

ABSTRACTS – PLENARY & SYMPOSIUM PRESENTATIONS

THINKING LIKE A MOUNTAIN, SEEING LIKE A WOODPECKER: BEHAVIORAL ECOLOGY AND CONSERVATION OF WOODPECKERS.

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Before a bird hatches it is already responding adaptively to its environment and to other birds, at first instinctively, but later also as a result of learning. While our understanding of these responses is essential to our ability to carry out successful conservation efforts, that understanding is also sometimes shaped by perceptions arising from short-term study, lack of an historical perspective, and preconceived notions arising from lack of insight. Aldo Leopold brought these ideas together suggesting in essence that we think too narrowly in scope and too short term. On the other hand, Margaret Morse Nice taught us to seek understanding through study of the intimate relationships among individuals. Marriage of these seemingly disparate perspectives is essential to sound conservation. Through this lecture I will celebrate the complexity of the interrelationships of woodpeckers and their physical and biotic environment to demonstrate the importance of both the longer view and the intimacy of social interaction to understanding and conservation. I will discuss the dynamic nature of social and habitat relationships inherent in concepts such as individual distance, differential niche use, home range, territoriality, old growth, and biodiversity, as well as problems that arise through misunderstanding of these relationships and concepts.

HOW PHYLOGENIES CAN GUIDE RESEARCH IN OTHER FIELDS: EXAMPLES FROM HUMMINGBIRDS

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Hummingbirds represent one of the most important model systems in research on birds. Not only do they exhibit spectacular species richness and ecological diversity, but they also approach the upper limits for vertebrate metabolism and physiological performance. They have also coevolved extensively with many plant taxa and are relatively easy to manipulate both in the field and in the laboratory. However, the tremendous potential for this group as a model for comparative biology has not been fully realized in part because of the absence of phylogenetic framework. Analysis of DNA sequence data (from 3 mitochondrial genes and two nuclear genes) from a diverse sample of Trochilidae (152 of 315 species sampled so far by the Jim McGuire lab) has produced a phylogenetic hypothesis that demonstrates the importance of phylogeny in guiding research in other fields. Examples are presented with respect to the evolution of sexual dimorphism, bill morphology, and biogeography.

S1. MIGRATORY BIRDS AND COASTAL ECOLOGY: INTRODUCTION.

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Much of the avifauna that breed in the forests of eastern North America migrate from temperate breeding grounds to more tropical wintering areas in the Caribbean, Mexico, and Central and South America. The movement of those birds across the Gulf of Mexico is arguably the most conspicuous feature of this intercontinental migration. Before and after flights across the Gulf of Mexico, literally millions of migrants are concentrated in bottomland hardwood forests and scattered patches of coastal woodland of Mississippi. These woodlands provide the last possible resting and refueling locations (or stopover habitats) before migrants make a nonstop flight (18-24 hr) of greater than 1000 km in fall, and the first possible landfall for birds returning north in spring. Today, the availability of such habitats for birds and other wildlife is often at odds with rapid human population growth in coastal landscapes. Anthropogenic disturbances and habitat loss likely limit birds' use of coastal habitats, and exacerbate existing – and often less understood – constraints on habitat use imposed by natural events, including hurricanes. Aldo Leopold remarked over 50 years ago that “[M]any of the diverse wildernesses out of which we have hammered America are already gone; ... One of the fastest-shrinking categories of wilderness is coastlines. No single kind of wilderness is more intimately interwoven with history, and none nearer the point of complete disappearance.”

S2. COASTAL ECONOMIC AND SOCIAL DEVELOPMENT.

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Holistic and sustainable economic development planning encompasses the social, cultural, economic, and environmental resources available in the region and develops policy designed to capitalize on those resources. However, few development policies accurately reflect these resources nor do policies encourage cross fertilization of these resources to promote holistic sustainable development. This presentation will explore the potential benefits of a strategic ecosystem approach. This approach focuses on the creation and implementation of effective policy and practice that are created to inform, educate, and enlighten leaders on holistic development planning for future innovation. Involved in this process is the notion of targeted research in the area of study, economic data analysis, environmental impact, conservation mechanisms, and education of key personnel to promote informed, sustainably focused community and economic development policy formation and practice.

S3. FLOCKING TO THE COAST: IMPLICATIONS OF RECENT HUMAN DEVELOPMENT ALONG THE GULF COAST FOR MIGRATING BIRDS.

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Along the northern Gulf coast, the loss and fragmentation of natural habitats due to rapid human population growth is at odds with the critical habitat needs for the millions of migrating birds that stop over here before and after crossing the Gulf of Mexico. To better understand the conservation implications of this conflict, we studied 1) the habitat use by migrating land birds at different spatial scales across this region using weather radar observations and ground surveys, 2) the movement and behavior of birds during stopover using radio telemetry, and 3) recent land cover changes along the Gulf coast. Migrants appear to respond to landscape structure before making landfall, preferring to stop over in landscapes dominated by hardwood forests (particularly bottomland hardwood forests) and avoiding landscapes dominated by non-forested land, such as agricultural fields, clear-cuts, and urban areas. However, the correlation between bird density and hardwood forest cover weakened with greater proximity to the coast. Moreover, land bird densities were highly-concentrated along the immediate coast out to about 25 km inland. Thus, migrants face strong extrinsic constraints on habitat use after negotiating the Gulf of Mexico during spring. Within Mississippi, the availability of hardwood forest habitat and the amount of protection these forests receive from human development declines with greater proximity to the coast. Additionally, the recent conversion of natural habitats for human land uses is greatest nearest the coast. Thus, our findings should increase the urgency for the conservation of forested coastal habitats for migrating birds.

S4. COASTAL ECOLOGY AND BIRD MIGRATION IN A RAPIDLY CHANGING CLIMATE.

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Over the last 100 years, the average global surface temperature has increased approximately 0.8°C (1.4°F), and both the rate of warming, and the rate of sea level rise, are expected to continue to increase. Warming is associated with shifts in range boundaries (e.g., towards the poles) and shifts in timing (phenology), and both types of changes are likely to be seen in focal bird species, and in plants and insects that contribute to habitat quality for migrants in coastal habitats. Suites of climate change scenarios, paired with range change or energetic models, can help us to understand the relative probability of various types of changes, and to move forward with conservation planning in the face of uncertainty. A risk assessment framework is particularly helpful for understanding the role of climate change in determining the frequency of rare yet potentially catastrophic events, such as hurricanes. Impacts of sea level rise include habitat loss through inundation and erosion, as well as stronger storm surges that penetrate far inland where saltwater intrusion will affect the availability of fresh water. Predictive tools like spatial models allow us to visualize how the impacts of sea level rise will vary, highlighting places where impacts will be particularly strong, like the Mississippi Delta, where rapid

subsidence is currently underway. To be effective over the long term, it is critical that strategies for protecting and restoring coastal habitats to benefit bird populations are developed with climate change in mind.

S5. WEATHER, MIGRATORY BIRDS, AND THE COASTAL SETTING.

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Weather as a hazard to birds during migration is poorly understood, often because the circumstances surrounding weather-borne impacts on migrating birds are difficult to observe and quantify. Moreover, weather's role as a hazard is complicated by other factors. For example, flight over large water barriers such as the Gulf of Mexico that are readily traversed in following winds become extreme hazards in headwinds. Despite these challenges, migrating birds have successfully coped with weather for millennia. Increasingly, however, anthropogenic factors, such as climate change and coastal development, have the capacity to magnify the impact of weather on birds during migration. Climate change-induced sea surface warming, for example, is predicted to increase overall hurricane intensity. Data collected in association with recent strong hurricanes shows coastal stopover habitats can be impacted in ways that affect near- and long-term habitat use by migrating birds and that these effects can be felt by birds >50 km inland. Coastal development interacts with weather (especially hurricanes) in relation to habitat loss, but birds in flight may also be at risk from the increasing prevalence of tall anthropogenic structures. The likelihood of birds impacting lighted buildings, communications towers, and wind turbines may be magnified by the disorienting effects of low cloud or fog which occurs frequently along the northern gulf coast compared to other parts of North America. Clearly weather should play an increasingly important role in migratory bird conservation, particularly in coastal landscapes where anthropogenic effects will be felt most acutely.

S6. POPULATION REGULATION OF MIGRATORY BIRDS.

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The study of population regulation is concerned with why animal populations increase, decrease, or remain stable. In the case of Neotropical migratory birds, which must be successful in multiple roles across multiple ecosystems, population regulation should take into account their entire annual cycle (breeding, wintering, and migration). However, studies of population regulation focus mostly on the breeding period, infrequently on the wintering period, and rarely on the migratory period. Nonetheless, biologists are increasingly appreciating the important role that migration can have in the overall regulation of populations. Population regulation during migration can occur in one of two ways. Directly, mortality during migration reduces the overall annual survivorship probability of a population. Several studies have found that the majority of mortality occurs during migration, suggesting that migration is a potentially limiting period of the annual cycle. Additionally, recent research is showing that events during the migratory and wintering periods can have impacts on subsequent breeding seasons. This can manifest itself in multiple ways including delayed arrival on the breeding grounds, reduced condition upon arrival, and lower likelihood of obtaining high quality breeding habitat. Thus, while research and conservation efforts on migratory bird populations are generally focused on breeding populations, more consideration of the entire annual cycle is needed. The Gulf Coast region is a major transit point for many Neotropical migrants in North America – the successful transit of individuals back and forth through this region can have profound impacts on the population dynamics of breeding populations a world away.

S7. ENDANGERED/THREATENED MIGRATORY BIRDS AND THE GULF COAST.

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To determine the relative importance of factors in different portions of the annual cycle influencing the survival and successful reproduction of migratory birds with low populations or those designated as threatened or endangered requires leaps of faith. Application of theoretical constructs concerning demographic rates to specific cases must be done with limited and imprecise data. Each migrant poses its own set of social and political, as well as biological questions. A check of North American migrants listed as Threatened or Endangered yields a set of such cases, including Peregrine Falcon (*Falco*

peregrinus), Snowy (*Charadrius alexandrinus*) and Piping (*C. melodus*) Plovers, Southwestern Willow Flycatcher (*Empidonax traillii extimus*), Black-capped Vireo (*Vireo atricapilla*), Bachman's (*Vermivora bachmanii*), Golden-cheeked (*Dendroica chrysoparia*), and Kirtland's (*Dendroica kirtlandii*) warblers, among others. Fortunately, to this point only one of the critically imperiled species, Peregrine Falcon, is a trans-Gulf migrant. Cerulean Warbler (*Dendroica cerulea*), listed as Vulnerable by IUCN, provides an exemplar of the potential future for other species, including Swallow-tailed Kite (*Elanoides forficatus*), Bicknell's Thrush (*Catharus bicknelli*), Olive-sided Flycatcher (*Contopus cooperi*), and Golden-winged Warbler (*Vermivora chrysoptera*). Comparison of Cerulean Warbler to the critically imperiled species yields insight into the influence of stopover habitat, not only on the northern Gulf Coast, but throughout the periphery of the Gulf, on fitness of migrants. Opportunities to reduce our ignorance through improved monitoring of movements, to improve habitats through management strategies, and to maintain particular elements in the landscape through protective conservation actions, exist throughout the basin.

S8. SCIENCE-BASED CONSERVATION OF MIGRATORY BIRDS ALONG THE NORTHERN COAST OF THE GULF OF MEXICO

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The varied habitats found along the northern Gulf coast support a wide variety of North American birdlife for at least part of their annual cycle. Thus, this area is critical for science-based conservation efforts to protect, maintain, and increase existing bird populations. The Gulf Coast Joint Venture (GCJV) is the regionally based, biologically driven, landscape oriented partnership for the delivery of habitat conservation important to priority bird species from Brownsville, Texas, to Mobile Bay in Alabama. Its mission is to advance the conservation of important bird habitats within the GCJV region through biological planning, implementation of habitat conservation actions, and focused monitoring and evaluation of the planning and implementation processes. Currently, conservation planning efforts focus around four major bird groups: waterfowl, waterbirds, shorebirds, and landbirds. The GCJV's Monitoring, Evaluation, and Research Team (MERT), consists of working groups which address conservation planning for each of these major bird groups. Recognizing the critical importance of the GCJV region to transient migrant landbirds, the Landbird Working Group of the MERT selected a suite of nearctic-neotropic migratory birds (Cerulean, Golden-winged, and Swainson's warblers) as species to guide the process of setting habitat objectives for priority migrant landbirds in the region. In addition to providing an overview of the GCJV structure and current planning efforts, this presentation will highlight a recently proposed conceptual model for bird-landscape relations along the northern Gulf Coast. This effort uses a structural equation meta-model to evaluate the interrelationships between geographic position, human development, habitat, and migrant landbird use.