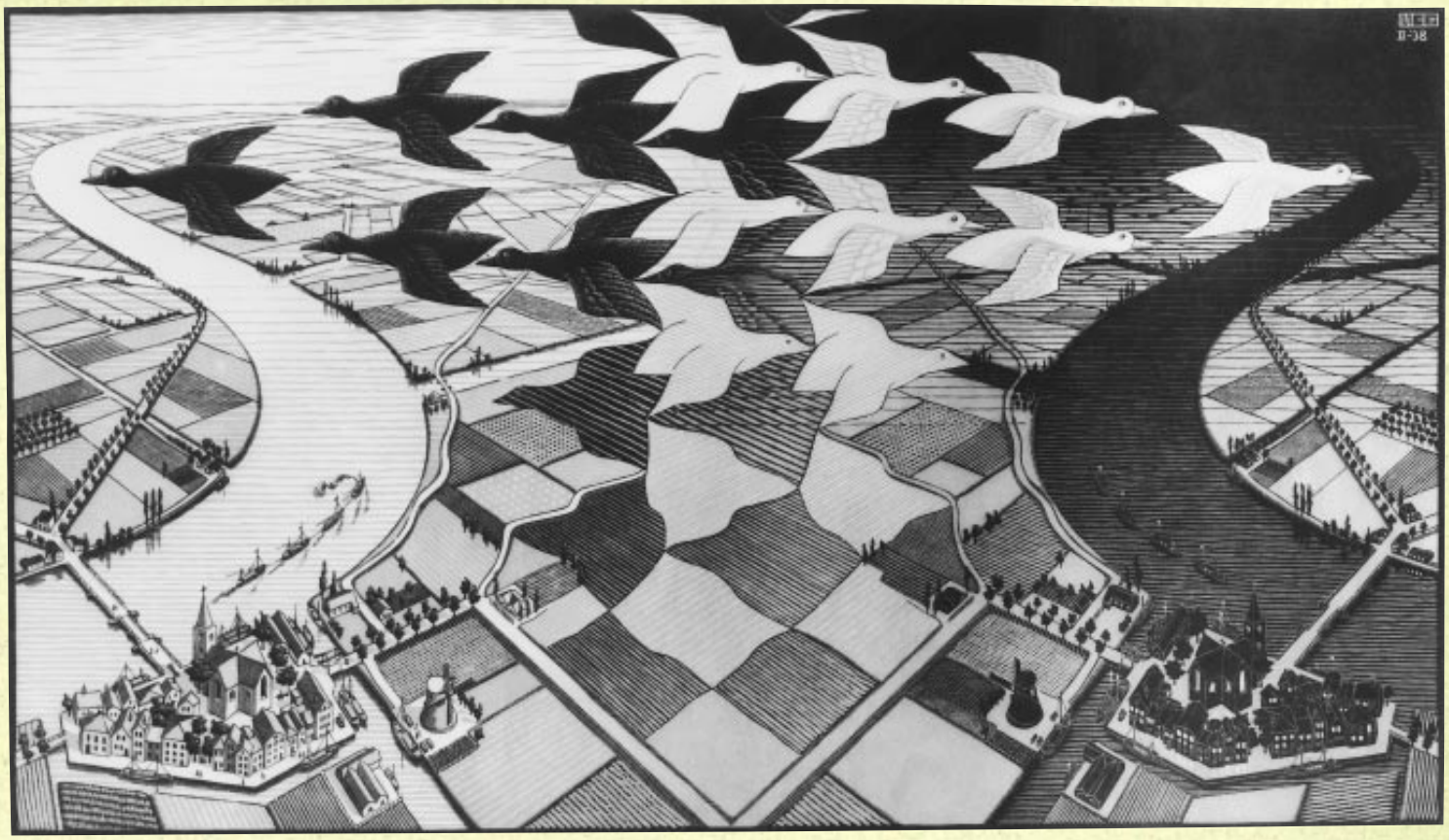
American Museum of Natural History

Conserving *Birds* in Human-Dominated Landscapes:

Weaving a Common Future



American Museum of Natural History ▪ Center for Biodiversity and Conservation ▪ April 27 and 28, 2006

Conserving *Birds* in Human-Dominated Landscapes: Weaving a Common Future

Conserving Birds in Human-Dominated Landscapes is sponsored by the American Museum of Natural History's Center for Biodiversity and Conservation in collaboration with the Mack Lipkin Man and Nature Lecture Series. Additional support is provided by the Cornell Laboratory of Ornithology, Ned and Linda Morgens, National Audubon Society, The Nature Conservancy, the U.S. Fish and Wildlife Service, the National Park Service, and Hawk Mountain Sanctuary.

The Mack Lipkin Man and Nature Lecture Series was established in honor of the late physician, Dr. Mack Lipkin, Sr., by his many friends and admirers. Dr. Lipkin was a gentle and powerful force who dedicated his life and career to advancing the most humane and caring practice of medicine. The Museum is proud to welcome ecologist Gordon Orians as the 2006 Mack Lipkin Man and Nature Lecture Fellow.

The Center for Biodiversity and Conservation was established with a leadership grant from The Starr Foundation and the support of many other generous foundations, corporations, and individuals. Many people contributed to the planning and execution of this symposium, and while they are far too numerous to list individually, the Center for Biodiversity and Conservation extends its thanks to all of them.

For their significant role in shaping the form and content of this symposium, we especially wish to acknowledge the symposium's Steering Committee and Content Advisors, who are named in the back of this program. We also wish to acknowledge the valuable contributions of John Alexander, Kevin Frey, Michael Ackil, the Museum's Volunteer Office, and Eagle Optics.

Symposium Content Coordinators: **Christopher E. Filardi, Ana Luz Porzecanski, and Felicity Arengo**

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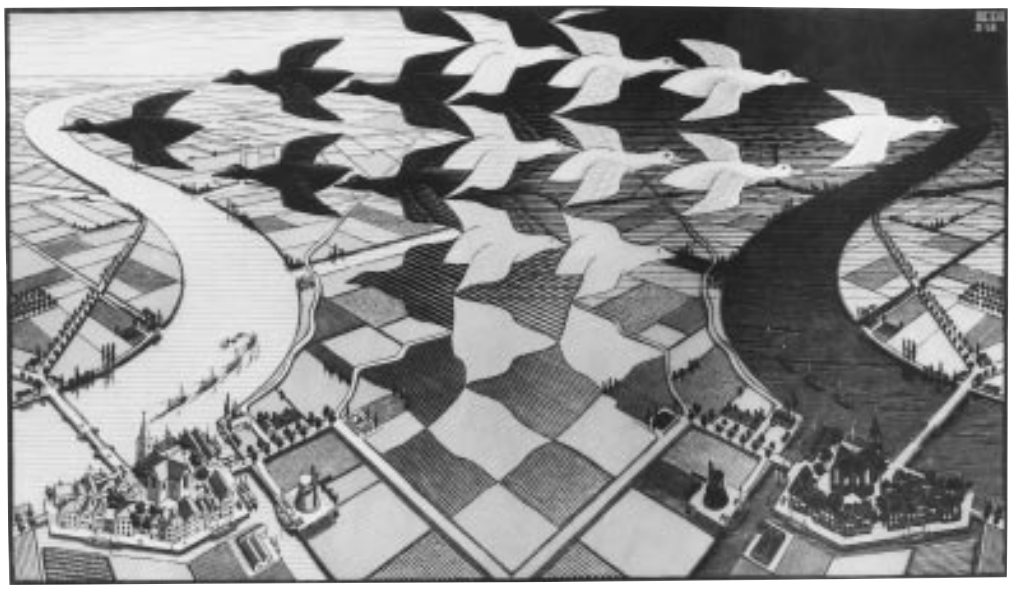
Program Design: **James Lui**

SPRING SYMPOSIUM

Conserving *Birds* in Human-Dominated Landscapes: Weaving a Common Future



American Museum of Natural History Center for Biodiversity and Conservation

April 27 and 28, 2006

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CONSERVING BIRDS IN HUMAN-DOMINATED LANDSCAPES
WEAVING A COMMON FUTURE

SPRING SYMPOSIUM

April 27 and 28, 2006

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Note: Additional symposium information, including speaker publications lists and suggested avian conservation resources, can be accessed via the CBC website at http://cbc.amnh.org

An archived transcript of the symposium presentations will also be available online in the coming months.

American Museum of Natural History

SPRING SYMPOSIUM

Birds and humans have coexisted for millennia within some of the most biologically rich regions on earth. But much of the living diversity around us is vanishing due to our escalating activities and numbers. Local and regional shifts in bird communities are often some of the most apparent signs of our impact on biodiversity. Because of their visibility, their cultural, aesthetic, and biological value, and because birds are often a primary way in which people connect with a place, they offer guidance and inspiration for conservation initiatives within the landscapes we jointly inhabit. As a result, efforts to conserve or invigorate bird diversity within human-dominated landscapes are gaining recognition as critical components of regional biodiversity conservation strategies. Research and policy initiatives have begun to focus more attention on the birds among us, in response to current issues like the complex implications of avian influenza, major disruptions in migratory flyways, and examples of the inspiring resilience of many urban and suburban bird communities.

Efforts that focus on conserving biodiversity in wilderness areas are necessary and important, and it is imperative that we minimize and mitigate human impact in these places. But a wealth of opportunities for transforming the nature of our influence lie within human-dominated landscapes. In large intact systems, the objective is to save all the natural elements. In human-altered landscapes this opportunity – and burden – is lost. For instance, there can be little hope in capturing historic ecological patterns or species assemblages within the large metropolitan centers where most people live, and it would be equally difficult to envision large-scale restoration of native habitats across the vast agricultural landscapes that sustain our growing numbers and attendant consumption patterns. The good news is that, within these altered areas, we have great freedom and remarkable opportunity. By fostering more diverse avian communities where we live, work, and produce, we can reinvigorate key elements of global biodiversity. Human activities can and do devastate diversity, but thoughtful changes in our behavior, political will, and interactions with the land- and seascapes on which we rely hold great promise for the future diversity of life on earth.

By exploring options and visions for conservation within human-dominated landscapes, we hope that this conference will lead us closer to capitalizing on the full breadth of conservation opportunities available to us. Ultimately, global biodiversity conservation may rely as much on our efforts to steward the diversity living among us as it does on unwavering, vigilant protection of the last great wild places.

A Biodiversity Science Symposium
American Museum of Natural History
Kaufmann and Linder Theaters

DAY ONE
THURSDAY, APRIL 27, 2006

8:00 – 9:00 a.m. REGISTRATION (77th Street Lobby)

9:00 a.m. – 12:30 p.m.

SESSION I
TRENDS IN SPACE AND TIME

INTRODUCTORY REMARKS

ELLEN V. FUTTER, *President, American Museum of Natural History*

AND MICHAEL J. NOVACEK, *Senior Vice President and Provost of Science, American Museum of Natural History*

SESSION INTRODUCTION

Moderator: **ELEANOR J. STERLING,** *Director, Center for Biodiversity and Conservation, American Museum of Natural History*

KEYNOTE ADDRESS

The Human Ecology of Globalization, Conservation, and Livelihoods

KARL ZIMMERER, *Professor and Chair, Department of Geography, University of Wisconsin, Madison*

KEYNOTE ADDRESS

Human Dominance of the Biosphere: Effects on Birds

ANDREW BALMFORD, *Reader in Conservation Science, Department of Zoology, University of Cambridge, UK*

BREAK (20 minutes)

Moderator: **GEORGE AMATO,** *Director, Conservation Genetics, American Museum of Natural History*

Birds in Agricultural Landscapes: Lessons from Britain

JULIET VICKERY, *Head of Terrestrial Ecology Unit, British Trust for Ornithology, Thetford, Norfolk, UK*

Is Urbanization for the Birds?

JOHN M. MARZLUFF, *Denman Professor of Sustainable Resource Science and Professor of Wildlife Science, College of Forest Resources, University of Washington, Seattle*

From the Estuary to the Open Ocean: Intersections between Marine Birds and People

JULIA K. PARRISH, *Associate Professor, Biology, and Associate Director, School of Aquatic and Fishery Sciences, University of Washington, Seattle*

Disease Threats to Bird Populations through History

PETER DASZAK, *Executive Director, Consortium for Conservation Medicine, New York, NY*

12:30 – 2:15 p.m. LUNCH BREAK

2:15 – 5:00 p.m.

SESSION II
UNDERSTANDING HUMAN INFLUENCE:
GEOGRAPHY, ECOLOGY, AND SOCIOECONOMICS

SESSION INTRODUCTION

Moderator: **JOHN A. WIENS,** *Chief Scientist, The Nature Conservancy, Arlington, VA*

Human Impacts on Bird Diversity: Regional to Continental Scales

ANDREW HANSEN, *Professor, Ecology Department, Montana State University, Bozeman*

Is Human-Provided Food an Evolutionary Trap? An Apparent Paradox for Suburban Birds

REED BOWMAN, *Associate Research Biologist and Head, Avian Ecology Lab, Archbold Biological Station, Venus, FL*

Ecological and Socioeconomic Drivers of Urban Bird Communities: Insights from the Central Arizona – Phoenix Long-Term Ecological Research Project

MADHUSUDAN KATTI, *Assistant Professor, Biology Department, California State University, Fresno*

BREAK (20 minutes)

Moderator: **FELICITY ARENGO,** *Associate Director, Center for Biodiversity and Conservation, American Museum of Natural History*

People and Coastal Birds: Human Activities, Habitat Loss, Pollution, and Co-Existence

JOANNA BURGER, *Distinguished Professor of Biology, Rutgers University, Piscataway, NJ*

Forest Bird Species in Human-Dominated Landscapes of Southeast Asia: Losses, Persistence, and Conservation

NAVJOT S. SODHI, *Associate Professor, Department of Biological Sciences, National University of Singapore*

5:00 – 7:00 p.m.

THE 2006 MACK LIPKIN MAN AND NATURE SERIES
RECEPTION AND POSTER SESSION (Hall of Northwest Coast Indians)

7:00 – 8:00 p.m.

THE 2006 MACK LIPKIN MAN AND NATURE SERIES LECTURE (LeFrak Theatre)

Biodiversity and the Evolutionary Roots of Beauty

GORDON ORIANS, *Professor Emeritus of Biology, University of Washington, Seattle*

A Biodiversity Science Symposium
American Museum of Natural History
Kaufmann and Linder Theaters

DAY TWO
FRIDAY, APRIL 28, 2006

9:00 a.m. – 12:30 p.m.

SESSION III
INVIGORATING BIRD DIVERSITY IN HUMAN-DOMINATED SYSTEMS: LOCAL RESPONSES TO GLOBAL TRENDS

SESSION INTRODUCTION

Moderator: **DAN ASHE,** *Science Advisor to the Director, U.S. Fish and Wildlife Service, Washington, DC*

Bird Conservation: The North American Landscape

PAUL R. SCHMIDT, *Assistant Director for Migratory Birds, U.S. Fish and Wildlife Service, Washington, DC*

Where the People Are: Citizen Science as a Conservation Tool in Human-Dominated Landscapes

JANIS L. DICKINSON, *Arthur A. Allen Director of Citizen Science and Associate Professor of Natural Resources, Cornell Laboratory of Ornithology, Cornell University, Ithaca, NY*

Long-Term, Citywide Monitoring for Bird Science and Conservation in Urban Landscapes: Key Results and Lessons Learned from the Tucson Bird Count

WILL TURNER, *Research Scientist, Center for Applied Biodiversity Science, Conservation International, Washington, DC*

A New Paradigm for Resource Management Agencies Working in Human-Dominated Systems

REX R. JOHNSON, *Leader, Habitat and Population Evaluation Team, Division of Bird Habitat Conservation, U.S. Fish and Wildlife Service, Fergus Falls, MN*

BREAK (20 minutes)

Moderator: **JOHN ALEXANDER,** *Advisory Council, Center for Biodiversity and Conservation, American Museum of Natural History*

The Role of Traditional Agricultural Systems for Steppe Bird Conservation in Europe

ALDINA M.A. FRANCO, *Post-Doctoral Research Fellow, Department of Biology, University of York, UK*

Restoring Overgrazed Riparian Landscapes for Songbirds with Beaver Re-Introductions

STEVE ZACK, *Director, Pacific West Program, Wildlife Conservation Society, Portland, OR*

Conserving Birds in Fragmented Forests: Perspectives from the Brazilian Atlantic Forest

MIGUEL ÂNGELO MARINI, *Professor, Department of Zoology, Universidade de Brasília, Brazil*

12:30 – 2:15 p.m. LUNCH BREAK

2:15 – 5:00 p.m.

SESSION IV
SETTING THE BIRD DIVERSITY HORIZON: DECIDING WHERE WE WANT TO GO

Session Introduction

Moderator: **Ana Luz Porzecanski,** *Biodiversity Scientist/Coordinator for Latin America, Network of Conservation Educators and Practitioners, Center for Biodiversity and Conservation, American Museum of Natural History*

Keynote Address

Sure We Can…If We Want to

Michael L. Rosenzweig, *Professor, Ecology and Evolutionary Biology, University of Arizona, Tucson*

Keynote Address

Achieving Bird Conservation in Human-Dominated Landscapes: Goals, Strategies, and Challenges

Tess Present, *Director of Science and Bird Conservation Programs, National Audubon Society, Ivyland, PA*

Keynote Address

Value and Meaning: Conserving New Guinea Birds of Paradise in a Human Landscape

Paige West, *Assistant Professor, Department of Anthropology, Barnard College, Columbia University, New York, NY*

Break (20 minutes)

CAPSTONE PANEL DISCUSSION:

Moderator: **Christopher E. Filardi,** *Biodiversity Scientist for Pacific Programs, Center for Biodiversity and Conservation, American Museum of Natural History*

Thomas E. Lovejoy, *President, The H. John Heinz III Center for Science, Economics and the Environment, Washington, DC*

Gordon Orians, *Professor Emeritus of Biology, University of Washington, Seattle*

Tess Present, *Director of Science and Bird Conservation, National Audubon Society, Ivyland, PA*

Michael L. Rosenzweig, *Professor, Ecology and Evolutionary Biology, University of Arizona, Tucson*

Paige West, *Assistant Professor, Department of Anthropology, Barnard College, Columbia University, New York, NY*

Closing Remarks

Eleanor J. Sterling, *Director, Center for Biodiversity and Conservation, American Museum of Natural History*

John Alexander (Moderator)

Advisory Council, Center for Biodiversity and Conservation, American Museum of Natural History

John Alexander is a retired Vice President of Chicago's Harris Trust & Savings Bank, and served for many years as a consultant to that institution. He is co-founder and President of the Stewart Foundation. Mr. Alexander is a former State Director of The Illinois Nature Conservancy and is currently a member of the Massachusetts Nature Conservancy board. He is also Board Chair of the Lemur Conservation Foundation in Florida, and serves on the Board and Executive Committee of Lincoln Park Zoo in Chicago, where he chairs the Conservation Committee. He sits on the Advisory Council of the American Museum of Natural History's Center for Biodiversity and Conservation, and is a member of the National Council of the World Wildlife Fund. A passion for photography, as well as years spent climbing the world's major mountains, have provided Mr. Alexander with an opportunity to experience and understand many of the problems unique to the world's wild and far-away places. He is a graduate of Purdue University and attended the University of Chicago School of Business.

George Amato (Moderator)

Director, Conservation Genetics, American Museum of Natural History

George Amato is Director of Conservation Genetics and Administrator of the Ambrose Monell Cryo Collection for Molecular and Microbial Research at the American Museum of Natural History. He also serves as an adjunct professor at Columbia, Yale, and Fordham Universities. Dr. Amato has lectured and published extensively on conservation strategies for endangered species, concentrating much of his work on the use of molecular analysis to determine conservation priorities and in developing forensic tools for monitoring the illegal trade in wildlife. Additionally, he is the chairman of the American Zoo and Aquarium Association's (AZA) systematics advisory group as well as an advisor to numerous IUCN and AZA specialist groups. Dr. Amato is involved in conservation issues on a global scale working on projects in Africa, Southeast Asia, and the Caribbean. He received his B.S. from the University of Connecticut and his Ph.D. in Biology from Yale University.

Felicity Arengo (Moderator)

Associate Director, Center for Biodiversity and Conservation, American Museum of Natural History

Felicity Arengo is Associate Director of the Center for Biodiversity and Conservation (CBC) where she helps oversee strategic planning, project development, and fundraising efforts. She is also adjunct professor at Columbia University. Dr. Arengo has over 10 years of field research and project experience in Latin America and is currently the Western Hemisphere coordinator of the IUCN Flamingo Specialist Group. She received a M.Sc. degree in 1987 and a Ph.D. in Wildlife Ecology in 1997 from the College of Environmental Science and Forestry, State University of New York. For her doctoral dissertation she studied Caribbean Flamingo behavior and ecology in Mexico. Currently she is working with South American colleagues on flamingo and wetland research and conservation in the high Andes. Prior to joining the CBC in December 2004 she was the Assistant Director of the Latin America and Caribbean Program at the Wildlife Conservation Society.

Dan Ashe (Moderator)

Science Advisor to the Director, U.S. Fish and Wildlife Service, Washington, DC

Dan Ashe is the Science Advisor to the Director of the U.S. Fish and Wildlife Service. Previously, he served as the Chief of the National Wildlife Refuge System and as Assistant Director for Refuges and Wildlife, directing operation and management of the 93 million-acre National Wildlife Refuge System, as well as land acquisition, and migratory bird and wetlands conservation programs. Mr. Ashe also served as the Fish and Wildlife Service's Assistant Director for External Affairs, directing the agency's legislative, communications, research, Native American, and state grant programs. From 1982 until 1995, Mr. Ashe was a Member of the Professional Staff of the former Committee on Merchant Marine and Fisheries, in the U.S. House of Representatives, advising the Committee's Chairmen and Members on a wide range of environmental policy issues. Mr. Ashe earned degrees from the University of Washington and Florida State University.

Andrew Balmford

Reader in Conservation Science, Department of Zoology, University of Cambridge, United Kingdom

Human Dominance of the Biosphere: Effects on Birds

How far, why, and how are people impacting birds, and what can we do about it? Humans have been changing the abundance and diversity of avian communities for millennia – Polynesians colonising the Pacific, for instance, may have wiped out as many as 2000 species of birds by 1000 BP. But our impacts – whether measured through extinctions, levels of threat, or population sizes – are accelerating. Underlying drivers include not just human population growth, but accelerating per capita consumption, selfish and short-term decision-making, the growing disconnect between people and nature, and a broad tendency for people to settle in biologically rich areas. Proximate threats vary in space and over time, and increasingly interact with one another. Nevertheless, the greatest threats, both now and into the foreseeable future, are habitat loss and degradation, chiefly for farming.

With this in mind, I consider potential conservation responses, focusing in particular on the emerging debate about whether the impact of agriculture is best met through wildlife-friendly farming, or through intensification of production on already cleared land.

Andrew Balmford is a conservation scientist interested in systematic planning, the costs and benefits of conservation, the success of conservation interventions, and how conservation might best be reconciled with other activities, especially in developing countries. He tackles these questions through fieldwork, analyzing large databases, and modeling, and by working as far as possible with colleagues in other disciplines. He also strives to build close relationships with conservation practitioners, and so co-founded the Cambridge Conservation Forum and the annual Student Conference on Conservation Science. He won the 2000 Zoological Society of London Marsh Award for Conservation Biology, and was named by *Scientific American* as one of their top 50 scientists of 2003.

Reed Bowman

Associate Research Biologist and Head, Avian Ecology Lab, Archbold Biological Station, Venus, FL

Is Human-Provided Food an Evolutionary Trap? An Apparent Paradox for Suburban Birds

Urbanization can influence the distribution of foods for birds. Some natural foods, especially arthropods, may decline with urbanization but may be replaced with human-provided sources, which tend to be of relatively high quality and more predictable in space and time. Access to human-provided food has influenced the winter distribution of many birds but little attention has been paid to influences during the breeding season. We have examined the reproductive biology and behavior of wildland and suburban populations of Florida Scrub-Jays for 14 years. Using longitudinal observational studies and experiments, we have shown that predictable food in the suburbs reduces stress, and the combination of predictable food and reduced stress results in earlier breeding and markedly less between-year variation. This results in mis-timing the peak food demands of nestlings and food resources of sufficient quality to fuel nestling growth. Suburban parents feed their nestlings human-provided food which reduces growth and survival, leading to reduced recruitment. Coupled with other factors that influence demographic rates, this leads to a decline in the suburban population. Such physiological mechanisms may be relevant to other birds that are omnivores and use human-provided foods but feed their nestlings arthropods, but simple changes in human behaviors could eliminate the negative consequences.

Reed Bowman is an Associate Research Biologist and head of the Avian Ecology lab at Archbold Biological Station. He holds graduate degrees in wildlife and biology from McGill University and the University of South Florida. Over the last 25 years he has studied the ecology, demography, and conservation of several threatened and endangered birds, including the White-crowned Pigeon, the Red-cockaded Woodpecker, and the Florida Scrub-Jay. In addition to his work in avian ecology, one of Dr. Bowman's primary interests is the many effects, both locally and worldwide, of increasing urbanization on birds. He is the author of more than 60 scientific papers and book chapters and the editor of two books, including the recently published and acclaimed *Avian Ecology and Conservation in an Urbanizing World*. He is a Fellow of the American Ornithologists' Union and a past President of the Florida Ornithological Society. He is a member of the Florida Scrub-Jay Recovery Team and helped develop the soon-to-be released Recovery Plan for this species. He is an adjunct graduate faculty member at the University of South Florida, University of Central Florida, and University of Memphis, and has been the major advisor of two Ph.D. students and five Masters students.

Joanna Burger

Distinguished Professor of Biology, Rutgers University, Piscataway, NJ

Co-author: Michael Gochfeld, UMDNJ-Robert Wood Johnson Medical School, Piscataway, NJ

People and Coastal Birds: Human Activities, Habitat Loss, Pollution, and Co-Existence

As human populations continue to concentrate along coasts, there is increasing interaction between people and birds. This trend will continue, and conservationists must devise ways for birds and people to co-exist. Increasingly birds are exposed to multiple stressors at the same time in coastal environments, and each one exerts an incremental influence on reproductive success. Nowhere is the clash of people and birds more obvious than in coastal areas, where hordes of people visit beaches at the same time that birds are nesting. On top of human disturbance are the effects of habitat loss, fisheries take, and increasing pollution from urbanization and suburbanization. With changes in energy policy, there are increases in atmospheric deposition of chemicals, such as mercury, which have major implications for biodiversity of nesting birds. Human disturbance and fisheries take, during both nesting and migratory stop-overs, have resulted in population declines in some species (Red Knot), shifts in foraging locations (other shorebirds), and shifts in nesting locations (Common Terns), among other effects. Our 30-year New Jersey data set on reproductive success, population dynamics, and pollutants is one of the

longest-running studies in the world, and shows that populations of some species are stable, while others are declining. We found that lead and cadmium levels have declined in birds, while mercury has not. These contaminants cause behavioral deficits, such as delayed recognition, decreased begging behavior, and abnormal behavioral thermoregulation, lowering reproductive success. The management implications, at least for New Jersey, include integrating a wide range of stakeholder interests (recreationists, fishermen, commercial fishermen, beach house-owners) with avian needs.

Joanna Burger is a Distinguished Professor of Biology at Rutgers University where she teaches animal behavior and ecological risk. As a behavioral ecologist and ecotoxicologist, her primary research interests focus on the factors that affect behavior and reproductive success of birds, including human disturbance, habitat loss, introduced predators, and contaminants. Dr. Burger received a B.S. in biology from the State University of New York at Albany, an M.S. from Cornell University in Zoology and Science Education, and a Ph.D. in ecology and behavior from the University of Minnesota. She completed post-doctoral research in the interface of ethology and comparative psychology at the Institute of Animal Behavior at Rutgers-Newark. She then joined the faculty at Rutgers University, where she also has an appointment in the UMDNJ School of Public Health. She has published over 400 research papers in refereed journals, and edited, authored or co-authored 19 books on avian behavior, contaminants, and natural history. She has served on a number of National Academy/National Research Council, EPA, and U.S. Fish and Wildlife Service Committees, has served on the New Jersey Endangered and NonGame SpecCouncil for over 20 years, and serves on the Editorial Boards of several journals. This research has been funded over the years by NIMH, NIEHS, U.S. Fish and Wildlife Service, EPA, NJDEP, DOE, Trust for Public Lands, and Wildlife Trust.

Peter Daszak

Executive Director, Consortium for Conservation Medicine, New York, NY

Disease Threats to Bird Populations through History

Just as people have been burdened by plagues throughout history, bird populations have also been threatened by infectious agents. During the early nineteenth century, the mosquito Culex quinquefasciatus *was introduced to Hawaii, driving a surge in avian malaria and pox and the extinction of as much as a third of the endemic bird fauna. In the last few decades, Gyps vultures have disappeared across much of their range in India due to the presence of a veterinary drug in cattle carcasses. In 1999, a pathogen of European and African birds, West Nile virus, made its entrance into the New World and is now the most significant vector-borne disease in the U.S. The most recent—the global emergence of a new strain of avian influenza—has been spread through trade in poultry and pet birds as well as natural bird migration. The common theme in all of these diseases is increasing impact of people on ecosystems: introducing diseases through trade and travel (pathogen pollution); spreading toxic chemicals in the environment; and promoting the spread of wildlife diseases. Despite history, the future is bright. Our growing understanding of the links between conservation and medicine has led to new strategies for combating these threats and a new agenda for conservation policy.*

Peter Daszak is Executive Director of the Consortium for Conservation Medicine (CCM), New York – an institutional partnership that links Johns Hopkins Bloomberg School of Public Health, Tufts University School of Veterinary Medicine, USGS National Wildlife Health Center, and Wildlife Trust. The CCM is the first inter-institutional partnership to formally link conservation, disease ecology, and wildlife and human health. A Ph.D. parasitologist by training, Dr. Daszak's research has been instrumental in revealing the impact of emerging diseases on wildlife populations. His work has included identifying the first case of a disease causing extinction of a species, discovery of a disease responsible for amphibian population declines, highlighting the importance of emerging wildlife diseases to conservation, and discovering the wildlife origin of SARS virus. He has served on national and international panels for conservation and health, and won the 2000 CSIRO silver medal for collaborative research. His work has been covered by the *New York Times, Wall Street Journal, The Economist, Washington Post, US News & World Report, CBS 60 Minutes II*, CNN, ABC, and NPR's *Talk of the Nation, Morning Edition,* and *Fresh Air with Terri Gross*.

Janis L. Dickinson

Arthur A. Allen Director of Citizen Science and Associate Professor of Natural Resources, Cornell Laboratory of Ornithology, Cornell University, Ithaca, NY

Where the People are: Citizen Science as a Conservation Tool in Human-Dominated Landscapes

Citizen Science approaches, whether in the classroom or the neighborhood, have demonstrated potential to educate and empower the public to confront and learn about key conservation issues in a rewarding way. As Cornell Laboratory of Ornithology's (CLO) pioneering Citizen Science initiative approaches the end of its second decade, it is now possible to evaluate the scientific contributions, scientific potential, as well as the impacts on public scientific literacy, conservation efforts, and

conservation outcomes. As we move into the third decade of Citizen Science at Cornell, we are planning to apply our experience to the development of new projects that not only attract the public to explore biodiversity across the urban gradient, but engage them in hands-on activities that test the cumulative impacts of local habitat enhancement efforts on the diversity, abundance, and nesting success of birds in their backyards, parks, and green spaces. The goal is to test the effects of regionally specific restoration activities using a suite of powerful Internet-based data collection tools developed at CLO, determining the cumulative impacts of habitat modification in a quantitative way. Bottom-up approaches like this represent the only possibility for improving the conservation value of residential landscapes and may also prove effective in agricultural landscapes, where top-down restrictions on habitat destruction are minimal. Use of Citizen Science as a tool for action research can create residential conservation communities that address these challenges at a scale that was unimaginable a decade ago, emphasizing the summative effects of small, personal, land-use decisions.

Janis Dickinson received a Ph.D. in Entomology/Animal Behavior from Cornell University in 1987. She is a behavioral ecologist who lived at, and studied Western Bluebirds on, U.C. Berkeley's Hastings Natural History Reserve in upper Carmel Valley, California, from 1987 to 2005. In September 2005, she returned to New York to become Director of Citizen Science at Cornell Laboratory of Ornithology, a decision motivated by the hope that involving citizens in conservation-oriented research would help precipitate cultural shifts in favor of sustainable practices. She is a member of the graduate fields of Natural Resources and Neurobiology and Behavior at Cornell, and is using animal behavior as a mechanism for engaging citizen scientists to develop the critical-thinking skills and the understanding needed to evaluate the scientific issues of the day.

Christopher E. Filardi (Moderator)

Biodiversity Scientist for Pacific Programs, Center for Biodiversity and Conservation, American Museum of Natural History

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Christopher Filardi joined the Center for Biodiversity and Conservation (CBC) in the summer of 2005 as a biodiversity scientist for Pacific programs. Dr. Filardi has a long history of conducting conservation and education activities, and biodiversity research in the Pacific region. He has, among other things, studied foraging behavior of Palm Cockatoos (*Probosciger aterrimus*) in Papua New Guinea in an effort to expand CITES protection; worked with the Wildlife Conservation Society to set up one of the first community-based wildlife reserves in New Guinea; and studied radiations of Pacific birds to clarify boundaries among species and begin unraveling the origins of pan-Pacific bird groups. Throughout his professional career, Dr. Filardi has maintained a commitment to bridging his research interests with grassroots conservation. He has also helped establish natural history-based undergraduate student programs that integrate indigenous communities with wildlands conservation in threatened landscapes of western North America and Central America. His current work at the CBC includes coordinating content for the 2006 spring symposium "Conserving Birds in Human-Dominated Landscapes;" initiating seabird research on Palmyra Atoll; and expanding his research and conservation work in the Solomon Islands to integrate research, education, and community-based protected areas strategies across the archipelago. Dr. Filardi received his Ph.D. in 2003 from the University of Washington, where he studied patterns of speciation and the biogeographic history of tropical Pacific flycatchers.

Aldina M.A. Franco

Post-Doctoral Research Fellow, Department of Biology, University of York, UK

The Role of Traditional Agricultural Systems for Steppe Bird Conservation in Europe

The European landscape has been transformed by agriculture for millennia. Many species adapted to these transformed landscapes and, therefore, the conservation of biodiversity in Europe is intrinsically related to agricultural practices. However, agriculture has been changing dramatically in recent decades, causing huge declines in numbers of many species. Currently, agricultural and grassland habitats contain the largest numbers of endangered bird species in Europe. In Portugal, European Union agricultural policies, such as large incentives for forestry and irrigation projects, are the main force causing land-use changes. These changes are occurring even within protected areas. To prevent further loss of habitat and species population declines, conservation projects and agri-environmental measures were implemented in the largest steppe area in Portugal aiming to maintain and/or promote low-intensity agriculture that is more compatible with the conservation of steppe birds. Monitoring showed a significant increase of endangered bird species populations in the areas where low-intensity, extensive agriculture was promoted. However, in Europe, not all agri-environmental schemes delivered positive outcomes. The outputs of agri-environmental schemes should be better assessed to guarantee that positive results are delivered. In addition, the attractiveness of the scheme to farmers should be improved in order to guarantee an effective conservation of biodiversity in human-transformed landscapes.

Aldina Franco is interested in issues concerning species abundance and distribution at different spatial scales, trying to understand the role of habitat loss and climate change on species

distribution changes and population declines, especially when linked to the conservation of endangered species. This can be applied to understand the factors limiting small populations and to identify measures needed to revert population declines. She has worked for LPN-Liga para a Proteção da Natureza (a Portuguese NGO) co-ordinating a European-funded project on the conservation of steppe birds, and is supervising a Lesser Kestrels *(Falco naumanni)* conservation project. Currently, she is a post-doctoral research fellow working at the University of York, UK.

Ellen V. Futter

President, American Museum of Natural History

Ellen V. Futter has been President of the American Museum of Natural History since November 1993. She previously served for 13 years as President of Barnard College, where, at the time of her inauguration, she was the youngest person to assume the presidency of a major American college. She is a fellow of the American Academy of Arts and Sciences, a member of the Council on Foreign Relations, and a former chairman of the Federal Reserve Bank of New York. With a strong record of public service, Ms. Futter is widely recognized as a dynamic voice for education and is an active supporter of women's issues. She has been awarded numerous honorary degrees and is the recipient of the National Institute of Social Sciences Gold Medal Award. Ms. Futter graduated Phi Beta Kappa, magna cum laude, from Barnard College in 1971. She received a J.D. from Columbia University Law School in 1974.

Andrew Hansen

Professor, Ecology Department, Montana State University, Bozeman

Human Impacts on Bird Diversity: Regional to Continental Scales

Much of what we know about humans and birds comes from field studies across wildland to urban gradients. An intriguing new set of studies using satellites is finding continental-scale controls on biodiversity and on land use. Results from these studies set the broad context for understanding local controls on biodiversity and ways to effectively tailor conservation strategies to local landscapes. Using data from the new MODIS satellite and the North American Breeding Bird Survey, we found that native bird species richness is positively correlated with measures of ecosystem energy including heat and plant productivity. This suggests that available energy sets an upper limit on biodiversity potential. Human density and land use are also positively correlated with energy. Our results indicate that human activities reduce native bird species diversity below the biophysical potential. The effects of human activities on bird diversity vary across energy gradients such that low-energy ecoregions are especially susceptible to human impacts. We illustrate these ecoregion-scale impacts and implications for conservation with case studies from the high-energy Pacific Northwest Ecoregion and the low-energy Greater Yellowstone Ecoregion.

Andrew Hansen is Professor in the Ecology Department at Montana State University. He teaches introductory ecology to undergraduates and landscape ecology to graduate students. His research focuses on interactions among biodiversity, ecosystem processes, and land use, with an emphasis on landscape management. He received a B.S. in Ecology from Huxley School of Environmental Sciences, Western Washington University. He completed a Ph.D. in ecology at the University of Tennessee and the Oak Ridge National Laboratory. Dr. Hansen completed post-doctoral research positions in landscape ecology at the University of the Witwatersrand in South Africa and with the Scientific Committee on Problems in the Environment (SCOPE) in France. He then joined the faculty of Oregon State University, where he studied ecological approaches to forestry. At Montana State University, Dr. Hansen is focusing on rates of land use change and consequences for protected areas such as Yellowstone National Park. Results from Yellowstone provided the basis for comparative study of land use change surrounding several nature reserves and biodiversity within reserves for six greater ecosystems around the world. Dr. Hansen also led a national study of global change effects on forest biodiversity as part of the U.S. Assessment of Climate Change and Variability. He is currently studying vulnerability of national parks to land use and climate change across the U.S. His work uses a combination of remote sensing, computer simulation, and field studies. This research is funded primarily by NASA, EPA, USDA, conservation organizations, and the timber industry.

Rex R. Johnson

Leader, Habitat and Population Evaluation Team, Division of Bird Habitat Conservation, U.S. Fish and Wildlife Service, Fergus Falls, MN

A New Paradigm for Resource Management Agencies Working in Human-Dominated Systems

The magnitude of the challenge of conserving the full spectrum of migratory birds and their habitats dwarfs traditional wildlife management resources. To be successful, conservationists must expand their reach and modes of operation beyond the bounds of the traditional paradigm. This requires unambiguous goals and explicit objectives, cost-effective conservation strategies that are based on a systematic application of reliable science, and means for dealing with the uncertainty inherent in managing

ecological systems. These attributes are attained through the use of systematic, science-based planning and evaluation founded on the use of models describing population-habitat relationships at local and landscape scales. Examples of model-based biological planning will be presented that illustrate how its use can increase management efficiency; serve as a framework for identifying and prioritizing among management information needs; and direct habitat conservation conducted with programs seeking diverse environmental and socio-economic benefits, but for which wildlife benefits are secondary goals, thereby enhancing the impact of these programs on bird populations.

Rex Johnson received his B.S. from Ball State University in Indiana, his M.S. from Iowa State University and his Ph.D. from South Dakota State University. Throughout his career he has focused on the relationships of migratory birds and their habitats at multiple spatial scales, with a special emphasis on wetland and grassland birds of the North American Prairie Pothole Region. Since 1998 he has been employed by the Migratory Bird Program of the U.S. Fish and Wildlife Service. In that capacity he has worked intensively on the systematic integration of biological planning, targeted research, and monitoring into migratory bird conservation. He works extensively with migratory bird joint ventures, and the international migratory bird conservation initiatives, especially the North American Waterfowl Management Plan.

Madhusudan Katti

Assistant Professor, Department of Biology, California State University, Fresno

Co-authors: Diane Hope, Corinna Gries, Paige Warren and Eyal Shochat, Central Arizona – Phoenix Long-Term Ecological Research Project, Arizona State University

ECOLOGICAL AND SOCIOECONOMIC DRIVERS OF URBAN BIRD COMMUNITIES: INSIGHTS FROM THE CENTRAL ARIZONA–PHOENIX LONG-TERM ECOLOGICAL RESEARCH PROJECT

Urban bird communities are strongly influenced by environmental changes due to human activities. While urban bird studies address the effects of habitat modification by humans, they rarely incorporate underlying socioeconomic factors. We combine bird census data (from 2000-2005, four times annually) with habitat and socioeconomic measurements in the Phoenix metro area to ask: Do socioeconomic factors have detectable effects on bird communities? Does adding socioeconomic variables to traditional ecological models of urban bird communities increase their statistical explanatory power? We examine bird diversity and abundance in multivariate models using measures of habitat (e.g., vegetation composition, structure, land cover) and socioeconomics (e.g., income, housing age, population density) as predictor variables. We show that while bird species richness increases with traditional variables (plant diversity, foliage volume), it is also driven strongly by socioeconomics—rising with median family income in particular. Likewise, bird abundance rises with income, human population density, and median housing age in addition to plant diversity and foliage volume. In general, the explanatory power (r^2 values) of multivariate models nearly doubles upon incorporating socioeconomic variables. We examine the relative importance of these factors on seasonal and annual trends in the bird community as Phoenix continues to grow, and argue that ecologists must explicitly address socioeconomic factors to better understand and manage the dynamics of urban biodiversity.

Madhusudan Katti is an ecologist with a primary research focus on how birds respond to environmental variation in natural and human-dominated landscapes. He grew up and discovered bird-watching near Bombay (now Mumbai), India, earned a Masters degree in Wildlife Biology from the Wildlife Institute of India, Dehradun (in the Himalayan foothills of northern India), and studied the wintering ecology of migratory warblers in southern India for his Ph.D. at the University of California, San Diego. He then held post-doctoral positions at Princeton and Arizona State universities before joining the faculty of the Biology Department at California State University, Fresno, in 2004.

Thomas E. Lovejoy (Panelist)

President, The H. John Heinz III Center for Science, Economics and the Environment, Washington, DC

Thomas E. Lovejoy has been President of The H. John Heinz III Center for Science, Economics and the Environment since May 2002. Before moving to The Heinz Center, he was the World Bank's Chief Biodiversity Advisor and Lead Specialist for Environment for Latin America and the Caribbean as well as Senior Advisor to the President of the United Nations Foundation. Dr. Lovejoy has been Assistant Secretary and Counselor to the Secretary at the Smithsonian Institution, Science Advisor to the Secretary of the Interior, and Executive Vice President of the World Wildlife Fund–U.S. He conceived the idea for the Minimum Critical Size of Ecosystems project (a joint project between the Smithsonian and Brazil's INPA), originated the concept of debt-for-nature swaps, and is the founder of the public television series *Nature*. In 2001 he was awarded the prestigious Tyler Prize for Environmental Achievement. Dr. Lovejoy served on science and environmental councils or committees under the administrations of former Presidents Reagan, Bush, and Clinton. He is a tropical biologist and conservation biologist who has worked in the Brazilian Amazon since 1965. He received his B.S. and Ph.D. in biology from Yale University; the focus of his dissertation was bird diversity in the Amazon rainforest.

Miguel Ângelo Marini
Professor, Department of Zoology, Universidade de Brasília, Brazil

Conserving Birds in Fragmented Forests: Perspectives from the Brazilian Atlantic Forest

The Brazilian Atlantic Forest is a highly degraded ecosystem, and a world hotspot, with 118 endemic birds and 112 threatened taxa. However, until today only one species has gone extinct, due mostly to hunting and not fragmentation. Recently collected mist-net and observation data revealed that most forest-dependent birds from Atlantic Forest sites are able to cross open habitats among forest fragments, in spite of widespread belief that forest birds have a "fear" of open habitats. Also, nest predation estimates and experiments in the region have shown that after a certain decrease in fragment size, nest predation rates do not increase. Further, a new estimate of the amount of Atlantic Forest left revealed that when small fragments are considered, the picture is much better than previously thought. Overall, most Atlantic Forest birds apparently have been able to survive in fragmented forests immersed in human-dominated landscapes, probably through meta-population dynamics. The movement of birds between small fragments also indicates that management of birds in these landscapes may rely more on stepping-stones than on corridors, a practice that may save thousands of dollars and decrease conflicts with human activities, such as roads.

Miguel Ângelo Marini obtained his Ph.D. from the University of Illinois at Urbana-Champaign, Illinois (1993), and since 1994 has been teaching and mentoring graduate and undergraduate ecology and zoology students at Brazilian universities. He is currently a professor at the Zoology Department, University of Brasília, Brazil. His research is oriented to ecology and conservation of Brazilian birds, including projects about the effects of forest fragmentation on birds of the Atlantic Forest, and currently about the reproductive success of Cerrado (savanna) birds. He has published more than 60 articles in international and Brazilian journals and books, and recently organized the XIX Annual Meeting of the Society of Conservation Biology, held in Brasília, Brazil.

John M. Marzluff
Denman Professor of Sustainable Resource Science and Professor of Wildlife Science, College of Forest Resources, University of Washington, Seattle

Is Urbanization for the Birds?

Urbanization reduces, converts, perforates, and fragments native vegetation. It also provides food, water, and shelter for birds. I review some of these processes at national and global scales and detail how they affect bird demography, relative abundance, and community composition in the Seattle metropolitan region. Bird diversity peaks at intermediate levels of human settlement primarily because of the colonization of intermediately disturbed forests by early successional, native species. Extinction of native forest birds and colonization of settlements by synanthropic birds have lesser effects on the overall pattern of avian diversity with respect to the level of urbanization. However, extinction increases linearly with loss of forest, and colonization by synanthropic species decreases curvilinearly with a reduction of urbanization. It appears that the response of adult survivorship (not reproduction or dispersal) to human activities is an important demographic mechanism determining which species live with or away from people. These findings have biological, theoretical, and practical implications. Biologically, intermediate disturbance appears to drive diversity by increasing the heterogeneity of the local land cover. Theoretically, models can be developed that pose testable hypotheses about how extinction and colonization are affected by urbanization to determine standing diversity. Practically, the maintenance of high local and regional diversity will require planning and cooperation among a diverse group of planners, ecologists, policy makers, home owners, educators, and activists so that the same landscapes are not promulgated everywhere. Maintaining high bird diversity where people live may engage humanity to value nature. Even common species have wide-ranging and lasting effects on human culture that conservationists should recognize and work to maintain in urbanizing lands.

John Marzluff is Professor of Wildlife Science at the University of Washington. He also holds the Denman Chair in Sustainable Resource Sciences and directs the Urban Ecology Program at UW. His graduate (Northern Arizona University) and initial post-doctoral (University of Vermont) research focused on the social behavior and ecology of jays and ravens. He was especially interested in communication, social organization, and foraging behavior (e.g., *The Pinyon Jay*, 1992, Academic Press). His current research brings this behavioral approach to pressing conservation issues including raptor management, management of pest species, and assessment of nest predation. His recent book, *In the Company of Crows and Ravens* (with Tony Angell, 2005 Yale U. Press) blends biology, conservation, and anthropology to suggest that human and crow cultures have co-evolved. He has led studies on the effects of military training on falcons and eagles in southwestern Idaho, the effects of timber harvest, recreation, and forest fragmentation on goshawks and marbled murrelets in western Washington and Oregon, conservation strategies for Pacific Island crows, and the effects of urbanization on songbirds in the Seattle area. Dr. Marzluff has authored over 100 scientific papers on various aspects of bird behavior and wildlife management. He is a member of the board of editors for *Bird Behavior, Acta Ornithologica*, and *Ecological Applications*. He has edited *Avian Conservation: Research and Management* that includes 40 chapters

detailing research approaches to conserve avian biodiversity throughout the world (1998, Island Press), *Avian Conservation and Ecology in an Urbanizing World* (2001, Kluwer Academic Publishers), and *Radiotelemetry and Animal Populations* (2001, Academic Press). He is currently leader of the U.S. Fish and Wildlife Service's Recovery Team for the critically endangered Mariana Crow. He is an Elected Member of the American Ornithologist's Union (1993) and currently serves on the board of the Cooper Ornithological Society.

Michael J. Novacek

Senior Vice President, Provost of Science, and Curator, Division of Paleontology, American Museum of Natural History

As Senior Vice President and Provost of Science, **Michael Novacek** provides leadership to the Museum's curatorial staff and advises the President on the direction of scientific research at the Museum. He is a chief spokesperson in enunciating the Museum's scientific program. Dr. Novacek was instrumental in establishing the Museum's Center for Biodiversity and Conservation and is a co-chair of the steering committee of Systematics Agenda 2000, an international scientific initiative to discover, describe, and classify the world's species. As a curator in the Division of Paleontology, Dr. Novacek has conducted extensive research on the evolutionary relationships of extinct and living mammals. His examination of broad-based problems in systematics and evolution draws upon evidence from the fossil record and molecular biology. He is one of the team leaders of the joint American Museum of Natural History/Mongolian Academy of Sciences ongoing expedition to the Gobi Desert to search for fossils and, in 1993, was one of the discoverers of Ukhaa Tolgod, the richest Cretaceous fossil site known in the world. In 1999, he started a series of expeditions to Patagonia, Argentina, to research dinosaurs, mammals, and other fossils. Dr. Novacek has served as a member of the National Science Foundation Advisory Board and of the Board of the American Association for the Advancement of Science. He received an A.B. in zoology from the University of California, Los Angeles, in 1971, an M.A. in biology from San Diego State University in 1973, and a Ph.D. in paleontology at the University of California, Berkeley, in 1978. He joined the Museum in 1982.

Gordon Orians

Professor Emeritus of Biology, University of Washington, Seattle

Biodiversity and the Evolutionary Roots of Beauty

The 2006 Mack Lipkin Man and Nature Lecture

Throughout history, individuals and cultures have been captivated by the unusual and rare in nature, as well as by the extraordinary diversity of the natural world. What does this fascination say about who we are? And how does it influence our attitudes and actions toward the preservation of biodiversity? Dr. Orians will examine the intricate relationship that exists between people and nature, and explore the concept that our aesthetic responses to different aspects of our environment are deeply rooted in our evolutionary history.

Gordon Orians is Professor Emeritus of Biology at the University of Washington in Seattle, where he served for 11 years as director of the Institute of Environmental Studies. During a distinguished career that has spanned nearly five decades, Dr. Orians has delved deeply into the study of ecology, with an emphasis on the behavioral ecology of birds. His research has focused on habitat and mate selection, foods and foraging, and relationships between social organization and environment. Dr. Orians's ecological investigations have also included community structure, population dynamics, plant-herbivore interactions, and the role of biodiversity in ecosystem functioning. Much of this work has provided fundamental insights both within and across the many disciplines he has studied. In addition to basic ecological research, Dr. Orians devotes considerable time to the interface between science and environmental policy.

Dr. Orians is a member of the American Academy of Arts and Sciences and the National Academy of Sciences (NAS). He served as chair of the NAS committee commissioned by the U.S. Congress to assess the cumulative effects of oil and gas exploration on Alaska's North Slope. He also serves on the NAS advisory committee selected to review and advise on the restoration of Florida's Greater Everglades Ecosystem. Dr. Orians' honors include the Eminent Ecologists Award from the Ecological Society of America and the Distinguished Service Award from the American Institute of Biological Sciences. His current projects include writing a book that will attempt to synthesize ecological concepts at all levels, ranging from behavioral ecology to ecosystems; and a book on environmental esthetics, using habitat selection theory as a conceptual framework for analyzing and interpreting human responses to natural and modified environments.

Julia K. Parrish

Associate Professor, Biology, and Associate Director, School of Aquatic and Fishery Sciences, University of Washington, Seattle

From the Estuary to the Open Ocean: Intersections between Marine Birds and People

The ocean is the last great habitat to be touched by man. Only recently have humans ventured beyond the coastal environment, as explorers laying claim to new lands, trade routes, and resources. Only within the last hundred years has industrial technology allowed humanity to invade the world's oceans as fishers, shippers, and tourists. And yet, in that short time period, the tide of humanity has swept in at the expense of many marine bird species.

Unlike most other avifauna, marine birds evolved largely in the absence of predators. Nesting on islands with no humans and no mammals, boobies, penguins, albatross and great auks were unprepared for sailors, and later egg and feather hunters, that would eventually decimate colonies and extinct species. With people came a wave of introductions – both plant and animal – that changed the face of seabird colonies and island ecosystems. Nesting and foraging habitats were further eroded as colonizers developed coastal landscapes, a trend that still continues in tropical ecosystems. As coastal and later open ocean fisheries developed to meet the needs of human demands, millions of seabirds were – and are – caught inadvertently in lines and nets; others face increased competition for prey resources; while still others are subject to a cascade of ecosystem change brought about by industrial fishing. Instead of fish eggs, petrels now find colorful plastic pieces collecting along ocean currents. Oil from spills, ballast water, and terrestrial run-off fouls murres and puffins. And even as regulation, restoration, and an increasing conservation ethic has seen many threatened species stabilize and increase, climate change looms, endangering nesting habitat, altering species' ranges, and fundamentally changing nearshore ecosystems worldwide.

Is there hope? The increasing reach of humanity comes with an increasing responsibility – to act, to conserve, to preserve, and to restore. And while lobbying our leaders for good environmental protection is essential, every person can vote with their feet, their wallets, and their time. Choosing your vacation, or even your next meal, wisely can make a difference. Finding a citizen science project to monitor change and put data and patterns in the heads of all the people can change the world.

Julia K. Parrish is an Associate Professor at the University of Washington, the Associate Director of the School of Aquatic and Fishery Sciences, and the Executive Director of COASST, a citizen science program that uses beach-cast birds to monitor coastal environmental health. She has studied the natural history, ecology, and conservation of marine birds for the last 15 years, and has authored many scientific articles and books. When not teaching Marine Biology, Dr. Parrish can be found on Tatoosh Island, off the northwest tip of Washington State, studying the biology of Common Murres.

Ana Luz Porzecanski (Moderator)

Biodiversity Scientist and NCEP Coordinator for Latin America, Center for Biodiversity and Conservation, American Museum of Natural History

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Ana Luz Porzecanski is biodiversity scientist and Coordinator for Latin America of the Network of Conservation Educators and Practitioners (NCEP) at the Center for Biodiversity and Conservation, where she helps organize training workshops with university professors and conservation professionals in Bolivia, Mexico, and Peru; and coordinates the production of NCEP modules in these countries. Dr. Porzecanski obtained her undergraduate degree in biology from the Universidad de la República, Uruguay, and completed her Ph.D. at Columbia University in 2003, where she carried out research on the systematics and historical biogeography of several South American aridland birds, as well as on international environmental policy issues. Dr. Porzecanski also teaches courses in conservation biology and evolution at Columbia University.

Tess Present

Director, Science and Bird Conservation Programs, National Audubon Society, Ivyland, PA

ACHIEVING BIRD CONSERVATION IN HUMAN-DOMINATED LANDSCAPES: GOALS, STRATEGIES, AND CHALLENGES

There is increasing acknowledgement of the enormous need and the great potential to improve native bird habitat and diversity in human-dominated landscapes. Whether these landscapes are metropolitan urban-suburban mosaics or working lands, we recognize that they can rarely be restored to pristine ecosystems. There is significant opportunity, however, to enhance their habitat value and ecological function to improve the status of native bird populations and increase species diversity.

How might we achieve such outcomes? Involving people who live, work, and play in these landscapes is key, as is having explicit and realistic targets and goals for our conservation work. We need to recognize that not all species can be conserved in human-dominated landscapes. We also need to define and promote actions that science tells us have the greatest likelihood of achieving our bird population and diversity goals, and in which we can involve the most people.

We already engage people in bird conservation in human-dominated landscapes through citizen science and community-based stewardship programs. We now need to expand these efforts, to refine what we aim to achieve, and to increase opportunities for involving diverse constituencies in our conservation efforts. A major challenge will be to align our goals and priorities with those of partners and stakeholders, and establish their relevance to quality of life by linking bird conservation to community well-being.

Tess Present is Director of Science and Bird Conservation Programs, and Senior Scientist for Ecology and Conservation Science, for the National Audubon Society. She oversees the activities and operations of Audubon's national Science division, including the national Important Bird Areas Program, Christmas

Bird Count, and other Citizen Science initiatives; Audubon At Home; the Birds and Agriculture Program; Seabird Restoration Program; and Coastal Bird Conservation Program. She is deeply involved in Audubon's conservation planning, and in defining Audubon's conservation goals, targets, and priorities. Since joining Audubon in 2001, Dr. Present has been at the forefront of Audubon's efforts to engage diverse constituencies in improving the status of bird populations and habitat in managed landscapes, focusing first on urban-suburban landscapes with the Audubon At Home initiative and then expanding to production-agriculture landscapes with the Birds and Agriculture Program. Dr. Present came to Audubon after a 15-year academic career in marine ecology. She has held faculty appointments at San Diego State University, the Marine Sciences Research Center of the State University of New York at Stony Brook, and the University of Miami. She received her Ph.D. in Marine Biology from Scripps Institution of Oceanography, University of California, San Diego, and her undergraduate degree from Smith College, Northampton, Massachusetts.

Michael L. Rosenzweig

Professor, Ecology and Evolutionary Biology, University of Arizona, Tucson

SURE WE CAN...IF WE WANT TO

The science of species diversity warns that we cannot save most species in our national parks and biological reserve systems. We must also adjust the way we use the land and sea so that a very large proportion of earth's species can make their livings alongside us. This strategy of conservation is called reconciliation ecology. The practice of reconciliation ecology is growing around the world. Much of what is now called restoration ecology is actually reconciliation ecology because it does not withdraw the land from human use. Heartening examples of reconciliation come from our farms, our rangelands, and our forests. Together, these three categories constitute an extremely large fraction of the land we use. Biology cannot prove that we ought to preserve biodiversity. Fundamentally, that choice is ethical and aesthetic. Citizens will make it. And most citizens live in urban areas. Conservation must touch them in their everyday lives and reconciliation ecology can accomplish that. So, though it may be a minor part of the earth's surface, we must also pay attention to reconciling the land we actually live on: our cities, our suburbs, our towns. Then our numbed sense of biophilia will reemerge and our largely frustrated religious commitment to stewardship will begin to bear fruit.

Part prize-winning scientist and part eloquent prophet, **Michael Rosenzweig** now devotes himself to Reconciliation Ecology—a vision of the future that marries civilization and nature to save the world's species. An evolutionary ecologist, Rosenzweig (University of Pennsylvania, 1966) is Professor of Ecology and Evolutionary Biology at the University of Arizona. He has produced complex mathematical theories of predation dynamics, habitat choice and species diversity, and conducts field experiments with arid-land birds and mammals. Editor-in-chief and publisher of Evolutionary Ecology Research, his books include *Species Diversity in Space and Time* (Cambridge University Press, 1995) and *Win-Win Ecology* (Oxford University Press, 2003).

Paul R. Schmidt

Assistant Director for Migratory Birds, U.S. Fish and Wildlife Service, Washington, DC

BIRD CONSERVATION: THE NORTH AMERICAN LANDSCAPE

There is a long and robust history of migratory bird conservation in the United States, with more than a century of cooperation and legislation guiding the way. The maturing of conservation design has come just as we are confronting the myriad issues accompanying the increasingly human-dominated landscape. After building a good foundation in science, the many conservation partners in the continent came together in the 1980s and 1990s to develop cooperative initiatives to address the challenges facing waterfowl, landbirds, shorebirds, waterbirds, and more. Modeled after the North American Waterfowl Management Plan in 1986, organizations and leading individuals joined forces to develop continental plans for landbirds (Partners in Flight), shorebirds, and waterbirds. Partnerships on the landscape sprung up in the 1990s, called joint ventures, to design and deliver landscape changes to benefit migratory birds in accordance with the continental plans. These joint ventures were formed on a local and regional level by Federal and state governments, non-governmental organizations, industry, and private citizens to conserve sustainable populations of birds in the face of challenges affecting populations; whether loss of habitat, collisions with human structures (building, towers, wind turbines, etc.), contaminants, etc. Throughout the last several decades, the professional focus has been to conserve birds at the population level. This is significant, as we face the delicate balance of where to invest limited resources. Working together to advance the vision of the international effort known as North American Bird Conservation Initiative ("biologically-based, landscape-oriented partnerships delivering the full spectrum of bird conservation") is a sound approach that gives us hope in the face of huge challenges in conserving birds.

Paul Schmidt is the Assistant Director for Migratory Birds for the U.S. Fish and Wildlife Service. His duties include policy direction for the U.S. Fish and Wildlife Service relative to bird conservation, including the allocation of funds to national and regional offices, as well as implementation of numerous national and regional monitoring efforts; the oversight of annual hunting regulations for migratory game birds throughout the country; guiding the use of Joint Ventures in bird conservation; and effective execution of the North American Wetlands Conservation Act and the Neotropical Migratory Bird Conservation Act. Mr. Schmidt received a B.S. degree in Biology from the College of William and Mary in 1978 and has continued his education with graduate courses in Wildlife Management and Public Administration. During his 28-year career with the Fish and Wildlife Service, he has held numerous management positions in the field, regional, and national offices, including seven years in Alaska. Mr. Schmidt currently serves as Chairman of the Arctic Goose Joint Venture, Chairman of the Service Regulations Committee, International Delegate to Wetlands International, and as a member of the North American Waterfowl Management Plan Committee, Partners in Flight Council, North American Waterbird Council, and U.S. Shorebird Council.

Navjot S. Sodhi

Associate Professor, Department of Biological Sciences, National University of Singapore

Forest Bird Species in Human-Dominated Landscapes of Southeast Asia: Losses, Persistence, and Conservation

Southeast Asia (Brunei, Cambodia, East Timor, Indonesia, Laos, Malaysia, Myanmar, the Philippines, Singapore, Thailand, and Vietnam) contains not only the highest mean proportion of endemic (national level) bird species, but also the highest mean proportion of threatened bird species compared to other tropical regions. However, among the world's tropical regions, Southeast Asia is of particular conservation concern because it has the highest rate of habitat loss. As with other tropical regions, Southeast Asia is losing native habitats due to anthropogenic actions such as logging, agriculture, and urbanization. However, the effects of such activities on bird species of Southeast Asia are poorly understood. In fact, the bird fauna of Southeast Asia remains one of the least studied in the tropics. Over the past several years, we have studied the effects of human activities on forest birds in relatively more disturbed (Singapore, Java, and the Philippines) as well as relatively less disturbed (Peninsular Malaysia and Sulawesi) Southeast Asian landscapes. Data at various elevations, ranging from lowlands to highlands, and levels of human dominance (i.e. selective logging, plantation, and urbanizations) were collected. Forest-dependent bird species and those living at higher elevations were found to be particularly sensitive to anthropogenic disturbance. The presentation will include pertinent conservation and management recommendations.

Navjot S. Sodhi is currently an Associate Professor in the Department of Biological Sciences at the National University of Singapore. He received his Ph.D. from the University of Saskatchewan (Canada). He has been studying the effects of rainforest loss and degradation on Southeast Asian fauna for the past ten years. He has published over 80 scientific papers in international and regional scientific journals. He has recently published a co-authored book entitled *Southeast Asian Biodiversity in Crisis* (Cambridge University Press). He has received research grants from organizations such as the National Geographic Society. He has also spent time at Harvard as a Bullard Fellow where he now holds an adjunct position. Dr. Sodhi currently is an Associate Editor of *Conservation Biology, The Auk, Biotropica, Ornithological Science*, and *Ecological Research*.

Eleanor J. Sterling (Moderator)

Director, Center for Biodiversity and Conservation, American Museum of Natural History

As Director of the Museum's Center for Biodiversity and Conservation (CBC), **Eleanor Sterling** oversees strategic planning and project development, leads fundraising efforts, and manages a multidisciplinary staff of over 25. In her capacity as a conservation biologist, Dr. Sterling also conducts fieldwork, studying the distribution patterns of biodiversity in tropical regions of the world and translating this information into recommendations for conservation managers, decision-makers, and educators. Dr. Sterling has extensive expertise developing environmental education programs and professional development workshops, having trained teachers, students, and U.S. Peace Corps volunteers in a variety of subjects related to biodiversity conservation.

In 2000, in partnership with colleagues from around the world, Dr. Sterling developed the Network of Conservation Educators and Practitioners, which primarily targets undergraduate- and graduate-level educators in developing countries who will train the next generation of conservation biologists. The project's first training workshops were conducted in Bolivia (August 2001 and July 2002) and Vietnam (May 2002). Dr. Sterling has coauthored a book highlighting Vietnam's remarkable biodiversity, *Vietnam: A Natural History* (May 2006), to be published by Yale University Press.

Dr. Sterling has more than 20 years of field research experience in Africa, Asia, and Latin America, where she conducted surveys and censuses, as well as behavioral, ecological, and genetic studies of primates, whales, and other mammals. She is considered a world authority on the aye-aye, a nocturnal lemur found only in

Madagascar. For the last seven years, Dr. Sterling has served as an adjunct professor at Columbia University, where she now serves as the Director of Graduate Studies for the Department of Ecology, Evolution, and Environmental Biology. Dr. Sterling sits on the Board of Governors of the Society for Conservation Biology, and is both a Board member and Management Committee member of the Center for Environmental Research and Conservation (CERC). Dr. Sterling received her B.A. in psychobiology from Yale College in 1983 and her Ph.D. in anthropology and forestry and environmental studies from Yale University in 1993. She joined the Museum in 1996 as the CBC's Program Director and was named Director of the Center in 2000.

Will Turner

Research Scientist, Center for Applied Biodiversity Science, Conservation International, Washington, DC

Long-Term, Citywide Monitoring for Bird Science and Conservation in Urban Landscapes: Key Results and Lessons Learned from the Tucson Bird Count

As urban populations grow, cities can take on an increasing role in sustaining biodiversity. Yet our cities generally remain inhospitable to most native birds. Long-term data collected throughout a city can aid in developing approaches for sustaining birds in and around urban areas. But long-term, spatially extensive (i.e. citywide) data are scarce. Volunteer-based, citywide surveys offer high-visibility, efficient means to acquire data unobtainable by other methods, presenting great potential to advance conservation and organize urban ecology research. The Tucson Bird Count (TBC) has successfully monitored birds at ~1000 sites throughout Tucson, Arizona, and surrounding desert for five consecutive years. The TBC uses a rigorous survey design, producing data of genuine use to scientific research and planning. TBC data have already served many purposes, including scientific research, land-use planning, and conveying ecological issues dramatically to a large local audience. I will discuss: 1) key results of the TBC to date, including an international study quantifying the extent to which urban humans are separated from biodiversity; 2) particular data needs filled by citywide monitoring programs; 3) logistical and survey-design challenges and their solutions; and 4) the benefits of and potential for a global network of cities with long-term avian monitoring programs.

Will Turner started the Tucson Bird Count while a Ph.D. student in Ecology and Evolutionary Biology at the University of Arizona. After completing his doctorate, he continued research on biogeography, conservation in human-dominated landscapes, and the creation and management of conservation networks as a Research Associate at Princeton University's Environmental Institute and Wilson School of Public and International Affairs. He is currently a Research Scientist in the Center for Applied Biodiversity Science at Conservation International.

Juliet Vickery

Head of Terrestrial Ecology Unit, British Trust for Ornithology, Thetford, Norfolk, United Kingdom

Birds in Agricultural Landscapes: Lessons from Britain

The decline of farmland birds is currently one of the biggest conservation issues facing conservation science in Europe. In Britain, long-term national data sets shows clear temporal and spatial matching between increases in agricultural production and declines, often dramatic ones, in both the population size and distribution of breeding birds. The species affected encompass a broad suite of functional groups that differ widely in their ecological requirements. I will show how a combination of national surveys of birds and their habitats, combined with detailed ecological studies, have been used to identify the ecological and demographic mechanisms driving these declines. I will focus on two case studies representative of a range of species in Britain and Europe: granivorous finches and buntings that have been affected by a loss of winter foraging habitat, and the Skylark Alauda arvensis *that has declined as a result of a loss of nesting habitat. I will show how a detailed scientific understanding of the mechanisms underlying declines has been used to develop and test land management solutions and how these can be integrated into farming systems as options within agri-environment schemes. In concluding, I will consider the generality of the British experience in relation to addressing the decline of farmland birds and highlight some key lessons and future challenges.*

Juliet Vickery is head of the terrestrial ecology unit at the British Trust for Ornithology (BTO). She studied for her doctorate at the University of Oxford, carried out post-doctoral research at the University of East Anglia, and then lectured in animal ecology and conservation at the University of Edinburgh. Her work at the BTO combines both large-scale, volunteer-based surveys with local intensive studies of farmland birds and their habitats. Research has focussed on understanding the causes of population declines and then designing and testing land-management solutions to them, and involves working closely with both policy makers and practitioners.

Paige West

Assistant Professor, Department of Anthropology, Barnard College, Columbia University, New York, NY

VALUE AND MEANING: CONSERVING NEW GUINEA BIRDS OF PARADISE IN A HUMAN LANDSCAPE

In the Eastern Highlands province of Papua New Guinea, Gimi-speaking landowners and conservation activists have been working together to conserve birds of paradise since the early 1980s. The Gimi forests, although seemingly pristine to western visitors, are human-dominated landscapes, imprinted with Gimi history, identity, and cosmology. Birds of paradise play an important role in Gimi notions of their relations with their ancestors and in their relationship with conservation scientists. They can also help us to understand how Gimi value their surroundings, as this is one of the first steps in conserving birds and other animals that are important to Gimi. This talk will examine how Gimi come to value and understand birds of paradise, and then show how Gimi and conservation scientists, through working together over long periods of time, come to respect each other and work together to establish the Crater Mountain Wildlife Management Area. Through these examples from a seemingly out-of-the-way place, the talk will attempt to make some suggestions for how we might work to conserve species important to science, and landscapes important for human livelihoods.

Paige West received her M.A. in Environmental Anthropology from the University of Georgia and her Ph.D. in Cultural Anthropology from Rutgers University. She is currently Assistant Professor of Anthropology at Barnard College and Columbia University. Since 1996, drawing on the theories, methods, and insights of both cultural anthropology and political ecology, she has conducted fieldwork in Papua New Guinea, Australia, Germany, England, and the United States. In 2002 she received the American Anthropological Association's Anthropology and Environment Junior Scholar award for her work. She is a cultural and environmental anthropologist with interests in the linkages between environmental conservation and international development, the material and symbolic ways in which the natural world is understood and represented, the aesthetics and poetics of human social relations with nature, and the critical analysis of the creation of commodities and practices of consumption. Dr. West has recently completed a book entitled *Conservation Is Our Government Now: The Politics of Ecology In Papua New Guinea*, published by Duke University Press and available June 1, 2006.

John A. Wiens (Moderator)

Chief Scientist, The Nature Conservancy, Arlington, VA

John A. Wiens grew up in Oklahoma as an avid birdwatcher. With degrees from the University of Oklahoma and the University of Wisconsin-Madison under his belt, he joined the faculty of Oregon State University and, subsequently, the University of New Mexico and Colorado State University, where he was a University Distinguished Professor. His work has emphasized landscape ecology and the ecology of birds and insects in arid environments on several continents. He has authored or edited six books and some 200 scientific papers.

Dr. Wiens has held Visiting Professor positions at the University of Oslo, the University of British Columbia, the Tropical Ecosystem Research Centre of CSIRO in Darwin, Australia, and the National Center for Ecological Analysis and Synthesis in Santa Barbara, California. He was awarded a Fulbright Senior Fellowship for work at the University of Sydney, and has collaborated with colleagues in France, England, Poland, The Netherlands, Argentina, Chile, Canada, and Australia.

Dr. Wiens left academia in 2002 to join The Nature Conservancy as Chief Scientist, with the challenge of putting years of classroom teaching and academic research into conservation practice in the real world. He is responsible for developing and helping to implement science-based conservation throughout The Nature Conservancy and forging new linkages with partners. He is based at the Worldwide Office of The Nature Conservancy in Arlington, Virginia.

Steve Zack

Director, Pacific West Program, Wildlife Conservation Society, Portland, OR

RESTORING OVERGRAZED RIPARIAN LANDSCAPES FOR SONGBIRDS WITH BEAVER RE-INTRODUCTIONS

Riparian habitat is the most important habitat for migratory songbirds in Western North America. It is also the most degraded of habitats, with as much as 80 percent badly degraded by cattle grazing alone. Over 60 percent of Neotropical migratory birds use riparian areas in the western U.S. at some point during the year, and breeding diversity of birds is higher in western riparian habitat than in all other western habitats combined. We have engaged with diverse private and governmental stakeholders in putting a bird's-eye-view on different progressive riparian restoration efforts and the management of grazing, including an evaluation of the reintroduction of American beaver. When restoration results in reestablishing woody vegetation, migratory birds return, and more vegetation means more species. Beaver reintroductions have powerful, positive effects for riparian habitat

and bird diversity. As repaired riparian systems retain soil, recharge water tables, and improve water quality, these efforts suggest viable solutions to an important problem.

Steve Zack directs the Pacific West Program of the Wildlife Conservation Society. He earned his B.S. at Oregon State University (1978) and Ph.D. at the University of New Mexico (1985). He spent several years studying birds in Kenya, Venezuela, and Madagascar. After teaching at Yale (1988–1993) he left to become engaged in conservation issues in his native western landscapes. He has conservation research activities towards understanding wildlife response to restoration in riparian, ponderosa pine forest, oak woodland habitats, and in estuaries, and he follows migratory birds to arctic Alaska to understand the growing oil footprint and identify key regions there for conservation.

Karl Zimmerer

Professor and Chair, Department of Geography, University of Wisconsin, Madison

The Human Ecology of Globalization, Conservation, and Livelihoods

While globalization is associated with extensive environmental damage, it must also be recognized that globalization has contributed to the expansion of certain types of environmental conservation. The worldwide expansion of designated protected areas is a prime example of the potential environmental benefits of globalization. During the past twenty years, the global coverage of designated protected areas has nearly tripled. In addition, globalization leads toward the adoption of a human ecology perspective as a broad umbrella that integrates humans and their livelihoods into conservation. I present a global overview of trends in space and time concerning three facets of globalization in relation to protected-area conservation: 1) overall expansion and geographical distribution of protected-area expansion in world regions, showing the notable increase in developing countries; 2) the designation and expansion of transnational protected areas and ecoregion-based designs including projects for conservation corridors; and 3) the role of designations of sustainable land use in global protected-area expansion. My presentation then argues that these globalization trends have brought environmental conservation into significantly increased interaction with human livelihood activities, including agriculture and other types of resource use (e.g., soil, water, and forestry resources) as well as migration and non-resource-based economic activities. I use regional- and local-scale examples to show how the global trends in conservation must be scaled to these more local levels in order to understand the growing interaction and changing relations between conservation and livelihoods.

Karl Zimmerer is professor and Chair of the Department of Geography, a member of the Gaylord Nelson Institute for Environmental Studies, at the University of Wisconsin, Madison, and most recently a fellow of the Agrarian Studies Program at Yale University. He serves as the agrobiodiversity reviewer of the Tropical Agricultural Center (CIAT) in Cali, Colombia, and as an advisor to several NGOs and agencies in the U.S., Europe, and Latin America. He is the author of numerous articles and has authored and edited four books, including *Changing Fortunes: Biodiversity and Peasant Livelihoods* and *Globalization and the New Geographies of Environmental Conservation*. He is the editor of the Nature-Society section of the Annals of the Association of American Geographers. His research interests include environment-development interactions and the human ecology of landscapes; global environmental change, biodiversity, and water resources in tropical mountain agriculture; and environmental conservation and globalization.

Center for Biodiversity and Conservation American Museum of Natural History

In 1993, the American Museum of Natural History created the Center for Biodiversity and Conservation (CBC) to enhance the use of scientific data to mitigate threats to biodiversity. The CBC develops strategic partnerships to expand scientific knowledge about diverse species in critical ecosystems, and to apply this knowledge to conservation; builds professional and institutional capacities for biodiversity conservation; and heightens public understanding and stewardship for biodiversity. Working both locally and around the world, the CBC develops model programs that integrate research, education, and outreach so that people — a key factor in the rapid loss of biodiversity — will become participants in its conservation.

The CBC's programs focus on areas of the world where biodiversity is richest and most threatened, as well as on taxa that have traditionally been neglected in the conservation process, such as invertebrates. The CBC has active projects in The Bahamas, Bolivia, Lao PDR, Madagascar and southern Africa, the Pacific Islands, Vietnam, and the United States. Dr. Christopher E. Filardi, CBC Biodiversity Scientist for Pacific Programs, has a long history of conducting biodiversity research focusing on some of the remarkable patterns of variation among birds inhabiting islands across the tropical Pacific. Together with Dr. Robert Moyle of the AMNH Ornithology Division, Dr. Filardi recently published a paper in the journal *Nature* that has essentially overturned the conventional thinking that islands are evolutionary "dead-ends," with a new study showing that birds from widely dispersed South Pacific islands have contributed significantly to continental bird biodiversity in Australia. Dr. Filardi is currently expanding his research and conservation work in the Pacific, including initiating seabird research on Palmyra Atoll. In South America, CBC Associate Director Dr. Felicity Arengo is conducting research on flamingos, and CBC Biodiversity Scientist Dr. Ana Luz Porzecanski conducts research on avian biogeographic patterns. With local colleagues, Dr. Arengo is monitoring populations of James' and Andean Flamingos and using satellite telemetry to study Andean Flamingo movements and habitat use. They are using these data to identify priority areas for conservation and designing a network of wetlands of importance for flamingo conservation. Dr. Porzecanski has analyzed the patterns of evolutionary and biogeographic diversity found among aridland birds on the continent, and together with several colleagues, recently published an assessment of the avifauna of the Bolivian Chiquitano and Cerrado biomes.

Raising awareness and promoting conservation action are also CBC imperatives, and through symposia, workshops, and publications we help to inform the public about biodiversity issues. To make the complex political and economic decisions necessary for the protection of global biological resources, people must have the scientific tools to identify and understand the mechanisms behind the threats to biodiversity. The CBC's role is to equip the world community to use these tools effectively.

Learn more about the CBC, visit **http://cbc.amnh.org**

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Cornell Laboratory of Ornithology

The Cornell Lab of Ornithology is a nonprofit membership institution with the mission to interpret and conserve the earth's biological diversity through research, education, and citizen science focused on birds. From its headquarters at the Imogene Powers Johnson Center for Birds and Biodiversity in Ithaca, New York, the Lab leads international efforts in bird monitoring and conservation, and fosters the ability of bird enthusiasts of all ages and skill levels to make a difference. For more information about the Cornell Laboratory of Ornithology, visit http://www.birds.cornell.edu/.

National Audubon Society

For over a century, Audubon has worked to protect birds and other wildlife and the habitat that supports them. Our national network of chapters, nature centers, scientific and educational programs, and advocacy on behalf of areas sustaining important bird populations engages millions of people of all ages and backgrounds in conservation. Some of Audubon's most important initiatives include the Important Bird Areas program, which promotes community stewardship of critical bird habitat; citizen science projects that bring professional staff and volunteers together to monitor birds; and Audubon At Home, which provides information and resources that individual citizens can use to make conservation a part of their daily lives. For more information about the Audubon Society, visit http://www.audubon.org/.

National Park Service

The National Park Service, a bureau within the U.S. Department of Interior, is charged with the responsibility to preserve, unimpaired, the natural and cultural resources and values of our nation's National Park System for the enjoyment, education, and inspiration of this and future generations. The National Park Service administers over 390 designated units of the National Park System, encompassing more than 84 million acres, and oversees a National Trails System, and cooperates and assists partners in the management of National Heritage Areas, and Wild and Scenic River Systems. The National Park System includes more than 270 units with significant natural resources, with many of these units serving as important stop over sites, wintering and or breeding grounds for migratory bird species. Parks such as Point Reyes, Golden Gate, Cuyahoga Valley, Gateway and Rock Creek Park are in the heart of urban or urbanizing areas and play important roles in increasing the visiting publics' understanding of the important roles migratory birds play in the ecology of these parks. For more information about the National Park Service and its programs, visit http://www.nps.gov.

The Nature Conservancy

The Nature Conservancy is a leading international, non-profit organization that preserves the plants, animals and natural communities representing the diversity of life on Earth by protecting the lands and waters they need to survive. To date, the Conservancy and its more than one million members have been responsible for the protection of more than 15 million acres in the United States and have helped preserve more than 120 million acres in Latin America, the Caribbean, Asia and the Pacific. Visit the Conservancy on the Web at http://www.nature.org/.

U.S. Fish and Wildlife Service

The U.S. Fish and Wildlife Service is the principal Federal agency responsible for conserving, protecting and enhancing fish, wildlife and plants and their habitats for the continuing benefit of the American people. The Service manages the 95-million-acre National Wildlife Refuge System, which encompasses 545 national wildlife refuges, thousands of small wetlands and other special management areas. It also operates 69 national fish hatcheries, 64 fishery resources offices, and 81 ecological services field stations. The agency enforces federal wildlife laws, administers the Endangered Species Act, manages migratory bird populations, restores nationally significant fisheries, conserves and restores wildlife habitat such as wetlands, and helps foreign and Native American tribal governments with their conservation efforts. It also oversees the Federal Assistance program, which distributes hundreds of millions of dollars in excise taxes on fishing and hunting equipment to state fish and wildlife agencies. For more information about the U.S. Fish and Wildlife Service, visit http://www.fws.gov/.

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