

University of Nebraska - Lincoln

DigitalCommons@University of Nebraska - Lincoln

Proceedings of the North American Crane
Workshop

North American Crane Working Group

1-8-2020

PROCEEDINGS OF THE FIFTEENTH NORTH AMERICAN CRANE WORKSHOP

JANE E. AUSTIN

RICHARD P. URBANEK

MEGAN E. BROWN

Follow this and additional works at: <https://digitalcommons.unl.edu/nacwgproc>



Part of the [Behavior and Ethology Commons](#), [Biodiversity Commons](#), [Ornithology Commons](#),
[Population Biology Commons](#), and the [Terrestrial and Aquatic Ecology Commons](#)

This Article is brought to you for free and open access by the North American Crane Working Group at DigitalCommons@University of Nebraska - Lincoln. It has been accepted for inclusion in Proceedings of the North American Crane Workshop by an authorized administrator of DigitalCommons@University of Nebraska - Lincoln.

**PROCEEDINGS OF THE
FIFTEENTH NORTH AMERICAN
CRANE WORKSHOP**



**8 -11 January 2020
Lubbock, Texas**



FRONTISPIECE. Dr. George Archibald (center) received the L. H. Walkinshaw Crane Conservation Award at the Fifteenth North American Crane Workshop in recognition of his visionary leadership in international crane conservation efforts during the past nearly 50 years. George received his undergraduate degree from Dalhousie University in Halifax, Nova Scotia, in 1968, and completed his Ph.D. at Cornell University in 1977. Along with Ronald Sauey, in 1973 he established the International Crane Foundation (ICF) as the world center for the study and preservation of cranes. For 27 years George served as the President of ICF. He has received numerous awards and honors for his role as a charismatic and inexhaustible ambassador for crane conservation. He continues today as Senior Conservationist to direct programs for ICF worldwide. The Award was presented by NACWG President Richard Urbanek (left) and Vice-president Sammy King (right) on 10 January 2020. Thanks to photographer Ted Thousand for the print, which shows a sandhill crane nesting on George's farm. (Photo by Glenn Olsen)

Front cover: A frosty dawn at Muleshoe National Wildlife Refuge, Texas, 11 January 2020, by Daryl Henderson.

Back cover: Scenes from the Fifteenth Workshop in Lubbock, Texas, by Daryl Henderson, Glenn Olsen, and Richard Urbanek.

**PROCEEDINGS OF THE
FIFTEENTH NORTH AMERICAN
CRANE WORKSHOP**

**8-11 January 2020
Lubbock, Texas, USA**

Editors

**JANE E. AUSTIN
and
RICHARD P. URBANEK**

Associate Editor

MEGAN E. BROWN

Published by

NORTH AMERICAN CRANE WORKING GROUP

Proceedings of the Fifteenth North American Crane Workshop

© 2022 North American Crane Working Group

All rights reserved. Reproduction of material for noncommercial purposes is authorized without permission provided the source is cited.

Printed in the United States of America by Omnipress, Madison, Wisconsin

Available from:

International Crane Foundation
E-11376 Shady Lane Road
Baraboo, Wisconsin 53913-0447 USA

\$35.00 Postpaid

Proceedings of the North American Crane Workshops:

Lewis, J. C., editor. 1976. Proceedings of the [1975] international crane workshop. Oklahoma State University Publishing and Printing, Stillwater, Oklahoma, USA.

Lewis, J. C., editor. 1979. Proceedings of the 1978 crane workshop. Colorado State University Printing Service, Fort Collins, Colorado, USA.

Lewis, J. C., editor. 1982. Proceedings of the 1981 crane workshop. National Audubon Society, Tavernier, Florida, USA.

Lewis, J. C., editor. 1987. Proceedings of the 1985 crane workshop. Platte River Whooping Crane Maintenance Trust, Grand Island, Nebraska, USA.

Wood, D. A., editor. 1992. Proceedings of the 1988 North American crane workshop. Florida Game and Fresh Water Fish Commission Nongame Wildlife Program Technical Report 12, Tallahassee, Florida, USA.

Stahlecker, D. W., and R. P. Urbanek, editors. 1992. Proceedings of the sixth North American crane workshop. North American Crane Working Group, Grand Island, Nebraska, USA.

Urbanek, R. P., and D. W. Stahlecker, editors. 1997. Proceedings of the seventh North American crane workshop. North American Crane Working Group, Grand Island, Nebraska, USA.

Ellis, D. H., editor. 2001. Proceedings of the eighth North American crane workshop. North American Crane Working Group, Seattle, Washington, USA.

Chavez-Ramirez, F., editor. 2005. Proceedings of the ninth North American crane workshop. North American Crane Working Group, Seattle, Washington, USA.

Folk, M. J., and S. A. Nesbitt, editors. 2008. Proceedings of the tenth North American crane workshop. North American Crane Working Group, Gambier, Ohio, USA.

Hartup, B. K., editor. 2010. Proceedings of the eleventh North American crane workshop. North American Crane Working Group, Laurel, Maryland, USA.

Aborn, D. A., editor. 2014. Proceedings of the twelfth North American crane workshop. North American Crane Working Group, Laurel, Maryland, USA.

Aborn, D. A., editor. 2016. Proceedings of the thirteenth North American crane workshop. North American Crane Working Group, Baraboo, Wisconsin, USA.

Austin, J. E., and R. P. Urbanek, editors. 2018. Proceedings of the fourteenth North American crane workshop. North American Crane Working Group, Baraboo, Wisconsin, USA.

Austin, J. E., and R. P. Urbanek, editors. 2022. Proceedings of the fifteenth North American crane workshop. North American Crane Working Group, Baraboo, Wisconsin, USA.

Suggested citation format for articles in workshops 1-5:

Author(s). Year. Title of paper. Proceedings of the North American Crane Workshop 00:000-000.

Suggested citation format for articles in workshops 6-15:

Author(s). Year. Title of paper. Proceedings of the North American Crane Workshop 00:000-000.

ISBN 978-0-9659324-6-2

PREFACE

The North American Crane Working Group held the 15th North American Crane Workshop in Lubbock, Texas, on 8-11 January 2020. Lubbock, the “Hub City” of the Southern High Plains and location of Texas Tech University, was host of the workshop. The workshop opened on 8 January with an evening social at the National Ranching Heritage Center and concluded on 11 January with a field trip to Muleshoe National Wildlife Refuge. There were 73 registrants. The scientific program consisted of 34 oral and 14 poster presentations, a High Plains Plenary, and three special Symposia. The diverse array of topics covered represented the latest findings on North American cranes. Hosts Blake Grisham and Kathy Brautigam, workshop coordinators, did an outstanding job of local planning and arrangements.

At the workshop we also formally recognize and celebrate the achievements of individuals who have dedicated themselves to saving cranes and crane habitat. Our group’s highest honor, the L. H. Walkinshaw Crane Conservation Award, was presented to Dr. George Archibald by NACWG President Richard Urbanek and Vice President Sammy King. George, co-founder, past President, and currently Senior Conservationist of the International Crane Foundation, remains active today in his worldwide pursuit of crane conservation efforts.

Some of the highlights of Workshop 15 included an opening banquet at the National Ranching Heritage Center with presentations on art, play, and creativity and their roles in crane conservation by Gregory Hill and Rose Elizondo, as well as a presentation on sandhill cranes in Siberia by George Archibald. We had plenary presentations on the Texas High Plains and symposia on the future of habitat conservation, human dimensions and outreach, and the effects of telemetry and marking cranes. We enjoyed a field trip to Muleshoe National Wildlife Refuge to observe sandhill cranes at a major roost on the Texas High Plains. Our silent auction raised over \$850 for student travel awards. We also discussed potential locations for our next workshop and made tentative plans for the 16th North American Crane Workshop to be held in Baraboo Wisconsin, the home of the International Crane Foundation, during fall of 2023.

The general business meeting was held on the final day of workshop, and 11 board members were elected by voice vote to serve a 3-year term. A meeting of the new Board was held immediately after the general membership meeting to elect officers for 2020-2023: President Hillary Thompson (International Crane Foundation [ICF]), Vice-president Sammy King (U.S. Geological Survey, Louisiana Cooperative Fish and Wildlife Research Unit), Treasurer Barry Hartup (ICF), and Secretary Megan Brown (University of Maryland). At Large board members include David Aborn (University of Tennessee), Antonio Cantu (Louisiana State University), Tom Leiden (Leiden Conservation Foundation), Tommy Michot (University of Louisiana), Glenn Olsen (U.S. Geological Survey, Eastern Ecological Science Center), Richard Urbanek, and Jeannie van Vianen (ICF).

The papers in these Proceedings represent 5 presentations from the workshop and 10 manuscripts submitted later. Abstracts of oral and poster presentations for which a paper is not published here are included at the end of the volume. We are grateful to the following reviewers for their contributions to the quality of this volume:

Jonathan Aaltonen, Adrienne Atkins, Jeb Barzen, Kim Boardman, Andre Breault, Sarah Converse, Douglas Currie, Tim Dellinger, Angela Dedrickson, Katie Edwards, David Ellis, Terry Finger, Blake Grisham, Daryl Henderson, Scott Hereford, Jerome Howard, Diana Koester, Michael Mace, Christopher Malachowski, Carl Mitchell, Glenn Olsen, Gunter Nowald, Kerry Morrison, Bev Paulan, Aaron Pearse, Amy Powell, Brandon Reishus, Scott Swengel, Eva Szyszkoski, Dana Varner, Zsolt Vegvari, John Vradenberg, and Sara Zimorski.

Daryl Henderson was instrumental in final editing and proofing.

This volume retains use of the genus *Grus* for 4 crane species (sarus, brolga, white-naped, and sandhill). Until analysis of nuclear DNA supports reclassification, the NACWG will continue to endorse the conclusions of Krajewski et al. (2010, *Auk* 127:440-452) and Krajewski (2018, Chapter 2 in *Whooping Cranes: Biology and Conservation*, Academic Press). Krajewski (personal communication, 2016) considers recent reclassification to the genus *Antigone* to be premature.

Jane Austin and Richard Urbanek, Editors
January 2022



**CARROLL D. (CD) LITTLEFIELD
1940-2019**

Carroll Littlefield, best known as CD, was born on 21 June 1940 in Plainview, Texas, after which his family moved to Happy, Texas. He began undergraduate work at Eastern New Mexico University and received his B.S. degree from Texas Tech University, his M.S. degree from Colorado State in 1968, and did further graduate work at the University of Arizona. Through summer and temporary employment he experienced diverse regions, from Hutton Lake National Wildlife Refuge (NWR) outside Laramie, Wyoming, to the North Platte River, and Churchill and Dolphin, Manitoba. Later jobs would take him to the Aleutian Islands in Alaska and the Cosumnes River in California.

Much of CD's career was spent at Malheur NWR in eastern Oregon. CD was a tireless advocate to save the breeding population of sandhill cranes there, which were falling prey to various species of nest predators, and he generally argued for the refuge to live up to its name. CD generated controversy on both sides of the spectrum for the policies he recommended to save the sandhill cranes and other wildlife. The Malheur controversies may have caused CD to become somewhat world-weary and he retired from paid work in 2002 to return to Muleshoe, Texas. There he lived and continued avian studies at the Bioresearch Ranch in the Peloncillo Mountains, conducting 15 10-and-12 year transect studies that involved walking 24,000 km (15,000 miles) on the Ranch during that time frame. He finalized his transect studies in 2016 but remained an avid birder. A dedicated naturalist and writer, CD published more than 50 papers or reports on cranes and over 30 articles on other birds or natural history observations, including his book, *Birds of Malheur National Wildlife Refuge*, a long-time favorite with birders there.

CD Littlefield passed away unexpectedly of a heart attack at his home in the Peloncillo Mountains in Rodeo, New Mexico, on 28 May 2019. His memory looms large over his former haunts, especially at Malheur NWR in Oregon and in the New Mexico Bootheel, where he was much beloved.

Ed Newbold and Delia Scholes, Seattle, Washington (Photo of sandhill cranes at Malheur by David Marshall, U.S. Fish and Wildlife Service)



**PAUL A. JOHNSGARD
1931-2021**

Paul Johnsgard was born in Fargo, North Dakota, on 28 June 1931. He completed majors in zoology and botany for his B.S. degree from North Dakota Agricultural College (now North Dakota State University) in 1953. He obtained his M.S. degree on wetland ecology in central Washington from Washington State College (now Washington State University) in 1955 and his Ph.D. degree at Cornell University, on waterfowl evolution and pioneering the application of egg-white protein data to avian taxonomy, in 1959. After postdoctoral fellowships in England on waterfowl behavioral evolution, Paul accepted a faculty position at the University of Nebraska-Lincoln in 1961. During a career of 40 years there, he directed 12 students to Ph.D. degrees and 12 to M.S. degrees, and taught zoology, ecology, ornithology, and animal behavior to more than 7,000 students. He was named Professor Emeritus after retiring in 2001.

Paul was a prolific writer and published more than 100 books and 100 peer-reviewed scientific papers in addition to about 150 nature articles. Nearly all his published works were illustrated with his own drawings and photos. In his nearly 60 years at Nebraska, Johnsgard earned the University of Nebraska's highest honors including the Distinguished Teaching Award, Outstanding Research and Creative Activity Award, and an honorary Doctor of Science degree. Major national recognitions included a Guggenheim Foundation Fellowship, the National Wildlife Federation's National Conservation Achievement Award, the National Audubon Society's Charles H. Callahan Award, and the American Ornithologists' Society's Ralph Schreiber Conservation Award, all in recognition of his ornithological research, writing, and conservation work.

Among all birds, the cranes were his favorite. His *Cranes of the World* (1983) remains a basic monograph of the family. In his most recent published book on sandhill cranes, Paul acknowledged, "Above all, I must declare gratitude to the cranes, who have made my life rich, exciting, and wonderful ... [They] have exposed me to an additional dimension of reality and perception that I could not have imagined possible for a human to experience." He was active and working on his 105th book right up until his death on 28 May 2021.

Adapted from his self-prepared obituary and Nebraska Today, University of Nebraska-Lincoln



**RODERICK (ROD) C. DREWEN
1939-2021**

Born in California, Rod grew up with a keen interest in the wildlife around him. He honed that interest in college studies, earning degrees in wildlife biology and management from Humboldt State University (B.S.), South Dakota State University (M.S.), and ultimately his Ph.D. in 1973 at the University of Idaho. His doctoral dissertation on the ecology of Rocky Mountain (RMP) sandhill cranes remains the seminal study of that population and ultimately led Rod to continued work leading the first reintroduction experiment for whooping cranes, initiated at Grays Lake in the Rocky Mountain Flyway. Although this project did not succeed in establishing a new population of whooping cranes, the results have informed recovery efforts for this and other crane species throughout the world. The development of egg collecting techniques, capture and banding, captive rearing, the use of ultralight aircraft and other methods for reintroduction have all benefited from Rod's expertise. His long-term studies of RMP population size and recruitment have been critical to the management of these birds. Rod also led the effort to disperse trumpeter swans from Harriman State Park, Idaho, in the early 1990s, which resulted in their expansion to Bear Lake, Grays Lake, and Star Valley and the rebuilding of their southward migrations. During his 54-year career, Rod worked as an independent contractor with many agencies and conservation groups from the Arctic tundra to southern Mexico. He published more than 50 papers on migratory birds as well as countless reports to contracting agencies. He also served as a mentor to many students and researchers around the world. In 2020, Rod received a lifetime achievement award on behalf of the Northern Rockies Conservation Cooperative and the Meg and Bert Raynes Wildlife Fund in recognition of his commitment and dedication to the conservation of wildlife in the Greater Yellowstone Ecosystem.

Rod and his wife and partner in conservation Ruth Shea lived in Blackfoot, Idaho, often wintering in Portal, Arizona. He passed away at his Idaho home on 28 July 2021 after a long illness. The Rod Drewien Crane Conservation Fund has been established to support the Greater Yellowstone Sandhill Crane Initiative, a program facilitated by the Teton Regional Land Trust in partnership with other state and federal agencies and non-profit organizations.

Wendy Brown, Albuquerque, New Mexico (Photo from Teton Regional Land Trust)

CONTENTS

PREFACE	iii
PAPERS.....	1
THE IMPACT OF MARKING ON CRANES: AN ISSUE PAPER..... Anne E. Lacy, Barry K. Hartup, and David A. Brandt	1
WHOOPING CRANE STAY LENGTH IN RELATION TO STOPOVER SITE CHARACTERISTICS Andrew J. Caven, Aaron T. Pearce, David A. Brandt, Mary J. Harner, Greg D. Wright, David M. Baasch, and Emma M. Brinley Buckley	6
TWENTY-YEAR STATUS OF THE EASTERN MIGRATORY WHOOPING CRANE REINTRODUCTION Hillary L. Thompson, Nicole M. Gordon, Darby P. Bolt, Jadine R. Lee, and Eva K. Szyszkoski	34
EFFECTS OF RELEASE TECHNIQUES ON PARENT-REARED WHOOPING CRANES IN THE EASTERN MIGRATORY POPULATION.....Hillary L. Thompson, M. Susanna Mann, Marianne M. Wellington, Kim H. Boardman, and Glenn H. Olsen	53
BLACK FLY SURVEY OF A WHOOPING CRANE REINTRODUCTION AREA IN EASTERN WISCONSIN Richard P. Urbanek and Peter H. Adler	72
VIGILANCE OF NESTING WHOOPING CRANES IN JUNEAU COUNTY, WISCONSIN Nicole M. Gordon, Darby P. Bolt, and Hillary L. Thompson	81
DRIVERS OF ANNUAL FLEDGING IN THE MISSISSIPPI SANDHILL CRANE POPULATION, 1991-2018 Henry W. Woolley, Scott G. Hereford, and Jerome J. Howard	90
SURVEYS AND POPULATION ESTIMATES OF A DISTINCTIVE SUBPOPULATION OF SANDHILL CRANES IN THE FRASER RIVER LOWLANDS OF BRITISH COLUMBIA Myles M. Lamont	103
HOW STRESSFUL IS IT TO MOVE? WHOOPING CRANE GLUCOCORTICOID RESPONSE DURING FACILITY TRANSFER..... Megan E. Brown, Christopher Martin, Christopher Crowe, Sprina Lui, and Nucharin Songsasen	116
BRIEF COMMUNICATIONS.....	123
OBSERVATIONS OF WHOOPING CRANE PARENTAL PROVISIONING OF CHICKSGlenn H. Olsen	123
WHOOPING CRANE NEST BUILDING IN SOUTHWEST INDIANA.....Amy J. Kearns, Hillary L. Thompson, and Allisyn-Marie T. Y. Gillet	128
MISSISSIPPI SANDHILL CRANE CONSERVATION UPDATE 2017-2019.....Scott G. Hereford and Angela J. Dedrickson	134
FLORIDA SANDHILL CRANE RELOCATES EGG DURING INCUBATION.....Timothy A. Dellinger, Miranda L. Watford, and Ronald R. Bielefeld	141

SUMMARY OF MORTALITY AMONG CAPTIVE CRANES AT THE INTERNATIONAL CRANE FOUNDATION 2000-2020	Barry K. Hartup, and Robert Phillips	146
INITIAL EVALUATION OF CYCLIC ADENOSINE MONOPHOSPHATE ENZYME IMMUNOASSAY FOR USE WITH CRANE SEMEN SAMPLES.....	Megan E. Brown, Kim Boardman, and Katie L. Edwards	150
ABSTRACTS		155
UPDATE ON THE CAPTIVE WHOOPING CRANE POPULATION	Kim Boardman and Megan E. Brown	155
DESIGNING MORE CRANE-FRIENDLY TRANSMITTERS: THE IMPORTANCE OF WORKING WITH MANUFACTURERS AND LESSONS LEARNED.....	David A. Brandt	155
WINTER ECOLOGY OF SANDHILL CRANES ON THE SOUTHERN HIGH PLAINS OF TEXAS	Kathryn J. Brautigam, Blake A. Grisham, William P. Johnson, Owen N. Fitzsimmons, Jude R. Smith, and Warren C. Conway	156
USING ULTRASONOGRAPHY AND ENDOCRINOLOGY TO UNDERSTAND FOLLICULOGENESIS AND REPRODUCTIVE FAILURE IN WHOOPING CRANES	Megan E. Brown, Glenn H. Olsen, Budhan S. Pukazhenth, Chris Crowe, Warren Lynch, David E. Wildt, and Nucharin Songsasen	157
UNDERSTANDING THE INFLUENCE OF THE MAJOR HISTOCOMPATIBILITY COMPLEX ON MATE CHOICE AND SUCCESSFUL REPRODUCTION IN THE WHOOPING CRANE	Megan E. Brown, Glenn H. Olsen, Budhan S. Pukazhenth, Nucharin Songsasen, and Carly R. Muletz Wolz	158
CLIMATE CHANGE THREATENS WHOOPING CRANE RECRUITMENT AND POPULATION GROWTH ..	Matthew J. Butler, Kristine L. Metzger, and Grant M. Harris	158
SANDHILL CRANES IN MEXICO: STATUS OF HISTORICAL HABITATS AND CONSERVATION CHALLENGES	Antonio Cantu and Sammy L. King	159
IMPORTANCE OF FOOD SUBSIDIES FOR MIGRATORY BIRDS WINTERING IN CENTRAL NEW MEXICO	Daniel P. Collins, Matthew A. Boggie, and Scott A. Carleton	159
WHOOPING CRANE OUTREACH IN THE EASTERN FLYWAY	Elisabeth L. Condon	160
SALINAS OF THE SOUTHERN GREAT PLAINS OF TEXAS: ORIGINS, THREATS, AND IMPORTANCE TO SANDHILL CRANES AND MIGRATORY BIRDS	Warren C. Conway	160
FACTORS ASSOCIATED WITH LOCAL AND STATEWIDE POPULATION TRENDS OF THE FLORIDA SANDHILL CRANE	W. Andrew Cox, Timothy A. Dellinger, Richard A. Kiltie, Brittany A. Bankovich, and Brett M. Tornwall	161
FLORIDA SANDHILL CRANE MARSH USE AND NEST SUCCESS IN IMPROVED PASTURE AND FIRE- AND MECHANICALLY-MANAGED DRY PRAIRIE	Timothy A. Dellinger, W. Andrew Cox, and Erin H. Leone	161

NEST SUCCESS AND CHICK SURVIVAL OF SANDHILL CRANES IN SOUTHCENTRAL WISCONSINAndrew P. Gossens, Anne E. Lacy, and Sabine Y. Berzins	162
A METAPOPOPULATION VIABILITY ANALYSIS FOR WHOOPING CRANES, WHAT IT MEANS FOR SPECIES RECOVERY PLANNING—NEXT STEPS..... Wade C. Harrell, Mark T. Bidwell, Kathy Traylor-Holzer, and Phil S. Miller	162
IMPACTS TO INTEGUMENT FROM LEG BAND-MOUNTED TELEMTRY DEVICES IN WHOOPING CRANES..... Barry K. Hartup, Julia S. Lankton, and Grayson A. Doss	163
EFFECTS OF SALINE LAKES AND PLAYA WETLAND ECOLOGICAL STATE CHANGES ON SANDHILL CRANE SPACE USE OF THE SOUTHERN HIGH PLAINS..... David A. Haukos	163
TESTING USE OF SMALL UAS TO DETECT NESTING SANDHILL CRANES.....Scott G. Hereford, Richard B. Brown, and Scott K. Bishaw	164
RETHINKING WETLAND CONSERVATION IN A WATER-SCARCE FUTURE..... Sammy L. King, Murray K. Laubhan, John Vradenburg, and Leigh H. Fredrickson	164
THE ARANSAS-WOOD BUFFALO WHOOPING CRANE POPULATION: MULTI-LEVEL, MULTI-SCALE HABITAT SELECTION OF WHOOPING CRANES ON THE TEXAS COAST..... Sarah E. Lehnem, Steven E. Sesnie, Matthew J. Butler, Kristine L. Metzger, and Aaron T. Pearse	165
PROGRESS MADE WITH LAND MANAGERS TO IDENTIFY AND IMPROVE POTENTIAL STOPOVER HABITATS FOR MIGRATING WHOOPING CRANES..... Chester A. McConnell	165
FRAGMENTATION OF THE NETWORK OF ISOLATED WETLANDS ON THE SOUTHERN HIGH PLAINS OF TEXAS..... Nancy E. McIntyre	166
IDENTIFYING SUSTAINABLE HABITAT FOR WINTERING WHOOPING CRANES..... Kristine L. Metzger, Sarah E. Lehnem, Steven E. Sesnie, Matthew J. Butler, Aaron T. Pearse, Kelly Mcdowell, and Grant M. Harris	166
TRENDS IN SANDHILL CRANE NUMBERS IN EASTERN NEW MEXICO—AN UPDATE.....James B. Montgomery, Jr., and Jeffrey S. Beauchamp	167
HUMAN DIMENSIONS OF WHOOPING CRANE CONSERVATION IN ALABAMA..... Wayde C. Morse, Taylor T. Franklin, and Christopher A. Lepczyk	167
SUMMER HOME RANGES AND NESTING ECOLOGY OF GREATER SANDHILL CRANES IN NORTHEAST OREGON..... M. Cathy Nowak, Kathryn J. Brautigam, Daniel P. Collins, and Blake A. Grisham	168
FIVE YEARS OF RELEASING PARENT-REARED WHOOPING CRANES IN WISCONSIN..... Glenn H. Olsen	168
PRESENCE OF WIND TOWERS DISPLACE MIGRATING WHOOPING CRANES..... Aaron T. Pearse, David A. Brandt, Kristine L. Metzger, Wade C. Harrell, Mark T. Bidwell, and David M. Baasch	169

ENVIRONMENTAL FACTORS DRIVING NOCTURNAL WHOOPING CRANE MOVEMENT PATTERNS ON THE TEXAS WINTERING GROUNDS.....	John P. Pistone, Wade C. Harrell, and Elizabeth H. Smith	169
FACTORS AFFECTING COLT SURVIVAL OF WILD-HATCHED WHOOPING CRANES IN THE EASTERN MIGRATORY POPULATION.....	Bianca R. F. Sicich and Hillary L. Thompson	170
MURAVIOVKA PARK–SPECIALLY USED NATURE AREA	Sergei M. Smirenski and Elena M. Smirenski	170
HIGH VECTOR-BORNE HAEMOSPORIDIA PREVALENCE IN EASTERN SANDHILL CRANES OVER TWO DECADES	Skye L. Sneed, Lisa D. Auckland, Barry K. Hartup, Gabriel L. Hamer, and Sarah A. Hamer	171
MONITORING WHOOPING CRANE NESTS IN LOUISIANA THROUGH THE USE OF TRAIL CAMERAS	Eva K. Szyszkoski, Sara E. Zimorski, and Phillip L. Vasseur	171
AN UPDATE ON THE LOUISIANA NON-MIGRATORY WHOOPING CRANE REINTRODUCTION	Eva K. Szyszkoski, Sara E. Zimorski, and Phillip L. Vasseur	172
POPULATION UPDATE FOR THE EASTERN MIGRATORY POPULATION OF WHOOPING CRANES 2017-2019	Hillary L. Thompson	172
COUNTDOWN TO ENGAGEMENT: HABITAT AND ADULT-FOCUSED OUTREACH IN TEXAS.....	Anna D. Turkett	173
PUBLIC COMMUNICATION OF CRANE RESEARCH: SCICOM PRINCIPLES AND METHODS	Anna D. Turkett	173
VIDEO BEHAVIOR ANALYSIS OF TWO WINTERING POPULATIONS OF WHOOPING CRANES USING PROGRAM BORIS	Virginia M. Van Vianen, Anne E. Lacy, and Elizabeth H. Smith	174
DIURNAL TIME-ACTIVITY BUDGETS AND HABITAT USE OF WHOOPING CRANES IN THE REINTRODUCED LOUISIANA NONMIGRATORY POPULATION.....	Phillip L. Vasseur, Sammy L. King, and Michael D. Kaller	174
BEHAVIOR ANALYSIS AND LONG-TERM SURVIVAL OF CAPTIVE-REARED JUVENILE WHOOPING CRANES IN THE REINTRODUCED LOUISIANA NONMIGRATORY POPULATION	Phillip L. Vasseur, Sammy L. King, Michael D. Kaller, and Sara E. Zimorski	175
COMPARISON OF HUMAN- AND CAMERA-MONITORED WHOOPING CRANE NESTS TO DETERMINE AN EFFECTIVE SURVEILLANCE RATE	Phillip L. Vasseur, Eva K. Szyszkoski, Sara E. Zimorski, and Joseph R. Marty	176
DISPERSAL OF CAPTIVE-REARED YEARLING WHOOPING CRANES FROM RELEASE SITES IN SOUTHWEST LOUISIANA	Sara E. Zimorski, Eva K. Szyszkoski, and Phillip L. Vasseur	176



North American Crane Working Group

Releases of Parent-Reared Whooping Cranes in the Eastern Migratory Population from 2013 – 2018

M. Susanna Horn and Hilary L. Thompson
International Crane Foundation

FIVE PAST NACWG PRESIDENTS



Conclusions and Implications

- Great variability
- No consistent correlation
- Unpredictable
- No consistent range
- Habitat loss
- Habitat fragmentation
- Habitat isolation



Florida sandhill crane populations are stable or increasing throughout its range in Florida

Factors associated with population growth of Florida sandhill cranes

- Population density
- Habitat quality
- Nest success
- Survival of young
- Dispersal
- Immigration
- Emigration