



**THE TRUMPETER SWAN SOCIETY**  
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*Working to assure the vitality and welfare of wild Trumpeter Swans*

## **25<sup>th</sup> Swan Conference: Presentation and Poster Abstracts**

**Best Western Premier Hotel**  
**3559 College Ave, Alton, IL 62002**

***Tuesday, November 19<sup>th</sup> 2019***

### **SWANS OF RIVERLANDS; HISTORY AND OUTREACH OF THE AUDUBON CENTER AT RIVERLANDS AND THE RIVERLANDS MIGRATORY BIRD SANCTUARY**

Charles Deutsch, U.S. Army Corps of Engineers, West Alton, MO  
Ken Buchholz, Audubon Center at Riverlands, West Alton, MO

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#### **ABSTRACT**

The U.S. Army Corps of Engineers, Rivers Project Office and the National Audubon Society have hosted overwintering trumpeter swans at the wetlands of the Riverlands Migratory Bird Sanctuary since 1991. The five swans, released from Wisconsin, that migrated to Riverlands in 1991 set the stage for almost 30 years of public interest in the trumpeter swan's story, conservation of wintering habitat at Riverlands, citizen science engagement, public outreach and many other activities centered around swans. The numbers of swans that build up in winter at Riverlands top the 1500 mark and has ultimately led to Riverlands being designated a globally important bird area by the National Audubon Society due to the large numbers of overwintering trumpeter swans. Efforts to enhance the public's education about swans, protect their habitat and work with partners to reduce swan mortality from accidental shooting, power line strikes and lead poisoning have benefited the swan population as well as the visiting public that target this region to view these iconic birds.

### **HISTORY AND UPDATE: GREAT RIVERS TRUMPETER SWAN WATCH**

Pat Lueders, Great Rivers Trumpeter Swan Watch, St. Louis, MO

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#### **ABSTRACT**

The Great Rivers Trumpeter Swan Watch, a partnership including Missouri Audubon, the St. Louis Audubon Society, Audubon Society of Missouri, the U.S. Army Corps of Engineers, and The Trumpeter Swan Society, was formed in 2011 to monitor the number and behavior of Trumpeter Swans wintering in the area surrounding the Missouri, Mississippi, and Illinois Rivers. The number of Trumpeter Swans counted during the Great Rivers Trumpeter Swan Watch has increased from 332 in 2011 to 1377 in 2019. Over 2300 swans, including some Tundra, were counted on the refuge on February 1, 2019, the largest number recorded

to date, possibly the result of the area being used as an important migration staging location for both swans and waterfowl. The Riverlands Migratory Bird Sanctuary was designated a Global Important Bird Area in 2014 because of the presence of such a large wintering population of endangered Trumpeter Swans. Since the beginning of the Great Rivers Trumpeter Swan Watch, volunteers have been recruited each year to count the roosting swans at dawn once every two weeks from November 10th until February 10th and to monitor their behavior after the swans depart the roosting areas. From 2011 until 2019, over 75 different volunteers have participated in the watch. In addition to counting the number of individuals and observing the behavior of the wintering swan population, volunteers identify and count the number of additional waterfowl using the refuge. Since 2011, Trumpeter Swan collar information has been recorded and submitted to the National U.S. Banding Lab resulting in the successful tracking of over 94 Trumpeter Swans that have used the refuge. To date, all of the collared Trumpeter Swans recorded in the Great Rivers Watch were collared in the state of Wisconsin between 2002 and 2012. In addition to the swan watch counts and monitoring, these volunteers also assist in the annual Trumpeter Swan Festival held each November by Missouri Audubon at the Audubon Center at Riverlands. The festival is an educational activity to familiarize the general public with Trumpeter Swans and other waterfowl, to promote the activities of the Audubon Center, and to advocate for the protection of the swans and all endangered species. The Great Rivers Trumpeter Swan Watch will begin its eighth season this year.

## **LONG-TERM BIRD DECLINES AND WHAT MISSOURI IS DOING ABOUT IT: THE MISSOURI BIRD CONSERVATION PLAN**

**Sarah Kendrick, Missouri Department of Conservation, Jefferson City, MO**

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### **ABSTRACT**

Recent research has quantified a net loss of North American birds over the last 50 years: 2.9 billion, or 29%. Over the last year, technical bird experts convened to build the Missouri Bird Conservation Plan's Technical Section. This Plan identifies our state's most threatened landbird species and what they each require for breeding habitat to focus the efforts of multiple agencies, non-governmental organizations, and private landowners. The Plan also outlines research and monitoring needs statewide. The second half of the Bird Plan, the Outreach Section, is now underway with a different group of bird conservation education professionals from across the state. The Outreach Section works to focus high-level bird conservation messages and disseminate those to the public together. Come and learn about what the Missouri conservation community is doing to combat bird declines by focusing land management, research, and outreach for our most-threatened birds!

## **ALDO LEOPOLD AND MISSOURI CONSERVATION**

**Susan L. Flader, Aldo Leopold Society, Columbia MO**

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### **ABSTRACT**

Aldo Leopold (1887-1948) is best known for his concept of a land ethic—a conviction of personal responsibility for the health of the biotic community, including soils, waters, plants and animals as well as people. Born in Iowa along the Mississippi River flyway, he began as a birdwatcher and hunter and went on to a distinguished career as a forester and wildlife ecologist, beginning in Arizona and New Mexico Territories and culminating at the University of Wisconsin.

This presentation explores Leopold's less known interest and involvement with conservation in Missouri. He first visited in 1926 for a float trip on the Current River, then crisscrossed the state in 1929-30 on a game survey, during which he met and talked with over 125 scientists, sportsmen, agency professionals, and policymakers; he also acquired what he called his Missouri shanty on the Current River as a base for annual

quail hunting trips during the 1930s. Leopold maintained frequent correspondence with Missourians during the establishment and early years of the state's bi-partisan conservation commission, which he had recommended, and was invited several times to reflect on the progress being made there. From study of his correspondence and writings about the state, as compared with similar materials regarding other states and his views on general conservation policy, it is likely that Missouri came closer than any other state to exemplifying Aldo Leopold's sense of how conservation might best be organized and implemented on the ground, both during his lifetime and to the present day.

**“BACK FROM THE EDGE OF EXTINCTION”**

Paul Moffett, Audubon Center at Riverlands, St. Charles, MO

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The photos were all taken at Audubon Riverlands, the largest overwintering area for the Trumpeter Swans. The purpose of the program is to educate and gain an appreciation of these magnificent birds.

**RED ROCK LAKES NATIONAL WILDLIFE REFUGE, ITS HISTORY AND ROLE IN TRUMPETER SWAN RECOVERY**

Bill West, U.S. Fish and Wildlife (retired), Belgrade, MT

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**ABSTRACT**

On the north side of the Continental Divide, in Southwest Montana, is the remote Centennial Valley. It is a vast, high elevation, nearly intact, landscape of forest, sagebrush steppe, wet meadow and the largest wetland complex in the 18 million-acre Greater Yellowstone Ecosystem. It is the uppermost point of the Missouri /Mississippi watershed, 3768 miles from the Gulf of Mexico. Red Rock Lakes National Wildlife Refuge (RRLNWR) is there. In 1922 the U.S Biological Survey attempted to establish a NWR. They were not successful due to politics of Butte, MT, the economic engine of Montana at the time.

In the early 1930s George Melendez Wright, Yellowstone NP's first biologist and namesake of today's George Wright Society found a viable trumpeter swan population in the valley, when the species was thought nearly extinct. He persuaded Ding Darling to establish a NWR there. This time declining swans were the political leverage despite some unwilling sellers. Many homesteads were no longer viable business operations. First acquisition was funded by "The Resettlement Administration" meant to resettle struggling farm families to better locations. Duck stamp dollars acquired much of the remainder. In 1940-41 Interior Secretary Harold Ickes, lobbied President Roosevelt (FDR) to stop an Army General from building a winter training camp nearby at Henry's Lake, Idaho. 5000 soldiers and infrastructure had been built and a 35,000-soldier camp was planned. FDR Eventually ordered the General to vacate Henry's Lake. Swan conservation was again the leverage. It happened just days before Pearl Harbor. Swan feeding began in 1935 to keep them on the RRLNWR, away from hunters. The U.S Fish and Wildlife Service (USFWS) quit feeding in 1992 to prevent catastrophic disease spread on the feed line and to encourage migration south. The population struggled for a time, but finally did migrate to the Snake River Plain, Idaho. By 2008 there were still 10-12 wintering at the feed line. There are none today. The refuge has become much more than a swan conservation area. Other wildlife returned, including moose, wolf, grizzly bear, elk, deer, pine marten, wolverine, water birds, waterfowl and Arctic grayling. Migratory song birds are abundant.

The TS objective in 2009 Refuge Comprehensive Conservation plan (CCP) was 19 nests and 140 white birds Those objectives were achieved soon after the plan. Later, valley objectives were increased by Pacific Flyway Management Plan for Rocky Mountain Population of TSS. The population objective was raised to 20 nesting pairs and 200 white birds. Those objectives were achieved with 25 broods (= minimum of 25 nests) in 2018. Fall aerial counts found white birds at 245 in 2018 and 249 in 2019.

There has been a steady increase over 27 years since termination of winter feeding (1993-2019). Data shows a significant increase per year in average number of both white birds and total birds (i.e. adults plus cygnets). Data indicates a non-significant pattern in cygnet production during this same time period. However, the average cygnet production 2012 to 2019 (9 years, = 50 cygnets/year) is nearly 2.5xs higher than during previous period from termination of winter feeding (i.e. 1993) to 2011 (19 years, average =21 cygnets/year).

TSs at RRLNWR are doing well. The best swan nesting territories appear occupied. There is room for improvement in the Centennial Valley on private lands. USFWS private land biologists are working on projects to improve TS nesting on private lands in partnership with the Trumpeter Swan Society.

**NATIONAL WILDLIFE REFUGES AND THE NATIONAL WILDLIFE REFUGE ASSOCIATION**  
Carl Woodward, National Wildlife Refuge Association, Washington D.C.

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## **ABSTRACT**

The National Wildlife Refuge System is an 850 million-acre network of public lands and waters set aside for wildlife conservation. Part of the United States Department of the Interior, it comprises 100 million acres of land or 5% of all of the land in the United States. There are refuges in every state, 568 refuges in all, and include the largest, Arctic NWR in Alaska (21 million acres), and the largest in the lower 48, Desert NWR in Nevada (1.6 million acres). The other 750 million acres are mostly in a vast area of the Pacific beyond Hawaii. It is the largest system of dedicated conservation lands and waters in the world.

The National Wildlife Refuge System lands and waters serve a purpose distinct from that of other U.S. public lands: Wildlife conservation drives everything on national wildlife refuges, from the purposes for which each refuge was established, to the recreational activities offered, to the resource management tools used.

Each refuge is established to serve a statutory purpose that targets the conservation of native species dependent on its lands and waters. All activities on those acres are reviewed for compatibility with this statutory purpose.

Particular attention is paid to the protection and preservation of endangered species and their habitat. Refuges play a critical role in providing and improving the appropriate environment for the restoration of rare birds and animals. Many years ago trumpeter swans, for example, were nearly extinct. Yet in the 1930s and 40s, certain Red Rock Lakes swans were relocated to, Malheur, Ruby Lake, Turnbull and in the 60s to LaCreek NWR. Today, with successful breeding and habitat restoration, trumpeter swans are now successfully found in the Pacific Coast Flyway, the Rocky Mountains, the Central Flyway, the Mississippi and the Atlantic Flyway. Without the National Wildlife Refuge System, restoration of trumpeter swan populations would have been far less successful.

The National Wildlife Refuge Association is a private non-profit devoted to supporting the Refuge System. The NWRA works by lobbying and coordinating. NWRA lobbies Congress for the system's budget, as well as Interior and elsewhere on particularly important issues, such as drilling in the Arctic or bombing in the Desert NWR. NWRA coordinates Friends Groups for lobbying and to assist in their operations. NWRA coordinates with local land owners, foundations and Interior itself to protect habitat surround refuges. Occasionally NWRA joins other environmental groups to fight for refuges in the courts.

**UTILIZING THE TRUMPETER SWAN SPECIES SURVIVAL PLAN (SSP), ZOOLOGICAL FACILITIES, AND COLLABORATING ORGANIZATIONS TO ADVOCATE CONSERVATION**  
Tiffany Mayo, Cleveland Metroparks Zoo, Cleveland, Ohio

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**ABSTRACT**

Zoos, in conjunction with government agencies and other organizations, have been contributing to trumpeter swan conservation since the 1960's. Cygnets hatched and raised at zoos have gone to several states helping to create sustainable populations of wild swans across North America. The success of these programs is based on collaboration from participants working together to carry out the common mission of species restoration and conservation.

A primary goal of an Association of Zoos and Aquariums (AZA) Species Survival Plan (SSP) is to create a sustainable, genetically diverse population of animals within the zoological community. In addition to this role, the trumpeter swan SSP has the unique opportunity to coordinate the release of animals into the wild as part of state restoration partnerships. This gives Zoos the chance to actively participate in waterfowl conservation initiatives and the ability to share the conservation story with millions of visitors. Zoos can engage and educate visitors by exhibiting trumpeter swans acting as ambassadors for their wild counterparts that are symbolic for healthy wetlands. As SSP Coordinator for trumpeter swans, one of my main objectives has been promoting and facilitating the conservation efforts of Zoos along with increasing and expanding those efforts. This has been accomplished through written and social media, presentations, fundraising and forming relationships with outside organizations. In addition, I believe using trumpeter swans to connect people to their local environment is fundamental in sparking conservation action for all species.

**THE NORTH AMERICAN WATERFOWL MANAGEMENT PLAN: AN INVITATION TO CONNECT PEOPLE TO NATURE**

Andrew Raedeke, Missouri Department of Conservation, Columbia, MO

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**ABSTRACT**

In the 1980s, the waterfowl management community recognized business as usual was insufficient to address the threats that were leading to a loss of wetlands and rapidly declining waterfowl populations. Leaders of the time responded by creating a shared vision, embodied in the 1986 North American Waterfowl Management Plan (NAWMP). This plan was based on the premise that partners working together at regional scales using an adaptive, science-based approach would be able to help reverse the downward trends in continental waterfowl populations. This shared vision translated into success. Since its inception, NAWMP partners have conserved and restored 15.7 million acres of wetlands and other important habitats for waterfowl shared by Canada, the United States and Mexico. As a result, many waterfowl populations are now substantially larger than they were before. Today, we are confronted with a new, unanticipated threat, the growing disconnect between society and nature and business as usual once again will not suffice. In response, the waterfowl conservation community has expanded its vision beyond just habitat and waterfowl populations to also include people. The NAWMP community invites The Trumpeter Swan Society to join us in working together to achieve the new NAWMP goal of *“Growing numbers of waterfowl hunters, other conservationists and citizens who enjoy and actively support waterfowl and wetlands conservation.”*

## **PLATTE BASIN TIMEPLAPSE**

**Michael Forsberg, University of Nebraska, Institute of Agriculture and Natural Resources, Lincoln, NE**

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### **ABSTRACT**

In motion since 2011, Platte Basin Timelapse project (PBT) is a long-term documentary project using time-lapse photography as a backbone to capture a Great Plains watershed in motion, educating via multimedia storytelling, and growing a new generation of science-based storytellers. Our mission is to get people to think about where their water comes from, what it means to live in a watershed today, and to think about it as a community to which we all belong. One important facet of our watershed storytelling is focused on key wildlife species in diverse geographies from mountains to plains. By doing so we not only help audiences appreciate and better understand a species natural history, but we also shine a light on broader conservation challenges, why it matters, and what is at stake for all of us. The Nebraska Sandhills is one of the last intact prairie grassland ecosystems on the continent and almost entirely in the Platte watershed, and trumpeter swans have become a focal species for our efforts in this part of the watershed. In my presentation I'll tell the story of Platte Basin Timelapse, touch on our education, research and storytelling efforts underway, and specifically showcase some of our work on trumpeter swans in the Nebraska Sandhills.

## **HOW DO INDIVIDUAL ATTRIBUTES PREDICT BIRD CONSERVATION BEHAVIORS AMONG BIRDERS IN THE UNITED STATES?**

**Terrell D. Rich, Boise State University, Department of Public Policy, Boise, ID**

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### **ABSTRACT**

There is a serious disconnect between the needs for bird conservation and birder interests, on the one hand, and public policies for bird conservation in the United States on the other. The scientific foundation for bird conservation is robust. Ornithologists have been producing sophisticated multi-species vulnerability assessments and conservation plans since the first North American Waterfowl Management Plan was published in 1986. Similar assessments from Partners in Flight, the North American Bird Conservation Initiative, Joint Ventures, and other bird conservation partnerships have been produced nearly annually over the intervening 33 years.

At the same time, national surveys have revealed that around 45,000,000 American feed and/or watch birds. This number vastly exceeds the number of hunters, fishers, and other consumptive users. But despite the science and the public interest, the policies of public agencies – the 50 state wildlife agencies and the U.S. Fish and Wildlife Service (USFWS) – are inadequate at best.

I completed a nationwide survey of birders in the U.S. to discover their interests, motivations, and degree to which they engaged in bird conservation behaviors. This was a nonrandom sample of 285 birding groups in all 50 states. Over 5,500 usable surveys were returned. The dependent variable included 18 different actions that birders could select, e.g., contributed checklists to eBird. The independent variables evaluated birding interest and intensity, childhood (ages 1-11) experiences with nature, important people in childhood, general attitudes and values, knowledge of bird conservation partnerships and information sources, bird conservation actions intended but not taken, norm activation, and demographics.

The median age of respondents was 61 (range 11-93), and 57% were female. Respondents reported a wide range of interest in birding. They spent an average of 6 days per month birding for at least 1 hour away from home (range 0-31), had a mean life list size of 783 (range 1-10,012), and maintained an average of 5 bird feeders (range 0-50). These results revealed a broad range of types of birders. Respondents rated themselves from 0 (very conservative) to 100 (very liberal), but the mean (71) was strongly liberal. The most important childhood experience in shaping attitudes toward nature was outdoor play (68% saying it was very important), followed by vacations to outdoor locations (51%), and reading about nature (38%). Knowledge of the sources of bird mortality was not very nuanced as every factor was rated very important. They greatly overestimated the impact of collisions with towers and wind turbines, electrocution, and illegal shooting. Knowledge of bird conservation partnerships and products was low, with 31%-41% not familiar with 6

major items, e.g., State of the Birds reports. The most important external influence on bird conservation behavior was messages from conservation organizations (24%). State wildlife agencies and the USFWS were not important influences (6% and 5%, respectively). The top bird conservation behavior (among 18 options) was making yards more desirable for birds (83%), followed by renewing memberships in conservation organizations (75%), and sharing content on social media (67%). The least popular action was writing editorials for newspapers and similar actions (14%). The action most frequently intended, but not taken, was participating in a Christmas Bird Count (19%).

The goal of this research was to discover how well birder experiences, interests, and knowledge predicted those 18 behaviors. Preliminary analyses show that while there were many highly significant models (all  $P < 0.001$ ), the greatest amount of variance explained in any one model was only 32% (adjusted  $R^2$ ). The most important predictor was norm activation, being significant in 16 of 18 models. The most important factor in norm activation was messages from conservation organizations (significant in 6 models) followed by the influence of birding friends (5 models). The other significant types of predictors, in decreasing order and adjusted for the number of questions asked, were knowledge of bird conservation (8), sources of bird conservation messages (8), birding interest and intensity (6), demographics (4.3), general attitudes and values (2), and childhood experiences with nature (1). The only category with no significant predictive value was types of important people in childhood, e.g., father.

The main conclusion is that birders do respond to messages from conservation organizations, although not to those from state wildlife agencies or the USFWS. Because 31-41% of respondents were not familiar with the major bird conservation partnerships and their products, this suggests that a greater effort in simply communicating bird conservation needs in actionable ways will be effective in increasing action. It's also encouraging that childhood experiences and people were not important in predicting behavior because those historical effects can't be changed. These results will be shared with the Association of Fish and Wildlife Agencies, the USFWS, and bird conservation partnerships so that specific new communication strategies can be identified.

#### HOW MINNESOTA USED PUBLIC ENGAGEMENT IN SWAN RESTORATION / MINNESOTA PROGRAM FOR ENGAGING THE PUBLIC THROUGH NATIONAL MEDIA ATTENTION

Christine Herwig, Minnesota Department of Natural Resources (DNR), Nongame Wildlife Program, Bemidji, MN; Carrol Henderson, Minnesota DNR (retired)

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#### ABSTRACT

A cornerstone of success for Minnesota's Trumpeter Swan (*Cygnus buccinator*) reintroduction efforts was engaging the public through local and national media. For the first release of 21 Trumpeter Swans, it was realized that the event would be newsworthy as the "First, Biggest, and Most". Major national news stations were contacted, and the event was pitched as the first and largest swan release in U.S history. In 1987, a CBS news team visited Minnesota to cover this release. A year later, high profile reporter Roger Caras of ABC aired a story at a lake on the White Earth Reservation where local children released swans. The story was estimated to have 40 million viewers. This approach of engaging the media resulted in interested citizens and increased donations that improved the success of this reintroduction effort and future projects and elevated the profile of Minnesota's Nongame Wildlife Program. Carrol Henderson, long time supervisor for Minnesota Department of Natural Resource's Nongame Wildlife Program, has a number of lessons learned from his success working with media. Starting with a belief that the more the public is engaged, the more enthusiastic they will be about nongame work and accomplishments. Carrol's lessons learned and examples from the Trumpeter Swan reintroduction efforts will be presented.

## **ZOOS AND PUBLIC ENGAGEMENT: METHODS TO GET VISITORS INVOLVED IN CONSERVATION**

**Matt Schamberger, St. Louis Zoo, St. Louis, MO; Erin Tate, St. Louis Zoo**

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### **ABSTRACT**

The Saint Louis Zoo attracts over 3 million visitors annually. For most, the educational experience is not a higher motivation than simply spending time with family on a nice day. The Zoo is constantly investigating and developing new ways to deliver targeted messages to visitors that could have an impact on a variety of conservation efforts. The Zoo's Conservation Audience Research and Evaluation (CARE) team has identified that there can be simple methods to generate interest in a conservation topic and to provide a low- barrier, high-impact action item for the visitor to engage in later. Our presentation will discuss these methods as well as the Saint Louis Zoos overall reach and how we get conservation messages out through other channels such as Facebook, Twitter, Instagram, the zoo's website, and programs offered by our education department. We will also discuss a pelican keeper chat survey that was conducted and share what we learned from the study and how we have used that information to conduct other studies around zoo grounds that help us get important conservation messaging out to our visitors.

## **PROMOTING HABITAT – “TRUMPETING THE CAUSE FOR WETLANDS” WITH LANDOWNERS, SCHOOLS, AND THE GENERAL PUBLIC**

**David D. Hoffman, Iowa Department of Natural Resources, Clear Lake, IA**

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### **ABSTRACT**

A primary objective of Trumpeter swan restoration in Iowa is to “Trumpet the Cause for Wetlands”. Trumpeter swans serve as excellent ambassadors in Iowa for promoting wetland values, water quality, the environment, and enriching the quality of life. Over 450 swan releases and 40 winter swan viewing events “Swan Soiree” have been conducted by IADNR and county conservation staff. The public and media have been invited to attend. These public programs have been very popular. The goal is to educate, engage and connect people to the Trumpeters and especially their habitat. An estimated 5,000-15,000 students and public have been impacted annually since 1995. Observed results have included a greater awareness, appreciation and empowerment. This has translated into additional wetland acres being restored, improved water quality and increased wildlife populations including trumpeter swans. Unforeseen results have included students, adults and volunteers being infected by “Swanitis”, with a remarkable passion to help restore, enhance and protect swans and their wetland habitat. Donations have also been received at these events to help support swan restoration. Money has come from a wide variety of swan enthusiasts, conservation groups, and charities. When combined with considerable soft match/in-kind contributions, a conservative estimate totaling over 1.5 million dollars has been raised to directly to fund swan reintroduction in Iowa. Additional outreach includes a Trumpeter swan and wetland education and activity manual. It was developed by Ron Andrews in 1996 and distributed to Iowa school teachers. A current goal is to update the manual and offer it for nationwide distribution. The public outreach effort has been a huge success by raising awareness in regards to these magnificent birds, habitat and by providing critical funding to carry out the work.



## **TRUMPETER SWAN RESTORATION IN MONTANA'S BLACKFOOT WATERSHED**

Elaine Caton, Blackfoot Challenge, Ovando, MT

Greg Neudecker, U.S. Fish and Wildlife Service, Ovando, MT

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### **ABSTRACT**

The Blackfoot watershed in western Montana encompasses 1.5 million acres with over 30,000 acres of wetlands. In 2003 a pair of Trumpeter Swans (*Cygnus buccinator*) nested in a wetland in the upper watershed, the first record of residency since 1806. The US Fish and Wildlife Service and the Blackfoot Challenge, a watershed nonprofit, began a joint reintroduction effort in 2005, after an extensive habitat suitability study identified 27 potential nesting territories. To date, 211 captive-reared birds (primarily yearlings) have been released. The first territory was established by released birds in 2010, and the number of territories and nests have increased steadily since then, with 8 successful nests and 17 cygnets fledged in 2019. Engaging local residents has been a vital component of the project, and includes public releases with students from area schools attending. The Blackfoot Challenge, a collaborative watershed organization of landowners, government agencies, and nonprofit groups, has been key to the program's success. Wetland conservation and restoration is a major focus of the Challenge's conservation strategy, and properties with wetlands have been targeted for conservation since 1990. Seven public and private entities now hold 150,000 acres in easements in the valley, and over 300,000 additional acres have been acquired for conservation purposes, including many wetland areas. As a flagship species, Trumpeter Swans have been important in highlighting the significance of wetland habitat on private lands. Trumpeters are a highly visible and well-loved wildlife species that are obviously dependent on wetlands for survival. Landowners contact project leaders to report swan locations, donate to the swan program, host and volunteer at swan releases, and have been essential in helping to protect swans and their habitat in the Blackfoot watershed.

## **COMMON INJURIES IN TRUMPETER SWANS WITH SPECIAL EMPHASIS ON LEAD TOXICITY**

Renee Schott, Wildlife Rehabilitation Center of Minnesota, Roseville, MN

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### **ABSTRACT**

The Wildlife Rehabilitation Center of Minnesota is one of the largest wildlife rehabilitation hospitals in the country, seeing approximately 15,000 animals per year. Additionally, they likely see the largest number Trumpeter Swan admissions of any wildlife hospital, admitting approximately 50 swans per year. Trumpeter swans are admitted for rehabilitation due to a variety of injuries and illnesses, including trauma, aspergillosis, feather problems, lead toxicity, infectious diseases (West Nile Virus, Pox Virus), lead toxicity and others. Data from WRCMN will be reviewed for cause of admission. Half of all swan admissions have a toxic level of blood lead. Treatment for lead toxicity is prolonged (average stay is several months), intensive (requires injections, fluids, many medications, and supportive care), and expensive (\$60/day/swan in medications alone). Topics of discussion for this talk include: sources of lead that swans ingest, characteristics of lead toxicity cases, prognosis, and most successful treatment options.

## **TRUMPETER SWAN REHABILITATION IN THE RIVERLANDS AREA**

Rachael Heaton, TreeHouse Wildlife Center, Dow, IL

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### **ABSTRACT**

The Riverlands area is a favorite wintering ground for Trumpeter Swans as well as other birds on the Mississippi Flyway. There are numerous parks and wildlife sanctuaries set aside specifically for birds to

utilize on this section of the Mississippi River. Unfortunately, these birds sometimes run into trouble. TreeHouse Wildlife Center, a wildlife rehabilitation and education center, has been operating on the Mississippi Flyway since 1979. Our first Trumpeter Swan was admitted in 1992. Since then, the common ailments and threats we have seen for swans in this area include lead poisoning, aspergillosis, collisions with powerlines, and poaching. Lead poisoning is our top reason for admittance, usually caused by the swan having ingested lead fishing equipment such as sinkers. Collisions with powerlines used to be a major problem but thankfully Ameren has taken to installing flight diverters on their lines over places visited by these birds, lessening the amount of collisions per year. Poaching is often explained by hunters saying they misidentified trumpeter swans for snow geese. Finally, aspergillosis is a fungal infection that occurs in swans that are in a weakened state, often coinciding with the previously listed threats if the bird survived the initial incident. Our ability to work with these birds has grown over the years. To continue to improve our clinic to accommodate these large birds, we have mapped out an expansion to our facility to take rehabbing swans and other water birds to the next level.

#### LEAD POLICIES AND EFFORTS TO “GET THE LEAD OUT”

Christine Herwig, Minnesota Department of Natural Resources (DNR), Nongame Wildlife Program, Bemidji, MN; Carrol Henderson, Minnesota DNR (retired)

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#### ABSTRACT

Since 1977, Minnesota Department of Natural Resource’s Nongame Wildlife Program has been involved in understanding the impacts of lead on birds and advocating for the use of nontoxic alternatives. In 1977, a research project was initiated to determine if Bald Eagles (*Haliaeetus leucocephalus*) at the Lac qui Parle Wildlife Refuge in Minnesota were being poisoned by consuming Canada Geese (*Branta canadensis*) that had consumed lead shotgun pellets in agricultural fields where they were being hunted (and also to determine if wounded geese carried lead pellets from hunting injuries). Drs. Lucille Stickel and Oliver Pattee from the U.S. Fish and Wildlife Service provided funding to the Nongame Wildlife Program to carry out pioneering research in collaboration with Drs. Dan Frenzel and Pat Redig of the University of Minnesota. As a result of this research, policy changes were initiated that eventually led to mandatory use of nontoxic shot for waterfowl hunting in Minnesota in 1987. A federal ban followed in 1991. Lead is still used today in ammunition for other forms of hunting and in fishing tackle. Numerous Bald Eagles, Trumpeter Swans (*Cygnus buccinator*) and Common Loons (*Gavia immer*) are found sick or dead from lead exposure every year in Minnesota. In collaboration with numerous other agencies and organizations, the Nongame Wildlife Program has been using a variety of approaches to encourage Minnesotan’s to use nontoxic alternatives. In the late 1990s, an information campaign, advocacy and tackle exchange had been part of the efforts to encourage citizens to voluntarily switch to nontoxic alternatives. The “Get the Lead Out!” program was a 10-year campaign that raised awareness, prompted some tackle makers to expand lead-free offerings, and resulted in the collection of about 8,000 pounds of lead tackle at high-profile exchanges at major retailers. As part of the Deepwater Horizon oil spill settlement, monies will be used to re-initiate the Get the Lead Out! effort. After a study published in 2012 by the University of Minnesota suggested elevated levels of lead in eagles in deer hunting areas where rifles were used, the Nongame Wildlife Program offered educational programs to youth hunters at state parks ahead of the youth hunting season. Those young hunters that showed up to hunt with nontoxic ammunition were offered a free state park pass for the following year. The Nongame Wildlife Program has a legacy of using novel approaches to inform and educate about the impacts of lead on birds and has worked tirelessly to “get the lead out” in an era that legislative initiatives have been blocked.

**NORTH AMERICAN NON-LEAD PARTNERSHIP: PROTECTING OUR WILDLIFE CONSERVATION  
& HUNTING HERITAGE**  
Leland Brown, Oregon Zoo, Portland, OR

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**ABSTRACT**

Sportsmen and -women have been at the forefront of natural resource conservation throughout North America for over a century, and hunters continue to meet increasingly complex conservation challenges each year. Historically, many successful conservation efforts have focused on individual species recovery, and habitat conservation and improvement. In the last 20 years, significant research has identified lead exposure in scavengers across North America, and the world, with continental evidence of impacts. However, discussion of solutions has been mired in political controversy, limiting engagement from necessary stakeholders. The North American Non-Lead Partnership seeks to expand the coalition of hunters, anglers and other conservationists dedicated to improving ecosystem and wildlife health by choosing non-lead options. Using a fact based, collaborative approach, focused on incentives and voluntary participation, the Partnership has had success engaging stakeholders. This Partnership helps to create specifically tailored processes for partners like state agencies and traditional hunting conservation groups to engage with their own stakeholders on the specific details of the issue, ammunition choices, and ways to protect both our tradition of wildlife conservation and hunting heritage that are critical to both the North American Model and the future of hunting.

*Thursday, November 21<sup>st</sup> 2019*

**ENVIRONMENTAL POOL MANAGEMENT ON THE MISSISSIPPI RIVER IN THE ST. LOUIS  
DISTRICT**  
Ben McGuire, U.S. Army Corps of Engineers, Environmental Planning Section, St. Louis, MO

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**ABSTRACT**

Environmental Pool Management has successfully improved ecosystem resiliency and restored habitat for fish and wildlife along the Upper Mississippi River for over twenty years in the St. Louis District. Managing Pools 24, 25, and 26 below maximum regulated pool for 30-45 days during the summer months to grow vegetation has still provided a dependable navigation channel 100% of the time. This practice has consistently provided thousands of acres of habitat along the Upper Mississippi River over the length 100 river miles for little to no additional cost. In 2015, St. Louis District began an experimental longer duration drawdown of 90+ days during the growing season from 2015-2018. Vegetation has responded with an increase in species diversity totaling over 60 species for the four experimental years. In 2017, this emergent aquatic vegetation produced an average of 1,355 pounds of seed per acre, which totaled 2.16 million pounds of seed for migratory waterfowl food. This is enough to food satisfy the metabolic demand for 8.1 million ducks for one day or 271,000 ducks for 30 days. In addition, the experiment has shown the re-establishment of a perennial aquatic vegetation community in Pool 26 that has been missing for over 25 years and the documentation of two federally listed species, the decurrent false aster and the interior least tern, which occurred due to Environmental Pool Management operations.

## **SURVIVAL BY DEGREES: 389 BIRD SPECIES ON THE BRINK**

Sarah Saunders, National Audubon Society (NAS), New York, NY; Chad Wilsey, NAS; Brooke Bateman, NAS; Lotem Taylor, NAS; Joanna Wu, NAS; Geoffrey LeBaron, NAS,

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### **ABSTRACT**

Audubon's 2019 Report, *Survival by Degrees: 389 Species on the Brink*, is a powerful look at how vulnerable birds are to climate change across North America based on a new, updated scientific analysis that leverages big data and incorporates the unique biology of each bird to determine its vulnerability. In this research, we related bird observations for 604 species with climate and habitat conditions at these locations and used modeling algorithms to capture the unique composition of each species' suitable range. We then mapped and compared the projected current and future ranges to estimate the predicted range loss and gain under multiple future climate change scenarios. These projections were then used to assess how vulnerable each species is to climate change. Our results indicate that over two-thirds of North American birds are moderately or highly vulnerable to climate change under a 3.0°C warming scenario. Of these climate-vulnerable species, 76% would have reduced vulnerability and 38% of those would be considered non-vulnerable if warming were stabilized at 1.5°C. Climate change vulnerability was not evenly distributed across habitats. For example, 78% of waterbird species were vulnerable to climate change, compared to 100% of Arctic bird species. Trumpeter Swan's overall vulnerability status is moderate, with potential for both range loss and range gain during summer and winter under the 3.0°C warming scenario. Specifically, greater vulnerability for this species is predicted in summer, with the potential to completely lose suitable breeding conditions within Minnesota. However, the species is projected to gain suitable breeding conditions in the Arctic. In addition to changes in climate and habitat, we assessed the potential impacts of other forecasted threats related to climate change, including sea level rise, land use change, and extreme weather events. We found that extreme spring heat is the most ubiquitous threat, covering > 98% of the conterminous United States under 3.0°C of warming. By contrast, sea level rise and lake level change are the most geographically restricted threats, covering only about 1% of the conterminous United States under both warming scenarios. Overall, 97% of the species analyzed were affected by two or more threats under 3°C, but limiting the rise in warming to 1.5°C would result in most species (58%) projected to experience only a single threat. To address these concerning findings, Audubon is taking action to help reverse the threat of climate change by focusing on climate adaptation and mitigation. This report pinpoints the places and species in greatest need of climate adaptation planning, providing a framework for persuading localities, states, and the federal government to prepare for the impacts of climate change. In addition, Audubon is working to get solutions in place to counteract the underlying causes of climate change, including advocating for a suite of policies that will help drive down emissions at the scale and speed we need. Together, Audubon's network and the public can reduce the vulnerability of North American bird species to climate change, ensuring a bright future for birds and humans alike.

## **LOSS OF AN ICON: CAN TRUMPETER SWANS PERSIST IN YELLOWSTONE NATIONAL PARK?**

Evan Shields, Montana State University, Bozeman, MT

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### **ABSTRACT**

Once widespread and abundant across much of the western United States, trumpeter swans (*Cygnus buccinator*) were nearly extirpated by the early 1900s due to habitat loss and wildlife trade. Trumpeter swans were first documented in Yellowstone National Park in 1919. At the time, they were thought to be some of the last trumpeter swans in the continental United States. Although instrumental in the recovery of the species across North America, this subpopulation which resides and nests within the park has declined dramatically since the 1960s and has produced very few young in recent years. Abundance of trumpeter swans, recorded during autumn aerial surveys, ranged from 85 total swans in 1954 to only 2 swans observed in 2010. Thus, there are strong concerns about the population's future. While wildlife managers in Yellowstone National Park have taken action in the face of uncertainty by augmenting the park's population with captive-raised

swans since 2012, it is unclear whether restoration efforts will have a lasting impact. Possible causes of decline include, but are not limited to, human disturbance at nest sites, changes in habitat quality, predation, loss of breeding tradition, and changes in weather patterns or climate. As it is still unclear what may be driving the decline in trumpeter swans, this project was established to assemble data sets of potential population drivers, or model covariates, to determine their availability and state, and assess which covariates help explain variation in trumpeter swan abundance, growth rates, and nesting parameters. This analysis will increase the understanding of trumpeter swan population dynamics in Yellowstone National Park and can be used to inform management decisions to protect and restore these iconic birds.

## INCUBATION BEHAVIOR AND GENETIC ATTRIBUTES OF TRUMPETER SWANS RESTORED TO GRAYS LAKE NATIONAL WILDLIFE REFUGE

David Bush, Idaho State University, Department of Biology, Pocatello, ID

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### ABSTRACT

The Trumpeter Swan (*Cygnus buccinator*) is North America's largest waterfowl and a species of conservation concern due to severe population loss during Euro-American settlement of North America. Wildlife agencies are reestablishing Trumpeter Swans by translocating individuals into historically occupied habitat, including returning swans to Grays Lake National Wildlife Refuge (GLNWR) in southeastern Idaho. GLNWR is the largest high elevation hard stem bulrush (*Schoenoplectus spp.*) marsh in North America encompassing 8903 ha at 1920 m above sea level. Sixty-seven Trumpeter Swans (41 second year and 26 greater than second year) were translocated from Red Rock Lakes National Wildlife Refuge to GLNWR from 1989 - 1991, but the population persistently exhibits high cygnet mortality. From 2012 - 2015, I examined two biological factors potentially related to cygnet mortality at GLNWR, (1) incubation behavior of nesting adults and (2) genetic signals of inbreeding. Dysfunctional incubation behavior leads to impaired cygnet development and subsequent post hatch vulnerability. Inbreeding can express deleterious alleles and can impair cygnet development and subsequent post-hatch performance. I used continuous videography to measure diurnal and nocturnal incubation behavior of 11 nests in detail. To measure inbreeding, I noninvasively extracted 46 DNA samples from 16 nests using eggshell embryonic membranes and embryonic tissue, and measured heterozygosity at nine microsatellite loci. I found no indication of dysfunctional incubation among adults. Trumpeter Swans on GLNWR took an average of two incubation recesses during the day, one morning recess and one midafternoon recess, and incubated continuously throughout the night. Cynets had somewhat low levels of allelic diversity but allelic diversity was similar to other swan populations. Adult incubation behavior and inbreeding likely are not causes of elevated cygnet mortality. Future research should focus on ecological factors of the marsh environment including food availability, parasitism, and length of breeding season for causes of cygnet mortality.

## THERMAL ECOLOGY OF TRUMPETER SWAN (*CYGNUS BUCCINATOR*) INCUBATION

Paige C. Miller, Idaho State University (ISU), Pocatello, ID; David A. Bush, ISU; David J. Delehanty, ISU

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### ABSTRACT

The Rocky Mountain Population (RMP) of Trumpeter Swans (*Cygnus buccinator*) breed from western Canada south to Nevada, Idaho, and Wyoming. The U.S. breeding segment of the RMP includes swans that nest and reside year-round in the Greater Yellowstone Ecosystem. U.S. Fish and Wildlife surveys conducted between 1985 – 2015 indicate that the swan population in the Greater Yellowstone Ecosystem has been stable. This subpopulation is sufficiently large and secure that investigators can conduct detailed studies of swan nesting ecology. Visually, swans are conspicuous, constructing large nests in open habitat. Videographic monitoring indicates that swans typically take 2 – 3 nest recesses per day and often cover eggs before recess. Previous observations have correlated swan nest recess occurrence with time of day. Swans exhibit constant nocturnal incubation. Diurnally they take mid-morning and mid-afternoon recesses. We hypothesize that

recesses are timed to minimize excessive heat gain or loss to eggs. Thermal conditions experienced by embryos can have significant effects on development. We hypothesize that swan nests modulate thermal flux, helping to provide thermal constancy for embryos. We are investigating the timing of swan nest recesses in relation to the effective thermal conditions of the nest environment, and the thermal effects of the structure of swan nests. In summer 2019, we used continuous videography to measure swan incubation behavior at Grays Lake and Bear Lake National Wildlife Refuges, located in southeastern Idaho, USA. After swan cygnets hatched and left the nests with their parents, we installed Thermochron iButton® temperature loggers within empty swan eggshells and placed two eggs in each of two nests at Grays Lake National Wildlife Refuge, one in the center of the nest cup and one buried 10-12 centimeters in the nest material. This simulated swan nest recesses in which eggs were left uncovered and covered by parents, respectively. Eggs that were uncovered underwent more variable temperature fluctuations (range 3.7-50.3 °C) than eggs that were covered (range 16.6-28.8 °C). We attribute this range variation primarily to differences in UV radiative heat gain during the day, and conductive, convective, and radiative heat loss at night. We seek to investigate swan incubation behavior and thermodynamics further in summer 2020.

#### A RESEARCH-BASED SOLUTION TO MICHIGAN'S CENTURY-OLD MUTE SWAN PROBLEM

Randall T. Knapik, Michigan State University (MSU), Department of Fisheries and Wildlife, East Lansing, MI; David R. Luukkonen, MSU; Scott R. Winterstein, MSU

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#### ABSTRACT

Nonnative invasive organisms are a leading threat to native ecosystems. Mute Swans (*Cygnus olor*) are one such species in the Great Lakes region of North America. Mute Swans were first introduced to Michigan by humans in 1919. Tolerance of and support by humans, high adult survival, and striking plumage has contributed to their success and influenced management policies across their introduced range. Successful invasive species management programs incorporate regionally-estimated demographic parameters into removal objectives. Michigan State University, the Michigan Department of Natural Resources (MDNR), and U.S. Department of Agriculture's Wildlife Services formed a partnership in 2015 to refine strategies to achieve the long-term goal set forth by the MDNR to have fewer than 2,000 Mute Swans in Michigan by the year 2030. Number of breeding pairs, clutch size, number of hatched young, and number of fledged young were documented in 3 breeding seasons (2016-2018) across 6 sites throughout Michigan's Lower Peninsula. Mean productivity (i.e., number of fledglings per pair) pooled across sites and years was low (1.4 fledged young/pair) despite high clutch sizes (mean 7.0 eggs/clutch, range 1-10), but productivity varied among the 6 study sites (range 0.4 fledged young/pair-2.7 fledged young/pair). Mean productivity decreased as the number of breeding pairs increased across sites; however, there was an exception as breeders at the site with the fewest pairs also fledged the lowest number of young (2 fledged young/5 pair [0.4 fledglings per pair]). Decreased breeding productivity in areas of high breeding pair density resulted from density-dependent effects on reproduction for Mute Swans in Michigan.

We used a density-dependent matrix population model to estimate the number of individuals in each life-stage that must be removed to reach long-term abundance goals. Survival rates for juvenile, nonbreeding, and breeding swans must be reduced by at least 26 % over baseline levels if all life stages were targeted for management. Over 17 % of the population must be removed annually (12,760 swans 2018-2029) with removals needing to be spread across the 3 primary life stages (33 % juveniles, 35 % nonbreeding swans, 32 % breeding swans). Twice as many swans would need to be removed if efforts only focused on juveniles instead of on breeding swans. Targeting removal of adult population segments is the most efficient control strategy as at least 94% of Mute Swan nests would need to be destroyed annually (15,748 nests 2018-2029) to achieve the same goal.

**INTERIOR POPULATION TRUMPETER SWAN MIGRATION ECOLOGY AND CONSERVATION**  
David Wolfson, University of Minnesota, Minnesota Cooperative Fish & Wildlife Research Unit, St Paul, MN  
David E. Andersen, U.S. Geological Survey, Minnesota Cooperative Fish & Wildlife Research Unit, St Paul, MN  
John Fieberg, University of Minnesota, St Paul, MN  
Tom Cooper, U.S. Fish and Wildlife Service, Bloomington, MN  
Steve Cordts, Minnesota Department of Natural Resources (DNR), Bemidji, MN; Carrol Henderson, Minnesota DNR (retired); Christine Herwig, Minnesota DNR  
John Moriarty, Three Rivers Park District, Plymouth, MN  
Margaret Smith, The Trumpeter Swan Society, Plymouth, MN  
Randall T. Knapik, Michigan State University (MSU), East Lansing, MI; David R. Luukkonen, MSU

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## **ABSTRACT**

Interior Population trumpeter swans currently breed throughout most of the western Great Lakes region and have increased dramatically in abundance and distribution in recent years after multiple reintroduction efforts starting in the 1960s. However beyond rough estimates of population size and trend and distribution, there is relatively little recent information about their ecology, hindering conservation decision-making. To address current information needs, we are marking Interior Population trumpeter swans with GPS-GSM transmitters to study their movement ecology at multiple scales and across cohorts. We will evaluate landscape-scale patterns including annual movement patterns and migration pathways, and fine-scale patterns such as molt migration, and resource use and selection patterns. We plan to sample swans in a variety of geographic locations to represent different environmental conditions and reintroduction histories. We captured 19 trumpeter swans in Minnesota and Michigan during the summer of 2019, and plan to deploy ~30 additional collars during 2020 in Minnesota and project collaborators plan to help deploy an additional 20-25 transmitters in Michigan, Wisconsin, Iowa, and Manitoba. Movements during the summer of capture were restricted primarily to the waterbodies where swans presumably breed or established breeding territories. We expect a range of fall migratory movements ranging from short-distance movements to locations with open water during winter, to long-distance movements outside the breeding distribution. Results of this study will inform current and future Interior Population trumpeter swan conservation by providing basic information about migration, year-round movements, and use of agricultural and other landscapes. Our website, <https://trumpeterswan.netlify.com/>, provides an online platform for the general public to learn more about trumpeter swans, our study of movement ecology, and provide information about observations of marked swans. This project is in the beginning phases and we are currently inviting participation from additional collaborators across the Interior Population breeding distribution.

## ***Thursday, Lunch Presentation***

### **FINDING OUR STRIDE: TRANSFORMING ALTON, IL AND OUR CONFLUENCE REGION INTO A NATURE-BASED ACTIVE LIVING DESTINATION**

Patrick McGinnis, Lower Illinois River Valley-Rural Prosperity Initiative, Godfrey, IL  
Brett Stawar, Great Rivers and Routes Tourism Bureau, Alton, IL  
Mark Carlie, AltonWorks, Alton, IL

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## **ABSTRACT**

Alton, IL is a historic river town with a rich and colorful history, situated at the center of the “Great Rivers Confluence” Region where the Missouri and Illinois Rivers join the Mississippi River. This region is blessed with thousands of acres of safely accessible public lands, managed almost seamlessly by the U.S. Army Corps of Engineers, U.S. Fish & Wildlife Service, Missouri Department of Natural Resources/Department of Conservation and Illinois Department of Natural Resources.

Over the last 25 years, a critical mass of important milestones have been realized toward strengthening our region's nature-based attractions portfolio. Today, we are the site of the North America Swarovski Water School, the National Great Rivers Museum, the Riverlands Migratory Bird Sanctuary, two national wildlife refuges, a regional Audubon Center, the Mississippi River National Water Trail, and the National Great Rivers Research and Education Field Station. We also have the Meeting of the Great Rivers National Scenic Byway anchored at one end by Pere Marquette State park (the largest state park in Illinois), and at the other end, the Lewis and Clark Corps of Discovery Historic Site.

Locally, we have the highest number of boat slips and registered recreational crafts of any reach on the Upper Mississippi River, miles of bike trails, hiking trails, rock climbing along our scenic limestone bluff scape, and paddling adventures. To celebrate our cultural and natural heritage, we developed a line-up of special events. We continue to define and build out our regional active living-adventure tourism destination, while striving to improve the overall livability of our communities.

Throughout the Midwest, rural communities are struggling. Downstate Illinois is bleeding population. Historically, Alton was a manufacturing and industrial town. Many of those factory jobs have left and haven't returned. We could chase the next Toyota plant or we can move ahead aggressively to capitalize on enriching our destination assets and overall livability. We believe what the experts are telling us, "talent already has a job...talent is looking for a great place to live."

We believe our Great Rivers Confluence region can emerge as a process model for downstate revitalization. We have the opportunity to be a living classroom and living laboratory, optimizing our natural assets in a sustainable fashion and revealing a process model for struggling rural and collar communities toward diversifying their economy and bolstering their livability to encourage in-migration of new families, retirees, and talent.

During this presentation, we will briefly touch upon three convergent efforts driving change for the region in our pursuit of standing up a viable outdoor recreation economy. Participants will hear about key activation projects flowing from our Lower Illinois River Valley – Rural Prosperity Initiative, learn of efforts underway to update the Corridor Management Plan supporting our Meeting of the Great Rivers National Scenic Byway, and learn about local efforts to revitalize Alton's historic downtown business district to reposition Alton as a gateway at the center of a regional effort to reconnect Americans and international travelers with America's Great Rivers and the Heartland.

## **THE OREGON PROJECT AND EVIDENCE OF INCREASING CONNECTIVITY IN THE WESTERN U.S. FLOCKS**

Gary Ivey, The Trumpeter Swan Society, Bend, OR

Martin J. St. Louis, Oregon Department of Fish and Wildlife, Summer Lake, OR

Brandon S. Reishus, Oregon Department of Fish and Wildlife, Salem, OR

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### **ABSTRACT**

The ongoing Oregon Trumpeter Swan Restoration Project has seen recent progress, as the total number of white (adult and subadult) trumpeter swans counted in Oregon reached 36 in September 2019. The project has resulted in some interesting movements of released trumpeters with Oregon birds showing up in California, Nevada, Idaho, Montana, Washington and British Columbia, in some cases connecting to existing flocks or other wintering trumpeters. As part of an ongoing study, we marked a migrant trumpeter swan with a GPS-GSM transmitter in March of 2019 at Summer Lake Wildlife Area and tracked it to its summering location in eastern British Columbia. Additionally, other release programs in the western states have documented increased connections among current flock locations, suggesting that overall progress in building increased connectivity among existing western flocks is occurring. Building strong connectivity between these flocks is key to their future sustainability.



**STATUS OF TRUMPETER SWAN RESTORATION AND THE PROMOTION OF WETLANDS IN IOWA**  
David D. Hoffman, Iowa Department of Natural Resources, Clear Lake, IA

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**ABSTRACT**

In 1993, the Iowa Department of Natural Resources (IDNR), working cooperatively with public and private partners, developed a plan to restore Trumpeter Swans to their former breeding range in Iowa. The primary goal is to restore a self-sustaining, migratory population of trumpeter swans. The secondary goal is to use the swans to “trumpet” the positive values of wetlands, including water quality improvement, flood reduction, and groundwater recharge in addition to wildlife habitat. A total of 1,218 cygnets have been released from 1995 - 2019.

Swans from 132 sources and partnerships from 26 different states have been used for re-introduction in Iowa. Sources include private propagators, zoos and other state swan restoration programs. Public support for the program was higher than anticipated; private donations have exceeded \$500,000 with over 1000+ volunteer hours tallied. The first nesting attempt by free-flying swans in Iowa since 1883 was documented in 1998. Through 2019, a total of 699 nest attempts have been recorded in Iowa, with additional nesting attempts by Iowa swans in MN, WI, Ontario, IL and MO. Fifty five nesting attempts were documented in Iowa in 2019. The Iowa population was estimated at 339 Trumpeter Swans in 2015. Mortality rates are higher than anticipated and slowed trumpeter swan restoration efforts. Mortalities include lead poisoning, power line collisions, shooting, disease and flooding. A total of 2,470 trumpeters were tallied in 40 out of 99 counties during the mid-winter waterfowl survey in January 2019. Marked swans from Iowa have been reported in 17 states and 2 Canadian provinces. An experimental release of 49 swans was conducted in Arkansas with the cooperation of Arkansas Game and Fish Commission in 2008-2010. The project was marginally successful, with two swans returning north to central MN and two to Iowa. Additional efforts to encourage migration have included the experimental fall releases of cygnets at traditional fall staging areas. Early indications have shown positive results. The Iowa DNR partnered with Iowa State University (ISU) and captured and GPS collared 15 trumpeter swan cygnets. Goals of the project include: 1) evaluate breeding locations, migratory movements and wintering areas of trumpeter swans. 2) provide the opportunity for ISU ornithology students to collect and analyze ornithological data. 3) provide information to the public on trumpeter swan ecology, movements and the value of wetlands via a website. The southern half of Iowa is the current priority area for restoration work and cygnet releases due to low trumpeter swan nesting densities of two pair and the fact that trumpeters very rarely pioneer their nesting efforts south. An objective of self-sustaining numbers across south Iowa is desired with a goal of eight nesting pairs south of Interstate 80 by 2022. This popular public program has experienced successes in the restoration of a species and promotion of wetland values and restored wetland acres. Sustainable numbers of trumpeter swans are now found in several counties in Iowa. Subsequently, IADNR involvement is being reduced with a transition of responsibilities to several public and private partners. These are mainly county conservation board staff and naturalists. The emphasis continues to be trumpeter swan restoration in southern Iowa, environmental education and the promotion of wetland habitat.

**UPDATE FROM MINNESOTA / TRUMPETER SWAN REINTRODUCTION IN MINNESOTA**

Christine Herwig, Minnesota Department of Natural Resources (DNR), Nongame Wildlife Program, Bemidji, MN; Carrol Henderson, Minnesota DNR (retired)

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**ABSTRACT**

Trumpeter Swans (*Cygnus buccinator*) were extirpated from Minnesota’s fauna by 1884. Through the efforts of many federal and state agencies and local organizations and with the help of some passionate individuals, Trumpeter Swans have been restored to the Minnesota landscape. In the 1960s, Hennepin Parks (now Three Rivers Park District) began a decades-long effort to reintroduce Trumpeter Swans to Minnesota. Their goal was to establish a free-flying flock of 100 swans with 15 breeding pairs. Trumpeter Swans had been absent from Minnesota for nearly 100 years when the Minnesota Department of Natural Resources Nongame

Wildlife Program joined the effort to accelerate the restoration of this species and built on the success of Hennepin Parks. Trumpeter Swans were identified in a recovery plan in 1981 as a species to be reintroduced to restore an extirpated native wildlife species; this species was being reintroduced to restore an integral part of the state's biological diversity and not for eventual designation as a game species. As such, no game and fish funding or Pittman-Robertson funding was expended for the reintroduction of Trumpeter Swans. Eggs were originally acquired from Red Rock Lake and Lacreek National Wildlife Refuges with limited success. Ultimately, 150 eggs were collected from Alaska, incubated and reared in Minnesota, and released primarily at two locations with smaller releases at two additional sites. From 1987 to 2007, 372 swans were released in Minnesota at a cost of \$514,500. The initial restoration goal was 30 pairs of breeding swans in the state. That goal was reached in 1991. In 2008, Minnesota had an estimated 3,600 Trumpeter Swans. In 2015, as part of the North American Trumpeter Swan Survey that is conducted approximately every five years to monitor the status of Trumpeter Swans, the total population estimate for Minnesota was 17,021 swans. Highest concentrations of swans were observed west of the metropolitan area and in the north-central part of the state, near the main release sites for the reintroduction efforts. Although the population is healthy, very little is known about trumpeter swan ecology in Minnesota or about migration and habitat use. The University of Minnesota in cooperation with the Minnesota Department of Natural Resources, U. S. Fish and Wildlife Service, Three Rivers Park District, and many others was recently funded that will provide basic information about migration, year-round movements and habitat use, and mortality risk that will be used to inform current and future trumpeter swan conservation in Minnesota. Reintroduction efforts were a partnership among a number of agencies and organizations. This effort would not have been possible without generous donations from taxpayers to the Minnesota Department of Natural Resources Nongame Wildlife Program.

**WISCONSIN'S TRUMPETER SWAN RECOVERY PROGRAM: A 30-YEAR RETROSPECTIVE (1989-2019) ON RESEARCH, MANAGEMENT, AND COLLABORATION.**

Sumner W. Matteson, Wisconsin Department of Natural Resources, Bureau of Natural Heritage Conservation, Madison, WI

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**ABSTRACT**

The State of Wisconsin Trumpeter Swan (*Cygnus buccinator*) recovery plan, written in 1986, set as a recovery goal 20 breeding and migratory pairs by the year 2000. From 1989 through 1997, we worked with the late Rod King of the USFWS to collect a total of 385 Trumpeter Swan eggs in Alaska at the Minto Flats and Nelchina Basin during early June. These eggs were transported in a private jet piloted by the late Terry Kohler and Mary Kohler, and the eggs were placed in incubators under the supervision of Ed Diebold, Avian Curator, Milwaukee County Zoo. Overall hatching success during the 9-year period was 93%, and the cygnets were placed into two programs: *captive-rearing* at sites in southern and southeastern Wisconsin (with cygnets wing-clipped and released at nearly 2 years of age at selected northerly wetland sites), and *decoy-rearing* at selected wetland sites in northern and central Wisconsin, where camouflaged University of Wisconsin interns in float tubes led cygnets to loafing and feeding sites throughout the summer. Decoy-reared cygnets were then allowed to fly free at fledging – about 16 weeks of age. A captive parent-rearing program involving three private cooperators also provided yearling birds to the program. During 1989-2005, decoy-rearing contributed 196 (49.7%) birds, captive-rearing 159 (40.4%), and captive parent-rearing 32 (8.1%), with another 7 miscellaneous (1.8%) birds, totaling 394 (100%). Monitoring of Wisconsin's growing flock from the early 1990s through 2014 involved: spring aerial surveys to locate nests, ground-truthing to determine clutch size, and August flights to locate families and count cygnets, followed by round-ups to mark cygnets. By 2014, there were 253 nesting pairs in Wisconsin. The Department transitioned from documenting every nesting pair in the state annually to aerial surveys in 2015 as part of the national quinquennial survey protocol implemented by USFWS. In 2015, the Trumpeter BPOP was 3,679 (95% CI:  $\pm$  4,619). In 2019, the state's BPOP had reached 6,106 (95% CI:  $\pm$  4,728). Many private and public partners contributed to Wisconsin's successful restoration program, including TTSS, FWS, MNDNR, MIDNR, WDNR, UW-Madison, Milwaukee County Zoo, Natural Resources Foundation of Wisconsin, Windway

Capital Corporation, GE Medical Systems, Bad River Band of the Lake Superior Chippewa, and several others to be mentioned.

## STATUS ON THE ABUNDANCE LEVELS AND TRENDS FROM THE CURRENT TRUMPETER SWAN SURVEY OF THE ROCKY MOUNTAIN POPULATION U.S. BREEDING SEGMENT

David Olson, U.S. Fish and Wildlife Service, Region 6 - Division of Migratory Birds, Denver, CO

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### ABSTRACT

The Rocky Mountain Population (RMP) of trumpeter swans (*Cygnus buccinator*) consists of birds that nest primarily from western Canada southward to Wyoming and Nevada. The RMP/U.S. Breeding Segment consists of the Greater Yellowstone Flock, which are those birds that summer in the areas at the juncture of the boundaries of Montana, Wyoming and Idaho, and the Restoration Flocks around Ruby Lake NWR, NV and Malheur NWR and Summer Lake WMA in Oregon and the Flathead Indian Reservation in Montana. Annually in September a fall trumpeter swan survey is conducted by several administrative entities and is intended to provide an accurate count of the number of RMP trumpeter swans that summer in the U.S. Observers counted 1,043 swans (white birds and cygnets) in the U.S. Breeding Segment of the Rocky Mountain Population of trumpeter swans during fall of 2018, which was a 8.1% increase from last year's count (965). The number of white birds in the Greater Yellowstone Area (600) was similar to last year's count of 595. The total number of cygnets increased 27.8%, from 115 in 2017 to 147 in 2018. Cygnet counts increased from 2017 by 148.3% for Montana but decreased by 15.5% and 7.14% for Wyoming and Idaho respectively. Twenty-eight white birds were observed at the Summer Lake Wildlife Management Area (WMA), which was an increase of 33.3% from last year's count of 21, and 4 white birds were observed at Malheur National Wildlife Refuge (NWR). Nevada did not do a survey this year. Precipitation throughout most of the Greater Yellowstone Area was 100% – 150% of normal during winter 2017 - 2018. During the summer months, temperatures were average while precipitation was 75% – 100% of normal, especially during June - August. Palmer Drought Indices for areas within the Greater Yellowstone area increased slightly during 2018 compared to last year and was near normal for the area for 2017.

## RESTORATION OF TRUMPETER SWANS ON THE FLATHEAD INDIAN RESERVATION AND ADJACENT ABORRIGINAL LANDS IN NORTHWESTERN MONTANA

Dale M. Becker, Confederated Salish and Kootenai Tribes, Pablo, MT

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### ABSTRACT

The Confederated Salish and Kootenai Tribes (CSKT) commenced reintroduction and restoration efforts for Trumpeter Swans (*Cygnus buccinator*) in 1995 to return an extirpated species to the Tribal homelands. Two hundred and seventy captive-propagated Trumpeter Swans were released on the FIR from 2002 through 2019. Nesting commenced in 2004, and the first production of wild cygnets in possibly 100 years or more fledged from local wetlands. Since then, at least 244 nesting pairs have produced at least 551 fledgling cygnets. Swans from this project have colonized into several wetland habitats throughout northwestern Montana and may soon do the same in southeastern British Columbia. The primary cause of mortality of released swans has been powerline collisions, and lines are regularly marked with flight diverter installations to minimize potential future collisions. Annual productivity, fall and winter surveys seem to indicate a healthy, growing population of Trumpeter Swans in northwestern Montana. The CSKT has also been active in purchasing a substantial amount of wetland habitat and restoring the viability of those lands. A wide variety of public outreach efforts have targeted the general public, Tribal members, bird hunters and Reservation youth to inform them of the importance of wildlife such as Trumpeter Swans and their dependence upon the existence of high quality wetlands habitats for swans, as well as for the diverse array of fauna and flora that comprise those habitats.

## STATUS OF THE HIGH PLAINS FLOCK OF TRUMPETER SWANS

Mark P. Vrtiska, Nebraska Game and Parks Commission, Lincoln, NE

David Olson, U.S. Fish and Wildlife Service, Region 6 - Division of Migratory Birds, Denver, CO

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### ABSTRACT

The High Plains flock (HPF) of Trumpeter Swans (*Cygnus buccinator*) was established at LaCreek National Wildlife Refuge (NWR) in southwestern South Dakota in the 1960s. Since then, the population has expanded into the Nebraska Sandhills. Fall counts of the HPF were conducted until 2012, but fall counts indicated a growth rate of total birds at approximately 5% from 1990-2012. The HPF was also surveyed during the annual Mid-Winter Waterfowl Survey (MWS) during the same time period, and also indicated a similar pattern of population growth. The correlation between the two counts was high ( $r = 0.81$ ) for total birds, 2000-2012. A higher ratio of juveniles:adults was observed during the MWS than from the fall survey. Breeding trumpeter swans have occupied all areas of the Sandhills and have expanded eastward. Major wintering locations include the Niobrara, Snake, North, Middle and South Loups, North Platte and Platte, Dismal, Calamus, and Cedar rivers, and Blue and Birdwood creeks. Numbers and distribution of trumpeter swans not associated with the HPF are increasing and expanding in eastern Nebraska. Breeding habitat for the HPF would appear relatively stable, with continued threats from invasive species, such as common carp (*Cyprinus carpio*) and phragmites (*Phragmites australis*). Wintering habitat may be in more jeopardy with a major transmission line slated to be constructed in near future that bisects 5 rivers or creeks used by wintering swans. Additional, smaller lines may also bisect wintering areas or near breeding areas. The MWS will likely serve as the primary population survey to monitor status of the HPF. Additional information is needed to better understand biology and ecology of the HPF and to conserve their habitats.

### ONTARIO TRUMPETER SWAN PROGRAM UPDATE

Kyna Intini, Ontario Trumpeter Swan Restoration Team (OTSRT), Dundas, ON; Julie Kee, OTSRT; Beverly Kingdon, OTSRT; Kim Stevenson, OTSRT

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### ABSTRACT

The Ontario restoration program was begun in the early 1980's by retired MNR biologist Harry Lumsden. Over the almost 40 years of the program we have seen the successful restoration of a self-sustaining flock of Trumpeter swans (*Cygnus buccinator*) to Ontario. At this point our program focuses on continued monitoring of the population. Banding and wing-tagging birds has continued throughout this project, and has resulted in a very large, comprehensive database, with many of the marked birds' lineage tracked back to the beginning of the reintroduction. With dedicated volunteers we have collected over 180,000 sightings since the beginning of the program, which are logged in our database. Sightings are collected from a variety of sources and this database is an invaluable resource for researchers. A number of projects with universities and students have been undertaken over the course of the project, both to study the population, the birds themselves, as well as health-related studies that have been instrumental in identifying the prevalence of some diseases (e.g., avian bornavirus), not only within the population itself, but in waterfowl in general. Currently we have a collaborative effort with Dr Sherri Cox of the National Wildlife Centre & the University of Guelph, taking blood samples to test for lead poisoning in the birds we band. Her study aims to look at how extensive chronic lead toxicity is in trumpeters in Ontario. This is important work as lead poisoning can pose a threat to the Trumpeter swan population and is one of the common causes of death noted on birds we submit for necropsy. We continue to add to this extensive database, which we continue to offer to students/academic institutions for research purposes to ensure this data is utilized to further increase the understanding of this population and the species in general. The history of tagging in Ontario has also provided opportunity to observe some behaviours that might otherwise not be recorded, including ongoing family dynamics among parent birds and their cygnets from previous seasons, among brood siblings and site fidelity among cygnets born within a specific wetland. Specific behaviours of birds throughout different stages of their life have been observed, and certain patterns of behaviour noted. We are currently planning for the sixth North American Trumpeter

Swan Survey in 2020. Our portion of the count will only include the southern Ontario population as the Canada Wildlife Service (CWS) has determined that it is not a current priority to survey northwestern Ontario.

## TRUMPETER SWAN STATUS AND MANAGEMENT ACTIONS IN OHIO

Laura Kearns, Ohio Division of Wildlife, Olentangy Research Station, Columbus, OH

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### ABSTRACT

Trumpeter Swans (*Cygnus buccinator*) were reintroduced in Ohio from 1996-2003 by the Ohio Division of Wildlife. Since then, the population has continued to grow. In 2019, the breeding population reached more than 80 pairs, and produced nearly 200 cygnets. The total flock size now numbers over 500 birds, which includes a large number of non-breeders. The species status was changed from state-endangered to state-threatened in 2013, and the species is now being considered for delisting. Management actions since 2003 have included management of invasive plant species in existing wetlands, restoration and creation of new wetlands, and control of the non-native mute swan (*Cygnus olor*). The Ohio Swan Management Plan calls for the eradication of mute swans from public lands by 2020. Mute swan control is conducted by both the Ohio Division of Wildlife and USDA-APHIS Wildlife Services. After relatively large control efforts in 2014 and 2015 to curb growing numbers of mute swans, the mute swan population in Ohio has stabilized at relatively low levels, such that an average number of take over the last 3 years (2016-2018) was approximately 40 birds. Most mute swans now remain on private lands. Controversy generated by mute swan control in Ohio has allowed for limited populations to survive on public lands, but the Division continues to work with constituents to minimize reproduction of these populations through egg-addling programs. Certainly, mute swan control has been an important management action to enable the continued growth of the trumpeter swan population in Ohio.

## *Poster Abstracts*

### **BEHIND THE BULRUSH: THE FIRST HUNDRED DAYS OF SWAN TRACKING IN THE GREATER YELLOWSTONE**

Andrea A. Kristof, U.S. Fish and Wildlife Service (USFWS), Camas National Wildlife Refuge, Hamer, ID;  
Brian H. Wehausen, USFWS Camas National Wildlife Refuge

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#### **ABSTRACT**

Within the Intermountain West, the tristate area of Idaho, Montana, and Wyoming supports the U.S. breeding segment of the Rocky Mountain Trumpeter swan population. Over the last two decades, the growth of this segment appears to be driven by steady increases in the Wyoming and Montana flocks. By contrast, the Idaho flock has shown no significant trend in annual growth and concerns are mounting that we may be witnessing the onset of a decline. Each year, an estimated 50-75% of Idaho flock nesting attempts occur at three refuges within the Southeast Idaho National Wildlife Refuge Complex. Initial investigations cited insufficient cygnet survival but subsequent banding and alpha-numeric collaring efforts have also drawn into question rates of adult and fledgling overwinter survival and site fidelity. We know very little about the off-refuge movements, survival, and site fidelity of these refuge swans, which confounds our ability to identify potential culprits for flock decline. Therefore, we seek to better understand whether the disappearance of refuge swans is due to mortality or emigration through collecting information on wintering locations, survival, and nesting/molting site fidelity. In July 2019, we deployed four Ornitela GSM-GPS tracking collars at each of four refuges in the Greater Yellowstone Ecosystem to test whether this technology will provide the battery life and data upload frequencies necessary to gain insight on these conservation questions. During the first hundred days of deployment, we have observed regular upload frequencies and good battery health from three of the four collars. We will continue to monitor these birds for collar-associated swan mortality (due to icing), battery health, and upload frequencies throughout the winter. If they perform acceptably, we aim to deploy another 4 to 5 collars in the 2020 season.

### **GENDER DIFFERENCES IN THE VALUES, ATTITUDES, KNOWLEDGE, SKILLS, AND BEHAVIORS OF U.S. BIRDERS**

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#### **ABSTRACT**

In the U.S., 233 species of birds (22% of species) need conservation action. At the same time, an estimated 45,000,000 people feed and/or watch birds. Yet the policies of the 50 state wildlife agencies and the U.S. Fish and Wildlife Service are out of touch with these facts. A national survey was conducted to discover the connections between the interests of birders and the bird conservation actions they had taken over the previous 12 months (June 2018-June 2109). Responses were received from 3080 female and 2258 male birders (97%). The remaining 164 (3%) of respondents chose to not answer the question or selected "other." All differences reported here were significant at  $P = 0.01$  or better.

**Political Spectrum** – Female birders were more liberal than males. Females scored a mean of 73.6 and males 67.1 (very conservative = 0 and very liberal = 100).

**Birding Interest and Intensity** – Males spent more days per month (mean 7.12) than females (4.87) birding for at least one hour away from home. Males maintained more types of lists (mean 2.58) than did females (1.88). These included life list, year list, and others (max value was 6). Males had larger life lists (mean 950) than females (636). Females maintained more feeders (5.2 vs 4.9, respectively).

**Childhood (Ages 1-11) Experiences Important in Shaping Attitude Towards Nature** –The evaluation scale varied from very important (=3) to not important (=0). Males found camping (1.69 vs 1.54), hiking (1.87 vs 1.71), and reading about nature (2.06 vs 1.95) to be more important than did females. Females valued

outdoor play (2.61 vs 2.47) and visits to zoos and aquaria (1.92 vs 1.77) more than males. There were no differences for vacations to outdoor locations, youth group activities, or watching nature shows on TV.

**Important People Shaping Attitude Towards Nature in Childhood (Ages 1-11)** –The evaluation scale varied from very important (=3) to not important (=0). Females scored mother (1.76 vs 1.54), father (1.87 vs 1.76), sibling (0.81 vs 0.68), and grandparent (1.30 vs 1.07) more important than did males. Males scored only friend (1.15 vs 0.98) more highly than did females. There was no difference for teacher or other adult.

**Social Aspects of Birding** – The evaluation scale for this variable varied from strongly agree (+2) to strongly disagree (-2). Males enjoyed competing with other birders (-0.45 vs -0.85) and helping others develop their birding skills (1.30 vs 1.15) more than did females. Females preferred to bird with others, rather than alone (0.39 vs 0.30), and were happier for others when they saw a bird that the subject didn't (1.20 vs 1.10). There was no difference for “most of my friends are connected with birding.” Note that scores for the “competing” question were quite low for males and females.

**Inherent Value of Birds** – The evaluation scale for this variable varied from strongly agree (+2) to strongly disagree (-2). Females had a stronger belief in birds' right to exist (1.81 vs 1.74), were less acceptable of some extinction (-1.65 vs -1.54), and valued birds more highly even if they could not see them (1.88 vs 1.82).

**Bird Conservation Actions** – Birders could choose between 0 and 18 bird conservation actions that they took over the previous 12 months. The biggest differences were for “made my yard more desirable for birds” (females 87% yes vs males 80% yes) and “led bird walks” (males 51% yes vs females 33% yes). Males took significantly more actions in total than did females (9.06 vs 8.13).

**Norm Activation** – This question asked whose opinion was important when the respondent took a bird conservation action. The evaluation scale for this variable varied from strongly agree (+2) to strongly disagree (-2). Females were significantly more responsive to the input of birding friends (0.77 vs 0.70), messages from conservation organizations (1.08 vs 0.86), messages from their state wildlife agency (0.26 vs 0.05), and messages from the U.S. Fish and Wildlife Service (0.21 vs 0.00). There was no difference for one's own sense of what's right or the influence of a family member.

**Conclusions** – There were numerous differences in the values, attitudes, knowledge, skills, and behaviors between male and female birders in the U.S. Many of these differences were relatively small but were, nonetheless, highly significant. These differences are of theoretical interest. But more importantly, they help inform how bird conservationists might appeal to the public for increased bird conservation action.

## ANALYSIS OF AQUATIC MACROPHYTE ABUNDANCE AND DISTRIBUTION IN HENRY'S FORK OF THE SNAKE RIVER TRUMPETER SWAN (*CYGNUS BUCCINATOR*) WINTERING GROUND THROUGH HARRIMAN STATE PARK OF IDAHO, 1988 AND 2011-2017

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### ABSTRACT

Aquatic macrophyte cover was quantified in 1988 and 2011-2017 along 68 random transects on the Henry's Fork of the Snake River Trumpeter Swan Wintering Ground through Harriman State Park of Idaho, USA. In 1988, sampling was conducted from late August to early November; in 2011-2017 sampling occurred in September each year. From 2011-2017, significant increases in unvegetated, exposed river substrate were found throughout river sections. Between 1988 and 2011-2017 the amount of bare, unvegetated river substrate in the shallow winter feeding areas increased between 14.50%, and 58.53%. Moreover, the percent cover of Watermilfoil (*Myriophyllum* spp.) and Sago pondweed (*Potamogeton stuckenia*) declined 36.33% in these feeding areas. Overall, the greatest significant changes in the macrophyte community occurred in the upstream reaches that are favored by wintering Trumpeters compared to the downstream reaches. Aquatic macrophyte distribution and abundance through Henry's Fork of the Snake River at Harriman State Park of Idaho, USA is dependent upon available physical, chemical, and biological resources. As such, changes to these physical, chemical, and biological resources (and their interrelated effects) are causative factors affecting the composition of this unique macrophyte community. Since 1988, increased sedimentation, low winter flows [that dewater the river channel, increase winter frazil and anchor ice formation that subsequently disrupt the physical substrate and remove macrophytes], loss of important nutrients, and

waterfowl herbivory have been hypothesized as anthropogenic (human-caused) and ecological factors behind these significant changes. Continued sampling along these transects, combined with experimental treatments, is needed to better understand long-term macrophyte community variation over time, the interactive factors that affect it, and its ability to withstand/respond to anthropogenic and natural stressors.

**EFFICACY OF MICRO-RADIO TRANSMITTERS PLACED ON NEWLY-HATCHED TRUMPETER SWAN (*CYGNUS BUCCINATOR*) CYGNETS AT GRAYS LAKE NATIONAL WILDLIFE REFUGE, IDAHO, USA**

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Carl D. Mitchell, U.S. Fish & Wildlife Service (retired), Wayan, Idaho  
David Delehanty, Idaho State University, Department of Biological Sciences, Pocatello, Idaho  
David Bush, Idaho State University, Department of Biological Sciences, Pocatello, Idaho

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**ABSTRACT**

Trumpeter Swans (*Cygnus buccinator*) were once widely distributed throughout North America. Population declines during the 19<sup>th</sup> and 20<sup>th</sup> Centuries were attributed to overhunting and habitat loss. By the early 20<sup>th</sup> Century only ~ 70 swans were found in the Yellowstone Ecosystem. Although conservation efforts continued through the 20<sup>th</sup> Century cygnet survivorship in the Yellowstone Flock has declined due to food limitation, weather, diseases, abnormalities, emaciation, predation, and parasites. As part of a collaborative research effort to understand factors affecting trumpeter swan population persistence in the Yellowstone Ecosystem, we affixed short-term (~90 day) radio-transmitters on newly-hatched Trumpeter Swan (*Cygnus buccinator*) cygnets at Grays Lake National Wildlife Refuge, Idaho, from 2012 – 2014. A total of 74 eggs were laid among 19 nests; (mean clutch size = 3.8 eggs/nest). Hatching success during this time was 82.4% (n = 61/74 eggs). Fledgling success was 32.4% (24/74). Despite small sample size (n=15) for micro-radio transmitters, cygnets equipped with micro-radio transmitters had approximately equivalent survivorship compared to non-radioed cygnets.

**TRUMPETER SWAN (*CYGNUS BUCCINATOR*) EGG TEMPERATURES IN RELATION TO CYGNET SURVIVORSHIP IN THE YELLOWSTONE ECOSYSTEM**

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Bill Long, Wyoming Wetlands Society, Jackson, WY  
Victoria B. Flihr, Western Oregon University, Department of Biology, Monmouth, OR

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**ABSTRACT**

Trumpeter Swans (*Cygnus buccinator*) were once widely distributed throughout North America. Population declines during the 19<sup>th</sup> and 20<sup>th</sup> Centuries were attributed to overhunting and habitat loss. By the early 20<sup>th</sup> Century only ~ 70 swans were found in the Yellowstone Ecosystem. Although conservation efforts continued through the 20<sup>th</sup> Century cygnet survivorship in the Yellowstone Flock has declined due to food limitation, weather, diseases, abnormalities, emaciation, predation, and parasites. We placed 4 artificial eggs (with temperature data loggers) in 4 trumpeter nests during 2015 breeding season. Of these, we found differences among nests in average number of incubation recesses, average length of recesses, and average egg temperature fluctuation. We hypothesize these differences may significantly affect a cygnets' subsequent survivorship during the 3-month post-hatch rearing season and subsequent recruitment into the population.