlist.org. Drepanis funerea (Black Mamo). [online] Available at: <http://www.iucnredlist.org/details/22720852/0> [Accessed Jan. 2018].

Scott, H. (1956). Robert Cyril Layton Perkins. 1866-1955. Biographical Memoirs of Fellows of the Royal Society, 2(0), pp.215-236. . doi:10.1098/rsbm.1956.0015. JSTOR 769486

Frowde, H. (1894). Oxford honours, 1220-1894, being an alphabetical register of distinctions conferred by the University of Oxford from the earliest times : University of Oxford : Free Download & Streaming : Internet Archive. [online] Internet Archive. Available at: <https://archive.org/details/oxfordhonours12200univrich> [Accessed Jan. 2018].

Howard, L. O. (1930). History of applied Entomology (Somewhat Anecdotal).Smiths. Miscell. Coll. 84 X,pp.1-564.

Scott, H. & Benson, R. B. (1956): Perkins, R. C. L. Entomologist's Monthly Magazine (3) 91 1955 pp.289-291.

Evenhuis, N.E. (ed.) (2007). Barefoot on Lava: The Journals and Correspondence of R.C.L. Perkins in Hawaii, 1892-1901. Honolulu: Bishop Museum Press.

Munro, G. (1944). Birds of Hawaii. Rutland: Bridgeway Press.

Bryan, W. (1908). Some Birds of Molokai. [online] Google Books. Available at: https://books.google.com/books?id=kZIKQAAMAAJ&pg=PA56&source=gbp_toc_r&cad=4#v=onepage&q&f=false [Accessed Feb. 2018].

Berger, A. (1981). Hawaiian birdlife. 2nd ed. Honolulu: University of Hawaii Press.

Birdsna.org. (2018). Black Mamo - | Birds of North America Online. [online] Available at: <https://birdsna.org/Species-Account/bna/species/blkmam/introduction/> [Accessed Feb. 2018].

Pyle, R. and Pyle, P. (2017). Black Mamo, The Birds of the Hawaiian Islands: Occurrence, History, Distribution, and Status.. 2nd ed. [PDF] Honolulu, HI: B.P. Bishop Museum. Available at: <http://hbs.bishopmuseum.org/birds/rfp-monograph/pdfs/08-DREP/BLMA.pdf> [Accessed Feb. 2018].

Liebherr, J. and Polhemus, D. (1997). R.C.L.Perkins:100Years of Hawaiian Entomologyl. [PDF] Honolulu: University of Hawai'i Press. Available at: <https://scholarspace.manoa.hawaii.edu/bitstream/10125/3192/1/v51n4-343-355.pdf> [Accessed Feb. 2018].

Birdsna.org, Black Mamo - | Birds of North America Online. [online] Available at: <https://birdsna.org/Species-Account/bna/species/blkmam/introduction/> [Accessed Feb. 2018].

Hear.org. Preliminary study of the behavior and ecology of axis deer on Maui, Hawaii. [online] Available at: <http://hear.org/AlienSpeciesInHawaii/waringreports/axisdeer.htm> [Accessed Feb. 2018].

Strazar, M. (2000). MOLOKA'I IN HISTORY A Guide to the Resources. [ebook] Honolulu: History and Humanities Program of the Hawai'i State Foundation on Culture and the Arts. Available at: http://sfca.hawaii.gov/wp-content/uploads/2013/08/Molokai2000_SFCA1.pdf. . . . [Accessed Feb. 2018].

Avibirds.com. (2018). Black Mamo (Drepanis funerea) Extinct bird species. [online] Available at: http://www.avibirds.com/html/extinct/Black_Mamo.html#WIFVCWaX520 [Accessed 6 Mar. 2018].

Newton, A. (1893). Proceedings of the general meetings for scientific business of the Zoological Society of London, 1893- On a new Species of Drepanis discovered by Mr. R.C.L. Perkins. [ebook] London: Messrs. Longmans, Green and Co., p.690. Available at: <https://ia601900.us.archive.org/25/items/in.ernet.dli.2015.229851/2015.229851.Proceedings-Of.pdf> [Accessed Jan. 2018].

Thewebsiteofeverything.com. (n.d). Black mamo - Pictures and facts - Birds @ thewebsiteofeverything.com. [online] Available at: <http://thewebsiteofeverything.com/animals/birds/Passeriformes/Fringillidae/Drepanis-funerea> [Accessed Feb. 2018].

project, V. VertNet Search Portal. [online] Portal.vertnet.org. Available at: <http://portal.vertnet.org/search?q=black+mamo> [Accessed Feb. 2018].



Fuller, E. (2013). *Lost Animals*. Princeton: Princeton University Press.

Piper, R., Cunha, R. and Miller, P. (2009). *Extinct animals*. Westport (Conn.): Greenwood Press.

Flannery, T. and Schouten, P. (2001). *A gap in nature*. New York: Atlantic Monthly Press.

Oasis.lib.harvard.edu. (n.d.). Wulsin, Frederick Roelker and Janet Elliott Wulsin Papers, 1921-1924 inclusive: A Finding Aid. [online] Available at: <http://oasis.lib.harvard.edu/oasis/deliver/~pea00049> [Accessed Feb. 2018].

Peabody.harvard.edu. (n.d.). Frederick R. Wulsin | Peabody Museum. [online] Available at: <https://www.peabody.harvard.edu/node/2468> [Accessed Feb. 2018].

Siris-archives.si.edu. (n.d.). Frederick Wulsin's Travel Footage of Africa ca. 1927. [online] Available at: <http://siris-archives.si.edu/ipac20/ipac.jsp?uri=full=3100001~121842710> [Accessed Feb. 2018].

Anon, (2013) 5 Winners and Losers on New "Red List" of World's Rarest [online] Available at: <https://news.nationalgeographic.com/news/2013/11/131125-iucn-red-list-endangered-species-okapi-leatherback-science/> [Accessed Feb. 2018].

The Study On Rural Development And Watershed Management In The South-West Region Of Alaotra Of The Republic Of Madagascar Final Report. (2008). [Pdf] Ministry Of Environment, Water And Forests Ministry Of Agriculture, Livestock And Fisheries The Republic Of Madagascar. Available at: http://open_jicareport.jica.go.jp/pdf/11881596_02.pdf [Accessed Feb. 2018].

Lammers, P., Richter, T., Waeber, P. and Mantilla-Contreras, J. (2018). Lake Alaotra wetlands: how long can Madagascar's most important rice and fish production region withstand the anthropogenic pressure?. [online] Journalmcd.com. Available at: <http://journalmcd.com/index.php/mcd/article/view/mcd.v10i3s.4> [Accessed 9 Feb. 2018].

Wilmé, L. (1994). Status, distribution and conservation of two Madagascar bird species endemic to Lake Alaotra: Delacour's grebe *Tachybaptus rufolavatus* and Madagascar pochard *Aythya innotata*. *Biological Conservation*, 69(1), pp.15-21.

News.bbc.co.uk. BBC - Earth News - Bird conservation: Alaotra grebe confirmed extinct. [online] Available at: http://news.bbc.co.uk/earth/hi/earth_news/newsid_8702000/8702598.stm [Accessed Feb. 2018].

Beolens, B., Watkins, M. and Grayson, M. (2014). *The Eponym Dictionary of Birds*. [online] Google Books. Available at: <https://books.google.com/books?id=En4wBAAQBAJ&pg=PT619&pg=PT619&dq=Jorge+Alfonso+lbarra,2000&source=bl&ots=tSrbjgDKL&sig=niwBGT7wWAHDAGq8lOQ53Tq7kGg&hl=en&sa=X&ved=0ahUKEwjv3bmgz6jZAhWk1IMKHdNEAuwQ6AEIPjAl#v=onepage&q=Jorge%20Alfonso%20lbarra%2C2000&f=false> ... [Accessed Feb. 2018].

Iucnredlist.org. *Podilymbus gigas* (Atitlan Grebe, Atitlán Grebe, Giant Grebe, Giant Pied-billed Grebe). [online] Available at: <http://www.iucnredlist.org/details/22696577/0> [Accessed Feb. 2018].

Griscom on Guatemalan Birds Studies from the Dwight Collection of Guatemalan Birds. I Ludlow Griscom. (1930). *The Auk*, 47(1), pp.114-114.

Hunter, L. (1988). Status of the Endemic Atitlan Grebe of Guatemala: Is It Extinct?. *The Condor*, 90(4), pp.906-912.

Birdwatching.com.gt. Birdwatching Guatemala. [online] Available at: <http://birdwatching.com.gt/birdwatching%20guatemala/aves-de-guatemala.html> [Accessed Feb. 2018].

Coop, D. (2011). Bad-Ass Bass Rain from the Sky - Revue Magazine. [online] Revue Magazine. Available at: <http://www.revuemag.com/2011/08/bad-ass-bass-rain-from-the-sky/> [Accessed Feb. 2018].

Fieser, E. (2009). How Guatemala's Most Beautiful Lake Turned Ugly. [online] Time.com. Available at: <http://content.time.com/time/world/article/0,8599,1942501,00.html> [Accessed Feb. 2018].

Resource.mccneb.edu. (n.d.). Improving on Nature - A Case Study by Dennis Kingery, Metropolitan Community College. [online] Available at: <https://resource.mccneb.edu/MAYA/Guatemala/casestudy2.htm> [Accessed Feb. 2018].

Star, P. (1991). T. H. Potts and the origins of conservation in New Zealand (1850-1890). [online] Hdl.handle.net. Available at: <http://hdl.handle.net/10523/341> [Accessed Feb. 2018].

Iucnredlist.org. *Sceloglaux albigifacies* (Laughing Owl). [online] Available at: <http://www.iucnredlist.org/details/22689496/0> [Accessed Feb. 2018].

<https://teara.govt.nz/en/biographies/1b46/buller-walter-lawry>

Nzbirdsonline.org.nz. (n.d.). Laughing owl | New Zealand Birds Online. [online] Available at: <http://www.nzbirdsonline.org.nz/species/laughing-owl> [Accessed Feb. 2018].

Williams, G. and Harrison, M. (1972). The Laughing Owl *Sceloglaux albigifacies* (Gray, 1844): A general survey of a near-extinct species.. [PDF] pp.4-19. Available at: https://notornis.osnz.org.nz/system/files/Notornis_19_1.pdf [Accessed Feb. 2018].

Birdwriter.com. (n.d.). Was British bird collector Henry Charles Palmer murdered? – Birdwriter. [online] Available at: <http://www.birdwriter.com/was-british-bird-collector-henry-charles-palmer-murdered/> [Accessed Feb. 2018].

Infogalactic.com. (n.d.). George Fergusson Wilson - Infogalactic: the planetary knowledge core. [online] Available at: https://infogalactic.com/info/George_Fergusson_Wilson [Accessed Feb. 2018].

Goodreads.com. (2014). Andrew Esposito's Blog - Why did British ornithologist Scott B. Wilson commit suicide? - June 14, 2014 05:05. [online] Available at: https://www.goodreads.com/author_blog_posts/6464849-why-did-british-ornithologist-scott-b-wilson-commit-suicide [Accessed Feb. 2018].

Olson, S. and James, H. (1994). *Exploration In The Hawaiian Islands, From Cook To Perkins*. 15th ed. [ebook] *Studies in Avian Biology*, pp.91-102. Available at: https://repository.si.edu/bitstream/handle/10088/6531/VZ_255_Hawaiian_ornithology.pdf?sequence=1&isAllowed=y [Accessed Feb. 2018].

Sykes Jr., Paul W., Angela K. Kepler, Cameron B. Kepler and J. Michael Scott. (2000). Kauai Oo (Moho braccatus), version 2.0. In *The Birds of North America* (P. G. Rodewald, editor). Cornell Lab of Ornithology, Ithaca, New York, USA. Retrieved from the Birds of North America: <https://birdsna.org/Species-Account/bna/species/kauoo>

Explorer.natureserve.org. (n.d.). Comprehensive Report Species - Moho braccatus. [online] Available at: <http://explorer.natureserve.org/servlet/NatureServe?searchName=%20Moho+braccatus> [Accessed Mar. 2018].

Forest Birds - Kauai ' Ō ' ō - Moho braccatus. (2005). [PDF] Hawaii's Comprehensive Wildlife Conservation Strategy. Available at: <http://dlnr.hawaii.gov/wildlife/files/2013/09/Fact-sheet-kauai-oo.pdf> [Accessed Feb. 2018].

Lockyer, S. (1892). *Ornithology of Sandwich Isles*. 45th ed. [ebook] pp.467-469. Available at: https://books.google.com/books?id=oEMCAAAYAAJ&pg=PA467&lpg=PA467&dq=Scott+Barchard+Wilson,+ornithologist&source=bl&ots=0X3XohoRpV&sig=2_74vW8zknDHEHGtFule81fX_g&hl=en&sa=X&ved=0ahUKEwiOuaXy3NP-SAhWS2YMKHfxEAq0Q6AEILTAD#v=onepage&q=Scott%20Barchard%20Wilson%2C%20ornithologist&f=false [Accessed Mar. 2018].

Climate-policy-watcher.org. (2016). Abundance and loss - Endangered Species - Climate Policy Watcher. [online] Available at: <https://www.climate-policy-watcher.org/endangered-species/abundance-and-loss.html> [Accessed Feb. 2018].

Birds of Southern California. (1912). 7th ed. [ebook] Hollywood, CA: Pacific Coast Avifauna, p.84. Available at: <https://books.google.com/books?id=RALAAAIAAJ&pg=PA84&lpg=PA84&dq=c.+h.Townsend,+1890+melo-dia+graminea&source=bl&ots=c1jaWGPITn&sig=0JpxseUxcPZp9SFVv1cEd0PUPc&hl=en&sa=X&ved=0ahUKEWjQidq136rZAhVM64MKHdZWBQE6AEIUDAJ#v=onepage&q=c.%20h.Townsend%2C%201890%20melodia%20graminea&f=false> ... [Accessed Feb. 2018].

Humple, D. and Geupel, G. (n.d.). Song Sparrow (Melospiza melodia). [online] www.prbo.org. Available at: https://www.prbo.org/calpif/htmldocs/species/riparian/song_sparrow.htm [Accessed Feb. 2018].

ThoughtCo. (2017). All about Santa Barbara Song Sparrow. [online] Available at: <https://www.thoughtco.com/profile-of-the-santa-barbara-song-sparrow-1182008> [Accessed Feb. 2018].

Channel Islands, National Park land Protection Study, March 1982. (1982). Relnk Books.

Islapedia.com. VAN ROSSEM, Adriaan Joseph - WikiName. [online] Available at: http://www.islapedia.com/index.php?title=VAN_ROSSEM,_Adriaan_Joseph [Accessed Mar. 2018].

Patten, M. and Pruett, C. (2009). The Song Sparrow, *Melospiza melodia*, as a ring species: patterns of geographic variation, a revision of subspecies, and implications for speciation. [ebook] United Kingdom: Systematics and Biodiversity, pp.33-62. Available at: <http://www.suttoncenter.org/wp-content/uploads/2015/09/2009-Patten-and-Pruett-Song-Sparrows.pdf> [Accessed Feb. 2018].

ROSSEM, A. (1924). A Survey Of The Song Sparrows Of The Santa Barbara Islands. [ebook] *The Condor*, pp.217-220. Available at: <https://sora.unm.edu/sites/default/files/journals/condor/v026n06/p0217-p0220.pdf> [Accessed Feb. 2018].

Farrar, L. (2008). Without Proof, an Ivory-Billed Boom Goes Bust. [online] Nytimes.com. Available at: <http://www.nytimes.com/2008/01/23/us/23woodpecker.html> [Accessed Feb. 2018].



BirdWatching. (2014). Historic ranges and 22 reported sightings of Ivory-billed Woodpeckers since 1944 - BirdWatching. [online] Available at: <http://www.birdwatchingdaily.com/featured-stories/historic-ranges-of-ivory-billed-woodpeckers/> [Accessed Feb. 2018].

Birds.cornell.edu. Studying a Vanishing Bird — Ivory-billed Woodpecker. [online] Available at: http://www.birds.cornell.edu/ivory/aboutibwo/studying_vanishing_html [Accessed 9 Mar. 2018].

Tanner, J. (1942). The Ivory-billed Woodpecker. Research Report No. 1. National Audubon Society, p.11.

Recovery Plan for the Ivory-billed Woodpecker (*Campephilus principalis*). (2010). [PDF] U.S. Fish & Wildlife Service. Available at: <https://www.fws.gov/ivorybill/pdf/IBWRRecoveryPlan2010.pdf> [Accessed Feb. 2018].

Collins, Michael D. (2017). "Video evidence and other information relevant to the conservation of the Ivory-billed Woodpecker (*Campephilus principalis*)". Heliyon.

Kunkemueller, P. (2016). Dover Tidings. 16th ed. [PDF] Dover, MA: Dover Historical Society. Available at: <http://doverhistoricalsociety.org/TidingsFall2016-FINAL.pdf> [Accessed Feb. 2018].

Scienceofthesouth.com. The Ghost of Ivory Bills | The Science of the South. [online] Available at: <http://www.scienceofthesouth.com/the-ghost-of-ivory-bills/> [Accessed Feb. 2018].

Birds.cornell.edu. (n.d.). Ivory-billed Woodpecker. [online] Available at: <http://www.birds.cornell.edu/ivory/> [Accessed Feb. 2018].

Iucnredlist.org. (n.d.). *Campephilus principalis* (Ivory-billed Woodpecker). [online] Available at: <http://www.iucnredlist.org/details/22681425/0> [Accessed Mar. 2018].

Fitzpatrick, J. (2005). Ivory-billed Woodpecker (*Campephilus principalis*) Persists in Continental North America. *Science*, [online] 308(5727), pp.1460-1462. Available at: <http://www.birds.cornell.edu/ivory/evidence/ScienceArticle05.pdf> [Accessed Feb. 2018].

Brewster's 'Birds of the Cape Region of Lower California' Birds of the Cape Region of Lower California William Brewster. (1903). *The Auk*, 20(1), pp.78-80.

Prýs-Jones, R. (2011). Type specimens of the imperial woodpecker *campephilus imperialis* (Gould, 1832). [online] Available at: https://www.researchgate.net/publication/291684270_Type_specimens_of_the_imperial_woodpecker_campephilus_imperialis_Gould_1832 [Accessed Feb. 2018].

Griscom, L. (1933). Notes on the Collecting Trip of M. Abbott Frazar in Sonora and Chihuahua for William Brewster. *The Auk*, 50(1), pp.54-58. Available at: www.jstor.org/stable/4076547.

Blog.biodiversitylibrary.org. Notes from William Brewster: The Evolving Field of Zoology. [online] Available at: <http://blog.biodiversitylibrary.org/2017/04/notes-from-william-brewster-evolving.html> [Accessed Feb. 2018].

Emmet, A. (2007). William Brewster, Brief life of a bird-lover: 1851-1919. *Harvard Magazine*, [online] (November-December). Available at: <https://harvardmagazine.com/2007/11/william-brewster.html> [Accessed Feb. 2018].

Lammertink, M., Gallagher, T., Rosenberg, K., Fitzpatrick, J., Liner, E., Rojas-Tomé, J. and Escalante, P. (2011). Film documentation of the probably extinct Imperial Woodpecker (*Campephilus imperialis*). *The Auk*, 128(4), pp.671-677.

Neotropical.birds.cornell.edu. (n.d.). Imperial Woodpecker - Introduction | Neotropical Birds Online. [online] Available at: http://neotropical.birds.cornell.edu/portal/species/overview?p_p_spp=322141 [Accessed Feb. 2018].

Mayden, R. Final Report SGER: Biodiversity of Native Mexican Trout (Genus *Oncorhynchus* spp.) and The Impending Treat of Their Demise by The Exotic Rainbow Trout *O. mykiss gairdneri* (Teleostei: Salmonidae). [ebook] Available at: http://bio.slu.edu/mayden/truchas/NSF_trout_final_report.pdf. I. [Accessed Feb. 2018].

Boswell, R., Boswell, R. and Boswell, R. From endangered to extinct: the tragic flight of the Eskimo curlew. [online] [canada.com](http://o.canada.com/news/from-endangered-to-extinct-the-tragic-flight-of-the-eskimo-curlw). Available at: <http://o.canada.com/news/from-endangered-to-extinct-the-tragic-flight-of-the-eskimo-curlw> [Accessed Feb. 2018].

Melling, T. (2010). The Eskimo Curlew in Britain. [ebook] British Birds. Available at: https://www.britishbirds.co.uk/wp-content/uploads/2014/05/V103_N02_P080%E2%80%93092_A.pdf [Accessed Feb. 2018].

Roberts DL, Jarić I. (2016) Inferring extinction in North American and Hawaiian birds in the presence of sighting uncertainty. *PeerJ* 4:e2426 <https://doi.org/10.7717/peerj.2426>

Rosen, Y. (2011). Scientists look for surviving Eskimo curlew birds. [online] [reuters.com](http://www.reuters.com/article/us-bird-extinct-idUSTRE75M84Q20110623). Available at: <http://www.reuters.com/article/us-bird-extinct-idUSTRE75M84Q20110623> [Accessed Feb. 2018].

Google Books. (1897). Annual Register of the Rensselaer Polytechnic Institute at the City of Troy. [online] Available at: https://books.google.com/books?id=trdGAQAAMAAJ&pg=RA2-PA50&lpg=RA2-PA50&dq=George+B.+Warren,+bird+collection&source=bl&ots=LIDD3m_GF5&sig=r26zlgEXVpA4qoBRmOdVvT3N6k-M&hl=en&sa=X&ved=0ahUKEwjE07Xm3_vYAhVnyoMKHRWMDQIQ6AEIRzAG#v=onepage&q=George%20B.%20Warren%2C%20bird%20collection&f=false [Accessed Feb. 2018].

Iucnredlist.org. (2017). *Numenius borealis* (Eskimo Curlew). [online] Available at: <http://www.iucnredlist.org/details/22693170/0> [Accessed Feb. 2018].

Datazone.birdlife.org. (n.d.). Eskimo Curlew (*Numenius borealis*) - BirdLife species factsheet. [online] Available at: <http://datazone.birdlife.org/species/factsheet/eskimo-curlw-numenius-borealis/text> [Accessed Mar. 2018].

Warren, G. and Clark, T. (1902). Catalogue of antique Chinese porcelains owned by George B. Warren of Troy, New York; with a note of introduction by Thomas B. Clarke, of New York. [ebook] Boston: Merrymount Press. Available at: <https://ia800200.us.archive.org/11/items/cu31924023327483/cu31924023327483.pdf> [Accessed Feb. 2018].

Chilton, G. (2014). *The curse of the Labrador duck*. New York: Simon & Schuster.

Dutcher, W. (1891). The Labrador Duck: A Revised List of the Extant Specimens in North America, with Some Historical Notes. *The Auk*, 8(2), pp.201-216. Available at: <https://sora.unm.edu/sites/default/files/journals/auk/v008n02/p0201-p0216.pdf>

Macroevolution.net. Labrador Duck - Not extinct after all?. [online] Available at: <http://www.macroevolution.net/labrador-duck.html> [Accessed Feb. 2018].

Iucnredlist.org. (2017). *Camptorhynchus labradorius* (Labrador Duck). [online] Available at: <http://www.iucnredlist.org/details/22680418/0> [Accessed Feb. 2018].

Chemunghistory.com. Chemung County - The Very Last Labrador Duck, Elmira, New York. [online] Available at: <http://www.chemunghistory.com/pages/labradorduck.html> [Accessed Feb. 2018].

Anon, (LAST - Sighting of the Labrador Duck - Elmira, NY - Last [online] Available at: http://www.waymarking.com/waymarks/WMPMZ0_LAST_Sighting_of_the_Labrador_Duck_Elmira_NY [Accessed 10 Mar. 2018].

Renko, A. (2016). EXTINCT: Seeking a bird last seen in 1878. *Star Gazette*. [online] Available at: <http://www.stargazette.com/story/news/local/2016/09/09/searching-last-labrador-duck/90118798/> [Accessed Feb. 2018].

Ali, S. (1960). The Pink-Headed Duck *Rhodonessa caryophyllacea* (Latham). [ebook] Wildfowl. Available at: <https://wildfowl.wwt.org.uk/index.php/wildfowl/article/download/120/120> [Accessed Feb. 2018].

Ripley, S. Dillon (1950). "Two birds about which more information is needed". *J. Bombay Nat. Hist. Soc.* 49 (1): 119–120.

Tordoff, A., Appleton, T., Eames, J., Eberhardt, K., Hla, H., Ma Ma Thwin, K., Myo Zaw, S., Moses, S. and Myo Aung, S. (2008). The historical and current status of Pink-headed Duck *Rhodonessa caryophyllacea* in Myanmar. *Bird Conservation International*, 18(01).

The Search for Lost Species. (n.d.). Pink-headed Duck. [online] Available at: <https://www.lostspecies.org/pink-headed-duck> [Accessed Feb. 2018].

Swan, R. (2016). Puzzle of pink-headed duck's plumage solved 67 years after it died out. [online] www.dailymail.co.uk. Available at: <http://www.dailymail.co.uk/sciencetech/article-3419538/Puzzle-pink-headed-duck-s-plumage-solved-67-years-died-out.html#ixzz4cuaErxC...> [Accessed Feb. 2018].

Rothschild, L. (1907). *Extinct Birds*. [ebook] London: Hutchinson & Co., Paternoster Row, E.C. Available at: <http://www.gutenberg.org/files/40000/40000-h/40000-h.htm> lord walter [Accessed Feb. 2018].

Palmpedia.net. (n.d.). *Butia yatay* - Palmpedia - Palm Grower's Guide. [online] Available at: http://www.palmpedia.net/wiki/Butia_yatay [Accessed Feb. 2018].

Eberhart, G. (2002). *Mysterious creatures*. Santa Barbara, Calif.: ABC-CLIO.

Botany.si.edu. Historical Expeditions / Department of Botany, National Museum of Natural History, Smithsonian Institution. [online] Available at: http://botany.si.edu/colls/expeditions/expedition_page.cfm?ExpedName=9 [Accessed Feb. 2018].

Iucnredlist.org. (2017). *Anodorhynchus glaucus* (Glaucous Macaw). [online] Available at: <http://www.iucnredlist.org/details/22685527/0> [Accessed Feb. 2018].

Planetofbirds.com. Rarest birds in the World: Glaucous Macaw (*Anodorhynchus glaucus*) – Planet of Birds. [online] Available at: <http://www.planetofbirds.com/rarest-birds-in-the-world-glaucous-macaw-anodorhynchus-glaucus> [Accessed Mar. 2018].



Liverpoolmuseums.org.uk. (n.d.). About John Gilbert, naturalist and explorer - World Museum, Liverpool museums. [online] Available at: <http://www.liverpoolmuseums.org.uk/wml/collections/zoology/john-gilbert/about-john-gilbert.aspx> [Accessed Feb. 2018].

Forshaw, J. and Knight, F. (2017). *Vanished and Vanishing Parrots*. Collingwood: CSIRO Publishing.

Russell, R. (2011). *The business of nature*. Canberra: National Library of Australia.

Chisholm, A. (1944). *Birds of the Gilbert Diary*. Emu - Austral Ornithology, 44(2), pp.131-150.

Dalton, D. (1996). *The Death of John Gilbert*. [ebook] espace.library.uq.edu.au. Available at: https://espace.library.uq.edu.au/data/UQ_241830/Lectures_on_NQ_History_S5_CH2.pdf?Expires=1520779737&Signature=KFRuLq-d5O-XyfcVrWS9LPQ7AoU5gKcV1HFMHIOWwOLuolJGmv68oPCmia91Byd8IWS1mx7Kvc0lwxSSRePnbppPK-06UP8NmRhBeyYc4Z8iZnJ3--tSeXxuvVeDB-4Ry8kNxyy5jB2UmJ0zk-6h-t--dCe3w-IWIAqgSBMrcal-faEKSnuXCAC1ENEmHarH2i0nKteediP7xuUdsknP3A2fJvNmf3vsz0nW4o6iybdODrfXISutVbu-TFmGUDg7AQ-jHyv42-0SURsLiBqhkjGBOEfdlGum0uZMsQqKDqVM17fxh9-2m4Jl8pPh9-PytuPmVZnspL3XiWLO0ABo-0ARA__&Key-Pair-Id=APKAJKNBj4MJBjNC6NLQ [Accessed Feb. 2018].

Liverpoolmuseums.org.uk. (n.d.). 1844 - 1845: The Port Essington Expedition (First Leichhardt Expedition) - World Museum, Liverpool museums. [online] Available at: <http://www.liverpoolmuseums.org.uk/wml/collections/zoology/john-gilbert/timeline/1844-1845.aspx> [Accessed Feb. 2018].

Chisholm, A. (2013). *Mateship with birds*. [Sydney, N.S.W.]: ReadHowYouWant.

Theaustralian.com.au. (2018). *Avian calling*. [online] Available at: <https://www.theaustralian.com.au/arts/review/avian-calling/news-story/a7feeed7a01b9d539deeb27bc8da70c?sv=39897ad073c3c8d66b1bdc9c3a36c89d> Map [Accessed Feb. 2018].

Jack, R. (1921). *Northmost Australia: Three Centuries of Exploration, Discovery, and Adventure in and Around the Cape York Peninsula, Queensland, with a Study of the Narratives of All Explorers by Sea and Land in the Light of Modern Charting, Many Original Or Hitherto Unpublished Documents, Thirty-nine Illustrations, and Sixteen Specially Prepared Maps, Volume 1*. [online] Google Books. Available at: <https://books.google.com/books?id=p-kJCAAAIAAJ&pg=PA189&pg=PA189&dq=dunbar+creek+in+australia&source=bl&ots=saHRkfUUV-J&sig=aAHFUm-nlwNmijYs9EhY1xr7Q&hl=en&sa=X&ved=0ahUKEwi0zJmVxoLZAhUC54MKHeC5ASYQ6A-EITTAJ#v=onepage&q=dunbar%20creek%20in%20australia&f=false> [Accessed Feb. 2018].

Fisher, C. (1986). A type specimen of The Paradise Parrot *Psephotus pulcherrimus* (Gould, 1845). *Australian Zoologist*, 22(3), pp.10-12.

<http://www.iucnredlist.org/details/22685156/0>

Environment.nsw.gov.au. *Paradise Parrot - profile* | NSW Environment & Heritage. [online] Available at: <http://www.environment.nsw.gov.au/threatenedspeciesapp/profile.aspx?id=20172> [Accessed Feb. 2018].

Schorger, A. Aaron Ludwig Kumlien. [PDF] *The Passenger Pigeon*. Available at: <http://images.library.wisc.edu/EcoNatRes/EFacs/PassPigeon/ppv07no01/reference/econatres.pp07n01.aschorger.pdf> [Accessed Feb. 2018].

Taylor, H. (1937). *Ludwig Kumlien*. [ebook] *Wilson Bulletin*. Available at: <https://sora.unm.edu/sites/default/files/journals/wilson/v049n02/p0085-p0090.pdf> [Accessed Feb. 2018].

Harvard Magazine. (2007). *William Brewster*. [online] Available at: <https://harvardmagazine.com/2007/11/william-brewster.html> [Accessed Feb. 2018].

Web.stanford.edu. *The Passenger Pigeon*. [online] Available at: https://web.stanford.edu/group/stanfordbirds/text/essays/Passenger_Pigeon.html [Accessed Feb. 2018].

iucnredlist.org. (2017). *Ectopistes migratorius* (Passenger Pigeon). [online] Available at: <http://www.iucnredlist.org/details/22690733/0> [Accessed Feb. 2018].

Idzikowski, J. (1989). *Trends in the List of Wisconsin Birds: A historical Perspective*. [ebook] *The Passenger Pigeon*. Available at: <http://images.library.wisc.edu/EcoNatRes/EFacs/PassPigeon/ppv51n01/reference/econatres.pp51n01.jdzikowski2.pdf> [Accessed Feb. 2018].

Audubon. (n.d.). *Why the Passenger Pigeon Went Extinct*. [online] Available at: <http://www.audubon.org/magazine/may-june-2014/why-passenger-pigeon-went-extinct> [Accessed Feb. 2018].

Nhm.ac.uk. (n.d.). *NaturePlus: Behind the scenes: 100 passenger pigeon facts on the 100th anniversary of its extinction*. [online] Available at: <http://www.nhm.ac.uk/natureplus/blogs/behind-the-scenes/2014/09/01/100-passenger-pigeon-facts-on-the-100th-anniversary-of-its-extinction> [Accessed Feb. 2018].

Greenberg, J. (2014). *A feathered river across the sky*. New York, NY: Bloomsbury.

Weatherford, C. (2005). *The Carolina Parakeet: America's Lost Parrot in Art and Memory*. Avian Publications.

McKinley, D. (1977). *Eggs of the Carolina Parakeet: A Preliminary Review*. *Bird-Banding*, [online] 48(1), p.25. Available at: <https://sora.unm.edu/sites/default/files/journals/jfo/v048n01/p0025-p0037.pdf> [Accessed Feb. 2018].

Tyler, W. and Bent, A. (1940). *Life Histories of North American Cuckoos, Goatsuckers, Hummingbirds and Their Allies*. *Bird-Banding*, [online] 11(4), p.182. Available at: https://companionparrotonline.com/Carolina_bent.html [Accessed Feb. 2018].

Brewster, W. (1875). *A new bird (Sterna Reia) to Massachusetts*. *Amer. Sorts*, V, p.249.

John James Audubon Center at Mill Grove. (n.d.). *The last Carolina Parakeet*. [online] Available at: <http://john-james.audubon.org/last-carolina-parakeet> [Accessed Feb. 2018].

Maynard, C. (1881). *The birds of eastern North America*. [ebook] Newtonville, MA: C. J. Maynard and Co. Available at: <https://www.biodiversitylibrary.org/item/238225#page/684/mode/1up> [Accessed Feb. 2018].

Rosen, J. *What a little bird told us*. [online] *latimes.com*. Available at: <http://www.latimes.com/la-op-rosen-24feb24-story.html> [Accessed Feb. 2018].

Gallagher, T. (2005). *The grail bird*. Boston: Houghton Mifflin. Available at:

<https://books.google.com/books?id=pwCXDgAAQBAJ&pg=PA7&pg=PA7&dq=%22Good+resolutions,+like+many+other+things,+are+much+easier+to+plan+than+to+practice.%22&source=bl&ots=eGbznrw-Bom&sig=pBgPdZkpfYXlj8PwuD6jx4-hZD4&hl=en&sa=X&ved=0ahUKEwiMtYr55JnZAhXj64MKHe2sAuAQ6A-EIjZAA#v=onepage&q=%22Good%20resolutions%2C%20like%20many%20other%20things%2C%20are%20much%20easier%20to%20plan%20than%20to%20practice.%22&f=false...>

The naturalist's guide in collecting and preserving objects of natural history. C. J. Maynard. (1887). *The naturalist's guide in collecting and preserving objects of natural history*. By C. J. Maynard. [online] *HathiTrust*. Available at: <https://babel.hathitrust.org/cgi/pt?id=uiug.30112009910974;view=1up;seq=51> [Accessed Feb. 2018].

Directory to the birds of eastern North America (1929). *Directory to the birds of eastern North America*, illustrated with many wood cuts and ... plates drawn and engraved by the author. By Charles J. Maynard. [online] *HathiTrust*. Available at: <https://babel.hathitrust.org/cgi/pt?id=uc2.ark:/13960/t38050691;view=1up;seq=122> [Accessed Feb. 2018].

Dunn, Jon; Kimball Garrett (1997). *A Field Guide to Warblers of North America*. Boston: Houghton Mifflin Company. p. 119.

O'bryne, F. (1920). *Report of Committee on Necrology*. 33rd ed. [ebook] Florida State Horticultural Society. Available at: http://fshs.org/proceedings-o/1920-vol-33/228-247_O%27Byrne.pdf [Accessed Feb. 2018].

Google Books. (1920). *University Record of the University of Florida: Undergraduate catalog 1919-20*. [online] Available at: https://books.google.com/books?id=i5BGAQAAMAAJ&pg=RA2-PA23&pg=RA2-PA23&d-q=hoyt+collection,+university+of+Florida&source=bl&ots=t1Y4XCWEI2&sig=YPGZyiqpbd_qg9bpxpTUZOASewk&hl=en&sa=X&ved=0ahUKEwiji_HRq57ZAhXiy0MKHa1pCcYQ6AEIOjAD#v=onepage&q=hoyt%20collection%2C%20university%20of%20Florida&f=false [Accessed Feb. 2018].

Google Books. (1908). *Biennial Report of the Historical Department of Iowa*. [online] Available at: https://books.google.com/books?id=N0ZAAQAAMAAJ&pg=PA11&pg=PA11&dq=Collection+of+r.+D.+Hoyt,+Seven+Oaks+,+Florida&source=bl&ots=1t1jkSPSSu&sig=HxVhFmrHJlcsxOHPvemliTdEANE&hl=en&sa=X&ved=0ahUKEwi19NHVnZ7ZAhWo54MKHaQBB_wQ6AEINDAD#v=onepage&q=Collection%20of%20R.%20D.%20Hoyt%2C%20Seven%20Oaks%20%2C%20Florida&f=false [Accessed Feb. 2018].

Google Books. (1919). *The Auk*, page 319, april, Vol xxxvi, no. 2. [online] Available at: <https://books.google.com/books?id=etwUAAAAYAAJ&pg=PA319&pg=PA319&dq=Robert+Day+Hoyt,+wife&source=bl&ots=xntCrjAT-4L&sig=ajT3gHzJ5tdTjKCHfGef-9Sms0&hl=en&sa=X&ved=0ahUKEwJq8JjbrJ7ZAhXH3YMKHSQMBKqG6A-ElaDAN#v=onepage&q=Robert%20Day%20Hoyt%20%2C%20wife&f=false> [Accessed Feb. 2018].

iucnredlist.org. (2017). *Vermivora bachmanii* (Bachman's Warbler). [online] Available at: <http://www.iucnredlist.org/details/22721607/0> [Accessed Feb. 2018].

Music.avclub.com. (2007). *12 Memorable newspaper comic-strip deaths*. [online] Available at: <https://music.avclub.com/12-memorable-newspaper-comic-strip-deaths-1798212527> [Accessed Feb. 2018].



Nicholson, D. (1928). Nesting habits of the Seaside Sparrows in Florida. [PDF] *Wilson Bulletin*. Available at: <https://sora.unm.edu/sites/default/files/journals/wilson/v040n04/p0225-p0237.pdf> [Accessed Feb. 2018].

Works, V. (n.d.). Victor H. Hall uses Forensic Evidence to Authenticate Two of Martin Johnson Heade's Most Important Works. [online] PRWeb. Available at: <http://www.prweb.com/releases/2014/02/prweb11601865.htm> [Accessed Feb. 2018].

Sahr, D. Environmental Politics and the Endangered Species Act. [online] Available at: <http://www.socialstudies.org/sites/default/files/publications/se/6407/640701.html> [Accessed Feb. 2018].

Klinkenborg, V. (2009). Last One. [online] *Ngm.nationalgeographic.com*. Available at: <http://ngm.nationalgeographic.com/print/2009/01/endangered-species/klinkenborg-text> [Accessed Feb. 2018].

AVISE, J. and NELSON, W. (1989). Molecular Genetic Relationships of the Extinct Dusky Seaside Sparrow. *Science*, [online] 243(4891), pp.646-648. Available at: <http://adsabs.harvard.edu/abs/1989Sci...243..646A> [Accessed Feb. 2018].

Walters, Mark Jerome (1992). *A Shadow and A Song: The Struggle to Save Endangered Species*. Post Mills, VT: Chelsea Green Publishing Co.

latimes. (1992). One Small Misstep for Man. . . : A SHADOW AND A SONG; The Struggle To Save an Endangered Species By Mark Jerome Walters. [online] Available at: http://articles.latimes.com/1992-11-29/books/bk-3027_1_endangered-species-act [Accessed Feb. 2018].

Bagheera.com. (n.d.). Dusky Seaside Sparrow: an Extinct Species. [online] Available at: http://www.bagheera.com/inthewild/ext_sparrow.htm [Accessed Feb. 2018].

Service, U. (n.d.). Species Profile for Dusky Seaside sparrow (*Ammodramus maritimus nigrescens*). [online] *Ecos.fws.gov*. Available at: <https://ecos.fws.gov/ecp0/profile/speciesProfile?spcode=B00R> [Accessed Feb. 2018].

Times, J. (1986). LAST DUSKY SPARROW STRUGGLES ON. [online] *Nytimes.com*. Available at: <http://www.nytimes.com/1986/04/29/science/last-dusky-sparrow-struggles-on.html> [Accessed Feb. 2018].

LANE, M. (2011). Owner hopes artwork a treasure. [online] *The St. Augustine Record*. Available at: <http://www.staugustine.com/article/20110122/NEWS/301229952> [Accessed Feb. 2018].

Toner, M. (1986). Dusky Seaside Sparrow Species Literally At End Of Its Line. [online] *tribunedigital-chicagotribune*. Available at: http://articles.chicagotribune.com/1986-05-05/features/8602010693_1_seaside-sparrow-endangered-species-act-second-bird [Accessed Mar. 2018].

Sharp, B. (June 1970). A POPULATION ESTIMATE OF THE DUSKY SEASIDE SPARROW. Vol. 82. No.2 [PDF] *The Wilson Bulletin*. Available at: <https://sora.unm.edu/sites/default/files/journals/wilson/v082n02/p0158-p0166.pdf> [Accessed Feb. 2018].

Sykes, Jr, P. (Sept. 1980). Decline and disappearance of the Dusky Seaside Sparrow from Merritt Island, Florida. *American Birds*. [online] Available at: <https://sora.unm.edu/sites/default/files/journals/nab/v034n05/p00728-p00737.pdf> [Accessed 10 Mar. 2018].

Engber, D. (2005). When can you say an animal is extinct?. [online] *Slate Magazine*. Available at: http://www.slate.com/articles/news_and_politics/explainer/2005/05/when_do_they_call_an_animal_extinct.html [Accessed Feb. 2018].

New Scientist. (2009). In defence of the Red List. [online] Available at: <https://www.google.com/amp/s/www.newscientist.com/article/mg20227026-600-in-defence-of-the-red-list/amp/> [Accessed Mar. 2018].

Blakemore, E. (2015). How We Decide Which Animals Become Endangered. [online] *Smithsonian*. Available at: <https://www.smithsonianmag.com/science-nature/how-we-decide-which-animals-become-endangered-180956923/> [Accessed Feb. 2018].

Mrosovsky, N. and Brundtland, G. (1997). IUCN's credibility critically endangered. [online] *Nature*. Available at: <https://www.nature.com/articles/38873> [Accessed Mar. 2018].

Gold, S. (2017). The Endangered Species Act Should Be the Last Resort. In *This America, It's Often First..* [online] *Slate Magazine*. Available at: http://www.slate.com/articles/health_and_science/science/2017/05/the_endangered_species_act_wasnt_meant_to_save_the_animals.html [Accessed Mar. 2018].

Stephanie Lewthwaite's suggested readings

Barrow, M. Jr. (2009). *Nature's Ghosts: Confronting Extinction from the Age of Jefferson to the Age of Ecology*. Chicago: University Chicago Press.

Bosch, L., and M. Denaci (2014). "Conclusion: Bioregionalism and Animal Studies." *In Life Streams: Alberto Rey's Cuban and American Art*, edited by L. Bosch and M. Denaci, 201-205. Albany: State University of New York Press.

Bosch, L. (2014). "Introduction—Life Streams: The Cuban and American Art of Alberto Rey." *In Life Streams: Alberto Rey's Cuban and American Art*, edited by L. Bosch and M. Denaci, 1-11. Albany: State University of New York Press.

Demos, T.J. (2016). *Decolonizing Nature: Contemporary Art and the Politics of Ecology*. Berlin: Sternberg Press.

Dilworth, J. n.d. "The Alabamboo Make and Ride." Available at: www.RideAlabamboo.com [Accessed Mar. 2018].

Dilworth, J. n.d. "Neskaupskóda/Norðotype" Available at: <http://www.xn--norotype-52a.com/> [Accessed Mar. 2018].

Drucker, J. n.d. "A New Naturalism: Biological Regionalism and the Work of Alberto Rey." Available at: <https://albertorey.com/paintings/a-new-naturalism/> [Accessed Apr. 2018].

Emmett, R., and D. Nye (2017). *The Environmental Humanities: A Critical Introduction*. Cambridge, Mass.: MIT Press.

Gathering Forest and Community/Hidden Frontiers. n.d. "History of Designers and Forests." Available at: http://hiddenfrontiers.designersandforests.us/?page_id=48 [Accessed Mar. 2018].

Gathering Forest and Community/Hidden Frontiers. n.d. "Our Creative Process." Available at: http://hiddenfrontiers.designersandforests.us/?page_id=30 [Accessed Mar. 2018].

Gracia, J. (2014). "The Construction of Identity in Art: Alberto Rey's Journey." *In Life Streams: Alberto Rey's Cuban and American Art*, edited by L. Bosch and M. Denaci, 47-65. Albany: State University of New York Press.

Hidden Frontiers (2015). "Call for Participants." Available at: <http://hiddenfrontiers.designersandforests.us/?p=53> [Accessed Mar. 2018].

Kolbert, E. (2014). *The Sixth Extinction: An Unnatural History*. London: Bloomsbury Publishing.

Nixon, R. (2013). *Slow Violence and the Environmentalism of the Poor*. Harvard, Mass.: Harvard University Press.

Nowlan, L. (2015). "Extinction Art." *Alternatives Journal* 41, no. 5 (December). Available at: <http://www.alternativesjournal.ca/people-and-profiles/extinction-art> [Accessed Apr. 2018].

Rey, A. n.d. "Aesthetics of Death: Artist Statement." Available at: <https://albertorey.com/paintings/aesthetics-of-death-artist-statement/> [Accessed Mar. 2018].

Rey, A. n.d. "Biological Regionalism: Artist Statement." Available at: <https://albertorey.com/paintings/biological-regionalism-artist-statement/> [Accessed Mar. 2018].

Rey, A. n.d. "Las Balsas: Artist Statement." Available at: <http://albertorey.com/paintings/artist-statements-on-earlier-series/las-balsas-the-rafts/> [Accessed Mar. 2018].

