

# Abstracts



12 – 15 August 2009

One Hundred and Twenty Seventh Stated Meeting of the  
American Ornithologists' Union



## Presentation Abstracts

Abstracts are listed alphabetically by first author. Presenting author is underlined. In cases where author affiliation information is missing, we apologise ... but those are instances where the author who submitted the abstract did not provide complete information.

~ AOU2009 Local Committee

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### ECOLOGICAL AND PHYSIOLOGICAL IMPLICATIONS OF MIGRATORY STRATEGIES: HORMONES AND STABLE ISOTOPES WORKING TOGETHER

Causes for declines in several populations of Neotropical migratory songbirds remain poorly understood. Recent evidence suggests that migrant populations are limited by factors interacting throughout the annual cycle. Our objectives are to better understand the role seasonal interactions play in influencing variation in physiological and ecological attributes of birds arriving at their breeding grounds using two species with differing migratory ecology—the long-distance Blackpoll (*Dendroica striata*) and short-distance Yellow-rumped warblers (*D. coronata*). We compared plasma corticosterone and testosterone levels, fat stores, and wing morphology between the two species during their arrival period at Churchill, Manitoba. Using stable isotopes ( $\delta D$ ) in flight feathers, we determined past breeding ground origins and associated them with arrival time. We found that, in both species, corticosterone and testosterone levels increased and decreased, respectively, with arrival time. However,  $\delta D$  values were associated with arrival times for only Yellow-rumped warblers. Fat stores and wing morphology were related to Blackpoll but not Yellow-rumped arrival times. These data suggest that reproductive trade-offs related to arrival time are similar between types of migrants, but factors affecting arrival time differ.

Abstract (5173); Session G19, Sat 15 August, Location: Houston Hall, Bodek Lounge, Oral at 09:00

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### PRAIRIE WARBLER ECOLOGY AND CONSERVATION IN PITCH PINE-SCRUB OAK BARRENS

Early-successional habitats have been recently declining in the northeastern United States due to fire suppression, silviculture, and development. Pitch pine thinned to reduce fire risk, scrub oak barrens and utility rights-of-way (ROW) represent three habitats within pitch pine-scrub oak (PPSO) barrens that are actively managed as shrubland habitat and appear to provide habitat for declining Prairie Warblers (*Dendroica discolor*) and other shrubland specialists. The objectives of this study are to provide detailed information on the abundance and nesting success of Prairie Warblers and scrub-shrub birds on PPSO barrens in relation to habitat restoration and fuels reduction activities. Methods include color-banding birds, mapping territories, nest searching and monitoring, and conducting point-intercept vegetation surveys. Initial results show higher Prairie Warbler abundance in scrub oak habitat and ROWs compared to treated pitch pine. Moreover, preliminary results suggest ROWs have higher Prairie Warbler productivity, followed by scrub oak and then treated pitch pine habitat. Additional research will validate initial findings, as well as investigate Prairie Warbler arrival dates, nest site selection, and nest thermal characteristics.

Abstract (5231); Session GP15, Fri 14 August, Location: Houston Hall, Hall of Flags, Poster Num: 107

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### GOLDEN-WINGED WARBLER ECOLOGY AND MANAGEMENT ON GRAZING AREAS

We measured response of Golden-winged Warblers (*Vermivora chrysoptera*) to brush-clearing and selective tree removal on high-elevation grazing areas on the Monongahela National Forest, West Virginia. Federally-owned grazing areas present a unique situation for conservation in that maintenance of early-successional habitat can be accomplished with minimal effort, while benefiting multiple use needs of the US Forest Service and local farmers. Pre- and post-treatment data were collected in 2008 and 2009, respectively. Based on seven nests and 28 territorial males in 2008, we found Mayfield nest success of 46.3% (67.8% excluding one nest abandoned after the first egg was laid), mean number of fledglings of 3.7/nest, and mean territory density of 5.4 males/ha. Blue-winged Warblers (*Vermivora pinus*) were absent from the site; however, there was one Brewster's Warbler hybrid territory. Thirty-three individuals were banded in 2008 to examine survival and return rates. High-elevation grazing areas may be high priority conservation areas because they sustain populations of Golden-winged Warblers while excluding Blue-

winged Warblers, are reliable long-term sources of habitat, and provide opportunities for positive interaction with the local community.

Abstract (5271); Session S08, Fri 14 August, Location: Irvine Auditorium, Amado Recital Room, Oral at 10:30

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#### THE EFFECTS OF SEASONALITY ON THE MIMETIC REPERTOIRE OF THE NORTHERN MOCKINGBIRD

A large number of bird species are vocal mimics, meaning they imitate the sounds of local heterospecifics. Despite the fact that sound environments vary greatly throughout the year, we know virtually nothing about whether mimetic repertoires also vary seasonally. We hypothesized that the mimetic repertoire of a prominent mimic, the Northern Mockingbird (*Mimus polyglottos*), would change depending on the migration patterns of mimicked species. We tested this hypothesis by sampling song from mockingbirds four times throughout the year: fall after migrants had departed, early breeding season, mid-breeding season, and late breeding season after spring migrants had arrived. We will finish data collection in late May, and we will analyze the recordings during June and July by reporting changes in both the mimetic repertoire and the frequencies with which mimicked vocalizations were produced.

Abstract (5235); Session G22, Sat 15 August, Location: Irvine Auditorium, Amado Recital Room, Oral at 14:00

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#### COMPARATIVE STRUCTURE AND ORGANIZATION OF CANOPY BIRD COMMUNITIES IN HONDURAS AND BRAZIL

Bird communities of Neotropical forest canopies have been understudied because of the difficulty of access or viEwing, New Jersey into the canopy. We provide the first quantitative comparison of canopy bird communities in northern Central America and central Amazonia based on extensive fieldwork in the forest canopy at Pico Bonito National Park, Honduras, and Manaus, Brazil. Our combined data set of 200 censuses and > 11,000 individual detections represents the largest data set to date on canopy birds. Number of species and individual detections per 3-hr census in Brazil (39.4 and 78.6, respectively) averaged higher than in Honduras (21.9 and 48.5). Organization of the two communities differed fundamentally. Brazil had higher species richness and diversity than Honduras. Also, the Honduras community was dominated by a small number of superabundant species, whereas the distribution of abundances in Brazil was more even. Both canopy communities had more omnivores and fewer insectivores than expected when compared with the regional pool of available canopy species. Despite this convergence, composition of guilds differed, with more raptors and granivores found in Brazil, and more nectarivores found in Honduras.

Abstract (5270); Session G12, Fri 14 August, Location: Irvine Auditorium, Café 58, Oral at 09:45

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#### STATE OF THE BIRDS III: ARCTIC, COASTS, OCEANS, HAWAIIAN BIRDS, ENDANGERED SPECIES

The State of the Birds report was the first attempt to comprehensively assess the status of all U.S. birds. Information for populations breeding in arctic and alpine regions is generally lacking; only 27 of 85 species could be analyzed, of which 10 arctic landbirds showed a declining trend. Although coastal birds are generally faring well, many ocean bird appear to be declining or their population trends are unknown; little quantitative information exists to evaluate the magnitude of population declines. Negative effects of some fisheries and pollution on survival of ocean birds is well documented. More than one-third of the 74 bird species, subspecies, or populations listed under the U.S. Endangered Species Act occur in Hawaii, 71 species have gone extinct since humans colonized the islands in 300 AD, and at least 10 more species have not been seen in the last 40 years. Proven conservation measures such as land protection, exotic predator control, and captive breeding are needed to avert further extinctions. Proactive conservation is far more cost-effective than listing species that then require intensive management to recover populations.

Abstract (5350); Session S11, Sat 15 August, Location: College Hall, Room 200, Oral at 16:30

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#### FOOD SUPPLEMENTS, NESTLING GROWTH AND DOUBLE BROODING IN THE EASTERN BLUEBIRD

We tested the hypothesis that mealworm supplements affect nestling growth and the probability of double brooding in the eastern bluebird (*Sialia sialis*). Nests were supplemented with mealworms from nest completion until the brood fledged. Length of incubation and nestling periods were determined by daily checks of the nest boxes. Nestling mass was measured daily for 13 days after hatch. Double brooding was determined as the presence of a second clutch in a

previously successful nest box. Incubation period was unaffected by treatment while nestling period was significantly shorter at supplemented nests ( $t=-0.88$ ,  $p=0.45$ ). Nestling mass was significantly greater at supplemented nests near the end of the nestling period ( $t=2.14$ ,  $p=0.02$ ). Mealworm supplements appeared to increase the rate of double brooding (71% supplemented vs. 28% control; Fisher's Exact Test,  $p=0.13$ ), but the power of analysis was low. We conclude that a shortened nestling period mediated by heavier nestling mass may play a role in a pair's decision to double brood.

Abstract (5331); Session GP02, Fri 14 August, Location: Houston Hall, Hall of Flags, Poster Num: 2

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#### PHYLOGEOGRAPHY OF THE SPOT-CROWNED WOODCREEPER (AVES: FURNARIIDAE) IN MESOAMERICA

We analyzed the genetic variation of the Spot-Crowned Woodcreeper (*Lepidocolaptes affinis*) in Mesoamerica by sequencing 1869bp of mtDNA regions (CytB and ND2) of 79 specimens of 34 localities from North-Eastern México to Costa Rica. We studied the genetic diversity and structure with population genetics methods and examined demographic history with mismatch distributions and coalescent based methods. The phylogenetic relationships between haplotypes were analyzed using ML, MP and Bayesian approaches. The Spot-Crowned Woodcreeper presented a moderate genetic diversity (36 unique haplotypes, nucleotide diversity=0.005) and low differentiation among individuals (mean p-uncorrected divergence=1.8%). The phylogeographic pattern showed that the Nicaragua depression was an evident geographic barrier. Populations in the two sides of Tehuantepec isthmus did not show strong differentiation. In Mexico, the Oaxaca mountains and the Sierra Madre Oriental populations were related and composed of two different lineages. Relationships among many haplotypes were not fully resolved likely due to recent differentiation. In general, our data didn't support a scenario of demographic expansion and the only population that showed evidence of a genetic bottleneck was Costa Rica.

Abstract (5255); Session G11, Fri 14 August, Location: Cohen Hall, Terrace Room, Oral at 11:30

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#### SHORT-TERM EXPOSURE TO TESTOSTERONE INCREASES DOMINANCE INTERACTIONS AND ENHANCES BILL COLOR IN ZEBRA FINCHES

Testosterone (T) can underlie both male-male competition and mate choice displays. In zebra finches, it is not clear whether bill color influences male-male interactions and how bill color responds to short-term changes in T. We tested whether a single injection of T would influence male-male dominance interactions and change bill color. Birds in triads established hierarchies. Dominant, subordinate, or sham control birds were then injected with T. Contrary to previous studies, we found that zebra finch males form stable dominance hierarchies and that bill brightness, not hue, predicted dominance status of control males. Exposure to T led both dominant and subordinate birds to increase dominance scores over four days, longer than the < 24hr period in which injected T stays active. In addition, exposure to T increased bill brightness and hue in four days, showing the dynamic nature of allocation of pigments to the bill. Our results suggest that zebra finches can modulate T and bill color levels over short time periods and these changes occur through positive feedback between T levels and dominance beyond those caused by a single exposure.

Abstract (5189); Session G14, Fri 14 August, Location: Cohen Hall, G17 Auditorium, Oral at 14:00

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#### THE ADAPTIVE SIGNIFICANCE OF BROOD SIZE IN AMERICAN COOTS

The adaptive significance of clutch size in precocial birds is an enigma. American Coots (*Fulica americana*) produce large broods of asynchronously hatching precocial offspring, but reproductive capacity does not appear to be limited by the ability to produce or incubate additional eggs. To determine if coots are limited by brood-rearing capacity, I experimentally manipulated brood size and hatching asynchrony for 1084 coot chicks from 99 nests and measured fledging success using mark-recapture analysis. Survival to 40 days of age averaged 0.52 and was affected by brood size, hatching order, hatchling size, and supplemental feeding. Experimentally enlarged broods fledged slightly more offspring than control broods, whereas experimentally reduced broods fledged substantially fewer offspring. The ability of adult coots to raise additional offspring improved with supplemental feeding and declined with increased hatching asynchrony, suggesting that the ability of parents to provision broods is the key factor limiting reproductive success. I conclude that clutch size in American Coots is determined primarily by the ability of parents to provision their young during the first 20 days of life.

Abstract (5533); Session G16, Fri 14 August, Location: Irvine Auditorium, Café 58, Oral at 16:45

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#### RED KNOT IN THE WESTERN HEMISPHERE: HOW IMPORTANT IS DELAWARE BAY TO POPULATION VIABILITY?

Studies of adult Red Knots at the critical refuelling stopover site in Delaware Bay before departure to the Arctic breeding grounds, and at Mingan Archipelago in Quebec following the breeding season, show that annual survival of adults is now within the normal range for the species. The continuing decline of the population in 2002-2007 is therefore attributed partly to poor recruitment of young in the Arctic, which in turn reflects inadequate refuelling in Delaware Bay and thus a reduction in the number of successful breeders. Arrival times of post-breeding adults at Mingan indicated poor breeding seasons in 2006-2007, but in 2008 a large peak of late arriving males fledging young suggested a rare good breeding season. This was confirmed by an increase of about 3,000 birds in the annual count in the wintering population in Tierra del Fuego, the first significant expansion since the 2000-2001 massive losses. The partial ban on horseshoe crab harvesting in Delaware Bay during May likely allowed more Red Knots to refuel adequately and breed successfully in 2008, and is fundamental to population viability.

Abstract (5426); Session S01, Thu 13 August, Location: Cohen Hall, G17 Auditorium, Oral at 17:00

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#### MULTILOCUS PHYLOGEOGRAPHY OF AUSTRALIAN GRASSFINCHES

The zebra finch *Taeniopygia guttata* has long been an important model system for the study of neurobiology and behavior, and with the sequencing of its genome is poised to become a model system for evolutionary genomics. The zebra finch is unique among its grassfinch relatives in having successfully colonized the arid interior of Australia and the Lesser Sunda Islands. The double-barred finch *T. bichenovii* is the only congener of the zebra finch, and is distributed across important biogeographic barriers in northern Australia. We used a panel of 30 genetic loci to characterize the timing and demography of divergence between the two zebra finch subspecies and between populations of double-barred finches. Zebra finch populations in Australia show a strong signature of population expansion whereas those in the Lesser Sundas show signatures of a founder event that may have contributed to phenotypic divergence. Zebra finches appear to have colonized the Lesser Sunda islands in the early Pleistocene whereas double-barred finch populations are much less divergent. An understanding of the population structure of grassfinches is essential for informed interpretation of protein evolution in this clade.

Abstract (5453); Session S10, Sat 15 August, Location: College Hall, Room 200, Oral at 09:30

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#### INFLUENCE OF FOOD AND PREDATOR ABUNDANCE ON STRESS LEVELS OF SANDHILL CRANES WINTERING IN NORTHERN MEXICO

Intense and prolonged stress among birds affects survival and productivity. Stress levels, measured as levels of corticosterone hormones, may be influenced by food resources and predator recognition. However, few studies have explored the effects of such conditions on stress in wild birds. We evaluated the relationship between food and predator abundance on stress levels of sandhill cranes (*Grus canadensis*) wintering in wetlands in Northern Mexico during two winters, 2007-08 and 2008-09. Corticosterone was measured from fecal samples using an Enzyme Immunoassay (EIA). Cranes wintering in wetlands with low food abundance had higher levels of corticosterone (Mean =  $1149.0 \pm 328.0$  SE), than those in areas with high food (Mean =  $99.3 \pm 3.4$  SE). Cranes wintering in wetlands with high predator abundance showed higher levels of corticosterone (Mean =  $1953.0 \pm 373.0$  SE) versus those in wetlands with low predator abundance (Mean =  $116.7 \pm 6.2$  SE). Our results demonstrate the influence of two key environmental factors on stress among wild birds and represent the first account of such influences in cranes.

Abstract (5191); Session G16, Fri 14 August, Location: Irvine Auditorium, Café 58, Oral at 14:00

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 META-ANALYSIS OF TRANSMITTER EFFECTS ON AVIAN BEHAVIOR AND ECOLOGY

Researchers increasingly attach transmitters and other devices to free-living birds and assume that doing so does not harm the birds or bias the data collected. Although many studies have investigated transmitter effects on birds, their conclusions were generally limited to a single species or type of device. To achieve a broader understanding of this topic we combined results from 84 studies using a meta-analysis. We found a significant negative effect of transmitters on birds, both overall and for 8 of 12 specific aspects of behavior and ecology analyzed. Effects were independent of attributes of the birds (age, sex, body mass, primary method of locomotion) and we found no evidence that the mass of the device relative to the bird's mass contributed to effects. We did, however, find that the risk of device-induced mortality differed between attachment methods. Most effects were not a consequence of capture and restraint, suggesting that traditional mark-recapture techniques do not negatively affect birds. Researchers should carefully balance the benefits of these techniques against the potential costs to the birds and the reliability of the data obtained.

Abstract (5403); Session G13, Fri 14 August, Location: Houston Hall, Bodek Lounge, Oral at 12:00

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 USING NEST PLACEMENT PATTERNS TO UNDERSTAND THE ROLE OF SOCIAL VERSUS ECOLOGICAL CUES IN SALT MARSH SPARROW HABITAT SELECTION BEHAVIOR

Understanding when species distribution patterns should be ascribed to patterns in the physical habitat, rather than the influence of social cues, remains a crucial step in understanding avian habitat selection. To distinguish between these mechanisms, we assessed the spatial relationships of 213 saltmarsh sharp-tailed sparrow (*Ammodramus caudacutus*) nests. Tests of aggregation failed to detect any evidence for non-random nest placement. This result held when all nests were assessed together and when previous or currently active nests were considered alone. Although we identified spatial autocorrelation in the underlying saltmarsh vegetation features, there was no evidence that female sparrows aggregated in response to this patchiness. These results support the view that female sparrows do not use the location of other nests or patchiness in vegetation features as cues in their nest placement decisions. The nature of nest failure in this species due to tidal flooding suggests that cues operating at the entire marsh level could be more important for habitat selection decisions than the more local nest placement cues investigated here. Further analysis of nest flooding data is underway.

Abstract (5372); Session G01, Thu 13 August, Location: Cohen Hall, G17 Auditorium, Oral at 10:30

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THE INFLUENCE OF LOCAL HABITAT HETEROGENEITY ON THE STRENGTH OF SEXUAL SELECTION IN PROTHONOTARY WARBLERS

That the strength of sexual selection is contingent on the environment is a relatively recent discovery that is now the focus of empirical research. However, few studies have examined how local ecological conditions could alter the strength of sexual selection. We tested this hypothesis by examining reproductive behavior of prothonotary warblers which breed in areas that differ drastically in the amount of vegetation present. This could alter the efficacy of mate guarding and increase the occurrence of extra-pair paternity (EPP). We predicted that birds breeding in areas of dense vegetation would mate guard more intensely but have higher rates of EPP than birds in open areas. We found that males tend to spend more time close to fertile females in dense vegetation than males in more open areas. Preliminary paternity analysis indicates that EPP does occur in prothonotary warblers and we will go on to examine the effect of habitat on its occurrence. These results could allow us to understand how selection may vary over space which provides a mechanism for maintaining additive genetic variance in traits under strong directional selection.

Abstract (5230); Session G09, Thu 13 August, Location: Irvine Auditorium, Café 58, Oral at 14:00

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#### LONG-TERM LANDSCAPE SCALE RESPONSE OF FOREST-BREEDING SONGBIRDS ON AN INTENSIVELY MANAGED APPALACHIAN FOREST

Forest-nesting passerines may be negatively impacted by forest disturbance from logging activities, though management can produce habitat for early successional species. We examined abundance and nesting success of songbirds relative to habitat changes, identified landscape features influencing avian community changes, and identified disturbance thresholds. We conducted point counts on an industrial forest in West Virginia from 1996–1998, 2001–2003, and 2007–2008, monitored nests of 12 focal species, and modeled abundance with landscape variables. Since 1996, mature forest cover declined by 51%. Total individuals, species diversity, Shannon diversity, and interior-edge species peaked in 2002; forest-interior species declined after 2001. Edge species increased even after habitat disturbance surpassed the tolerance threshold for forest species. Declining forest-interior and interior-edge abundance was associated with more clearcuts, edge density, and patch shape complexity. Interior-edge species benefited from partial harvests. Edge species abundance increased with increased edge density and clearcuts. Nest success significantly increased for American Robin and declined for Blue-headed Vireo and Wood Thrush. Overall, the shift in the bird community occurred 5–6 years post-harvest. Management using partial harvests might delay the threshold for forest birds.

Abstract (5259); Session G05, Thu 13 August, Location: Irvine Auditorium, Amado Recital Room, Oral at 12:00

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#### IS PLAYING FAVORITES A BENEFICIAL PARENTAL INVESTMENT STRATEGY IN LARGER BROODS?

The energetic cost imposed on parents by nestlings generally increases in larger broods. We tested the hypothesis that a beneficial strategy for parents with larger broods is to consolidate resources into fewer nestlings instead of distributing less food evenly to all offspring. We manipulated parental workload of Mountain Chickadees by creating reduced, enlarged, and control brood size treatments. Parental effort increased with an increase in brood size, yet maternal condition after feeding nestlings for 15 days was similar for all treatments. Enlarged broods had the most within-nest variation in nestling condition, suggesting that food distribution becomes biased as parental workload increases. However, more above-average quality nestlings were raised in enlarged broods despite the greater between-sibling variation. Sons were similar in weight for all treatments, but daughters were lightest in the enlarged broods. Chickadee parents appear to be able to produce more high quality offspring at little cost to themselves but at a cost to daughters. Future research should address whether parents are selectively investing in sons or responding to competitive behaviors that may be expressed more by males.

Abstract (5194); Session G06, Thu 13 August, Location: Irvine Auditorium, Café 58, Oral at 12:15

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#### HABITAT AND MIXED-SPECIES FLOCK USE BY BOREAL MIGRANTS IN EASTERN ECUADOR WITH EMPHASIS ON CANADA WARBLER (*WILSONIA CANADENSIS*)

Little data exists on habitat and mixed-species flock use by boreal migrants in South America. Between 7 January and 20 February 2009 we noted age, sex, habitat, and mixed-species flock occurrence for each migrant detected at a study site in eastern Ecuador. We detected 13 species 775 times in five habitat types. Eight of 13 species preferred secondary forest, including Canada Warbler, while three others preferred pasture or edge. 10 of 13 species followed mixed-species flocks, but only three >50% of the time. Male Canada Warblers were more frequent (36%) in primary forest than females (2.6%,  $\chi^2 = 20.91$ ,  $df = 4$ ,  $p < 0.001$ ). Females were detected with greater frequency (23.1%) relative to males in both scrub and edge (1.8% scrub, 12.7% edge,  $\chi^2 = 27.53$ ,  $df = 8$ ,  $p < 0.001$ ). Younger males were detected in flocks (88.9%) more than females (46.1%) or older males (55.6%,  $\chi^2 = 9.38$ ,  $df = 2$ ,  $p < 0.01$ ). Though basic, data on habitat preference and mixed-species flock use may aid conservation efforts and further research on these species in South America.

Abstract (5367); Session GP34, Fri 14 August, Location: Houston Hall, Hall of Flags, Poster Num: 87



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PHYLOGEOGRAPHY, COURTSHIP ETHOLOGY, AND SPECIES LIMITS IN THE MACGREGOR'S BOWERBIRD COMPLEX (*AMBLYORNIS MACGREGORIAE*)

New Guinea's extensive montane ecosystems span a composite landscape of disparate geological origins, across which several putative barriers to gene flow have been traditionally postulated in shaping the evolutionary history of the island's montane avifauna. To date, the biogeographic relationships of populations isolated on these montane "forest islands" have yet to be examined within a modern molecular framework, and species limits for much of this diversity remains poorly known. Herein I use mtDNA sequence data to examine patterns of genetic variation in Macgregor's Bowerbird (*Amblyornis macgregoriae*), explore how proposed geographic barriers and habitat fragmentation have shaped genetic structure within the species, and test the validity of previously described subspecies. Broad geographic sampling reveals shallow genetic divergences across well-documented biogeographic breaks in the central highlands and Papuan peninsula, whereas both shallow and highly divergent lineages were recovered among peripherally isolated populations. These results are integrated with an analysis of bower morphology and courtship display behavior sampled across 6 of 7 subspecies to further resolve species limits within the complex and shed light on evolution of the courtship phenotype in *Amblyornis* bowerbirds.

Abstract (5542); Session G11, Fri 14 August, Location: Cohen Hall, Terrace Room, Oral at 11:15

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MORPHOLOGICAL VARIATION IN THE COOPER'S HAWK: USING THREE-DIMENSIONAL MORPHOMETRICS TO INVESTIGATE SHAPE CHANGES RELATED TO SEXUAL DIMORPHISM AND ENVIRONMENT

Sexual size dimorphism has been analyzed in relationship to behavior in Falconiformes, but shape dimorphism has rarely been investigated. Furthermore, many biomechanical studies use living birds for analyses, but there has been no investigation of shape change between wild and captive birds and its affect on flight biomechanics. This study uses three-dimensional landmarks to investigate shape changes between males and females and wild and captive specimens in the Cooper's Hawk (*Accipiter cooperii*). The sterna and furculae of 30 individuals were digitized and compared using Principal Component Analyses and MANOVA to test for significance between sexes as well as wild vs. captive specimens. Results indicate no significant shape difference between male and female specimens. However, captive specimens show less shape variation than the wild specimens, indicating this species exhibits phenotypic plasticity and become more similar in shape when brought into captivity. This result indicates that captive specimens may not be suitable for biomechanical studies and biomechanical variations between wild and captive birds should be further studied.

Abstract (5501); Session GP35, Fri 14 August, Location: Houston Hall, Hall of Flags, Poster Num: 91

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SHIFTS IN OVENBIRD TERRITORIES IN A CONTIGUOUS FOREST

Male songbirds typically show high rates of territory fidelity and some studies indicate that reproductive failure may influence an individual's decision to move territories. We used 10 years of data collected from color-banded male Ovenbirds on two study sites in eastern Pennsylvania to investigate inter-year territory shifts. Using spot-mapping data to draw territories in a GIS, we calculated the proportion each bird's territory overlapped its previous year territory and its first-year territory. Territory shifts did not appear to be associated with reproductive failure and territories from consecutive years tended to overlap considerably. However, proportional overlap tended to decline with territories separated by more than one year in time. We will discuss the implications of the observed pattern of territory drift given that few studies collect data beyond two to three years.

Abstract (5468); Session G17, Fri 14 August, Location: Houston Hall, Bodek Lounge, Oral at 15:00

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NEW YORK CITY AUDUBON'S HARBOR HERONS PROJECT: COLONIAL WATERBIRD POPULATION TRENDS IN NEW YORK/NEW JERSEY HARBOR, 1986-2008

Following an increase in colonial waterbird nesting in the New York/New Jersey Harbor during the 1970s, New York City Audubon founded the Harbor Herons Project to monitor the population status of colonial waterbirds on island and mainland habitats. Monitoring efforts have focused on long-legged wading birds and Double-crested Cormorants, with additional effort devoted to gulls and terns. Between 1986 and 2008, nine species of long-legged wading birds have nested on 14 islands, with a mean population size of 1,580 total pairs; a mean of 1,065 total pairs of Double-

crested Cormorants have nested on seven islands. Great Black-backed and Herring gulls have nested on 17 islands, and Common Terns on one island. One mainland colony, occupied by Yellow-crowned Night-Herons, is the single largest colony of this species in New York State. There have been substantial shifts in the number of islands occupied by colonial waterbirds within the Harbor. In general, population trends for long-legged wading birds in the Harbor have tracked regional trends; Double-crested Cormorant and gull population trends have appeared more variable.

Abstract (5430); Session S07, Sat 15 August, Location: Houston Hall, Class of '49 Auditorium, Oral at 09:00

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#### POPULATION GENETICS OF A RECENT TRANSCONTINENTAL COLONIZATION OF SOUTH AMERICA BY BREEDING BARN SWALLOWS

Well characterized intercontinental colonizations by birds are rare. In 1980, six pairs of Barn Swallows were found breeding in Argentina within the species' historic wintering range, and this South American population has since grown to thousands of pairs. We explored the genetic context and consequences of this colonization event via comparisons among the South American population and two North American populations. We tested for evidence of a genetic founder event by assessing allelic diversity at eight microsatellite loci and haplotype diversity of mitochondrial ND2 sequences. Contrary to our expectations, the recently established South American breeding population of Barn Swallow showed no evidence of a founder effect, with no difference in heterozygosity, allelic diversity, haplotype diversity, or population differentiation relative to the North American populations. The genetic similarity of these populations suggests that this long-distance colonization event was not associated with a strong demographic bottleneck, possibly because the South American population has continued to receive gene flow via ongoing immigration from North America.

Abstract (5410); Session G08, Thu 13 August, Location: Houston Hall, Bodek Lounge, Oral at 14:15

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#### ISLAND BIOGEOGRAPHY AND THE ORIGIN OF THE LEMON-COLLARED MANAKIN IN BOCAS DEL TORO, PANAMA

The Lemon-Collared Manakin (*Manacus cerritus*) in Bocas del Toro, Panama is thought to have originated from unidirectional introgression from the Golden-Collared Manakin (*Manacus vitellinus*) into the White-Collared Manakin (*Manacus candei*) through a present-day hybrid zone on the mainland. New evidence demonstrates that the Lemon-Collared Manakin, or a similar subspecies, is also present on islands just off the coast of the hybrid zone. This suggests that the Lemon-Collared Manakin is possibly a much older subspecies of origin independent of the present day hybrid zone on the mainland. An alternative interpretation is that the present-day mainland hybrid zone shows in real-time how an ancient hybridization event might have produced this similar subspecies, now stranded in the islands.

Abstract (5609); Session G11, Fri 14 August, Location: Cohen Hall, Terrace Room, Oral at 09:00

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#### NO ENERGETIC COST OF DISTURBANCE IN MIGRATORY SONGBIRDS

Anthropogenic or natural disturbances can have a significant impact on wild animals. Therefore, understanding when, how, and what type of human and natural events disturb animals is a central problem in wildlife conservation. We use heart rate telemetry to quantify the energy expenditure associated with different types of human-mediated and natural disturbances in a common and an endangered songbird, the White-eyed Vireo (*Vireo griseus*) and Black-capped Vireo (*Vireo atricapilla*), respectively. We fitted 0.5g heart rate transmitters to 24 male vireos and continuously recorded heart rate and activity. We calibrated heart rate to energy expenditure for eight additional males and show that heart rate predicted 74% and 92% of energy expenditure. We conducted standardized disturbance trials in the field to experimentally simulate a natural stressor, predator presence, and two anthropogenic stressors. Although vireos initially showed behavioral and heart rate reactions to some disturbances, we could not detect an overall increase in energy expenditure during one- or four-hour disturbances in White-eyed Vireos. We suggest that these birds quickly determined that disturbances were non-threatening and thus showed no (costly) physiological response.

Abstract (5321); Session G10, Thu 13 August, Location: Irvine Auditorium, Amado Recital Room, Oral at 16:15

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**FECAL ODOR IS A PUTATIVE ALARM SIGNAL IN THE DOMESTIC CHICKEN (*GALLUS GALLUS DOMESTICUS*)**

Alarm odors are commonly used signals in many animal taxa, but we know almost nothing about them in birds. We tested (N=87) domestic chicks to a putative alarm odor from conspecific feces. "Odor-producing" chicks, from which feces were collected, experienced alarm during a simulated attack from a natural predator (Cooper's Hawk [*Accipiter cooperii*] mounted on a pulley system). Controls experienced no predator. Odor-producers were also fed one of two diets: (1) a "natural" diet (insects, greens and seeds), or (2) a "control" diet of gamebird chow. A naive group of "response" chicks reacted to fecal odors. Odor exposure followed a published method that tests birds in the hand in a tonically-immobile, "sleep-like" state. The degree to which birds rouse from sleep reveals discrimination between odor types. Chicks reacted most strongly to the fecal odor of alarmed conspecifics fed the "natural" diet, compared to all other treatments. Our results suggest that conspecific odors indicative of alarm are detectable to chickens, occur in feces, and are linked to diet. We suggest that birds may perceive other conspecific cues through fecal odor.

Abstract (5584); Session GP29, Fri 14 August, Location: Houston Hall, Hall of Flags, Poster Num: 77

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**CAN TREE DECAY DYNAMICS AND STAND DECAY PROFILES SERVE AS PREDICTORS OF FUTURE WOODPECKER-FRIENDLY FORESTS?**

Cavity-nesting birds account for up to one-third of avian communities in forested systems. The foundation of these communities consists of dead and/or decaying trees within which cavities are formed. Maintaining an adequate number and diversity of suitable woodpecker excavation trees is necessary to sustain cavity-nesting populations within managed forests. Nest-site selection data reveals preferred tree characteristics at the time of nesting, however, predicting which trees will become suitable for excavation in future years is a high priority management need. Using 12 years of tree and nesting data within mixed deciduous coniferous forests of interior British Columbia, we examined decay dynamics of trembling aspen, which accounted for 97% of 1262 woodpecker nests found. Our goal was to determine if tree decay dynamics and stand decay profiles can be used to predict future woodpecker-friendly forests. Here we (a) present recruitment, decay and loss rates of aspen, (b) compare decay dynamics of random aspen to woodpecker nest-trees, (c) compare stand decay availability profiles and woodpecker decay selection profiles across areas of varying woodpecker nesting effort, and (d) discuss implications for cavity-nester management strategies.

Abstract (5346); Session G17, Fri 14 August, Location: Houston Hall, Bodek Lounge, Oral at 15:15

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**BIRD COMMUNITY RESPONSE TO VEGETATION COMPOSITION AND STRUCTURE IN FILTER STRIPS IN MARYLAND**

Filter strips are strips of herbaceous vegetation (i.e. herbaceous buffers) that are generally planted between rowcrop fields and streams or wetlands. Over 16,000 ha of filter strips have been enrolled in Maryland through the U.S. Department of Agriculture's Conservation Reserve Program (CRP). In the summers of 2004–2006 we studied the bird community response to vegetation composition and structure in filter strips in Maryland. Most bird community metrics were positively associated with the percent cover of forbs and plant species richness, and negatively associated with vegetation density and height, litter depth, and the percent cover of warm-season grasses and orchardgrass (*Dactylis glomerata*; a cool-season grass). Most nests were located in relatively tall and sturdy forbs and shrubs. Our findings suggest that bird habitat would be improved if filter strips included shorter, less dense grasses, higher plant species diversity, and higher numbers of forbs. If bird conservation is a priority, we recommend against planting orchardgrass in filter strips or periodically decreasing the percent cover of orchardgrass.

Abstract (5217); Session GP06, Fri 14 August, Location: Houston Hall, Hall of Flags, Poster Num: 18

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#### UNIQUE CRYPTIC DIVERSITY IN A MALAGASY PASSERINE

Long-billed Greenbul (*Bernieria madagascariensis*) belongs to an endemic Malagasy passerine clade, "Bernieridae". It is the only member of the clade to inhabit both the western dry forest and eastern humid forest of Madagascar, and its two described subspecies correspond to these habitats. *B. m. madagascariensis* occupies eastern humid forest, and the paler *B. m. inceleber* inhabits the western dry forest. A phylogeographic survey of the species yielded two widely divergent groups, with a 16.2% mean corrected pairwise distance between mitochondrial haplotype clades. Surprisingly, these clades do not correspond to the described subspecies, which cannot be distinguished genetically. One clade is restricted to humid forest in the southeastern part of the island, and the other is widespread over the rest of the species' range, with no known overlap. Despite plumage differences between the described subspecies, the haplotype clades do not exhibit distinguishing phenotypic differences, including in vocalizations, plumage, or size. This level of phenotypical stasis despite extreme mitochondrial divergence may be a unique scenario in birds. Further, the data highlight the important role of cryptic diversification in Malagasy passerine biodiversity.

Abstract (5379); Session G21, Sat 15 August, Location: Houston Hall, Class of '49 Auditorium, Oral at 14:00

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#### GOING BEYOND THE ENDANGERED SPECIES ACT: A NEW MODEL FOR POST-RECOVERY MANAGEMENT FOR THE COMPLETELY CONSERVATION-RELIANT KIRTLAND'S WARBLER

One of the greatest successes of the Endangered Species Act (ESA) is the biological recovery of the Kirtland's Warbler, but this success cannot be acknowledged under ESA because it is dependent on annual management. The species was listed as endangered due to the loss of its jack pine breeding habitat in Michigan after decades of forest fragmentation and fire prevention. Its decline was accelerated by reproductive losses from nest parasitism by Brown-headed Cowbirds. Recovery efforts include management of jack pine plantations on dry sandy soils and removal of the nest parasites, resulting in a ten-fold increase in the population size by 2007. The species' population size has reached the recovery target, but it is completely reliant on perpetual recovery efforts. The most significant threat to the species is the loss of annual management funding. The Kirtland's Warbler Recovery Team is pursuing a new paradigm for post-recovery management that hinges on a shift from public funding under ESA to a public/private partnership to achieve the early-succession ecosystem management necessary to support Kirtland's Warblers and their jack pine associates into perpetuity.

Abstract (5544); Session S02, Thu 13 August, Location: Houston Hall, Class of '49 Auditorium, Oral at 16:00

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#### COLOR DISCRIMINATION LEARNING AND MEMORY IN JUNGLE CROWS (*CORVUS MACRORHYNCHOS*)

We studied color discrimination learning and memory in jungle crows (*Corvus macrorhynchos*) of the corvidae family in class Aves. Corvids are characterized by the presence of relatively large brain size among birds and their ability to learn and perform complex cognitive tests. However, how long they retain and retrieve the learned task in relation to the complexity of the task is not clear in jungle crows. In the present study, two choice color discrimination task experiment was performed using wild caught jungle crows (N=12) and tested for memory. This preliminary study showed that jungle crows learn color discrimination task and reach to the criterion (80% or more correct choice in two consecutive days) in a few trials. They also discriminated the correct color stimuli after one, two and three months making very few errors. This shows that jungle crows can learn from their experience and retrieve for later use. We suggest that Jungle crows may remember the learned task even much longer.

Abstract (5184); Session GP29, Fri 14 August, Location: Houston Hall, Hall of Flags, Poster Num: 121

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#### GEOGRAPHIC VARIATION AND EVOLUTION OF YELLOWTHROAT (*GEOTHLYPIS*) SONG

Common yellowthroats use learned, single-song repertoires that vary geographically. Patterns of geographic and temporal variation can reveal the effects of genetics and dispersal on cultural evolution of song, so we examined such

variation in common yellowthroat (*G. trichas*) note types, note structure, and song structure. We compared genetically differentiated eastern and western populations, and also compared migratory and resident subspecies. In addition, we compared song structure among four *Geothlypis* species: *G. trichas*, *G. aequinoctialis*, *G. poliocephala*, and *G. semiflava*. In migratory *G. trichas*, we found local populations share songs that are relatively stable over time, but there are no widespread patterns of geographic variation. The largest differences in song structure were between migratory and resident subspecies. In general, tropical yellowthroats have longer, more complex songs. These results suggest that historic differences in dispersal strongly affect cultural evolution in yellowthroats.

Abstract (5380); Session G22, Sat 15 August, Location: Irvine Auditorium, Amado Recital Room, Oral at 14:15

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#### BLOOD SAMPLING REDUCES ANNUAL SURVIVAL IN CLIFF SWALLOWS

Researchers commonly collect blood samples from wild birds, and most assume that blood sampling has no adverse effect on the birds. Few have done controlled comparisons among bled and non-bled birds and estimated survival using modern statistical methodology. We used a dataset on Cliff Swallows (*Petrochelidon pyrrhonota*) containing 2945 bled and 7822 non-bled birds captured at the same time and at the same sites in Nebraska to estimate annual survival and recapture probabilities of each group. Blood was collected in amounts varying from 0.3–1.2% of the birds' body mass. Apparent survival of bled birds was lower than that of birds not bled; bled birds experienced a 21–33% reduction in average survivorship, depending on amount of blood taken and whether birds were resident at a fumigated or non-fumigated colony. The reduction in annual survival was higher for birds at non-fumigated colonies. All effects of blood sampling applied only in the year after sampling. Our results suggest that blood sampling is not benign. Researchers following the 1%-of-body-mass guideline may be collecting too much blood, especially when research requires repeated samples.

Abstract (5177); Session GP06, Fri 14 August, Location: Houston Hall, Hall of Flags, Poster Num: 19

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#### INVASIVE BIRDS IN A NOVEL LANDSCAPE: HABITAT ASSOCIATIONS AND EFFECTS ON ESTABLISHED SPECIES

Studying the relationships among introduced species, their preferred habitats, and native species can be important for predicting the effects of invasives on native populations. Examining the colonization of North America by the Eurasian collared-dove *Streptopelia decaocto*, we quantified the habitat characteristics of sites most likely to be occupied by this invasive bird species. Further, we studied the relationship between collared-dove abundance and the abundance of other dove species in the study area. Linking satellite-derived land-cover data with winter bird community data from 444 study sites in Florida, U.S.A. from 1999–2008, we found that collared-doves were more likely to occupy sites in landscapes that have been highly-modified by human activity than sites in forested landscapes. The probability of site occupancy was also related to the spatial proximity of other sites reporting doves (positive autocorrelation). Contrary to our expectations, the site-level abundance of four other dove species all increased with collared-dove abundance. Interactions between collared-doves and native species should be further studied in different environments as this invasive bird rapidly colonizes North America.

Abstract (5238); Session G03, Thu 13 August, Location: Cohen Hall, Terrace Room, Oral at 12:00

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#### WHY DOES NEST SURVIVAL VARY SEASONALLY?

Clutch size declines as the breeding season progresses in many bird species, suggesting that birds should breed early to maximize annual fecundity. However, seasonal trends in other reproductive parameters, such as nest survival may also affect the optimal time for breeding. Seasonal variation in nest survival, however; has largely been ignored in studies addressing breeding phenology. Moreover, little is known about seasonal patterns in nest survival. In the Sierra Nevada Mountains of northern California, nest survival of Wilson's Warblers (*Wilsonia pusilla*) varies seasonally. To determine the underlying causes of seasonal variation in nest survival, we modeled nest survival as a function of (1) foliage density and (2) availability of alternative food resources for nest predators. Our results suggest that seasonal changes in foliage density cause seasonal variation in nest survival. Availability of food resources for nest predators did not appear to influence seasonal variation in nest survival. A critical examination of seasonal variation in nest

survival will help identify the underlying processes that influence breeding phenology as well as help isolate factors that affect the risk of nest predation.

Abstract (5465); Session G24, Sat 15 August, Location: Cohen Hall, Terrace Room, Oral at 16:00

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#### RESONATING FEATHERS INDUCE WING TO SING IN *MACHAEROPTERUS DELICIOSUS* (PIPRIDAE)

Male Club-winged manakins produce a unique, tonal sonation while perched during courtship. The sound was hypothesized to result from excitation of resonance in modified secondary feathers at or near the fundamental frequency of the sound produced in nature. Here we use laser vibrometry to measure and compare the resonant properties of the secondary feathers of the Club-winged manakin relative to two other manakin species to test the resonant prediction of the resonant stridulation hypothesis. We determined that the enlarged 6th and 7th secondary feathers of *M. deliciosus* have a pronounced frequency peak near 1500 Hz, and further exhibit exceptionally high Q properties. The unmodified secondary feathers of the wing do not exhibit strong resonant properties when measured in isolation. However, when measured with the modified secondary feathers, the unmodified feathers are induced to resonate in phase near the 1500Hz frequency, and harmonics emerge. These results lend critical support to the resonant stridulation hypothesis of sound production in *Machaeropterus deliciosus*, and refines the sound-producing model to include that the unmodified wing is also an important part of the sound producing mechanism.

Abstract (5429); Session G18, Sat 15 August, Location: Irvine Auditorium, Amado Recital Room, Oral at 12:15

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#### CLIMATIC PATTERNS PREDICT THE ELABORATION OF SONG DISPLAYS IN MOCKINGBIRDS

Climatic patterns affect the distribution and abundance of resources and the timing and duration of breeding opportunities. In vertebrates, climatic variability selects for enhanced cognition when organisms compensate for environmental changes through learning and innovation. This hypothesis is supported by larger brain sizes, higher foraging innovation rates, higher reproductive flexibility, and higher sociality in species living in more variable climates. Male songbirds sing to attract females and repel rivals. Given the reliance of these displays on learning and innovation, we hypothesized that they could also be affected by climatic patterns. Here we show that in the mockingbird family, species subject to more variable and unpredictable climates have more elaborate song displays. We discuss two potential mechanisms for this result, both of which acknowledge that the complexity of song displays is largely driven by sexual selection. First, stronger selection in more variable and unpredictable climates could lead to the elaboration of signal quality. Alternatively, selection for enhanced learning and innovation in more variable and unpredictable climates might lead to the evolution of signals of intelligence in the context of mate attraction.

Abstract (5610); Session S09, Sat 15 August, Location: Cohen Hall, G17 Auditorium, Oral at 10:30

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#### EFFECTS OF FOREST MANAGEMENT ON DENSITY AND REPRODUCTIVE SUCCESS OF CERULEAN WARBLERS IN THE APPALACHIAN MOUNTAINS

Cerulean Warblers (*Dendroica cerulea*) are among the fastest declining forest songbirds in the United States (Sauer et al. 2008). One way we may be able to improve breeding habitat for Cerulean Warblers is through the use of forest management. In this ongoing study, we experimentally manipulated forest stands (using three levels of harvest and control) on seven sites across the Appalachian Mountains, where 80% of the global Cerulean Warbler population currently breeds (Buehler et al. 2006). From 2005-08, we utilized spot-mapping (Bibby 1992) and nest monitoring

(n=315 nests) to compare density and reproductive success before (2005-06) and after harvest (2007-08). In 2008, density increased by 37, 43, and 45% on the light, intermediate, and heavy harvests respectively, and decreased by 22% on the control plots (versus pre-harvest averages). Mayfield nest success was lower on harvested plots (41%) in 2008 than the controls (55%). Nest success also varied annually across all sites (23 – 52%) and among sites (22 – 65% in 2008). These results suggest that some silvicultural practices may increase Cerulean Warbler density, but may also lead to a decline in nest success. The next two years of data should help elucidate these relationships.

Abstract (5368); Session GP20, Fri 14 August, Location: Houston Hall, Hall of Flags, Poster Num: 54

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#### ASSESSING AND IMPROVING THE CLIMATE FOR WOMEN SCIENTISTS AT THE DEPARTMENTAL AND INSTITUTIONAL LEVELS THROUGH THE IOWA STATE ADVANCE PROGRAM

The ISU ADVANCE Program uses a comprehensive approach to recruit, retain, and advance women faculty in STEM disciplines. Our program works at all levels of the university, using “top-down” and “bottom up” approaches. Our most intensive work, the Collaborative Transformation Project, uses the “bottom up” approach, working with all faculty (women and men) in selected focal departments to ascertain their experiences and to work with them to improve departmental climate. At the college and University levels (“top down” approach), we are sharing the lessons learned from focal departments and developing initiatives that benefit all faculty. We have sponsored workshops and discussions to inform the faculty of ways that culture, practices and structure can enhance and/or hinder recruitment and retention, including events that address: unintentional bias, the findings from our faculty satisfaction survey, ways to increase faculty flexibility, and ways faculty search committees can increase diversity in candidate pools and avoid unintentional bias during the interview and selection process. The ISU ADVANCE Program has enhanced the awareness of the role that departmental climate can have on recruitment and retention of faculty.

Abstract (5454); Session GP35, Fri 14 August, Location: Houston Hall, Hall of Flags, Poster Num: 92

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#### PHYSIOLOGICAL COSTS AND LIFE-HISTORY TRADEOFFS OF ALTITUDINAL MIGRATION IN A PARTIALLY MIGRATORY SPECIES

Populations of White-ruffed Manakins (*Corapipo altera*) on the Atlantic slope of Costa Rica are partially migratory. Previous work suggests that food abundance cannot explain downhill migration in this species, and that migratory behaviour is condition-dependent. We examined a new hypothesis to explain why some manakins migrate altitudinally. The severity of wet-season rainstorms at high elevations is hypothesized to restrict foraging time to the extent that birds either risk starvation by remaining resident, or migrate downhill. As predicted, severe storms were associated with increases in stress hormone levels and fat deposition, changes in fuel use, and decreases in hematocrit. Furthermore, several of these indicators of condition revealed that resident manakins were more adversely affected by storms than migrants. Temporal patterns of capture of manakins and other altitudinal migrant species also strongly supported the idea that birds migrate downhill in response to bad weather. Physiological responses to storms among species differing in diets help explain why many frugivores and few insectivores migrate altitudinally. Current work examines how survival risks mediated by migration trade off with reproductive success in the subsequent breeding season.

Abstract (5339); Session S04, Sat 15 August, Location: Cohen Hall, G17 Auditorium, Oral at 14:30

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#### PHYLOGENETIC ANALYSIS OF PHENOTYPIC DIVERGENCE IN THE ANTBIRDS

The Thamnophilidae, a species-rich Neotropical family of birds (ca. 220 species), provides great opportunities to investigate the generation of phenotypic diversity. By focusing on the evolution of morphometric and vocal traits, I specifically test whether low phylogenetic signal is associated with higher disparity of vocal and morphometric traits. I also attempt to identify plausible mechanisms driving phenotypic evolution of those traits by combining information on phenotypic evolution rates and phylogenetic signal. Preliminary analyses of 140 species (63% of family) suggest that the amount of accumulated phenotypic disparity is greater than expected by chance in all morphometric traits and in two of the three principal axes of variation of vocal traits. Also there is variation in rates of evolution among different traits, and only traits related to body size show high phylogenetic signal. These preliminary results show that only evolution of body size might be mediated by constant genetic drift, whereas the other variables may be subject to divergent selection. Further analyses will allow better understanding of the mechanisms behind the accumulation of phenotypic divergence in the antbirds.

Abstract (5505); Session G15, Fri 14 August, Location: Cohen Hall, Terrace Room, Oral at 14:15

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#### SEXUAL CONFLICT AND THE FUNCTIONAL MORPHOLOGY OF THE WATERFOWL PENIS

The mechanics and functional morphology of the waterfowl penis are of evolutionary interest in the context of antagonistic sexual conflict. In waterfowl, male penis length is correlated with frequency of forced copulation. Female genitalia have coevolved antagonistically and have been hypothesized to create physical barriers to the full intromission of the male penis in the absence of female cooperation. We used histology, high-speed video and glass vaginas to describe the functional morphology of the waterfowl penis. The collagen matrix of the penis is very thin and is not arranged in either a helical or axial orthogonal pattern, making the penis very flexible. The eversion of the avian penis is incredibly rapid. Full penile eversion was not achieved when we used glass vaginas that mimic the coevolved vaginal structure of the female, whereas glass vaginas matching the chirality of the penis or simple straight tubes allowed the penis to evert fully. Our results support the hypothesis that duck vaginal complexity evolved to exclude the penis during forced copulations, and that functional features of the male penis have evolved via sexual conflict.

Abstract (5215); Session G18, Sat 15 August, Location: Irvine Auditorium, Amado Recital Room, Oral at 12:00

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#### IMPACTS OF HABITAT FRAGMENTATION FROM FOREST MANAGEMENT ON SOCIAL BEHAVIOR, VOCAL COMMUNICATION, AND PHYSIOLOGICAL STRESS IN CAROLINA CHICKADEES

Previous research on habitat fragmentation's influence on social behavior suggests that understanding social behavior and vocal interactions may be important for conservation efforts. Fragmentation-induced changes in social behavior may alter the functioning of social groups. The fragments created by different forest management techniques will be used to investigate how fragmentation can influence social behavior, physiological stress, and vocal communication in Carolina chickadees (*Poecile carolinensis*). Carolina chickadees are an ideal model organism because they have complex social system which has allowed them to evolve a unique vocal system. A disruption in the social system and a change in stress level are predicted to cause a change in chickadee's vocal communication. These data could be important in helping to identify and screen for more complex impacts of fragmentation caused by forest management techniques.

Abstract (5327); Session GP30, Fri 14 August, Location: Houston Hall, Hall of Flags, Poster Num: 80

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#### STATUS OF WINTERING GRASSLAND BIRDS IN A POST-HURRICANE SALVAGE-LOGGED FOREST

North American grassland birds have been declining at an alarming rate. Winter habitat for grassland species in the southeastern U.S. generally occurs within forests subject to management. We studied wintering grassland bird communities in De Soto National Forest in southern MS. Our objectives were: 1) Assess bird communities in upland forest stands that were salvage-logged following Hurricane Katrina, in stands managed for Red-cockaded Woodpeckers, and in stands containing bogs; and 2) Determine what habitat factors predict stand occupancy by birds. We conducted bird and habitat surveys in 32 stands over two winters. The wintering grassland bird community included Bachman's Sparrow (*Aimophila aestivalis*), Henslow's Sparrow (*Ammodramus henslowii*), and Sedge Wren (*Cistothorus platensis*). Forest-stand associations varied among these species. Bachman's Sparrow occurred only in upland and RCW-managed stands, Henslow's Sparrow occurred only in bogs and RCW-managed stands, and Sedge Wren occurred in all stand types. Homogeneity of herbaceous density was the best predictor of stand occupancy by Henslow's Sparrow. We recommend management practices focusing on small-scale herbaceous ground-layer restoration in bogs via active shrub removal and growing season prescribed fire.

Abstract (5205); Session GP34, Fri 14 August, Location: Houston Hall, Hall of Flags, Poster Num: 88



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#### THE IMPORTANCE OF SPECIES HABITAT, BIOREGION, AND VARIABLE SOURCE IN MODELING SPECIES DISTRIBUTIONS

Remote sensing has not been broadly used in species distribution modeling, especially for conservation applications. This is surprising because remote sensing provides real time land cover metrics that should improve predictions. We evaluated the usefulness of high-resolution remote sensing data, as compared to more traditional climate data, for modeling the distributions of 136 Colombian bird species of conservation concern. We also assessed the importance of the climate versus remote-sensing variables with regard to species habitat preferences and the bioregion in which they were found. We found that remote-sensing measures of canopy complexity contributed to distribution models almost twice as often as any other variable, followed by percent tree cover, measures of leaf area, and mean annual temperature. Our results also suggested that certain remote-sensing or bioclimatic variables may be more useful for predicting species that exist in certain vegetation types or bioregions, but this varies among species and the relative importance of variables to models cannot be explained by these characteristics alone. This study yields insight into the importance of remote-sensing variables and relevance to species characteristics in distribution modeling.

Abstract (5348); Session GP06, Fri 14 August, Location: Houston Hall, Hall of Flags, Poster Num: 20

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#### ASSESSING RELATIVE NEOPHOBIA IN AMERICAN CROWS (*CORVUS BRACHYRHYNCHOS*)

American crows have successfully invaded suburban and urban habitats where they have experienced many, rapid, anthropogenic changes to their environment. However, despite their success, crows are highly neophobic. In these studies we are testing whether or not our assessments of neophobia (as a trait of an animal) might be influenced by the animal's knowledge of its habitat. Specifically, we are investigating whether crows' response to novelty and hence, apparent neophobia, is adjusted to their expectation of novelty. American crows are territorial, cooperative breeders that also spend time at communal foraging sites. Our population frequents a compost facility utilized as a communal foraging site. Birds at the compost experience a wide variety of objects, changing foods, and disturbances on a daily basis while suburban home territories remain relatively static and predictable. Our predictions are that neophobia will significantly decrease where novelty is expected, and increase where novelty is unexpected, regardless of the object type. The assessments of neophobia are part of a larger study examining the relationship of personality to exploratory and social behaviors.

Abstract (5442); Session GP33, Fri 14 August, Location: Houston Hall, Hall of Flags, Poster Num: 127

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#### EFFECTS OF PRESCRIBED BURNING ON GOLDEN-WINGED WARBLER POPULATIONS IN THE CUMBERLAND MOUNTAINS, TENNESSEE

Golden-winged Warbler (*Vermivora chrysoptera*) populations have declined dramatically in the Appalachian Bird Conservation Region over the past 40 years. In Tennessee, golden-winged are restricted to early successional habitats in the Cumberland Mountains and in a few other sites in the Southern Blue Ridge Mountains. The Cumberland Mountains population has been estimated at about 300 breeding pairs, making it the largest population in the Southeast. We have been working cooperatively with the Tennessee Wildlife Resources Agency to develop and implement a conservation strategy for the Cumberlands population. Our goal has been to double the population over the course of the next ten years. To achieve this goal, more quality golden-winged habitat is needed. We have implemented a prescribed burning strategy on ten individual sites to increase golden-winged populations in the core of the Cumberlands. The strategy has had variable success depending on the starting point of the vegetation, the fire intensity, and the number of burns completed. Prescribed burning appears to be an appropriate tool for restoration of golden-winged habitat.

Abstract (5283); Session S08, Fri 14 August, Location: Irvine Auditorium, Amado Recital Room, Oral at 09:00

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#### QUANTIFYING BIRD DENSITY DURING MIGRATORY STOPOVER USING WEATHER SURVEILLANCE RADAR

Weather surveillance radars detect birds in the airspace at the onset of their migratory flights, potentially providing comprehensive measures of the relative stopover density of birds on the ground over broad geographic areas. We evaluated the correspondence between radar measures from two radar sites and the ground density of migrating birds estimated at 24 hardwood forest sites along the northern coast of the Gulf of Mexico during two autumn and two spring seasons. We also evaluated several approaches that adjust radar measures for biases caused by the behavior of migrating birds and the path of the radar beam to facilitate quantitative comparisons among measures taken at different distances from the radar. Adjusted radar echo strength was strongly and positively correlated with migrating bird density at the ground. We will discuss the nature and efficacy of the radar data adjustments. Our results provide empirical support for using radar data to map where birds stop over during their migratory journeys in order to identify important stopover sites for conservation and better understand stopover habitat use.

Abstract (5317); Session G23, Sat 15 August, Location: Houston Hall, Bodek Lounge, Oral at 16:45

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#### RADIONUCLIDES AND METALS IN MUSCLE OF COMMON EIDERS, AND METALS IN THEIR EGGS AND FEATHERS, FROM THE ALEUTIANS

Radionuclides and metals were examined in the muscle of common eiders (*Somateria mollissima*) from Amchitka and Kiska Islands in the Aleutian Chain of Alaska, and metals were examined in their feathers and eggs, to determine whether there were 1) radionuclide or metal levels of concern (eiders are eaten by Aleuts), 2) differences between levels in feathers and eggs, and 3) positive correlations between metal levels in females and their eggs. Radionuclide levels in muscle were all below detection limits. Average metal levels in eggs (dry weight) were as follows: arsenic (769 ppb, ng/g), cadmium (76.1 ppb), chromium (414 ppb), lead (211 ppb), manganese (1,470 ppb), mercury (430 ppb) and selenium (1,730 ppb). Levels of arsenic and cadmium were higher in eggs, while chromium, lead, manganese, and mercury were higher in feathers. There were no significant correlations between the levels of any metals in down feathers of females and in their eggs. The levels of mercury in eggs were below ecological benchmark levels, and were below human health risk levels. However, Aleuts can seasonally consume several meals of bird eggs a week, providing cause for concern for sensitive (pregnant) women.

Abstract (5186); Session GP09, Fri 14 August, Location: Houston Hall, Hall of Flags, Poster Num: 33

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#### SEA LEVEL CHANGE AND RESPONSES BY COLONIAL WATERBIRDS IN NEW JERSEY

Changes in sea level have the potential to dramatically change the size, structure and height above the water of coastal islands, which can affect colonially nesting birds that have been forced to nest on low-lying islands. A study of colonial birds in Barnegat Bay New Jersey from 1976 to the present indicates that there have been several physical changes attributable to rises in sea level, including 1) disappearance of the lowest-lying islands, 2) decreases in size of some islands, and 3) shifts in vegetation on salt marsh islands. These have resulted in shifts in bird use of Barnegat Bay that include 1) gradual abandonment of some islands as they disappeared, 2) abandonment by colonial birds of some islands that are still present, 3) shifts in species of birds nesting on islands, and, 4) concentration of some species on fewer islands. The natural horizontal and vertical stratification of nesting on salt marsh islands forces the greatest change on those that nest at the edges of the islands, on the lower portions. The greatest shifts have been for Common Terns and Black Skimmers because they nest on the lowest portions of salt marsh islands, on sand, or on wrack. They also show shifts in microhabitats used. Both species showed a significant decrease in the number of islands they nest on over the last 30 years.

Abstract (5185); Session S07, Sat 15 August, Location: Houston Hall, Class of '49 Auditorium, Oral at 11:00

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#### A LOW-COST AERIAL RADIO TELEMETRY SYSTEM FOR AVIAN CONSERVATION: PRELIMINARY RESULTS

In May 2009, we deployed a low-cost aerial tracking system to monitor radio tagged Bridled White-eyes (*Zosterops conspicillatas*) translocated to the Northern Mariana island of Sarigan. The system consisted of an autopilot controlled electric powered model glider, mounted with a radio-direction-finding pod capable of scanning up to 50 radio transmitter frequencies. The pod transmitted to a ground station the angle to each radio transmitter detected, allowing us to triangulate positions. The aircraft was capable of autonomous flight along a preset route, and communicated with a ground station via a radio modem, allowing us to control flights and monitor radio-tracking pod output. Preliminary analysis of tracking results indicate that the tracking pod was able to detect and locate the extremely light (0.30 g) and low powered radio transmitters we used at 250m, and likely would have a much greater range with more powerful transmitters. The system was specifically designed to operate in extremely remote environments under a variety of weather conditions and would be a viable alternative to ground-based telemetry or full-sized aircraft for radio tracking in difficult terrain.

Abstract (5613); Session GP32, Fri 14 August, Location: Houston Hall, Hall of Flags, Poster Num: 126

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#### BIRDS AS INDICATORS OF THE STATUS OF NORTH AMERICAN HABITATS: SCIENTIFIC AND PRACTICAL CONSIDERATIONS

The concept of wild bird indicators has been applied throughout the world in State of the Birds reports and has been accepted as an important measure of environmental health. In the United Kingdom, government policy requires that specific conservation practices be implemented to reverse declines in habitat-specific bird indicators. Birds make good habitat indicators for several reasons: 1) A lot is known about the habitat requirements of birds. 2) Birds are adapted to a wide variety of habitats. 3) Birds are easy to identify and count. 4) Vegetation sampling can be complicated, and the biological significance of differences can be difficult to interpret. 5) People like birds and care about their fate. To assess the health of six major habitat types, we created bird population indicators based on the best available monitoring data for groups of species. Because reliable long-term trend data were not available to create bird population indicators for all U.S. habitats, we also used the proportion of species of conservation concern in each habitat as a separate indicator of health or threats to that habitat.

Abstract (5499); Session S11, Sat 15 August, Location: College Hall, Room 200, Oral at 14:00

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#### WHY DO PASSERINE FLEDGLINGS FLAUNT FLUFFY FEATHERS?

It was recognized long ago that the body feathers of the first (juvenile) plumage of many passerines are lax and loosely-textured compared to adult body feathers, giving a fluffy appearance to fledglings of many species. In other species, juvenile body feathers appear relatively adult-like in texture and structure. To better understand these phenomena, we tested the hypothesis that selection on nestlings to develop and fledge rapidly favors diversion of resources away from body feathers, yielding a lax first plumage. We also tested the hypothesis that nestlings produce tightly-textured, adult-like feathers if they wear those feathers for an extended time between fledging and the next molt. Using comparative analyses of body feather structure among 34 North American passerines, we found that juvenile body feathers are relatively adult-like in species with long nestling periods and in species with extended time between fledging and the next molt. We conclude that the structural quality of the first plumage reflects trade-offs between the need to fledge rapidly and the need for a high-quality plumage after fledging.

Abstract (5597); Session G24, Sat 15 August, Location: Cohen Hall, Terrace Room, Oral at 16:45

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#### RECENT WORK IN EUROPEAN STARLINGS YIELDS NOVEL INSIGHTS ON THE NEURAL CONTROL OF REPRODUCTION

The direct links between sexual behavior, reproduction and stress physiology are not very well understood in any vertebrate. We have been examining aspects of the hypothalamic control of reproduction and sexual behavior in European starlings (*Sturnus vulgaris*). Specifically, we have been investigating the neuropeptide gonadotropin inhibitory hormone (GnIH). GnIH may inhibit reproduction in vertebrates via its action on gonadotropin releasing

hormone (GnRH), luteinizing hormone, testosterone and estradiol. We recently reported that the hypothalamic content of GnIH in house sparrows increases during times of stress at the beginning of the breeding season, indicating a mechanism by which reproduction could be delayed or disrupted in response to environmental stimuli. Here, we examined the neuroendocrine correlates of nesting opportunity in European starlings that obtained a nesting cavity versus those that did not during the breeding season. We present the first data indicating an influence of social environment on GnIH.

Abstract (5336); Session S09, Sat 15 August, Location: Cohen Hall, G17 Auditorium, Oral at 11:00

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#### EXTRA-PAIR BEHAVIOR AND THE SPATIAL DISTRIBUTION OF PARENTAL CARE

Extra-pair behavior is likely an underlying cause of unequal levels of parental care between males and females in socially monogamous species, but its effect on levels of care provided by males has not been sufficiently explained. This study tests the genetic distribution hypothesis which proposes that males are not decreasing their total parental care, but are engaging in care-giving away from the nest. I tested this hypothesis by examining the spatial distribution of nest defense to a taxidermic mount of a Blue Jay (*Cyanocitta cristata*) at varying distances from the nests of two high EPF species, the Hooded Warbler (*Wilsonia citrina*) and the Red-eyed Vireo (*Vireo olivaceus*), and one low EPF species, the Blue-headed Vireo (*V. solitarius*). Females of all three species responded most often and most intensely when the predator model was presented next to the nest which is consistent with several hypotheses of nests defense. Spatial patterns of investment in defense by males provided good support for the genetic distribution model especially when average EPF levels are taken into consideration.

Abstract (5596); Session G06, Thu 13 August, Location: Irvine Auditorium, Café 58, Oral at 10:30

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#### INFORMATION TRANSMISSION IN AMERICAN CROWS (*CORVUS BRACHYRHYNCHOS*)

Relatively little is known about social transmission of learned behaviors in animal groups, more specifically, the path of transmission among individuals. We will investigate transmission patterns by introducing a novel foraging task to American crows (*Corvus brachyrhynchos*), territorial, cooperative breeders that mingle at communal foraging sites. We will follow the behavioral evidence of learning and transmission of the task, while collecting data on affiliation and agonistic interactions on the family territory and their participation in communal foraging. Using a social network analysis, we will relate the pattern by which the task solution spreads among birds, both within and between families, to the social attributes of those birds that do and do not demonstrate the behavior. The networks created can answer questions on horizontal versus vertical transmission, selective transmission between specific individuals, and the role of information scrounging from other birds at communal foraging sites.

Abstract (5443); Session GP29, Fri 14 August, Location: Houston Hall, Hall of Flags, Poster Num: 122

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#### CONSERVATION RESERVE PROGRAM INFLUENCES THE SUITABILITY OF PLAYA WETLANDS AS STOPOVER HABITAT FOR MIGRATORY BIRDS

Birds migrating in the Central Flyway must select stopover locations from heavily modified landscapes. We asked how landscape composition affects bird use of playa wetlands and how particular landuses, such as USDA's Conservation Reserve Program (CRP), affect the suitability of playas for migratory stopover. We analyzed aerial surveys of 1,738 playas for hydrologic responses to rainfall as well as 9,362 field surveys to 558 playas for bird use. We used generalized linear mixed models with playa ID and year as random effects to model migration chronology, account for non-independence of repeat visits, and provide inference regarding variation among playas. We found that playas embedded in CRP were less likely to become inundated in a rain event. However, wetland use by both waterfowl and landbirds increased with the area of CRP in the landscape. Shorebirds responded to the density of playas in the landscape. Our results suggest a reduction in the probability of flooding for individual playas in CRP must be weighed against the avian response to CRP at the landscape scale and the protection that buffers afford wetlands from sedimentation.

Abstract (5472); Session G23, Sat 15 August, Location: Houston Hall, Bodek Lounge, Oral at 14:00

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#### HISTORICAL DIVERGENCE AND GENE FLOW: COALESCENT ANALYSES OF MITOCHONDRIAL, AUTOSOMAL AND SEX-LINKED LOCI IN *PASSERINA* BUNTINGS

Quantifying the role of gene flow during the divergence of closely related species is crucial to understanding the process of speciation. We collected DNA sequence data from 21 loci (2 mitochondrial, 13 autosomal, and 6 sex-linked) for population samples of *Passerina amoena* and *Passerina cyanea* to test explicitly between a strict allopatric speciation model and a model in which divergence occurred despite post-divergence gene flow. Likelihood ratio tests of coalescent based population genetic parameter estimates indicated a strong signal of post-divergence gene flow and a strict allopatric speciation model was rejected. Analyses of partitioned data sets (mitochondrial, autosomal, and sex-linked) suggest the overall gene flow patterns are driven primarily by autosomal gene flow, as there is no evidence of mitochondrial gene flow and we were unable to reject a allopatric speciation model for the sex-linked data. These results are consistent with the low fitness of female avian hybrids under Haldane's rule and demonstrate that sex-linked loci likely are important in the initial generation of reproductive isolation, not just its maintenance.

Abstract (5309); Session G08, Thu 13 August, Location: Houston Hall, Bodek Lounge, Oral at 17:15

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#### THE ROLE OF CULTURAL DIVERGENCE IN SPECIATION

Through sexual selection, female mate choice can be a critical component of reproductive isolation. Yet female choice is rarely measured among allopatric populations and thus is rarely used to estimate reproductive isolation. We compared female and male behavioral responses to non-local dialects in two allopatric populations of Rufous-collared Sparrows (*Zonotrichia capensis*) in Ecuador. In playback experiments, we broadcasted the following song types: local dialect, non-local dialect (25km away), distant non-local dialect (4000km away), and a control song from a local flycatcher. We found that females can distinguish between dialects and prefer their local dialect. In contrast, males do not distinguish between dialects and responded aggressively to all conspecific song dialects. The lack of discrimination among song dialects in males would traditionally be interpreted as a lack of reproductive isolation between the populations. However, female preference for local dialects suggests that females would mate assortatively, creating reproductive isolation among populations. Thus, female response to song dialect variation is a potential mechanism that could drive or maintain population divergence.

Abstract (5284); Session G04, Thu 13 August, Location: Houston Hall, Bodek Lounge, Oral at 12:00

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#### INDIVIDUAL QUALITY AND REPRODUCTIVE COST IN TREE SWALLOWS (*TACHYCINETA BICOLOR*): INSIGHTS FROM PLASMA METABOLITES

Reproductive effort, the amount of resources invested in a current reproductive event, is a fundamental variable in life history theory because it involves a tradeoff between current and future reproductive success. We utilized plasma metabolite profiles of male Tree Swallows (*Tachycineta bicolor*) coupled with nestling growth parameters and parental behavior to investigate whether reproductive effort invokes a cost manifested in the deterioration of metabolic state, or reflects greater resources available for parental expenditures. Triglycerides (TRIG) and uric acid (URIC) were positively correlated between males and nestlings, and nestling TRIG and B-OH butyrate (BUTY) were related to nestling growth, suggesting that well-fed males better provision nestlings. Within males, both the correlation between TRIG and BUTY and between visitation rate and BUTY were positive, indicating a potentially unique metabolic situation characteristic of aerial foragers. Male swallows might spend considerable time eating while foraging for nestlings, but the numerous flight bouts required for provisioning might necessitate glucose-sparing mechanisms, resulting in high plasma TRIG and BUTY. Overall, these results provide evidence that the effects of individual energetic state are strong determinants of parental effort.

Abstract (5554); Session GP26, Fri 14 August, Location: Houston Hall, Hall of Flags, Poster Num: 66

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#### LANDSCAPE- AND HOME-RANGE-LEVEL HABITAT SELECTION BY GOLDEN-WINGED WARBLERS IN COSTA RICA

We studied Golden-winged Warbler habitat use and selection in the Cordillera de Tilarán in Costa Rica between 2006 and 2009 using radio telemetry and temporally replicated point counts. We modeled abundance in relation to precipitation, elevation, habitat type, and microhabitat variables while accounting for variation due to detectability and availability. Our results reveal a complex hierarchical habitat selection process. At the landscape-level, we found evidence that Golden-winged Warblers avoided dry forests typical of the lower elevation Pacific slope forests in our study area. Within the wetter life zones, they appeared to favor naturally-disturbed forest and advanced secondary forest to undisturbed primary forest or agroforestry systems. Examples of naturally disturbed forest include riverside forest and large canopy gaps. Use versus availability data from radio-tracking 23 males and 3 females indicate that within home-ranges, activity centers were focused in areas with high number of hanging dead leaves, vine tangles, and intermediate basal areas. This complex habitat selection behavior results in low density and localized occurrence, which makes wintering Golden-winged Warblers highly susceptible to deforestation.

Abstract (5387); Session G19, Sat 15 August, Location: Houston Hall, Bodek Lounge, Oral at 12:00

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#### WHERE'S DUBYA? IDENTIFYING W-SPECIFIC SEQUENCES IN THE AVIAN GENOME

Ecological and evolutionary studies of birds have benefited greatly from the recent availability of avian genome sequences. However, up to a tenth of the genome remains in DNA fragments that have proven difficult to assign to specific chromosomes despite vigorous genome assembly efforts. The female-specific W chromosome is comprised mostly of repetitive DNA, making traditional methods of sequence assembly challenging. As a result, coverage of the avian W chromosome is extremely poor. We devised a novel method for identifying sequences that are specific to the W chromosome. Using next-generation sequencing technologies, we generated 10 million short sequences from a male (ZZ) and mapped them to the genome sequence of a female (ZW). This method allowed us to pull out segments of the female ZW genome that are underrepresented in the male ZZ genome and therefore female specific. Our method has successfully identified several new W-specific sequences, information that will greatly improve the assembly of the W chromosome and enhance future studies on avian sex determination and sex chromosome evolution.

Abstract (5516); Session G18, Sat 15 August, Location: Irvine Auditorium, Amado Recital Room, Oral at 09:00

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#### ADAPTATION TO HIGH-ELEVATION IN THE RUFIOUS-COLLARED SPARROW (*ZONOTRICHIA CAPENSIS*): METABOLIC GENE EXPRESSION ALONG AN EXTREME ELEVATIONAL GRADIENT

Understanding the interactions between gene expression and environmental conditions can provide insights into the genetic basis of adaptive physiological traits. At high elevations, cold and hypoxia interact to place severe stress on metabolic processes. We measured the expression of six metabolic genes in Rufous-collared Sparrows (*Zonotrichia capensis*) that were collected along an elevational gradient in the Peruvian Andes. Metabolic adjustments are particularly important in coping with thermal stress, and although temperature decreases linearly with elevation in the Andes, metabolic gene expression was not linearly related to elevation. Metabolic gene expression was highest in individuals sampled at very high elevations (>4000m), but surprisingly, expression was lowest at middle elevations (1500 m - 2500 m). This pattern suggests a decoupling of metabolic gene expression and local temperature regimes. Potential explanations for this decoupling include physiological tradeoffs between thermal stress and hypoxia compensation, genetically encoded expression differences, or epistatic interactions among genes that vary along the elevational gradient. These results highlight the complexity of transcriptional responses to elevational gradients, and provide insights into the role of gene expression variation in high altitude adaptation.

Abstract (5392); Session G08, Thu 13 August, Location: Houston Hall, Bodek Lounge, Oral at 14:30

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#### THE TIMING OF LIFE CYCLE EVENTS IN EQUATORIAL BIRDS - AN INTERTROPICAL COMPARISON AND REVIEW

I conducted year-long field studies in Sarawak, Borneo and northeastern Peruvian Amazon to monitor forest fruiting phenology and avian molting and breeding schedules. Both study sites are equatorial lowland rainforests without

distinct dry seasons and yearly rainfall peaks. Fruit and insect availabilities correlate to rainfall patterns at both sites. Energetically demanding molting and breeding activities coincided with periods of greatest food availability (rainier season) in the Peruvian site only. While Sarawakian birds generally do not molt nor breed during the rainiest part of the year, although food was most abundant at that time. The possible explanations for these observations are presented together with schematic diagrams of models based on the duration of food availability, the amount of food available to birds, and the nutritional requirements of each energetically demanding stage of a bird's life cycle (egg laying, incubation, parental care of nestlings and molting). These models will show how environmental factors serve as important proximate and ultimate cues for the timing avian life history events. I will also review studies in other tropical sites that support these models.

Abstract (5221); Session G17, Fri 14 August, Location: Houston Hall, Bodek Lounge, Oral at 16:15

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#### MIGRATION TIMING, INDIVIDUAL CONDITION, AND CAROTENOID CONTENT MEDIATE CROWN COLOUR VARIATION IN GOLDEN-CROWNED KINGLETS

Carotenoids are responsible for many red, orange, and yellow colors in animals. Carotenoid coloration can be dependent on pigment access/metabolism, nutritional condition, and parasites. We investigated possible condition-dependent and pigmentary bases of variation in Golden-crowned Kinglets (*Regulus satrapa*). Despite the sexually-dichromatic crowns of the family Regulidae, little research has been conducted on this conspicuous trait. We captured 186 kinglets during fall migration in southwestern Ontario and collected data on arrival date, body condition, fat and pectoral scores, ectosymbionts, and feather growth-rate. We quantified crown coloration using reflectance spectrometry and examined feather carotenoids using high-performance liquid chromatography. Eight pigments were identified in the orange male feathers, including red and orange ketocarotenoids and yellow hydroxycarotenoids. Yellow female feathers contained primarily lutein and 3'-dehydrolutein. Females in better condition with fewer mites displayed deeper crown hues. Earlier migrants of both sexes were more colourful; in males, this was due to greater amounts of canthaxanthin, astaxanthin, and alpha-doradexanthin. These results suggest that early fall migration may be important, and provide further support for the condition-dependence of carotenoid coloration and the signaling potential of female ornaments.

Abstract (5570); Session G19, Sat 15 August, Location: Houston Hall, Bodek Lounge, Oral at 09:15

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#### EXPLORING SOCIAL CONTAGION IN YAWNING AND STRETCHING BY BUDGERIGARS

Yawning is ubiquitous across vertebrates and, in humans, is clearly socially contagious. A few comparative studies suggest that highly social primates and domesticated dogs may yawn contagiously, but there are no studies of birds. Yawning may be related to arousal and a potential social function of contagion is group synchronization. There are few if any naturalistic studies of yawning in social groups of any species. Budgerigars (*Melopsittacus undulatus*) are highly social, flocking parrots with marked behavioral synchrony in foraging, resting, etc.. Occurrences of yawning and stretching in an un-manipulated aviary flock were significantly clumped, as predicted by contagion. Similar patterns were seen for stretching, suggesting that social contagion may not be limited to yawning, but extend to other behaviors associated with arousal. Experimental results were mixed but intriguing. There was no significant increase in yawning after viEwing, New Jersey conspecific yawns on video, but a bird's first yawn occurred significantly sooner when viEwing, New Jersey recordings of yawning conspecifics versus a control video without yawning. Experimental tests of contagion may be too insensitive or artificial to detect naturally functional levels.

Abstract (5435); Session G01, Thu 13 August, Location: Cohen Hall, G17 Auditorium, Oral at 10:45

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#### INDIVIDUAL DISTINCTIVENESS IN THE CALLS OF A SUBOSCINE: THE EASTERN WOOD-PEWEE (*CONTOPUS VIRENS*)

Generally, songs of suboscines are innate, while oscine songs are learned. Oscine songs are more variable, presumably because mistakes during learning produce variability. Multiple studies demonstrate individual call distinctiveness and recognition in oscines. However, individual recognition should be important for both suborders. Only recently have researchers evaluated this ability in a suboscine. We investigated call distinctiveness in the Eastern Wood-Pewee

(*Contopus virens*) (EAWP), a small subspecies that breeds in the eastern U.S., by evaluating several parameters in this species' "pee-a-wee" call, as well as its "wee-ooo" call. We predicted that (1) EAWP calls have greater between than within individual variation, thus providing the potential to code information on individual identity and quality, (2) EAWP calls are individually distinctive, and (3) recorded EAWP calls can be correctly classified to the bird of origin. To test these predictions, we recorded natural calls of males arriving into their breeding territories. We found that EAWP calls demonstrate the potential for information coding. We correctly classified 98% of pee-a-wee and 94% of wee-ooo calls to the bird of origin, demonstrating EAWP calls are individually distinctive.

Abstract (5494); Session G22, Sat 15 August, Location: Irvine Auditorium, Amado Recital Room, Oral at 14:30

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#### TAXONOMIC STATUS OF HARLAN'S HAWK

Harlan's Hawk (*Buteo harlani*) has been considered by the AOU as either a species (1886-1891, 1944-1973) or as a subspecies of Red-tailed Hawk (*B. jamaicensis*) (1898-1944, 1973-present). The two lumpings lacked taxonomic justifications, whereas the separation in 1944 was based on published plumage differences. From examining more than 2000 museum specimens, I have found that Harlan's are always diagnosable by plumage and by the shorter extent of bare tarsi. These taxa differ in frequency of color morphs, tail coloration and pattern, body plumage by age, behavior, and markings on the remiges. Harlan's Hawk plumages are highly variable, much more so than in other Buteos. Rufous in the plumages of many adults, apparently the only reason for the lumpings, will be shown to be due to ancestry, not to interbreeding. No valid cases of interbreeding were found; all such alleged cases were in the breeding range of Harlan's and were based on misidentified adults. Harlan's Hawk should be again considered a species, as it differs greatly from Red-tailed Hawk, and its inclusion in that taxon has never been justified

Abstract (5204); Session G15, Fri 14 August, Location: Cohen Hall, Terrace Room, Oral at 16:45

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#### CLUSTERED NESTING AND VEGETATION THRESHOLDS REDUCE EGG PREDATION IN SOOTY TERNS: IMPLICATIONS FOR MANAGEMENT

Seabirds reduce the risk of egg predation by aggregating and by selecting habitat features that reduce the nest's exposure to predators. However, the relationship between both mechanisms is not clear. It is essential to understand these nesting mechanisms to develop informed management strategies for colonies at risk. We studied nesting behavior and incidence of egg predation on the Dry Tortugas sooty tern colony. For eight years we counted the number of nests and predated eggs, and recorded percent vegetation and bare ground cover. We developed a hierarchical Bayesian model that: i) determines the relationship between nesting numbers and vegetation types and identifies thresholds of percent cover; and ii) allows testing hypotheses on nesting strategies to reduce predation. Our results show that the terns aggregate their nests on heterogeneous sites with clear thresholds in percent vegetation cover and bare ground to reduce egg predation (e.g. around 23 % shrubs and at least 15% bare ground). These results allow establishing specific habitat management strategies to reduce the risk of egg predation for this and other colonies.

Abstract (5397); Session G16, Fri 14 August, Location: Irvine Auditorium, Café 58, Oral at 15:00

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#### IMPACT OF NON-NATIVE PLANTS ON BIRD COMMUNITIES IN SUBURBAN FOREST FRAGMENTS

Development into forested areas is occurring rapidly across the United States, and many of the remnant forests within suburban landscapes are being fragmented into smaller patches, impacting the quality of this habitat for avian species. An ecological effect linked to forest fragmentation is the invasion of non-native plants into the ecosystem. However, few studies have explicitly examined the link between the density of native plants and avian communities and habitat use. The objective of this project will be to estimate avian occupancy, abundance, and diversity as a function of non-native plant density and associated invertebrate abundance. I will conduct 100 avian point counts 3 times between 15 May – 15 August, 2009-2010 in Delaware and Pennsylvania to quantify avian occupancy, abundance, and diversity within plots. Vegetative structure and composition will be analyzed within a 500m buffer surrounding each plot and also within the plots by measuring understory coverage, canopy coverage, and the proportion of stems that are native.



Finally, I will measure the invertebrate biomass (standardized by plant volume) within each point by vacuum sampling to estimate the avian food supply.

Abstract (5252); Session GP17, Fri 14 August, Location: Houston Hall, Hall of Flags, Poster Num: 110

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#### EFFECTS OF PLAGUE AND PRECIPITATION ON BURROWING OWL DIET AND BREEDING SUCCESS

Burrowing owls (*Athene cunicularia*) on the Pawnee National Grassland in Colorado nest in burrows dug by black-tailed prairie dogs (*Cynomys ludovicianus*). Owl nest sites can be altered or lost due to plague (*Yersinia pestis*) mortality in prairie dogs. Our objectives were to quantify prey use of burrowing owls, to examine the effects of plague, precipitation, and nest density on prey use, and to determine whether prey composition influenced nest or fledging success. We monitored 319 nests from 2005 – 2008 and identified prey items from regurgitated pellets and prey remains. The largest differences in prey composition were associated with year, rainfall, nest success, and fledging success. Owls in dry years and those at successful and very productive nests ate fewer birds and more mammals. Plague was largely unrelated to owl diet, suggesting that the effects of plague on owl populations result from changes in prairie dog presence, burrow availability, or landscape heterogeneity rather than prey populations. However, low summer precipitation and high mammal use were strongly related to burrowing owl breeding success.

Abstract (5384); Session G06, Thu 13 August, Location: Irvine Auditorium, Café 58, Oral at 11:30

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#### SALIENT AVIAN OBSERVATIONS IN A NEOTROPICAL ENDEMIC HOTSPOT

Observations were made in extreme northwestern Peru during both foliate and defoliate periods in a low-elevation tropical “dry” forest, where most trees are deciduous. Registered in this study during the foliate period was the first sighting of the thamnophilid (antbird), *Myrmeciza exsul*, in Peru. Observed for the first time in Peru west of the Andes were the picid, *Campephilus pollens*, the tyrannid, *Myiodynastes chrysocephalus*, and the tanager *Piranga leucoptera*. Primary observations in northwestern Peru were also made of *Zonotrichia capensis* and *Chlorospingus flavigularis*. All of these species had previously been recorded in forests of southwestern Ecuador proximate to the Peruvian study area except *C. pollens*, which is generally an inhabitant of higher-elevation mesic forests. Seven of the species observed in this survey are threatened with extinction. One of them, *Leucopternis occidentalis*, was not rare in our study area. Most birds of prey and wrens did not enter Tumbes Reserved Zone until the defoliate period. Most Fringillidae were present during the entire study or during only the defoliate period. Euphoniae constituted an exception.

Abstract (5436); Session G12, Fri 14 August, Location: Irvine Auditorium, Café 58, Oral at 09:00

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#### OXYGEN STORES IN DIVING EARED GREBES

Aerobic diving in birds is limited by oxygen stores that can be carried on dives. These stores take the form of free oxygen in airways (lungs, air sacs) and bound to carrier molecules in the blood (hemoglobin) and in the muscles (myoglobin). We have been looking at bound oxygen in the muscles and blood of Eared Grebes (*Podiceps nigricollis*). Myoglobin (Mb) concentrations were measured in breast muscle, leg muscle, and heart. Mb concentration was higher in all three tissues than in other diving birds. On the other hand, the hemoglobin (Hb) content of grebe blood is only average for birds, and at the low end of the values for other divers. To evaluate the Hb concentration, we have begun measuring the total blood volume of grebes to ascertain if it differs from other divers. Preliminary data show it to be about the same as in other divers. Although Eared Grebes are excellent divers, we have not yet found any characters that distinguish it substantially from other diving birds.

Abstract (5608); Session G10, Thu 13 August, Location: Irvine Auditorium, Amado Recital Room, Oral at 14:00

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#### CAN CIRCADIAN RHYTHMS INFLUENCE THE PACE OF EMBRYO DEVELOPMENT?

Life history traits vary geographically; for example, temperate breeding birds typically have higher metabolic rates, larger clutches, and shorter incubation periods than tropical birds. Food, temperature, and predation may be important selection pressures driving latitudinal patterns. We explored the potential role of circadian rhythms, set by different photoperiods, on metabolic and development rates of avian embryos. With nest cameras we verified circadian patterns in the time of day of egg laying and hatching. In a pilot common garden experiment, we incubated the eggs of temperate-breeding House Sparrows under identical temperature and humidity conditions but with different

photoperiod treatments. We expect embryos incubated under the temperate (18L:6D) treatment to pip in 11-12 days, while embryos incubated under the tropical (12L:12D) treatment to pip later. We expect embryo metabolic rate, estimated based on CO<sub>2</sub> production, to be higher during the day light hours than during night hours. We combine these three lines of evidence to explore whether the circadian rhythms associated with temperate and tropical photoperiods could account for the slower pace of life in the tropics.

Abstract (5497); Session GP19, Fri 14 August, Location: Houston Hall, Hall of Flags, Poster Num: 112

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#### STATE OF THE BIRDS: WETLANDS, WATERFOWL, MARSH BIRDS AND GAME BIRDS

We present composite summaries of avian indicators from 1968-present used to assess habitat health for wetland, waterfowl, marsh and game birds breeding or wintering in the United States and associated territories. The wetland bird indicator steadily increased beginning in the late 1970s, coinciding with major policy shifts from draining to protecting wetlands. Conservation programs protecting millions of wetland acres contributed to thriving populations of wetland-dependent birds. The waterfowl indicator increased steadily over 40 years, reflecting the success of continentally-coordinated management. Many waterfowl show stable or increasing populations. Some duck populations continue to show troubling declines. The marsh bird indicator showed a steady decline until about 1990, followed by fluctuations over the last two decades, perhaps reflecting precipitation patterns. Marsh bird detection rates are low, so the indicator may not accurately reflect population status. Some Game Birds declined by more than 50% in the last 40 years. Further research is required to assess limiting factors. Some game birds showed stable populations; however, populations of these species were augmented by captive-breeding and release programs.

Abstract (5247); Session S11, Sat 15 August, Location: College Hall, Room 200, Oral at 16:00

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#### FLEDGING SUCCESS AND NESTLING SEX RATIO OF EASTERN BLUEBIRDS BREEDING IN GOLF COURSE LANDSCAPES

Man-made golf course landscapes may offer replacement habitat for bird species that are displaced from natural habitat due to human activity. However, pesticide use and habitat alteration on golf courses may be detrimental to population persistence. We investigated fitness consequences of breeding on golf courses for Eastern Bluebirds (*Sialia sialis*) in Virginia from 2004-2009. Lower fitness resulting from poor environmental conditions may appear as reduced reproductive success and a nestling sex bias in favor of the cheaper sex; female bluebirds are the smaller, cheaper sex. We measured fledging success and identified nestling sex by plumage in broods raised in nest boxes on golf course and reference sites. If golf courses are lower quality, we expected lower fledging success and a sex bias toward female nestlings in golf course broods compared to reference broods. Overall, fledging success on golf courses was lower than on reference sites, but the percentage of female nestlings per brood did not differ. Thus, golf courses may provide lower quality breeding habitat, but parents do not appear to adjust their reproductive effort by manipulating offspring sex ratios.

Abstract (5478); Session G03, Thu 13 August, Location: Cohen Hall, Terrace Room, Oral at 11:15

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#### COALESCENT AND PHYLOGENETIC ANALYSES OF THE STREAK-BACKED ORIOLES (*ICTERUS PUSTULATUS*): EVOLUTION OF THE TRES MARIAS ISLANDS POPULATION

The Streak-backed Oriole (*Icterus pustulatus*) is an interesting example of a species that shows extensive morphological variation, but molecular variation that is limited and weakly structured. Initially, we examined species limits and population genetics, focused on mainland populations. Here, we sequenced eight individuals from the Tres Marias Islands in order to complete this history. Unlike the weak geographic structure observed within the mainland populations, the island populations' show a fixed difference that separates them from the mainland populations. We used phylogenetic analyses to establish their relationships and coalescent analyses (IM) to estimate demographic parameters including migration, population densities and time of divergence. Results showed almost no gene flow

between continent and islands. Also, that the island's populations were likely founded by fewer than 20 individuals; hence only one haplotype was found in these islands. We are now using these approaches to ask similar questions in the *I. graduacauda*/*I. chrysater* group.

Abstract (5287); Session GP12, Fri 14 August, Location: Houston Hall, Hall of Flags, Poster Num: 37

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#### RESOURCE SELECTION OF A CRITICALLY ENDANGERED KINGFISHER IN AN AGRICULTURAL ISLANDSCAPE: A MULTI-SCALE STUDY

The critically endangered Tuamotu Kingfisher (*Todiramphus gambieri*) is now endemic to a small atoll of French Polynesia where indigenous vegetation has been extensively converted to agriculture. We evaluated the species' habitat requirements to provide management guidelines for its conservation and, further, develop a translocation program for the formation of a rescue population. We collected data from 2006-2008 to examine the association between kingfisher distribution and habitat attributes at the landscape scale, and movement and resource use at the home range scale. Using focal observations of nest provisioning and radiotagged individuals we also identified foraging habitats and prey items used during reproduction. Results indicate that the Tuamotu Kingfisher is now dependent on agricultural management for reproduction. Coconut plantations provide the only nest sites used by the species, and prescribed burns create preferred open foraging habitat. However, dense vegetation was consistently selected by fledglings, and broadleaf trees by adults. In addition, large scale burns would decrease the availability of prey items and destroy nesting snags.

Abstract (5563); Session G17, Fri 14 August, Location: Houston Hall, Bodek Lounge, Oral at 14:45

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#### A MODEL OF AMAZONIAN DIVERSIFICATION OVER THE PAST 3 MYR: WHAT THE BIOGEOGRAPHY OF *PSOPHIA* TEACHES US ABOUT THE ORIGINS OF A HIGHLY DIVERSE BIOTA

Estimates of relationships, biogeographic history, and divergence-times for species within *Psophia* capture a "complete" history of the major Amazonian areas of endemism over the last 3 myr. These data, along with inferences about population history, make specific predictions about the ages of vicariance events thought to be drivers of diversification. Moreover, these predictions allow testing of major competing geological hypotheses about Amazonian history, each of which has different implications for the taxonomic assembly of its biota. Our results imply that allopatry among species is associated with riverine and wetland barriers, and given our estimates of divergence times, they predict the ages of river formation related to these vicariance events: Amazon river (~2.5Ma), upper Rio Negro (~1.0Ma), lower Rio Negro (~800Ka), and Rio Madeira (~1.0Ma). Our results discriminate between two geological hypotheses about the Amazon Basin: the Amazon river and terrestrial environments in the western Amazon (Solimões) Basin are much younger than traditionally accepted. Using results from *Psophia* we construct a temporal and spatial model for diversification of the Amazonian biota over the past 3 myr.

Abstract (5548); Session G11, Fri 14 August, Location: Cohen Hall, Terrace Room, Oral at 09:30

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#### TESTOSTERONE DOES NOT RELATE TO TERRITORIAL BEHAVIORS OR SONG IN HOUSE WRENS

The behavioral effects of increased testosterone vary among species, including increased aggressiveness, increased song output, and/or improved song structure. Maintaining a high level of testosterone may be costly because of its putative immunosuppressive effects, and testosterone could therefore enforce honesty for sexual signals such as song. We recorded male house wrens' songs (*Troglodytes aedon*) before their mates began incubation, conducted a lengthy playback to measure individual aggressiveness, and immediately captured birds to sample testosterone. We then measured several song features likely to be under sexual selection. Contrary to expectations, testosterone did not correlate with either aggressiveness or song features, and it did not increase in response to playback. Testosterone declined over the season and did not show a second peak with the second peak of territory establishment and breeding. These results are in direct contrast to early work on testosterone and aggression, and they fail to support the hypothesis that testosterone is the cost maintaining signal honesty of song.

Abstract (5484); Session G22, Sat 15 August, Location: Irvine Auditorium, Amado Recital Room, Oral at 15:00

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#### DOES LIVING ON A MERCURY-CONTAMINATED SITE AFFECT TREE SWALLOW FITNESS?

Mercury is a widespread contaminant with well-documented effects on wildlife, but as with many contaminants, solid evidence of specific effects on free-living populations of birds is elusive. Tree Swallows (*Tachycineta bicolor*), have been used in many studies of contaminants, including mercury, but a majority of studies has found few or no individual effects. We recently completed a four-year study of Tree Swallows breeding along a tributary of the Shenandoah River in Virginia, USA, that was contaminated by industrial mercury prior to 1950. Female swallows nesting at contaminated sites produced approximately one less fledgling per season, were less likely to replace clutches lost to simulated nest predation, had reduced immune responsiveness to an experimental injection of PHA antigen, appeared to have altered corticosterone profiles, were less likely to regrow experimentally plucked primary feathers, and returned at lower rates the following year. Taken together, this is overwhelming evidence that songbirds living on sites contaminated with mercury suffer individual fitness effects. Mercury, which is an increasingly ubiquitous contaminant worldwide, has the potential to reduce viability in vulnerable bird populations.

Abstract (5420); Session GP09, Fri 14 August, Location: Houston Hall, Hall of Flags, Poster Num: 34

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#### SONG DIFFERENTIATION AND DISCRIMINATION OF INDIGOBIRDS IN EAST AFRICA

Indigobirds (*Vidua* spp.) are brood parasites that imprint on the songs of their hosts during development, which leads to adult behaviors that maintain both assortative mating and host specificity. Adult males have a wide repertoire of vocalizations, including mimicry of host songs and calls, species-specific complex non-mimicry, and a universal chatter call. We recorded and analyzed songs from the four indigobird species found in East Africa, which genetic analyses suggest are the result of a recent colonization from West Africa. We quantified differences in songs among all four species, and also conducted a playback experiment to measure song discrimination in two species. These data will be combined with morphological and multi-locus genetic analyses to determine levels of diversification among these recently evolved species.

Abstract (5402); Session G07, Thu 13 August, Location: Cohen Hall, Terrace Room, Oral at 16:00

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#### WINTER FOOD LIMITS MIGRATORY SPARROW CONDITION AND WITHIN-SEASON SURVIVAL

Migratory animals likely encounter factors in multiple seasons and locations that affect their body condition, survival, and ultimately reproductive success. One such factor, winter food availability, is predicted to limit the body condition and survival of migratory birds. Food limitation may be especially acute for short distance migrants that winter in temperate zones, and often experience cold and unpredictable weather, thus likely requiring much energy for thermoregulation. We tested the hypothesis that winter food abundance limits body condition and within-season survival of a short distance migrant, the Swamp Sparrow (*Melospiza georgiana*) on its wintering grounds in coastal North Carolina. In Winter 1, we found that birds on four similar plots had generally low body condition and low within-season survival. In Winter 2, we added food to two plots and found increases in body condition and survival on those plots. Radio-tracking revealed very little emigration from study plots, thus supporting our survival estimates. These results show that seemingly subtle habitat variations, such as in winter food abundance, may affect body condition and survival of short distance migratory birds.

Abstract (5416); Session GP34, Fri 14 August, Location: Houston Hall, Hall of Flags, Poster Num: 89

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#### DEATH BY CHOCOLATE OR BY BULLET? THREATS TO FOREST BIRD CONSERVATION IN WEST AFRICA

Much of West Africa has been heavily deforested, and Ghana in particular has lost more than 80% of its original forest cover, largely to monoculture cocoa plantations. Ghana's remaining forest wildlife is under tremendous pressure

from uncontrolled logging and hunting. We present early results of ongoing surveys of birds in moist semi-deciduous and evergreen forests in Ghana with particular attention understory birds and hornbills (Bucerotidae), using mist nets, point counts, and playback. Research to date suggests that unsustainable logging intensities (up to > 5 trees per ha) may have negative effects on the persistence of forest dependent understory avifauna, and that unsustainable shotgun hunting may be driving local and regional extinctions of hornbills even where suitable habitat remains. The combined effects of legal and illegal resource use in Ghana's forests threaten the future of its wildlife, and the extirpations of a number of key seed-dispersing wildlife in turn threaten the ecological integrity of its remaining forests. The "empty forest" syndrome of Ghana, with respect to large mammals, may be further traumatised to the "silent forests," reflecting impoverished bird fauna.

Abstract (5602); Session G20, Sat 15 August, Location: Cohen Hall, Terrace Room, Oral at 09:00

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#### THE SELF-REHABILITATION OF A CAPTIVE AMERICAN CROW AT THE BINGHAMTON ZOO

We document the self-motivated rehabilitation of a captive, yearling American Crow (*Corvus brachyrhynchos*) in a specially designed exhibit at the Binghamton Zoo at Ross Park, Binghamton, NY. This exhibit houses four rehabilitated American Crows of various flying abilities. Upon arrival, the focal crow had no functional flight or tail feathers, had apparently never flown successfully, and was using its legs and an abnormal body orientation to cushion its landing on ground. In a supportive social and physical environment with flying crows and staggered perches, the focal bird appeared to develop and "practice" routines that ultimately resulted in its recovering normal body posture and flight ability. The concept of post-juvenile "motor learning" of flight or other actions is rarely discussed but merits more attention (see Stamps 1995. Am. Nat. 25: pp). We suggest that enclosure design and social environment provided an ideal setting for the self-motivation of "practice" and this recovery. Attention to the potential for such practice could facilitate rehabilitation.

Abstract (5425); Session GP20, Fri 14 August, Location: Houston Hall, Hall of Flags, Poster Num: 55

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#### SYMPATRIC SPECIATION IN ACTION: EVOLUTION OF SEASONAL POPULATIONS IN THE BAND-RUMPED STORM PETREL

Temporal separation of breeding time (allochryony) is a candidate mechanism by which two populations may diverge and develop reproductive isolation in the absence of physical barriers to gene flow. Recently discovered seasonal populations of the band-rumped storm petrel (*Oceanodroma castro*) present an ideal opportunity to study how the factors that drive temporal separation of breeding time may ultimately lead to sympatric speciation. We assessed genetic differentiation between the seasons on different archipelagos throughout the species' range and constructed a range-wide phylogeny to establish whether sympatric seasonal populations on each island are sister taxa. Preliminary results indicate that seasonal populations have arisen sympatrically at least four times. In order to understand the ecological and genetic processes leading to the evolution of seasonal populations we developed a more detailed picture of population genetic processes and gene flow for a single island in the Cape Verde archipelago where genetic differentiation between the seasons is incomplete.

Abstract (5526); Session GP12, Fri 14 August, Location: Houston Hall, Hall of Flags, Poster Num: 38

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#### HOUSE FINCH POPULATION DYNAMICS MAY BE AFFECTED BY OTHER BIRD SPECIES SERVING AS CARRIER SPECIES FOR A BACTERIAL PATHOGEN

The bacterial pathogen *Mycoplasma gallisepticum* has persisted as a pathogen of House Finches (*Carpodacus mexicanus*) since its emergence as a disease organism of the finches in the mid-1990s. The bacteria appear to be responsible for regulating densities of eastern North American House Finches to half their pre-disease abundance. This persistence continues in spite of the conjunctive disease essentially disappearing every spring and early summer, only to reappear in late summer. These seasonal dynamics suggest that hidden carriers exist for the bacteria, and potentially these carriers are other species of birds. In order to verify this supposition, we tested for the presence of *Mycoplasma gallisepticum* in 1295 opportunistically caught wild birds of 46 different species. The presence of *M. gallisepticum* was detected in 22 species by standard polymerase chain reaction (PCR) and/or rapid plate agglutination

(RPA) antibody tests. Of these 22 species, only 6 have been reported to show clinical symptoms of the disease, suggesting a much larger asymptomatic reservoir for the bacteria. These results indicate the potential for more complex routes of infection and more complex host – disease dynamics than previously thought for House Finches and *Mycoplasma gallisepticum*.

Abstract (5340); Session GP08, Fri 14 August, Location: Houston Hall, Hall of Flags, Poster Num: 27

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#### POOR BODY CONDITION MAY INFLUENCE BREEDING PROPENSITY OF LESSER SCAUP NESTING IN BOREAL ALASKA

Nation-wide populations of lesser scaup (*Aythya affinis*) have been in decline for over 20 years. One hypothesis suggests that reduced breeding propensity may be explained by poor body condition. We evaluated this hypothesis by examining the relationship between body condition and breeding status of pre-breeding female lesser scaup collected in the boreal forest of Alaska in 2007 (n = 18) and 2008 (n = 28). We found that females that had entered Rapid Follicle Growth (RFG) were approximately 84g heavier (p<0.000) and carried 16g more lipid (p=0.006) than those birds that had not entered RFG. In addition, we compared birds collected in 2007-2008 with those collected at the same site in 1991 (n = 60). We found that body mass of females collected 16-17 years earlier did not differ significantly (p = 0.069) but 1991 birds carried approximately 20g more lipid (p = 0.021). These results suggest that female lesser scaup may need to reach a minimum lipid threshold in order to reproduce and birds in recent years may be failing to meet those thresholds.

Abstract (5487); Session GP02, Fri 14 August, Location: Houston Hall, Hall of Flags, Poster Num: 3

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#### EFFECTS OF FOREST PATCH SIZE ON REFUELING PERFORMANCE OF THREE SPECIES OF SONGBIRDS DURING SPRING MIGRATION

In highly fragmented landscapes, migrating birds may be forced to use patches of potentially suboptimal stopover habitat, thereby reducing their ability to refuel. We tested the influence of patch size on the quality of forest patches by examining levels of triglyceride (a plasma lipid metabolite) for three species of migrant passerines in northwestern Ohio. We collected blood from 73 Magnolia Warblers (*Dendroica magnolia*), 102 Yellow-rumped Warblers (*D. coronata*), and 51 White-throated Sparrows (*Zonotrichia albicollis*) at shoreline forest sites of varying sizes (0.7 ha, 4.5 ha, and 30.3 ha) from 27 April-26 May in 2005 (2 sites) and 2006 (3 sites). In 2005, triglyceride concentrations for Yellow-rumped Warbler and Magnolia Warbler were lower for individuals captured in the larger site (p<0.01). In contrast, triglyceride concentrations in 2006 were not significantly different among study sites for Magnolia Warblers, Yellow-rumped Warblers, or White-throated Sparrows (p>0.10). Contrary to our expectations, refueling rates for the three species were not positively related to patch size, suggesting the smaller forest patches provided equivalent refueling opportunities during stopover.

Abstract (5573); Session GP21, Fri 14 August, Location: Houston Hall, Hall of Flags, Poster Num: 58

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#### NEST SUCCESS IN WOOD THRUSHES: CONCEALMENT AND PARENTAL NEST ATTENDANCE BEHAVIOR

An individual's fitness depends on a successful nesting attempt. Physical concealment and the pair's behavior can obviously impact success. We documented nest concealment and nest attendance behavior of Wood Thrushes during seven breeding seasons. There was no significant difference between successful and unsuccessful nests in nest concealment (t=0.392, df=57, P=0.697). Of particular interest is the coordination of the parents' behavior and its impact on nest survivorship. Parental behavior was recorded during hour-long nest watches. Each year ~30 nesting attempts on ~15 territories were repeatedly observed. Nesting success is low and variable among years, only 5-50% of nests produced at least one fledgling during a breeding season. There was extensive variability in nest attendance

among pairs, with males accounting for most of this variation. Significantly, male attendance significantly increased the likelihood of nest success ( $F=9.603$ ,  $df=1$ ,  $P=0.0034$ ). Males associated with successful nesting attempts spent significantly more time in nest attendance (~14% of time at nest) than males at failed nests (~5%). Future analyses will consider why males reduce nest attendance when it obviously has major fitness consequences.

Abstract (5571); Session GP02, Fri 14 August, Location: Houston Hall, Hall of Flags, Poster Num: 4

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#### EVOLUTIONARY RESPONSE OF FOREST SONGBIRDS TO 100 YEARS OF LANDSCAPE CHANGE IN NORTH AMERICA

Major changes in landscapes caused by humans can create strong selection pressures and induce rapid evolution in natural populations. Northeastern North America offers a unique opportunity for the study of rapid evolution in forest songbirds, because in the last 100 years this region has experienced extensive afforestation in temperate areas, and extensive clearcutting in boreal areas. Removal of mature forests should increase demand for mobility in species restricted to them. I tested whether wing pointedness, a trait associated to mobility, has changed in response to contrasting histories of forested landscapes. Based on museum skins, I show that boreal forest songbirds have evolved more pointed wings over the last 100 years. By contrast, wings of temperate forest songbirds have become less pointed over the same period. Culmen length, a measurement unrelated to flight capability, did not change significantly. The ability of forest songbirds to rapidly adapt to changes in landscapes may mitigate negative consequences of habitat loss caused by humans through direct exploitation or indirectly through climate change.

Abstract (5220); Session G05, Thu 13 August, Location: Irvine Auditorium, Amado Recital Room, Oral at 11:45

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#### EVALUATING THE POTENTIAL FOR ENERGY AND PROTEIN TO LIMIT ABUNDANCE OF THE ENDANGERED HAWAIIAN MOORHEN

Estimating energetic carrying capacity for year-round breeders feeding on replenishing resources is challenging, requiring a lot of data. We conducted a preliminary assessment to determine if there was evidence that energy or protein limit numbers of Hawaiian Moorhen (*Gallinula chloropus sandvicensis*). We compared moorhen numbers at 15 Oahu wetlands with predicted numbers based on energy abundance and required energy. We did this under two scenarios: moorhen metabolize all food energy at a wetland; and moorhen are limited by their ability to metabolize a fraction of the food plus a combination of competition and costs associated with reproduction. Our models showed that energy values overestimated numbers of moorhen at wetlands under both scenarios except at one wetland after discounting for costs of competition and reproduction. Additionally, we looked for correlations between moorhen abundance and energy or protein abundance but did not find any even when we controlled for wetland area or when we considered whether wetlands were managed for waterbirds. Moorhen do not appear to be energy-limited, nor do they select sites based on energy or protein.

Abstract (5404); Session GP10, Fri 14 August, Location: Houston Hall, Hall of Flags, Poster Num: 36

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#### WINTER TERRITORY DEFENSE AS A COLLECTIVE ACTION IN WESTERN BLUEBIRDS

Collective action models seek to understand the evolution and form of cooperative, goal-directed behavior in animals from ants to humans. We are just beginning to see an application of collective action theory to the problem of group defense of territories in birds. A collective action perspective has much to offer the problem of group defense, where individuals that contribute pay the costs, while those that don't still potentially reap the benefits. In this talk, we include sex and individual quality in a game-theoretical model of collective action, exploring predictions using data on western bluebird territorial defense. This approach incorporates the differential costs and benefits of male and female investment based upon group size, philopatric breeding opportunities, age (dominance), sex, and body condition. Our analysis shows a good fit of western bluebird territorial defense to predictions based on collective action.

Abstract (5441); Session G01, Thu 13 August, Location: Cohen Hall, G17 Auditorium, Oral at 12:15

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#### AUSTRALIAN ARID AND SEMI-ARID BIRDS DANCE TO THEIR OWN BEAT: PATCHY HABITAT DRIVES DIVERSE PATTERNS OF DIVERSIFICATION

Comparative phylogeography offers a powerful way to diagnose the history of biotic stability of a geographic region of interest and its avifauna. We compared phylogeographical patterns and parameters of genetic diversity within and among eleven southern Australian bird species that are broadly co-distributed either in arid and semi-arid regions or in its more mesic habitats. MtDNA (ND2) divergence from four previously described phylogeographic breaks range from substantial to no structure. Likewise, there were no clear patterns with regard to patterns of genetic diversity and population expansion. Phylogeographic breaks are concordantly located, which suggests community composition is not completely ephemeral. Rather, species of more arid zones show variable historical responses depending on habitat preference and, perhaps, increased adaptability to different habitats, compared with studies of species from more mesic environments. Further insight into these questions of demographic history raised by the mtDNA data can be gained from multi-locus coalescent analyses. We present analyses of multilocus sequence data from two species.

Abstract (5307); Session S10, Sat 15 August, Location: College Hall, Room 200, Oral at 12:00

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#### PHYLOGENY OF THE BARN SWALLOW COMPLEX: SPECIATION AND INTROGRESSION

The cosmopolitan Barn Swallow complex (*Hirundo rustica* and related *Hirundo* species) is a model system for studies of mate choice, sexual selection, and related topics in behavioral ecology, but its phylogenetic and phylogeographic relationships are not yet completely resolved. The six subspecies of *Hirundo rustica* differ in both morphological and behavioral characters, and recent evidence suggests that different sexual signal may persist in these subspecies. However, it is not clear whether each subspecies is a monophyletic group, or how these forms are related to the other *Hirundo* species. We reconstructed the phylogenetic relationships of all 14 species of the genus *Hirundo* and all six *rustica* subspecies. This analysis confirms a recent divergence of *Hirundo rustica* within the genus and of the six *rustica* subspecies. The European subspecies (*H. r. rustica*) and the East-Mediterranean subspecies (*H. r. transitiva*) show very modest genetic differentiation despite the strong phenotypic differences between them. We further explored the phylogenetic relationships and possible patterns of ongoing genetic connectivity between the European and the East-Mediterranean subspecies.

Abstract (5344); Session G21, Sat 15 August, Location: Houston Hall, Class of '49 Auditorium, Oral at 14:15

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#### SPATIOTEMPORAL VARIATION IN HENSLOW'S SPARROW POPULATIONS AT THREE SPATIAL SCALES

Henslow's Sparrows are suspected to be erratic and regionally opportunistic in their selection of breeding sites. We compared variation in Henslow's Sparrows' (*Ammodramus henslowii*) use of breeding habitat to those of Grasshopper (*A. savannarum*) and Savannah (*Passerculus sandwichensis*) sparrows using two variables to describe annual nest site fidelity: prevalence of occurrence and variance in abundance. We focused on three scales: global (across the breeding range), regional (within the range of Henslow's Sparrows), and local (within Breeding Bird Survey routes). In 2000-2007, Henslow's Sparrows differed from sympatric relatives in consistency of occurrence, but not in levels of variation in abundance at occupied sites. We compare and contrast results of these analyses at broad and fine spatial scales.

Abstract (5414); Session G13, Fri 14 August, Location: Houston Hall, Bodek Lounge, Oral at 10:30



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#### ACOUSTIC VARIATION IN BIRD SONG ACROSS AN ANTHROPOGENIC NOISE GRADIENT

Animals use acoustic signals as their fundamental form of communication for territory defense, mate attraction and individual recognition. Transmission of these signals to their intended receivers is essential for reproduction and survival. Anthropogenic noise can mask signals of animals that vocalize in the low frequency range. Several species of birds have been shown to raise the lower frequency bound of their songs in noisy environments. To further investigate the effect of anthropogenic noise on bird song, we examined the acoustic characteristics of seven species of birds across 30 sites with a broad range of noise levels. All species studied vocalize within the frequency range of ambient noise and thus could be subject to masking. Six species significantly increased the lowest frequency of their song with increasing ambient noise. Because communication is central to the reproductive success and survival of animals, investigating the consequences of altering the acoustic environment is crucial. This study documents a phenotypically plastic response to a human-altered environment and marks the first documentation of this phenomenon across multiple species and across a broad gradient of noise levels.

Abstract (5634); Session GP35, Fri 14 August, Location: Houston Hall, Hall of Flags, Poster Num: 93

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#### PATTERNS OF DOMINANCE IN BREEDING BIRD COMMUNITIES OF OAK-HICKORY FORESTS OF SOUTHERN INDIANA

For several decades, studies of avian community ecology have emphasized patterns in species richness and species diversity, while understanding of other aspects of community structure, such as dominance or beta diversity, have lagged behind. We are part of a multi-taxon, long-term study of the impacts of active management practices in the mature forests of southern Indiana. As part of this long-term study, we collected 3 years of data on species distribution and abundance at 234 locations across nine 80-ha study regions. We recorded up to 8400 detections of 59-65 breeding species per year. Samples were dominated by common species of mature deciduous forest. For example, in 2007 five species [Red-eyed Vireo (*Vireo olivaceus*), Acadian Flycatcher (*Empidonax vireescens*), Ovenbird (*Seiurus aurocapilla*), Eastern Wood-Pewee (*Contopus virens*), and Chipping Sparrow (*Spizella passerina*)] accounted for 38.6% of total detections. We will present patterns of change in species dominance (evenness) and in beta diversity (turnover) at two spatial scales: within each of the 80-ha study regions and across all of the regions in which the study regions are up to 35 km apart.

Abstract (5481); Session GP07, Fri 14 August, Location: Houston Hall, Hall of Flags, Poster Num: 25

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#### SLIGHT CHANGES IN INCUBATION TEMPERATURE AFFECT EARLY GROWTH AND STRESS ENDOCRINOLOGY IN WOOD DUCK (*AIX SPONSA*) DUCKLINGS

Although the effects of incubation temperature on phenotype of avian hatchlings are poorly understood, recent research suggests that subtle changes in incubation conditions can influence hatchling characteristics including body size and condition. We explored the effects of incubation temperature on hatching success, survival to 9-d post hatch, growth, and the hypothalamo-pituitary-adrenal (HPA) axis in wood duck ducklings (*Aix sponsa*). Wild wood duck eggs were experimentally incubated at temperatures that fall within the range of temperatures of naturally-incubated wood duck nests (35.0, 35.9, and 37.0°C). Hatching success and post-hatch survival was greatest in ducks incubated at the intermediate temperature. Ducklings incubated at both 35.9 and 37.0°C had 43% higher growth rates than ducklings incubated at 35.0°C. In addition, ducklings incubated at the lowest temperature had higher baseline (17-50%) and stress-induced (32-84%) corticosterone concentrations than ducklings incubated at 35.9 and 37.0°C at 2- and 9-d post hatch. Our results illustrate that subtle differences (< 1.0°C) in incubation temperature can have important consequences for physiological traits important to fitness.

Abstract (5211); Session G10, Thu 13 August, Location: Irvine Auditorium, Amado Recital Room, Oral at 16:00

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#### DEVELOPING A PREDICTIVE HABITAT MODEL FOR BOBWHITE MANAGEMENT

Some of the steepest regional declines of northern bobwhites (*Colinus virginianus*) populations have occurred in the upper Mid-Atlantic states where abundances were once one of the highest in the country. Consequently, regional efforts are underway to determine where bobwhite populations remain and what habitats have the potential to support bobwhite for future conservation. From 15 May to 15 August, 2008, we conducted 3 replicates of 180 point-count surveys to sample the presence of bobwhite within Delaware. Based on the 2007 Delaware Land Use/Land Cover dataset, we modeled the scale-dependent relationships of bobwhite presence with metrics of landscape composition and configuration. Bobwhite presence was negatively related to the amount of low density development within 8.5 km and the amount of emergent wetland within 7.5 km. Additionally, bobwhite presence was positively related to the amount of high density development within 9.5 km and the amount of shrubland within 10 km. We used this model to produce a map of the predicted presence of breeding bobwhite within Delaware. The modeling results and distribution map will be used to guide future habitat management efforts.

Abstract (5206); Session G20, Sat 15 August, Location: Cohen Hall, Terrace Room, Oral at 11:45

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#### CAUSES AND CONSEQUENCES OF INTER-SEASON MATE FIDELITY IN A LEKKING PASSERINE

In species with long reproductive lifespans, female mate fidelity and divorce are important mechanisms by which females may increase their reproductive success. Inter-season mate fidelity is generally associated with socially monogamous mating, but may also occur in lek mating systems. Benefits of fidelity therefore may have a strong influence on female reproductive decisions, even in the absence of paternal involvement in nesting or offspring care. In the lek-mating lance-tailed manakin, approximately 25% of females re-mated with previous copulation partners across years, a level of inter-season mate fidelity comparable to that of some socially monogamous species. Females were faithful to individual males, and were not significantly site faithful when previous mates were replaced. With the goal of determining why females may be faithful to specific males, I examined long-term patterns of mate choice for 63 female lance-tailed manakins, using genetic paternity data from 2000-2008. I investigated the behavioral correlates of mate fidelity and switching and how these influenced reproductive success, specifically examining whether fidelity is related to increased offspring or female survival, faster offspring growth rates, or decreased female energetic expenditure.

Abstract (5578); Session G09, Thu 13 August, Location: Irvine Auditorium, Café 58, Oral at 14:15

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#### USE OF BODY MOLT TO AGE CRESTED CARACARAS

Valid population models require accurate parameterization of age and state-transition points based on life history. We found confusion in published literature regarding the time required (2, 3, or 4 years) for Crested Caracaras (*Caracara cheriway*), a threatened species, to attain adult plumage. To resolve this, we captured, photographed, and uniquely marked juvenile and immature Caracaras in Florida. Thereafter, we re-photographed marked Caracaras in the wild. We captured 164 Caracaras and collected useful photographs of 15 birds 4-25 months later. Sequential photographs identified the number of months between plumages. We found that Caracaras spend 1 year in juvenal plumage, 1.5 years in prebasic (immature) plumage (a mix of juvenal and adult plumage), and attain adult plumage 2.5 years post-fledging. Specific proportions, but not color (black vs. brown), of streaking and barring on the breast were the best indicators of age; calendar month was less informative due to widely asynchronous fledging. This population contains hundreds of vagrant non-territorial floaters, and subtle differences in plumage may function as important indicators of resource holding potential in contests over limited breeding territories.

Abstract (5354); Session GP19, Fri 14 August, Location: Houston Hall, Hall of Flags, Poster Num: 48

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#### LEEWARD NEST ORIENTATION IN SHRUB-STEPPE BIRDS OF THE SOUTHERN GREAT PLAINS

Many birds exhibit nonrandom, directional orientation of their nest entrances or of nest position relative to surrounding vegetation. There is evidence that birds orient nests into prevailing winds in especially warm climates,

presumably to moderate nest temperature. We predicted that shrub-steppe birds in the southern Great Plains would orient their nests on the windward side of nesting plants, including cholla cactus (*Opuntia imbricata*) and honey mesquite (*Prosopis glandulosa*). We measured nest orientation in Mourning Dove (*Zenaidura macroura*), Northern Mockingbird (*Mimus polyglottos*), Curve-billed Thrasher (*Toxostoma curvirostre*), and Lark Sparrow (*Chondestes grammacus*) as the compass direction in which nests were most exposed to the ambient environment. Contrary to our prediction, nests of most study species (N=263) exhibited nonrandom ( $P < 0.05$ ) orientations toward the north-northeast (mean angle range=4.8-48.2 degrees), leeward to prevailing southerly winds. Such was the case for Lark Sparrow, despite cooler, maximum temperatures at its windward nest exposures. A leeward orientation of nests might aid in nest stability, minimize nestling desiccation, or assist adults in leaving or entering nests.

Abstract (5286); Session G06, Thu 13 August, Location: Irvine Auditorium, Café 58, Oral at 11:45

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#### EFFECT OF TAMOXIFEN ON YOLK STEROID LEVELS IN HOUSE SPARROWS: TOWARD A MECHANISM OF YOLK STEROID ACCUMULATION

Variation in the accumulation of maternally-derived steroids in avian yolks appears to have adaptive effects on both short- and long-term offspring phenotype. While many studies have found social and environmental correlates of this variation in line with adaptive hypotheses, insufficient knowledge of the mechanism(s) of yolk steroid accumulation precludes a definitive rejection of non-adaptive hypotheses. We experimentally tested the hypothesis that steroids enter the yolk by binding to the yolk precursors (lipoproteins) as they pass through the steroid-producing tissue layers surrounding the oocyte. We used injections of the anti-estrogen tamoxifen to reduce yolk precursor expression and overall egg size in captive house sparrows. We predict that fewer steroids will have the opportunity to bind lipoproteins in tamoxifen-treated birds, thus reducing total yolk steroid content relative to untreated eggs of the same clutch, whereas yolk steroid content will be similar across the clutch in control-treated females. Eggs produced during tamoxifen treatment were on average 17 percent smaller than untreated eggs of the same clutch. Results of the effect of tamoxifen on circulating and yolk steroid levels will be discussed.

Abstract (5523); Session G10, Thu 13 August, Location: Irvine Auditorium, Amado Recital Room, Oral at 14:15

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#### URBAN COLONIALS AND IMPACTS OF SPRAWL: A CASE STUDY WITH GREAT EGRETS

Herons, egrets, and ibises nest on islands in the NY/NJ Harbor, signaling improved environmental quality in the region since passage of the Clean Water Act, 1972. Using citizen science effort NJ Audubon Society and NYC Audubon are monitoring the foraging ecology of these birds within the urban/suburban matrix, complementing long-term nest survey data. During 2008 approximately 50 volunteers conducted surveys. The most common species observed were Great and Snowy Egret, with higher average numbers per site in the Meadowlands than any other general areas (10.0 and 7.2, respectively). Both species were seen at greater frequency in the Meadowlands than any other NJ region. Preliminary analyses suggest that habitat and tide cycle are factors in determining use. More birds are observed in open water habitats and Snowy Egrets were most often seen in shallower water. More birds than expected were seen during mid-incoming tides in the Meadowlands and mid-outgoing tides in the Raritan Bay area suggesting the importance of tidal cycle in determining use of non-breeding sites. Current foraging sites must be protected from shoreline hardening, human encroachment, and development.

Abstract (5398); Session S07, Sat 15 August, Location: Houston Hall, Class of '49 Auditorium, Oral at 09:30

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#### CONSERVATION RELIANCE IN AN ERA OF CLIMATE CHANGE: CAN WE SAVE SALTMARSH SPARROWS AS THE OCEANS RISE?

As climate changes, conservation biologists anticipate widespread biodiversity changes. Habitat specialists are among the most susceptible species, and even those that seem stable may rapidly decline as their habitat disappears. Species confined to low-lying coastal habitats are especially vulnerable due to rising sea-levels. Several sparrow species and subspecies are restricted to tidal marshes, and number among those that may rapidly require human intervention to stave off extinction. Saltmarsh sharp-tailed sparrows, for instance, nest only in the highest portions of the tidal marshes of the northeastern United States. Most nest loss in these birds is caused by flooding during the highest high tides. Both eggs and chicks can withstand limited nest-flooding, but reproductive success depends largely on the nesting cycle fitting between the peak tides of the lunar cycle. Rising sea-levels, however, threaten to push the species towards a threshold beyond which reproduction is impossible. Solving this problem will likely require protecting areas where marshes can migrate inland, facilitating habitat change to ensure that suitable conditions are continuously available, and tidal management to buy time for new marsh to develop.

Abstract (5310); Session S02, Thu 13 August, Location: Houston Hall, Class of '49 Auditorium, Oral at 16:30

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#### INFLUENCE OF FOREST STRUCTURE ON AVIAN COMMUNITIES IN CHITWAN NATIONAL PARK, NEPAL

The primary objective of this study was to measure avian species richness and abundance, with particular emphasis on woodpeckers, in relation to forest structure and composition in two subtropical forest types in Nepal: sal (*Shorea robusta*) forest and riverine forest dominated by bilaune (*Maesa chisia*) and vellar (*Treulia nudiflora*). We collected data on birds during 10-minute unlimited distance point counts each separated by 300 m at six different sites in each habitat (sal forest, n=24; riverine forest, n=23). Diameter and species of all trees > 5 cm diameter breast height were collected at each point within a 0.05-ha circular sample. During the point counts, a total of 73 species were found in both habitats, 62 forest bird species were encountered in riverine only, 54 species in sal forest only, and 60% shared. Black-hooded Oriole (*Oriolus xanthornus*) was the most frequently encountered species in both habitats. Six species of woodpeckers were found in each habitat with Fulvous-breasted Woodpecker (*Dendrocopos macei*) more common in riverine forest and Grey-capped Woodpecker (*D. canicapillus*) more common in sal forest.

Abstract (5500); Session GP07, Fri 14 August, Location: Houston Hall, Hall of Flags, Poster Num: 26

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#### PERSONALITIES IN FORAGING BEHAVIORS: SUCCESSFUL BIRDS ARE SLOW AND BOLD

We investigated whether house sparrows (*Passer domesticus*) have foraging personalities. We tested 37 birds individually in outdoor aviaries, in four 20-minute trials, with the task of finding seed hidden in 10 patches of sand. We measured five behaviors: the tendencies to begin, stop, and resume foraging, and the among- and within-patch search rates. All five behaviors were repeatable, and correlations among the behaviors resulted in two principal component axes. PC1 was defined by the tendencies to stop and resume foraging and the among-patch search rate, which we suggest describes activity since an active bird would move in space quickly, getting on and off the grid and moving among patches. PC2 was comprised of the tendency to begin foraging and the within-patch search rate, and we suggest that this describes boldness, since the birds that tended to begin soonest were quickest to forage after a human disturbance (placement of patches), and high within-patch search rates reflect a lack of vigilance. Seed-finding rate was affected negatively by activity and positively by boldness. Therefore, successful foraging results from being slow and bold.

Abstract (5345); Session G01, Thu 13 August, Location: Cohen Hall, G17 Auditorium, Oral at 12:00

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#### HOW WELL DOES MIGRATION MONITORING SAMPLE NORTH AMERICAN OSPREY POPULATIONS?

We used satellite tracks of 61 Ospreys (*Pandion haliaetus*) captured on breeding range in North America between 1995 and 2000 to analyze the degree to which migration monitoring samples their populations. We used (1) 6-km-wide linear trajectories connecting positions with straight lines and (2) utilization distributions derived from Brownian bridge analysis to examine the proportion of birds likely to be detected by watchsites, the proportion of watchsites likely to detect tagged birds, and the overall geography of southward Osprey migration. Method 1 estimated a continental detection rate of 23%, with a rate of 36% in eastern North America, and 20% of all watchsites intersecting migration trajectories. Method 2 estimated that 95% of the utilization distributions of migrating Ospreys in North America intersected at least one watchsite and 84% of watchsites intersected at least one utilization distribution. Detection probabilities (mean  $\pm$  SD) for individuals were estimated to be  $0.38 \pm 0.21$  in eastern,  $0.020 \pm 0.023$  in midwestern, and  $0.016 \pm 0.013$  in western North America. Migrant Ospreys concentrated on narrow fronts and used land bridges rather than large water crossings on migration.

Abstract (5329); Session G23, Sat 15 August, Location: Houston Hall, Bodek Lounge, Oral at 14:30

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**EXTINCTION IN THE GALAPAGOS: USING ANCIENT DNA TO DETERMINE GENETIC STRUCTURE IN HISTORIC POPULATIONS OF DARWIN'S FINCHES**

Loss of genetic variation and heterozygosity are common characteristics of declining avian populations, but can these values be used to more accurately estimate a population's extinction risk? This study will utilize DNA from museum specimens of a model avian system, Darwin's finches, to investigate the genetic characteristics of populations prior to extinction. Sixteen microsatellite loci will be used to generate genetic profiles, including measures of allelic diversity, heterozygosity, homozygosity and inbreeding coefficients, which can be compared between extinct and extant populations. I hypothesize that significant reductions in genetic variation and heterozygosity occurred in populations prior to extinction. The data generated by examining the genetic profiles of extinct avian populations may be useful in developing more accurate methods for estimating a population's extinction risk, which would aid in the more efficient allocation of conservation resources and management. This research will be funded by an AOU student research grant.

Abstract (5349); Session GP06, Fri 14 August, Location: Houston Hall, Hall of Flags, Poster Num: 103

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**MALE-DRIVEN ADVANTAGES MASQUERADE AS BENEFITS OF MULTIPLE MATING FOR FEMALE WESTERN BLUEBIRDS (*SIALIA MEXICANA*)**

The question of why socially monogamous females mate with extra-pair males has been a major challenge for behavioral ecologists, with the leading hypothesis being that females gain genetic benefits. Studies comparing growth of extra-pair and within-pair young (EPY, WPY) from the same brood control for social and physical environment, but assume growth differences have a genetic basis. Non-genetic factors that vary within broods, specifically egg size, birth order and gender, also affect offspring growth. We demonstrate that a paternity-related growth advantage in western bluebirds results from effects of birth order. EPY are larger than their half-siblings and positioned earlier in the laying order. Early-born young in genetically monogamous broods also develop faster than later-hatched siblings, indicating that order rather than paternity accounts for growth differences between half-siblings. We test various hypotheses for female benefits, but conclude that non-genetic differences in offspring growth benefit extra-pair males with no apparent advantages to females. Behavioral data further indicate that representation of EPY early in the laying order reflects optimal timing of extra-pair male copulations, thereby maximizing male fitness gains from multiple mating.

Abstract (5432); Session G09, Thu 13 August, Location: Irvine Auditorium, Café 58, Oral at 14:30

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**HIGH RATES OF EXTRA-PAIR PATERNITY IN THE SOUTH TEMPERATE WHITE-RUMPED SWALLOW (*TACHYGINETA LEUCORRHOA*)**

Despite all the detailed paternity studies on Tree swallows (*Tachycineta bicolor*), and the very high rates of extra-pair paternity in this species, there is still no information on paternity levels for most of the nine species included in the genus *Tachycineta*. Here, we look at extra-pair paternity rates in the White-rumped swallow (*T. leucorrhoa*), a congeneric southern hemisphere breeder. Following life history predictions we expected south-temperate White-rumped swallows to show low rates of extra-pair paternity - similar to those found in the tropical Mangrove swallow (*T. albilinea*). We found, however, that the population sampled in this study had extra-pair young in 80.9% of the broods (N = 42) totaling 56.9% of the offspring in the colony (N = 186). We discuss the implications of our results in the context of life history theory.

Abstract (5492); Session G24, Sat 15 August, Location: Cohen Hall, Terrace Room, Oral at 14:15

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#### TRUE MONOGAMY IN FLORIDA SCRUB-JAYS: EXTRA-PAIR PATERNITY ABSENT REGARDLESS OF DEMOGRAPHIC CIRCUMSTANCES

We used microsatellite markers (20 loci) to examine paternity for 1290 Florida Scrub-Jay offspring from 258 color-banded family groups occupying three ecologically and demographically distinct landscapes: (1) contiguous scrub in well-managed habitat at Archbold Biological Station; (2) naturally fragmented scrub within a prairie and pine flatwoods landscape; (3) artificially fragmented scrub in a rapidly developing suburban landscape. We expected elevated extra-pair paternity (EPP) in the suburban landscape where rates of mortality, divorce, and first-year breeding are highest. Instead, we found no genetic mismatches between offspring and behavioral father in the suburban tract, and only one clear case overall (one mismatched offspring in a brood of four). The Florida Scrub-Jay is a rare example of true genetic monogamy in a passerine bird. Absence of EPP may be a consequence of unusually large territory sizes, strong selection for pair-bond maintenance, and a highly competitive social environment where only a few males achieve breeding status. Because only the highest quality males own territories, females may gain no selective advantage in allowing males other than their mates to sire their offspring.

Abstract (5473); Session G01, Thu 13 August, Location: Cohen Hall, G17 Auditorium, Oral at 11:00

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#### EVOLUTION OF A MICROSATELLITE LOCUS IN THE CORVIDAE

We assessed the evolution of a highly variable microsatellite locus across a wide sampling of corvids. The locus, MJG1, was originally found in *Aphelocoma ultramarina* and characterized as a tetranucleotide repeat with a GAAA motif. We cloned and sequenced representative alleles from 17 species in total, including ten jays and seven *Corvus* (including the basal *C. monedula*), and more intensively in up to 14 individuals in two species of *Corvus*. We found that the motif varied across species, with all members of the genus *Corvus* having a stereotypical pentanucleotide pattern (GAAAA), and jays showing either a tetranucleotide or a mixed motif. We also sequenced mtDNA cytochrome b for the same species and constructed a phylogenetic tree. Mapping of the motif across the tree and character state reconstructions indicate that the locus evolved from a tetranucleotide state at the base of the tree to a mixed state, and then to a pure pentanucleotide state in the *Corvus*. The pattern of evolution suggests that slippage mutations within the microsatellite repeat unit led to an increase in the poly A, eventually fixing at four A's within *Corvus*.

Abstract (5303); Session G18, Sat 15 August, Location: Irvine Auditorium, Amado Recital Room, Oral at 09:15

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#### MIGRATION IN THE 3RD DIMENSION: WHAT WE KNOW ABOUT TROPICAL ALTITUDINAL MIGRATION AND WHY WE NEED TO KNOW MORE

Despite over 30 years of research interest, altitudinal migration in the tropics remains a little-studied phenomenon. I reviewed 35 papers with original data on tropical altitudinal migration to determine our current understanding of this behavior and its causal mechanisms, to identify critical knowledge gaps and new approaches and to identify conservation needs unique to species that migrate altitudinally. I contextualized data from my own research on a community of Nicaraguan birds within this broader review. There are few tests of proposed causal mechanisms for altitudinal migration, but birds may migrate to breed during peak abundance of food or to avoid nest predation, seasonal storms, and competition with conspecifics. These short-distance movements have been linked to food preference and may be the precursor to long-distance migration out of the tropics, although recent research suggests this relationship may be complex. Migratory behavior is poorly described in many regions yet has broad implications for successful reserve design. There are still many lacunae regarding altitudinal migration but new methodological and conceptual approaches may yield new insights into this little studied behavior.

Abstract (5227); Session S04, Sat 15 August, Location: Cohen Hall, G17 Auditorium, Oral at 14:00

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#### CHICK-A-DEE CALL VARIATION IN CAROLINA CHICKADEES AND RECRUITING FLOCKMATES TO FOOD

The ‘chick-a-dee’ call of many Parid species is structurally complex and functions in social cohesion. An earlier study with Carolina chickadees, *Poecile carolinensis*, found that receivers responded differently to playback calls differing in note composition in feeding contexts. Here, we addressed whether signalers actually produce calls differing in note composition in feeding contexts and whether those calls might serve a recruitment function. First, we found that the first chickadee to take seed from a feeding station produced calls with a greater number of D notes before the second chickadee arrived to take seed, compared to after the second chickadee arrived to take seed. We tested the idea that calls with many D notes might serve a general recruitment function using playbacks of calls containing different numbers of D notes. The latency for a first chickadee to come into a site and take seed was shorter for playback variants containing a large number of D notes. Thus, chick-a-dee calls containing a large number of D notes may function to recruit other flock members to a discovered food source.

Abstract (5253); Session G22, Sat 15 August, Location: Irvine Auditorium, Amado Recital Room, Oral at 17:15

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#### FEMALE COWBIRDS CAN USE MATE-CHOICE COPYING TO MODIFY THEIR SONG PREFERENCES

We conducted a tutoring experiment designed to determine whether female brown-headed cowbirds (*Molothrus ater*) would attend to the vocalizations of other females and use them to influence their preferences for male courtship songs. Prior to the breeding season we exposed adult and juvenile females to songs of unfamiliar males. We paired half of the songs with female chatter vocalizations – a vocalization that a female gives in response to a song from a male who is courting her effectively. Thus, chatter immediately following a song provided a cue indicating that the song was sung by a male who was successful in courting a female. In the breeding season, we placed all tutored females in sound-attenuating chambers and played them the tutor songs without chatter. We measured females’ preferences for the songs based on how often the songs elicited the females’ copulatory solicitation displays. Females produced significantly more solicitation displays to the songs that had been paired with chatter than to songs that were not paired with chatter. This experiment is the first demonstration that females can modify their song preferences by attending to the vocal behaviour of other females.

Abstract (5226); Session GP30, Fri 14 August, Location: Houston Hall, Hall of Flags, Poster Num: 81

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#### MULTIPLE MALE ORNAMENTS AND AGE- AND CONDITION-DEPENDENT SIGNALING IN THE COMMON YELLOWTHROAT

In many animals, sexual selection has resulted in complex signaling systems where males advertise aspects of their phenotypic or genetic quality through elaborate ornamentation and display behaviors. Despite the potential for age-related changes in the costs and benefits of signaling, we know little about how the information-content and reliability of ornaments changes with male age. In this three-year study we explored age-specific patterns of signal reliability in the Common Yellowthroat, a socially monogamous warbler with two prominent plumage ornaments—a melanin-based, black facial “mask” and carotenoid-based, uv-yellow “bib”. We found that the condition dependence of bib traits differed between age-classes, and that selection via female choice appeared to mirror these changes in signal reliability. In contrast, mask traits showed the same patterns of condition dependence and selection across age classes. Our results suggest that the information-content of some ornaments changes with male age. Patterns of sexual selection appear to mirror these changes, suggesting that ornaments may function only at some times (ages) or in some contexts.

Abstract (5213); Session G09, Thu 13 August, Location: Irvine Auditorium, Café 58, Oral at 14:15

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#### POPULATION-LEVEL IMPLICATIONS OF CLIMATE CHANGE FOR A MONTANE FOREST SONGBIRD, BICKNELL'S THRUSH

High elevation species are among those predicted to be at greatest risk from climate change. Identifying critical montane habitat patches is essential to promote conservation of these species. We examined population-level responses of a montane forest songbird, Bicknell's Thrush, to climate warming. We combined local (stand characteristics) and landscape (patch size) scale habitat models to predict spatial and temporal distributions of habitat suitability. Using these models, we predicted probability of occupancy, local colonization and extinction across Vermont under current conditions and with a 1 deg C increase in mean July temperature. An increase of 1 deg C results in a dramatic reduction of montane habitat with substantial loss of small patches. Although there were fewer patches under the future scenario, those that remained were of highest local quality (high boreal basal area). We found that average probability of site occupancy and colonization decreased slightly, however, extinction probability increased considerably. Under limited warming, Bicknell's Thrush could persist given favorable local habitat conditions in remaining patches; however, increases of more than 1 deg C threaten the future persistence of the species.

Abstract (5463); Session S05, Fri 14 August, Location: Irvine Auditorium, Amado Recital Room, Oral at 16:30

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#### CORRELATED EVOLUTION OF MIGRATION AND SEXUAL DICHROMATISM IN THE NEW WORLD ORIOLES

The evolution of sexual dimorphism has long been attributed to sexual selection, specifically as it would drive repeated gains of elaborate male traits. In contrast to this pattern, New World oriole species all exhibit elaborate male plumage, and the repeated gains of sexual dichromatism observed in the genus are due to losses of female elaboration. Interestingly, most sexually dichromatic orioles belong to migratory or temperate-breeding clades. Using character scoring and ancestral state reconstructions from two recent studies in *Icterus*, we tested a hypothesis of correlated evolution between migration and sexual dichromatism. Our results show that the evolution of these traits is significantly correlated. Indeed, our best model of character evolution suggests that gains of sexual dichromatism are 25 times more likely to occur in migratory taxa. This study demonstrates that a life history trait with no known relationship to sexual selection has a strong influence on the evolution of sexual dichromatism. We recommend that researchers further investigate the role of selection on elaborate female traits in the evolution of sexual dimorphism.

Abstract (5330); Session G18, Sat 15 August, Location: Irvine Auditorium, Amado Recital Room, Oral at 09:30

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#### MOLECULAR EVOLUTION OF MITOCHONDRIAL PROTEINS IN TROPICAL AND TEMPERATE BIRDS: THERMAL ADAPTATION TO LATITUDINAL CLIMATES?

Temperate bird species show significantly higher metabolic rates compared to tropical species presumably reflecting adaptation to differing climates yet the molecular basis for this difference remains unclear. Bird families spanning both environments offer a unique opportunity to study the molecular evolution of this physiological adaptation. Here, we explore the role of evolution of mitochondrial proteins as a cause for variation in metabolic rate by estimating selection on genes encoding proteins involved in the oxidative phosphorylation pathway (OXPHOS). We sequenced and analyzed 14 mitogenomes from 7 pairs of tropical and temperate species. Maximum likelihood-based methods for detecting selection identified 67 sites under positive selection along lineages: 38 (56.7%) of these changes occur in NADH genes encoding proteins involved in OXPHOS complex I while OXPHOS complexes III, IV and V experience 0, 16 and 13 significant changes, respectively. Many of these mutations significantly alter the residue properties of the resulting proteins suggesting these changes could influence OXPHOS function. Our study supports the idea that mitochondrial genes fundamental in metabolic activity of both temperate and tropical bird lineages may influence climatic adaptation.

Abstract (5632); Session GP35, Fri 14 August, Location: Houston Hall, Hall of Flags, Poster Num: 94



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#### EFFECT OF FOOD ON REPRODUCTIVE PHYSIOLOGY AND BEHAVIOR OF AMERICAN GOLDFINCHES

American goldfinches (*Carduelis tristis*) breed in mid-July and August, much later than most songbirds. This may be due to birds waiting for seed availability. We tested whether supplementation with thistle seed and spray millet would affect reproductive physiology and behavior in captive goldfinches, compared to birds fed a standard maintenance diet. Captive birds were held in male-female pairs and switched from a short to long day photoperiod. We monitored gonads, beak coloration, molt, song production and, brood patch development. All birds came in to reproductive condition then eventually became photorefractory and entered molt. Preliminary analyses indicate an effect of photoperiod, but no effect of food, on physiological measures. Seed supplements did appear to increase singing rate, however. Hormone data will also be presented. The present results indicate that goldfinches are strongly photoperiodic, but there is only limited evidence for effects of food type on reproductive physiology.

Abstract (5490); Session G24, Sat 15 August, Location: Cohen Hall, Terrace Room, Oral at 14:30

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#### AUDITORY RESPONSES TO PURE TONES AND AMPLITUDE MODULATION IN THE BROWN-HEADED COWBIRD (*MOLOTHRUS ATER*) AND THE RED-WINGED BLACKBIRD (*AGELAIUS PHOENICEUS*)

The configuration of the peripheral auditory system of many avian species is thought to be a result of co-evolution between signal generation and signal perception. This co-evolution is presumed to result in a peripheral auditory system that is closely tuned to the vocalizations of conspecifics. Avian brood parasites, however, use heterospecific vocalizations and cues generated by host activity to locate suitable nests. The peripheral auditory system of avian brood parasites, therefore, may be shaped not only by co-evolution between conspecific sender and receiver, but also between heterospecific host and parasite. Thus, we hypothesize that avian brood parasites should have characteristics of the peripheral auditory system that enhance the ability to detect and locate potential hosts. Here we compare the response of the brown-headed cowbird (*Molothrus ater*), an avian brood parasite, and a closely related non-parasite, the red-winged blackbird (*Agelaius phoeniceus*) to tone bursts and amplitude modulation. We used auditory evoked potentials to create audiograms (a measure of threshold sensitivity to different frequencies) and modulation rate transfer functions (a measure of sensitivity to different rates of amplitude modulation) for comparison.

Abstract (5326); Session G07, Thu 13 August, Location: Cohen Hall, Terrace Room, Oral at 16:15

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#### YAWNING, STRESS, AND AVIAN THERMOREGULATION

Yawning is commonly observed in birds as well as other vertebrates. Yawning in humans and rats occurs before, after, and during instances of heat stress, hyperthermia, and abnormal thermoregulation, strongly suggesting thermoregulatory functions. However, the significance of yawning in birds is understudied. We show that yawning frequency in budgerigars (*Melopsittacus undulatus*) changes with ambient temperature manipulations. Yawning is also associated with other avian cooling behaviors, namely gular fluttering and wing venting, further demonstrating its temperature-sensitive nature. In addition, brief handling, which increases core body temperature in birds, appears to produce an increase in yawn frequency. We propose that yawning serves as a metabolically inexpensive means of cooling by increasing venous blood flow while cooling blood traveling to the brain through convection. Thus, yawning serves as a compensatory rather than primary cooling behavior, which is trumped by more effective, but possibly more costly evaporative cooling behaviors. This research provides novel insight into avian thermoregulation, and suggests that the physiological trigger for yawning is related to increasing body temperatures.

Abstract (5333); Session G10, Thu 13 August, Location: Irvine Auditorium, Amado Recital Room, Oral at 14:30

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#### EFFECTS OF CORTICOSTERONE ADMINISTRATION ON OFFSPRING PRIMARY SEX RATIO IN ZEBRA FINCH (*TAENIOPYGIA GUTTATA*)

Researchers have documented significant skews in the primary sex ratios of avian offspring in relation to a variety of environmental and social cues. Zebra finches, in particular, adjust offspring sex ratio according to both the quality and

quantity of available food, as well as the attractiveness of the male. The mechanisms behind such manipulation of offspring sex, however, remain elusive. Recent studies suggest that females with chronically elevated corticosterone levels (both naturally and artificially) produce significantly female biased offspring sex ratios. We tested the effects of a pharmacological dose of corticosterone at the time of sex chromosome segregation on the primary sex ratio of zebra finch offspring. Females were injected intraperitoneally with 20ug of corticosterone dissolved in 100ul of peanut oil, or with a control oil vehicle six hours prior to the predicted time of ovulation. Females injected with corticosterone and control injection treatments produced significantly more males compared to untreated controls. Our results show that primary sex can be influenced at the time of meiotic division by even a mild stress associated with injection.

Abstract (5456); Session GP26, Fri 14 August, Location: Houston Hall, Hall of Flags, Poster Num: 67

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#### KNEMIDOKOPTIC MANGE IN HAWAII `AMAKIHI (*HEMIGNATHUS VIRENS*): ONE YEAR LATER

Knemidokoptic mange (caused by the mite *Knemidokoptes jamaicensis*) on two Hawai'i `Amakihi (*Hemignathus virens*) was first observed while mist-netting wild passerines at low-elevation (595 m) in the Manuka Natural Area Reserve (NAR) on the island of Hawai'i in June, 2007. During subsequent mist-netting in the Manuka NAR in 2008, we found Hawai'i `Amakihi with knemidokoptic mange at all elevations (305 m, 595 m, 863 m, and 1585 m) sampled. The prevalence of mange among Hawai'i `Amakihi was highest at lower elevations with 15% (2/13) at 305 m, 22% (8/36) at 595 m, 5% (1/20) at 863 m, and 4% (1/23) at 1585 m. Also in 2008, we detected 2 out of 36 Hawai'i `Amakihi with knemidokoptic mange in the Keauohana Forest Reserve (293m) approximately 95 km from the Manuka NAR. No other native or non-native species caught at these sites have been found with mange. These data show that *K. jamaicensis* is not restricted to the Manuka area. The presence of this parasite over a large elevational gradient and spatial range indicates a potential threat to high elevation native bird communities in such key conservation lands as the Kahuku Unit of Hawai'i Volcanoes National Park and the South Kona Unit of Hakalau Forest National Wildlife Refuge. The focus of further investigations should be placed on the transmission of *K. jamaicensis* to prevent further spread of this parasite on the island of Hawai'i and neighboring islands.

Abstract (5242); Session GP08, Fri 14 August, Location: Houston Hall, Hall of Flags, Poster Num: 28

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#### COMMUNICATION TOWERS AS BARRIERS TO BIRD MIGRATION AND OPPORTUNITIES TO REDUCE THE RISK

Each year millions of birds collide with communication towers during migration. These avian fatalities are primarily Nearctic-Neotropical migrants and include >60 USFWS Birds of Conservation Concern. Due to the proliferation of cellular communications and digital television the number of towers has increased to >100,000 in the US alone. The tower height, tower lighting, siting within the landscape, and the presence of supporting guy wires influences the numbers of avian collisions. Research has determined that taller towers, towers with guy wires, and towers with non-flashing lights are involved in significantly more avian collisions than shorter towers, unguyed towers, and towers with only flashing lights. These mitigation techniques should be considered when planning tower construction and siting. In addition, the FAA is currently evaluating the safety of extinguishing non-flashing lights on existing towers, which would reduce avian collisions by as much as 70%. These lighting changes can be accomplished at minimal cost and would reduce the cost of tower operation. Extinguishing non-flashing lights is one of the most effective and economically feasible means of achieving a significant reduction in avian fatalities at existing communication towers.

Abstract (5591); Session A01, Thu 13 August, Location: Cohen Hall, Terrace Room, Oral at 14:00

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#### LOUISIANA WATERTHRUSH RESPONSE TO NATURAL GAS AND OIL WELL DEVELOPMENT IN WEST VIRGINIA

Natural gas deposits increasingly are being exploited across much of the central Appalachians. Drilling activities can result in heavy equipment disturbance during construction of well pads, ponds, and access roads within the forest-dominated habitat common in this region. Our study area, 3,600 ha on the Lewis Wetzel Wildlife Management Area, currently has little anthropogenic canopy disturbance. Gas well construction began intensively in 2008 and is expected to increase. Pilot research in 2008 documented 65 Louisiana Waterthrush territories along 41 km of streams; 31 males were banded. Also in 2008, we completed a Rapid Stream Bioassessment and Louisiana Waterthrush Habitat Suitability Index which indicated that 5.8 km (14%) of these 1st to 3rd order streams were impacted by drilling activities, however some still contained Waterthrush territories. During the 2009 breeding season, we quantified nest success, territory density, return rates, and habitat assessments for Louisiana Waterthrush, a riparian obligate bioindicator. These data provide a valuable baseline for considering avian response within this changing landscape.

Abstract (5335); Session G03, Thu 13 August, Location: Cohen Hall, Terrace Room, Oral at 12:15

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#### WHICH DAD IS BEST? FITNESS CONSEQUENCES OF EXTRA-PAIR PATERNITY IN OFFSPRING OF THE DARK-EYED JUNCO, *JUNCO HYEMALIS*

Extra-pair mating is easily understood from the male's perspective – a male's reproductive success will increase if he mates with multiple females. Less clear is why females participate in this behavior. One explanation that is frequently put forward is that females are mating with attractive, healthy, or otherwise "fit" males in order to secure "good genes" for their offspring. The main prediction of this hypothesis is that extra-pair young (EPY) will out-perform within-pair young (WPY) on one or several measures of fitness. We have tested this prediction with data from a long-term study of a free-living population of dark-eyed juncos (*Junco hyemalis*). Using DNA collected over 18 years (1990-2007), we have assigned paternity to over a thousand nestlings, and can compare EPY and WPY performance on a variety of fitness metrics, including early growth, fledging likelihood, recruitment, and reproduction.

Abstract (5318); Session G09, Thu 13 August, Location: Irvine Auditorium, Café 58, Oral at 14:45

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#### BLACKER SUBADULT MALES OCCUPY SUPERIOR WINTER TERRITORIES IN THE AMERICAN REDSTART

The habitat quality of non-breeding areas can play an important role in driving life history strategies of migratory birds. In American redstarts (*Setophaga ruticilla*), a species with delayed plumage maturation, dominance interactions lead to sex-and-age biased winter habitat segregation. However, some subadult individuals are able to defend territories in high-quality habitat typically dominated by adult males. Here, we compare the plumage and morphology of subadult males in Jamaica to determine which features predict winter habitat occupancy. Subadult males in high-quality mangrove habitat (N=10) displayed significantly more black (adult-like) plumage than those holding territories in low-quality scrub (N = 5). In addition, an analysis of subadult males during the breeding season in Ontario showed a significant negative correlation between arrival date (a correlate of winter habitat quality) and the extent of adult-like plumage (N = 21). Delayed plumage maturation has previously been linked to advantages associated with the non-breeding season. However our data are intriguing because they display an association between the degree of adult-like plumage and habitat occupancy, suggesting that this trait may play a role in winter social organization.

Abstract (5450); Session G14, Fri 14 August, Location: Cohen Hall, G17 Auditorium, Oral at 16:30

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#### A SPECIES TREE FOR THE SCOLOPACI: IMPLICATIONS FOR CHARACTER EVOLUTION

Recent studies have examined phylogenetic relationships among shorebirds (Aves: Charadriiformes), a group of birds that is widespread geographically and remarkably diverse in life-history, morphology, and behavior, using multiple nuclear and mitochondrial DNA sequence data to construct phylogenies with good resolution and strong support. However, the species-level relationships among shorebirds have not yet been fully resolved, an important step in understanding the evolution of their varied and fascinating array of traits. To begin to address this gap we sequenced multiple mitochondrial and nuclear genes from the shorebird sub-order Scolopaci for more than 80% of the extant taxa to develop a hypothesis of their relationships. The phylogeny constructed from these sequences using Bayesian and maximum-likelihood methods was well-resolved and well-supported at most nodes. In expanding upon a genera-level framework, we present hypotheses of many species relationships for the first time, with data indicating that several Scolopaci genera are intermixed and non-monophyletic. We discuss methods for resolving difficult (more recently-diverged) clades, and outline the implicit evolutionary history of several behavioral traits in the Scolopaci.

Abstract (5462); Session G21, Sat 15 August, Location: Houston Hall, Class of '49 Auditorium, Oral at 14:30

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#### AN INDIVIDUAL WHOOPING CRANE'S FAMILY HISTORY: PATTERN OF DISTRIBUTION AND STOPOVER USE

Between 1977 and 1988, 134 Whooping Cranes were banded in Canada, at Wood Buffalo National Park (WBNP) breeding grounds. Historical information from WBNP, wintering grounds in Aransas National Wildlife Refuge (ANWR, Texas), and along the central flyway during migrations, was used to study one of the banded Whooping Cranes known to be alive in 2008 since 1978. Thirty year records allowed us to build a genealogy tree and identify all banded and unbanded cranes associated to this crane and its family. This individual produced 4, 13, and 4 descendents, in the first, second and third generations, respectively. In total 21 descendents, and three of them banded are still alive. All males selected nesting and winter territories and did not change territories with new mates. Nests were established in the Sass River at WBNP, and wintering territories in Matagorda Island at ANWR, same parent's territory. Years of nesting success and failure occurred in synchronicity among members of the family. They repeatedly used 7 stopovers along the central flyway. Information from this family will contribute to studies of population and migration ecology.

Abstract (5237); Session GP27, Fri 14 August, Location: Houston Hall, Hall of Flags, Poster Num: 71

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#### ALLOPREENING AND BIOLOGICAL MARKETS IN BUFF-BREASTED WREN FAMILIES

A major focus in evolutionary biology is to understand how cooperation is achieved within social groups. Drawing analogies with human trading, the concept of biological markets proposes that individuals exchange commodities for their mutual benefit. I test this concept as applied to allopreening in family-living buff-breasted wrens (*Thryothorus leucotis*) by considering overall patterns of allopreening as well as the patterns of reciprocated and non-reciprocated allopreening between breeding partners and between parents and offspring. I observed 205 bouts of allopreening within families, with 89.3% involving breeding partners and 10.7% involving parents and offspring. Males and females were equally likely to initiate allopreening. As predicted if allopreening is exchanged for itself, in immediately reciprocated bouts the duration of allopreening by the initiator was positively associated with the duration of allopreening by the recipient. Allopreening, however, appeared to be exchanged more frequently with other commodities, as most allopreening episodes were not reciprocated. Parents were more likely to initiate preening than their offspring, suggesting that parents traded allopreening for commodities offered by offspring.

Abstract (5421); Session G01, Thu 13 August, Location: Cohen Hall, G17 Auditorium, Oral at 11:15

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#### NEW STUDIES OF TWO ENDANGERED CARIBBEAN ENDEMIC BIRDS, *PTERODROMA HASITATA* AND *TACHYGINETA EUCHRYSEA*

Conservation scientists often lack basic life history and demographic data on endangered bird species that is critical to determine appropriate conservation action. In 2008 we initiated studies of two endangered Caribbean endemic birds, Black-capped Petrel (*Pterodroma hasitata*) and Golden Swallow (*Tachycineta euchrysea*). As part of a USFWS-sponsored project for Black-capped Petrel we conducted intensive night-time surveys and tested methods for netting and nest-finding at three field sites in the Dominican Republic and Haiti. As part of the Golondrinas de las Americas

project, for Golden Swallow we deployed 200 nest boxes at four sites. We also searched for and monitored nests in natural tree and cliff cavities. We will detail additional results of efforts of the 2009 field season not yet completed at the time of this writing. Our intent is to inform of ongoing efforts, and, in particular for Black-capped Petrel, to garner support and advice to devise the best methods to study for this particularly difficult-to-study species.

Abstract (5179); Session GP10, Fri 14 August, Location: Houston Hall, Hall of Flags, Poster Num: 105

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#### BREEDING BIOLOGY OF THE CANADA WARBLER (*WILSONIA CANADENSIS*)

The Canada warbler (*Wilsonia canadensis*) is declining at a rate of 4.1% per year in New Hampshire and 2.3% throughout its range with insufficient understanding (Sauer et al. 2008). Little is published about the general breeding biology of this bird, especially pertaining to nesting constraints, parental behaviors and young birds. Our study in Canaan, NH is the longest running for this species (seven consecutive years as of 2009). The average clutch size was 4.8 (n = 62) and average nest success was high at 76.2%. Few nests were depredated (n = 11; 17.7%) or abandoned (n = 3; 4.8%). Nestlings reached 90% of their asymptotic mass by 5.45 days and fledged on average at 8.06 ± 0.12 days. We have found few re-nesting attempts (n = 2). Polygamy was confirmed (n = 2) and is suspected to occur at higher rates than observed, since nests are hard to find. Females exhibited high nest attentiveness and more aggressive nest defense tactics than males perhaps due to the lack of re-nesting opportunities. These data may assist in developing proper management strategies.

Abstract (5471); Session GP02, Fri 14 August, Location: Houston Hall, Hall of Flags, Poster Num: 5

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#### TRAFFIC NOISE INFLUENCES OCCUPANCY RATES OF TWO SPECIES WITH HIGH ACOUSTIC INTERFERENCE: YELLOW-BILLED CUCKOO AND WHITE-BREADED NUTHATCH

Urban sound environments may be disproportionately affecting avian communication and interrupting the critical tasks of territory defense, mate attraction, and other aspects of auditory communication. We estimated occupancy of eight forest breeding birds in areas dominated by traffic noise versus quiet areas. We hypothesized that birds whose peak song frequencies that overlap the frequency range of traffic noise (< 3kHz) would suffer increased acoustic interference or masking. The resulting degradation of communication would be expressed in lower habitat occupancy in loud areas compared to quiet areas. For species whose songs are masked by traffic noise, we predicted that noise would be the most important model in describing occupancy, and for other species, habitat covariates would be more important. Using Program Presence 2.2, we found that for the two species whose peak frequency fell in the masked range, noise characterization was the single best model in predicting occupancy, and occupancy rates were 55% and 35% lower in noisy areas versus quiet areas. For all other species, the constant only or other habitat covariates were more important than noise in explaining occupancy.

Abstract (5276); Session G03, Thu 13 August, Location: Cohen Hall, Terrace Room, Oral at 10:30

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#### PHYLOGENETIC COMMUNITY STRUCTURE IN TROPICAL HUMMINGBIRD COMMUNITIES

Determining how of biotic interactions, current and historical environment, and biogeographic barriers influence community structure is a fundamental. We quantified community composition, community phylogenetic structure for 189 hummingbird communities in the Ecuadorian Andes. We found that at low elevations communities are phylogenetically overdispersed, a likely outcome of intense competition among hummingbirds. At higher elevations communities are phylogenetically clustered, consistent with ecological filtering resulting from physiologically stressful high elevation environments. Further, by comparing phylogenetic and compositional beta diversity across these communities we show that clades within the hummingbird phylogeny replace each other along the steep environmental gradient between the lowlands and Andes. Communities in the lowlands on opposite sides of the Andes tend to be phylogenetically similar even though taxonomic composition of communities is different, a pattern implicating the Andes as an important vicariant barrier. In sum, by simultaneously evaluating different measures of diversity across many communities and several strong environmental gradients, we are able to explore some of the

mechanisms driving community structure and diversity at different scales in one of the most species rich, complex regions of the world.

Abstract (5464); Session G15, Fri 14 August, Location: Cohen Hall, Terrace Room, Oral at 14:00

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#### EVALUATING THE COSTS AND BENEFITS OF MIGRATION IN AMERICAN DIPPERS: A NORTHERN PERSPECTIVE ON ALTITUDINAL MIGRATION

Altitudinal migration involving annual movement to and from higher elevation breeding areas may be a response to spatial variation in food supply, a strategy to reduce predation risk or an outcome of intra-specific competition for a limited resource at low elevations. We evaluated these hypotheses in a short-distance altitudinal migrant, the American dipper, by comparing the provisioning behaviour and breeding performance of migrants with sedentary birds (residents) that remain at lower elevations year round. We found that migrants and residents had similar clutch and brood sizes but migrants fed nestlings more invertebrates and less fish, consequently had a lower energetic provisioning rate, and produced nestlings of lower quality. Nest predation rates were slightly higher for migrants than residents. Migrants are also less likely to double brood so produce fewer, lower quality young per season. Our results suggest that altitudinal migration in American dippers does not allow exploitation of a superior food source or reduce predation risk, and is more likely to be an outcome of competition for limited nesting sites at low elevations.

Abstract (5355); Session S04, Sat 15 August, Location: Cohen Hall, G17 Auditorium, Oral at 17:00

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#### MACROALGAL MATS ALTER FORAGING BEHAVIOR OF SHOREBIRDS IN A SOUTHERN CALIFORNIA ESTUARY

As eutrophication increases the occurrence and persistence of rapid growing, ephemeral macroalgae it is critical to determine their impact on food webs in coastal lagoons. Our objectives were to determine if macroalgae reduces prey availability for shorebirds, if shorebirds avoid mats while foraging, and if mats alter the foraging strategy of birds. We found that macroalgal mats host higher abundances macrofauna than sediments. Surveys revealed that none of the shorebird groups: Black-bellied Plovers, Long and short billed Dowitchers, Marbled Godwits, and Least and Western sandpipers and Willets avoided macroalgal mats. However, larger shorebirds appear to avoid them while foraging. Additionally, focal analysis showed that godwits and sandpipers spent a higher proportion of their time pecking while on bare sediment and more time probing while on mats. These shifts indicate that while mats host high abundances of prey, macroalgae may interfere with the visual and tactile hunting strategies of shorebirds. As estuaries continue to be affected by anthropogenic impacts, shorebird fitness could be compromised by extensive and chronic macroalgal blooms.

Abstract (5195); Session G16, Fri 14 August, Location: Irvine Auditorium, Café 58, Oral at 14:45

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#### DISTURBANCE IMPACTS ON AVIAN COMMUNITIES IN THE SOUTHERN APPALACHIANS

We provide an overview of our research on breeding bird response to natural and managed habitat disturbance at the Bent Creek Experimental Forest and other locations within the southern Appalachians. A diversity of forest age-classes is created by natural disturbances such as downbursts of wind that create large, incomplete habitat gaps, or by managed disturbances such as timber harvests, prescribed fire, or fuel reduction treatments. Our studies indicate that breeding bird density and species richness is generally higher in disturbance-mediated habitat patches with substantially reduced canopy tree density. Retention of some canopy trees and snags in disturbed forest stands may result in higher densities of birds associated with open habitat while retaining many forest and generalist species. Short-term declines may occur in some bird species associated with the ground- or shrub-strata for nesting and foraging. Young forest patches provide a greater abundance of fleshy fruit and flying/foliar insects, and may serve as magnets for breeding bird recruitment and foraging. Patches of disturbed habitat provide diverse within-stand habitat structure, and create a mosaic of habitat patches across the forested landscape.

Abstract (5493); Session S06, Fri 14 August, Location: Houston Hall, Class of '49 Auditorium, Oral at 12:00

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#### CONTROLLED FIRE AND LIVESTOCK GRAZING SHAPE BIRD COMMUNITIES IN EAST AFRICAN SAVANNAS

Historically, pastoralists in East Africa maintained savannas with controlled fire and livestock herding using temporary corrals called bomas. Increasingly, pastoralism is being abandoned with potentially negative consequences for biodiversity. We investigated the impacts of fire and bomas on savanna bird communities in Kenya. Generally, burned plots and recently abandoned bomas attracted greater densities of birds and different community assemblages than the surrounding undisturbed matrix. In the first dry season after burning, bird densities were highest and the majority of species were primarily observed on burned sites. During a drought the following year, however, a greater proportion of species were observed on bomas. Bird densities fluctuated less on bomas than burns from year to year, indicating that while fire may be of short-term importance, bomas may exert a more lasting effect and provide refuge against drought. Several Palearctic migrants specialized in burns regardless of rainfall, so continued fire suppression could further harm their already declining populations. Fire and livestock herding using bomas appear to be critical to savanna bird communities, and both types of disturbance should be incorporated into conservation planning.

Abstract (5424); Session G20, Sat 15 August, Location: Cohen Hall, Terrace Room, Oral at 12:00

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#### A PREDATOR-ELICITED SONG IN THE SPLENDID FAIRY-WREN

Signals are typically designed to be obvious to the intended receivers, particularly elaborate displays related to territorial or courtship behavior. In auditory signaling systems, adaptations of acoustic structure or timing facilitate changes in the conspicuousness of signals. In this study we investigated a vocal signal in splendid fairy-wrens (*Malurus splendens*), the "Type II song," that may represent a novel form of signal amplification: "hitchhiking" a song to the end of a predator vocalization. We conducted three playback experiments to examine the function of Type II songs and found that: 1) males responded to Type II songs as if they were a display, 2) females became more attentive after hearing a predator vocalization than a non-predator vocalization and 3) females responded more strongly to Type II songs when they were preceded by a predator call than when they were given alone. These results are consistent with the hypothesis that Type II songs are a functional display and that males are exploiting predators to better convey their own signal.

Abstract (5377); Session G04, Thu 13 August, Location: Houston Hall, Bodek Lounge, Oral at 10:30

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#### MONITORING NOCTURNAL SONGBIRD MIGRATION USING MULTIPLE COMPLEMENTARY TECHNIQUES

Bioacoustic analysis of nocturnal flight calls is an emerging tool for monitoring songbird populations and migration patterns but must be benchmarked against established methods. We compared data from three migration monitoring schemes (banding, bioacoustics, Doppler radar) from four fall migration seasons across in southwestern Pennsylvania. Acoustic results totaled more than 350 nights and over 30,000 flight call detections. Banding data consists of 398 days and more than 37,000 records. Doppler radar was examined for a subset of nights. We analyzed nightly as well as seasonal trends in migration rate (all three methods) and taxonomic composition (acoustics and banding only). Our analysis indicates large variability in perceived volume of migration for acoustic and banding methods, but more consistent measures from Doppler radar. This indicates that local landscape and weather factors may play a large role in perceived daily migration volume and species composition as measured by acoustic and banding methods, but less so in measures of daily raw migration volume measured by Doppler radar. The three methods are highly complementary in describing migration on a local and regional scale.

Abstract (5601); Session G23, Sat 15 August, Location: Houston Hall, Bodek Lounge, Oral at 14:45

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UNRAVELING THE MOLT PATTERN OF ARCTIC WARBLERS THAT BREED IN ALASKA  
(*PHYLLOSCOPUS BOREALIS KENNECOTTI*)

The Arctic Warbler (*Phylloscopus borealis*) is an Old World warbler that breeds in the northern latitudes of Scandinavia to Russia and east across the Bering Sea into Alaska. It is the only *Phylloscopus* species that breeds in North America. Of the three Arctic Warbler subspecies, only *P. b. kennecotti* breeds in western and central Alaska. A Paleotropical migrant, all subspecies of the Arctic Warbler migrate to Southeast Asia with *P. b. kennecotti* wintering in the Philippines. From 2004-2006, the Alaska Bird Observatory (ABO) conducted a study to describe the breeding ecology and habitat associations of the Arctic Warbler in central Alaska. We captured and colorbanded 112 adult Arctic Warblers within the study area. Adult birds arrived on the breeding grounds with little to no wear on their flight feathers, indicative of a protracted molt completed before spring migration. The study of Arctic Warbler museum specimens from Alaska and from Southeast Asia confirm that molt of remiges (prebasic molt) occurs on wintering grounds; however, more questions remain unanswered regarding the prealternate molt of this species and warrants further study.

Abstract (5395); Session G15, Fri 14 August, Location: Cohen Hall, Terrace Room, Oral at 16:00

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BREEDING SEASON MOVEMENT OF LOGGERHEAD SHRIKES IN NORTH DAKOTA

We have monitored a population of loggerhead shrikes (*Lanius ludovicianus*) on the Standing Rock Reservation in southcentral North Dakota since 1984. Through observation of colorbanded birds and recapture of banded birds, we have documented movement of shrikes within a breeding season. For example, one female moved 0.5 km between nesting attempts within a year. Mean fledgling dispersal distance was 1.6 km, with movements over 3 km observed. In 2008 we conducted a preliminary radiotelemetry study, marking 4 nestlings (18-22 days old) from two different nests, and following them for 32 days. Brood division occurred with the nest-mates moving separately at least occasionally. Fledglings remained within 2 km of the natal sites during the duration of the study (up to day 50 and 54 post-hatching). These results may have implications for our understanding of nest-site selection and fledgling survival in this declining species.

Abstract (5531); Session G24, Sat 15 August, Location: Cohen Hall, Terrace Room, Oral at 14:45

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THE TINAMOU TWO-STEP: THE TINAMOU IS A RATITE, THE TINAMOU IS NOT A RATITE

Tinamous have traditionally been thought to be the closest relatives to the flightless ratites and together they comprise a basal lineage in birds called the Palaeognaths. Numerous studies have tried to resolve phylogenetic relationships among the ratites, and a recent provocative analysis of a large nuclear gene dataset placed the Tinamous well within the ratite tree, making the ratites paraphyletic. Here we present additional nuclear sequences from 10 different genes for all the extant ratites, the extinct Moa (*Anomalopteryx didiformes*) and several species of Tinamou. This dataset, along with a panel of rare genomic events, may help to not only resolve these relationships but also provide an explanation for the gene tree discordance which has made this much studied group of birds so difficult to resolve.

Abstract (5322); Session G21, Sat 15 August, Location: Houston Hall, Class of '49 Auditorium, Oral at 14:45

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HEIGHTENED EXPOSURE TO PARASITES DRIVES THE EVOLUTION OF IMMUNITY

Cowbirds are exposed to more diverse disease organisms as a result of their life history strategy of brood parasitism and their physical intimacy with their avian hosts. We hypothesize that cowbirds experience increased selection for



stronger immunity in proportion to the number and diversity of host species they exploit. Previously we showed that (1) two extreme host-generalist cowbirds (brown-headed and shiny cowbirds) had exceptionally strong resistance to West Nile virus; and (2) that the resistance of the intermediate host-specialist (bronzed cowbird) to WNV was intermediate, stronger than that of non-parasitic Icterid species, but weaker than that of the extreme host-generalist cowbirds. Recently we profiled cowbirds' functional innate responses, the immune responses responsible for attacking pathogens in the earliest stages of infection, which are a critical determinant of a species' disease resistance. We found the same pattern: (1) leukocytes isolated from the extreme host-generalist brown-headed cowbird were significantly more active than those from the intermediate host-generalist bronzed cowbird; (2) leukocytes from bronzed cowbirds were intermediate in functional activity between those of the non-parasitic red-winged blackbird and the extreme generalist brown-headed cowbird.

Abstract (5469); Session G07, Thu 13 August, Location: Cohen Hall, Terrace Room, Oral at 17:15

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#### SURVIVAL OF ADULT TREE SWALLOWS AT A SITE CONTAMINATED BY MERCURY

Mercury is a heavy metal that has become a ubiquitous contaminant in ecosystems worldwide. While several studies have documented physiological and neurological impairments caused by mercury exposure in birds, few have examined effects on fundamental demographic parameters like adult survival. From 2005-2008, we marked 932 adult Tree Swallows breeding along the South River (Virginia, USA) to examine whether annual survival was reduced as a result of living on a mercury-contaminated site. We used Cormack-Jolly-Seber models to evaluate whether sex, breeding site, and individual mercury exposure affected apparent survival. Overall, survival declined with increased mercury exposure, irrespective of sex. Post-hoc analyses suggested that females breeding on contaminated sites tended to exhibit reduced survival at older life stages relative to swallows breeding on reference sites. Since reproductive potential often increases with age, reduced survival of the oldest birds could have serious consequences for population dynamics of songbirds in contaminated areas. Future research should attempt to integrate multiple demographic parameters and life history traits to effectively address how contaminants may affect avian populations over longer time scales than have traditionally been considered.

Abstract (5400); Session G20, Sat 15 August, Location: Cohen Hall, Terrace Room, Oral at 10:45

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#### THE EVOLUTION OF AVIAN EGG COLOR: A COMPARATIVE ANALYSIS

Avian eggshell coloration is a particularly interesting trait because eggshell pigmentation is unique to birds, is present in even the most basal species, and exhibits extreme interspecific variation in coloration and patterning. Moreover, the evolution of conspicuous egg coloration is particularly intriguing since predation pressure is likely to be an important selective factor in egg color evolution. Although there has been much speculation about the evolution and maintenance of conspicuous egg color, no single hypothesis has gained conclusive support to date. Our study presents a broad comparative analysis of egg color evolution in birds, including representatives of more than 415 species distributed across all avian orders. Specifically, we tested multiple established and novel hypotheses relating to the evolution of egg coloration in birds, including crypsis, thermoregulation, egg recognition, sexual signaling, and several novel hypotheses. We obtained egg reflectance spectra from natural history collections and compared these to published life history information. Our findings suggest that multiple factors interact to influence the evolution of egg coloration in birds, and our study provides insight into the evolution of conspicuous eggs

Abstract (5524); Session G14, Fri 14 August, Location: Cohen Hall, G17 Auditorium, Oral at 14:30

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#### USING ISOTOPES TO TRACK INTRATROPICAL MIGRATIONS IN ANDEAN HUMMINGBIRDS

I examined an emerging methodology for tracing annual altitudinal migrations which takes advantage of the natural variation in deuterium abundance from the base to the peaks of the Andes. Local migrations by birds in the tropics pose conservation problems, in part because the movements themselves are difficult to document. There is a theoretical relationship between Deuterium (or  $^{18}\text{O}$ ) signature and elevation, because of fractionation during precipitation events and evapotranspiration. A previous study had suggested that if a bird had more or less deuterium in its tissues than theory would suggest, such discrepancy might be used to identify altitudinal migrants. Unfortunately, when I refined the methodology, I found that the variation within species and sites was too great to allow such applications.

Abstract (5511); Session S04, Sat 15 August, Location: Cohen Hall, G17 Auditorium, Oral at 15:00

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#### A PHYLOGENOMIC STUDY OF CHICKADEES REVEALS THEIR EVOLUTIONARY HISTORY

The behavior and ecology of the New World chickadees have been studied extensively, but there is still no well-resolved molecular phylogeny for this model avian group. A previous mtDNA-based phylogeny found that Carolina Chickadees and Black-capped Chickadees are not each other's closest relatives despite forming a well-studied hybrid zone where their breeding ranges overlap along a contact zone stretching across much of North America. Furthermore, the mtDNA-based phylogeny was unable to resolve the relationship between Mexican Chickadees and Mountain Chickadees. To further elucidate these relationships, we reconstructed a phylogeny of the New World chickadees using DNA sequence data from 25 nuclear loci. Trees constructed using both Bayesian and Maximum Likelihood methods supported the same topology. We found a sister species relationship between Carolina Chickadees and Black-capped Chickadees, which is discordant with the previous phylogenetic hypothesis between these species. In addition, we found strong support for the placement of Mexican Chickadee as sister to Mountain Chickadee. These results underscore the value of using multiple loci to infer phylogenetic relationships between closely related species.

Abstract (5433); Session G18, Sat 15 August, Location: Irvine Auditorium, Amado Recital Room, Oral at 11:45

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#### DOES EXTRA-PAIR PATERNITY INFLUENCE HYBRID ZONE DYNAMICS IN SYMPATRIC GOLDEN-WINGED AND BLUE-WINGED WARBLER POPULATIONS?

The Golden-winged Warbler (*Vermivora chrysoptera*) is a species of conservation concern in eastern North America. Over the last 150 years, the Golden-wing phenotype has disappeared as it is steadily replaced by hybrid and Blue-winged Warbler (*Vermivora pinus*) phenotypes in a dynamic mosaic hybrid zone. Heterospecific and hybrid pairings have been documented throughout the hybrid zone, but are too infrequent to account for the number of hybrids observed. We explored the hypothesis that interspecific differences in extra-pair mating behavior could contribute to Golden-wing declines. We conducted paternity analyses in two populations with both species in sympatry; a declining and introgressed population in Kentucky and a stably coexisting population in New York. To date, we have found similar rates of extra-pair paternity in both populations, with mixed and Blue-winged pairs having a greater proportion of extra-pair offspring (40-50%) than pure Golden-winged pairs (20-30%). Additionally, we have identified at least 3 cases of heterospecific extra-pair paternity. We discuss how interspecific differences in patterns of extra-pair paternity, as a cryptic means of hybridization and genetic introgression, may contribute to the decline of Golden-winged Warblers.

Abstract (5386); Session G08, Thu 13 August, Location: Houston Hall, Bodek Lounge, Oral at 14:45

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#### AVIFAUNA OF THE GRAN PAJONAL AND SOUTHERN CERROS DEL SIRA, PERU

The Gran Pajonal plateau and Cerros del Sira comprise an isolated eastern Andean uplift in central Peru. The Gran Pajonal plateau is characterized by patches of savanna locally known as "pajonales", and is fringed by large areas of montane evergreen forest to the east in the Cerros del Sira and to the south. The biogeographic interest of the region stems from the isolation of these two major habitat types and the lack of previous ornithological survey work. We surveyed birds at two savanna and three montane forest localities using audio recording, field observations, mist netting, and limited collecting. Of 470 species recorded, 314 were present in montane evergreen forest and 106 were detected in savanna habitat, including many significant range extensions. The savanna was inhabited by species typically restricted to larger tropical savannas in drier regions of South America as well as taxa widespread in open areas in Amazonia. The montane evergreen forest community included a number of taxa typically restricted to isolated "outlying" Andean ridges in addition to a subset of the more widespread Andean avifauna.

Abstract (5198); Session GP01, Fri 14 August, Location: Houston Hall, Hall of Flags, Poster Num: 1

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COMPARISON OF THE RESPONSE TO ACUTE STRESS AND MORPHOLOGY IN AN URBAN AND A RURAL POPULATION OF CLAY-COLORED THRUSH (*TURDUS GRAYI*) IN NICARAGUA

Myriad studies have examined and documented avian species that appear to be tolerant to living and breeding in urban environments. The ability of these species to adapt to successful urban living is likely driven by changes in the internal physiological mechanisms that drive behavioral and reproductive choices. Here we present data comparing morphology and stress responsivity between an urban and rural population of the Clay-colored Thrush – *Turdus grayi* – in Nicaragua. Counter-intuitively, baseline stress hormone levels were higher in rural birds vs. urban birds, and there was no difference between populations in the acute response to stress (i.e., urban birds showed no habituation to disturbance). While morphometric measurements were also similar between populations, body mass was higher in rural birds, suggesting a potential for better body condition in these birds. Finally, there was no difference between male and female stress responses, but a small sample (n=3) of juvenile birds showed a more robust response to capture and restraint stress. Further research is planned to examine other potential differences between these two populations of thrush.

Abstract (5266); Session GP33, Fri 14 August, Location: Houston Hall, Hall of Flags, Poster Num: 86

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ARE CAPTURE RATES AND DETECTIONS OF SONGBIRD MIGRANTS CORRELATED WITH NON-NATIVE SHRUBS?

As part of an on-going study of habitat use in Northeastern Pennsylvania by songbird migrants, we examined mist-net capture rates in 2008 and survey detections in 2007 to determine if there were correlations between number of migrants and the most abundant native and non-native shrubs. The average capture rate for short-distance migrants and long-distance migrants did not differ between our site that averaged 26% non-native vegetation and one that averaged 52% non-native vegetation. At individual nets, the amount of native dogwood (*Cornus*) was positively correlated with long-distance migrant capture rates in the fall and short-distance capture rates in the spring, but both long- and short-distance migrants had negative coefficients (although not significant at the 0.05 level) with exotic honeysuckle (*Lonicera*). The number of short-distance migrants per 100m of forest transect was negatively correlated with non-native buckthorn (*Rhamnus*) and positively correlated with honeysuckle. Long-distance migrants per 100m of shrub transect were negatively correlated with density of honeysuckle. We intend to further examine migrant use of native vs. exotic vegetation and the fitness consequences of their use.

Abstract (5369); Session GP21, Fri 14 August, Location: Houston Hall, Hall of Flags, Poster Num: 59

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THE PERCEPTUAL BASIS OF SPECIES RECOGNITION IN CAPTIVE ZEBRA FINCHES: NEW INSIGHTS FROM NEW STIMULUS SETS

The zebra finch is a model species for the neuroethological study of mate choice in songlearning birds. Here we provide new insights into the behavioural and neurophysiological basis of conspecific discrimination by females in captivity using phylogeographically diverse yet relevant heterospecific stimuli. We demonstrate critical variation in the strength and ontogenetic dependence of species discrimination regarding both the visual and acoustic cues of species recognition. For example, we used male zebra finch stimuli of two colour morphs, wild-type (conspecific) and white with a painted black beak (foreign), producing one of two vocalisation types; songs and calls learned from zebra finch parents (conspecific) or cross-fostered songs and calls learned from Bengalese finch (*Lonchura striata* vars. *domestica*) foster parents (foreign). We found that female zebra finches consistently preferred males with conspecific visual and acoustic cues over males with foreign cues, but did not discriminate when the conspecific and foreign visual and acoustic cues were mismatched. Our results in general confirm prior findings regarding the relative importance of acoustic over visual features for female zebra finches when discriminating between suitable social companions.

Abstract (5167); Session S03, Fri 14 August, Location: Cohen Hall, G17 Auditorium, Oral at 11:00

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DO INCUBATION COSTS CAUSE WOOD DUCKS TO DELAY NESTING?

Optimal development of avian embryos takes place within a narrow range of incubation temperatures. Parents must balance the competing demands of maintaining good body condition while caring for developing eggs. Reduced

attendance by incubating parents may lower egg temperatures leading to longer incubation periods that result in increased predation risk and changes to neonate phenotype. We examined the relationship between body condition and nesting date, incubation behavior, and nest temperature of female Wood Ducks. We predicted that females that began incubation in poor condition would have reduced incubation constancy and lower average nest temperatures than females in good condition. Females in relatively good condition initiated nests 17 days earlier, were 10% heavier at the start of incubation, and lost 4.5% more body mass during incubation than females in poor condition. Female body condition had little effect on incubation constancy or the number of daily recesses, but average nest temperature was slightly lower (0.4 C) for females in poor condition. Nesting later in the season may help reduce incubation costs and allow females in poor condition to successfully complete incubation.

Abstract (5461); Session G16, Fri 14 August, Location: Irvine Auditorium, Café 58, Oral at 16:00

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#### VEGETATION HEIGHT PREFERENCE INFLUENCES POST-CRP POPULATION TRENDS FOR GRASSLAND BIRDS IN ILLINOIS

The continued decline of grassland bird populations is becoming a prominent conservation problem in North America. However, the recent establishment of millions of hectares of grassland habitat by the U.S. Department of Agriculture's Conservation Reserve Program (CRP), is believed to have had the potential to benefit grassland bird populations by substantially increasing the habitat base for these declining species. CRP grasslands differ from other agricultural grasslands in that they generally provide taller and denser vegetation than other common grasslands such as pastures and hayfields, and grassland birds are known to have varied preferences with respect to grass height associations. Thus, it is unrealistic to expect that CRP will benefit all grassland bird species equally. I test the hypothesis that grassland birds associated with taller vegetation have benefited more from CRP than birds preferring shorter-stature grasslands by examining the relationship between grassland bird vegetation height associations and post-CRP population trends within Illinois. Post-CRP change in population trends for these grassland birds was significantly related ( $P < 0.001$ ) to species' vegetation height associations. Results show that grassland birds occupying the taller ends of the habitat spectrum have been more likely to have improving population trends in the 18 years following the establishment of CRP grasslands than birds occupying the shorter ends of this spectrum.

Abstract (5275); Session GP06, Fri 14 August, Location: Houston Hall, Hall of Flags, Poster Num: 22

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#### THE INCREDIBLE, EDIBLE HORSESHOE CRAB EGG: MONITORING A CRITICAL RESOURCE FOR RED KNOTS

Horseshoe Crab (*Limulus polyphemus*) eggs are a critical resource for migrating Red Knots (*Calidris canutus*) during their spring stopover in Delaware Bay, USA. There has been considerable debate as to the best approach to characterize the availability of Horseshoe Crab eggs to Red Knots, with the eventual goal of a comprehensive Baywide survey. I conducted surveys of the Horseshoe Crab eggs on the New Jersey Beaches of Delaware Bay during the springs of 2005 - 2009. My results indicate that Horseshoe Crab egg densities in New Jersey have declined rapidly, from approximately 5,700 eggs per square meter in 2005 to approximately 1,300 eggs per square meter in 2008. During the same period, however, Delaware's mean egg density increased and was more than an order-of-magnitude greater than New Jersey's, seemingly without explanation. Herein, I discuss how and why this large discrepancy in Horseshoe crab egg densities may occur. I also suggest a new, two-part survey design based on adaptive management principles.

Abstract (5504); Session S01, Thu 13 August, Location: Cohen Hall, G17 Auditorium, Oral at 14:30

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#### SIBLING RIVALRY AND OVERWINTERING PATTERNS IN JUVENILE RED-COCKADED WOODPECKERS (*PICOIDES BOREALIS*)

Red-cockaded Woodpeckers are cooperative breeders where male offspring can disperse soon after fledging, overwinter and disperse in the spring or remain at the natal site as a helper. Timing of natal dispersal is a critical life history trait, yet relatively little is known about what drives individual decisions. My previous work revealed that siblings establish male-biased, linear dominance hierarchies. In 2007, dominant brothers had a higher probability of overwintering at the natal site than subordinate brothers and sisters. However, this was likely driven by high subordinate mortality in July 2007. Of the overwintering juveniles, all subordinates and some dominants dispersed in the spring but only dominant brothers became helpers. The 2008 cohort did not experience high July mortality, resulting in equal overwintering rates among dominant males, subordinate males and females. Spring dispersal

strategies for the 2008 cohort is yet unknown. In 2007, aggression between brother pairs was higher, and nestling mass was lower, suggesting food limitation. In summary, juvenile social rank plays an important role in resource acquisition leading to higher overwinter survival of dominants in bad food years.

Abstract (5244); Session G01, Thu 13 August, Location: Cohen Hall, G17 Auditorium, Oral at 11:30

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#### HIGHLY PROMISCUOUS MATING IN THE SALT MARSH SHARP-TAILED SPARROW *AMMODRAMUS CAUDACUTUS*

We studied mating patterns in Saltmarsh Sharp-tailed Sparrows (*Ammodramus caudacutus*), a species with no territorial defense, no paternal care and no pair bonds. Fifty-seven of 60 broods (and all broods that were completely sampled) resulted from polyandrous mating by females. About 1/3 of the broods had a different father for each chick, but the most common pattern, found in 36 of 60 nests, was multiple sires but with at least one male having sired two or more chicks. The degree of polyandry in Saltmarsh Sharp-tailed Sparrows may be the highest documented in any bird. We were able to assign paternity to particular males for about half the 206 chicks genotyped. Males sired chicks up to 1.4 km from their original capture site, and some males sired chicks in multiple nests, separated by up to 0.5 km. We also document a case of two females laying eggs in the same nest.

Abstract (5291); Session G16, Fri 14 August, Location: Irvine Auditorium, Café 58, Oral at 16:15

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#### THE EVOLUTION OF CAROTENOID PIGMENT SYSTEMS: A BIOCHEMICAL AND PHYLOGENETIC APPROACH

Elaborate sexually selected traits are thought to evolve from less exaggerated character states, but rarely can trajectories of trait evolution be studied directly. Carotenoid-based colors in birds offer a unique opportunity to investigate the phylogenetic history of sexual ornaments. Some species acquire bright plumage using dietary carotenoids unchanged while others deposit more costly, metabolically derived pigments in feathers. We examined the evolution of pigment systems across a genus-level phylogeny of cardueline finches and a family-level phylogeny of oscine passerines. We found that basal members of the cardueline finches used only yellow dietary carotenoids; species with the ability to metabolize red keto-carotenoids appeared later, followed by species that modify dietary carotenoids into canary xanthophylls. Ancestral passerines did not use carotenoid pigments to color plumage, nor did two orders closely related to passerine birds, Psittaciformes and Falconiformes. It appears that the ability to incorporate carotenoids into feathers arose independently within Passeriformes. These results demonstrate a non-directional pattern of color evolution while providing biochemical support for the prediction that more costly animal signals evolve from those that are comparatively easier to develop.

Abstract (5216); Session G09, Thu 13 August, Location: Irvine Auditorium, Café 58, Oral at 15:00

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#### WHAT IS THE FREQUENCY OF UNREPORTED PROBLEMS IN AVIAN TELEMETRY STUDIES?

Quantifying the effects of manipulative research on wildlife can be difficult when few animals are affected in any one study. Collating information on impacts, however, can identify vulnerable groups of organisms and may allow researchers to reduce problems. We garnered information about the frequency and severity of avian telemetric impacts via an online survey. Sixty-six respondents provided information for 85 species, mostly passerines. Negative transmitter impacts (bird entanglements with vegetation or body parts and non-entanglement related injuries) affected 38% of all passerine species studied. Simultaneously, 29% of passerine species were reported to have caused transmitter damage. Only two respondents indicated that they had documented these problems in the peer-reviewed literature. No differences in the rate of transmitter problems were found among age groups or attachment methods, but ground-foraging species were more likely than others to suffer negative transmitter impacts. Our results imply that, although few animals are affected in any one study, transmitter problems are not uncommon. A system for collating information on problems and making it available to researchers could reduce harmful effects and reduce wasted research effort.

Abstract (5197); Session G13, Fri 14 August, Location: Houston Hall, Bodek Lounge, Oral at 12:15

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#### MISSOURI FOREST FRAGMENTS MIGHT NOT BE POPULATION SINKS FOR SOME MIGRANT FOREST BIRDS

Forest fragments are generally thought of as population sinks for migratory forest birds in Missouri. The models that supported this conclusion did not have a good estimate of annual fecundity. Missouri birds have a potentially long breeding season, and even with increased rates of nest failure may be able to make up for these losses with repeated nesting attempts. We followed female Acadian Flycatcher *Empidonax vireescens* (2007-2008) in Missouri through the entire breeding season, making sure to find most of their nest attempts including all of their fledged nests. Acadian Flycatcher fledged an average of 2.06 young/female, for a l of 1.02. Traditional models would have underestimated fecundity by 29 % and l by 7%. We also developed an individual-based model to estimate annual fecundity for various season lengths. With some simple input parameters, the model predicted the actual annual fecundity within 1-4%. This dataset is still incomplete, but analysis shows we have been underestimating productivity in fragmented forests, and where birds have continued to persist, may not be reliant on source populations, but are sustainable.

Abstract (5423); Session GP13, Fri 14 August, Location: Houston Hall, Hall of Flags, Poster Num: 39

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#### SOURCES OF VARIATION IN DETECTION PROBABILITY FOR BIRDS IN HABITAT RELATIONSHIP MODELS

Species are not always detected when present at a survey location; therefore not accounting for detection probability can bias estimates of occupancy. Identifying sources of variation in detection probability is important in designing studies of bird populations and habitat use. We assessed how several potential covariates (temperature, date, observer, species prior detection and observer memory) affected the fit of species detection models. We also developed a test that would identify inestimable detection rates when the observer did not have the opportunity to encounter a species. Among the 59 species we encountered, observer, prior detection and observer memory models were the best fitting models of detection for 48 species when compared to models that included temperature and date. Our results suggest that differences in detection rates among observers as well as prior detections are significant sources of variation in occupancy models for breeding birds. These sources of variation must be considered in the design and analysis of future research and monitoring programs in order to achieve unbiased and precise estimates of occupancy.

Abstract (5474); Session G17, Fri 14 August, Location: Houston Hall, Bodek Lounge, Oral at 14:00

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#### TO SAVE A MOCKINGBIRD: GENETIC ANALYSES OF DARWIN'S MOCKINGBIRDS

Small and isolated island populations provide ideal systems to study the effects of reduced population size, genetic drift and gene flow on genetic diversity. We assessed the genetic diversity within and among 19 mockingbird populations on 15 different Galápagos Islands, covering all four endemic species. We tested for signs of drift and gene flow, and used historic specimens to assess the degree of genetic change over the last century. Differences in within-population genetic diversity were substantial and genetic differentiation among populations was pronounced and increased with geographic isolation. Furthermore, a century of genetic drift reduced genetic diversity, especially on the smaller islands, and our temporal data showed that island size serves as a good predictor for effective population size. Drift was particularly pronounced in one of the two remaining populations of the endangered Floreana mockingbird, which was found to be considerably inbred. We discuss how our results are of direct use for planned reintroduction actions for this species. More generally we show that, unlike in many other Galápagos bird species, gene flow among mockingbird populations is extremely low.

Abstract (5308); Session S09, Sat 15 August, Location: Cohen Hall, G17 Auditorium, Oral at 12:00

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#### CAROTENOID EVOLUTION IN CACIQUES AND ORIOLES: TWO VERY DIFFERENT PATTERNS OF COLOR EVOLUTION

Carotenoid-based colors have signaling roles in a range of animal taxa, yet little is known about how these colors vary across species, much less across broader taxonomic levels. The caciques are a group of passerine birds from Central and South America that appear to divide visually into discrete yellow and red color groups. We used a reflectance

spectrometer to quantitatively measure cacique colors and then reconstructed color changes across a molecular phylogeny. Quantitative color variables fell into two widely separated short- and long-wavelength clusters, supporting the observed yellow and red color groups. Ancestral state reconstructions inferred a yellow ancestral state with two independent changes to red, and no reversals. This pattern contrasts with that of another closely related icterid clade, the New World orioles, which exhibit a full range of carotenoid colors and have a pattern of evolution that is continuous and extremely labile. These findings suggest that modes of color evolution may vary considerably, even among closely related taxa.

Abstract (5210); Session G18, Sat 15 August, Location: Irvine Auditorium, Amado Recital Room, Oral at 09:45

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#### A PRELIMINARY STUDY LINKING BREEDING PRODUCTIVITY, DIET, AND BLOOD PROFILES OF BODY CONDITION IN ATLANTIC PUFFINS AT MACHIAS SEAL ISLAND

In 2007, key indicators of body condition and immune function were measured in Atlantic Puffins (*Fratercula arctica*, ATPU) at Machias Seal Island in the Gulf of Maine to better understand the physiological mechanisms underlying patterns of breeding success in this ecosystem. Adult birds (43 ATPU) were sampled for plasma corticosterone, triglycerides, and glycerol June 10 – 12 (“early”), before the first chick hatched (June 15) and after chick provisioning began (June 30 – July 23; “late”). Corticosterone tended to be higher during the later stage, a pattern consistent with parental provisioning. Triglycerides and glycerol remained low across the sampling period, indicating that the birds were not actively burning or storing fat (both sexes), or, for females only, undergoing egg development. However, the heterophil/lymphocyte ratio, an indicator of immune activity, was significantly greater during the “late” stage. Not only did heterophil counts increase by 16%, lymphocyte counts decreased by 32%, collectively suggesting that the birds were unable to maintain important homeostatic immune function, with implications for current as well as future condition. 2007 was one of the least productive years on record for ATPU, as herring and hake, the preferred diet for chicks, were scarce in seabird diets in the northern Gulf of Maine. Further work is underway to more closely link patterns of condition with breeding success.

Abstract (5301); Session GP26, Fri 14 August, Location: Houston Hall, Hall of Flags, Poster Num: 68

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#### A NOVEL “PITA” DESIGN FOR HORMONE MANIPULATIONS IN SMALL BIRDS

Many units that deliver compounds to modify hormone activity may be too large for some species, tedious to prepare, or expensive. Commercially produced products, like Alzet® osmotic pumps or Silastic® tubing packed with a compound, can be bulky and strain tissues, particularly in small birds < 15-20 g. We developed a small, lightweight, flat, flexible “pita”-shaped implant that, when placed under the skin, follows the contours of the bird’s body, resulting in little or no tension on tissues. The design allows a greater proportion of total implant volume to be represented by the compound rather than the container. Materials are inexpensive (< \$0.10 each, excluding compound) and locally obtained. Implants, made to any size and shape, can be used within hours of construction. In laboratory trials (15-20 g sparrows), testosterone (T)-filled pitas resulted in plasma T levels comparable to those from Silastic® implants, within 3 days after administration. In field trials with 6-7 g warblers, pita implants resulted in expected behavioral effects within 7 days. This new “pita” implant design may offer more options for those working with small animals.

Abstract (5176); Session GP26, Fri 14 August, Location: Houston Hall, Hall of Flags, Poster Num: 69

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#### BIRDS IN NORTHERN HARDWOODS ECOSYSTEMS: LONG-TERM RESEARCH ON POPULATION AND COMMUNITY PROCESSES IN THE HUBBARD BROOK EXPERIMENTAL FOREST

Long-term studies in relatively undisturbed habitats, such as many USFS experimental forests, provide valuable insight into bird population and community processes. Major findings from 40 years of research in the Hubbard Brook Experimental Forest, New Hampshire, show that the distributions and abundances of bird species are dynamic, even within well-developed and relatively mature forests. At the local scale, population size is most affected by factors that influence fecundity and recruitment, mainly food availability, weather and nest predators. Fecundity is strongly correlated with subsequent recruitment and is critical for maintaining breeding population size. Events in the non-breeding season, however, also influence breeding events. At the landscape scale, populations are spatially structured by species’ responses to habitat and environmental patterns, but also by social interactions such as competition and conspecific attraction. Settlement patterns and ultimately reproductive performance vary with habitat quality, based on

vegetation structure, food availability and nest predator effects that differ across the landscape. Results from these long-term studies provide a mechanistic framework for predicting how future changes in habitat quality and climate will influence bird populations in north-temperate forests.

Abstract (5233); Session S06, Fri 14 August, Location: Houston Hall, Class of '49 Auditorium, Oral at 11:00

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#### GEOGRAPHIC VARIATION IN TESTOSTERONE DURING BREEDING IN MALE ORANGE-CROWNED WARBLERS

Comparative hormone studies can reveal how physiology underlies life history variation. Orange-crowned warblers breeding in Alaska (*Vermivora celata celata*) and California (*V. c. sordida*) face different ecological constraints and exhibit different life histories. We examined testosterone as a potential mechanism underlying differences in male reproductive strategies between populations. From 2006 - 2008, we sampled males during the pre-laying, incubation, and nestling stages. Alaska males exhibited a pattern typical of northern passerines; testosterone was high during pre-laying and declined during incubation to low levels during nestling provisioning. Testosterone in California males, however, did not vary consistently with breeding stage and remained relatively high throughout the breeding season. In Alaska, where short seasons and high adult mortality limit breeding opportunities, reduced testosterone during nestling provisioning likely facilitates parental investment. In California, where nesting occurs throughout a long season, elevated testosterone may prolong breeding readiness and facilitate investment in mating effort. The costs of sustaining elevated testosterone to California males probably include reduced parental investment. This study indicates a role for testosterone in mediating reproductive trade-offs in male orange-crowned warblers.

Abstract (5513); Session G10, Thu 13 August, Location: Irvine Auditorium, Amado Recital Room, Oral at 17:00

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#### SEX DIFFERENCES IN INNATE IMMUNITY IN TREE SWALLOWS

Evolutionary theory predicts that exposure to more diverse pathogens will lead to the evolution of more effective immune responses. The innate immune system defends the host from pathogens in a non-specific manner and can be thought of as an important first-line of defense preventing pathogens from gaining a foothold in hosts. We predicted that female Tree Swallows have more robust innate immunocompetence than do males; during the breeding season females are exposed to more sexually transmitted microbes (STMs) (e.g., bacteria, fungi, viruses) than are males because (a) females participate in extra-pair copulations with multiple males, (b) the transmission of STMs during copulation is likely to be asymmetrical because ejaculates move from males to females, and (c) Tree Swallow semen contains potentially pathogenic STMs. We tested our prediction in the 2009 breeding season by conducting two assays of the innate immune system. The microbicidal assay produced an index of the capacity of the blood to rapidly "thwart" an invasion by potential pathogens. The phagocytosis assay measured the ability of isolated neutrophils to phagocytize bacteria. Results of these assays will be presented.

Abstract (5257); Session GP16, Fri 14 August, Location: Houston Hall, Hall of Flags, Poster Num: 109

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#### TRANSFER AND EFFECTS OF MATERNAL ANTI-PLASMODIUM ANTIBODIES IN HAWAII AMAKIHI AND COMMON CANARY

We investigated the passive transfer of anti-malaria (*Plasmodium relictum*) antibodies using data collected from wild Amakihi (*Hemignathus virens*) and captive Canaries (*Serinus canaria*) as a laboratory model. First, using an Enzyme-Linked Immunosorbent Assay, we analyzed the eggs of breeding female Amakihi from a combination of low and high elevation sites on the Island of Hawaii for antibodies. Analyses showed significantly higher anti-malaria antibody levels in Amakihi eggs at low elevation, which indicated a passive transfer of maternal antibodies to the eggs. Second, we quantified parasitemia in Canary offspring from both infected and uninfected hens. Due to a small sample size (N = 2) from a low infection rate in the control group, we failed to detect effects of maternal exposure to malaria on antibody response and parasitemia in the offspring. We found anti-malaria antibodies in Amakihi eggs, but did not



find evidence for their trans-generational benefit. Resistance to malaria in Canary and Amakihi might be mostly innate, rather than from maternal effects.

Abstract (5388); Session GP16, Fri 14 August, Location: Houston Hall, Hall of Flags, Poster Num: 45

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#### HE'S JUST NOT THAT INTO YOU: VARIATION IN FEMALE COLORATION IS NOT DRIVEN BY MALE MATE CHOICE IN EASTERN BLUEBIRDS

It is generally accepted that males express extravagant ornaments as an evolutionary response to sexual selection. However, despite the fact that many females possess ornamental traits there is no similarly accepted explanation. In this study, I explored the function of female coloration in eastern bluebirds (*Sialia sialis*); specifically, whether it is a sexually selected trait that influences male mate preference. Female tail coloration was weakly predictive of reproductive success, however, rump and breast coloration appear to be unrelated to fitness. Male mate preference experiments revealed that rump and breast coloration do not influence male mate preference (preference for tail coloration remains untested). Thus, female rump and breast coloration do not appear to currently be under sexual selection. While it does not seem that male mate preference drives the variation of female rump and breast coloration in eastern bluebirds, other mechanisms of sexual selection or evolution may be at work, and it will be important to demonstrate how selective pressures have shaped the phenotype of both sexes separately to fully understand how they have influenced the species as a whole.

Abstract (5295); Session G09, Thu 13 August, Location: Irvine Auditorium, Café 58, Oral at 15:15

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#### A PREDICTIVE HABITAT MODEL FOR THE GRASSHOPPER SPARROW IN DELAWARE

Many grassland songbirds across North America, including the grasshopper sparrow (*Ammodramus savannarum*), are reported to be experiencing drastic declines in population levels. Since 1967, there has been a 65% decrease in the population of grasshopper sparrows across their range. Most of the decline has been directly attributed to the loss of grassland habitat. As a result, it is imperative to determine the locations of remaining suitable habitat for successful management of the species. From May 15 to August 15 2008, we conducted 3 replicates of 180 point-count surveys to sample the presence of grasshopper sparrows in Delaware. We recorded presence/absence and associated habitat to 1) build a predictive habitat distribution model that identifies scale-dependent relationships in habitat use, 2) produce a habitat suitability map that reflects predicted presence of breeding grasshopper sparrows within Delaware, and 3) use model outcome and distribution map to target future land conservation of existing habitat and optimize the impact of management efforts. From May 15 to August 15 2009, we will conduct 3 additional replicates of 180 point-count surveys to validate the model.

Abstract (5297); Session GP15, Fri 14 August, Location: Houston Hall, Hall of Flags, Poster Num: 108

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#### SURVIVAL IN A CREATED LANDSCAPE: RADIO-TRACKING FLEDGLING BLUEBIRDS ON GOLF COURSES

As more natural land is developed, wildlife must either adapt to urbanization, be pushed into marginal habitats, or perish. Though golf courses could be an oasis of green in an increasingly paved landscape, little is known about how birds use this created landscape. In 2008, 71 Eastern Bluebird (*Sialia sialis*) fledglings were radio-tracked on golf course and reference sites in Williamsburg, Virginia to determine fledgling survivorship. Individual instances of mortality were documented in 22 cases, falling into three main categories: hawk predation, snake predation, and body recovered intact. Postfledging survivorship, calculated using a Kaplan-Meier estimator, showed that birds that fledged from nests on golf courses had significantly higher initial mortality rates (Wilcoxon,  $p=0.048$ ). Fledglings on golf courses exhibited 24% mortality in the first 10 days postfledging, compared to only 6% mortality during the same time for reference fledglings. Many of the early golf course mortalities were due to predation by hawks, suggesting that the open, manicured environment may make it harder for fledglings to escape predation, potentially causing an ecological trap.

Abstract (5385); Session G03, Thu 13 August, Location: Cohen Hall, Terrace Room, Oral at 11:00

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#### LOGGERHEAD SHRIKES: SUCCESS IN A NOVEL ENVIRONMENT

Although Loggerhead Shrike (*Lanius ludovicianus*) populations have declined in many areas, in southwest Florida the species seems to be thriving in a unique urban environment: large parking lots. During 2007-2009 we have documented nesting shrikes in several university and shopping mall parking lots. Nesting has been primarily in planted southern live oaks (*Quercus virginiana*) and laurel oaks (*Quercus laurifolia*), with others in black olive (*Bucida buceras*) and cabbage palm (*Sabal palmetto*). Color-banded chicks and young allowed us to document chick survival and dispersal. Site fidelity between years has been high. Nest tree structure, tree dispersion, landscape maintenance, and an abundance of brown anoles (*Anolis sagrei*; a major food source) in urban habitats have contributed to shrike success.

Abstract (5415); Session GP02, Fri 14 August, Location: Houston Hall, Hall of Flags, Poster Num: 6

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#### INFERRING SPECIES TREES IN THE FACE OF INCOMPLETE LINEAGE SORTING: A MULTI-LOCUS ZDNA PHYLOGENY OF NEW WORLD ORIOLES (*ICTERUS*)

Darwin's vision of a "Tree of Life" showing evolutionary relationships among all extant species seems an increasingly feasible goal, at least for vertebrate animals. However, virtually all published molecular phylogenies for closely related animals are based on a single locus – maternally inherited mitochondrial DNA. Approaches using multiple nuclear loci are needed to test published trees and better resolve the twigs of the entire tree of life. Stochastic and incomplete sorting coupled with a slow mutation rate relative to mtDNA makes the use of nuclear loci challenging. Combined analysis of six Z-linked introns resolved a well-supported nuclear phylogeny of New World orioles (*Icterus*). The zDNA concatenation tree is strikingly congruent with a published mtDNA phylogeny. The field of phylogenetics is beginning to test new species tree methods using the coalescent. We will present preliminary analyses based on two of these algorithms, BEST and STEM. Preliminary results provide continued support for oriole relationships inferred by mtDNA and zDNA concatenation. Unfortunately, the BEST algorithm is slow to converge and many more loci (10-20) will be required for robust species tree inference.

Abstract (5338); Session G21, Sat 15 August, Location: Houston Hall, Class of '49 Auditorium, Oral at 15:15

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#### EVOLUTION OF BRAIN SYSTEMS FOR COMPLEX BEHAVIORAL TRAITS: SONG IN BIRDS AND SPOKEN LANGUAGE IN HUMANS

Darwin's theory of evolution by natural selection heavily influenced many fields of science, including neuroscience. In this regard, an understanding of the evolution and mechanism of how the brain controls complex behavioral traits has been a mysterious question for generations. One such complex trait is vocal learning, a critical behavioral substrate for song in song learning birds and spoken language in humans. A common feature of species that have this trait (songbirds, parrots, hummingbirds, and humans) is that they have forebrain to brainstem systems for vocal control, whereas those that produce only innate sounds have only the brainstem vocal system. Using behavioral, molecular, electrophysiological, and anatomical approaches we have found that the song learning systems of distantly related birds are embedded within a motor system also present in vocal non-learning birds that is involved limb and body movements. The song learning and adjacent motor systems share many properties in common, including motor-driven gene expression cascades and connectivity into two sub-networks - an anterior pathway that in songbirds is necessary for song learning and a posterior pathway that is necessary for song production. Comparative analyses suggest parallels with the spoken language brain system in humans. Based on these and other findings, we propose a motor theory for the origin of vocal learning, where unique brain systems used to learn and produce song and spoken language evolved out of a pre-existing vertebrate system that controls movement and motor learning, such as learning how to walk or fly. We propose that the pre-existing system is a fundamental design of the vertebrate brain, which consists of the two motor sub-pathways (anterior and posterior) that during embryonic development form parallels systems to control different muscle groups, and are innervated by sensory systems for feedback control of different motor behaviors. When vocal learning evolves, this pre-existing motor system is then connected to muscles of the vocal organ (syrinx in birds, larynx in humans) to control a specialized form of learned movement control - song and speech. In this manner, the evolution of brain pathways for vocal learning may have evolved independently of a common ancestor, but dependent on a pre-existing motor learning pathway used a scaffold. We suggest that this could be a possible mechanism for evolution of complex behavioral traits in birds and mammals beyond vocal learning.

Abstract (5622); Session K1, Fri 14 August, Location: Cohen Hall, G17 Auditorium, Oral at 08:00

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#### WRENS ON THE EDGE: THE IMPORTANCE OF COLD, SNOW, AND SUPPLEMENTAL FOOD TO CAROLINA WRENS NEAR THE NORTHERN EDGE OF THEIR RANGE

Northern populations of Carolina wrens (*Thryothorus ludovicianus*) have undergone drastic population changes during the last half-century. Winter survival is widely accepted as the key to understanding these changes. We analyzed climatic and wren data from 1959 to 2007 to determine which aspect of winter weather best explained Carolina wren populations around Ann Arbor, MI. Neither total snowfall nor overall cold predicted population changes, while overall daily snow cover was the best predictor of population change. These findings suggest that northern Carolina wrens are limited by their ability to find food during periods of snow cover. We hypothesized that human influences, particularly urban warmth and supplemental feeding, could aid survival of Carolina wrens during winter. We surveyed Carolina wrens, temperatures, and presence of bird feeders on 21 transects along an urban to rural gradient. Carolina wrens only survived where they had access to winter bird feeders, regardless of temperature. These results suggest that supplemental feeding by humans is critical to the survival and expansion of northern populations of Carolina wrens.

Abstract (5362); Session G05, Thu 13 August, Location: Irvine Auditorium, Amado Recital Room, Oral at 11:15

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#### THE RELATIONSHIP BETWEEN WILDLIFE OPENINGS AND BIRD USE IN THE EAST GULF COASTAL PLAIN

Because of population declines in many songbirds, it is imperative that we understand the effects of forest management on breeding habitat. Wildlife openings are often created for game species; however, few studies have examined their effects on bird distributions. We examined the relationship between opening size and use by 5 birds listed in the Partners in Flight species of regional importance list along with Brown-headed Cowbirds (*Molothrus ater*). We focused on 2 state-owned lands within the East Gulf Coastal Plain of Alabama, where we conducted point counts in 60 openings ranging from 0.05 – 19 ha during May-July 2008. We examined opening use with occupancy analysis and found strong support for opening size in the top models for Acadian Flycatcher (*Empidonax vireescens*), Eastern Towhee (*Pipilo erythrophthalmus*), Indigo Bunting (*Passerina cyanea*) and Brown-headed Cowbird. Use by Indigo Bunting and Brown-headed Cowbird increased with opening size, while use by Acadian Flycatchers decreased as opening size increased. Information gathered from this study may be used to better integrate non-game management into current and future forest management strategies.

Abstract (5444); Session G17, Fri 14 August, Location: Houston Hall, Bodek Lounge, Oral at 16:00

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#### HOW DO CENTRAL AND WESTERN AMAZONIAN RAINFOREST COMMUNITIES DIFFER? A COMPARISON OF WHOLE COMMUNITIES

Because of poor productivity due to old soils, bird communities in central and eastern Amazonia have been assumed to be species-poor compared to the more productive western Amazonia. Appropriate comparisons to test this relationship using standardized methods have not yet been conducted at the scale of the entire bird community. We spot-mapped a 100-ha plot of continuous terra firme rainforest near Manaus, Brazil during the dry season of 2008 to facilitate comparisons with similar surveys in French Guiana, Peru, and Ecuador. We reanalyzed species lists from those studies to include only core forest avifauna and compared richness, density, biomass, and territory size estimates across studies. All four communities were relatively equal in richness and overall bird density, but biomass estimates were about 150% greater in western Amazonia than in Manaus and French Guiana. Rarity was exaggerated in the Manaus community and territory sizes were correspondingly larger than in western Amazonia. Gradients of avian richness within lowland Amazonia are constrained by phylogenetic conservatism of the subcontinental species pool; instead, biomass and territory size apparently respond to local variation in primary productivity.

Abstract (5618); Session GP35, Fri 14 August, Location: Houston Hall, Hall of Flags, Poster Num: 95

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#### MOLT-BREEDING OVERLAP IN A FRAGMENTED AMAZONIAN LANDSCAPE

Molt and breeding are energetically demanding processes that each occur once or more annually and do not overlap in most temperate passerines, but their overlap may be more frequent in the tropics. We investigated the occurrence of

molt-breeding overlap, defined as the simultaneous presence of a brood patch and bilaterally symmetrical wing molt, in a seasonally wet central Amazonian terra firme rainforest and forest fragments. We captured 974 birds with brood patches in 14 passerine families between 2000 and 2008. At the family-level, molt-breeding overlap in suboscines ranged from 0.9% (N=113) in Pipridae to 20.4% (N=434) in Thamnophilidae. Among 10-primaried oscines molt-breeding overlap ranged from 0.0% in Vironidae (N=14) to 25.0% in Polioptilidae (N=22). Molt-breeding overlap was never observed in three families of 9-primaried oscines (N=25). At the species-level, we found a positive correlation between sensitivity to fragmentation and the percentage of molt-breeding overlap ( $R^2=0.22$ ,  $P=0.095$ ). Extremes in humidity and temperature are exacerbated in fragments resulting in unfavorable conditions for having molt-breeding overlap and may help explain why some Neotropical families have not colonized highly seasonal temperate environments.

Abstract (5278); Session G12, Fri 14 August, Location: Irvine Auditorium, Café 58, Oral at 10:45

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#### EXTRA-PAIR YOUNG IN HOUSE WREN BROODS ARE MORE LIKELY TO BE MALE THAN FEMALE

Sex-allocation theory predicts females should preferentially produce offspring of the sex with greater fitness potential. In socially monogamous animal species, extra-pair mating often increases the variance in fitness of sons relative to daughters. Thus when offspring sired by a female's extra-pair mate(s) typically have greater fitness potential than offspring sired by the within-pair mate, sex-allocation theory predicts females will bias the sex of offspring sired by extra-pair mates towards male. We examined the relationship between offspring sex and paternity over six breeding seasons in an Illinois population of house wrens (*Troglodytes aedon*). Of the 2345 nestlings that had both sex and paternity assigned, 350 (15%) were sired by extra-pair males. The sex ratio of extra-pair offspring, 0.534, was significantly greater than the sex ratio of within-pair offspring, 0.492, representing a difference of 8.5% in the proportion of sons produced. To our knowledge, this is the first confirmed report of female birds increasing their production of sons in association with extra-pair fertilization. Our results are consistent with the oft-mentioned hypothesis that females engage in extra-pair mating to increase offspring quality.

Abstract (5188); Session GP02, Fri 14 August, Location: Houston Hall, Hall of Flags, Poster Num: 7

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#### EVIDENCE FOR A MATERNAL EFFECT BENEFITING EXTRA-PAIR OFFSPRING IN THE HOUSE WREN

Females may engage in extra-pair copulations to secure alleles that enhance offspring fitness. To test this, researchers have typically compared fitness-related attributes of extra-pair (EP) and within-pair (WP) half-siblings. Often neglected, however, is the possibility that females provide EP offspring with certain non-genetic advantages. In species in which eggs hatch asynchronously, females may place EP offspring in earlier-laid eggs in the clutch. Because they tend to hatch first, chicks from earlier-laid eggs are often larger and more competitive than their nestmates. We tested for an association between offspring paternity and position in the laying sequence in house wrens. We used a chick's mass relative to that of its nestmates shortly after hatching was completed as an index of position in the laying sequence. In 27 broods with mixed paternity, EP offspring weighed, on average, significantly more than their WP counterparts. This suggests that EP offspring are more likely to appear in earlier-laid eggs. We recommend that, when comparing EP and WP half-siblings in species in which eggs hatch asynchronously, researchers test for this potential maternally derived effect on offspring performance.

Abstract (5187); Session G24, Sat 15 August, Location: Cohen Hall, Terrace Room, Oral at 15:00

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#### DECOUPLED EFFECTS OF THE EL NIÑO SOUTHERN OSCILLATION AND RAINFALL ON DEMOGRAPHIC RATES AND POPULATION GROWTH OF AN ISLAND ENDEMIC

Predicting the influence of climate change on populations requires an understanding of the links between regional climate drivers, local weather, and demographic rates. In southern California, the correlation between the El Niño Southern Oscillation (ENSO) and rainfall is nonlinear; strong El Niño events are related to high rainfall years, but there is no correlation between rainfall and ENSO during weak La Niña years, when droughts are most likely to occur. San Clemente Sage Sparrow (*Amphispiza belli clementeae*) fecundity and population dynamics are strongly impacted by drought. Severely reduced reproductive output during drought years leads to population declines, followed by high reproductive success and rapid population growth during relatively wet years. In wet years, nearly 100% of adult females are successful breeders and coupled with limits imposed on the length of the breeding season this leads to the nonlinear relationship between fecundity and rainfall. The consequence of nonlinearities in these relationships are that sage sparrow dynamics are uncoupled to the ENSO, counter to expectation based on the separate influence of ENSO on rainfall and rainfall on fecundity.

Abstract (5232); Session GP04, Fri 14 August, Location: Houston Hall, Hall of Flags, Poster Num: 14

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#### EVIDENCE OF SUFFICIENT HORSESHOE CRAB EGGS FOR REDUCED RED KNOT POPULATION ON SPRING MIGRATION STOPOVER IN DELAWARE BAY, USA

Horseshoe crab (*Limulus polyphemus*) eggs are a dietary staple of the red knot (*Calidris canutus*) during spring stopover on Delaware Bay. Numbers of knots stopping in Delaware Bay declined in the 1990's concurrent with a decline in horseshoe crabs, leading to the hypothesis that red knots were limited by crab egg abundance. We counted crab eggs at sites selected by foraging knots on Delaware Bay in May-June 2004 and experimentally tested whether knots depleted crab eggs in 2005 to determine if crab eggs were abundant enough to support knots during migration in those years. Crab egg numbers at knot foraging sites did not decline throughout the day in 2004. In 2005, egg abundance was lower in bird-accessible compared to bird-excluded plots in the wrack line, but not in other beach zones. We found no evidence that the horseshoe crab egg resources in Delaware Bay were insufficient to support the refuelling of red knots which were present in 2004 and 2005. Management for increased crab egg numbers in the wrack may increase the carrying capacity of Delaware Bay for red knots.

Abstract (5486); Session G19, Sat 15 August, Location: Houston Hall, Bodek Lounge, Oral at 09:45

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#### MALE GENERAL COGNITIVE ABILITY INFLUENCES MALE MATING SUCCESS IN THE SATIN BOWERBIRD

The findings that song complexity is related to learning ability, song quality is related to male reproductive success, and males adjust their behavior according to female signals points to a likely relationship between general cognitive performance and reproductive success. The 'cognitive performance hypothesis' posits that individuals demonstrating greater general cognitive performance are preferred in mate choice. Satin bowerbirds (*Ptilonorhynchus violaceus*) are an excellent species for testing this hypothesis because their complex male courtship, including bower building and mimicry of other species of birds, suggests a selective advantage to individuals with higher cognitive abilities. We assessed 20 males for performance on an array of cognitive tasks including problem-solving ability, bower building ability, and mimetic ability. In addition, we used canonical correlation analysis to construct an analog to the human intelligence factor, *g*, and compared this 'bowerbird *g*' to male mating success. Problem-solving ability and mimetic ability each predicted mating success. In addition, our bowerbird *g* score significantly correlated with mating success. Our findings suggest that males with better general cognitive performance are more sexually attractive.

Abstract (5243); Session G09, Thu 13 August, Location: Irvine Auditorium, Café 58, Oral at 16:00

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#### THE AUSTRALO-PAPUAN BUTCHERBIRDS: COMPARATIVE STUDIES AMONG CLOSELY RELATED SPECIES

Extreme cyclic aridity during the past 2 million years is hypothesised to have played a critical role in shaping geographic variation in widely distributed Australian birds. Phenotypically distinct geographic forms are most often thought to have diverged in isolation after range contractions. We examined sequences from mtDNA and nuclear introns, and assessed morphological variation within two closely related groups of Australo-Papuan butcherbirds (Passeriformes: Artamidae: *Cracticus*) with near continent-wide distributions to discriminate among biogeographical hypotheses regarding the origins of diversity in each group. We highlight a need to reassess the taxonomy and hypothesised evolutionary history of the white-throated butcherbird complex due to widespread sharing of plumage characters, nDNA haplotypes and mtDNA paralogy among three contemporarily allopatric species (*C. torquatus*, *C. argenteus* and *C. mentalis*). Comparisons of the widespread *C. torquatus* and *C. nigrogularis* revealed strikingly different patterns of phenotypic and genetic variation, supporting divergence following vicariance in *C. torquatus* and recent range expansion with abiotic origins to phenotypic variation in *C. nigrogularis*. Our results add to the emerging awareness of species-idiosyncratic responses to large-scale environmental processes.

Abstract (5394); Session S10, Sat 15 August, Location: College Hall, Room 200, Oral at 10:30

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#### PREVALENCE OF *CAMPYLOBACTER* IN WILD BIRD POPULATIONS

*Campylobacter* bacteria have a significant impact on human health, being responsible for the majority of food borne illnesses and gastroenteritis worldwide (B.A. Bannister et al. 2000) Wild birds have been thought to factor into the epidemiology of this bacterium, although few studies have estimated the prevalence of *Campylobacter* in wild birds in the U.S. This study evaluated the occurrence *C. jejuni*, *C. coli*, and *C. lari* from 333 wild bird fecal samples collected at Tri-State Bird Rescue and Research in Newark, Delaware. Species were ultimately identified by multiplex-PCR and Multi-locus sequencing typing PCR. Prevalence rates of *Campylobacter* from nine avian families averaged to be 7.5% overall with rates ranging widely between different families. Crows (*Corvus brachyrhynchos* and *Corvus ossifragus*) had the highest prevalence, followed by laughing gulls (*Larus atricilla*) and blue jays (*Cyanocitta cristata*). All positive samples were *C. jejuni*. It remains somewhat unknown as to why certain species are more prone to carrying the bacterium than others, although feeding habits and ecological niches occupied by individual species are sure to play a role.

Abstract (5401); Session GP08, Fri 14 August, Location: Houston Hall, Hall of Flags, Poster Num: 29

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#### A PERFORMANCE FOR THE AGES: IMPLICATIONS OF AGE-RELATED CHANGES IN SONG STRUCTURE IN A SUBOSCINE BIRD, THE WESTERN SLATY ANTSHRIKE (*THAMNOPHILUS ATRINUCHA*)

Many studies assume that suboscine songs are invariant during adulthood, yet no known study has examined within-individual changes in song structure. We sampled loudsong from known-age Slaty Antshrikes and discovered that age is negatively associated with trill rate in both sexes and, in females, positively associated with peak frequency difference of the first and last syllable. To our knowledge, this is the first demonstration that song structure varies continuously with age in any species. Considering that all *Thamnophilidae* have trills, we suggest that this pattern may be common. This discovery led to the finding that 71% of Antshrike males are paired with younger females, a pattern that is likely generated by intense sexual selection. We then used the correlation to estimate—with less than six days' vocal sampling—some demographic features of two populations known to differ in exposure to adult predators. We discovered that song-derived adult survival was 84% and 78% in low and high adult predator sites, respectively. If the age-trill relationship holds for other *Thamnophilidae*, it could hold considerable promise for behavioral ecology, conservation, and life-history theory.

Abstract (5553); Session G22, Sat 15 August, Location: Irvine Auditorium, Amado Recital Room, Oral at 15:15

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#### SPYCAMS REVEAL EVIDENCE OF SPECIFIC ADULT FEEDING CALLS TO NEWLY HATCHED NESTLING HOUSE WRENS

Vocalizations have been investigated in many species, including House Wrens (*Troglodytes aedon*), often with the goal of determining functions of specific songs and calls. Here we describe and show video responses of young nestling wrens to adult feeding calls. Beginning in 2008, we placed minicameras with infrared illumination and built-in microphones inside lids of nest boxes to record behaviors of adult wrens during incubation and nestling periods. We observed from videos that adult wrens with food gave calls to newly hatched young. On hearing these calls, blind nestlings usually raised their heads to receive food. We suggest that these calls are specific feeding calls, different from other vocalizations including other “chatter” calls, based on the following evidence: context (calls given only when an adult has food and stop once a nestling is fed); response by young to these calls (raise head and open mouth); lack of similar response by young to other vocalizations; reduction in use of these calls as young age and learn other cues for begging for food; and analysis of spectrograms.

Abstract (5521); Session G22, Sat 15 August, Location: Irvine Auditorium, Amado Recital Room, Oral at 14:45

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#### SEASIDE SPARROW REPRODUCTIVE SUCCESS IN RELATION TO PRESCRIBED FIRE FREQUENCIES IN MID-ATLANTIC TIDAL MARSHES

In Maryland, prescribed marsh burning has been practiced for over 80 years. We compared the effects of four fire-return intervals (annual, 3-5 years, 7-10 years, >10 years) on the marsh bird community at Blackwater National Wildlife Refuge and Fishing Bay Wildlife Management Area. During the breeding seasons of 2007 and 2008, we monitored 215 Seaside Sparrow (*Ammodramus maritimus maritimus*) nests. Nest and territory densities were greater on annual intervals than on 7-10 and >10 year intervals (P-values < 0.05). Daily nest survival probabilities did not differ among intervals (annual –  $0.936 \pm 0.0091$ ; 3-5 years –  $0.952 \pm 0.0085$ ; 7-10 years –  $0.954 \pm 0.0151$ ; >10 years –  $0.938 \pm 0.0167$ ). Annual intervals produced more eggs per ha than 7-10 and >10 year intervals (P-values < 0.05), but all intervals produced the same number of fledglings per ha. Although annual intervals contain the most Seaside Sparrows, they fail to produce a correspondingly high number of fledglings. Implications of extensive annual burning on the persistence of this Seaside Sparrow population require further evaluation.

Abstract (5508); Session GP02, Fri 14 August, Location: Houston Hall, Hall of Flags, Poster Num: 99

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#### COI BARCODE RESOLUTION FOR EASTERN PALEARCTIC BIRDS: REVISITING SPECIES BOUNDARIES IN HIGH-LATITUDE BIRDS

DNA barcoding employs sequences from a short standardized gene region (cytochrome c oxidase I for animals) to identify species. The ability to discover cryptic species has also been explored, however, both utilities remain contentious. Birds remain an ideal group to test the efficacy of the barcode approach because of their mature taxonomy. COI diversity has been surveyed extensively in North American birds, but treatments elsewhere are sparse. In this study, we expand the COI library by sampling a large proportion of Palearctic birds. We acquired COI sequences from vouchered museum specimens (N=1674) representing 398 species and merged this data with that for North American birds. Avian diversity is low in this region, though a number of species are shared with or are sister to Nearctic taxa, which provides transcontinental comparisons. We tested different methods for species assignment including neighbour-joining clusters, distance-based thresholds, and character-based methods. We compare the results and reliability of these different tests. Well-supported divergences within species and their implications regarding species boundaries are discussed, as are reasons for low diversity between a limited number of species pairs.

Abstract (5529); Session G08, Thu 13 August, Location: Houston Hall, Bodek Lounge, Oral at 15:00

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#### BIRDS, VIRUSES, AND ANTHROPOGENIC CHANGE – A MOLOTOV COCKTAIL IN THE MAKING

The introduction of West Nile virus to the Western hemisphere, and the global emergence of H5N1 avian influenza have drawn new focus to the interactions of pathogens and wild birds. My work has focused on how the ecology of West Nile virus transmission has both been shaped by avian community composition, and has in turn altered community composition through WNV mortality. I will describe patterns of interactions of mosquito vectors and avian hosts, how both communities are altered by urbanization of eastern forests, and the striking consequences for viral transmission. In addition, I will highlight how globalization of trade and travel has combined with avian migration in the dispersal, spread, and emergence of West Nile virus and avian influenza. Finally, I will describe how studies of the basic ecology of birds and their interactions with pathogens and vectors can lead to novel control strategies that provide unmatched public health benefits for zoonotic diseases.

Abstract (5624); Session K3, Fri 14 August, Location: Houston Hall, Bodek Lounge, Oral at 08:00

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#### WINTERING PATTERN OF SWANS ALONG THE NAKDONG RIVER, KOREA

The purpose of this study is to analyze the swan populations along the Nakdong River, which is the second longest river in Korean peninsula, from six sites of Haepyeong Wetland at Gumi, Dalseong and Ansim Wetland at Daegu, Upo Wetland at Changnyeong, Junam Reservoir at Changwon and Nakdong River estuary, the largest wintering area of swans in the country, at Busan. It is to investigate the distributions of swans and climatic conditions during wintering period and rainfall data during growing seasons of the feeding plants. They have shown three patterns in wintering times in the individual numbers of the swans along the river from 1999 to 2008. The swans at Nakdong River estuary showed their peak numbers in November and December, at Junam in December and January, at Upo and Haepyeong in January and February. It suggests that the swans have a tendency to move northward from Nakdong River estuary to Junam, Upo, and Haepyeong as time goes on. This migrating phenomenon seems to happen due to the various factors including foods, temperature and variable environmental conditions at this area.

Abstract (5319); Session GP21, Fri 14 August, Location: Houston Hall, Hall of Flags, Poster Num: 60

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#### NEXT-GENERATION SEQUENCING OF THE RAINBOW LORIKEET REVEALS HUNDREDS OF POTENTIAL MICROSATELLITE LOCI

High throughput sequencing technologies can produce large amounts of sequencing with relatively little effort. We used genomic DNA from the rainbow lorikeet, *Trichoglossus haematodus*, and conducted a run using 1/8 of a sequence plate on a 454 Life Sciences (Roche) GS FLX Titanium sequencer. Of the nearly 50,000 reads we obtained, we identified 1000 sequences with di, tri, and/or tetranucleotide microsatellite repeats (we focused on sequences with a minimum of 6 repeats for dinucleotides, and 4 repeats for tri- and tetranucleotide repeats). Excluding sequences with multiple microsatellite repeats and those that lacked sufficient flanking region for primer design, there were 566 potential microsatellites that could be developed for genotyping. Of these, 171 were dinucleotide, 312 trinucleotide, and 83 tetranucleotide repeats identified. The use of next-generation sequencing technology represents a straightforward and quick alternative method for the identification and development of microsatellite loci.

Abstract (5557); Session GP22, Fri 14 August, Location: Houston Hall, Hall of Flags, Poster Num: 62

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#### INJECTING THE MITE INTO ECOLOGICAL IMMUNOLOGY: MEASURING THE ADAPTIVE IMMUNE RESPONSE AND FITNESS COSTS OF HOUSE SPARROWS CHALLENGED WITH HEMATOPHAGOUS MITES

During the breeding season, passerine adults and nestlings are exposed to an array of ectoparasites, including hematophagous mites. Although a great deal of research has been conducted examining the direct consequences of mite infestation on host fitness and immunologic function in the domestic fowl, to date, there are no studies in the published literature that profile the specific adaptive immune response of a passerine species to hematophagous mites. In the present study, we measure the humoral immune response of the passerine house sparrow (*Passer domesticus*) to specific hematophagous mite antigens. Further, we examine the fitness tradeoffs in relation to the presence of mite



specific antibodies in a population of wild nestling and adult sparrows where individuals were confirmed to be parasitized. Our results confirm that house sparrows are capable of mounting a specific adaptive immune response against hematophagous mite antigen. Further, an explorative study examining the presence of mite specific antibodies in the yolk and nestling serum in relation to nestling quality and egg mass suggests that there are fitness consequences associated with mounting a specific immune response against ectoparasites.

Abstract (5302); Session GP16, Fri 14 August, Location: Houston Hall, Hall of Flags, Poster Num: 46

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#### PHYLOGENY OF TYPICAL LONG-BILLED RAILS OF AUSTRALASIA AND OCEANIA

I present a phylogenetic hypothesis for the “typical rails” of Australasia and Oceania based on ancient DNA sequences obtained from living and extinct species. The typical rails of this region comprise a diverse assemblage of long-billed species variously placed in the genera *Lewinia*, *Nesoclopeus*, *Gallirallus*, *Habropteryx*, *Tricholimnas*, *Aramidopsis*, *Amaurornis*, *Eulabeornis*, *Habroptila*, and *Megacrex*. As is the case in the more cohesive groups of rails referred to as crakes (*Porzana*), gallinules (*Gallinula*), swampheens (*Porphyrio*), and coots (*Fulica*), the typical rails of this region have radiated extensively into single-island endemic species, many of which are flightless. The presented phylogeny has implications for the timing and pattern of island colonizations and the evolution of flightlessness, and will become the basis for a revised classification at the genus level. Preliminary phylogenetic analyses provide mixed support for the hypothesis that single-island endemic flightless rails evolved from extant, paraphyletic, volant species, and indicate that the flightless condition may evolve prior to reproductive isolation.

Abstract (5440); Session GP25, Fri 14 August, Location: Houston Hall, Hall of Flags, Poster Num: 64

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#### USE OF UV AND OTHER SIGNALS TO PREVENT COLLISIONS BETWEEN BIRDS AND WINDOWS

Billions of birds are estimated to be killed striking clear and reflective windows in urban, suburban, and rural habitats worldwide. Birds in general behave as if windows installed in buildings and as noise barriers along roadways are invisible, and window-collision casualties are likely the fittest as well as the less fit members of species populations. Ultraviolet (UV) signals are expected to be of optimum utility alerting birds to the window hazard because they see UV and humans do not. From 2004 to 2008 outdoor flight cage and field experiments were used to evaluate UV signals and select other methods to prevent bird-window collisions. Clear UV-reflecting and UV-absorbing window coverings in the form of stripes and grid patterns offered an effective warning that birds avoid while posing little or no obstructed view for humans. One-way films, ceramic frit glass, and uniformly covering panes with decals or feathers such that they are separated by 10 cm or less in vertical columns or 5 cm or less in horizontal rows also effectively prevent avian mortality at windows.

Abstract (5181); Session A01, Thu 13 August, Location: Cohen Hall, Terrace Room, Oral at 14:15

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#### AMERICAN CROW DECLINES AND WEST NILE VIRUS SUPPORT THE DILUTION EFFECT

Studies of infectious pathogens that cross over from wildlife to human populations provide key insights into the role of biodiversity in pandemic disease risk. Here we test the dilution effect, whereby a diverse host community dampens pathogen transmission and potentially slows its rate of spread, examining mortality effects of contact by American Crows with West Nile virus, a pathogen that has become the dominant vector-borne pathogen in North America since its introduction in 1999. Consistent with the dilution effect, we found that crow populations were significantly less likely to decline in sites of high avian species diversity after controlling for host density, weather, temporal spread of the pathogen, spatial autocorrelation, and the overall probability that an infected host will transmit the pathogen to a vector (the reservoir competence of the community). We conclude that the dilution effect plays an important role in moderating West Nile virus disease risk on a continental scale. Results underscore the importance of vertebrate biodiversity as well as the need for ecological community approaches to understanding the role of host diversity in shaping disease risk.

Abstract (5363); Session G02, Thu 13 August, Location: Houston Hall, Class of '49 Auditorium, Oral at 10:45

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THE VOCAL BEHAVIOUR OF A NEOTROPICAL SUBOSCINE: THE BARRED ANTSHRIKE  
(*THAMNOPHILUS DOLIATUS*)

Despite extensive research on vocal behaviour in oscine songbirds, our understanding of the vocalizations of suboscines is rudimentary, considering their tremendous diversity in the Neotropics. Here we provide the first rigorous description of the vocal behaviour of Barred Antshrikes, a widespread Neotropical suboscine whose voice has only been described anecdotally. We recorded the vocalizations of 20 pairs from 20 locations between May and July 2008 and 2009. We measured 14 fine structural characteristics and found that male vocalizations are significantly longer, contain more syllables, and are generally of lower frequency than females. We quantified the number of solos and duets sung in a 24-hr period across 20 recording locations. Analyses show pronounced diel variation with a peak vocalization rate between 05:00h and 07:00h suggesting that Barred Antshrikes participate in dawn chorus singing. Analyses of seasonal variation show a peak early in the year at the start of the breeding season. We also provide a description of duetting behaviour with a focus on which sex initiates and terminates a duet. We demonstrate that this suboscine antbird has remarkably complex communication behaviour.

Abstract (5365); Session G04, Thu 13 August, Location: Houston Hall, Bodek Lounge, Oral at 10:45

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VOCAL AND ANATOMICAL EVIDENCE FOR A TWO-VOICED SYSTEM IN THE GREATER SAGE-GROUSE  
(*CENTROCERCUS UROPHASIANUS*)

Mate choice in lekking Greater Sage-grouse may depend on acoustic components of the courtship display, yet we know little about how males produce these sounds. Here we present evidence for previously undescribed two-voiced sound production in the sage-grouse. We detected this 'double-whistle' (DW) using multi-channel audio recordings combined with video of male courtship. Of 28 males examined, all males produced at least one DW during observation; variation in DW production did not correlate with mating success. We examined recordings from six additional populations and found evidence of DW in all populations. To examine the possible mechanism of this two-voiced system, we dissected two male and female sage-grouse; the syrinx in both sexes differed noticeably from that of the domestic fowl, and notably has two sound sources where the bronchi join the syrinx. Additionally, males possess a region of pliable tracheal rings at the base of the trachea, as well as a prominent syringeal muscle that is much reduced or absent in females. We conclude that undiscovered morphological and behavioral complexity may exist even within well-studied species.

Abstract (5515); Session G22, Sat 15 August, Location: Irvine Auditorium, Amado Recital Room, Oral at 16:30

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OLFACTORY ENRICHMENT OF CAPTIVE KEA (*NESTOR NOTABILIS*) AT THE PHILADELPHIA ZOO

Stereotypic behavior in captive animals often results from stress and a lack of stimulation. Enrichment is a common practice that aims decrease stereotypies through heightened stimulation. The goals of our study were to: (1) determine whether stereotypic behaviors of an endangered parrot (Kea, *Nestor notabilis*) can be reduced through object enrichment, and (2) verify whether kea can detect odors. Two Kea at the Philadelphia Zoo experienced three treatments in which they were presented with: scented toy balls, unscented toy balls, or a control treatment in which all toys were removed. Results indicate that object enrichment was beneficial. Specifically, relative to the control treatment, stereotypic behaviors decreased and behaviors indicative of social play increased when either scented or unscented balls were provided. Birds also exhibited a particular behavior, face-rubbing, primarily in the presence of scented balls, which suggests that they could detect the odor applied to toys. Scent may be a useful but overlooked component of enrichment programs for Kea as well as other avian species.

Abstract (5600); Session GP06, Fri 14 August, Location: Houston Hall, Hall of Flags, Poster Num: 23

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#### BENEFITS OF EXTRA-PAIR MATING IN PURPLE MARTINS

Approximately 75% of socially monogamous passerines pursue extrapair mating (Griffith, et al., 2002), with the frequency of extrapair paternity varying among and within taxonomic groups (Birkhead and Møller, 1992). Despite the prevalence of extra-pair mating, its adaptive significance is not well understood (Jennions and Petrie, 2000; Simmons, 2005; Dunn, et al., 2009). We investigated the benefits of extra-pair mating behavior in the purple martin (*Progne subis subis*), a colonial secondary cavity nesting swallow. We collected nesting data, determined social parentage for most nests and blood sampled adults and young for subsequent parentage analysis using microsatellite markers. We then tracked the survival and recruitment over subsequent years. In 2006, our data show that second-year (SY) males have higher rates of cuckoldry than do after-second-year (ASY) males, similar to a population studied by Morton, et al. (1991). We found that of offspring with SY social fathers, extra-pair offspring had higher survival rates than within-pair offspring. We argue that our data support the good genes hypothesis of mate choice by showing an adaptive advantage to extra-pair mating behavior.

Abstract (5459); Session G24, Sat 15 August, Location: Cohen Hall, Terrace Room, Oral at 15:15

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#### A HISTORY OF RESEARCH ON ALTITUDINAL MIGRATION OF BIRDS IN THE ANDES: ACTIVITIES, INSIGHTS AND KNOWLEDGE GAPS

While early observations of altitudinal bird movements in the Andes stem from the end of the 19th century, research in this region has since then been dominated by findings generated elsewhere, especially in Costa Rica. Considering the Andean avifauna a study object in its own right, the first ever comprehensive review of available data was undertaken. Among the 151 publications found, there has been a moderate exponential growth in publishing productivity from the 1960s onwards. With a few exceptions, studies are of limited scope (elevational coverage, time period) and typically lack a specific study design, thus generating results only as a side effect. While prevailing conservationist reasoning prevails, especially ultimate factors like physiology and genetics (0 publications) remain unexplored. Three years of field work about a bird community in the eastern Bolivian Andes show that the scarce literature data in existence must be considered of limited solidity. Research on altitudinal bird movements in the Andes to date has been largely epigonic to influential publications from Costa Rica and has failed to build up an autonomous research tradition.

Abstract (5540); Session S04, Sat 15 August, Location: Cohen Hall, G17 Auditorium, Oral at 16:30

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#### NEW INSIGHT INTO THE EOCENE NORTH AMERICAN AVIFAUNA

Avian fossils from the Fossil Butte Member (FBM) of the Eocene Green River Formation provide one of the richest records of fossil birds worldwide. As part of an ongoing evaluation of this avifauna, we present new phylogenetic analyses of fossil representatives of Coliiformes, Coracii, and Galliformes. Combined analyses of morphological and molecular data place North American fossil taxa from all three groups as stem parts of clades with predominantly Southern Hemisphere extant distributions. These topologies contribute to mounting evidence that extant ranges for major avian subclades may be of comparatively recent origin. FBM fossils also reveal unexpected insight into the paleoecology of these clades. A new species of Coliiformes preserves carbonized feather impressions indicating a wing more similar to that of extant aerial insectivores than to living mousebirds. Coracii, represented by three stem species, appear to be the most numerically abundant clade within the FBM avifauna. Ongoing study of the Green River avifauna promises further insight into avian biogeography and improved fossil constraint on calibration points for divergence dating studies.

Abstract (5534); Session G18, Sat 15 August, Location: Irvine Auditorium, Amado Recital Room, Oral at 11:30

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#### CONTAMINANTS AS LIMITING FACTORS IN RESTORING COLONIAL WATERBIRD POPULATIONS

The last half century marked considerable interest as well as pioneering understanding of the interaction among persistent toxic substances and effects on various avian species, including colonial waterbirds. Among these effects were adult lethality, reproductive impairment involving early life stages (egg hatching, eggshell thinning and productivity impairment), and sub-chronic effects on survivors (late-stage nestling impacts and fledging survival, and recruitment to adult breeding populations). This presentation will summarize some of these decadal time – contaminants - effects relationships and address restoration options that include continued assessment and monitoring

needs. In this manner, habitat can be embraced to not only include physical habitat availability and quality but also the quality of the chemical environment within these physical habitats. After roughly 60 years, the full integration of persistent environmental contaminants into a long-range restoration vision for colonial waterbirds remains a challenge.

Abstract (5629); Session S07, Sat 15 August, Location: Houston Hall, Class of '49 Auditorium, Oral at 11:30

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#### THE VOCAL BEHAVIOR OF COMMON LOONS: VARIATION WITH TIME OF DAY AND WEATHER CONDITIONS

For animals to communicate effectively, a signal must be detected by a receiver in order to evoke a response. As signals transmit further through the environment, the risk of masking and degradation increases substantially. This is especially true in long-distance signals, such as the calls of Common Loons (*Gavia immer*) whose vocalizations travel several kilometers to reach their intended receivers. As a consequence, loons may choose to vocalize less when abiotic conditions impair long-distance communication. In this study, we explore the diel rhythms of loon vocal behavior and evaluate the effects of weather on animal signaling strategies. We used an innovative long distance Acoustic Monitoring System that allows us to passively monitor the natural vocal behavior of multiple animals across 10-km transects over extended time periods. Our results show pronounced diel variation in the four types of vocalizations produced by Common Loons. We demonstrate that Common Loon vocal behavior varies between day and night and that loons change their signaling strategies with changing weather patterns to enhance effective communication.

Abstract (5248); Session G04, Thu 13 August, Location: Houston Hall, Bodek Lounge, Oral at 11:00

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#### ACOUSTIC MONITORING OF NOCTURNAL MIGRANTS: A COST EFFECTIVE WAY TO MONITOR POPULATIONS AT A LARGE SCALE

Migrant birds face growing pressures from habitat loss and climate change. Inexpensive and efficient monitoring protocols are essential to improve conservation efforts, especially to monitor remote populations, e.g., boreal populations. During nocturnal migration birds emit short flight calls that we recorded and analyzed. The numbers of calling birds and species that passed overhead can be estimated and used to assess population trends and determine concentrated migration pathways. At Powdermill we have collected 5 years of acoustic monitoring data, documented and collected >30,000 known species flight calls and have begun to assess inter- and intra- specific variation of flight calls. The latter will help to improve the collection and analysis of monitoring data. In addition, we and our collaborators have operated over 40 nocturnal monitoring stations and have proven that this technique shows great potential for enhancing monitoring and management tools. In addition, the data serve as a permanent, reusable record that is more flexible than observer-based surveys. Moreover, acoustics costs a fraction of observer-based surveys, and can effectively and inexpensively census entire populations at a regional or continental scale.

Abstract (5590); Session G23, Sat 15 August, Location: Houston Hall, Bodek Lounge, Oral at 15:00

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#### BREEDING BIOLOGY AND SPACING PATTERNS OF THE BLACK CATBIRD

Avian behavioral ecology suffers from what Stutchbury and Morton called the “temperate zone bias”: most bird species inhabit the tropics, yet theory in behavioral ecology derives predominantly from temperate zone studies. The Black Catbird, *Melanoptila glabrirostris*, is a poorly known mimid endemic to the Yucatán Peninsula and its adjacent islands. We report here preliminary findings of field research on the Black Catbird from the Sian Ka'an Biosphere Reserve and Isla Cozumel. Breeding occurred in May through August 2008. Clutch size averaged 2.5 eggs (range = 2–3, N = 37). Catbirds often cooperatively mobbed predators in groups of up to 7 adult birds, but 79% (N = 62) of nests nevertheless were depredated. In northern Sian Ka'an, several concurrently active nests were ≤ 3 m apart. Our site at the Sian Ka'an Visitors' Center hosted a breeding density of 34.3 adults/ha, which represents the highest known

breeding density for any mimid, clustering that may represent a formerly undocumented level of social organization for the Mimidae. We will gather additional data from May until July 2009.

Abstract (5562); Session GP29, Fri 14 August, Location: Houston Hall, Hall of Flags, Poster Num: 123

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#### SONG OUTPUT PREDICTS PATERNITY AND FLEDGING SUCCESS IN SONG SPARROWS

Sexual selection theory predicts that females should benefit from mating with males capable of high signal effort. Because song output is energetically costly, this signal may be an honest indicator of current condition in male songbirds. We investigated the relationship between song output and mating success in breeding male song sparrows (*Melospiza melodia*), using a 16-channel acoustic location system to simultaneously record a network of individuals interacting in their natural environment with minimal human interference. All subjects successfully attracted social mates, but males with high rates of song output at dawn were more likely to maintain paternity in their social mate's offspring. Males with high rates of dawn song, and males with high song complexity, were also more likely to successfully fledge offspring. High rates of song output may function to deter rival males and thus protect paternity. Alternatively, female song sparrows may use song output as a cue to assess a male's current condition and potentially, his genetic and/or parental quality.

Abstract (5337); Session G22, Sat 15 August, Location: Irvine Auditorium, Amado Recital Room, Oral at 16:00

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#### GOLDEN-WINGED WARBLER BREEDING HABITAT CHARACTERIZATION IN PENNSYLVANIA

Researchers and managers largely agree that habitat management is the key to the long-term conservation of the Golden-winged Warbler. However, management guidelines that promote the creation and maintenance of optimal Golden-Winged Warbler breeding habitat is lacking. In 2008, we initiated research that examined Golden-Winged Warbler demographics and habitat selection across two study areas in northcentral Pennsylvania. These study areas were <20km apart, but differed considerably in landscape context and plant community composition. Blackberry cover and distance to shrub >2m high exhibited less variation within Golden-winged Warbler territories (n=58) than within "unused" territories (n=32). Golden-winged Warbler territories had more grasses, forbs, blackberry, and shrubs <2m tall, and fewer ferns, shrubs >2m tall and saplings than "unused" territories. Additionally, intensive habitat mapping using a <1m accuracy GPS, revealed that territories were 3-6 times more patchy with respect to vegetation than adjacent habitat. When managing for Golden-winged Warbler breeding habitat, techniques that result in the conditions described above should be used. Moreover, we suggest managing for Golden-winged Warbler habitat in areas that seasonally flood or use methods such as prescribed burning-scenarios that often result in patchy vegetation.

Abstract (5290); Session S08, Fri 14 August, Location: Irvine Auditorium, Amado Recital Room, Oral at 09:30

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#### EVALUATING THE INFLUENCE OF SURFACE WATER ON BIRD DIVERSITY AND ABUNDANCE IN SOUTHWESTERN RIPARIAN WOODLANDS

Riparian woodlands in the desert southwest are an important resource because they constitute <1% of the landscape, yet typically support >50% of the breeding birds. These riparian woodlands also provide critical stopover habitats for many species of long-distance migrant birds. Recent drought and increasing human demand for limited water resources have led to declines in surface water in riparian woodland across the region. From 2006 to 2008, we evaluated the influence of surface water on bird abundance and diversity by conducting bird surveys, measuring surface water, and sampling vegetation in 28 riparian woodlands in southeastern Arizona. Surface water was significantly and positively associated with total relative abundance of riparian birds as well as relative abundances of several species of breeding (e.g., song sparrow, yellow warbler) and long-distance migrant (e.g., Wilson's warbler) birds. In order to determine possible causal pathways for these results, we estimated and compared biomass of aerial and arboreal arthropods at a subset of dry and wet sites. Our results indicate that presence of surface water in riparian woodlands benefits both breeding and migrant birds.

Abstract (5527); Session G17, Fri 14 August, Location: Houston Hall, Bodek Lounge, Oral at 16:30

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#### NETTING METHODS INFLUENCE AGE DISTRIBUTION IN SAMPLES OF CLIFF SWALLOWS

Mist-netting is often used to compare the relative abundance of species, sexes, and ages to make inferences concerning their relative abundance in different communities and years. Its use avoids biases of census techniques that rely on the visual or auditory abilities of human observers. Netting also allows quantitative comparisons of secretive birds. However, mist nets only sample low-flying birds and many species learn to avoid nets. Because of the widespread use of mist nets, we decided to compare the sample bias of different netting methods. Cliff Swallows (*Petrochelidon pyrrhonota*) nest in large colonies, which provides an ideal situation for using mist nets. We allowed swallows to fly into nets voluntarily and compared those data to data from swallows captured by flushing them into the nets. Our sample of 3,062 birds showed that flushed birds were older than birds that made voluntary flights into the nets. Our study shows that the method of netting can give a skewed estimate of a population's age structure and that researchers who use mist nets should recognize this sampling bias when making conclusions about demography.

Abstract (5396); Session G13, Fri 14 August, Location: Houston Hall, Bodek Lounge, Oral at 09:00

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#### HABITAT USE, DISTRIBUTION, AND CONSERVATION OF YELLOW-BILLED COTINGA IN COSTA RICA

Little is known about the Yellow-billed Cotinga (*Carpodectes antoniae*), despite its Endangered conservation status and conspicuous plumage and displays. We conducted surveys between 2007 and 2009 for Yellow-billed Cotinga throughout its historic range in Costa Rica in both mangrove and forest habitats. Our observations included foraging, courtship behavior, and first observations of nesting and parental care. Nesting was confirmed within mangrove habitat, all foraging observations occurred within forest canopy trees, and courtship displays by males were observed in both habitats. Our observations reveal that important locations for Yellow-billed Cotinga occur where both mangrove and forests are adjacent to one another, and that some of these locations fall outside Costa Rica's protected area system within the Osa Peninsula and Golfo Dulce region where most Yellow-billed Cotingas live.

Abstract (5250); Session G12, Fri 14 August, Location: Irvine Auditorium, Café 58, Oral at 09:15

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#### A SPECIES TREE FOR AUSTRALO-PAPUAN FAIRY WRENS (MALURIDAE)

Estimating species trees is of great importance to evolutionary biologists, and there has been greater appreciation of the need to infer species tree with consideration of heterogeneity in gene trees. Using a group of Australian passerines (the family Maluridae), we estimated a species tree with currently available species-tree estimation methods: (1) Bayesian Untangling of Concordance Knots (BUCKy), (2) Species tree with Average Ranks of Coalescences (STAR), and (3) Bayesian Estimation of Species Tree (BEST), as well as concatenation (4). A total of 18 genes (7828 bps), consisting of four different genetic markers (mtDNA, anonymous loci, introns and exons), were sequenced. The genetic markers showed high variability and approximately 18% of total sites were parsimony informative. Gene trees revealed that a high level of incomplete lineage sorting is still present across the family, but the species tree broadly agrees with previous results. In addition, 96 independent indels (insertions or deletions) showed good phylogenetic signal at the generic level. Reconstruction of ancestral states of species distribution suggested that *Malurus* originated from Papua New Guinea.

Abstract (5561); Session G21, Sat 15 August, Location: Houston Hall, Class of '49 Auditorium, Oral at 16:00

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#### COMPARATIVE PHYLOGEOGRAPHY ACROSS AUSTRALIA'S CARPENTARIAN BARRIER: INTEGRATING PALEOENVIRONMENTAL AND MOLECULAR DATA

With its long history of isolation as a continent, Australia has provided great opportunities for studying phylogeography. As one of the prominent barriers in northern Australia, the Carpentarian barrier has played an important role in differentiating many avian species since the Pleistocene. To better understand the contributions of contemporary and historical environmental factors in shaping species distributions, we used GIS approaches to study

four taxon pairs spanning the Carpentarian barrier: grassfinches (*Poephila*), brown and black-tailed treecreepers (*Climacteris*), Red-backed Fairy Wrens (*Malurus*), and Figbirds (*Sphecoheres*). First, we developed predictive models of each species' range during 3 time periods (present day, the last glacial maximum 20 kya, and the last interglacial 120 kya). We then summed these models to assess range stability and putative refugia for each species. The results suggest that for all species pairs, a discontinuity is predicted at the Carpenterian barrier and two major refuges were identified in northern Australia: the Kimberly and Atherton Plateau. Furthermore, we correlate multilocus genetic structure and putative refuges to test alternative modes of diversification for these groups.

Abstract (5520); Session S10, Sat 15 August, Location: College Hall, Room 200, Oral at 09:00

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#### IRIDESCENT COLORS IN JUNGLE CROW'S FEATHER

We studied the feather color of Jungle Crows (*Corvus macrorhynchos*). Jungle Crow appears at first glance as black plumage, regardless of their sex. However, under appropriate light illumination, the iridescence can be perceived on its feathers. We examined iridescent feather barbules (N=96) of the secondaries using transmission electron microscopy and computer simulation for the microstructure characteristics and the origin of iridescent color. It was found male crow has a singly layered, closed-packed melanin granule arrangement in their feather barbules right beneath the surface, while female crow shows a rather random distribution of granules without layered arrangement. We have modeled the microstructure of iridescent male barbules by taking into account the actual arrangement of melanin granules, which is located under a thin surface keratin layer. The computer simulation suggests that the locally regular arrangement of melanin granules causes the iridescence from green to violet due to diffraction grating under the illumination of oblique incidence, which is only observable under back-scattering geometry.

Abstract (5182); Session GP05, Fri 14 August, Location: Houston Hall, Hall of Flags, Poster Num: 15

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#### RESOLVING THE PHYLOGENY OF THE HAWAIIAN HONEYCREEPERS (DREPANIDINAE) WITH 454 PARALLEL TAGGED SEQUENCING OF COMPLETE MITOCHONDRIAL GENOMES

The Hawaiian honeycreepers (or drepanidines) are a classic example of adaptive radiation which has been particularly extensive, resulting in more than 56 species and a tremendous diversity in morphology, ecology and behavior in an evolutionarily short time frame. Resolution of branching patterns of basal nodes is often difficult in cases of adaptive radiations either because multiple speciation events occurred simultaneously (i.e. hard polytomy) or because a rapid rate of speciation necessitates the use of a large quantity of sequence data to recover the genetic signature of speciation (soft polytomy). Previous molecular genetic phylogenies for the drepanidines have used allozymes, restriction fragments of mitochondrial DNA and nucleotide sequences of cytochrome *b* but have found low bootstrap support for many nodes. In order to improve resolution we sequenced complete mitochondrial genomes for 19 extant honeycreeper species using parallel tagged sequencing on the 454 platform. We also sequenced mitochondrial genomic sequences for over 20 additional outgroup species to identify close relatives of the drepanidinae.

Abstract (5366); Session G08, Thu 13 August, Location: Houston Hall, Bodek Lounge, Oral at 17:00

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#### EXAMINING DIVERSIFICATION OF AVIAN LINEAGES IN INDO-MALAYAN ARCHIPELAGO USING STATISTICAL PHYLOGEOGRAPHY AND ECOLOGICAL NICHE MODELING

A major area of research in phylogeography is assessing the importance of glacial cycles in generating and maintaining biological diversity. Despite being biologically rich, tropical areas are poorly studied in this regard. Using Sundaland as a model study system, we investigated whether the presence of habitat barriers during glacial periods kept populations of 16 species of rainforest birds apart even though landmasses were connected by the exposed Sunda shelf. Using maximum likelihood and Bayesian gene genealogies as guides, we asked if inter-population differences were consistent with various divergence scenarios (the common feature being that there was panmixia before the last or penultimate glacial periods). For each species, we also generated ecological niche models and projected them onto a climatic model (CCSM) for the last glacial maximum (LGM). Paleodistributions of species were overlaid after they were grouped according to phylogeographic structure. Statistical comparisons of averaged paleodistributions showed that species with shallower divergences were "retrodicted" to have greater inter-population connectivity during LGM.

This supports our hypothesis that differential responses to climatic changes resulted in different phylogeographic structures.

Abstract (5374); Session G11, Fri 14 August, Location: Cohen Hall, Terrace Room, Oral at 11:45

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#### VEGETATION STRUCTURE AND FLORISTIC COMPOSITION ARE KEYS TO ATTRACT BIRDS IN MOSAIC LANDSCAPE IN TAIWAN

Habitat fragmentation has been considered as threat to biodiversity and maintaining large forest patches is often considered the key in preserving biodiversity in fragmented habitats. However, the effects of habitat fragmentation are not universal to all bird species. We mapped the locations of all observed bird individuals in a 50 ha. experimental farm, located within primary forests, by territory mappings during the breeding seasons from 2005 to 2007. We classified landscape types by aerial photograph and measured vegetation structure of each patch. Over 90% of the registration spots were located in forests. Generalized Linear Model suggested the distributions of dominant passerine species were mainly affected by total foliage volume of understory or plant family richness, not patch area. High foliage volume might protect the birds from raptors and high plant richness might provide diverse food resource, even in very small patches. We conclude that, unless forest patches are highly isolated, increasing the diversity of vegetation vertical structure and floristic composition of small patch could attract birds to stay in fragmented habitats.

Abstract (5393); Session GP13, Fri 14 August, Location: Houston Hall, Hall of Flags, Poster Num: 40

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#### PLANTING DESIGN, LANDSCAPE, AND SEASONAL INFLUENCES ON THE USE OF TROPICAL RESTORATION SITES BY WINTERING NEOTROPICAL MIGRANTS

Active restoration is an increasingly important strategy to facilitate degraded tropical ecosystem recovery. Despite calls to enhance tropical lands for wintering Neotropical migrants, migrant responses to forest restoration efforts are unexplored. We used mist netting to investigate how planting design (seedlings planted continuously, in patches, or not planted), landscape forest cover, and season (late wet, dry, and early wet) influenced the relative abundance of migrants in restoration sites in Costa Rica. We used behavioral observations to identify food resources. We studied four species that have declined in North America; Chestnut-sided Warbler, Mourning Warbler, Swainson's Thrush, and Tennessee Warbler. Three species were most abundant in treatments planted continuously rather than in patches and three species showed seasonal patterns. Extra-floral nectaries on one planted species provided resources for Chestnut-sided and Tennessee Warblers. Thus planting design and tree selection may enhance site use by some migrants.

Abstract (5196); Session G12, Fri 14 August, Location: Irvine Auditorium, Café 58, Oral at 11:45

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#### SOCIAL ENVIRONMENT INDUCES HORMONAL AND MORPHOLOGICAL CHANGES IN A COOPERATIVELY-BREEDING BIRD

Social cues are known to induce hormonally mediated shifts in behavior, but the role of these signals in influencing hormone-dependent morphological traits is unclear. Red-backed fairy-wrens (*Malurus melanocephalus*) are cooperative breeders with three behavioral and morphological male phenotypes: red/black breeders, brown breeders, and brown helpers. Male morphology (plumage and bill color) is androgen dependent in this species. Moreover, helpers that acquire breeding positions develop darker bills, suggesting that social status influences hormonal state and thus morphology. We experimentally tested this hypothesis by removing red/black males from their social groups (N=16), creating breeding positions for replacement helper males. Replacement males demonstrated an increase in both androgen levels (measured in feces) and bill darkness and limited production of red/black plumage. These results support the hypothesis that an individual's social status influences hormone-dependent morphological characters, and alterations of status can lead to rapid changes in these characters. Additionally, while bill color is responsive to hormonal activation during breeding, alterations in plumage color may be temporally limited to the period of pre-nuptial molt.



Abstract (5293); Session G15, Fri 14 August, Location: Cohen Hall, Terrace Room, Oral at 16:15

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#### EFFECTS OF GRASSLAND RESTORATION ON DICKCISSEL NESTING SUCCESS IN TEXAS

Introduced exotic grass species have displaced native grass species and can alter the existing plant communities degrading habitat for many grassland passerines, including the dickcissel. We compared nesting success of dickcissels between exotic grass sites and restored native grass sites in the blackland prairie region of east-central Texas during 2007–2008 breeding seasons. We conducted point counts and nest searching from March – July. Dickcissel abundance was 44% higher in restored sites. Daily survival (DSR) for dickcissel nests in restored sites was 0.895 (SE = 0.013) and for exotic sites was 0.930 (SE = 0.017) (n=104). We used an independent samples t–test to compare mean nest height, which was 56% higher in restored sites than exotic sites and mean nest substrate height which was 58% higher in restored sites than in exotic sites (n = 83). Despite a high failure rate (82%) and a lower DSR and observed success in restored sites than exotic sites, the number of nests that fledged in restored sites (n=11) compared to exotic sites (n=7) suggests that dickcissels at restored sites produced more young overall.

Abstract (5264); Session G20, Sat 15 August, Location: Cohen Hall, Terrace Room, Oral at 12:15

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#### SONG LEARNING STRATEGIES IN THE DEVELOPING SONGBIRDS

The development of birdsong learning is a continuous interplay between an innate program and environmental variables experienced early in life. Vocal learning behavior has evolved in only a few groups of altricial birds. One may hypothesize that, during the developmental process of song learning, early vocal or environmental experience may enhance learning plasticity or impose developmental constraints for subsequent vocal ontogeny to best adapt to individual or species-specific ecological needs. Here I show that (1) early vocal experience such as food begging calls or subsong can have a critical influence on the development of song learning; (2) social variables such as the number of siblings in a clutch can affect the development of different learning strategies in colonial species; and (3) seasonal, territorial young songbirds develop different learning strategies to best match the song of a neighboring adult at breeding grounds.

Abstract (5594); Session S03, Fri 14 August, Location: Cohen Hall, G17 Auditorium, Oral at 09:00

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#### SOCIAL ENVIRONMENT AND BEAK COLOR IN HOUSE SPARROWS

Black beak color in male House Sparrows is a secondary sexual characteristic whose expression is directly correlated with testosterone levels. Experiments in 2005 suggested that male sparrows required physical contact with other birds to maintain black beak color while in captivity. In 2006 we experimentally determined if male-male physical contact affected testosterone levels in captive male House Sparrows as indicated by black beak color. We housed wild-caught male House Sparrows either singly, “Solo” males, or in the company of two other males, “Group” males, from 26 May - 7 July 2006. All males were in visual and auditory contact with other sparrows of both sexes housed in nearby cages. Starting on 26 May and once a week thereafter we produced digital images of Solo and Group males to monitor their beak color. Beak blackness decreased more quickly and to a greater extent in Solo than in Group males. These results suggest that social environment in captivity affected beak color and suggest that male House Sparrows require physical interactions with other sparrows to maintain breeding season levels of testosterone.

Abstract (5258); Session G14, Fri 14 August, Location: Cohen Hall, G17 Auditorium, Oral at 15:00

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#### EFFECTS OF PRESCRIBED BURNING AND MESQUITE DENSITY ON THE SUCCESS AND BROOD PARASITISM OF LARK SPARROW NESTS

Woody encroachment has been shown to facilitate predators of grassland bird nests. We examined Lark Sparrow (*Chondestes grammacus*) nest success, and brood parasitism by Brown-headed Cowbirds (*Molothrus ater*), in shortgrass prairie under experimental, prescribed burns designed for mesquite (*Prosopis glandulosa*) control at the Crossbar Cooperative Management Area in Texas. Daily nest mortality rate (DMR) and parasitism probability were modeled using 10 explanatory variables, including fire frequency, shrub density, and other covariates. In 2008, nest success (N=126) was low, with only 2.8% of nests estimated to have fledged young. We found that DMR was only significantly influenced by mesquite density at the nest site, and positively so (P=0.017). Twenty-one percent of nests

were parasitized by cowbirds. The effect of fire frequency on parasitism probability was dependent upon the time of season ( $P=0.018$ ), where parasitism probability increased over time in plots burned every four years and remained unchanged in other burn treatments. Management practices that reduce mesquite density might increase nest success of Lark Sparrows and possibly other bird species. Additional data will be collected in 2009.

Abstract (5298); Session G07, Thu 13 August, Location: Cohen Hall, Terrace Room, Oral at 17:00

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#### CORTICOSTERONE FACILITATES FEEDING AND FATTENING AT THE EXPENSE OF FLIGHT MUSCLE AND DEVELOPEMNT OF BREEDING CONDITION IN CAPTIVE WHITE-THROATED SPARROWS

Several studies have found that baseline corticosterone (CORT) is elevated as birds prepare for the energetic demands of migration. Corticosterone appears to be critical for regulating energy intake, metabolism, and body composition during periods of increased energy demand. In this study, we examined how elevated baseline CORT influenced food intake, body composition and testis size in captive White-throated Sparrows (*Zonotrichia albicollis*,  $N = 24$ ) preparing for spring migration after transfer from short to long day photoperiod. We used osmotic pump implants to provide controlled, sustained delivery of either exogenous CORT, RU-486 (a glucocorticoid receptor antagonist), or vehicle (polyethylene glycol) for 14 days. We found that CORT-implanted birds had significantly greater food intake, fat scores and body mass than RU-486 and vehicle birds. CORT-implanted birds, however, showed reduced flight muscle mass and males had smaller testis size compared to RU-486 and vehicle birds after 14 days. Our results clearly demonstrated that while CORT can enhance feeding and fattening, chronically elevated CORT is counterproductive for maintenance of flight muscle and development of breeding condition in the spring.

Abstract (5261); Session G10, Thu 13 August, Location: Irvine Auditorium, Amado Recital Room, Oral at 14:45

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#### THE EVOLUTIONARY RADIATION OF THE STARLINGS AND MOCKINGBIRDS

The starlings (Sturnidae) and their sister clade the mockingbirds and allies (Mimidae) are a cosmopolitan avian group with high variation in singing and social behavior, dramatic differences in morphological traits related to both foraging and display, and substantial disparities in rates and patterns of phylogenetic diversification. We have reconstructed a comprehensive molecular phylogeny for this radiation, which we explore here in the context of understanding both the evolutionary history of this group and the context of the trait evolution that has produced the spectacular present-day diversity of form and function within this avian radiation.

Abstract (5411); Session S09, Sat 15 August, Location: Cohen Hall, G17 Auditorium, Oral at 09:00

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#### GEOGRAPHIC VARIATION IN TIMING OF REPRODUCTION IN AMERICAN GOLDFINCHES

Throughout most of their range, American Goldfinches (*Carduelis tristis*) breed much later in the summer than other seasonally breeding songbirds. Using nest records we examined geographic variation in the timing of reproduction in this species. In Ontario and British Columbia, fully molted males and females form pairs and begin singing in early May, but delay breeding until late-July, or early August. In California, however, American goldfinches enter reproductive condition and begin nesting in early May. Field laparotomy data indicate that in Ontario birds may be physiologically prepared to reproduce many weeks in advance of actual reproduction. Here we compare photoperiod, temperature and rainfall levels and temperature and rainfall variability to determine what climatic conditions are best correlated to the timing of reproduction in this species in order to predict which environmental cues trigger reproduction.

Abstract (5583); Session G24, Sat 15 August, Location: Cohen Hall, Terrace Room, Oral at 14:00

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#### MULTI-SEASON OCCUPANCY ESTIMATION FOR MONITORING RUSTY BLACKBIRDS IN THE LOWER MISSISSIPPI ALLUVIAL VALLEY

Rusty Blackbird (*Euphagus carolinus*) populations have declined by as much as 95% since the 1960's. Christmas Bird Count data may be biased towards areas with easier access and larger urban populations. To develop a better monitoring program for Rusty Blackbirds, we evaluated changes in occupancy within the Lower Mississippi Alluvial Valley (LMAV) during the non-breeding seasons of 2006, 2007, and 2008. We surveyed 89 sites in 2006 and 115 sites in 2007 and 2008 10 times each (5 times in January and 5 times in February). Occupancy (SE) decreased during

2006 from 0.73(0.11) in January to 0.63(0.12) in February but increased during 2007 from 0.38(0.07) in January to 0.41(0.07) in February. Occupancy (SE) for 2008 (January and February combined) was 0.95(0.17). Overall, occupancy was lower in 2007 than in 2006 and 2008. The rate of change (SE) in occupancy was 0.68(0.11) between winters 2006 and 2007 and 1.36(0.42) between winters 2007 and 2008. High water levels in the LMAV during 2007 corresponded with low occupancy rates of Rusty Blackbirds, indicating their habitat use in the LMAV may decrease during high water years.

Abstract (5192); Session G13, Fri 14 August, Location: Houston Hall, Bodek Lounge, Oral at 09:15

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#### MANAGEMENT STRATEGIES AND ACTIONS FOR CONSERVATION-RELIANT BIRDS

The goal of the Endangered Species Act (ESA) is to “recover” listed species to the point where they no longer need protection from the Act. However, many listed species face ongoing threats that will require management long after their population level recovery criteria have been met. We collected information on recovery management actions for all 93 ESA listed bird species that have approved recovery plans to determine the degree to which ongoing management will be required. The recommended management actions were then categorized as follows: control of other species, active habitat management, control of direct human impacts, artificial recruitment, and pollution control. All species required ‘conservation-reliant’ management actions for their recovery with 56, 70, 60, 61, and 20 species having at least one action in each of the aforementioned management categories, respectively. Given the long-term nature of the management actions necessary for the recovery of these species, ongoing active management will be required for the conservation of most listed avian species long after their population recovery goals have been met.

Abstract (5170); Session S02, Thu 13 August, Location: Houston Hall, Class of ‘49 Auditorium, Oral at 17:00

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#### THE INFLUENCE OF WEATHER ON AVIAN COLLISIONS AT COMMUNICATION TOWERS

We present results from a landscape scale study on the effects of different tower structures on avian collisions at communication towers during migration in Arkansas. From 2005 through 2008, we searched 28 randomly-selected towers during spring and fall migration to compare the effects of physiographic region, tower height, tower lighting regime, and the presence/absence of guy wires on the number of birds recovered. Data indicated significantly ( $p = 0.051$ ) more birds were found at towers  $>140$  m (mean = 0.91 birds/search day) than at shorter towers (mean = 0.06 birds/search day). A correlation analysis of bird casualties at tall towers in and the amount of rainfall the night before searches occurred found no significant association during Spring 2005 and 2006 study seasons ( $r = -0.13068$ ,  $p = .148$ ). Rather, most of our birds were recovered on mornings after clear evenings without any precipitation. Conservation implications from these types of analyses are important in that our data suggest that tower collisions are not solely an artifact of inclement weather passing through.

Abstract (5280); Session A01, Thu 13 August, Location: Cohen Hall, Terrace Room, Oral at 15:15

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#### HOME FIELD ADVANTAGE OR DIFFERENTIAL DISPERSAL: WHY DO PHILOPATRIC SONG SPARROWS HAVE LOWER HAEMATOZOAN PARASITE LOADS?

The relationship between natal philopatry and fitness is likely to have profound effects on population genetic structure and connectivity. White-crowned sparrow singing nonlocal song dialects, and song sparrows with fewer locally-common microsatellite alleles (presumably relatively long-distance dispersers), have been shown to have higher blood-borne parasite loads than “local” birds (presumably philopatric). Several processes might account for this pattern, including: (1) genetic adaptation to and/or previous experience with the local parasite fauna, or (2) general and inherent differences in quality between dispersing and philopatric individuals. To distinguish between these two possibilities, we conducted an immune challenge experiment to measure responsiveness to the novel antigen phytohaemagglutinin (PHA). PHA response was unrelated to genetic similarity to the local population, undermining the idea that philopatric individuals have superior immune systems in general. Instead, familiarity with local strains of parasite may confer an advantage on philopatric individuals. This finding may help to explain female preferences for local-sounding males, and also suggests an important role for parasites as local selective forces.

Abstract (5595); Session G02, Thu 13 August, Location: Houston Hall, Class of ‘49 Auditorium, Oral at 11:30

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POPULATION CONNECTIVITY IN BURROWING OWLS THROUGHOUT NORTH AMERICA; HAVE OWLS ALTERED THEIR MIGRATORY BEHAVIOR IN RESPONSE TO LAND-USE CHANGES IN MEXICO?

Identifying factors that limit the distribution of organisms is the ultimate puzzle in ecology. Shifts in the distribution of migratory birds can provide insights into the factors that limit species' distribution as well as factors that promote the evolution of migratory behavior. Recently, the distribution of Burrowing Owls has shifted; contracting in the northern breeding range while expanding in northwestern Mexico. We suggest that these changes are the result of formerly migrant owls from northern latitudes becoming resident breeders in Mexico, where irrigated agriculture has created conditions suitable for year-round residency. To test this hypothesis, we used microsatellite DNA markers to determine the genetic structure of Burrowing Owl populations throughout North America. We also conducted stable isotope analyses on feathers to track the extent of annual breeding dispersal among populations in North America. Preliminary results suggest that owl populations are not genetically differentiated within their breeding range. Preliminary stable isotope data did not reveal evidence of higher than expected levels of connectivity between northern migratory populations and populations in Mexico.

Abstract (5373); Session G19, Sat 15 August, Location: Houston Hall, Bodek Lounge, Oral at 10:30

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DO TERRITORIAL YODELS FACILITATE NEIGHBOR/NON-NEIGHBOR DISCRIMINATION BY COMMON LOONS?

Though past studies have recognized suites of acoustic parameters of territorial yodels that may facilitate individual recognition, few have assessed whether loons can actually discriminate between yodels of different male Common Loons (*Gavia immer*). Through an acoustic playback experiment, we discovered that loons (N=20) vocalized sooner to, and with more tremolos to, non-neighbor yodels that had dominant frequencies that were lower (which reflect males of larger body size) than those of the resident male. Results from a second playback experiment supported the prior findings, but also revealed that neither elements of the introductory phrase nor elements of the strophe of repeat phrases that follow the introductory phrase can alone explain variation in territorial pairs' (N=16) acoustic responses to non-neighbor yodels. Thus, we believe that loons can perceive differences in the yodels of territorial neighbors and non-neighbors; however, we are unsure as to what elements or combination of elements within the introductory phrase and/or repeat phrases are important for this discrimination.

Abstract (5498); Session GP30, Fri 14 August, Location: Houston Hall, Hall of Flags, Poster Num: 82

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CALIFORNIA CLAPPER RAILS ARE A DISTINCT, ENDANGERED SPECIES

Much of taxonomy is arbitrary, designated by subjective interpretations of morphological and/or genetic differences based on the investigator's favored species concept. In the field of conservation of endangered species these taxonomic designations have tangible effects pertaining to the availability of funds, public interest, and conservation priority. King and Clapper rails are widespread, secretive marsh birds. They are similar morphologically and have a parapatric distribution extending thousands of kilometers along the Gulf and Atlantic coasts. The morphologically distinct rails of California are designated as subspecies of Clapper Rails because they primarily inhabit salt marshes. We sequenced mitochondrial and nuclear DNA for both species and found that King and Clapper rails of the eastern United States are more closely related to each other than either is to the birds of California. Based on diagnosability, the California birds qualify as distinct species under the Phylogenetic Species Concept. They also qualify as distinct species using the comparative approach under the Biological Species Concept. They are currently protected under the Endangered Species Act but the elevation of taxonomic rank will considerably raise their profile.

Abstract (5391); Session G15, Fri 14 August, Location: Cohen Hall, Terrace Room, Oral at 14:45

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#### NUCLEAR PHYLOGEOGRAPHY OF THE BROWN CREEPER (*CERTHIA AMERICANA*) IN PINE/OAK WOODLANDS

The brown creeper (*Certhia americana*) is a resident species of several regional pine-oak woodlands, making it a good model for a biogeographic study. Preliminary study of mitochondrial DNA variation (ND2 gene) identified six clades of *C. americana*, which correspond geographically with regional pine-oak woodlands. Mitochondrial phylogeographic patterns will be assessed by checking for congruence (or lack thereof) with nuclear phylogeographic patterns. The nuclear phylogeographic study will focus on sequence data from fifteen known nuclear loci supplemented by sequence data from fifteen anonymous nuclear loci, thereby reducing ascertainment bias. One (GMS2724) individual was used to construct a small-insert genomic library to produce genetic markers. From this library, polymerase chain reaction primers were designed if the fragment was not similar to any sequences in GenBank (for anonymous loci). Amplicons of designed primers were checked against *Taeniopygia guttata* genome information for general chromosome location. Loci were chosen from a wide-range of chromosomes, with GC content ranging from 37-63%. Preliminary analyses of the selected loci suggest that they will provide genetically informative data for further analysis.

Abstract (5383); Session GP22, Fri 14 August, Location: Houston Hall, Hall of Flags, Poster Num: 117

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#### IDENTIFYING AVIAN HOSTS FROM MOSQUITO BLOODMEALS USING DNA BARCODING

Mosquitoes transmit a number of vector-borne diseases such as West Nile virus and avian malaria among birds. We developed universal molecular methods for identifying the avian origins of blood meals, and validated this approach using material collected from nine species of mosquitoes in Ithaca, New York. To identify avian and mammalian hosts we amplified and sequenced the "barcode" region of the cytochrome c oxidase subunit I (COI) gene. We identified 16 avian host species from 14 families in total, and found that one mosquito species, *Culiseta inornata*, feeds primarily on birds, with the American Robin as its most common avian host species. Additional mosquito species showed a variety of host feeding patterns. Because of its tendency to feed only on birds, *Culiseta inornata* has the potential to maintain local reservoir populations of infected hosts allowing the persistence of West Nile virus or other pathogens.

Abstract (5598); Session G02, Thu 13 August, Location: Houston Hall, Class of '49 Auditorium, Oral at 11:15

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#### MIGRATORY CANADA GEESE CAUSE CRASH OF US AIRWAYS FLIGHT 1549

In the United States alone, over 7,400 bird-aircraft collisions (birdstrikes) were reported in 2007. Most of these strikes occur during take off and landing, and it is during these flight phases that aircraft experience their highest risk of damage after colliding with birds. Birdstrikes with aircraft carry enormous costs in lives and money. Using the feather remains and other tissue samples from the engines of the US Airways Flight 1549 which landed in the Hudson River on 15 January 2009, we demonstrate with molecular tools and stable hydrogen isotopes that migratory Canada Geese were responsible for the crash. Determining whether the geese involved in this catastrophic birdstrike event were resident or migratory is essential to development of management techniques for risk reduction of future collisions. Currently, the U.S. civil aviation industry is not required to report birdstrikes; yet this fundamental information on frequency, timing and species as well as their geographic origin is critical to reducing future birdstrikes. Integrating this information with bird migration patterns, bird-detecting radar and bird dispersal programs at airports can minimize risk of collisions with birds.

Abstract (5357); Session A01, Thu 13 August, Location: Cohen Hall, Terrace Room, Oral at 14:30

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#### RESPONSE OF COLONIALY NESTING RIPARIAN BIRD SPECIES TO CLIMATE CHANGE

Approximately 40 bird species depend upon riparian ecosystems, from headwaters to large rivers, for foraging and nesting habitat in the northeastern U.S. Colonialy nesting birds are characteristic of larger river extreme of this continuum. Warming will affect both water temperature and flow regime of headwater streams but will primarily influence the flow regime of larger rivers. The influence of these perturbations will be manifested in ecological and behavioral responses of birds to alteration of both foraging and nesting habitat for headwater stream birds and primarily foraging habitat for colonialy nesting species on larger rivers. For example, data from the Susquehanna River and elsewhere suggest that Black-crowned Night-Herons, Great Egrets and other species characteristic of larger rivers will utilize off-river foraging sites to a greater extent during severe alterations in flow regime. Comparison with the response of headwater stream birds and coastal colonial breeders to warming will place the effects of warming on species characteristic of larger river systems and in an ecological and behavioral context.

Abstract (5328); Session S07, Sat 15 August, Location: Houston Hall, Class of '49 Auditorium, Oral at 10:30

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#### SEASONAL COMPOSITION AND DYNAMICS OF BIRD COMMUNITIES IN SECONDARY FOREST AND SHADE-COFFEE PLANTATIONS OF THE SAN LUIS VALLEY, COSTA RICA

We compared avian community composition and turnover in shade-coffee plantations to that in secondary forest fragments within the San Luis valley, Costa Rica from 2005-2008. In particular, we modeled patch occupancy (i.e., composition) and change in occupancy (i.e., turnover) of species groups (i.e., guilds) based on habitat type (shade coffee vs. secondary forest), temporal variation, and a priori traits of guilds while accounting for variation in capture probability based on netting effort, temporal variation, habitat type, weather patterns, and guilds. Although apparent species richness was higher in shade coffee (61) than secondary forest (46), we found that composition and seasonal turnover of guilds was similar across habitats while accounting for incomplete capture. Our findings indicate that shade coffee may serve as a surrogate for secondary forest with respect to avian communities available for capture in our study. Shade coffee plantations, therefore, may host avian communities that resemble those of surrounding secondary forest and can serve as viable corridors linking patches of unfarmed forest. This information is an important step toward effective landscape-scale conservation and management in the San Luis valley.

Abstract (5412); Session G12, Fri 14 August, Location: Irvine Auditorium, Café 58, Oral at 09:30

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#### AVIAN INFLUENZA INFECTION DYNAMICS AMONG SHOREBIRD HOSTS AT THE DELAWARE BAY SPRING MIGRATION STOPOVER SITE

Prior research has documented annual avian influenza virus (AIV) epizootics in Ruddy Turnstones (*Arenaria interpres morinella*) during spring migration stopover at Delaware Bay. We examined the temporal interactions between AIVs and their shorebird hosts, and particularly the disease dynamics within Ruddy Turnstones. Between 2006-2008, we tested >3000 cloacal swab samples for presence of live virus, and >300 serum samples for antibodies against AIV. Peak AIV prevalence in Turnstones (8.0-22.7%) occurred between 22-25 May with 75% population seroconversion by 29 May. AIV prevalence in Sanderlings (*Calidris alba*), but not Red Knots (*Calidris canutus rufa*), was positively correlated with prevalence in Ruddy Turnstones. Binomial regression plots of AIV prevalence and seroprevalence in Ruddy Turnstones over the course of the stopover were consistent with epizootic temporal patterns. Although Ruddy Turnstones are known competent hosts for AIV infection, the marked epizootic prevalence and seroconversion patterns observed indicate that nearly all infected birds acquire infection locally and recover before resuming northward migration. Rare infections in sympatric shorebird species may be due to relatively higher population immunity upon arrival, and likely result from virus spillover events.

Abstract (5241); Session G02, Thu 13 August, Location: Houston Hall, Class of '49 Auditorium, Oral at 11:45

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#### RESPONSE OF AVIAN POPULATIONS TO WOODLAND RESTORATION IN THE OZARK MOUNTAINS, ARKANSAS

In response to recent oak decline in the Ozark Mountains, Arkansas, the USDA Forest Service initiated an oak woodland restoration project involving thinning and prescription burning of upland oak-hickory forest. We investigated the response of breeding bird populations to oak woodland restoration by comparing populations between units thinned and burned twice (2004 and 2007) and control areas not subjected to restoration treatments. Surveys were conducted May through June in 2008 using distance sampling methods. Species richness was similar between control and restored sites; however, species composition shifted towards more open- and shrub-nesting species in restored sites. In recently restored areas, some ground-nesters such as the Ovenbird (*Seiurus aurocapillus*) were completely absent. Some shrub-nesters such as the Yellow-breasted Chat (*Icteria virens*) were only detected in restored sites. This research suggests that woodland restoration will affect the current breeding bird communities of the Arkansas Ozarks.

Abstract (5207); Session G20, Sat 15 August, Location: Cohen Hall, Terrace Room, Oral at 11:00

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#### ARE HOUSE FINCHES RESPONSIBLE FOR HOUSE SPARROW POPULATION DECLINES IN THE SOUTHEASTERN US?

The introduction of the House Finch (*Carpodacus mexicanus*) to eastern North America has been suggested as a factor in declines of House Sparrow (*Passer domesticus*) populations. Previous studies have focused on House Finch invasions in the northeastern US, but no study has examined their effects in the southeastern US. We examined competition between House Sparrows and House Finches in the southeastern US by analyzing co-occurrence patterns within Auburn, AL and trends in Christmas Bird Count data within four southeastern states. We found no evidence for competitive exclusion using null-model analysis. House Sparrow populations rose after a disease outbreak in House Finches; however, House Sparrow declines were not correlated with House Finch abundance. Our results suggest that while competition may exist between these species, it is not important enough to affect community structure or population dynamics in the southeastern US.

Abstract (5359); Session G13, Fri 14 August, Location: Houston Hall, Bodek Lounge, Oral at 10:45

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#### MERCURY BIOACCUMULATION IN THE TERRESTRIAL FOOD WEB OF A MONTANE FOREST

We investigated mercury (Hg) concentrations in a terrestrial food web in high elevation forests in Vermont. Hg concentrations increased from autotrophic organisms to herbivores < detritivores < omnivores < carnivores. Within the carnivores studied, raptors had higher blood mercury levels than their songbird prey. The Hg concentration in the blood of the focal study species, Bicknell's Thrush, varied over the course of the summer in response to a diet shift related to changing availability of arthropod prey. The Bicknell's Thrush food web is more detrital-based (with higher Hg concentrations) in early summer and more foliage-based (with lower Hg concentrations) during late summer. There were significant year effects in different ecosystem compartments indicating a possible connection between atmospheric Hg deposition, detrital-layer Hg concentrations, arthropod Hg concentrations, and passerine blood Hg levels.

Abstract (5483); Session GP09, Fri 14 August, Location: Houston Hall, Hall of Flags, Poster Num: 35

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#### MODELING POPULATION GROWTH OF BICKNELL'S THRUSH ACROSS A LATITUDINAL GRADIENT

Bicknell's Thrush tops most North American lists of species of conservation concern because it occupies a limited, fragmented distribution and faces multiple habitat threats. Between 1993-2003, Bicknell's Thrush in New Hampshire experienced annual declines of 7% per year. Monitoring in Canada's Maritime provinces (2002-2008) indicated

declines as steep as 20% annually, while surveys at Mont Gosford, Quebec from 2001-2007 showed a decline in the number of occupied sites. Here we present the first robust estimates of annual survival and fecundity for this species, and we examine population growth rates spanning a latitudinal gradient from Stratton Mountain, VT (1997-2008) in the southern portion of its breeding range to Mount Mansfield, VT (1993-2008) in the central and Gaspé, Quebec (1998-2003) in the north. We used capture-mark-recapture models to estimate survival of adults. Estimates of annual fecundity (females/female) were determined with the aid of radio telemetry to calculate re-nesting rates and molecular methods to determine fledgling sex ratios. Our estimates of finite rate of population increase indicated negative growth following cone mast years (high red squirrel abundance) and positive growth after mast failures.

Abstract (5268); Session S05, Fri 14 August, Location: Irvine Auditorium, Amado Recital Room, Oral at 15:00

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#### DIFFERENTIAL TROPHIC LEVELS OF RUSTY BLACKBIRDS

The Rusty Blackbird (*Euphagus carolinus*) population has declined by 90% in the last five decades and the causes remain unknown. Accordingly, this species is the subject of many studies by the members of the International Rusty Blackbird Working Group. We focused on sexual differences in the winter foraging ecology of Rusty Blackbirds in Williamsburg, VA, USA. Rusty Blackbirds are sexually dimorphic in both plumage and size. Males are approximately 15% larger than females by mass. The species is omnivorous in winter, consuming both plant seeds and invertebrate animal prey. We examined the potential trophic segregation between sexes by comparing the relative carbon and nitrogen stable isotope ratios in whole blood between males and females. Trophic status is relevant to Rusty Blackbird studies because, as obligate wetland foragers, they spend much of their time foraging in areas where anaerobic sulfur-reducing bacteria methylate mercury. Methylmercury moves freely through food webs, and animals that occupy higher trophic positions are exposed to greater quantities of mercury.

Abstract (5419); Session GP06, Fri 14 August, Location: Houston Hall, Hall of Flags, Poster Num: 104

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#### PREDICTIVE MODELS TO EVALUATE MANAGEMENT ALTERNATIVES FOR RED KNOTS AND HORSESHOE CRABS IN THE DELAWARE BAY

We are using the tools of structured decision making and adaptive resource management to, to find smart solutions to the controversial issue of horseshoe crab harvest in the Delaware Bay. An essential component of that decision making process is to develop a set of predictive models that describe the possible ecological interactions between horseshoe crab populations and shorebird species (specifically the Red Knot) to evaluate and compare proposed alternative management actions. We present models that link Red Knot population dynamics to horseshoe crabs in the Delaware Bay through weight gain and differential survival and/or reproductive success for heavyweight versus lightweight birds. We are using modified versions of published population models for both species and the models are parameterized using the best available data on both species from the Bay, including a weight-base multi-state survival analysis using 12 years of Red Knot mark recapture/resight data. Model simulations indicate that Red Knot population viability may be constrained by horseshoe crab dynamics and crab harvest rates, but the effects are highly sensitive to parameterization of the models.

Abstract (5437); Session S01, Thu 13 August, Location: Cohen Hall, G17 Auditorium, Oral at 16:30

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#### PHYSICAL ADAPTATIONS FOR TOOL USE IN THE NEW CALEDONIAN CROW

The New Caledonian Crow (*Corvus moneduloides*) constructs and uses tools for foraging, including complex barbed and hooked tools. Studies of captive individuals have demonstrated impressive reasoning power in addition to simple tool construction. The use of complex tools and the existence of apparent regional traditions of construction style or



tool “dialects” on the island of New Caledonia suggest an intelligent species with enhanced cognitive skills. The bill shape of the New Caledonian Crow is unique within the genus *Corvus*, being unusually stout with a noticeably upturned lower bill. Radiographs show that even the underlying bone is upturned. We contend that this bill shape is a physical specialization for tool use. Together with other evidence, such as large brain size, ubiquitous tool use among individuals, spontaneous tool construction by naïve juveniles, and apparent co-option of normal corvid bill function, this adaptation suggests that tool use by the crows is an ancient trait and not a recent innovation.

Abstract (5475); Session G15, Fri 14 August, Location: Cohen Hall, Terrace Room, Oral at 16:30

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#### THE CAUSES OF MITOCHONDRIAL DNA GENE TREE PARAPHYLY IN BIRDS

Gene tree paraphyly is a potentially serious problem because many phylogenetic and phylogeographic studies assume species are monophyletic. A recent survey by Funk and Omland (2003) found that a significant proportion of bird species (16.7%) were paraphyletic in their mtDNA gene trees. This could imply that mtDNA is an unreliable or even misleading marker for delimiting species. We expand on Funk and Omland’s survey and identify the causes of species-level paraphyly in birds. We find that in most cases paraphyly is caused by incorrect taxonomy. In such cases, mtDNA serves systematics by exposing and clarifying taxonomic errors. We find the next most common cause of paraphyly to be incomplete lineage sorting due to recent speciation. Here mtDNA gives a consistent picture of evolution, given the timeframe, but it is not useful for delimiting species and other criteria must be employed. There were relatively few clear instances of paraphyly due to hybridization, though there were many cases where incomplete lineage sorting and hybridization could not be distinguished. We ultimately conclude that, far from a hindrance, mtDNA is generally a useful tool that should continue to facilitate detection of avian species.

Abstract (5171); Session G15, Fri 14 August, Location: Cohen Hall, Terrace Room, Oral at 15:00

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#### PHYLOGEOGRAPHY OF A TAIWANESE ENDEMIC, STEERE'S LIOCICHLA (*LIOCICHLA STEERII*)

High endemism and a complex topographic environment characterize the island of Taiwan. Phylogeographic studies indicate that vicariance caused by Taiwan’s mountains has subdivided many lowland and montane taxa into genetic phylogroups. No study has yet examined a montane bird species to see whether birds also follow a vicariant paradigm. We used mitochondrial DNA sequences and nuclear microsatellites to investigate the evolutionary history of an endemic mountain bird, Steere’s Liocichla (*Liocichla steerii*). We found no evidence of the deep genetic divisions found in other vertebrates. Our results instead suggest that populations of Steere’s Liocichla across the island are connected by gene flow, though dispersal appears to be partially constrained by altitude. We also found evidence of recent population expansion. Ecological niche modeling suggested suitable habitat during the Last Glacial Maximum was comparatively limited, but since Steere’s Liocichla underwent population expansion. Genetic diversity is high across the island, suggesting expansion was from multiple areas rather than a few isolated refugia. We comment on the conservation implications of our data and urge caution when interpreting results from highly polymorphic markers such as microsatellites.

Abstract (5503); Session G21, Sat 15 August, Location: Houston Hall, Class of ‘49 Auditorium, Oral at 16:45

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#### BICKNELL'S AND SWAINSON'S THRUSHES IN REGENERATING NEW BRUNSWICK CLEARCUTS: NICHE SEPARATION BY NEST SITE AND DIET

Bicknell’s Thrush (BITH) (*Catharus bicknelli*) is sympatric with Swainson’s Thrush (SWTH) (*C. ustulatus*) in regenerating clearcuts in north-central New Brunswick. We determined if BITH and SWTH show niche separation by nest site and or diet. Vegetation was characterized in 5-m radius patches around nests and ‘non-use’ points. The ratio of stable nitrogen isotopes ( $\delta^{15}\text{N}$ ) was used to determine dietary niche-width. Initial analysis of blood using stable hydrogen isotopes revealed an effect of wintering grounds until mid-June; thus  $\delta^{15}\text{N}$  of feces was analyzed to obtain a value for local diet. BITH but not SWTH nest patches differed from non-use patches. Fecal samples are currently being analyzed and we predict that BITH will show a smaller trophic niche width than SWTH, reflecting relative

specialist versus generalist diet. Despite evidence that regenerating clearcuts are relatively poor in biodiversity, we found that closely related, morphologically similar species still chose different nest sites. Our results suggest that stable isotope values should be interpreted with caution, since blood collected early in the breeding season may be influenced by diet on the wintering ground or during migration.

Abstract (5224); Session S05, Fri 14 August, Location: Irvine Auditorium, Amado Recital Room, Oral at 16:00

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PHYLOGEOGRAPHY MEETS SYSTEMATICS IN A MULTILOCUS FRAMEWORK: THE CHESTNUT-SHOULDERED FAIRY-WRENS (*MALURUS* SPP)

Australian birds show morphological and genetic variation that is often argued to have been structured by Pleistocene cycles of climatic change. The chestnut-shouldered fairy-wrens (*Malurus* spp) are an ideal group for using multiple loci to test this hypothesis and to understand demographic history. They are widespread across the continent and phenotypic variation in one species is strongly structured geographically. They have had a complex nomenclatural history. Current taxonomy hinges on plumage variation and allozyme analysis. Here we present phylogeographic analysis of the group based on mitochondrial and nuclear loci from *Malurus lamberti lamberti*, *M. l. assimilis*, *M. l. rogersi*, *M. l. dulcis*, *M. amabilis*, *M. pulcherrimus* and *M. elegans*. Phylogenetic analysis nests *M. amabilis* within the *M. lamberti* group rendering the latter as currently construed paraphyletic. Haplotype networks for ND2 reveal strict geographic structuring of five genetic lineages coinciding broadly but not universally with distributions of the species and nominal subspecies sampled. Only one of these lineages was supported by the nuclear DNA data set. These data challenge current taxonomy and the taxonomic implications of the data are discussed.

Abstract (5272); Session S10, Sat 15 August, Location: College Hall, Room 200, Oral at 11:30

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EASTERN BLUEBIRD (*SIALIA SIALIS*) COLORATION AS A SIGNAL FOR MALE-MALE COMPETITION

Eastern bluebirds (*Sialia sialis*) are a sexually dichromatic species, suggesting that sexual selection has played a role in the evolution plumage traits. Males have bright blue wing and back plumage which can indicate individual age and condition. However, experimental tests have shown a lack of female choice for males with brighter plumage. We tested whether male coloration serves as a signal of dominance when birds are making quick assessments of a rival's competitive ability. We used a combination of novel field and aviary experiments in Auburn, Alabama to test the hypothesis that blue coloration is an honest signal for male-male competition and is perceived as such by conspecifics.

Abstract (5549); Session GP32, Fri 14 August, Location: Houston Hall, Hall of Flags, Poster Num: 72

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IDENTIFYING ALTITUDINAL MIGRANTS FROM BIRD SURVEYS: THE COMPARATIVE UTILITY OF PRESENCE-ABSENCE DATA, RAW COUNT DATA, AND DISTANCE-BASED ABUNDANCE ESTIMATES

Identifying natural history strategies, including migratory behavior, is an important first step in understanding the structure and dynamics of bird communities. In relatively poorly known montane bird communities around the world, altitudinal migration may be a common strategy. We conducted point counts and mist netting along a 2500 m elevational gradient on the moist eastern slope of the Andes in southeastern Peru to determine when and where along the gradient species occur. We observed 423 species of birds. Few species showed complete elevational range shifts between breeding and nonbreeding seasons, although some did show partial range shifts, suggesting that presence-absence alone is insufficient to characterize the migratory status of most species. Other species showed changes in density distributions, or the distribution of densities along the elevational gradient, between seasons, suggesting that partial migration of populations may be more common than complete migration. Over all, we found little evidence to suggest that altitudinal migration is widespread in southeastern Peru. We also discuss data collecting in the mountains, the benefits of using multiple survey methods, and the problems of modeling density distributions.

Abstract (5532); Session S04, Sat 15 August, Location: Cohen Hall, G17 Auditorium, Oral at 16:00

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#### THE EFFECTS OF STRESS ON THE INNATE IMMUNE SYSTEM OF THE BROWN-HEADED COWBIRD AS MEDIATED BY THE STRESS HORMONE CORTICOSTERONE

The effects of stress on the immune system are dependant upon the type and duration of the stressor, and the condition of the individual. I conducted a series of simple tests to ascertain how the innate immune systems of male and female Brown-headed Cowbirds (*Molothrus ater*) respond to an acute stressor. I found that males and females exhibited opposite responses; male immune activity decreased and was negatively correlated with the stress hormone corticosterone (CORT), whereas female immune activity increased and was positively correlated with CORT. These results do not necessarily implicate CORT as the driver behind the changes in immunity, however, as other components of the stress response could influence immune activity. I will be presenting results from an experiment in which I artificially elevate CORT levels in the cowbirds without inducing a normal stress response by remotely providing mealworms injected with CORT. This procedure will allow me to examine the effects of high CORT levels on the immune system without the normal milieu of physiological and behavioral changes that typically accompany a stress event.

Abstract (5306); Session G10, Thu 13 August, Location: Irvine Auditorium, Amado Recital Room, Oral at 16:30

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#### NEOTROPICAL BIRDS SHOW A HUMPED DISTRIBUTION OF GENETIC DIVERSITY ALONG A LATITUDINAL TRANSECT

Theory predicts a correlation between the species richness of a community and the within-population genetic diversity of members of that community. Empirical evidence for this 'species-genetic diversity correlation' comes from several studies showing that within-population genetic diversity increases with decreasing latitude. Alternatively, postglacial range expansion or the central-peripheral model, which posits that diversity diminishes from the center of a species' range toward its edges, could explain these results. We surveyed within-population mitochondrial DNA ( $\pi$ ) variation in nine resident landbird species along the corridor of Neotropical lowland forest from southern Mexico to western Ecuador, where avian species richness increases with decreasing latitude. We found no evidence for an inverse relationship between  $\pi$  and latitude, invalidating both a latitudinal gradient in genetic diversity and the SGDC model for these birds. Instead, we found that  $\pi$  had a humped distribution, wherein the highest values were more frequently observed in mid-range populations than would be expected by chance. Our findings have implications for theories of genetic variation across a species' range, for conservation planning, and for understanding how biological diversity scales from genes to communities.

Abstract (5604); Session G11, Fri 14 August, Location: Cohen Hall, Terrace Room, Oral at 12:00

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#### MULTI-SCALE APPLICATION OF A COMMON HYDROLOGICAL MEASURE TO MIGRATORY FLIGHT PATHS OBTAINED FROM SATELLITE AND HIGH FREQUENCY GSM TELEMTRY

Sinuosity is a hydrological metric that describes the degree to which a stream wanders. Here we apply sinuosity as a descriptive measure of migratory paths of Golden Eagles (*Aquila chrysaetos*) in eastern North America. We calculated the sinuosity index as the straight-line distance between summering and wintering grounds divided by the total distance traveled as measured by GPS telemetry. We examined sinuosity at a coarse resolution and continental scale, using satellite telemetry locations collected every four hours and compared sinuosity among age classes and migratory distances. While sinuosity is related to age and total migratory distance, underlying topography also appears to be an influence. To address the latter we examined sinuosity at a fine resolution and regional scale in Pennsylvania using

GSM telemetry which collects very high frequency GPS locations, every 30-60 seconds. Because risk of collision and exposure to other hazards while flying is related to the time spent migrating, the sinuosity index can be incorporated into population level models that assess risk of exposure to hazards such as wind turbines, power lines and other flight obstructions.

Abstract (5566); Session G23, Sat 15 August, Location: Houston Hall, Bodek Lounge, Oral at 15:15

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#### CONSERVATION OF SEMIPALMATED SANDPIPER: DELAWARE BAY AND BEYOND

Long-term population trend indices suggest that Semipalmated Sandpiper (SESA) has declined significantly since the 1980s, especially populations migrating along the Atlantic Coast en route to eastern Canadian breeding areas. Historically, 250,000-500,000 SESA staged in Delaware Bay in spring, but this population has declined by 75%. While in Delaware Bay, SESA feed primarily on horseshoe crab eggs during episodes of rapid mass accumulation. However, intense harvest pressure from 1995-2005 has dramatically reduced egg availability. Since 1995, we monitored mass accumulation in SESA during migration stopovers in Delaware Bay. We found that mean size-adjusted mass and mass gain rates in daily SESA capture cohorts was significantly greater during the "early" (1995-1997) compared with "middle" (2000-2003) and "late" periods (2004-2008). A quadratic function best described mass gain rates during the "early" period, while a linear function performed better during later periods. Our results suggest that mass gain potential for SESA staging in Delaware Bay has decreased over the past decade and may have contributed to reduced species viability. Other factors that may be contributing to declines (e.g., poaching on wintering grounds) are discussed.

Abstract (5370); Session S01, Thu 13 August, Location: Cohen Hall, G17 Auditorium, Oral at 16:00

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#### MIGRATION DYNAMICS IN DIFFERENT REGIONS OF THE NORTHEAST US: IMPLICATIONS FOR WIND POWER DEVELOPMENT

Understanding temporal and spatial movement patterns in birds is critical to evaluating mortality risk before constructing tall structures that obstruct flight paths, especially in areas known for high density migration events. Here we report on migration magnitudes and altitudinal distributions recorded during marine radar studies in three sites of the northeast U.S.: Cape May Peninsula, NJ (mid Atlantic coastal plain, 2005), mid-Atlantic Appalachian Mountains (VA, MD and WV, 2006) and the Tug Hill Plateau, NY (Great Lakes region, 2007-2008). We found significant differences in migration magnitude and passage rate among study sites. However, which sites had the greatest magnitude varied with season (i.e., spring or fall). Similarly, the proportion of birds flying  $\leq 200$  m above ground level varied among sites and between seasons. Overall, altitudinal distribution appeared related to a site's elevation above sea level, i.e., the greater the elevation above sea level, the more skewed the distribution of toward lower flight altitudes. The high variability we found among sites suggests that caution should be exercised when applying results from single-site studies to evaluate collision risk at unstudied locations.

Abstract (5576); Session A01, Thu 13 August, Location: Cohen Hall, Terrace Room, Oral at 14:45

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#### WINTER BIRD COMMUNITY RESPONSE TO GRASSLAND HETEROGENEITY

The reduction in grassland heterogeneity due to traditional management practices with large-scale annual burns and uniform grazing has been shown to reduce breeding bird diversity. It remains to be determined how structural homogeneity affects wintering bird communities, including species of conservation concern such as Smith's Longspur (*Calcarius pictus*) and Le Conte's Sparrow (*Ammodramus leconteii*). These and other species may benefit from "heterogeneity-based" patch-burn management. We examined the influence of structural heterogeneity on wintering birds in traditional and patch-burn fields at The Nature Conservancy's Tallgrass Prairie Preserve in Osage County, OK. During January and February 2009 we used an area-search method to survey 1-ha plots (N = 79), and weighted the abundance of species encountered using Partner's in Flight-based ranks. Mean Avian Conservation Value was higher in patch-burn plots burned in 2008, and was associated with increased heterogeneity in vertical obstruction, vegetation height, and grass cover. This offers further support for the importance of heterogeneity in managing grasslands for avifauna.

Abstract (5445); Session GP20, Fri 14 August, Location: Houston Hall, Hall of Flags, Poster Num: 113

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#### DESIGNING LANDSCAPES FOR SUSTAINABLE BIRD POPULATIONS IN THE SOUTHEASTERN UNITED STATES

Bird abundance in the United States has been declining for half a century, likely a result of habitat changes. Current predictions suggest urbanization, sea level rise and climate change will have significant impact on bird habitat in the Southeastern U.S. We are working with the Atlantic Coast Joint Venture to create a conservation priority map of the Southeastern U.S. and here present our initial map for one of our focal species, Brown-headed Nuthatch (*Sitta pusilla*). For current conservation priorities around Charleston, S.C., nuthatch predicted distributions, habitat suitability and population connectivity features were used as layers in a spatially-explicit model. The model was smoothed using kernel density estimators with kernel size based on dispersal distance. We used urbanization and climate models to predict habitat at 25, 50, 75 and 100 years into the future and repeated the spatially-explicit model at each time-step. Priority maps were created by combining the spatially-explicit models for each climate model. We hope these priority maps can be used by stakeholders to make decisions about where to conserve habitat for sustainable bird populations into the future.

Abstract (5371); Session G05, Thu 13 August, Location: Irvine Auditorium, Amado Recital Room, Oral at 11:30

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#### SEASONAL TURNOVER OF COLOR-BANDED DOUBLE-CRESTED CORMORANTS AT A COLONY/ROOST IN EASTERN LAKE ONTARIO

We searched for color-banded Double-crested Cormorants (DCCOs) from a blind at a colony in eastern Lake Ontario in 2007-08. Over 19,000 cormorants have been color-banded on the Great Lakes in recent years. Our goal was to identify the fate/status of color-banded cormorants that were observed at this site. The season was divided into three periods: spring migration (April), the breeding season (May-July) and post-breeding/autumn migration (August-October). One hundred seventy-nine colour-banded adult DCCOs were observed. Eighty-six colour-banded adults were observed in April, 48 of these (56%) were also observed in May-July, and 21 (24%) also were observed during August-October. However, 38 (44%) were not observed during the breeding season (May-July) but 11(13%) did return during August-October. Of 58 cormorants first observed during May-July, only 16 (28%) were also observed during August-October and 42 (72%) were not seen again. During August-October 35 new, previously unrecorded cormorants were observed on the island. Thus, at least 73 of the 179 (41%) colour-banded adult DCCOs recorded on Snake Island did not breed there nor were they observed there during the breeding season.

Abstract (5586); Session A02, Fri 14 August, Location: Houston Hall, Class of '49 Auditorium, Oral at 16:00

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#### DETECTING LOW-LEVEL INFECTIONS OF HOUSE FINCHES BY A BACTERIAL PATHOGEN, AND IMPLICATIONS FOR HOST – PATHOGEN DYNAMICS

House Finch populations in eastern North America are infected by a bacterial pathogen, *Mycoplasma gallisepticum*, that causes conjunctival disease. Disease prevalence varies seasonally, with near absence in late spring and early summer and re-emergence of disease in late summer. One explanation for persistence of the pathogen from year to year is that low-level infections can persist in House Finches without obvious disease symptoms. We compared the prevalence of mycoplasmal infections detected by diagnostic testing with that seen from clinical signs of disease in a captive population of House Finches. This population was composed of adult birds that were experimentally exposed to the bacteria eight months previously, and newly-introduced juvenile birds with no detectable previous exposure to

the bacteria. Under these conditions, we found that techniques detecting infections based on the presence of bacterial DNA and host antibodies were substantially more sensitive and informative than detection based on clinical signs. We conclude that low-level infections exist and result in transmission of the bacteria between birds, and thus can play an important role in host – pathogen dynamics.

Abstract (5446); Session GP08, Fri 14 August, Location: Houston Hall, Hall of Flags, Poster Num: 30

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#### COMPARATIVE PHYLOGEOGRAPHY OF BROWN (*SULA LEUCOGASTER*) AND RED-FOOTED BOOBIES (*S. SULA*)

To test the hypothesis that both physical and ecological barriers to gene flow drive population differentiation in tropical seabirds, we surveyed microsatellite and mitochondrial control region variation in 242 brown boobies (*Sula leucogaster*), which prefer inshore habitat, and 271 red-footed boobies (*S. sula*), which prefer pelagic habitat. We found that global population genetic structure was high in both species, and that gene flow among ocean basins apparently has been restricted by major physical barriers. In contrast, the evolutionary history of populations within ocean basins differed markedly between the two species. In brown boobies, we found high levels of population genetic differentiation and limited gene flow among colonies. Although red-footed booby colonies were also genetically differentiated within ocean basins, coalescent analyses indicate that populations have either diverged in the face of ongoing gene flow or diverged without gene flow, but have recently come into secondary contact. We suggest that these contrasting patterns of gene flow within ocean basins may be explained by the different habitat preferences of brown and red-footed boobies.

Abstract (5491); Session GP22, Fri 14 August, Location: Houston Hall, Hall of Flags, Poster Num: 63

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#### CONSERVATION ECOLOGY OF ENDEMIC CARIBBEAN MIMIDS

The Caribbean region contributes importantly to diversity in the Mimidae: of 34 species, 8 (24%) are endemic to the region, including 5 of the 10 mimid genera. Three endemic species merit conservation concern. The Cozumel Thrasher (Critically Endangered) is exceedingly rare, if not extinct, likely from predation by introduced boas. The Black Catbird (Near Threatened) faces habitat loss and fragmentation in its restricted Yucatán range. The White-breasted Thrasher (WBT; Endangered), a facultative cooperative breeder endemic to Martinique and St. Lucia, was rare before resort development on St. Lucia began to destroy habitat containing 34% of the remaining population. We studied WBTs within undamaged forest and habitat fragments on the development site in 2006-2008. WBTs continued to occupy the site in high densities, persisting and nesting in habitat fragments as small as 0.23 ha. Nest success did not differ between pre- and post-disturbance samples, but following habitat loss, group size and frequency of cooperative breeding increased. Protection of these threatened Caribbean species, along with study of the lesser-known endemic mimids, is central to the conservation of overall family diversity.

Abstract (5514); Session S09, Sat 15 August, Location: Cohen Hall, G17 Auditorium, Oral at 11:30

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#### PARALLEL EVOLUTION IN THE TAIL PATTERN OF *MYIOBORUS* REDSTARTS OF LOWER- AND UPPER-MONTANE TROPICAL FORESTS

*Myioborus* redstarts use animated displays of their contrasting black-and-white tails to startle insect prey that are pursued and captured in flight. Throughout South America and southern Central America, *Myioborus miniatus* occurs in lower-montane forest, while another taxon from a sister clade of *Myioborus* replaces it at higher elevations. Because our previous work on *miniatus* suggests that extensive geographic variation in the tail pattern of this species reflects adaptation to regional prey or habitat conditions that maximizes foraging performance, we tested the hypothesis that the tail pattern of *M. miniatus* and its upper-montane ecological replacements may evolve in parallel. In the greater Andean region, we found strong evidence of parallel evolution; *miniatus* and upper-montane taxa collected from the same general location have strikingly similar amounts of white in the tail. However, parallel evolution is absent in the Pantepui region; upper-montane Pantepui taxa have much less tail white than does Pantepui *miniatus*. The differences in parallel evolution between Andean and Pantepui taxa will be considered in the context of *Myioborus* phylogenetic relationships and the ecology and evolutionary history of Pantepui taxa.

Abstract (5178); Session G18, Sat 15 August, Location: Irvine Auditorium, Amado Recital Room, Oral at 10:30

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#### FIRST-YEAR SURVIVAL OF EASTERN KINGBIRDS, AND COMPARATIVE METHODS FOR ESTIMATION IN OTHER SPECIES

Survival of young between fledging and the start of breeding is an important but difficult statistic to measure mainly because of low juvenile site fidelity. We report results of a 7-year mark-recapture/resight study to estimate juvenile and adult survival from an ecologically isolated population of Eastern Kingbirds (*Tyrannus tyrannus*) from eastern Oregon. We also review the literature to compare methods for estimating juvenile survival. Juvenile kingbird resighting rate was high (23%), and only slightly lower than the survival estimate derived from Program MARK (males = 0.292; females = 0.284). The MARK estimate of adult male (0.638) and females (0.637) survival did not differ, was independent of year, and was more than twice that of juveniles. Comparisons of juvenile survival for 43 additional species to adult survival indicated that the "50% rule" (i.e. juvenile survival is half adult survival) overestimates juvenile survival for species in which annual adult survival is less than 70%. We show that better estimates of juvenile survival are possible using regression methods that account for total annual productivity, age at first reproduction, migratory behavior, and method of estimating survival.

Abstract (5547); Session G13, Fri 14 August, Location: Houston Hall, Bodek Lounge, Oral at 09:30

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#### AN ENVIRONMENTALLY-BASED NULL MODEL FOR BIODIVERSITY IN SOUTH AMERICA AND AFRICA

Since the separation of Gondwanaland, South American and African biotas have taken different evolutionary paths, which produced high biodiversity regions in both cases. Climatic variation over the past million years has been proposed as a main driving factor for speciation via creation of habitat refugia during the glacial maxima and expansions during interglacial periods. I test this hypothesis through the use of artificially created species based on environmental regimes during the last interglacial and follow their geographic range changes/displacements through the last glacial maximum and up to the present time. Using this methodology, I was able to recover current biodiversity patterns on both continents. These results support the idea of Pleistocene refugia as an important driver of biodiversity patterns, and generates new insights about the role of historical fragmentation of environments in shaping global biodiversity.

Abstract (5168); Session G11, Fri 14 August, Location: Cohen Hall, Terrace Room, Oral at 09:45

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#### IRRUPTION BLACK-CAPPED CHICKADEES HAVE MINIMAL IMPACT ON HYBRID FLOCK STRUCTURE IN SOUTHEASTERN PENNSYLVANIA

Black-capped chickadees exhibit irruptive behavior (movement of a subset of a population from high to low latitudes that does not occur every year). Most data concerning irruption birds have been gathered through Christmas Bird Counts or at banding stations, providing information on a regional basis regarding the number of birds that move, but few studies have followed individual birds to determine the subset of the population that irrupts, where they go, or how they behave if and when they stop moving. We studied relationships between visiting Black-capped Chickadees and locally resident hybrids (Black-capped x Carolina chickadees) during an irruption year using color-banding and observations at feeding stations. Irruption birds arrived in late fall and left in early spring, and most individuals remained in small local areas throughout the winter. The population of visiting chickadees included juveniles and adult birds of both sexes. Irruption birds associated and interacted with local hybrid chickadees at low rates, while mainly staying with other irruption visitors. This study suggests that Black-capped Chickadees establish local residency during irruption but have little impact on local flock structure and dominance relationships of hybrid residents.

Abstract (5635); Session GP02, Fri 14 August, Location: Houston Hall, Hall of Flags, Poster Num: 12

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SCIENTIFIC CERTAINTY IN THE FACE OF ECOLOGICAL COLLAPSE: RECOGNIZING THE ECOLOGICAL IMPORTANCE OF THE DELAWARE BAY FOR THE *RUFUS* SUBSPECIES OF THE RED KNOT

Since 1997, Red Knots *Calidris canutus rufa* have been studied intensively throughout the West Atlantic Flyway, especially at the final northbound stopover in Delaware Bay. There, the ability to forage on abundant horseshoe crab eggs has long been recognized as vital to the population's survival. Despite this, eggs have declined dramatically because adult crabs have been over-harvested as whelk bait. This has led to a 60-80% decline in both numbers of knots using the Bay and in the flyway population as a whole. Harvest of horseshoe crabs increased from <150,000 in 1990 to >2.0 million in 1998. This was reported annually to the Atlantic States Marine Fisheries Commission, the authority that determines catch quotas. Despite this, although ASMFC imposed restrictions, it refused to take decisive action to restore the population. The current harvest still exceeds that of the early 1990s and although the decline has halted, there is no sign of significant restoration. In the past year, two peer-reviewed papers have recommended a complete cessation of the harvest in the interests of shorebird conservation, but the ASMFC has not acted.

Abstract (5611); Session S01, Thu 13 August, Location: Cohen Hall, G17 Auditorium, Oral at 14:00

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ARE BOTTOMLAND HARDWOOD FORESTS HIGH-QUALITY HABITATS FOR PILEATED WOODPECKERS?

We hypothesized that higher-elevation bottomland hardwood habitats (sweetgum-oak) would be the better quality habitat for Pileated Woodpeckers (*Dryocopus pileatus*; PIWO; Tanner 1942) compared to the lowland swamp habitats (cypress-tupelo). Specifically, we predicted that PIWOs in sweetgum-oak forests (because of reported greater availability of food resources) would exhibit smaller home ranges, have greater reproductive success, and have more frequent feeding visits at nests than those found in cypress-tupelo swamps. Overall, nest success of sweetgum-oak forests (58.3%, N=36 nests) was significantly lower than nests in cypress-tupelo swamps (75.0%, N=32). However, adult PIWO visits to nests per day during the late nesting period were significantly more frequent in sweetgum-oak forests (22.1 visits/day) than in cypress-tupelo swamps (14.9 visits/day). In addition, overall radio-marked PIWO mean home-range (including non-breeders) size was 172.1 ha (range=22.4-994.3 ha; N=30). However, breeding individuals (N=22) exhibited a smaller mean home range (mean=43.9±7.8 ha [SE]) than reported in the literature (ca. 53-160 ha; Renken and Wiggers 1989), perhaps indicating relatively high-quality habitats for this species in bottomland forests.

Abstract (5510); Session G06, Thu 13 August, Location: Irvine Auditorium, Café 58, Oral at 12:00

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NOTE COMPOSITION OF CAROLINA CHICKADEE 'CHICK-A-DEE' CALLS AND ACOUSTIC STRUCTURE OF D NOTES VARY WITH MOBBING INTENSITY AND MOB COMPOSITION

Variation in note composition of 'Chick-A-Dee' calls has been used to calculate the information-coding potential of the call and linked to variation in behavioral context. However, even greater complexity may arise if the acoustic structure of individual note types varies across contexts. Specifically, the structural-motivational hypothesis predicts that the highly variable D note (a low frequency, broadband stack of overtones) should have higher entropy and frequency modulation when given in contexts of higher aggression and predation risk. In fact, harsh sounds are often used by animals in aggressive contexts such as mobbing behavior. However, it is also possible that these fundamental acoustic properties are redundant with call syntactical structure in chickadees. We found that D note entropy and frequency modulation increased with mobbing call rate and heterospecific presence (mob characteristics related to mobbing intensity) during multi-species mobbing behavior. Duration of D notes also varied with social context. These note-level changes were not strongly correlated with changes in call note composition, suggesting that structural-motivational acoustic properties are not redundant with syntactical information.

Abstract (5585); Session G22, Sat 15 August, Location: Irvine Auditorium, Amado Recital Room, Oral at 17:00

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THE POTENTIAL PROBLEM OF PENGUINS FOR AVIAN CONSERVATION IN COSTA RICA

Some have indicated the increasing disconnect between humans and nature is one of the greatest indirect threats to global species conservation. This trend is often attributed to the current increase in global levels of urbanization, yet empirical evidence for its existence is sparse. In this presentation I document the phenomenon of environmental



generational amnesia in Costa Rica, a tropical country known for its biodiversity and environmental ethic. I created a survey of 16 questions addressing knowledge of local and exotic species of birds, as well as perceptions of urbanization and temporal changes to the state of the environment. I administered this survey to students between 4th – 6th grades and provided additional copies for their parents and grandparents. As expected, parents and grandparents outperformed the students. However, nearly all students could identify a penguin, but less than half could identify the national bird, or other birds common to their back yard. Furthermore, student perceptions about the current and future state of the environment differ significantly from those of their older relatives, highlighting the reality of this potential problem for future conservation.

Abstract (5378); Session G12, Fri 14 August, Location: Irvine Auditorium, Café 58, Oral at 12:00

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**NORTHERN AUSTRALIAN MANGROVE BIRDS: COMPARATIVE STUDIES OF CO-DISTRIBUTED SPECIES IN A FRAGMENTED BIOME**

Australia harbours the world's richest mangrove-restricted bird fauna, yet it has received little attention from phylogeographers. Therefore, greater attention on the genetic diversity of endemic mangrove birds, as well as modern evaluations of earlier hypotheses on the origins and speciation mechanisms of this intriguing avifaunal community are needed. The present synthesis aims to complement previous studies. It includes preliminary results from addressing questions centred on the rich avifauna of northern Australian mangrove forests. I outline intraspecific variation of mitochondrial DNA in three typical mangrove-inhabiting passerines (*Rhipidura phasiana*, *Pachycephala lanioides*, *Peneoanthe pulverulenta*). I explore evidence of past and current hybridization events among two species of white-eyes (*Zosterops luteus* and *Zosterops lateralis*). Finally, I provide insights into the complex historical biogeography that contributed to present taxonomic diversity of mangrove communities. This is drawn from the phylogenetic relationships of fantails (Aves: Rhipiduridae). The patterns documented through comparative phylogeography and the processes of historical biogeography inferred through phylogenetic reconstruction indicate that the majority of Australia's mangrove endemic birds evolved present structure recently, and in the case of fantails, from a diverse array of Pacific island ancestors.

Abstract (5488); Session S10, Sat 15 August, Location: College Hall, Room 200, Oral at 11:00

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**GEOGRAPHIC VARIATION IN THE CALLS AND DUETS OF THE BARRED OWL (*STRIX VARIA*)**

Geographic variation in bird vocalizations provides insight into the ecology and evolution of animal communication and vocal behavior. Research on songbirds has connected patterns of regional dialects to patterns of vocal learning and dispersal. We explored whether geographic variation might shed insight into acquisition of complex vocal behaviors, such as duets. We explored geographic variation in the calls and the complex duets of Barred Owls. We recorded Barred Owl vocalizations at 10 locations across five southeastern United States covering one subspecies range (*Strix varia georgica*). We compared geographic patterns of fine-structural measurements of male calls, female calls, and duets, as well as variation in rates of call occurrence and transition frequencies between calls within duets (duet syntax). Neither call structure, duet structure, nor call occurrence and transition frequencies were accurately assigned to location and none of these components of calls and duets were related to geographic distance.

Interestingly, there were similar geographic patterns between call and duet structure and transition frequencies. We conclude Barred Owl vocalizations and duets are individually variable and lack a distinct pattern of geographic variation.

Abstract (5537); Session G22, Sat 15 August, Location: Irvine Auditorium, Amado Recital Room, Oral at 16:15

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**ORIGIN AND DIVERSIFICATION OF PHILIPPINE BULBULS**

We examine the origin and diversification of Philippine bulbuls using a phylogenetic framework. We used maximum likelihood and Bayesian methods to construct trees from DNA sequences of two mitochondrial and two nuclear genes obtained from 11 Philippine bulbul species as well as 32 other Asian and African taxa. We found eight independent colonization events of bulbuls to the Philippines, including one clade comprising Philippine members of the genus *Ixos* that underwent extensive diversification within the archipelago. Each Philippine clade of bulbuls invaded either the Palawan region or the oceanic islands of the Philippines, but not both. Genetic data reveal at least 5 lineages that warrant recognition as full species. This study underscores how Philippine avian diversity is currently underestimated and highlights the need for further phylogenetic studies in other Philippine bird groups.

Abstract (5559); Session G15, Fri 14 August, Location: Cohen Hall, Terrace Room, Oral at 15:15

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#### THE SELECTIVE FORCES BEHIND BILL DIMORPHISM IN THE SWAMP SPARROW

We investigated the extent and causes of bill size dimorphism in two geographically isolated subspecies of the Swamp Sparrow (*Melospiza georgiana*), one in inland, freshwater bogs and the other in tidal, salt marshes. The bills of the coastal population were markedly sexually dimorphic while those in the inland population were not. Coastal males possessed larger bills than females (controlling for body size), while coastal female bills were similar in size to those of both inland sexes. Variation in bill size was correlated strongly with diet in the inland population, but was unrelated to diet among coastal birds. In the coastal population bill size was positively correlated with the size of the sexually dimorphic crown patch, and larger-billed coastal females paired preferentially with larger-billed males, while neither of these patterns was true in the inland population. We therefore suspect that selection on bill size is largely driven by natural selection among inland sparrows and by sexual selection among coastal sparrows.

Abstract (5427); Session G09, Thu 13 August, Location: Irvine Auditorium, Café 58, Oral at 16:30

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#### ADAPTIVE RESPONSE OF JAPANESE QUAIL TO COLD ACCLIMATION: MORPHOLOGICAL AND BIOCHEMICAL PROPERTIES OF SKELETAL MUSCLE

Skeletal muscle is the site of both shivering thermogenesis (ST) and regulatory nonshivering thermogenesis (NST) through avian uncoupling protein (avUCP). Thermogenic capabilities may be upregulated in response to chronically cold ambient temperatures, especially during development. Japanese Quail were acclimated to cold (5°C) or warm temperatures (25°C) for three weeks starting at age 14d posthatch (CA and WA, resp.). Pectoralis muscle of CA birds possessed more avUCP, but, contrary to predictions, mitochondrial area (as %total fiber area) was not elevated. However, muscle mitochondria of CA birds possessed more cristae, suggesting concomitantly higher catabolic capacities to support both elevated ST and NST. Activities of three regulatory enzymes (pyruvate kinase, citrate synthase, and 3-hydroxyacyl-CoA-dehydrogenase) were assayed at three temperatures in pectoralis and gastrocnemius muscles from CA and WA birds. As predicted, enzyme activities increased with temperature, but catabolic capacities did not increase with CA in either muscle. Additionally, thermal sensitivities of catabolic enzymes did not differ in CA birds. This lack of significant differences, together with depressed growth and lower body temperature in CA birds, suggest birds acclimated in part through regulated hypothermia.

Abstract (5614); Session G10, Thu 13 August, Location: Irvine Auditorium, Amado Recital Room, Oral at 15:00

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#### TEMPERATE ZONE BIASES IN STUDIES OF SEXUAL DIMORPHISM: PHYLOGENETIC STUDIES OF PLUMAGE AND SONG EVOLUTION IN NEW WORLD ORIOLES

Understanding the causes of sexual dimorphism has been a focus of evolutionary biology since Darwin. Most of this research has asked why elaborate male traits have been favored by selection. Such a research program implicitly assumes that dimorphic species have evolved from drab monomorphic ancestors. However, a phylogenetic perspective indicates that many pathways can lead to the gain or loss of sexual dimorphism. Our group has now produced highly concordant molecular phylogenies for orioles based on mtDNA and nuclear DNA introns. Ancestral state reconstructions using these trees suggest that the ancestral oriole was a tropical species that had elaborate coloration and elaborate song in both sexes. Evolution of "typical" [*sic*] dimorphism in color and song has repeatedly occurred in orioles due to losses in females in temperate zone species. Conventional explanations for the evolution of sexual dimorphism due to gains in males do not apply in these orioles and many other bird taxa. Phylogenetic approaches that lead researchers to account for all species in a monophyletic group may help avoid biases determined by which species are convenient to work on.

Abstract (5399); Session G09, Thu 13 August, Location: Irvine Auditorium, Café 58, Oral at 16:45

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#### PHYLOGENETIC PATTERNS IN THE EXPRESSION OF SEASONAL MIGRATION

Analyzing the expression of migration within avian phylogenies has been proposed as a means to evaluate hypotheses about the evolution of migration, and as a way to assess the influence it may have on patterns of diversification. Previous studies have looked only at small phylogenies or those lacking significant proportions of migratory species. This study takes advantage of the recent wealth of high quality phylogenetic work to examine whether patterns exist within three large migratory groups (Old World Emberizini, Turdidae, Mimidae). This was done by scoring migration as a multi-state trait and analyzing the tree using discrete comparative methods. The goal was to determine how clustered or over-dispersed trait states were when compared to the null expectation of a constant rate of change across the phylogeny. By repeating the experiment for three large independent lineages we hoped to pull out patterns that were common across groups and potentially relevant for all migratory clades. Results were mixed, one group showed evidence for over-dispersion, another for clustering indicating that migration may be a more labile trait within some groups compared to others.

Abstract (5507); Session GP21, Fri 14 August, Location: Houston Hall, Hall of Flags, Poster Num: 61

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#### THE FRUGIVOROUS BIRD ASSEMBLAGE AT FRUITING *ELMERRILLIA TSIAMPACA* (MAGNOLIACEAE) TREES IN PAPUA NEW GUINEA

We studied the frugivore assemblage at 38 fruiting *Elmerrillia tsiampaca*, an important resource to frugivorous birds because it produces abundant lipid-rich fruits at a time of low fruit availability. We classified avian frugivores into functional disperser groups and quantified visitation rates and behavior at trees during 64 canopy and 35 ground observation periods. We tested predictions derived from other studies regarding frugivore size, duration of visits, and handling ability. *E. tsiampaca* fruits were consumed by 26 bird species; eight species removed most seeds. The most important visitors were larger than predicted based on diaspore size. Columbiidae efficiently exploited the structurally protected fruit, which was inconsistent with other studies in New Guinea where structurally-protected fruits were predominantly consumed by Paradisaeidae. Birds vulnerable to predation foraged for short time periods, consistent with the hypothesis that predator avoidance enhances seed dispersal.

Abstract (5588); Session GP14, Fri 14 August, Location: Houston Hall, Hall of Flags, Poster Num: 41

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Lara-Rodriguez, N. Z.,

#### PATTERNS IN THE RELATIONSHIP HUMMINGBIRD-PLANT IN CENTRAL EASTERN MEXICO

The biology of Neotropical hummingbirds is generally few know. It is unknown if there are ecological patterns in their interaction with their visited plants. Using ecological scaling we show spatio-temporal patterns detected at hummingbirds species inhabiting the Mexican Central East region. Our results represent eight years of field studies. To regional (100,000 km<sup>2</sup>), landscape (1000 km<sup>2</sup>) and local level (< 3 km<sup>2</sup>) we register that the hummingbird species use all these areas as an unit (i.e., most of them are in all the vegetation types) but individual plants species use the areas as vegetation patches (i.e., they are present at only one or two). At regional level abundance of hummingbirds appears to be determined by the composition of the community of plants, where the dominant plant families determine seasonal patterns of flower abundance; at landscape level we registered that hummingbird abundance is related to abundance of flowers by kind of vegetation, and; at local level by the bloom of the more abundant plants species. Abundance of hummingbirds could be determined by different biological characteristics at different spatio-temporal levels.

Abstract (5175); Session G12, Fri 14 August, Location: Irvine Auditorium, Café 58, Oral at 10:30

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#### COMPARISON OF MALE AND FEMALE ACTIVITY SPACE WITHIN SHARED TERRITORIES OF A DUETTING NEOTROPICAL PASSERINE, THE RUFOUS-AND-WHITE WREN (*THRYOTHORUS RUFALBUS*)

Research on avian territoriality has focused primarily on males, with little study of female territoriality or comparisons of territoriality between the sexes. However, in many tropical birds females use song to contribute to territory defense against intruders. In this study we compared male and female territorial behavior in Rufous-and-white Wrens

(*Thryothorus rufalbus*), a bird where both sexes sing solos and coordinate their songs into vocal duets. We recorded birds in Costa Rica using an eight-microphone Acoustic Location System capable of passively triangulating the position of birds based on delays in sound arrival time. We monitored seventeen mated pairs and measured activity space as the total area where each bird sang over a ten hour recording period. Males had much higher song output and much larger activity spaces than females. However, when we controlled for sex differences in song output we found that the sexes had similar sized and highly overlapping areas of vocal activity. Solo song activity spaces were very similar to duet song activity spaces for both sexes. Overall, female Rufous-and-white Wrens showed very similar territorial behavior to males.

Abstract (5360); Session G04, Thu 13 August, Location: Houston Hall, Bodek Lounge, Oral at 11:45

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#### BRAIN SIZE EVOLUTION IN GRACKLES AND ALLIES (FAMILY ICTERIDAE)

Brain size, corrected for body size, varies greatly among birds. One hypothesized advantage of increased brain size is that it provides the neural machinery to deal with a broader range of ecological conditions. We investigated this hypothesis within the grackles and allies, an ecologically diverse clade. We tested whether allometrically corrected endocranial volume was correlated with increased niche breadth and volume for 36 species, after accounting for phylogeny. We also included migratory status, and several other relevant variables (breeding system, degree of sexual dimorphism) in our analyses. Contrary to our hypothesis and recent findings in parrots, relative brain size was not associated with niche breadth in grackles and allies. Moreover, niche volume was negatively correlated with brain size but this relationship was driven by migratory status. Our results highlight the fact that the ecological correlates of brain size differ among clades. We further describe patterns of interest in brain size evolution within this clade, such as the relatively small brain size of *Molothrus* spp. (cowbirds), a finding that is consistent with studies of other brood-parasites such as cuckoos and honeyguides.

Abstract (5208); Session G18, Sat 15 August, Location: Irvine Auditorium, Amado Recital Room, Oral at 10:45

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#### DISEASES OF FISH-EATING BIRDS IN THE GREAT LAKES

Disease is one of the many causes of mortality in fish-eating birds in the Great Lakes region. Over the last 20 years, periodic outbreaks of Newcastle's disease, botulism, and to a lesser extent, West Nile virus have caused large mortality events in birds. Here we will discuss the epizootology of these diseases, the spatio-temporal patterns of infections, population impacts, and the risk birds carrying these diseases pose to health of domestic livestock and humans. The most notable mortality events include (1) a large die-off of juvenile double-crested cormorants due to a virulent form of Newcastle's disease in the early to mid-1990's and (2) a series of outbreaks of Botulism E in which tens of thousands of birds died between 1998 – 2007, including large numbers of common loons, red-breasted mergansers, long-tailed duck, and grebes. Although not common, West Nile virus has been isolated from dead double-crested cormorants. Information on disease prevalence as well as on the daily and seasonal movements of infected birds is essential for assessing risk.

Abstract (5587); Session A02, Fri 14 August, Location: Houston Hall, Class of '49 Auditorium, Oral at 16:45

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#### VARIATION IN SOCIAL AND VOCAL BEHAVIOR OF TUFTED TITMICE ACROSS HABITAT TYPE

Noise can be detrimental to birds through several mechanisms such as stress and masking of immediate threats or communication. However, much of our knowledge regarding the effects of background noise on avian social and vocal behavior is limited. Tufted titmice (*Baeolophus bicolor*) are ideal subjects to be used in efforts to understand species' response to these challenges because they are understudied and are important to the comparative study of complex communication systems. This research aims to determine whether and how titmice in similar physical habitats are affected by differing background noise levels and sources. Social and vocal behavior of twenty flocks of tufted titmice was recorded in urban-surrounded and minimally-disturbed state-park forests (N= 10 urban-surrounded, 10 minimally-disturbed flocks) in Eastern Tennessee. Noise and sound pressure levels were repeatedly measured at each site. I will be testing to determine whether habitat type affects social or vocal behavior such as signaler and receiver behavior, call rate, syntax, and acoustic and temporal qualities of calls. Differences across these two populations will be discussed regarding current theoretical and conservation themes.

Abstract (5294); Session G03, Thu 13 August, Location: Cohen Hall, Terrace Room, Oral at 10:45

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#### POSITIVE RESPONSE OF FOREST SONGBIRDS TO A LARGE-SCALE CALCIUM ADDITION

Birds require large amounts of calcium to reproduce. Acid deposition can reduce the amount of calcium available for reproducing forest songbirds in the northeast. As a result, we need to better understand how calcium availability affects forest songbird communities. The purpose of this study was to examine how calcium availability affects forest songbirds in a calcium-poor forest in central Pennsylvania by experimentally elevating soil calcium using terrestrial lime application. We monitored songbird abundance, snail abundance, and soil calcium at four, 100-ha sites for one year before, and for five years after 4500 kg/ha of dolomitic limestone sand were applied to two of the four sites. We found positive responses of soil calcium, snail abundance, and overall bird abundance to liming. We found a positive response of ground and understory foraging songbird abundance to liming while we found no response by canopy foraging species. These results suggest that calcium availability may be a limiting factor for songbirds in this study, that acid deposition could be negatively affecting birds, and that liming is a potential mitigation technique.

Abstract (5312); Session G20, Sat 15 August, Location: Cohen Hall, Terrace Room, Oral at 09:15

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#### AN APPARENT HYBRID BLACK-THROATED GRAY / GRACE'S WARBLER IN THE DAVIS MOUNTAINS OF WEST TEXAS

I observed a *Dendroica* warbler which appeared to be a female Black-throated Gray Warbler but exhibited a number of inconsistent plumage details. I obtained several pictures suggesting the bird to be a hybrid, with Black-throated Gray Warbler (*Dendroica nigrescens*) and Grace's Warbler (*Dendroica graciae*) the likely parental species. The facial pattern strongly suggested a Black-throated Gray Warbler, with heavy white superciliary and malar stripes separated by gray auriculars connected broadly to the back of the neck. The throat displayed a faint series of spots, with dark smudges on either side below the malar. Several features however clearly fell outside the expected phenotypic variation of Black-throated Gray Warbler, suggesting Grace's Warbler. Most notably, the diffuse yellow wash across the entire throat pointed to a hybrid origin. The supercilium also showed an extensive yellow supraloral spot continuous with the white supercilium, as opposed to the "pinched" supercilium above the eye in Black-throated Gray Warbler. As best I can determine, these images offer the first evidence of hybridization between these two species.

Abstract (5606); Session GP31, Fri 14 August, Location: Houston Hall, Hall of Flags, Poster Num: 85

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#### PHYLOGENETIC RELATIONSHIPS OF THE COCKATOOS, INFERRED FROM MITOCHONDRIAL AND NUCLEAR SEQUENCES

Cockatoos (Psittaciformes: Cacatuidae) are a morphologically distinct group of parrots which have been placed in 6 or 7 genera with approximately 20 recognized species. While the monophyly of the group is uncontroversial, relationships among cockatoo taxa have remained ambiguous. In this study I sampled two loci, cytochrome b and beta-fibrinogen intron 7, to assess the phylogenetic relationships among the cockatoos at the generic level. Maximum parsimony and Bayesian analyses were performed to assess the phylogenetic history of the cockatoos, including the Cockatiel (*Nymphicus hollandicus*), Galah (*Eolophus roseicapillus*), Palm (*Probosciger aterrimus*), Gang-gang (*Callocephalon fimbriatum*), and Major Mitchell's (*Cacatua leadbeateri*) Cockatoos, as well as representatives of the black (*Calyptorhynchus*) and white (*Cacatua*) cockatoos.

Abstract (5605); Session G21, Sat 15 August, Location: Houston Hall, Class of '49 Auditorium, Oral at 16:15

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#### THE EFFECTS OF FLOODING ON SALTMARSH-NESTING COMMON TERNS

The effects of tidal and storm flooding on the nests of Common Terns (*Sterna hirundo*) at Pettit Island, New Jersey are reviewed across 11 years. I also describe the effects of habitat manipulation on survival of nests in the face of flooding. Pettit Island is a small saltmarsh island that typically supports 125 to 200 pairs of Common Terns. In most years substantial losses to flooding were observed, largely among nests near the edge of the island. In 2007 flooding was severe, as the entire island was under water and >75% of nests were lost. Nests located in the center of the island and on mats of dead eelgrass (*Zostera*) were more likely to survive than those in other locations. Since 2002 I have transported additional eelgrass to the island to create artificial mats in the center of the island. The terns readily used these mats and, other than in 2007, nests on artificial mats tended to survive flooding. Losses of nests to flooding are likely to increase with rising sea levels, and habitat manipulation may become increasingly necessary.

Abstract (5320); Session G16, Fri 14 August, Location: Irvine Auditorium, Café 58, Oral at 15:15

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#### MAINTENANCE BEHAVIOR IN HOUSE SPARROWS

Ornithologists assume that preening, water and dust bathing, sunning, head-scratching, and anting, remove ectoparasites, clean and fix damaged feathers, and maintain overall plumage health. However few studies have focused on the form and function of maintenance behavior. House Sparrows (*Passer domesticus*), like most birds, engage in daily bouts of feather maintenance which may last for many minutes, yet the details of the behavior and its sequential organization are undescribed. We caught nine House Sparrows and placed them in an outdoor aviary, where we observed them daily over a period of several weeks. Observation times varied throughout the day so that we could get a sense of circadian organization of maintenance behavior. We described the different behavior patterns, the frequency of each and the sequence of patterns during bouts of preening. We apply information analysis to these data in order to look at the organization of preening bouts. Based on our analysis we speculate on the function of preening and other maintenance behavior to the health of the plumage.

Abstract (5551); Session GP35, Fri 14 August, Location: Houston Hall, Hall of Flags, Poster Num: 96

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#### FEMALE ORNAMENTATION AND REPRODUCTIVE INVESTMENT IN THE AMERICAN ROBIN

Ornamental traits in males have been the subject of research for decades, and sexual selection is recognized as the foremost explanation for their evolution. The expression of such traits in females has received much less study. Female ornamentation has been considered a non-adaptive, correlated response to selection on males. However, recent models predict the evolution of honest signals in females under certain circumstances, especially where male investment is high and female quality is variable. Male and female American robins (*Turdus migratorius*) invest heavily into offspring, and both display conspicuous breast plumage and bill colouration. Female robins show a subdued expression of these traits, however, considerable variation exists. I used field data to assess whether female ornamentation acts as a signal of individual quality, and whether variation is correlated with reproductive investment. As proxies of investment I analyzed clutch size, egg size, egg energetic investment, yolk androgen and carotenoid deposition, and relative parental effort. Preliminary results suggest that female colour may be a reliable indicator of condition and capacity for reproductive investment in this species.

Abstract (5603); Session GP05, Fri 14 August, Location: Houston Hall, Hall of Flags, Poster Num: 102

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#### SEARCHING FOR SAFE HAVEN: WADING BIRDS AND CONTAMINANTS ALONG A RURAL-URBAN GRADIENT

Wading birds, including herons, egrets, and ibises, colonized several urban estuaries in the northeast (e.g. New York Harbor, Boston Harbor) following passage of the Clean Water Act and the consequent reduction of raw sewage in urban waterways. During the 1980s-1990s, abundance of wading birds increased in urban estuaries by 15-40% annually. Since the mid-1990s, colonially nesting waterbirds have abandoned several core nesting sites, and populations regionally have declined by as much as 30%. Manomet's long-term studies of avian foraging and nesting ecology show that wading birds are exposed to contaminants throughout the region. Despite abundant foraging resources, the embryo-toxic effects of industrial contaminants in urban estuaries (e.g. PCBs, dioxins, PAHs) contribute to low fledging success. Unsustainable population losses have resulted in abandoned but viable nesting sites. Early gains in heron populations in New York Harbor and Boston Harbor were due to the exodus of herons from suburban and rural estuaries, where evidence shows birds were exposed to second-generation pesticides (anti-cholinesterases), behaviorally compromised, and vulnerable to predators. Manomet is working with partners to mitigate the effects of contaminants on waterbirds.

Abstract (5209); Session S07, Sat 15 August, Location: Houston Hall, Class of '49 Auditorium, Oral at 12:00

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#### SEXUAL SELECTION FOR NEGOTIATION SKILLS: USING ROBOTS AND ARRAYS TO STUDY COURTSHIP INTERACTIONS

In studies of sexual selection in the wild, measures of sexual display traits (e.g. trail length, song output) typically explain only 20-40% of the variation among individuals in mating success; so what explains the remainder of this variation? Effective courtship negotiation skills-such as the ability to choose and approach a courtship partner, and adjust sexual displays in response to the partner's signals-may be an important component of this unexplained variation, but we know little about the fitness consequences of these behavioral tactics. The growing use of robotics and sensor arrays has allowed us to examine in detail, and even participate in, animal negotiations about mating. I will discuss studies of sexual selection in the wild using these new technologies, including my work on sexual signaling by

bowerbirds and greater sage-grouse using robotic females and microphone arrays. These results suggest that to be successful, signaling animals may need both attractive signals and effective negotiation skills, allowing them to tactically respond to changes in the social and environmental context of courtship.

Abstract (5627); Session K6, Sat 15 August, Location: Houston Hall, Class of '49 Auditorium, Oral at 08:00

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#### HOW GREY PARROTS SEE THE WORLD

Some birds, such as Grey parrots (*Psittacus erithacus*), share a number of cognitive concepts with humans—e.g., category, relative size, same-difference, absence, number (Pepperberg 1999, 2006)—but few studies have examined whether they literally see the world as do humans. We tested Alex, a Grey parrot who identified the bigger or smaller of two objects by reporting its color or material using a vocal English label and who stated “none” if they did not differ in size, with two-dimensional Müller-Lyer figures (Brentano version) in which the central lines were of contrasting colors. His responses to “What color bigger/smaller?” demonstrated that, in general, he saw the standard illusion as do humans. We then tested him on the vertical-horizontal illusion (differently colored line segments), in T and L forms at various rotations. He saw the illusion in the T but not the L forms, matching some but not all human responses.

Abstract (5219); Session G01, Thu 13 August, Location: Cohen Hall, G17 Auditorium, Oral at 11:45

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#### NUCLEAR INTRONS VIOLATE THE ASSUMPTION OF SELECTIVE NEUTRALITY

Using DNA sequences to study population history is now common practice, but many methods assume the DNA studied is selectively neutral. Therefore, we often focus on regions within DNA that do not code for proteins (e.g., nuclear introns), because these regions are thought to be relatively free from selective constraints. To test the assumption of selective neutrality, we sequenced 22 introns from Gadwalls (*Anas strepera*) sampled throughout their Holarctic distribution and an outgroup species, the Snow Goose (*Anser caerulescens*). We then inferred population histories for Gadwalls using two different coalescent models. Comparing empirical values of genetic diversity with data simulated under models of selective neutrality and the inferred population histories, 36%—45% of the introns deviated from neutral expectations. Some loci had a paucity of genetic diversity suggesting the influence of selective sweeps, whereas others had an excess of diversity consistent with balancing selection. Regardless of whether selection is acting directly on components of introns or indirectly through the effects of genetic hitch-hiking, selection is likely having a profound effect on inferences of population history.

Abstract (5558); Session G08, Thu 13 August, Location: Houston Hall, Bodek Lounge, Oral at 15:15

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#### AVIAN TICK BURDENS ACROSS AN URBAN TO FOREST LAND-USE GRADIENT

Interactions between *Ixodes scapularis*, the primary vector of Lyme disease in the Eastern and Midwestern USA, and their hosts determine infection rates in ticks, and influence the human risk of infection. Several factors contribute to tick burdens over temporal and spatial gradients and determine what role birds may play in tick-borne pathogen transmission cycles. We determined seasonal patterns of avian tick burdens at 16 sites along an urbanization gradient in the mid-Atlantic, USA. We examined landscape and species-specific attributes coupled with questing tick abundance to understand variability in tick burdens. We found that the major drivers of tick burdens on birds were the time of year, the urbanization of the site, and the species of bird sampled, with some evidence for foraging height, sex, and age influencing tick burdens. We present models to estimate or predict avian tick burdens using individual, species, and site characteristics, and the density of questing ticks. Identifying causes of variation in tick burdens on avian hosts will increase our understanding of host-parasite interactions and the role birds play in the ecology of Lyme disease.

Abstract (5409); Session G02, Thu 13 August, Location: Houston Hall, Class of '49 Auditorium, Oral at 12:00

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#### A PROTOTYPE FORECASTING SYSTEM FOR SPREAD OF BIRD-BOURNE DISEASES IN NORTH AMERICA

The past two decades have seen major outbreaks of flaviviruses and flaviviruses that are spread spatially at least in part by migratory birds. Although much new information has accumulated on the natural history of the viruses, and on the geography of migration by individual bird species, no synthesis has been achieved regarding patterns of spread of such pathogens by migratory birds, which is clearly a large-scale challenge in understanding the geography of bird migration. We present a first step in this direction: a summary of seasonal (breeding, wintering) distributions of North American birds that show marked seasonal migratory movements. We use the species-level interseasonal connectivity among areas to make initial forecasts of patterns of spread of bird-borne diseases via bird migration, and identify key “next steps” towards improved forecasting.

Abstract (5234); Session G02, Thu 13 August, Location: Houston Hall, Class of '49 Auditorium, Oral at 10:30

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#### MITES OF OWLS

Parasitic mites of owls include those which feed on blood, feather oils, feather tissue, skin, and tissue fluid. Host relationships range from monoxenous to polyxenous, and mite geographic distribution ranges from endemic to cosmopolitan. Of 43 species of North American owls, mites are known from 18 species, but records from the Holarctic species are mainly from the Palearctic region. The mite fauna of *Asio otus* is most well known, 16 species, but only 2 species are known from North American Long-eared Owls. The North American mite fauna of *Bubo virginianus* is the best known, 11 species, followed by that of *Athene cunicularia* with 9 species, *Strix varia* with 5 species and *Otus asio* with 4 species. Three or fewer mite species are known from other owls in North America. Data on occurrence on different regions of the host's body, mite populations on healthy and diseased owls, and pathology are largely lacking.

Abstract (5169); Session GP08, Fri 14 August, Location: Houston Hall, Hall of Flags, Poster Num: 31

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#### DISTANCE DECAY IN BIRD COMMUNITY SIMILARITY: ARE NEUTRAL THEORY AND NICHE-ASSEMBLY THEORY POSSIBLE EXPLANATIONS?

The unified neutral theory of biodiversity and biogeography predicts that distance decay in community similarity is based on dispersal distance and ecological drift across homogeneous environments, whereas niche-assembly theory predicts distance decay is associated with environmental conditions and interspecific associations. We used multiple regression on distance matrices to test predictions of neutral theory and niche-assembly theory by investigating the relationship between bird community similarity and geographic distance, environmental conditions, and numbers of diurnal avian predators and brood parasites. We studied summer resident birds at 288 sites in the Oaks and Prairies region of Texas. Our results did not support neutral theory or niche-assembly theory for the community we studied. Geographic distance, environmental conditions and interspecific associations explained little of the variation in community similarity at the regional scale of our study. Despite a relatively homogeneous study area, distance effects predicted by neutral theory may have been swamped by the vagility of the bird species in our community. Distance decay predictions of niche-assembly theory may apply better at spatial extents where environmental differences are more pronounced.

Abstract (5236); Session G13, Fri 14 August, Location: Houston Hall, Bodek Lounge, Oral at 11:00

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#### THE EFFECT OF ACUTE CORTICOSTERONE INJECTIONS ON OFFSPRING SEX IN THE WHITE LEGHORN

Previous studies suggest that treatment with hormones can stimulate females to manipulate the sex of their offspring prior to ovulation. In addition, chronic treatment with corticosterone has resulted in significant skews towards female offspring in avian species. Corticosterone may influence which sex chromosome the heterogametic female donates into the ovulated ovarian follicle. However, corticosterone treatment occurred over a long period of time, making it



impossible to pinpoint when its effects on offspring sex occurred. We treated laying hens with acute high-dose corticosterone injections 5h prior to ovulation and quantified the sexes of subsequent embryos. We hypothesized that an injection of corticosterone coincident with the segregation of the sex chromosomes would stimulate the production of more female offspring than male offspring. Contrary to our predictions, hens injected with corticosterone produced nearly 76% males, a significant bias towards male offspring. Based on the results, we propose acute corticosterone increase during genetic sex determination as a possible mechanism for sex ratio manipulation in birds. Acute corticosterone exposure, compared with chronic exposure, may act through a different mechanism to skew offspring sex.

Abstract (5428); Session GP26, Fri 14 August, Location: Houston Hall, Hall of Flags, Poster Num: 70

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#### SONG VARIATION IN THE MOURNING WARBLER

I studied song variation among Mourning Warblers (*Oporornis philadelphia*) from throughout the breeding range in North America (N=505 at 22 localities). Analyses of physical parameters of song did not reveal any spatial patterns. I also compared syllable morphology among males and analyzed the geographic distribution of syllable and song types. Cluster analyses and isogloss mapping analyses were conducted on males and their syllables. Results from both analyses showed the same pattern of macrogeographic variation in song. There were four major regiolects or song populations: Newfoundland, Nova Scotia, Eastern Continental and Western Continental Regiolects. Large bodies of water were associated with boundaries between all regiolects. Eastern and Western Continental Regiolects were separated by a distance of 90 km in southwestern Ontario in the Lake Nipigon Region. There was a mix of songs from both regiolects in this area and some birds sang hybrid songs containing Eastern and Western syllables. Preliminary evidence from playback experiments showed that males reacted more aggressively towards playback of their own regiolect versus alien regiolects. Males appeared to be able to discriminate among regiolects.

Abstract (5305); Session G04, Thu 13 August, Location: Houston Hall, Bodek Lounge, Oral at 12:15

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#### FEATURES OF ARTIFICIAL NEST SITES THAT INFLUENCE SELECTION BY CAROLINA CHICKADEES

Other than a preference for small nestboxes, the criteria that Carolina Chickadees (*Poecile carolinensis*) use when selecting nest sites are not well documented. I summarize here the influence of six additional features on chickadee use of artificial nest sites. Chickadees did not show either a (1) right/left preference or a (2) high/low preference when given a choice of two identical PVC tubes; 17% of the chickadees nesting at sites with two identical tubes built nests and laid eggs in both tubes. When given a choice between two PVC tubes that differed in only one feature, chickadees preferred cavities that (3) contained sawdust (or small wood chips) rather than no sawdust or chips, (4) had 3.2 cm diameter entrances rather than larger entrances, (5) were 17.8 cm deep rather than 7.9 cm deep, and (6) were black, rather than white, inside. The relative importance of each of these features is not known.

Abstract (5249); Session GP20, Fri 14 August, Location: Houston Hall, Hall of Flags, Poster Num: 56

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#### NESTING FATE AND ECOLOGICAL TRAPS IN DECLINING RUSTY BLACKBIRD POPULATIONS: WHY THE BREEDING GROUNDS MATTER

We studied Rusty Blackbird breeding biology in New England to 1) aid monitoring efforts by determining what factors influence detectability and occupancy and 2) locate nests and determine if anthropogenic habitat alterations affect daily nest survival (DSR). The best-fit *a priori* model (Akaike weight = 0.99) indicated that detectability: 1) decreased over the breeding season; 2) decreased with increasing wind speed; 3) increased with playback; and 4) was not affected by time of day. Wetlands occupied by Rusty Blackbirds were those with exposed mud, puddles, a coniferous upland, and timber harvests 5–15 years old. Though nesting adults also selected nest plots (n=43) typical of regenerating timber harvests (short canopies, dense balsam fir growth 1 to 3 m high), nests in stands *without* recent harvests were 2.8 times more likely to fledge young. DSR also increased with alder density, suggesting that nests within wetlands had lower predation risk. When timber harvests encroach upon wetlands, dense coniferous regeneration may attract nesting Rusty Blackbirds towards uplands, which then exposes nests to increased predation pressure not typically found in undisturbed wetlands.

Abstract (5212); Session G06, Thu 13 August, Location: Irvine Auditorium, Café 58, Oral at 11:15

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#### THE EVOLUTION OF FEMALE SONG IN THE NEW WORLD BLACKBIRDS

Birds in which both sexes produce complex song are more common in the tropics than in temperate areas, where typically only males sing. Yet we know surprisingly little about the evolutionary origins of this striking latitudinal difference. We reconstructed the evolutionary history of female song in the New World blackbird family (Icteridae), a clade with both temperate and tropical representatives. Our results show that both sexes sang in the tropical ancestors of this group and that female song has been lost repeatedly with movements from tropical to temperate breeding ranges. This historical perspective suggests that male-biased song production in many temperate species today is the result not of sexual selection for complex song in males but rather selection against such songs in females. Comparisons to several other life history patterns indicate that the prevalence of female song in the tropics is largely explained by the life history traits associated with tropical habitats.

Abstract (5165); Session G18, Sat 15 August, Location: Irvine Auditorium, Amado Recital Room, Oral at 11:00

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#### ECOLOGICAL AND GEOGRAPHICAL INFLUENCES ON BIRD SPECIATION

Sister species of birds can show striking ecological differences and occur sympatrically, but many are ecologically very similar and geographically separated (in allopatry or parapatry). Geographically separated sister species are often old and differ predominantly in socially selected traits such as plumage and song; they may continue to hybridize where they meet in parapatric zones of narrow overlap. This suggests speciation processes can be ordered along a continuum, where the time needed for speciation in allopatry is shortened, the greater the differences between the environments that the diverging populations occupy. Using examples from islands and continents (including the Galápagos and the Himalayas), I consider how time in isolation and divergent selection pressures complement each other in promoting speciation. I also argue that these processes do not set the ultimate limit on speciation rate, but rather that is attributed to the ease of range expansions.

Abstract (5625); Session K4, Sat 15 August, Location: College Hall, Room 200, Oral at 08:00

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#### SELF-ASSEMBLY OF COLOR-PRODUCING AVIAN AMORPHOUS NANOSTRUCTURES BY PHASE SEPARATION

Non-iridescent structural colors in avian feather barbs are produced by coherent light scattering from quasi-ordered or amorphous photonic nanostructures of beta-keratin and air, which occur in two basic morphologies: tortuous channels and amorphous packings of spheres. Each class of nanostructure has a pronounced characteristic length scale of spatial variation in composition. Consequently, only a narrow range of wavelengths gets coherently reinforced and backscattered over multiple directions. Such isotropic optical properties play important roles in social and sexual communication. To be effective, birds need to precisely control the development of these nanoscale structures, yet little is known about how they grow. We hypothesize that multiple lineages of birds have convergently evolved to exploit phase separation and kinetic arrest to self-assemble spongy color-producing nanostructures in feather barbs. Observed avian nanostructures are strikingly similar to morphologies self-assembled during the phase separation of fluid mixtures through spinodal decomposition and nucleation-and-growth. Using the power of self-assembly, birds can robustly realize a diverse range of structural colors with relatively small physical and chemical changes during feather development.

Abstract (5568); Session G14, Fri 14 August, Location: Cohen Hall, G17 Auditorium, Oral at 15:15

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#### CONSERVATION BUFFERS FOR BREEDING GRASSLAND BIRDS IN MISSISSIPPI

Periodic disturbance of native grass habitat buffers in agricultural systems is required to maintain early-successional plant communities for grassland birds, but effects of disturbance type on habitat suitability and nesting success are unknown. Thus, we used line-transect surveys and systematic nest searches to characterize the abundance, diversity, and nesting success of grassland birds in habitat buffers in northeastern Mississippi. In the year prior to disturbance (2007), we observed 19 species. One year following disking and burning of 1/5 of the habitat buffers (2008), we observed nine species in burned buffers, eight in disked buffers, and 24 in unmanaged buffers. Nesting densities were

initially higher in unmanaged buffers, but increased in burned buffers later in the season. Red-winged Blackbird (*Agelaius phoeniceus*) nest survival was positively related to an interaction between height of surrounding vegetation and percent ground cover. Dickcissel (*Spiza americana*) nesting densities were highest in unmanaged buffers. Nest survival declined monotonically with time and was positively related to nest height. Additional evaluation of bird use of disturbed and undisturbed habitat buffers will be made 2-yrs post-disturbance (2009).

Abstract (5281); Session G17, Fri 14 August, Location: Houston Hall, Bodek Lounge, Oral at 16:45

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**LONG TERM AVIAN RESEARCH AT THE SAN JOAQUIN EXPERIMENTAL RANGE:  
RECOMMENDATIONS FOR MONITORING AND MANAGING OAK WOODLANDS**

Experimental Forests and Ranges are ideally suited for long-term, multi-disciplinary research exploring biotic responses to changing environmental conditions. The San Joaquin Experimental Range (SJER) lies in oak woodlands in the Sierra Nevada foothills of California. Since 1934, a total of 201 bird species have been observed. Early studies focused on the diet and habitat requirements of California Quail (*Callipepla californica*). Research done by Jerry Verner led to recommendations for avian monitoring techniques. 2009 marks the 25th year of a large-scale monitoring effort begun by Dr. Verner. We are using this dataset to examine population trends and predict effects of climate change. Work done on life history strategies has shown the importance of primary cavity nesters as keystone species by virtue of providing cavities used by other wildlife species. Additional work has examined differences in reproductive success of birds nesting in nest boxes and cavities, influence of European Starlings (*Sturnus vulgaris*) on native cavity-nesting bird, and source-sink dynamics of California Towhees (*Pipilo crissalis*). SJER continues to provide opportunities ranging from ecology and conservation biology to climate change and invasive species management.

Abstract (5546); Session S06, Fri 14 August, Location: Houston Hall, Class of '49 Auditorium, Oral at 10:30

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**PHYLOGENY AND BIOGEOGRAPHY OF A CLADE OF MANGOES (AVES, TROCHILIDAE)**

There is strong support for the hypothesis that hummingbirds originally diversified in the South American lowlands, and that the three most basal clades (Topazes, Hermits, and Mangoes) had lowland common ancestors. Within mangoes, however, there are several instances of highland-lowland vicariance events throughout the Andes. In order to explore whether Earth history can be the primary mechanism underlying these diversification events, we reconstructed the phylogeny of a clade of mangoes comprising the genera *Colibri*, *Doryfera*, and *Schistes*. We sequenced two mitochondrial genes (ND2 and Cytb) for over 100 individuals representing all the diagnosable distinct taxa and comprising the whole distribution range of the three genera, from both fresh tissue and museum skins, and performed ML and Bayesian analyses. Our results indicate that all the diagnosable distinct taxa are supported at the molecular level, so they should be regarded as phylogenetic species, and that the highland-lowland vicariance events, as well as the north-south distributional pattern found, can be linked spatially to the tectonic history of the Andes.

Abstract (5479); Session G11, Fri 14 August, Location: Cohen Hall, Terrace Room, Oral at 10:45

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**THE FIRST SPECIES CONSERVATION INTRODUCTION IN THE NORTHERN MARIANA ISLANDS:  
TRANSLOCATION OF BRIDLED WHITE-EYES TO SARIGAN FROM SAIPAN**

To help sustain avian species in the Mariana Islands satellite populations will be established on islands in the archipelago that are safe from the invasive Brown Treesnake. On 3 May 2008, biologists with the Marianas Avifauna Conservation (MAC) Project introduced to the island of Sarigan a founder population of Bridled White-eyes (*Zosterops conspicillatus*) captured on the island of Saipan. Of 77 white-eyes captured between 22 and 24 April 2008, the 50 most robust were chosen for translocation, all of which were color banded and 14 radio-tagged. Telemetry and visual monitoring of the introduced birds was conducted from 3 to 12 May 2008. Signals were detected at least once during monitoring for all but four birds and transmitters were recovered for five with no evidence of fatalities; the ultimate fate of five birds was unknown. All observations of foraging white-eyes were in native and mixed secondary forest. During further monitoring on 23 and 24 March 2009 banded and unbanded white-eyes were observed and a recent nest was found. Translocation to Sarigan of another 50 Bridled White-eyes was undertaken in May 2009.

Abstract (5166); Session GP06, Fri 14 August, Location: Houston Hall, Hall of Flags, Poster Num: 24

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#### ROOST SITE SELECTION IN RELATION TO FORAGING LOCATION IN OBLIGATE ARMY ANT FOLLOWING BIRDS IN AMAZONIAN PERU

Neotropical obligate army ant following birds have very large home ranges and few, specific locations at a given time and space that allow for foraging. Based on these restrictions and optimization of energy we predicted that these birds would preferentially roost near *Eciton burchellii* army ant bivouacs to allow for a faster and easier discovery of army ants (a potential food source) the following morning. We examined roost site selection in comparison to known, potential foraging locations for five species of obligate army ant following birds (*Phlegopsis nigromaculata*, *Myrmeciza fortis*, *Rhegmatorhina melanosticta*, *Gymnophthys salvini*, *Dendrocincla merula*) at the Cocha Cashu Biological Station in Manu National Park, Peru. No correlation was found for any species between roost site selection and known *E. burchellii* bivouac locations, suggesting that there may be other unknown external factors, for example predator avoidance by having known and therefore safe roost locations, guiding roost site selection. A more in depth study of roost site selection is necessary to better understand whether core roosting sites exist across species and if so, why they are used.

Abstract (5285); Session GP14, Fri 14 August, Location: Houston Hall, Hall of Flags, Poster Num: 42

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#### THE MARBLED MURRELET AND THE CRITICAL ROLE OF THE REDWOOD EXPERIMENTAL FOREST

When surveys for old-growth Douglas-fir dependant species began in 1983, the murrelet was an enigma, the first nest only accidentally found less than a decade earlier about 550 km to the south. We surveyed at 24 stations at the near-coastal Redwood Experimental Forest, a 935 acre tract of old-growth forest, largely of redwoods. This was the first quantified approach to the species, which soon became an icon for forest preservation, perhaps even exceeding the Spotted Owl, as the latter species frequents coastal second growth, a trait essentially unknown in the murrelet. The methods developed at the Forest resulted in a thesis, many papers on the murrelet, and were the central foundation of the protocol developed to monitor the species' inland-nesting habitat throughout the Pacific Northwest. In addition to population size, these methods provided much essential information on the species' behavior and ecology. Since then, research has continued in the Forest and surrounding region, showing the critical affinity for old-growth forests, as well as much information on the assemblage of birds of redwood forests in general.

Abstract (5300); Session S06, Fri 14 August, Location: Houston Hall, Class of '49 Auditorium, Oral at 14:00

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#### A NEW METRIC TO ELUCIDATE SPATIO-TEMPORAL PATTERNS OF BODY CONDITION IN PASSERINES

Effective conservation measures for birds facing rapid climate change and habitat alterations require the design of appropriate metrics to understand the strategies that species use. This knowledge may enable us to take management actions as birds adapt to change. The body condition of an individual can convey important information about different migratory and wintering strategies in different regions, critical life stages, and the probability of survival. Using complex surrogates of body condition, we compared environmental and geographical variables over a large region through time. To demonstrate this, we chose three passerine species with very different life histories. We found marked differences in condition, with living inland harder on the two migratory species. This result suggests that coastal habitats may play a more important adaptive role than inland habitats. We discuss the possible differences between visible fat, as estimated by fat scores, and fat that is in other parts of the body, and suggest alternative means to measure body condition.

Abstract (5267); Session G23, Sat 15 August, Location: Houston Hall, Bodek Lounge, Oral at 16:00

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#### EXPLORING MECHANISMS OF ODOR DETECTION IN CRESTED AUKLETS (*AETHIA CRISTATELLA*)

Crested Auklets (*Aethia cristatella*) produce a citrusy scent, which previous studies have suggested plays a role as a social signal. The mechanisms by which individuals detect odors are therefore important. At close-range birds engage in "ruff-sniff" displays, in which display partners rub their faces in the scented napes of one another. It is unclear, however, whether scent detection also operates at greater distances or in the darkness of nest crevices. We

hypothesized that two behaviors: headshaking and “mandibulating” (movement of mandible and tongue) are involved in detecting odors. We delivered odor into the crevices of (N=35) breeding birds and monitored responses via infrared camera. Birds exhibited significantly greater headshaking rates when exposed to synthetic auklet odor or a novel odor (banana) than the control (ambient air). Headshaking may be a general means of sampling and moving air through a bird's perforate septum. By contrast, mandibulating and a headshake-mandibulating sequence occurred most frequently during exposure to auklet odor only. In combination, the two behaviors appear to facilitate chemosensory detection by employing both olfaction and taste.

Abstract (5593); Session GP02, Fri 14 August, Location: Houston Hall, Hall of Flags, Poster Num: 8

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#### METHOD OF EJECTION OF REAL BROWN-HEADED COWBIRD EGGS AND A LACK OF COSTS IN AMERICAN ROBINS AND GRAY CATBIRDS

Hosts eject Brown-headed Cowbird (*Molothrus ater*) eggs by puncture- or grasp-ejection. Grasp-ejection is less costly but is an option only to hosts with bills large enough to grasp-eject eggs. For small-billed hosts, the cost of puncture-ejection may render acceptance adaptive. Although the method and cost of ejection is crucial to understanding host and parasite interactions, witnessed ejections of real cowbird eggs exist for only eight of 26 ejecter species. We present results from video-recorded ejections of real cowbird eggs by American Robins (*Turdus migratorius*) and Gray Catbirds (*Dumetella carolinensis*) and a review of witnessed ejections from the literature. With no cost, robins grasp-ejected all eggs (n = 12), whereas catbirds grasp-ejected 14 of 17 eggs and puncture-ejected 3 of 17 eggs. By contrast, previously observed ejections by robins and Warbling Vireos (*Vireo gilvus*) showed a mixture of puncture- and grasp-ejections. Observed ejections by five other species showed either all grasp-ejection or all puncture ejection. Our study revealed that even some large species puncture eject and do so with little cost to their own eggs.

Abstract (5277); Session GP03, Fri 14 August, Location: Houston Hall, Hall of Flags, Poster Num: 13

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#### SIGNALING ALTERNATIVE STRATEGIES: CHOICE, COPULATION & COLOR IN THE WHITE-THROATED SPARROW

Feather coloration can signal male quality, as females have been shown to often prefer brightly colored mates. However, other studies suggest that dull plumage might be advantageous if it reduces conspicuousness and/or aggression. To reveal the adaptive significance of coloration we examined plumage variation in the white-throated sparrow (*Zonotrichia albicollis*), a species that exhibits a stable polymorphism in which bright birds are promiscuous while dull birds are monogamous and invest in high amounts of parental care. Since coloration and behavior are absolutely correlated, plumage serves as a reliable cue of reproductive strategy. However, it appears that there also exists fine-scale variation within each morph/sex class. We examined plumage variation in association with components of within-pair and extra-pair mating success. Our results suggest that, in each morph the same plumage cue may signal alternate male traits – crown attributes in the dull morph are associated with monogamy and certainty of paternity while in the bright morph, they tend to be associated with extra-pair success. These results provide insight into how visual signals might evolve alternate meanings for mate selection.

Abstract (5539); Session GP28, Fri 14 August, Location: Houston Hall, Hall of Flags, Poster Num: 74

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#### FECAL SAC REMOVAL AND HELPER CONTRIBUTION IN COOPERATIVELY BREEDING SRI LANKA MAGPIE

Sri Lanka magpie (*Urocissa ornata*) is an endemic and threatened tropical species. In their cooperative breeding system, helpers accrue fitness benefits by providing aid during nest building, brood provisioning and fecal sac removal. We studied how fecal sac dropping distance and removal directions will reduce olfactory and visual cues obtained by nest predators. Breeders and helpers remove fecal sacs; frequently drop them in water rather than on land. A positive correlation found in fecal sac dropping distance and distance from the nest tree to water, suggesting that birds adaptively dispose of sacs into water. Helpers carry fecal sacs shorter distances before they drop on water or

land. As predicted by Weatherhead's hypothesis, breeders vary more in departure directions with fecal sacs than without but this pattern was reversed in observing the helpers. However, circular statistics showed that mean departure direction with fecal sacs differs from without fecal sacs. These results imply that fecal sac removal may be a behavioral component that should be investigated further in cooperatively breeding systems.

Abstract (5407); Session GP29, Fri 14 August, Location: Houston Hall, Hall of Flags, Poster Num: 78

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WILSON'S PLOVER POPULATION ECOLOGY AND HABITAT USE AT MARINE CORPS BASE CAMP  
 LEJEUNE, NORTH CAROLINA

Shorebird habitat has been degraded by increased anthropogenic uses along the Atlantic coast. Military lands may offer less human disturbance compared to other areas and often provide refuge to wildlife. We studied the population ecology and habitat use of Wilson's plovers (*Charadrius wilsonia*, a high priority species in the U.S. Shorebird Conservation Plan) in March-August 2008 and 2009 on the 12-km Onslow Beach at Marine Corps Base Camp Lejeune, North Carolina. We located and studied 20 nests of Wilson's plovers during 2008 and color-banded 20 adults and 18 chicks; the study is being replicated in 2009. In 2008, three nests were depredated and we observed  $1.47 \pm 0.36$  chicks hatched per pair and  $0.88 \pm 0.26$  fledglings per pair. Adults and chicks foraged primarily on fiddler crabs (*Uca* sp.), and some broods were observed to travel greater than 1.8 km from their nest site to the fiddler crab mudflat where they foraged until fledging. Our results indicate that accessibility of these fiddler crab foraging areas to Wilson's plover chicks may be an important factor limiting this population at Onslow Beach.

Abstract (5447); Session G16, Fri 14 August, Location: Irvine Auditorium, Café 58, Oral at 14:30

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MONITORING THE EFFECT OF COASTAL DEVELOPMENT ON AVIAN MIGRATION STOPOVER  
 HABITAT IN SIAN KA'AN BIOSPHERE RESERVE, QUINTANA ROO, MEXICO

The eastern coastal ecosystem of the Yucatan Peninsula is one of the most important places for bird migration. Unfortunately, this ecosystem is under increasing development pressure. Conservation of this habitat is very important because at least half of all Nearctic Neotropical migrants depend on this region for stopover or wintering habitat. The effects of development on birds have not been well documented. This information is necessary as a basis for developing a strategy for sustainable development practices for the Mexican government that will incorporate habitat conservation. We selected six sites with three differing levels of coastal development (low, medium and high) in which we monitored fall migration in Sian Ka'an Biosphere Reserve, Quintana Roo, Mexico. We set up 10 mist-nets per site from September to December 2006-2008. We banded for a total of 60 days per site. We sampled for a total of 4324, 4360 and 4028 net-hours for the low, medium and high development sites, respectively. We caught 3, 11 and 12 ind/10 net hours for the high, medium and low development levels, respectively. We captured a total of 132 species across all sites. This project is a pioneer study in that area, and it will provide well documented data about the effects of coastal development on migratory birds.

Abstract (5218); Session G19, Sat 15 August, Location: Houston Hall, Bodek Lounge, Oral at 10:45

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CONSERVATION-RELIANT BIRDS OF HAWAII: ALIEN SPECIES, DISEASE, AND CLIMATE CHANGE

More than one third of federally listed bird species occur in Hawaii. Typical recovery goals for endangered species include a sufficiently large population size and elimination of the threats that endanger the species. For many Hawaiian species, this might not be possible. The most common threats for Hawaiian birds are known, and include exotic invasive species (predators, threaten habitat) and mosquito-borne diseases. These threats are pervasive, recurrent, and treatable, but with current tools we cannot eliminate many of them. For example, Hawaiian Stilts require shallow wetlands that are overgrown by exotic plants if not actively managed. Of particular concern are forest birds that might lose their elevational refugia from mosquitoes because of climate change, if they are not eliminated by habitat destruction from exotic mammals beforehand. Consequently, under traditional concepts many imperiled Hawaiian birds might not be recoverable because they require continued active management. We review the Hawaiian avifauna and identify which species might be delisted based on traditional concepts, and which might be recoverable only within the context of continued management actions.

Abstract (5406); Session S02, Thu 13 August, Location: Houston Hall, Class of '49 Auditorium, Oral at 15:00

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DECODING AN ENIGMATIC SIGNAL: SHORT-RANGE SONG IN DARK-EYED JUNCOS (*JUNCO HYEMALIS*)

The study of song has largely focused on high amplitude, long-range songs (LRS) associated with male-male interactions and mate attraction. In addition to LRS many species also sing a low amplitude, often more complex short-range song (SRS) during courtship that is distinct from LRS and can exhibit a substantially different structure. Little is known about the standing variation in SRS between males or its importance in mate choice and female stimulation. We presented mated, free-living male Dark-eyed Juncos with a caged female conspecific placed near the nest and playback of a female precopulatory trill to elicit courtship behavior and SRS. During the female presentation and playback we recorded SRS from the focal male and later quantified both frequency and temporal characteristics of SRS. We also estimated repertoire size for each male and determined the amount of shared and unique song types within the individuals sampled. These results will be discussed in the context of mate choice and signal design.

Abstract (5417); Session GP30, Fri 14 August, Location: Houston Hall, Hall of Flags, Poster Num: 83

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MALE AND FEMALE PROVISIONING BY PARENT CANADA WARBLERS (*WILSONIA CANADENSIS*) IN NEW HAMPSHIRE

Provisioning rates by parent birds can greatly impact the success of a nest (Weidinger 2002). Much of the parental duties in many socially monogamous birds are divided between males and females (Lack 1968), however, we suspect a disproportionately larger amount of provisioning is done by the female. We video-taped Canada warblers' (*Wilsonia canadensis*) nests (n = 23) in Canaan, NH to record provisioning rates. Females were found to spend significantly more time at the nest ( $152.08 \pm 49.04$ s) and had higher feeding rates ( $9.54 \pm 2.07$  visits/min) than males ( $20.71 \pm 3.02$ s and  $5.53 \pm 0.90$  visits/min, respectively). The average time spent at the nest during a feeding visit was not significantly different between males ( $20.72 \pm 3.12$ s/visit) and females ( $20.80 \pm 6.75$ s/visit). Furthermore, there was no influence of bib size (which is correlated with age) upon feeding rates of males (df = 21, F = 0.027, p = 0.869). These sexual segregations of parental behaviors may help us better understand the nuances of the mating system of this species.

Abstract (5477); Session GP02, Fri 14 August, Location: Houston Hall, Hall of Flags, Poster Num: 9

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MATERNAL INVESTMENT AND THE EFFECT OF HELPERS ON NESTLING GROWTH IN THE FLORIDA SCRUB-JAY

The presence of non-breeding "helpers" in a variety of avian species provides a unique opportunity to investigate the tradeoff between current and future reproduction in breeders. In the presence of non-breeders that will provision nestlings, female breeders may invest more energy into early reproduction and produce higher quality offspring, or they may reduce their investment and allow non-breeders to compensate for this initial reduction through alloparental care. We investigated maternal investment and the effects of non-breeders on nestling growth throughout development in the Florida Scrub-Jay. Nestling mass on the day of hatching (a proxy for investment in the egg) was greater in territories with non-breeders. In addition, mean growth rates between days 0 and 5 post-hatch (when only males provision the nestlings) and days 5 and 11 post-hatch (when non-breeders are allowed access to the nestlings) were significantly higher in territories with non-breeders. These results suggest that female breeders of this species maximize the benefits of non-breeder presence by increasing investment in their offspring, and that the effects of these extra individuals extend throughout the nestling phase.

Abstract (5161); Session G06, Thu 13 August, Location: Irvine Auditorium, Café 58, Oral at 10:45

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HISTORICAL BIOGEOGRAPHY OF TRUMPETERS (GRUIFORMES; *PSOPHIA*) IN THE AMAZON BASIN AND THE QUATERNARY EVOLUTION OF THE AMAZONIAN AVIFAUNA

Despite many theories proposed to explain the high diversity found in the Neotropics, and mainly in Amazonia, no generalization has been possible. Trumpeters (genus *Psophia*) are endemic to Amazonia with no temporally close

extant relatives. They occur in all Amazonian areas of endemism, with morphologically distinct taxa in each of them, and they are cursorial, almost flightless birds with reduced dispersal capabilities. Here we use molecular phylogenetic, phylogeographic, and population genetic analyzes to combine spatial, temporal, and populational approaches to *Psophia's* history. The analyzes reveal eight distinct mitochondrial lineages, corroborating each endemic species. Relationships among these lineages are well supported, revealing an unforeseen "complete" picture of diversification within Amazonia. Diversification has occurred during the last 2 or 3 million years. Signals of recent population expansion were detected within two lineages, pointing to recent changes in distribution patterns. The history of *Psophia* seems to have been influenced by the main Amazonian rivers, which delimit distributions today, but also by large recent shifts in distribution possibly related to the occurrence of climatic oscillations during the Upper Pliocene and Pleistocene.

Abstract (5376); Session G11, Fri 14 August, Location: Cohen Hall, Terrace Room, Oral at 09:15

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#### BIRD COMINGS AND GOINGS IN THE WEST INDIES

My early experiences in Philadelphia, including acquaintance with James Bond (Birds of the West Indies) and working with Robert MacArthur (The Theory of Island Biogeography), stimulated my interest in the geographic and ecological distributions of island birds. Work with George Cox in the early 1970s led to the development of a taxon-cycle theory (in the sense of E. O. Wilson) for the West Indian avifauna. However, only after the general availability of molecular phylogenetic and phylogeographic techniques were Eldredge Bermingham and I able to reconstruct the histories of birds in the archipelago. With the advantages of a time scale and relationships among island populations, we have been able to confirm the dynamics of the taxon cycle, demonstrate repeated phases of expansion and contraction of birds within the archipelago, relate geographic history to ecological distribution, and estimate rates of extinction of island populations. More recent work on hemosporidian parasites of birds has revealed a continuum of dependence to independence of blood parasites on their hosts, and suggested ways in which pathogens might influence distribution and even species formation.

Abstract (5621); Session PL2, Thu 13 August, Location: Irvine Auditorium, Oral at 09:00

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#### BICKNELL'S THRUSH – CONSERVATION IN THE FACE OF LONG ODDS

Bicknell's Thrush is among the Nearctic-Neotropical migrants of highest conservation priority in North America. Its rarity (estimated global population of < 50,000 individuals), restricted breeding and winter distributions, habitat specialization, and vulnerability to multiple rangewide threats are compounded by incomplete knowledge about its overall status. The species exhibits a complex mating system and a highly skewed breeding adult sex ratio. Sexual habitat segregation may occur in winter, and females appear to be limited at some point in the annual cycle. Recent population trend data show conflicting results, with sharply declining populations in Maritime Canada and stable or slightly increasing trends in the U.S. On the species' Greater Antillean wintering grounds, where an estimated 90% of the global population occurs on Hispaniola, loss of forested habitats has been severe and is ongoing. The International Bicknell's Thrush Conservation Group (IBTCG) formed in 2007 to develop and implement a scientifically-based conservation action plan for the species. We will present an overview of the conservation challenges facing Bicknell's Thrush, highlight the IBTCG's primary goals and recommendations, and assess the prospects for this at-risk species.

Abstract (5347); Session S05, Fri 14 August, Location: Irvine Auditorium, Amado Recital Room, Oral at 14:00



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#### CONSERVATION OF FOREST BIRDS: EVIDENCE OF A SHIFTING BASELINE IN COMMUNITY STRUCTURE

Effective conservation of forest avifaunal diversity requires identifying changes in diversity over time and the mechanisms underlying those changes. In this study, we investigated whether observed changes in avian community structure were associated with disturbances to forest habitats. We assessed land cover change from 1985 to 2006 from a series of Landsat TM/ETM+ imagery of 21 study areas, representing 9 forested ecoregions of the conterminous United States. We measured community structure using a similarity index based on the proportional abundance of forest bird species from N.A. Breeding Bird Survey routes. We found substantial changes in community structure associated with the extent and cumulative effects of forest disturbance. Community similarity declined to 0.72, corresponding to a 10-35% change in richness and a 10-80% change in abundance. Forest disturbances were more strongly associated with community structure shifts in the western and northern US. The change in community structure from historical conditions suggests that avian conservation may be exposed to the “shifting baseline syndrome” whereby substantial shifts in diversity are masked by the use of short-term reference conditions to assess change.

Abstract (5364); Session G05, Thu 13 August, Location: Irvine Auditorium, Amado Recital Room, Oral at 12:15

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#### ALARM CALLS OF WHITE-CROWNED SPARROW PARENTS FAIL TO STIMULATE CORTICOSTERONE PRODUCTION IN THEIR OFFSPRING

Parent alarm calls may alert offspring that a predator is nearby and ready them to leave the nest should it become discovered. We tested this hypothesis in the White-crowned Sparrow (*Zonotrichia leucophrys*) to determine if exposure to parent alarm calls stimulated the production of corticosterone (CORT), a hormone known to prepare individuals for stressful conditions. Nestlings were tested at two ages in one of two groups; nestlings in a treatment group were exposed to 4 min of alarm calling by parents prior to blood-sampling whereas nestlings in a control group were blood-sampled without alarm call exposure. In young nestlings, there was no difference in mean CORT levels between treatment and control groups, nor did CORT levels increase after handling. In old nestlings, there was no difference in mean CORT levels between the treatment and control groups; however, CORT levels of old nestlings increased after handling. Why CORT levels did not increase due to alarm calls is unclear but may reflect nestlings' inexperience with alarm calls or may be a way by which nestlings reduce the costs of CORT exposure.

Abstract (5164); Session G24, Sat 15 August, Location: Cohen Hall, Terrace Room, Oral at 16:15

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#### PARTITIONING ANNUAL SURVIVAL OF GREAT LAKES PIPING PLOVERS

Avian mark-recapture studies are typically restricted to a single portion of the annual cycle. A single recapture window facilitates estimation of annual survival, but does not allow the determination of when and where most mortality occurs. We used program MARK and band-resighting data obtained from Great Lakes Piping Plovers (*Charadrius melodius*) throughout breeding and non-breeding seasons (1999-2008) to estimate after hatch year survival during four periods of the annual cycle. We included the date a plover was last seen as an individual covariate to correct for variable exposure periods. Detection probabilities followed an increasing linear trend, averaging 83% in the breeding season and 20% in the non-breeding season. Survival varied by year with a common intercept for each of the four periods. Weekly mortality rates were 3-5x higher during ‘movement periods’ (February –May; June –September) than the ‘non-movement’ periods (September –February; May –June) where plovers remained relatively stationary on breeding or wintering habitats. Our study is one of the first to partition survival rates for a single migratory population over the entirety of its annual cycle.

Abstract (5541); Session A02, Fri 14 August, Location: Houston Hall, Class of '49 Auditorium, Oral at 16:15

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#### THE EFFECT OF WINTER HABITAT TYPE AND DIET ON SPRING ARRIVAL DATES IN AN ENDANGERED SPECIES, THE KIRTLAND'S WARBLER

A growing body of evidence suggests that events within the non-breeding season can affect population processes in subsequent breeding seasons in migratory birds. We tested this hypothesis for the endangered Kirtland's warbler (*Dendroica kirtlandii*). We obtained spring arrival dates and tissue samples for stable isotope analysis from adult males in 2006-2008. In 2006, males from wet winter habitats, and males with more insects in their late winter diets arrived earlier on temperate breeding grounds relative to those from dry habitats and those that consumed more fruit. In 2007 and 2008, no such patterns were found. Unusually wet Bahamian winters preceded these summers, which may have created a surplus of suitable winter habitat, reducing differences among males. This implies that there is variation in the strength of carry-over effects between wet and dry Caribbean winters. Because spring arrival date is an important predictor of reproductive success in many bird species, our results suggest that in dry years, winter habitat and diet quality can produce ecologically relevant carry-over effects on individual Kirtland's warblers during the breeding season.

Abstract (5579); Session GP27, Fri 14 August, Location: Houston Hall, Hall of Flags, Poster Num: 120

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#### URBANIZATION DOES NOT REDUCE AVIAN NEST SURVIVAL IN FOREST PARKS

As accumulating evidence shows that cities host diverse and abundant mesopredator communities, the contribution of urban habitats to avian conservation has been questioned. We tested the relationship between nest survival and the amount of urbanization surrounding 19 remnant forests distributed along a rural-urban gradient in Ohio, USA, 2001-2008. Based on 2794 nests representing 5 species, daily survival rates of nests were lowest for synanthropic species compared to those that avoid urban landscapes. Rates of nest failure in remnant forests were not consistently linked to the amount of urbanization in the surrounding landscape matrix for any of our focal species. In this way, our work provides some reassurance that urban forests do not necessarily promote nest predation. However, predator-prey interactions varied among years, which raises the possibility that high nest predation during only a portion of years might influence behavioral decisions about settlement and site fidelity and eventually scale-up to affect community-level patterns.

Abstract (5254); Session G03, Thu 13 August, Location: Cohen Hall, Terrace Room, Oral at 11:30

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#### MOVEMENTS AND STOPOVER DURATION OF MIGRANT FOREST SONGBIRDS WITHIN DIFFERENT LANDSCAPES

Movements of stopover migrants can be constrained by patch and landscape attributes, but their responses to such attributes is poorly known. During spring 2006-2007, we used radio-telemetry to examine movements and stopover duration within urban forests of Columbus, Ohio (29 Swainson's Thrush; 10 Yellow-rumped Warbler), and agriculturally-dominated forests near Lake Erie (33 Red-eyed Vireo; 38 YRWA). Most individuals at Lake Erie moved widely among forest patches (YRWA: 6.2 km $\pm$ 3.4SD over 3 days; REVI: 0.95 km $\pm$ 0.8 over 1 day). YRWA moved less in urban forests (1.0 km $\pm$ 0.4) and rarely relocated to other patches. SWTH moved 0.58 km( $\pm$ 0.3) over 1 day, used areas farther from forest edge, and also rarely left their release patches (N=3) and this occurred only within the smallest patches (0.7 and 4.5 ha), suggesting area sensitivity within urban forest patches. At Lake Erie, stopover duration was 6.0 days( $\pm$ 3.3) for YRWA, but shorter within urban forest patches (4.2 days $\pm$ 2.7). We found large differences among species in their use of stopover habitat and that behavior can vary within species in response to different stopover habitats.

Abstract (5607); Session G19, Sat 15 August, Location: Houston Hall, Bodek Lounge, Oral at 11:00

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#### NEST SUCCESS OF THE TROPICAL BLACK CATBIRD IN THE NORTH COAST OF SIAN KA'AN BIOSPHERE RESERVE, MÉXICO

The Black Catbird (BLCA, *Melanoptila glabrirostris*) is a poorly known mimid endemic to the Yucatán Peninsula. We determined BLCA nesting success in a littoral forest of the Sian Ka'an Biosphere Reserve, Quintana Roo, México. We monitored 61 nests of which only 12 (20%) were successful and fledged young. Using the logistic exposure method to model nest survival, and Akaike's information criterion to compare several hypotheses related to the factors affecting nesting success, we found that nest age was the most important factor explaining daily nest success, indicating a cubic-age effect. Daily survival rate was 0.802 and the interval nest success (percent nests surviving the entire nesting period) was low (0.2%) compared with estimates for other tropical bird species. We suspect that predation was the main cause of nest failure.

Abstract (5262); Session GP02, Fri 14 August, Location: Houston Hall, Hall of Flags, Poster Num: 10

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#### MICROHABITAT ASSOCIATIONS OF WINTERING BIRDS IN A SOUTHEASTERN BOTTOMLAND FOREST WITHIN THE EASTERN GULF COASTAL PLAIN

We measured microhabitat characteristics at point count stations within the Choctawhatchee River Basin in the Florida Panhandle, and used this data to assess microhabitat characteristics affecting the occupancy of thirty-five wintering birds. Occupancy of birds was similarly influenced by both structural and floristic characteristics. Microhabitats that most frequently affected the occupancy of species included tupelo basal area, number of stems, presence of water, and tree community. To demonstrate the utility of this research, we closely examined the wintering microhabitat of the Rusty Blackbird (*Euphagus carolinus*). Model averaged estimates revealed that Rusty Blackbirds preferred ash forest but had negative associations with tupelo forest and stems. This study provides a foundation for further analyses of Rusty Blackbird wintering habitat and changes during preceding decades that may correspond with population declines. These habitat relationships allow for a more thorough understanding of complex ecosystem interactions and provide land managers with the necessary tools for targeting individual species.

Abstract (5352); Session G17, Fri 14 August, Location: Houston Hall, Bodek Lounge, Oral at 14:30

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#### RANGE-WIDE AND FULL LIFE-CYCLE MONITORING AND HABITAT ASSOCIATIONS OF GOLDEN-WINGED WARBLER

Based on surveys from 1999 to 2008, more than 70% of Golden-winged Warblers (GWWA) occur in the Great Lakes region from northern New York and Ontario to Minnesota; these populations have declined since 1998. In the Appalachian region, GWWA persists as small, disjunct, and rapidly declining populations surrounded by expanding Blue-winged Warblers. A wide variety of disturbed and other shrubby habitats are used for breeding, with a subtle but significant preference for aspen-dominated clearcuts in the upper Midwest and for alder-associated wetlands rangewide. In 2008 we initiated a spatially balanced design to monitor rare and patchily distributed Appalachian populations. Also in 2008-09 we began wintering-ground surveys in Central and South America, based on a model of potential distribution of the species using Maxent. A total of 179 GWWA was recorded at 332 sites in Nicaragua, Colombia, Costa Rica, and Panamá. Most of these occurred in secondary (50%) or primary (26%) forest, with only 24% in Agroecosystems; these results parallel intensive studies of wintering GWWA in Costa Rica. Full life-cycle research and monitoring will be necessary for successful GWWA conservation.

Abstract (5458); Session S08, Fri 14 August, Location: Irvine Auditorium, Amado Recital Room, Oral at 11:30

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#### STATE OF THE BIRDS I: ARIDLANDS, GRASSLANDS, FORESTS, AND URBAN BIRDS

We created population indicators for major terrestrial habitat categories (aridlands, grasslands, forests), based on composite 40-year change data from either the North American Breeding Bird Survey, Christmas Bird Count, or USFWS surveys. The population indicator for 17 of 30 obligate species in aridlands (deserts, sagebrush, chapparal)

showed a steady decline over 40 years, to nearly 30% below the 1968 baseline value. Similarly, the indicator for grasslands, based on 24 of 25 obligate species, dropped by nearly 40%. The forest-birds indicator, based on 96 obligate species, showed a decline of 10% through the 1980s, with a slight recovery in recent years. Birds of eastern forests (especially species of early successional forest) declined more than species of western or boreal forests. In contrast, an indicator based on 114 native species that breed secondarily in urban/suburban habitats showed an increase of 20% over 40 years. Habitat loss and fragmentation due to urban development is the major threat to forest and aridland birds, whereas agricultural practices and policy will determine the future of grassland birds in landscapes where little native prairie remains.

Abstract (5448); Session S11, Sat 15 August, Location: College Hall, Room 200, Oral at 15:00

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#### GOLDEN-WINGED WARBLER ECOLOGY IN ASPEN FORESTS MANAGED WITH LEGACY TREE RETENTION

Legacy trees are large canopy trees retained during previous clearcut harvests, and are increasingly being incorporated into even-aged forest management prescriptions in the Midwestern United States. We investigated the impact of legacy tree retention on Golden-winged Warbler breeding ecology in managed even-aged aspen forests in northern Wisconsin. We compared the breeding density, nesting success, and nest site and territory selection characteristics across three legacy tree retention treatments: no retention (n=3), conifer retention (n=3), and hardwood retention (n=3). Golden-winged Warbler territorial male density was higher in the two retention treatments relative to the no retention treatment. Nest success was higher in the retention treatments but primarily due to the almost complete lack of breeding activity in the no retention treatment. Boundaries of male territories in the no retention treatment were more likely to include the clearcut edge bordering older forest than in the retention treatments. This suggests that Golden-winged Warblers may preferentially avoid edges when scattered legacy trees are present for singing perches and foraging. These results suggest that legacy tree retention is an easy, cost-effective forest prescription to enhance Golden-winged Warbler breeding habitat.

Abstract (5358); Session S08, Fri 14 August, Location: Irvine Auditorium, Amado Recital Room, Oral at 11:00

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#### EJACULATE QUALITY, PLUMAGE COLORATION AND REPRODUCTIVE PHENOTYPE IN THE RED-BACKED FAIRY-WREN

Understanding how pre- and post-copulatory sexually selected traits covary can provide insight into the evolution of male ornamentation and female choice. In this study, we examined ejaculate quality in relation to plumage color and social status in the genetically promiscuous red-backed fairy-wren (*Malurus melanocephalus*). In this species, males exhibit three reproductive phenotypes: males can breed in red and black plumage, breed in brown plumage, or act as brown plumed non-breeding auxiliaries. We found red-black breeders invested more heavily in spermatogenic tissue, had larger sperm reserves, and tended to have greater numbers of sperm in ejaculate samples, when compared to brown breeders and auxiliaries. Within red-black breeders, plumage redness and saturation were negatively correlated with ejaculate sample sperm density. Additionally, sperm motility appeared to be related to variation in plumage coloration such that, overall, males with less elaborate ornamentation showed greater ejaculate quality. These results are consistent with predictions from sperm competition theory, which suggests males should increase investment into ejaculates when faced with a greater level of sperm competition or when they have a low probability of securing future matings.

Abstract (5518); Session G09, Thu 13 August, Location: Irvine Auditorium, Café 58, Oral at 17:00

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#### CAUSES AND CONSEQUENCES OF SOCIALITY IN AFRICAN STARLINGS

The African starlings are a socially and morphologically diverse group. Here, we use phylogenetically-controlled comparative analyses to explore the environmental causes and morphological consequences of sociality in this group. First, we show that cooperative breeding is positively associated with living in semi-arid savanna habitats and with temporal variability in rainfall. Using long-term rainfall data from across Africa, we demonstrate that savanna habitats are not only highly seasonal, but also temporally variable and unpredictable. Cooperative breeding is likely to be adaptive in temporally variable environments because it allows both for reproduction in harsh years and for sustained breeding during benign years. Second, we show that the degree of sexual dimorphism in plumage and body size is

reduced in cooperatively breeding species as a result of increased selection on females for traits that increase access to mates, resources, or higher social status within the group. In social species where there is unequal sharing of reproduction among females, and where female rank influences access to mates and other resources, intrasexual competition among females may be intense and ultimately select for female trait elaboration.

Abstract (5180); Session S09, Sat 15 August, Location: Cohen Hall, G17 Auditorium, Oral at 09:30

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#### FOREST FAVORED ACROSS SPECIES IN TROPICAL BIRD COMMUNITY

There have been noted inconsistencies in responses of bird populations across landscapes to habitat loss and fragmentation, widely attributed to the effects of the matrix habitats in which focal habitat fragments are typically embedded. We broadly quantified potential effects of the inter-patch matrix by estimating occupancy and colonization of forest and surrounding non-forest matrix by using a dynamic multi-species hierarchical model on a diverse community of birds in southwestern Costa Rica. We found higher levels of occupancy and colonization of forest across species in comparison to the non-forest matrix. Species' prior ecological classification of forest dependency was a poor predictor of overall occupancy dynamics of both habitat types. We also identified species of conservation concern, defined by having high estimates of occupancy of forest, and low estimates of occupancy and colonization of non-forest. We propose the use of the presented hierarchical community model to estimate occupancy dynamics of focal and inter-patch matrix habitats to identify which species in a community, specific to a region of interest, are likely to be most vulnerable to the effects of habitat loss and fragmentation.

Abstract (5163); Session G12, Fri 14 August, Location: Irvine Auditorium, Café 58, Oral at 11:15

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#### POSITIVE ANTIOXIDANT BALANCE OVER THE BREEDING SEASON PREDICTS REPRODUCTIVE PERFORMANCE IN BARN SWALLOWS

Antioxidants can confer somatic and reproductive benefits in many animals, but most prior evidence for this has centered on captive animal experimentation or single-time-point sampling (i.e. conditions at the onset of development or breeding). Another means by which to assess antioxidant contributions to animal performance is by tracking an individual's ability to increase or sustain antioxidant titers over time, in the face of oxidative crises, life-history challenges, or in association with phenotypic or behavioral attributes. In a field study of breeding barn swallows from the North American intermountain west, we found that males and females who were in positive antioxidant balance across the breeding season experienced increased social reproductive success. This was true even when controlling for plumage coloration, which also predicts fitness in this species and was positively correlated with circulating antioxidant concentrations. While reproduction itself is purported to impose oxidative stress on organisms, these data suggest that free-ranging, high-quality individuals can mitigate such costs, by one or several genetic, physiological, and environmental (e.g. diet) mechanisms.

Abstract (5251); Session G10, Thu 13 August, Location: Irvine Auditorium, Amado Recital Room, Oral at 16:45

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#### COMPARISON OF TREE-BUILDING METHODS FOR RECENTLY DIVERGED COMMON CHAFFINCH POPULATIONS (*FRINGILLA COELEB* SSP.) USING MULTILOCUS SEQUENCE DATA

Estimating molecular phylogenies of recently diverged, rapidly radiated or hybridizing species is difficult due to stochasticity in the lineage sorting process. Furthermore, the traditional practice of using a single individual to represent a species may further increase the probability of estimating the wrong species tree when species are not sorted into reciprocally monophyletic groups. We used 9 intron loci and the control region of mtDNA to infer evolutionary relationships among putative subspecies of the common chaffinch (*Fringilla coelebs*) believed to have diverged within the last million years. This widespread Palearctic species, distributed in Europe and Northern Africa (including the Atlantic islands), has marked phenotypic and behavioural differences between different populations. We compare and contrast resulting trees from the concatenated Bayesian analysis with the Bayesian hierarchical analysis (BEST) and discuss its implications. In addition, we use coalescent analysis to estimate population genetic parameters, including migration rates and divergence times among subspecies.

Abstract (5343); Session G21, Sat 15 August, Location: Houston Hall, Class of '49 Auditorium, Oral at 15:00

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#### PHYLOGEOGRAPHY OF *CINCLODES FUSCUS*, AN OVENBIRD OF THE ANDES AND PATAGONIA

We investigated genetic variation in *Cinclodes fuscus* (Bar-winged Cinclodes), a widespread and common species of ovenbird that breeds from Tierra del Fuego to the northern Andes. Traditionally, *C. fuscus* has been considered a single species composed of nine subspecies, but its long and narrow range suggests the possibility of considerable genetic variation among populations. Sequences of two mitochondrial genes revealed three discrete and geographically coherent groups of *C. fuscus*, occupying the southern, central, and northern Andes. Surprisingly, phylogenetic analyses indicated that these groups were more closely related to other species of *Cinclodes* than to each other. Implications of these findings will be discussed.

Abstract (5449); Session G15, Fri 14 August, Location: Cohen Hall, Terrace Room, Oral at 14:30

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#### EVOLUTIONARY PHOTONICS OF AVIAN AMORPHOUS NANOSTRUCTURES

Non-iridescent structural colors in avian feather barbs are produced by quasi-ordered or amorphous photonic nanostructures of beta-keratin and air. To physically characterize organismal structural color production, we need a precise 3D knowledge of the nanostructure. Current techniques like SEM/TEM do not provide 3D data. Synchrotron small Angle X-ray Scattering (SAXS) is an ideal crystallographic tool to investigate surface and bulk structural correlations of nanoscale artificial and natural photonic materials. We use SAXS to characterize the spatial organization of avian barb photonic nanostructures. We collected SAXS data from ~210 distinct structurally colored plumage patches belonging to ~150 avian species at the Advanced Photon Source, Argonne National Labs. We use single scattering theory to predict the optical reflectance directly from the SAXS structural information. Our results are not only congruent with optical reflectance measurements, but offer substantial improvements over 2D-Fourier analysis of TEMs. Using SAXS, we are also reliably able to distinguish between the two classes of barb nanostructures—spheres and channels.

Abstract (5466); Session G14, Fri 14 August, Location: Cohen Hall, G17 Auditorium, Oral at 16:00

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#### EFFECT OF INVASIVE PLANTS ON STOPOVER HABITAT QUALITY FOR SONGBIRDS

Stopover habitat is essential to migrating songbirds, and is particularly important in areas where bottlenecks or barriers occur, such as coastal shorelines and peninsulas. Yet these areas often are severely impacted by human influences, including the presence of invasive plant species. Large amounts of invasive plants may be indicative of poor habitat quality, providing insufficient foraging opportunities for migrants. We banded birds at Presque Isle State Park, Erie, Pennsylvania, along the southern shore of Lake Erie, at three sites with differing levels of invasive plant species during fall migration of 2008 (about 1600 birds captured) and spring migration of 2009. We are interested in getting feedback on additional methods of assessing migrant condition in order to evaluate the quality of the habitat in these areas. This is an ongoing study and we plan to make future habitat management recommendations based on this work.

Abstract (5545); Session GP21, Fri 14 August, Location: Houston Hall, Hall of Flags, Poster Num: 115

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#### BIRD-MONITORING PROGRAMS AND STATE OF THE BIRDS SUMMARIES

We used data from the North American Breeding Bird Survey (BBS, 365 species), the Christmas Bird Count (CBC, 120 species), and the Waterfowl Breeding Population and Habitat Survey (WBPHS, 13 species) to construct composite time series for a variety of indicator groups for the State of the Bird report. For each indicator group, input data consisted of estimates of change from a base year (1968) to all subsequent years. For the BBS and CBC, change estimates were computed using log-linear hierarchical models; for the WBPHS estimates were based on population

estimates calculated yearly from the survey data. CBC data were interpolated to accommodate the seasonal timing of the survey. Yearly change estimates were summarized into a composite estimate of change using a hierarchical model in which species change parameters were considered to have a common lognormal distribution. The mean of the change parameters was used as the estimate of composite change. This summary analysis accommodates differences in precision among estimates, and is similar to methods used in the United Kingdom. We implement the procedure for several indicator groups.

Abstract (5351); Session S11, Sat 15 August, Location: College Hall, Room 200, Oral at 14:30

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#### COORDINATING BOTH HEMISPHERES DURING THE PRODUCTION OF SONG

Song production is striking in its asymmetry at the peripheral level. The syrinx is a bipartite vocal organ that is divided into left and right halves that each contains an independent membranous sound source. Both sides can produce different sounds at the same time and in many cases, sound generation can rapidly alternate between sides. In all cases, the acoustic output is completely smooth suggesting a tremendous degree of synchronization between each syringeal half. Song production is produced by a discrete set of brain structures, known as the song system, and muscles on each half of the syrinx receive their respective motor commands from the song system in the ipsilateral hemisphere. Vocal motor commands generated in each hemisphere must therefore be highly coordinated to allow this high degree of synchronization. In this talk I will discuss how bilaterally connected circuits in the vocal-respiratory brainstem play a fundamental role in coordinating vocal motor activity in both hemispheres.

Abstract (5572); Session S03, Fri 14 August, Location: Cohen Hall, G17 Auditorium, Oral at 12:00

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#### STATE OF THE BIRDS DISCUSSION: QUESTIONS, COMMENTS, AND FUTURE DIRECTIONS

The 2009 State of the Birds Report provided a new synthesis of the population status of North American birds, and planning is underway for the 2010 report. Input from the ornithological community will be critical in guiding the development of future reports and in improving the use of indicators as summary measures of status within regional habitats. This moderated session provides an opportunity for additional discussion of topics addressed in the symposium presentations. It also will provide an opportunity for ornithologists to ask questions to participants in the State of the Birds project and to provide comments regarding the analyses and results. In particular, we welcome commentary from scientists regarding (1) the use of indicators of regional habitats; (2) the species groupings used as indicators in the report; (3) analysis and summary methods; and (4) useful future directions for the reports.

Abstract (5408); Session S11, Sat 15 August, Location: College Hall, Room 200, Oral at 17:00

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#### EPIGENETIC VARIATION IN TWO POPULATIONS OF HOUSE SPARROWS

Invasive species can devastate ecological communities, but the traits that make some species successful invaders and others less so remain elusive. It is thus important to identify characteristics that promote successful range expansion. One likely candidate is phenotypic plasticity. Epigenetic modification of the genome is one potential mechanism for plasticity. We used methylation sensitive-AFLP to identify methylation in house sparrows (*Passer domesticus*) from Tampa, Florida and Kenya, Africa. Both populations are introduced but one (Tampa) has been established for more than 150 years whereas the other (Kenya) was introduced only about 50 years ago and continues to expand today. Our goals were to determine if epigenetic variation i) existed among individuals, ii) could be reliably scored, and iii) differed between populations, the latter of which would indicate epigenetic modification as a mediator of invasion success. We detected epigenetic variation among individuals and were able to reliably score 24 loci, using a simple and repeatable technique. Epigenetic variation was different between Tampa and Kenya. Analyzing additional populations will resolve whether differences are due to invasion history or prevailing environmental conditions.

Abstract (5315); Session GP17, Fri 14 August, Location: Houston Hall, Hall of Flags, Poster Num: 47

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#### MICROSATELLITE ANALYSIS OF POPULATION STRUCTURE IN THE HOUSE SPARROW

The house sparrow (*Passer domesticus*) has been introduced throughout the world. To ascertain relationships among populations and thus identify physiological mediators of colonizations (independent of ancestry), we characterized genetic structure of 14 locales using nine microsatellites. Individuals were screened from seven Old World samples (Bulgaria, Germany, Italy, Norway, Spain, Sweden, and Turkey), five New World samples (Arizona, Kentucky, Massachusetts, Mexico, and Tampa), and two more recent invasions (Kenya, and Panama). Bayesian clustering identified three major groups: Old World birds, New World birds (including Panama), and Kenyan birds. Similar results were observed in pairwise F-statistic estimates: Kenya was distinguishable from all other populations whereas the majority of non-significant comparisons occurred among Old World samples. Genetic diversity estimates indicate that Old World samples are the most diverse, and Kenya is the least diverse; New World samples were intermediate. Collectively, results indicate that introductions may reduce genetic diversity in the short term, but the differences among diversity estimates are not great in magnitude, which suggest that either multiple waves of individuals were introduced or, once established, populations rapidly return to large sizes.

Abstract (5313); Session G08, Thu 13 August, Location: Houston Hall, Bodek Lounge, Oral at 16:00

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#### ECOLOGICAL CHARACTERIZATION OF SAY'S AND EASTERN PHOEBES AT MULTIPLE SPATIAL SCALES

We assessed the interspecific relationships between Say's (*Sayornis saya*) and Eastern (*S. phoebe*) phoebes at multiple scales by developing ecological niche models (ENM) at two spatial extents, continent wide and their contact zone in the Great Plains, and comparing model predictions with local-scale surveys. The two species showed significant differences in environmental attributes, primarily precipitation, temperature, and vegetation indices at both extents. Local-scale surveys from between -97° to -101° longitude around 39° latitude showed an increase in the ratio of Say's to Eastern occurrences from east to west from, 0:33 to 17:13. Local-scale occurrence of Say's Phoebe concurred with ENM at continental and contact zone extents. Local-scale occurrence of Eastern Phoebe coincides similarly with bioclimatic factors, but less closely for vegetation indices at the contact zone extent. Say's Phoebe nest sites were found more often in open country. Alternately Eastern Phoebe nest sites were found primarily along woodland streams, but also at six locations where Say's Phoebe had nested previously. At contact zone extents the niche space of Eastern Phoebe was embedded more into Say's Phoebe space than the converse.

Abstract (5174); Session G17, Fri 14 August, Location: Houston Hall, Bodek Lounge, Oral at 14:15

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#### NEOTROPICAL BIRDS ONLINE: A NEW, COMPREHENSIVE RESOURCE FOR INFORMATION ON THE BIRDS OF CENTRAL AND SOUTH AMERICA AND OF THE CARIBBEAN

Neotropical Birds Online (<http://neotropical.birds.cornell.edu/portal/home>) is an authoritative, comprehensive resource for life histories of Neotropical birds. The scope is all bird species regularly occurring in the western hemisphere south of region covered by Birds of North America: species that occur from Mexico and the Caribbean south to southernmost South America. Topics covered in each online account include appearance and identification, distribution, habitat, diet, foraging behavior, nesting biology, conservation status, and priorities for future research. The online format allows authors to revise their species accounts to keep pace with new research and new findings. It also allows the incorporation of rich media such as sound recordings and video in the account. Neotropical Birds Online is a collaborative project. Not only will it be useful to researchers, birders, and managers who are interested in birds of the neotropics, but it will be \*created\* by that same community of specialists. The accounts are developed



within a moderated wiki environment where web pages for every species are designed to enable anyone with information to access, contribute, or modify content.

Abstract (5509); Session GP19, Fri 14 August, Location: Houston Hall, Hall of Flags, Poster Num: 49

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**COLONIZATION OF A NOVEL ENVIRONMENT MAY INFLUENCE INTRASEXUAL DOMINANCE BEHAVIOR IN THE DARK-EYED JUNCO (*JUNCO HYEMALIS THURBERI*)**

In this study we examined the intensity of intrasexual aggression and predictors of dominance in captive flocks of males and females that were raised in a common garden study from two recently diverged populations of dark-eyed juncos, an ancestral population located in the Laguna Mountains, and a recently established coastal population located on the UCSD campus. Males from the colonist population have lower levels of testosterone, display less territorial aggression, are less ornamented, and more boldly explore novel environments, all of which are factors known to be related to intrasexual aggression and dominance. We predicted that rapid changes in dominance behavior might have occurred post-colonization. We quantified the rates of aggressive encounters within same sex 10 member flocks, and determined who won each interaction in order to establish hierarchies. Preliminary data indicate that within a flock, the UCSD males interact significantly more than the montane males and that phenotypic predictors of dominance may be different between the two populations. Ongoing research will focus on which phenotypic characteristics predict dominance within each flock employing previously collected behavioral, morphological, and hormonal data.

Abstract (5304); Session GP29, Fri 14 August, Location: Houston Hall, Hall of Flags, Poster Num: 79

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**CONSERVATION RELIANT SPECIES: OUR NEW RELATIONSHIP WITH NATURE**

The recovery (delisting) of a threatened or endangered species is often accompanied by the expectation that conservation management of the species will no longer be necessary. However, the magnitude and pace of human impacts on the environment make it unlikely that substantial progress will be made in delisting many species unless the definition of "recovery" includes some form of active management. Preventing de-listed species from again being at risk of extinction may require continuing, species-specific management actions. I characterize such species as "conservation-reliant", and suggest that viewing New Jersey "recovery" as a continuum of states rather than as a simple "recovered/not recovered" dichotomy may enhance our ability to manage such species within the framework of the Endangered Species Act. With ongoing loss of habitat, disruption of natural disturbance regimes, and the increasing impacts of non-native invasive species, it is probable that the number of conservation-reliant species will increase.

Abstract (5615); Session S02, Thu 13 August, Location: Houston Hall, Class of '49 Auditorium, Oral at 14:00

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**MAKING BRIGHTS BRIGHTER: FLUORESCENCE AND SEXUAL SIGNALING IN THE BIRD-OF-PARADISE GENUS *CICINNURUS* (PARADISAEIDAE)**

UVA induced fluorescence of avian plumage occurs when UVA light is absorbed then emitted at a longer wavelength of light, often visible to humans. This phenomenon has only been documented in three avian families and its role in sexual signaling is contentious. UVA induced fluorescence was found to occur in two species of Birds-of-Paradise (Paradisaeidae); *Cicinnurus magnificus* and *C. respublica*. These two species are sexually dimorphic with the male traits greatly exaggerated by sexual selection. The fluorescent plumage is restricted to a homologous yellow nape 'cape' that is integral in both species' male courtship displays. The role of the fluorescence in this sexual signal was assessed using reflectance spectroscopy. The fluorescent emission was found to represent ~9% of the reflectance at the peak emission wavelengths for both species. This represents a significant increase in the radiance of the feather patch and is likely to represent a significant change in the perceived hue as well. This is the first evidence of fluorescent plumage in the order Passeriformes as well as the first unambiguous case of fluorescence as a sexual signal.

Abstract (5193); Session GP05, Fri 14 August, Location: Houston Hall, Hall of Flags, Poster Num: 16

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#### AVIAN COMMUNITY RESPONSE TO FOREST MANAGEMENT FOR CERULEAN WARBLERS IN THE CENTRAL APPALACHIANS

The Cerulean Warbler Silviculture Project is a multi-state collaborative experiment testing forest management practices on seven study areas to benefit Cerulean Warbler breeding populations in their core range. Pre-harvest (2005-2006) and post-harvest (2007-2008) data from territory mapping of seven target species and point count surveys indicate a variety of species-specific and avian community changes relating to harvest intensity (light single-tree selection, intermediate shelterwood, heavy even-age). Some untreated reference plots exhibited considerable annual variation, however, increases in species richness have occurred in heavy treatments at most sites. Cerulean Warbler territory density was maintained or increased in light and intermediate harvest plots, similar to responses by some shrub-dependent species such as Hooded Warbler. Ovenbird territory density declined in treatment plots overall. Results suggest that harvesting trees to create forest gaps may benefit populations of Cerulean Warblers and other gap-dependent species, but management may need to consider species sensitive to interior forest disturbance. Analysis of avian community changes using annual measurements of treatment effects on forest structure and composition is underway, and additional data will be collected in 2009-2010.

Abstract (5353); Session G20, Sat 15 August, Location: Cohen Hall, Terrace Room, Oral at 09:30

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#### RECENT ADVANCES IN AVIAN BIOGEOGRAPHY ON SOUTHEAST ASIAN ISLANDS

Working mainly from the perspective of Borneo, we have discovered several phylogeographic patterns that challenge traditional views of bird evolution in SE Asia. Comparisons of swifts, leafbirds, thrushes, spiderhunters, and other groups have shown that Borneo's lowland populations are deeply divided. Such large divergences, both within and between islands, dispute the idea that sea-level changes caused by late Pleistocene glaciations led to diversification of birds in Sundaland. Although sea-level changes undoubtedly connected and disconnected populations, such events must have occurred much earlier than the late Pleistocene. Our comparisons have also shown that Borneo's montane populations are closer to taxa on other Sunda Islands than to lowland congeners on Borneo. This finding disputes the idea that montane endemics on Sunda Islands evolved in situ as a result of isolation from sea-level changes. More generally, our findings suggest that: the Philippines have more endemic species than currently recognized, the Philippines played a key role in avian diversification in the Indo-Malayan Archipelago, and mainland Asia was invaded and colonized, presumably numerous times, by taxa that originated on the Sunda and Philippine islands.

Abstract (5325); Session G11, Fri 14 August, Location: Cohen Hall, Terrace Room, Oral at 10:30

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#### CAN WE MAKE GLASS SAFE FOR BIRDS ?

Studies in Austria, building on research published by Klem, have evaluated the relative effectiveness of glass-pattern variables in deterring collisions. Starting in 2004, Roessler and collaborators used a test apparatus, the 'Roessler-Zuna Tunnel', to give birds in flight a choice between plain glass and glass with an applied pattern. Pattern variables included line color and width, orientation, spacing and surface coverage. By linking the project to the banding station at the Biological Station Hohenau Ringelsdorf, it was possible to obtain significant sample sizes for each pattern. Deterrence ranged from 0% (for plain glass) to over 90%. While it seems unlikely that glass appearing completely

transparent to people can be made deterrent to birds, there exist highly effective options covering less than 7% of the glass surface. Short-term, permanent and retro-fit solutions should be considered separately. There is a strong need for effective patterns to be tested in actual buildings and for more testing of commercially available materials.

Abstract (5431); Session A01, Thu 13 August, Location: Cohen Hall, Terrace Room, Oral at 15:00

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#### SURVIVAL AND FATE OF MISSOURI RIVER LEAST TERN AND PIPING PLOVER NESTS - DOES MONITORING INTENSITY MATTER?

Nest monitoring has many objectives, such as identifying threats of nest loss, guiding management decisions to minimize nest mortality, estimating nest survival, and providing foundation for population models. Accuracy of nest monitoring data improves as monitoring intensity increases. Infrequent nest visitation can lead to imprecise information on vital rates and factors potentially requiring management. However, intense monitoring may be difficult to achieve when nests are patchily distributed in large landscapes with challenging access and limited monitoring resources. Productivity of Least Terns and Piping Plovers on the Missouri River has been monitored since 1986 under a "low-intensity" protocol of 7-10 day nest-visitation intervals. We evaluated this protocol using a simultaneous "high-intensity" approach of 2-3 day nest-visitation intervals. Nest detection under the low-intensity approach was 61-81% for Least Terns and 28-59% for Piping Plovers. However, detection of failed nests by the low-intensity approach was 35-37% for Least Terns and 23-29% for Piping Plovers, producing inflated nest survival estimates. Results of this study illustrate how monitoring design can influence conclusions about productivity, with potential implications for management actions aimed at conservation.

Abstract (5502); Session G16, Fri 14 August, Location: Irvine Auditorium, Café 58, Oral at 14:15

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#### GALAPAGOS RAIL POPULATION CHANGE AND OCCUPANCY ASSOCIATED WITH HABITAT INVASION BY THE RED-BARKED QUININE TREE

Species on oceanic islands are more likely to be endemic as well as more extinction prone than those on continents. As a case in point, the Galápagos Archipelago supports an endemic rail, *Laterallus spilonotus*, of unknown status that is presently known to occur on just 4 of its 7 previously occupied islands and facing multiple threats to its persistence. In this study, we compared the rail's population status at 193 survey points between 2000 and 2007 on Santa Cruz Island and examined the influence of an invasion of the species' habitat by an exotic tree, the red-barked quinine tree (*Cinchona pubescens*). We detected a 13% reduction in rail occupancy and a 31% reduction in abundance between 2000 and 2007. Rail abundance declined more in low elevation areas (< 719 m) and outside of *Cinchona pubescens* removal areas. Rail occupancy was influenced primarily and positively by fern cover. Insofar as Galápagos rails responded positively to management actions that maintain native vegetation, we conclude that restoration projects that restore native vegetation communities benefit this apparently declining endemic bird for which more focused conservation attention is warranted.

Abstract (5240); Session G12, Fri 14 August, Location: Irvine Auditorium, Café 58, Oral at 11:30

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#### SEXUAL DICHROMATISM IN TANAGERS AND CARDINALS: EVOLUTION FROM AN AVIAN PERSPECTIVE

The tanagers (Thraupidae) exhibit a variety of plumage colors and patterns with roughly half of the species considered sexually dichromatic from a human visual perspective. Although tanagers have been important in studies of sexual dichromatism, previous studies have not taken the avian visual system into account. We measured reflectance spectra from 331 species in Thraupidae and 47 species in Cardinalidae, the sister clade to tanagers. To measure levels of dichromatism from an avian perspective, scores were calculated using the Vorobyev-Osorio color discrimination model for homologous color patches between males and females. We show that humans do not correctly classify dichromatic species, with 93.3% of tanagers and cardinals classified as monochromatic actually being dichromatic from an avian perspective. Our analyses also reveal different patterns in dichromatism scores between Thraupidae and Cardinalidae and show phylogenetic signal when mapped onto individual clades within tanagers.

Abstract (5519); Session G14, Fri 14 August, Location: Cohen Hall, G17 Auditorium, Oral at 16:15

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#### HOW MANY NESTS ARE IN THE POPULATION? A SYSTEMATIC EVALUATION OF THE HORVITZ-THOMPSON ESTIMATOR FOR NESTS PRESENT BUT UNDETECTED

In nest searching studies, researchers may want to know the total number of nests in their study area. The purpose of my study was to evaluate the reliability of one method for estimating the number of nests in a population, the Horvitz-Thompson estimator. I used a simulation to generate nesting histories, apply nest detection rates, and estimate nest survival and the H-T estimator. By sampling from a known population I could directly compare the estimated number of nests based on the H-T estimator to the actual number of nests. I found that the H-T estimator is most accurate at high rates of nest detection and nest survival. Over all ranges of nest survival, the H-T estimator tends to be most accurate when successful nests had ~90% to 95% chance of being detected. As nest detection rates increased, the H-T estimator was biased 10-15% high, especially at lower nest survival rates. The accuracy of the H-T estimator decreased precipitously as the nest detection rate dropped below 90%. These patterns held even when nest survival and nest detection rates varied temporally.

Abstract (5455); Session G13, Fri 14 August, Location: Houston Hall, Bodek Lounge, Oral at 11:45

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#### SHOULD WE EXPECT TRADEOFFS IN CONDITION-DEPENDENT SEXUALLY-SELECTED TRAITS?

Evidence is mixed for tradeoffs in investment among sexually-selected traits (e.g., do brighter birds have duller songs?). I show that outcomes depend on how resources are distributed. Consider two sexually-selected traits (song and plumage), and assume that one unit of investment has the same payoff for both traits. If all receive exactly the same quantity of resources, the trivial outcome is a perfect negative correlation ( $r = -1.00$ ) between investment in song and plumage. A more realistic scenario is where resources are normally distributed among individuals. Using random normal deviates for 100 individuals, and 1000 replicates, the relationship between song and plumage remained significantly negative (mean  $r = -0.54$ ). However, a normal distribution of resources probably reflects an intraspecific situation. If interspecific patterns in extra-pair paternity reflect intensity of selection on song and plumage, many species probably invest few resources, and few species invest many resources, in these traits (a negative binomial distribution). In this case, the relationship between song and plumage was not significant (mean  $r = 0.00$ ). These findings apply broadly to the study of tradeoffs.

Abstract (5342); Session GP28, Fri 14 August, Location: Houston Hall, Hall of Flags, Poster Num: 75

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#### RESOLVING THE PHYLOGENETIC RELATIONSHIPS AND TEMPORAL HISTORY OF THE CAPRIMULGIFORMES

Recent molecular work supports the monophyly of Caprimulgiformes (including an embedded Apodiformes) but basal relationships have remained difficult to resolve. We combined available molecular sequences and a new morphological data set in order to investigate basal relationships and to place a number of fossil taxa within the caprimulgiform tree, a goal being to estimate the temporal history of the group. Our results support the monophyly of Caprimulgiformes with an included "apodiform" clade, with some reservations regarding the inclusion of *Steatornis*. The relationships among the families outside the "apodiform" clade are not congruent across the different analyses due to a fundamental difference in the molecular and morphological results regarding the relationship of the Caprimulgidae with Nyctibiidae and Podargidae. The inclusion of numerous fossil taxa in the morphological data set,

and as constraints for molecular dating analyses adds important information regarding the temporal history, suggesting a Cretaceous origin of the Caprimulgiformes with the “apodiform” clade evolving in the early Palaeogene and the modern hummingbirds (Trochilidae) in the Eocene.

Abstract (5552); Session G21, Sat 15 August, Location: Houston Hall, Class of '49 Auditorium, Oral at 16:30

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#### SIBLING COMPETITION AND PARENTAL PROVISIONING IN NESTLING CAROLINA CHICKADEES.

Carolina chickadee (*Poecile carolinensis*) nests were observed to determine whether sibling interactions influence parental provisioning and/or nestling growth rate. We predict that a hierarchy exists among nestlings with some individuals gaining priority positions in the nest or competing with siblings for parental provisioning. Dominant siblings should experience a higher growth rate and possibly increased success post fledging. Nest boxes were placed in a managed hardwood/pine forest on the campus of the University of Arkansas at Monticello. Nests were monitored to determine the date of nest building, egg laying, and hatch date. Measurements of mass and tarsus length were taken every 4 days to determine growth rate. Nests were video-recorded every 4 days to observe nestling interactions and parental care. The following points were observed: 1) nestling position 2) begging rate 3) nestling provisioning. Preliminary data from 2005 indicated that begging strategy is most important in initiating provisioning. Nest location and clutch size does appear to impact provisioning. Data from the 2006 and 2008 breeding seasons are currently being analyzed.

Abstract (5202); Session GP19, Fri 14 August, Location: Houston Hall, Hall of Flags, Poster Num: 50

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#### WHY HAVE RED KNOTS, RUDDY TURNSTONES AND SANDERLINGS REACTED DIFFERENTLY TO THE DECLINE IN HORSESHOE CRAB AVAILABILITY IN DELAWARE BAY?

Red Knots *Calidris canutus*, Ruddy Turnstones *Arenaria interpres* and Sanderlings *Calidris alba* feed on horseshoe crab eggs in Delaware Bay, but their reaction to the decline in their availability has been different. Over 1998-2008, numbers of knots and turnstones using Delaware Bay declined by 60-70% though Sanderlings were erratic. The flyway population of knots has declined, but those of turnstones and Sanderlings have not. The decline in crab eggs has affected these species in different ways, because of differences in feeding ecology and migratory strategy. All three take eggs from the sand surface, but turnstones use their stout bills to dig pits to gain access to buried egg-clusters. Sanderlings are less dependent on eggs in Delaware Bay and commonly take other prey on the nearby Atlantic coast. Unlike knots, Sanderlings and turnstones have shown no year-on-year trend to lower weights at the end of the stopover. They may also be less dependent on eggs because both are relatively short-distance migrants compared with knots, many of which winter in Tierra del Fuego and, as such, are subject to greater physiological constraints.

Abstract (5612); Session S01, Thu 13 August, Location: Cohen Hall, G17 Auditorium, Oral at 15:00

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#### COMPARATIVE PHYLOGEOGRAPHY OF HISPANIOLAN ENDEMIC BIRDS

Within-island avian speciation is unlikely on medium-sized islands, yet Hispaniola supports at least four endemic species pairs. Complex geological history is a likely driver of this speciation: Hispaniola was previously configured as separate northern and southern island blocks, the southern block was itself previously divided by an ancient sea channel, and the present-day island contains several isolated montane regions. We surveyed phylogeographic variation in the four endemic species pairs and three non-endemic species using data from mtDNA, nuclear introns, and morphology. Haplotype networks, multilocus coalescent models, and principal components analysis of morphology revealed two patterns: several species show a north-south division at varying levels of differentiation, and two groups show distinct structure between the Tiburon Peninsula and mainland Hispaniola. No within-island structure was detected in the non-endemic species, which are part of recent Caribbean radiations and may have colonized Hispaniola

too recently to be affected by older geological events. Our results are consistent with the hypothesis that speciation in some taxa occurred on Hispaniola during ancient vicariance events, but that the history of this speciation differs among taxa.

Abstract (5496); Session G11, Fri 14 August, Location: Cohen Hall, Terrace Room, Oral at 11:00

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#### MOLECULAR SYSTEMATICS AND SPATIAL AND TEMPORAL PATTERNS OF DIVERSIFICATION OF THE *FORPUS* PARROTLETS

The genus *Forpus* consists of seven recognized species that are distributed in the lowlands of South America and Mexico. In this study, we reconstructed the evolutionary history of the genus *Forpus* by investigating species-level systematics, diversification rates and possible causal mechanisms of diversification. We sequenced two mitochondrial and three nuclear markers from all seven species which includes 12 subspecies and a total of 58 individuals from which we built phylogenetic trees using likelihood, parsimony and Bayesian approaches. The mitochondrial tree indicates that there are 15 independently evolving lineages and that the species *F. xanthopterygius* is paraphyletic. Based on divergence time estimates, the genus diverged from the late Miocene up until the late Pleistocene. We estimated the tempo of diversification by fitting various growth models to the distribution of diversification times. The tempo of diversification is best explained by a birth-death model, which is contrary to recent findings that have suggested diversification rates have decreased towards the present in lowland Neotropical birds. Overall, diversification in *Forpus* has been a protracted process linked to both geologic events and climatic oscillations.

Abstract (5452); Session G08, Thu 13 August, Location: Houston Hall, Bodek Lounge, Oral at 14:00

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#### THE IMPORTANCE OF MULTIPLE HABITATS AND LANDSCAPE CONNECTIVITY FOR NON-BREEDING MIGRATORY BIRDS

Migratory birds sometimes show low site fidelity during winter and may use roost habitats that are different from diurnal habitats. These patterns indicate that some birds require multiple habitats to meet different needs, but few studies have followed roosting and dispersing birds to their destinations. We examined daily and seasonal inter-habitat movements of radioed northern waterthrush and banded populations of other migrant warblers. Waterthrush moved on a daily basis from inland sites to coastal roost sites and seasonal movements to new areas showed a similar trajectory. We tested the importance of forest connectivity for migratory birds traveling to and from roosts by identifying corridors using graph-theoretic methods and mist-netting in these corridors and contiguous forest when migrants were commuting to and from roosts. Captures of all migrants were higher in corridors, indicating a funneling effect of these landscape features. Recaptures of individuals suggests the routine use of corridors. These results suggest that landscape connectivity across multiple connected habitats may be important to wintering migratory birds.

Abstract (5273); Session GP34, Fri 14 August, Location: Houston Hall, Hall of Flags, Poster Num: 90

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#### THE GEOGRAPHY OF PARROT COLORATION

We (Burt et al., in prep.) have shown that the red, orange, and yellow psittacofulvins in parrot feathers have antibacterial properties and resist degradation by soil bacteria. All feathers with psittacofulvins degrade more slowly than white feathers, which lack pigments. Feathers with melanin also degrade more slowly than white feathers (Goldstein et al. 2004), which suggests that melanin strengthens feathers against degradation. Birds in humid habitats, which facilitates bacterial growth, are likely to have feather-degrading bacilli in their plumage and are more darkly colored than birds in arid habitats (Burt and Ichida 2004). These relationships between the occurrence of melanic colors and feather-degrading bacteria in the plumage suggest that a similar one may exist with psittacofulvins. We found that for all 112 parrot species examined, the percentage of white and yellow in the plumage decreased as the average amount of rainfall increased. Among Australian species, the amount of red, green, blue and black plumage increased with rainfall. For species in New Zealand, the amount of white and yellow increased with the average temperature. We found no other significant trends.

Abstract (5485); Session G14, Fri 14 August, Location: Cohen Hall, G17 Auditorium, Oral at 14:45

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**AFFINITIES OF THE EARLY EOCENE FRIGATEBIRD *LIMNOFREGATA* BASED ON NEW SPECIMENS AND A MORPHOLOGICAL PHYLOGENETIC ANALYSIS OF WATERBIRD RELATIONSHIPS**

*Limnofregata* is known from multiple specimens from the Green River Formation, and is used extensively as a calibration point for studies of divergence timing in higher-level avian clades. However, *Limnofregata* has never been evaluated in a modern phylogenetic analysis. Anatomical information from new specimens and a morphological phylogenetic analysis of waterbirds encompassing over 40 taxa and 500 characters provide strong evidence for the sister-taxon relationship of *Limnofregata* and *Fregata*. Characters supporting this clade include: quadrate otic process mediolaterally elongate, square-shaped sternum, hypertrophied m. pectoralis tubercle with medial groove, tuberculum supracondylare ventrale distally concave, fenestrate manual phalanx II-1, and a hypertrophied medial ridge to trochlea cartilaginosa tibialis. The *Limnofregata/Fregata* dyad is sister-taxon to a well-supported Suloidea. *Pelecanus*, *Balaeniceps*, and *Scopus* are recovered as successively more distantly related sister taxa to this clade, a topology intermediate between recent conflicting analyses of avian phylogeny based on morphological and molecular data. ILD tests suggest that three anatomical partitions (cranial, pectoral, pelvic) possess significantly different phylogenetic signals, raising the possibility that anatomical subregions may be evolving at disparate rates, or exhibit varying levels of homoplasy.

Abstract (5361); Session G21, Sat 15 August, Location: Houston Hall, Class of '49 Auditorium, Oral at 17:00

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**LONG-TERM CHANGES IN THE PHENOLOGY OF AUTUMN PASSERINE MIGRATION AT A SOUTHERN NEW ENGLAND STOPOVER SITE**

We investigated long-term trends in mean autumn capture dates for 11 long-distance migrants and eight temperate migrants captured between 1960 and 2007 at a banding station in Kingston, Rhode Island. We used an information-theoretic approach to assess the relative importance of mean autumn temperature and annual capture rates as potential explanatory variables for these long-term trends. We detected annual trends in the highest ranked models, with the mean capture dates of seven species significantly delayed by an average of 3.03 days/decade, and the mean capture dates of five species were non-linearly related to year. Mean autumn temperature was an important factor in explaining these annual trends in eight species. Our analysis suggests that many migratory bird species are now departing the region much later than in the 1960s. However, important differences among species, such as long-term population trends or local breeding status, may influence species-specific responses to changes in climate patterns.

Abstract (5222); Session G19, Sat 15 August, Location: Houston Hall, Bodek Lounge, Oral at 11:15

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**ETHOLOGY, COMMUNICATION, AND COMPLEXITY**

Ethology's roots lie in the systematic study of naturally occurring behavior. We observe, find patterns, and seek to understand and connect those patterns through further observation and experiment. Niko Tinbergen suggested four basic goals: to explore the proximate causation, ontogeny, functions, and evolution of behavior. Among the patterns fascinating to him and to other early ethologists were striking, highly specialized signaling actions. Indeed, many species employ not just diverse signals, but also several other kinds of signaling performances, and such actions are essential in fostering and sustaining social order. Signaling enables animals to share information. Using the modern concept of information, and identifying those kinds of information that are selectively shared (or withheld) take our analyses beyond the initial focus on the internal, physiological causes of each individual's behavior - Tinbergen's first goal. The level of analysis changes. We ask what signaling contributes to alerting, warning, and, especially, negotiating: issues involving individuals as participants interacting with other participants, and nurturing social relationships. These tasks are markedly complex in a great many species. My goals here are to discuss, briefly, the nature of information, to use a few examples to explore the complexity of specialized signaling behavior, and to argue that attention to social behavior involves a different conceptual framework - a level of explanation not implicit in ethology's traditional focus on the bases of an individual's behavior. These goals are not novel, and are not a call to replace one level of analysis with another. Indeed, they are built upon the historical and ever-relevant roots of ethology, and call us to goals clearly stated by Robert Hinde more than a quarter of a century ago.

Abstract (5626); Session K5, Sat 15 August, Location: Cohen Hall, G17 Auditorium, Oral at 08:00

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DEVELOPMENT OF ACOUSTIC SENSITIVITIES IN JUVENILE BROWN-HEADED COWBIRDS  
(*MOLOTHRUS ATER*)

I examined how the acoustic responses of brown-headed cowbirds changed across early life transitions. Using playback experiments, I found that young male cowbirds prefer to approach speakers playing conspecific vocalizations over heterospecific vocalizations. Across development however, they varied in their responses to different types of conspecific vocalizations. In early life they preferentially approached speakers playing adult male and female vocalizations. In the fall, the mid part of their first year, when they typically join juvenile sub-flocks, they were found to preferentially approach juvenile vocalizations. In the winter, when they join large blackbird flocks to migrate, they showed no preferences, and finally in the spring when they return to the breeding territories to compete with other males and to court females, they preferred to approach adult vocalizations. Taken together, these experiments demonstrate how individuals must alter behavior to different developmental ecologies in order to react adaptively to social stimuli.

Abstract (5223); Session G04, Thu 13 August, Location: Houston Hall, Bodek Lounge, Oral at 11:15

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VOCAL GEOGRAPHIC VARIATION IN THE CACTUS WREN

Genetic studies of Cactus Wrens (*Campylorhynchus brunneicapillus*) shows two evolutionary units between Baja California and the Sonora and Chihuahua Deserts. We investigated whether historical isolation or influence of isolation-by-distance could be affecting large-scale geographic variation in the songs of this species. We recorded and gathered songs from 12 locations across the aridlands of North America. We measured nine characteristics of 41 songs and used a multivariate approach to test for differences between genetic groups suggested in previous work. We found song divergence at or near 30°N, a known possible barrier suggested by molecular data. The Baja California group showed significantly lower peak time (time in which the higher energy occurs in the song) and frequency absence (frequency in which a lack of energy occurs) than Sonora-Chihuahua Desert group. The analysis showed that spectral characteristics were not influenced by geographic distance. We suggest that song variation may be partially influenced by historical isolation followed by cultural drift.

Abstract (5577); Session GP30, Fri 14 August, Location: Houston Hall, Hall of Flags, Poster Num: 125

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SEX RATIO IN MAGELLANIC PENGUINS (*SPHENISCUS MAGELLANICUS*): IS ADULT MALE SEX-BIAS  
PRESENT AT HATCH AND HOW DOES DISTURBANCE AFFECT HATCHING RATIOS?

There is evidence that female birds may have the ability to affect sex-ratios in offspring when laying eggs. If and how these decisions are driven by immediate environmental conditions is of interest: i.e., do females in more disturbed environments alter the "normal" laying sex ratio? In addition, as adult sex ratios are often skewed, it is interesting to determine if this inequality is present hatching, or a by-product of post-hatching survival. We present data collected from the two-egg clutches laid by Magellanic penguins at a breeding colony in Argentina. Our initial assessment was to determine if the male-biased sex ratio present in adults is initiated at hatch, or is instead a post-hatching survival driven pattern. We present limited data on differential survival to fledging in a subset of nests that were followed throughout a breeding season. We also investigated if there is a difference in sex ratio at hatch between penguins that are living in a tourist-disturbed environment as compared to birds living in areas of the colony not visited by tourists.

Abstract (5265); Session GP19, Fri 14 August, Location: Houston Hall, Hall of Flags, Poster Num: 51

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ASYMPTOMATIC CARRIER SPECIES CAN AFFECT DISEASE DYNAMICS IN A PRIMARY HOST, THE  
HOUSE FINCH

When pathogens can infect multiple host species in a community, disease dynamics will reflect the interactions within the host community. We examine the extent to which variation in abundance of common species in an avian community affects the disease prevalence of a recently emerged wildlife pathogen in its primary host, the House Finch (*Carpodacus mexicanus*). While this novel pathogen, *Mycoplasma gallisepticum*, has caused extensive mortality in House Finches, our studies have demonstrated that many other wild bird species are also infected but rarely show



severe disease symptoms. Experimental work has also demonstrated that some of these species can transmit the bacteria under controlled conditions. However, unknown is whether transmission of *M. gallisepticum* from other bird species to House Finches is important to disease dynamics in the wild. We show that variation in abundance of some bird species in nature is associated with changes in disease prevalence in House Finches. These findings indicate that asymptomatic carriers of the *Mycoplasma* bacteria can affect disease prevalence and thus population dynamics of House Finches.

Abstract (5460); Session G02, Thu 13 August, Location: Houston Hall, Class of '49 Auditorium, Oral at 12:15

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#### CHIMNEY LOCATION MATTERS: CHIMNEY SWIFT (*CHAETURA PELAGICA*) HABITAT ASSOCIATIONS AT MULTIPLE SPATIAL SCALES

Chimney swift (*Chaetura pelagica*) populations are steadily declining. Management efforts are hampered by the lack of published data on chimney swift habitat associations. We know that chimneys in general constitute suitable breeding sites, but few aspects of the preferred habitat surrounding the chimneys have been quantified. Artificial nesting towers are an increasingly popular conservation approach, but are ultimately unlikely to succeed unless we know where towers should be placed. We used a database of known nesting locations, and a Connecticut land cover database, to investigate swift-chimney habitat associations at multiple spatial scales. We found that chimney swift nest sites are positively associated with Developed land cover, and with Agricultural land cover, at all the spatial scales (0.5 km, 3.5 km, and 6.5 km) examined. Conversely, swifts are negatively associated with Forested land cover. We interpret these relationships as reflecting the need of chimney swifts for nesting sites (chimneys) near food (insect)-generating grasslands. Our results suggest that conservation efforts should be focused in suburban areas, near Agricultural land cover.

Abstract (5525); Session G03, Thu 13 August, Location: Cohen Hall, Terrace Room, Oral at 11:45

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#### SUBTLE EDGE-OF-RANGE GENETIC STRUCTURING IN TRANSCONTINENTALLY DISTRIBUTED NORTH AMERICAN TREE SWALLOWS (*TACHYGINETA BICOLOR*)

Understanding how genetic variation in the Tree Swallow (*Tachycineta bicolor*) is geographically structured is informative because this broadly distributed North American bird is increasingly used as a model for studies of mating systems, life history traits, and physiology. We explored patterns of phylogeographic differentiation across the Tree Swallow's breeding range using nine microsatellite loci and a mitochondrial DNA sequence marker. Contrary to this species' high population-level variation in life history traits and other ecologically important characteristics, we found no genetic structuring across the majority of its distribution, spanning Tennessee, New York, and Alaska, and we found that birds from California form a distinct yet subtly differentiated genetic cluster. The Tree Swallow can be characterized as a species with both continent-wide genetic panmixia and slight differentiation at one edge of its breeding distribution. This pattern of genetic variation has implications for understanding the underlying basis of geographic variation in this species' life history and other phenotypic traits.

Abstract (5323); Session GP27, Fri 14 August, Location: Houston Hall, Hall of Flags, Poster Num: 73

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#### SOCIAL EXPERIENCE DURING MOLT DOES NOT AFFECT BIB SIZE IN JUVENILE HOUSE SPARROWS

Male house sparrows (*Passer domesticus*) possess a variably sized bib of black feathers which signals their fighting ability or aggressiveness. The bib's information content might therefore derive from its bearer's success in aggressive interactions during its production. We varied the social experience of 36 hand-reared juvenile males during their molt by housing each one with a series of wild-caught sparrows implanted with either 1) testosterone, to enhance their

aggressiveness toward the test subject 2) flutamide-ATD, an anti-androgen, to reduce their aggressiveness toward the test subject, or 3) empty silastic tubes, as a control. We predicted that juveniles housed with testosterone-implanted partners would lose most of their interactions and consequently produce small bibs, while juveniles housed with flutamide-implanted partners would win most of their interactions and produce large bibs. The mean bib size produced by juveniles in the three treatments did not differ. However, their social experience may not have been sufficiently different to affect bib production as the partner's dominance or aggressiveness was similar, even though their testosterone levels were in the predicted direction and of expected magnitude.

Abstract (5530); Session G14, Fri 14 August, Location: Cohen Hall, G17 Auditorium, Oral at 16:45

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#### EGG PATTERN MIMICRY BY THE COMMON CUCKOO: A BIRD VISION PERSPECTIVE

In the coevolutionary arms race between brood parasitic common cuckoos (*Cuculus canorus*) and hosts, selection for the detection and removal of cuckoo eggs by hosts, and the subsequent elaboration of cuckoo counter-defenses, has resulted in highly mimetic cuckoo eggs. We used novel methods based on avian visual perception to quantify the level of egg pattern mimicry between the common cuckoo and nine of its favorite hosts. Using a digital camera calibrated to simulate bird vision, we photographed cuckoo and host eggs and compared spatial patterns of markings using sophisticated image processing algorithms. We found that certain characteristics of pattern appear to be the most essential for successful egg mimicry by cuckoos. These results will be discussed in the context of the evolution of brood parasitism, egg pattern mimicry, and egg rejection by hosts. This is the first study to incorporate models of bird vision in an objective analysis of egg patterns, and has promising implications for future studies of animal markings in ways that are relevant to the visual system of the receiver.

Abstract (5517); Session G07, Thu 13 August, Location: Cohen Hall, Terrace Room, Oral at 16:30

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#### EXPERIMENTAL FORESTS AND RANGES: EMERGENT THEMES, OPPORTUNITIES, AND CHALLENGES

Since 1909, Experimental Forests and Ranges have been dedicated to long-term research at the watershed and landscape scales. They provide access to a wide diversity of study areas, infrastructure, opportunities for controlled manipulations, and integration with other types of long-term data. These features have facilitated important advances in a number of areas of avian research, including furthering our understanding of population dynamics, the effects of forest management, responses to disturbances such as fire and hurricanes, and other aspects of avian ecology and conservation. However, this invaluable resource has been underutilized by ornithologists. Most of the Experimental Forests and Ranges have had no ornithological work done on them. We encourage the ornithological community, especially graduate students and new faculty, to take advantage of this largely untapped potential for long-term work, linkage with long-term data sets, multiple disciplines, and active forest management.

Abstract (5619); Session S06, Fri 14 August, Location: Houston Hall, Class of '49 Auditorium, Oral at 14:30

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#### EXTINCTION AND COLONIZATION DYNAMICS IN AMAZONIAN RAINFOREST FRAGMENTS

Bird species richness in forest fragments typically shows an area effect, but temporal variation in assemblages cannot be identified without repeated samples. Temporal dynamism could be important, potentially distinguishing between a steady decay in species vs. communities rescued by recolonization. We estimated extinction and colonization rates from repeated samples of understory birds in 1-100 ha rainforest fragments from 1979-2007. Between preisolation and two years after isolation, fragments showed area-dependent extinction rates of 13-93%. Extinction rates declined over time, to 10-20% from 2000 to 2007 in 10-100 ha fragments. Despite the long-term pattern of extinction, fragments also showed area-dependent recolonization, with especially high turnover of species between samples in 1-ha fragments. Beginning about five years after isolation, recolonization roughly balanced extinction, apparently facilitated by second-growth development in the matrix. As a result, species richness in individual fragments declined little in the past 20 years. Flux in species composition reflects a large pool of species that sometimes occur in fragments, recolonizing from nearby continuous forest. At the same time, we also identified a suite of species that went extinct, but seldom recolonized.

Abstract (5279); Session G12, Fri 14 August, Location: Irvine Auditorium, Café 58, Oral at 11:00

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#### PARASITIC COWBIRDS MAY DEFEAT HOST DEFENSE BY CAUSING REJECTERS TO MIS-IMPRINT ON COWBIRD EGGS

Experiments suggest hosts that reject parasitic brown-headed cowbird (*Molothrus ater*) eggs develop egg recognition by imprinting on their own eggs; probably at the first nest naïve birds attend. This raises the possibility that parasitism of naïve individuals might cause them to mistakenly mis-imprint on, and accept, cowbird eggs. Our experiments demonstrated hosts with one versus  $\geq 2$  egg accepted and rejected, cowbird eggs, respectively. Mis-imprinting should increase with cowbird abundance increases; a hypothesis supported by our regional data. Simulated brood parasitism showed that two host species that usually reject cowbird eggs were more tolerant of cowbird eggs in the Great Plains, where cowbirds reach maximal abundance, than in eastern North America where cowbirds are less common. In addition, these two species and a third rejecter had high rates (10.8-30.4%) of natural parasitism at an Illinois site where cowbirds were extremely abundant. These rejecters accepted most cases of researcher-detected parasitism whereas they rarely accept cowbird eggs elsewhere. Despite the potentially high cost of rejection, our evidence indicates parasitism of rejecter species can be adaptive when host discrimination ability involves a learning process.

Abstract (5633); Session GP35, Fri 14 August, Location: Houston Hall, Hall of Flags, Poster Num: 97

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#### DELAYED SECOND CUTS: A NEW FARM BILL PROGRAM TO INCREASE GRASSLAND BIRD NEST SUCCESS

Birth rates of grassland birds in agricultural landscapes are frequently below replacement values as a result of forage harvest schedules. Because of livestock protein requirements, forage is harvested prior to the completion of nesting activities, and intervals between subsequent cuts are too short to allow successful nesting. Based on field data, we developed a wildlife-friendly model for intensively managed haylands and implemented this model in Vermont through the Environmental Quality Incentive Program (EQIP) of the Natural Resources Conservation Service. Farmers were ensured a first harvest with high protein content; after a 65-day delay (compared to the normal 35-40 day cutting cycle) farmers took a second harvest of greater quantity but decreased quality. Farmers were paid \$247 (2008) - \$333 (2009) per hectare to offset the costs associated with the decreased nutritional content caused by the approximately 25 day delay in the second harvest. As a result, Bobolink reproductive rates improved from 0.05 to 3.0 fledglings per female per year. The data collection and communication processes can serve as models to apply to other commodities and taxa.

Abstract (5311); Session G20, Sat 15 August, Location: Cohen Hall, Terrace Room, Oral at 11:30

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#### NONBREEDING SEASON SELECTION ON TRAITS INFLUENCING ANNUAL SURVIVAL IN A LONG-DISTANCE MIGRATORY BIRD

We evaluated phenotypic selection on three functionally related traits in nonbreeding American redstarts *Setophaga ruticilla*: body condition, the date of departure on spring migration, and migration distance as estimated through stable-hydrogen isotopes in feathers. The form and strength of selection differed between mangrove forest and second-growth scrub, two habitats that differ in susceptibility to seasonal drought, and between years that varied in rainfall. Birds in both habitats experienced directional selection for short migration distance to southern parts of the breeding range, but this pattern was greater in scrub compared to mangrove. During dry winters, redstarts experienced stabilizing selection on spring departure dates and directional selection for short migration. In years of high rainfall, directional selection for shorter migration was weaker and stabilizing selection on departure timing was not evident. These findings indicate that occupancy of drought-resilient habitat and years of high rainfall relax selection against migrating long distances and departing late. Information about variation in environmental conditions during winter is needed to refine our view of the selective pressures that influence survival, migration timing, and adaptation to changing climate.

Abstract (5489); Session G23, Sat 15 August, Location: Houston Hall, Bodek Lounge, Oral at 14:15

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RECENT DIVERGENCE IN THE ORCHARD ORIOLE COMPLEX (*ICTERUS SPURIUS*): USING  
 VOCALIZATIONS TO UNDERSTAND SPECIES BOUNDARIES

A well-studied example of recent speciation in birds is the Orchard Oriole complex. The Orchard Oriole (*Icterus spurius*) breeds across most of the eastern US. Its closest living relative, Fuertes' Oriole (*Icterus fuertesi*) breeds in Veracruz, Mexico. Fuertes' Oriole was initially described as a separate species based on its smaller size, differences in vocalizations, and unique adult male plumage coloration. However, later studies classified Fuertes' Oriole as a subspecies of *I. spurius*. Since then, much work has been done to determine if these taxa are indeed two separate species. We have found fixed differences in adult male plumage, migratory behaviors, and breeding habitat. However, no study has attempted to determine if there are differences in the vocalizations of the two taxa. To this end, male vocalizations will be recorded and audiospectrograms will be generated. Vocalizations will then be compared between populations and between taxa using statistical tests to look for differences in vocalization characters among individuals, among populations, and between taxa. We are doing parallel work using multiple loci and coalescent methods (IM) to study this recent divergence.

Abstract (5341); Session GP30, Fri 14 August, Location: Houston Hall, Hall of Flags, Poster Num: 84

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CARRY-OVER EFFECTS IN NEOTROPICAL MIGRATORY SONGBIRDS: REPRODUCTIVE EFFORT, MOLT  
 AND MIGRATION

Neotropical migratory songbirds face critical tradeoffs between reproductive effort and preparing for fall migration, yet little is known about how reproductive decisions affect late season physiological condition, timing of moult, or arrival on winter territories. We have recently used light level "geolocators" to reconstruct the timing and routes of fall and spring migration in Wood Thrush to test the hypothesis that high reproductive effort has a subsequent cost of delaying moult and migration. We found a positive correlation between cumulative reproductive effort and levels of corticosterone in late season Wood Thrush. Double brooded pairs experienced a two week delay in the onset of moult, and feather isotope analysis strongly suggests that many Wood Thrush overlap migration and moult. Reconstruction of migration routes show that Wood Thrush have prolonged stopovers during fall migration that result in wide variation in arrival time on wintering territories.

Abstract (5623); Session K2, Fri 14 August, Location: Houston Hall, Class of '49 Auditorium, Oral at 08:00

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DO MALE ORNAMENTS HONESTLY ADVERTISE FERTILITY IN THE RING-NECKED PHEASANT?

The phenotype-linked fertility hypothesis states that male sexual ornamentation should signify fertilization efficiency, and male traits have coevolved with female selection for such indicative traits. Female Galliformes show preference for male ornaments including spur length, tail length, UV reflectance, and body size. Recent findings from the poultry industry suggest that the most important indicator of male fertility is sperm mobility. Here we adopted a novel design to determine whether there was a correlation between male ornaments and sperm mobility using captive Ring-necked Pheasant (*Phasianus colchicus*). We discuss our findings and their significance for the relationship between male ornamentation and fertility.

Abstract (5556); Session GP28, Fri 14 August, Location: Houston Hall, Hall of Flags, Poster Num: 76

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BIRD ASSEMBLAGES AT HARDWOOD BOTTOMLAND RESTORATION SITES IN WESTERN TENNESSEE

A goal of wetland restoration under the Wetlands Reserve Program (WRP) is providing habitat for resident and migratory birds. However, few studies have measured bird use at sites that differ in time since restoration. We quantified avian species composition at 17 hardwood bottomland restoration sites (ages 2 – 21 yrs) and 4 reference sites (age = 40 yrs) in western Tennessee from March – August 2008. Bird composition was measured during three seasonal periods corresponding to spring migration, breeding, and post-fledging. Ninety-one bird species were documented at restoration sites. Mean bird species diversity and richness were positively related with restoration age. Relative abundances of 10 bird families were related with restoration age and 10 were related with site size during at least one seasonal period. Our results suggest that hardwood bottomland restoration sites in western Tennessee provide habitat for diverse avian assemblages, and that older sites are beginning to resemble reference sites. Larger restoration sites may be important for certain bird families. These findings provide evidence that the WRP is meeting its goal of bird community restoration in Tennessee hardwood bottomlands.

Abstract (5512); Session GP15, Fri 14 August, Location: Houston Hall, Hall of Flags, Poster Num: 43

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**FISHING FOR FUNCTION WITH A NEW HOOK: GEOGRAPHIC VARIATION IN EXTERNAL MORPHOMETRICS OF NORTH AMERICAN SHRIKES**

Despite their ostensible physical uniformity, Loggerhead Shrikes exhibit considerable geographic variation in plumage and morphometrics. In his comprehensive systematic revision, Miller (1931) proposed subspecific delineations, in part, upon several of these traits. Subsequent studies have examined genetic and morphological variation among subsets of the purported subspecies, but few, if any, have addressed their potential functional significance. Studies of Old World shrikes have demonstrated that intraspecific patterns of external morphological variation are associated with dietary differences. As part of a more comprehensive study on the biomechanics of feeding in shrikes, I explore here possibilities for functionally-relevant variation in external beak (e.g., size and shape) and hindlimb (e.g., digit and claw length) characteristics of North American shrike museum specimens. Variation may reflect aspects of musculature and skeletal morphology responsible for generating force and speed for catching and killing prey. These, in the context of environmental variation across a broad geographic range, may underlie potential variation in feeding performance across populations.

Abstract (5589); Session GP23, Fri 14 August, Location: Houston Hall, Hall of Flags, Poster Num: 119

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**BIRD DIVERSITY DILUTES THE INCIDENCE OF WEST NILE VIRUS IN HUMANS: THE BENEFITS OF BIRDS TO PUBLIC HEALTH**

Recent infectious disease models illustrate a suite of mechanisms that can result in lower incidence of disease in areas of higher disease host diversity: the 'dilution effect'. These models are particularly applicable to human zoonoses (infectious diseases of wildlife that spill over into human populations), that are becoming increasingly common. We explored whether the dilution effect can be observed in the relationship between the incidence of human West Nile virus (WNV) infection and bird (host) diversity in the eastern US. We constructed a novel geospatial contrasts analysis that compares the small differences in avian diversity of neighboring US counties with incidence of human disease. We controlled for confounding factors of climate, regional variation in mosquito vector type, urbanization, and human socioeconomic factors that are all likely to affect WNV incidence. We found there is lower incidence of human WNV in eastern US counties that have greater avian diversity. Our disease-diversity relationships confirm that the dilution effect can be observed in WNV outbreaks and illustrate an important public health and ecosystem service provided by avian biodiversity.

Abstract (5457); Session G02, Thu 13 August, Location: Houston Hall, Class of '49 Auditorium, Oral at 11:00

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**USING MIST NETS TO ASSESS SONGBIRD REPRODUCTION ON MARYLAND'S COASTAL PLAIN**

The Jug Bay banding station in central Maryland has participated in the MAPS program (Monitoring Avian Productivity and Survivorship) continuously since 1990. Constant effort mist-netting at fixed sites across North America is employed to capture and examine breeding songbirds. The breeding songbird community in our study site consists of 38 species. We effectively monitor six species (all migrants) that are of conservation concern in the mid-Atlantic region. Ten migrant and five resident species account for over 80% of all individuals banded. Over this 20 year study, the ratio of migrant HY:AHY individuals banded varied from 0-59%, whereas the HY:AHY ratio among year-round resident species was 31-200%. Wood Thrush, Ovenbird and Prothonotary Warbler were the only migrants to exhibit consistent production of young birds based on net captures; very few young Red-eyed Vireo, Acadian Flycatcher or Scarlet Tanager young were captured. It is not clear whether the low HY capture rate for most migrants is due to low reproduction or simply to the movement of young birds to foraging areas away from our study area after fledging.

Abstract (5592); Session GP02, Fri 14 August, Location: Houston Hall, Hall of Flags, Poster Num: 11

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**A PHYLOGENETIC ANALYSIS OF HETEROSPECIFIC VOCAL MIMICRY IN OSCINES**

Heterospecific vocal mimicry (HVM) is a compelling example of vocal learning that appears in both oscine passerines and parrots. While apparently widespread in parrots, HVM has a patchy distribution among oscine taxa. Recent advances in avian systematics have made it possible to look at the origin and persistence of HVM in a phylogenetic

context. Understanding the evolutionary history of mimicry in oscines provides key insight into the history of song learning in this group. I will test the hypothesis that HVM provides an honest signal of age in taxa where senders and receivers share a common acoustic milieu. If this hypothesis is true then mimicry should evolve in nonmigratory species that live in stable habitats with little social behavior. I test these predictions by looking at correlated evolution between mimicry and three factors; habitat, migratory behavior and reproductive behavior. I look at these factors in a sample of more than 2000 species of oscine passerines.

Abstract (5422); Session G22, Sat 15 August, Location: Irvine Auditorium, Amado Recital Room, Oral at 16:45

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#### HIGH FIRST YEAR SURVIVAL AND DELAYED AGE OF MATURITY IN A TROPICAL PASSERINE BIRD

Estimates of juvenile survival and age at maturity are essential for understanding parental investment theory, comparative studies of life history evolution, and demography. Despite their key importance, rarely are estimates available. Instead, juvenile survival is often assumed to be half that of adult survival. This assumption is questionable, particularly in tropical birds where extended post-fledging care and delayed dispersal are observed. We used re-sighting and radio-telemetry to examine first year survival, adult survival, and age of maturity in a Neotropical passerine, the western slaty antshrike. We found higher first year survival and a lower adult: juvenile survival ratio compared to northern hemisphere species. Offspring had delayed age at maturity, not reproducing until at least two breeding seasons after fledging. We compared our results to models using adult survival and breeding productivity to estimate first year survival. Estimates will be low for tropical species if one assumes birds breed at one year, thus knowing the age of maturity is crucial. These results have important implications for understanding latitudinal variation in key life history traits, such as clutch size and parental investment.

Abstract (5269); Session G13, Fri 14 August, Location: Houston Hall, Bodek Lounge, Oral at 11:30

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#### MOLECULAR CHARACTERIZATION OF MHC II OF RED KNOTS

The red knot population wintering in Tierra del Fuego (*Calidris canutus rufa*) has the longest migration route (15,000 km) of all 6 subspecies, and occupies exclusively high Arctic and marine environments. A hypothesis of shorebird migration predicts that shorebirds opting for these parasite-poor habitats may be susceptible to pathogens as a result of investments in long-distance migration and thermoregulation, rather than low immunocompetence. Alternatively, they may have low genomic variation due to a severe bottleneck before they evolved long migration routes. The study of the correlation of genotypic variation of the peptide-binding region of MHC IIB of red knots with annual survival will help to understand parasite resistance and other aspects of their ecology. To screen allelic variation at individual loci of MHC IIB, we applied a primer walking technique to partially characterize the two loci, and designed locus-specific primers. We verified the efficiency of our primers in family groups and other individuals. Single locus assays showed that red knots have surprisingly high allelic diversity in MHC IIB genes, arguing against the bottleneck hypothesis.

Abstract (5282); Session G23, Sat 15 August, Location: Houston Hall, Bodek Lounge, Oral at 16:30

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#### QUIRKY IN MORE WAYS THAN ONE: POPULATION GENETICS OF THE BLUE-FOOTED BOOBY

Recent population genetic studies of pelagic boobies (*Sula spp.*) using mitochondrial markers have detected highly structured populations, despite the high mobility of these species. We present the first comparable data for an in-shore booby, the blue-footed booby (*S. nebouxii*). Two subspecies are currently recognized: (*S. n. excisa*), endemic to the Galapagos archipelago; and (*S. n. nebouxii*), which is found along the west coast of South America from Mexico to northern Peru. Variation in a 540 base pair segment from the mitochondrial control region (N=154) and eight microsatellites (N=169) sampled from throughout their range indicated very weak population genetic structure, and only weak support for the current subspecies designations. Our results offer the first evidence of a tropical seabird that exhibits very weak population genetic structure. This weak population genetic structure may be the result of long distance natal dispersal and fidelity to the site of first breeding.

Abstract (5314); Session G08, Thu 13 August, Location: Houston Hall, Bodek Lounge, Oral at 16:15

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#### ARE BEWICKS WRENS (*THRYOMANES BEWICKII BEWICKII*) EXTIRPATED FROM ARKANSAS?

We surveyed northwestern Arkansas in the spring and summer of 2008 and 2009 for Bewicks Wrens (*Thryomanes bewickii bewickii*), as this species was relatively common historically in this area. We identified all open land-cover types (non-forested) in northwestern Arkansas based on available land-cover data and selected 250 random sample sites in public ownership and 250 random sites in private ownership. We also solicited past and current reported observations of BEWRs in Arkansas and surveyed all these locations (n = 50) for the presence of this species. We used broadcast surveys to determine presence or absence at each site, and visited each site three times per season in order to determine occupancy. We visited a total of 275 sites over the 2 years and detected only one Bewicks Wren at one site based on a recent report. This wren disappeared from this location within 1 week and definitely did not breed successfully. Based on these data we suggest that Bewicks Wrens should be classified currently as a rare transient species in AR and that the breeding population has been extirpated.

Abstract (5324); Session G20, Sat 15 August, Location: Cohen Hall, Terrace Room, Oral at 11:15

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#### FACTORS AFFECTING NEST SUCCESS IN AMERICAN COOTS

Nest success is an important vital rate in many species of birds. We measured nest success of American Coots (*Fulica americana*) breeding near Minnedosa, Manitoba during 1985-1991 to identify critical limiting factors affecting reproduction. Out of 1,186 monitored nests, 144 failed due to predation and 104 due to abandonment. Because abandonment was largely attributable to investigator disturbance, we conducted separate analyses of abandoned versus failed nests. Abandonment was a function of nest age, nesting attempt, and number of nest visits. Most abandonment occurred among laying stage nests following the first visit by investigators. Nest predation varied from 12-67% among years, and was primarily a function of annual variation in wetland depth. Nest predation also varied as a function of nest age and nesting attempt, with laying-stage nests and re-nests having the most losses. Laying date, supplemental food, and conspecific parasitism had negligible effects on abandonment or predation. We speculate that biparental incubation and nest defense were important factors contributing to higher nest success of coots relative to other overwater nesting species.

Abstract (5564); Session G16, Fri 14 August, Location: Irvine Auditorium, Café 58, Oral at 16:30

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#### BIRDS TRACK THEIR GRINNELLIAN NICHE IN RESPONSE TO A CENTURY OF CLIMATE CHANGE

Despite being a critical assumption of predictive modeling to climate change, niche conservatism lacks empirical evidence over short time scales. We use bird resurvey data from 82 sites, sampled a century apart throughout the Sierra Nevada of California, to test for evidence of niche conservatism. Changes in geographic range and climate resulted in bird species shifting their average climatological range over time. We compared the directions of these shifts relative to the position of species' climatic niches (as defined by range-wide continental occurrence), and found that 48 of 53 of avian species were tracking their climatic niche. Niche sensitivity analysis on an independent set of occurrence data significantly predicted particular environmental gradients tracked by species ( $P < 0.001$ ). Finally, we used occupancy models to examine support for different site-specific mechanistic models of niche conservatism. Niche conservatism models of colonization and extinction probabilities explained the data better than a null model for 50 of 53 species. Our results indicate that bird species in the Sierra Nevada are tracking their climatic niche through time in response to climate change.

Abstract (5172); Session G05, Thu 13 August, Location: Irvine Auditorium, Amado Recital Room, Oral at 10:30

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#### DISCOVERY OF A HYBRID ZONE BETWEEN TOWNSEND'S (*DENDROICA TOWNSENDI*) AND BLACK-THROATED GREEN (*D. VIRENS*) WARBLERS

Areas of hybridization between divergent taxa offer 'natural laboratories' to understand the generation and maintenance of biodiversity. Here we describe the first known area of extensive hybridization between Townsend's (*Dendroica townsendi*) and Black-throated Green (*D. virens*) warblers in an area of northeastern British Columbia, Canada. Using plumage, morphology, mtDNA and nuclear DNA markers we demonstrate individuals in the area of

overlap have admixed genetic traits, intermediate phenotype, and more overlap in morphological traits than further East and West. To distinguish whether the hybrid zone is maintained by selection as a 'tension zone' or represents recent contact we determined the width and centre of the cline across the zone. This study increases from four to five the number of known hybrid zones between well-differentiated wood-warbler (Parulidae) taxa in North America, three currently associated with divisions along the slopes Rocky Mountains.

Abstract (5199); Session G21, Sat 15 August, Location: Houston Hall, Class of '49 Auditorium, Oral at 17:15

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**PREPARATION FOR BREEDING ON THE NON-BREEDING GROUNDS IN NEO-TROPICAL MIGRANTS: DOES ELEVATED TESTOSTERONE ENHANCE MIGRATORY PREPARATION?**

Migratory birds face a conflicting set of energetic demands between surviving the winter, preparing to migrate and preparing to breed. Physiological mechanisms that minimize conflicts, perhaps through diversifying hormone function, would be advantageous to both survival and breeding success. We first address the hypothesis that Neo-tropical migrant songbirds begin breeding preparation on the non-breeding grounds. We further test the hypothesis that elevated testosterone (T) occurring during breeding preparation also supports, and perhaps accelerates, migratory preparation and, as a result, males with relatively high T will arrive at breeding territories earlier than those with lower T. Preliminary data from wintering songbirds in Jamaica show elevated T levels prior to spring departure. In a captive experiment, birds with T-implants increased food intake and reached peak migratory condition faster than both controls and individuals whose T activity was blocked. Consistent with this, in field studies, males arriving early on breeding areas had higher circulating T than those arriving later.

Abstract (5522); Session G19, Sat 15 August, Location: Houston Hall, Bodek Lounge, Oral at 11:30

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**BALANCING THE COSTS OF INBREEDING DEPRESSION IN COOPERATIVE CROWS**

In some species of cooperatively breeding birds, individuals interact with related adults of the opposite sex, and the opportunity for inbreeding is relatively high. We examined the occurrence of inbreeding and inbreeding depression in a large, open population of cooperatively breeding American crows (*Corvus brachyrhynchos*). Genetic analyses of parentage, parental relatedness coefficients and pedigree information suggested that 23% of parental dyads were first- or second-order kin. Heterozygosity-heterozygosity correlations confirmed that a microsatellite-based index of individual heterozygosity was an appropriate index of inbreeding in this population. Inbred birds had lower body condition indices, a higher disease probability and a lower survival probability than relatively outbred birds. In the case of matings between mothers and their adult auxiliary sons, however, the lower survival probability of incestuously produced individual offspring might have been outweighed by increased provisioning efforts by auxiliary birds: broods associated with within-group extrapair sires produced a greater number of offspring. Our results demonstrate ways in which the costs and benefits of breeding in kin groups might balance one another.

Abstract (5289); Session G06, Thu 13 August, Location: Irvine Auditorium, Café 58, Oral at 11:00

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**GENDER AND AGE DISTRIBUTION OF BICKNELL'S THRUSH AT TWO WINTERING SITES IN THE DOMINICAN REPUBLIC: EVIDENCE FOR SEXUAL HABITAT SEGREGATION**

A number of studies have shown sex and age-based habitat segregation to be an important component of winter season population limitations among migrant songbirds. In this study, we investigate the age and gender distribution of wintering Bicknell's Thrushes in the Dominican Republic. Between 2000 and 2008 we focused on two floristically and climatically distinct sites: one in high elevation cloud forest, and the other in mid elevation rainforest. We found the cloud forest site to be significantly male-biased in comparison to the rainforest site. The mean cloud forest proportion male was  $74\% \pm 11\%$ . In contrast, the rainforest site did not differ significantly from a 1:1 male to female ratio and, rather than being characterized as a "female" site, is best labeled as having an equal sex ratio. The mean proportion male at this site was  $53\% \pm 2\%$ . The distribution of juvenile birds did not differ between the sites. We identified several differences in the spatial behavior, diet, and body condition of birds at the two sites and we discuss these in the context of the differing gender distributions.



Abstract (5229); Session S05, Fri 14 August, Location: Irvine Auditorium, Amado Recital Room, Oral at 14:30

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**ARE WE LEAVING ENOUGH OF THE RIGHT CAVITY TREES: A MESSAGE FROM WARBLERS AND WOODPECKERS?**

In managed, tolerant, hardwood forests in Algonquin Provincial Park, Ontario, we discovered two unknown relationships between snags, declining trees, and wildlife that have implications for cavity tree retention. First, although they are known to nest only in forks of branches, Black-throated Green Warblers (*Dendroica virens*) nested in tree cavities in snags and declining trees. Second, contrary to previous reports, which suggest that American black bear (*Ursus americanus*) predation of woodpecker nests occurs infrequently, we found that bears depredate up to 25% of Yellow-bellied Sapsucker (*Sphyrapicus varius*) nests across wide geographic areas in some years, accounting for 71% of all nest failures. Predation-risk was much less in stands with no logging in the last 60 years than in stands logged 1-30 years previously. Sapsuckers may construct nests in safer sites (harder trees) in unmanaged forests, because they have almost double the number of nest trees to choose from, including more beech and especially more snags and declining trees. Snags may also be important to the nesting ecology of warblers. Our data, therefore, support a snag-retention guideline.

Abstract (5332); Session G20, Sat 15 August, Location: Cohen Hall, Terrace Room, Oral at 09:45

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**THE VOCAL BEHAVIOUR AND REPRODUCTIVE STRATEGIES OF A DUETTING NEOTROPICAL SONGBIRD, THE RUFOUS-AND-WHITE WREN (*THRYOTHORUS RUFALBUS*)**

Avian duets are complex displays where two individuals, usually the male and female of a mated pair, vocalize together in a highly coordinated fashion. We investigated the functional significance of avian duets by exploring the relationship between the duetting and reproductive behaviours of a Neotropical passerine, the Rufous-and-white Wren. We studied a population of colour-banded individuals in Santa Rosa National Park, Costa Rica. We examined the social reproductive behaviours of Rufous-and-white Wrens by observing nest building and nestling provisioning. Using microsatellite paternity analysis, we determined the genetic mating strategy of Rufous-and-white Wrens using blood samples collected between 2003 and 2009 from adults and offspring of 51 nests in our population. We collected focal recordings and 24-hour automated recordings to examine the relationship between pairs' duetting behaviour and their social and genetic reproductive behavior. Our ongoing analyses suggest that effort invested into social reproductive activities is related to vocal behaviour.

Abstract (5580); Session G04, Thu 13 August, Location: Houston Hall, Bodek Lounge, Oral at 11:30

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**BREEDING PHENOLOGY AND GENETIC MATING SYSTEM OF BOREAL CHICKADEES (*POECILE HUDSONICUS*) IN SOUTHEASTERN NOVA SCOTIA**

Within the socially monogamous systems of most songbirds, including chickadees (family Paridae), extra-pair fertilizations (EPF, copulations between birds not socially paired) are common as part of a mixed mating strategy. Rates of EPF are available for many species of Paridae, however it has yet to be examined in the Boreal Chickadee (*Poecile hudsonicus*). Additionally, basic breeding data for the Boreal Chickadee is very limited and many fundamental phenological questions remain. My study reports breeding data from populations of Boreal Chickadees on a mainland and island site in southeastern Nova Scotia. I installed artificial nests snags, recorded breeding phenology, banded, and collected blood samples from nestlings and adults at each nest. Notably, this is the first report of Boreal Chickadees rearing second broods per season. The second, genetic phase of my project is currently underway. I am using 6 hypervariable microsatellite DNA markers to determine paternity of offspring and EPF frequency. I will also compare the EPF and genetic variation in island versus mainland populations, expecting the more geographically isolated population to have lower genetic diversity and lower rates of EPF.

Abstract (5389); Session GP02, Fri 14 August, Location: Houston Hall, Hall of Flags, Poster Num: 100

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#### A GRASSLAND BIRD MONITORING APPROACH FOR EVALUATING THE SUCCESS OF THE LANDOWNER INCENTIVE PROGRAM IN NEW YORK AND NEW JERSEY

Intensive agricultural practices and increased urban sprawl have resulted in the decline of grassland bird species throughout the Northeast. Private landowners are the key to protecting remaining populations of grassland birds, and the Landowner Incentive Program (LIP) has been successfully managing habitat in this region. New Jersey and New York launched state-administered LIP programs in 2005 and 2007, respectively, and we have been monitoring grassland birds at LIP sites using volunteers and staff to determine the impact of management practices on their populations. Surveys were conducted in both states using a combination of approaches that incorporate Before-After-Control-Impact design and estimates of detection probability. Preliminary results reveal that managed areas provide improved habitat for some species, and that distance sampling and removal methods provide detection, occupancy, abundance, and density estimates with overlapping 95% confidence intervals for bobolinks, grasshopper sparrows, and eastern meadowlarks. In 2009-2010, we will refine survey sampling design and methodology for monitoring grassland birds through volunteer efforts thereby decreasing our reliance on staff time for obtaining reliable data to evaluate the success of LIP and other habitat management programs.

Abstract (5390); Session GP20, Fri 14 August, Location: Houston Hall, Hall of Flags, Poster Num: 57

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#### EFFECT OF DEER DENSITY ON BREEDING BIRDS IN DELAWARE

High deer densities are thought to negatively impact bird communities. We compared avian species richness and relative abundance in relation to deer density using Breeding Bird Survey (2005-2006) and our own point count estimates (2008) and deer density data for Delaware during the same time period. We also sampled vegetation composition and structure at all of our points. We defined three deer densities categories: low (<12 deer/km<sup>2</sup>), moderate (12-23 deer/km<sup>2</sup>) and high (>23 deer/km<sup>2</sup>), and six avian guilds: Interior Obligates, Forest Ground Nesters, Shrub Nesters, Ground Gleaners, Low-Canopy Foragers, and Tropical Migrants. Most (54%) avian guilds did not differ in richness or abundance associated with deer density ( $P>0.10$ ). Of the guilds that did differ, Interior Forest Obligates, Ground Nesters, Ground Gleaners, Low-Canopy Foragers and Tropical Migrants were greatest in moderate deer densities. Only Chipping Sparrow abundance was greatest in low deer densities. We did not detect a difference in vegetation among the deer density categories. Deer do not seem to have an effect on breeding songbirds in Delaware and managers should focus on other metrics as guides for deer management.

Abstract (5274); Session G20, Sat 15 August, Location: Cohen Hall, Terrace Room, Oral at 10:30

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#### EXTENSIVE RANGEWIDE MITOCHONDRIAL INTROGRESSION INDICATES SUBSTANTIAL CRYPTIC HYBRIDIZATION IN THE GOLDEN-WINGED WARBLER

Widespread declines of the Golden-winged Warbler (*Vermivora chrysoptera*) are due in part to hybridization with the Blue-winged Warbler (*V. pinus*), which predictably replaces *chrysoptera* at breeding sites where the two species come into contact. The mechanism by which this replacement occurs remains unresolved. Genetic work has indicated that even in areas of recent contact, introgression of *pinus* mitochondrial (mtDNA) and nuclear genes into *chrysoptera* individuals is common. To explore this process on a broader scale, we screened over 500 individuals from throughout the breeding range to examine geographic patterns of mtDNA introgression. The near ubiquity of mitochondrial introgression suggests that there are far fewer genetically pure populations of *chrysoptera* than previously believed, a finding with important implications for this threatened species. Continued sample collection and screening with a

panel of nuclear DNA markers is required to obtain a comprehensive understanding of the *chrysoptera* changing population dynamics throughout its breeding range.

Abstract (5260); Session S08, Fri 14 August, Location: Irvine Auditorium, Amado Recital Room, Oral at 12:00

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#### THE INFLUENCE OF TREE PHENOLOGY ON NEOTROPICAL MIGRANT BIRDS IN SOUTHWESTERN NORTH AMERICA

In western North America, migration patterns of neotropical land birds within riparian corridors evolved along landscapes at different elevations and within heterogeneous and patchy environments. Western migrant land birds appear to assess migrant routes and stop over habitats at four major scales; 1) Genetically influenced corridor selection influenced by local weather patterns; 2) large-scale landscape features; 3) Vegetation patches; and, 4) microhabitat selection within the vegetation patch. Along the lower Colorado River in Mexico, California and Arizona, the Santa Cruz and San Pedro rivers in Arizona, these four scales are variously influenced by weather, vegetative species, structure, and plant phenology patterns that appear to provide a cue to insect prey base. In migrating neotropical migrant warblers that we have examined along the Colorado, Santa Cruz and San Pedro rivers, species arrival dates and numbers were variable among years, being largely influenced by plant phenology cycles. Therefore, stopover and bird foraging patterns were greatly influenced by plant species and phenological patterns of the selected microhabitat. It thus appears that large scale landscape features, along with vegetation species, structure, phenology, abundance, and insect prey base all play a role in structuring spring warbler migration patterns along southwestern riparian corridors.

Abstract (5299); Session G19, Sat 15 August, Location: Houston Hall, Bodek Lounge, Oral at 11:45

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#### FLEXIBLE FLYWAYS: ALTERATIONS IN MIGRATION ROUTES AND TACTICS IN RUFFS

In Ruffs (*Philomachus pugnax*) large-scale shifts of the global population have been observed. To examine whether flexible usage of flyways contribute to these range shifts, individual male ruffs (n=5777; 1462 color-marked) from two flyways through Eastern and Western Europe were studied. Capture-resighting analyzes revealed that in Western Europe, in the 1990-ties and again since 2006 over >10.000 migrants disappeared from the passage population. In contrast, in Eastern Europe, staging now is commencing earlier, which has led to an increase in passing ruffs. The longitude of resights of ruffs marked in Western Europe but using other stopovers next spring (n=145) significantly increased between 2005-2008. The mass gain profiles switched between flyways, to higher rates in Eastern Europe and lower rates in Western Europe after 2006. Also rates of ornament development decreased in Western Europe. Mitochondrial and nuclear markers revealed no genetic differences between the two flyways (Fst<0.002). We conclude that ruffs may frequently shift between flyways, which disputes the current consensus is that migratory routes are genetically constrained in shorebirds. We discuss how the abating quality of the western European staging habitats has contributed to the current shift.

Abstract (5470); Session G19, Sat 15 August, Location: Houston Hall, Bodek Lounge, Oral at 12:00

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#### INTERGENERIC RELATIONSHIPS WITHIN TINAMOUS USING A MULTI-LOCUS APPROACH

Tinamous and all other ratites are the sister group to extant birds. While phylogenetic relationships among ratites have been actively investigated, the Neotropic tinamous have remained largely unstudied, likely owing to their cryptic nature. In this study, we used a multi-locus approach to clarify the phylogenetic relationships and biogeography of species within the family Tinamidae. A supermatrix was constructed for 19 species representing the 9 currently described genera using mitochondrial cytochrome b (1143bp) gene and nuclear RAG-2, ND2, FIB7, MUSK, TGFB, and TPM1 (5062bp) introns. Not all genes were recovered from all species. The data were analyzed using heuristic searches under several optimality criteria, and support was assessed using bootstrap analyses. Our data recovered two strongly supported clades. The first clade consists of (((*Nothoprocta*+*Rhynchotus*) *Nothura*) *Taoniscus*), with *Tinamotis*+*Eudromia* and *Nothocercus* ambiguously related to them. *Nothoprocta* is paraphyletic due to a strongly supported sister relationship of *Rhynchotus rufescens* and *Nothoprocta cinerascens*. The second clade consists of the

monophyletic genera *Crypturellus* and *Tinamus*. This phylogeny is largely congruent with habitat preference (forest versus arid/open areas) and morphological data.

Abstract (5476); Session GP25, Fri 14 August, Location: Houston Hall, Hall of Flags, Poster Num: 65

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#### WHAT'S THAT TUNE? BIRDS HAVE TO REMEMBER

Both as juveniles and as adults, songbirds must remember the songs of conspecifics, songs with individual differences that result from the vocal learning process. In juveniles, the tutor song, heard in the right social context, is remembered and serves to guide vocal imitation, leading to a copy that includes individually distinct features. In adults, song recognition subserves social communication by contributing to mate selection and to the establishment and maintenance of territories. Electrophysiological and gene induction studies have identified an auditory area of the zebra finch brain, NCM, that is specialized for processing and remembering conspecific vocalizations. In adults, NCM neurons can encode the individual patterns of a large number of songs, and recognize them hours to days later. In juveniles, NCM encodes a memory of the tutor song that lasts into adulthood and predicts the quality of the ultimate imitation of the tutor. The study of behaviorally-relevant song recognition reveals functional principles of sensory memory processing in the vertebrate brain and can help us to understand neural mechanisms of speech acquisition and perception, which also depend on sound recognition.

Abstract (5451); Session S03, Fri 14 August, Location: Cohen Hall, G17 Auditorium, Oral at 09:30

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#### THE ROLE OF BANDING DATA TO EVALUATE AVIAN POPULATION TRENDS

Although Breeding Bird Survey data report substantial declines for numerous species of migratory passerines, these data are often criticized due to sampling biases. Long-term monitoring efforts at bird banding stations provide another source of data to evaluate changes in bird populations. We used fall migration banding data to examine trends in capture rates over time and to evaluate whether evidence exists for a decrease in breeding productivity (estimated with age ratios). Data were collected at the Powdermill Avian Research Center and the Braddock Bay Bird Observatory. Preliminary results found steady declines for many species including Olive-sided Flycatcher ( $P < 0.001$ ) and Canada Warbler ( $P < 0.001$ ). However, for most species, we found no evidence for decreases in breeding productivity. Interestingly, nearly all species demonstrating significant declines in capture rates over time are also reported having range-wide declines using estimates derived with BBS data. Our results suggest that banding data is extremely useful in long-term monitoring of bird populations, and we encourage other researchers with access to such data to publish their results on temporal changes in capture rates.

Abstract (5543); Session G13, Fri 14 August, Location: Houston Hall, Bodek Lounge, Oral at 11:15

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#### DEVELOPMENT OF THE STRESS RESPONSE IN MAGELLANIC PENGUIN CHICKS HATCHED IN EITHER TOURIST-DISTURBED OR UNDISTURBED AREAS OF A BREEDING COLONY IN ARGENTINA

We showed previously that Magellanic penguin (*Spheniscus magellanicus*) chicks in tourist-disturbed areas of an colony show an adult-like expression of the glucocorticoid stress response at hatching. In contrast, chicks in undisturbed areas show a normal gradual development (90-120 days) of the adult-like stress response. The current study was conducted to determine if this rapid expression in tourist chicks is due to a hormonal cue that the female puts into the egg, or is instead a result of disturbances experienced while the chick is developing in the egg up to and including hatch. We did a classic egg-switching experiment, exchanging newly laid eggs between tourist-disturbed and undisturbed areas of the San Lorenzo Magellanic penguin breeding colony in Argentina. If a hormonal signal is passed to the egg by the female, we predict that tourist-laid eggs that are incubated in undisturbed areas will show the elevated stress response at hatch. In contrast, if the rapid development is due to disturbances over time during incubation, eggs laid by females in non-disturbed areas will also show the rapid expression of the stress response immediately after hatch.

Abstract (5263); Session G10, Thu 13 August, Location: Irvine Auditorium, Amado Recital Room, Oral at 17:15

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PHYLOGEOGRAPHY OF THE WHITE-BREASTED NUTHATCH (*SITTA CAROLINENSIS*) IN NORTH AMERICAN PINE AND OAK WOODLANDS: A MULTILOCUS APPROACH

Pine and oak woodlands are common North American floral communities with distinct regional species composition. The origination of these distinct communities was the once continentally distributed Tertiary forest. The orogeny of the late Miocene and Pliocene and Quaternary glacial cycles fragmented the Tertiary forest into separate regional communities. The White-breasted Nuthatch (*Sitta carolinensis*) is a common resident of these highly disjunct woodlands. One prior study has presented evidence for four distinct and well-supported clades that evolved in situ in these refugia. This study used one mitochondrial gene (ND2) to elucidate the phylogeography of this species. I am adding to the data the use of fifteen known nuclear loci and fifteen anonymous nuclear loci. Multilocus data is pertinent when determining the accuracy of gene coalescence and divergence times of populations. The stochastic variances related to the creation of gene trees can only be reduced by increasing the number of loci sampled as opposed to the number of samples of the same gene. Also, studies have revealed that the coefficient of variance could be significantly reduced when using ~25 loci.

Abstract (5467); Session GP22, Fri 14 August, Location: Houston Hall, Hall of Flags, Poster Num: 118

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CONSERVATION OF THE CALIFORNIA CONDOR: ARE SELF-SUSTAINING POPULATIONS POSSIBLE?

After 36 years, and tremendous efforts, the California Condor (*Gymnogyps californianus*) Recovery Program has achieved success beyond what many believed possible. There are roughly as many birds in the wild now as there were 70 years ago and nesting pairs are established at five release sites. However, the programs' success required unprecedented levels of human intervention on behalf of an endangered species, and condors continue to depend on humans to overcome some obstacles to their persistence. Their ability to overcome others they have yet to fully confront remains uncertain. For example, mortality due to lead poisoning appears to have been a significant factor in population declines during the 20th century, and continuing exposure to lead requires daily management actions (e.g. monitoring foraging behavior, proffering 'clean' carcasses, blood lead level testing, chelation therapy). Whether the birds could be self-sufficient foragers were the lead threat removed, or would instead continue to require supplemental food provided by humans, has yet to be determined. We discuss these and other issues that determine the potential for condors to transition from the heavily human reliant populations of today to less reliant or even self-sustaining populations in the future.

Abstract (5296); Session S02, Thu 13 August, Location: Houston Hall, Class of '49 Auditorium, Oral at 14:30

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TIMING OF POPULATION DIVERGENCE IN THREE SOUTHEAST ASIAN BIRD SPECIES

Having attained its current geological configuration since the mid-Miocene, Sundaland remains geographically active due to periodic connection and sundering of landmasses associated with eustatic changes in sea-level. One school of thought maintains that these connection events allowed for massive faunal exchanges, thus promoting genetic homogenization. On the other hand, physical (e.g. large rivers that are now submerged) and habitat barriers could keep populations isolated even during periods of low sea-level, therefore resulting in genetic differentiation. In our study, we examined the timing of population divergence in three species of rainforest birds (*Arachnothera longistrostra*, *Malacocincla malaccense* and *Orthotomus sericeus*) using multiple nuclear loci. Samples of each species were collected from three regions in Sundaland: the Malay Peninsula, western Borneo and northeastern Borneo. In a previous study these species showed very different phylogeographic structure as inferred from mtDNA. Using coalescence-based approaches, we ask if the three species experienced simultaneous divergences, and if divergence timings correlated with glacioeustatic cycles.

Abstract (5418); Session GP12, Fri 14 August, Location: Houston Hall, Hall of Flags, Poster Num: 106

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NEST TYPE SELECTION IN PEREGRINE FALCONS

The factors influencing nest site selection by Peregrine Falcons (*Falco peregrinus*) are not well understood. Historically, Peregrine Falcons nested mostly at natural (cliff) sites and seldom on man-made structures, but now the

majority of nests in much of the USA are on man-made structures. A possible explanation is imprinting on the type of structure from which the parental birds fledged, perpetuating the pattern from post-DDT era re-introductions when releases in much of the USA were primarily from man-made structures. Although some data support the notion of nest-type imprinting, further study is needed. In this context, we report a case of a pair of Peregrine Falcons that nested on a bridge for 2 years, then on a natural cliff ledge 3.5 km away for 2 years, and then on the original bridge for 2 more years, all in succession. The parental birds were the same, and nesting was successful, in every year. These observations will be discussed in the context of nest type selection, nest site fidelity, and the ongoing recovery of Peregrine Falcons in their historic range in the USA.

Abstract (5555); Session G24, Sat 15 August, Location: Cohen Hall, Terrace Room, Oral at 17:15

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#### ORNITHOLOGICAL CRADLE: PHILADELPHIA AND THE BIRTH OF AMERICAN BIRD STUDY

As the hub of New World scientific learning in the late 18th and early 19th centuries, Philadelphia played a leading role in the development of North American ornithology. William Bartram made the first rough calculations of continental bird populations at the family estate here; and with Bartram's help, Scottish poet (and convicted blackmailer) Alexander Wilson worked himself into an early grave in the city, creating American Ornithology. Just upriver a few miles at Mill Grove, a young French fop who had renamed himself John James Audubon was ignoring business to paint birds. The Academy of Natural Sciences nurtured generations of pioneering ornithologists from Thomas Say and Titian Peale to the brilliant ornithologist (and irascible crank) John Cassin. The city was an international crossroads for luminaries like Thomas Nuttall and Charles Lucien Bonaparte, who did much to catalogue the avifauna of the newly explored continent, and it was home to Graceanna Lewis, the first serious female ornithologist in the country, whose career came to a premature end with the death of her mentor, Cassin, in 1869.

Abstract (5620); Session PL1, Thu 13 August, Location: Irvine Auditorium, Oral at 08:20

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#### WILL EFFORTS TO CONTROL HEMLOCK WOOLY ADELGID PROTECT BIRD COMMUNITIES IN KENTUCKY?

We initiated a long-term study of the effects of Hemlock Woolly Adelgid (HWA), an invasive insect that quickly kills Eastern Hemlock trees (*Tsuga canadensis*), on the bird communities of Kentucky, and the efficacy of adelgid treatments. HWA has invaded across much of the range of Eastern Hemlock, but has only recently been detected in Kentucky. Bird species associated with Hemlock forests have shown reduced abundance in areas of heavy infestation and high Hemlock tree mortality. In Kentucky, wide-scale and intensive efforts using different techniques (e.g., pesticides, beetles) to control HWA and limit its impact on forest communities are underway. Our study is one of just a few pre-post tests of the effects of HWA on bird communities and also allows us to test the efficacy of different treatment methodologies.

Abstract (5536); Session GP17, Fri 14 August, Location: Houston Hall, Hall of Flags, Poster Num: 111

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#### SPATIAL AND TEMPORAL TRENDS IN MERCURY IN HERRING GULL EGGS FROM 25 GREAT LAKES SITES, 1974-2007

Total mercury was measured annually in Herring Gull eggs at up to 25 sites in the Great Lakes, 1974-2007. The objective of the study was to track both spatial and temporal trends in the concentration of this contaminant. Because of its primarily fish diet and year-around residency on the Great Lakes, the adult Herring Gull is a proven indicator of contaminant concentrations in that ecosystem. Fresh eggs were collected from a minimum of three sites in each lake. Eggs were analyzed with cold vapour atomic absorption spectrophotometry through 2000 and with an automated mercury analyzer from 2001-2007. Spatial analysis showed that sites in Lakes Superior, Michigan and eastern Lake Ontario and the St. Lawrence River were the most contaminated (lake-wide mean up to 0.182 ug/g w.w.). Eggs from the Niagara River and Lake Erie had the lowest concentrations. Ten of 15 sites for which there were 30 or more years of data showed significant declines. Sites which did not show declines were located in the St. Lawrence and Detroit Rivers as well as Lakes Michigan, Erie and Huron.

Abstract (5574); Session A02, Fri 14 August, Location: Houston Hall, Class of '49 Auditorium, Oral at 16:30

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#### INDIVIDUAL GENETIC DIVERSITY PREDICTS CLUTCH SIZE IN A WILD BIRD POPULATION

Despite considerable plasticity in clutch size, up to 26% of the variance in clutch size is due to individual differences among females in the house sparrow (*Passer domesticus*). Because heritability appears low, we tested for effects of non-additive genetic variation. Reproductive performance data, including clutch size, egg size, hatching, and fledging success were collected between 1993-2006. We selected 42 females that had laid at least seven clutches in their lives and used a survey of 21 microsatellite loci to measure genetic diversity for each female. We found that the proportion of eggs hatched and nestlings fledged were not associated with heterozygosity, but both clutch and egg size increased with heterozygosity. Further analysis suggests that the effect of heterozygosity is a genome-wide effect, and not due to specific loci. The results of this study emphasize the importance of genetic variability in wild birds, and provide insight into the evolution of clutch size and the maintenance of genetic variability in a population.

Abstract (5190); Session G08, Thu 13 August, Location: Houston Hall, Bodek Lounge, Oral at 16:30

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#### HOUSE WREN NEST USURPATION COMPLICATES STUDY OF CHICKADEE HYBRIDIZATION

House Wrens (*Troglodytes aedon*) frequently disrupt nesting of numerous bird species, including cavity nesters that use artificial structures (snags and boxes). To better understand the pattern and impact of wren usurpation in our study population of hybrid Carolina/Black-capped chickadees in SE Pennsylvania, we examined use of 151 artificial snags ("sites") in 2001 - 2008. Even though the study area is covered by both deciduous and coniferous forest, wrens built nests in an average of 34% of the 151 available sites by each season's end. Wrens didn't use any of the sites in every year but they never used 27% of the sites. Calculations showed that this pattern did not agree with a Poisson distribution. Wrens usurped an average of 9 chickadee nests in each year, accounting for 88% of failures. House Wrens thus represent a substantial impediment to the study of chickadee hybridization in our region. Ongoing data collection and analysis examines whether the likelihood of wren usurpation is influenced by canopy cover.

Abstract (5617); Session GP02, Fri 14 August, Location: Houston Hall, Hall of Flags, Poster Num: 129

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#### COUNTING CHICKS BEFORE THEY HATCH: FEMALE COWBIRDS CAN TIME READINESS OF A HOST NEST FOR PARASITISM

Demands associated with brood parasitism have favored sophisticated cognitive abilities in female brown-headed cowbirds. I found that cowbirds could use the rate of eggs added to nests across days to assess the readiness of a nest for incubation, allowing them to synchronize laying with the host and avoid nests where incubation had most likely commenced. In three experiments I allowed cowbirds to investigate and to lay in artificial nests that differed in the number of eggs they contained. Across days, I added eggs to nests at different rates to simulate differences in the timing of reproduction of the hosts. Cowbirds avoided nests where more days had elapsed than eggs had been added. The ability of females to remember and match time elapsed from first visit to a nest to the number of eggs laid in the nest provides evidence for an adaptive specialization of timing and counting abilities, allowing cowbirds to select optimal nests for parasitism.

Abstract (5225); Session G07, Thu 13 August, Location: Cohen Hall, Terrace Room, Oral at 16:45

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#### THE FUNCTION OF SONG IN COWBIRDS: MALE COMPETITION, FEMALE PREFERENCES, AND REPRODUCTIVE SUCCESS

In songbirds, song is central to the communication system. Song has many functions, including regulating male competition and allowing females to select mates. Here I examine the relationship between song characteristics, female preferences, and reproductive success in cowbirds. I amassed data from 17 captive flocks that I have studied over four years. I conducted observations on social interactions as the birds competed, courted, and reproduced. I also collected eggs laid during the breeding season and performed parentage analyses on them. Finally, I measured males' song quality in playback tests. Results revealed that the amount of songs males directed to females, a measure of courtship persistence, was the one variable strongly associated with males' copulation success. For offspring production, however, there was significant between-flock variability. The one variable that was strongly associated with eggs laid across groups was the amount of countersinging males produced; a measure of male competition. The relationship between egg production and male competition suggests that females may be trading off current versus future reproduction based on the opportunities available in groups to evaluate males' competitive abilities.

Abstract (5183); Session S03, Fri 14 August, Location: Cohen Hall, G17 Auditorium, Oral at 10:30

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#### EVIDENCE FOR CHEMOSIGNALING IN SONGBIRDS

Although chemical communication is known to play an important role in reproduction in many animal species, little is known about this mode of communication in birds. In previous work (Soini et al 2007, J. Chem. Ecol.) we found that concentrations of volatile compounds in preen gland secretions of Dark-eyed Juncos (*Junco hyemalis*) increased markedly when individuals were moved from short to long days, suggesting a role for these compounds in reproductive behavior. Using gas-chromatography mass-spectrometry we next compared preen oil components in juncos from several populations. We found striking differences in volatile compound concentrations among populations, particularly in a recently isolated population that has shown rapid evolution of behavioral, morphological, and physiological traits. Additionally, we present behavioral evidence suggesting that juncos can distinguish among preen oil odors from heterospecifics and conspecifics and between sexes. Together our data suggest that odors may play a role in songbird mate selection and potentially in assortative mating that could lead to population divergence.

Abstract (5203); Session G24, Sat 15 August, Location: Cohen Hall, Terrace Room, Oral at 16:30

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#### DEVELOPMENT OF A BIRD COMMUNITY INTEGRITY INDEX TO MONITOR SALT MARSH INTEGRITY AT NATIONAL WILDLIFE REFUGES

Coastal refuges in the National Wildlife Refuge System protect approximately 1,045,925 acres of salt marsh habitat in the lower 48 states. Minimal pristine salt marsh habitat remains and most marshes have experienced marsh management techniques such as grid-ditching and open marsh water management. Appropriate assessment and monitoring tools are necessary to provide refuge managers with the ability to determine overall marsh condition in order to maintain or improve the integrity of refuge marshes. Birds are linked to the overall ecological integrity of their respective ecosystems and are relatively easy to monitor. During the summer of 2008, call-broadcast surveys were performed at 165 points across 8 National Wildlife Refuges (NWRs) on the eastern seaboard. We detected 103 species: 23 wetland obligates, 51 wetland generalists, and 29 edge species. We developed a bird community integrity (BCI) index to evaluate marsh bird community integrity at each point. BCI scores will be used to compare management treatments of marsh units within and between refuges and may be used at NWRs to implement effective management strategies to monitor and improve salt marsh integrity.

Abstract (5535); Session GP20, Fri 14 August, Location: Houston Hall, Hall of Flags, Poster Num: 114

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#### REPRODUCTIVE SENESCENCE IN FLORIDA SCRUB-JAYS: A PHYSIOLOGICAL PERSPECTIVE

As part of the antagonistic pleiotropy theory of senescence, Williams (1957) predicted that reproductive effort should be inversely proportional to average adult life span. We tested whether actuarial and reproductive senescence in the Florida Scrub-Jay (*Aphelocoma coerulescens*) follow this pattern. To test this prediction, we collected reproductive and physiological data from cooperative breeding Florida Scrub-Jays over 12 breeding seasons. We found that females that lay more eggs early in life have shorter life spans. Conversely, male and female breeders that fledged more offspring early in life had longer reproductive life spans. Further, there is an increase in hatching success with age followed by a decline in hatching success in the oldest female breeders and also an increase in testosterone with age followed by a decline in testosterone production in the oldest male breeders, both physiological indicators of senescence of the reproductive system.

Abstract (5160); Session G10, Thu 13 August, Location: Irvine Auditorium, Amado Recital Room, Oral at 15:15



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#### UTILIZING FEATHERS IN ISOTOPE-BASED STUDIES OF AVIAN ECOLOGY: SAMPLING STRATEGIES AND CONSIDERATIONS

Stable isotope-based studies of feathers have afforded valuable insight into avian migration and foraging ecology. Unfortunately, factors such as isotopic heterogeneity within feathers remain poorly characterized and may compromise the accuracy of interpretations. We examined intrafeather isotope variability and sampling strategies in flight feathers of the Hawaiian Petrel (*Pterodroma sandwichensis*), a far-ranging, endangered seabird. Stable carbon and nitrogen isotope values show considerable intrafeather variation (average range within feathers is 1.3 ‰ for both  $\delta^{13}\text{C}$  and  $\delta^{15}\text{N}$ ), while stable hydrogen isotope values show low to moderate variation (average range of 11 ‰). We propose sampling strategies to provide accurate whole-feather isotope averages, including a minimally-invasive protocol that uses no more than the 1.0 mg of feather vane needed for stable isotope analysis. Additionally, we advocate the careful consideration of the time period represented by samples taken for stable isotope analysis. For the Hawaiian Petrel, we examined growth bars to gain insight into the time period represented by flight feathers and compare multiple flight feathers to test the ability of a single primary to represent the entire period of molt.

Abstract (5550); Session G23, Sat 15 August, Location: Houston Hall, Bodek Lounge, Oral at 16:15

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#### DARK BILLS TO REDUCE GLARE IS A WIDESPREAD ADAPTATION AMONG BIRDS

Because the bill projects into the bird's visual field, its hard, polished surface can reflect light into the eyes. Such glare can be minimized by dark coloration. North American wood warblers with dark bills forage in sunlight more often than wood warblers with pale bills. Willow Flycatchers (*Empidonax traillii*) whose bills were painted white increased their use of shade. These data strongly support glare reduction as the selective force behind dark bills of warblers and Willow Flycatchers. We studied the correlation between bill color and foraging behavior of neotropical and North American birds. Bill color was determined from museum specimens. We observed birds throughout the United States and Costa Rica from 1991-2009. Birds that forage in sunlight are significantly more likely to have dark bills than those that forage in shade. Those that forage on aerial insects are significantly more likely to have dark bills than those that glean or probe for insects or eat fruit or seeds. We suggest that glare reduction is an important selective force on bill color in birds.

Abstract (5560); Session G14, Fri 14 August, Location: Cohen Hall, G17 Auditorium, Oral at 14:15

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#### BIRD POPULATION ESTIMATES FOR PENNSYLVANIA: THE ADDED VALUE OF DENSITY ESTIMATES IN BIRD ATLAS PROJECTS

Bird atlases have traditionally focused on mapping bird distributions. Some second generation atlases have also included estimates of bird population density, which can be of additional value when assessing conservation needs and priorities. We analyze data from >30,000 randomly selected point counts conducted for the 2nd Pennsylvania Breeding Bird Atlas (2nd PBBA), 2004-2008, to produce population estimates, density maps and habitat relationships for breeding birds in Pennsylvania. Analysis of data with such large sample sizes presents unique computational problems and research opportunities. We use a combination of the "Removal" method, distance sampling and regression kriging to correct for sources of bias. The inclusion of habitat, weather, time of day and time of season covariates allows for refined models that are species specific. We compare our population estimates with USGS Breeding Bird Survey derived "Partners In Flight" estimates and note that for most species, 2nd PBBA estimates are higher.

Abstract (5381); Session G13, Fri 14 August, Location: Houston Hall, Bodek Lounge, Oral at 09:45

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#### DOES MORTALITY RISK AFFECT RESPONSE TO CLIMATE VARIATION FOR SYMPATRIC ROCK AND WHITE-TAILED PTARMIGAN?

Life histories of species vary along a reproductive-survival continuum and age-specific mortality is believed to be a key mechanism influencing this trade-off. In the southern Yukon, we examined the reproductive strategies of sympatric Rock and White-tailed Ptarmigan from 2004-2008. We previously noted that annual survival rates of Rock Ptarmigan average 20% higher than White-tailed Ptarmigan and we examined whether this might lead to lower reproductive effort for Rock Ptarmigan, especially under less favorable spring conditions. Onset of breeding was synchronous for the two species and was 3-4d earlier with each 1°C rise in spring temperature. As reproduction was delayed however, Rock Ptarmigan expended less effort on reproduction. Over a 4-week breeding onset, mean Rock Ptarmigan clutch size declined by 3.8 eggs compared to 0.8 eggs for White-tailed Ptarmigan. Rock ptarmigan were also less likely to re-nest following failure and as a consequence had shorter breeding seasons than White-tailed Ptarmigan. With a higher survival probability, Rock Ptarmigan will have a greater likelihood of future breeding opportunities and this may lead to lower resilience in maintaining reproductive effort under less favorable conditions.

Abstract (5630); Session GP35, Fri 14 August, Location: Houston Hall, Hall of Flags, Poster Num: 98

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#### THE ASIA-TO-AMERICA INFLUX OF AVIAN INFLUENZA WILD BIRD HOSTS IS LARGE

Recent literature has underestimated the number and taxonomic diversity of wild birds moving between Asia and North America. Our analyses of the major avian influenza (AI) host groups show that fully 33 species of waterfowl (Anatidae), 46 species of shorebirds (Charadriidae and Scolopacidae), and 15 species of gulls and terns (Laridae) are involved in movements from Asia to Alaska across northern oceans. Our data suggest that about 1.5 - 2.9 million individuals in these important host groups move from Asia to Alaska annually. Among all of the host groups we consider most relevant for AI virus movement models in this region (waterfowl, shorebirds, and gulls and terns), it seems likely that thousands of AI-infectious birds may be involved in annual Asia-to-America migrations. Incorporating our data into a recent model of the global spread of the highly pathogenic H5N1 suggests that wild birds are a more likely source of this strain being brought into USA than trade in domestic birds, although the latter remain a numerically more probable source of introduction into the New World.

Abstract (5292); Session GP08, Fri 14 August, Location: Houston Hall, Hall of Flags, Poster Num: 32

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#### THE EFFECTS OF ENVIRONMENTAL TEMPERATURES ON TREE SWALLOW REPRODUCTION: A 25-YEAR PERSPECTIVE

Increasing mean spring temperatures are correlated with earlier timing of breeding in Tree Swallows across North America. Earlier breeding poses increased hazards for nesting swallows, as periods of cold temperatures ("cold snaps") persist in the face of generally warming spring temperatures. There is considerable diversity in the responses of insects to colder temperatures, and this leads to great variation in the number and kinds of flying insects available for swallow foraging with varying temperatures across the season. The effects of cold snaps depend on the ages of chicks being exposed, with intermediate-aged chicks more vulnerable to cold and temporary parental abandonment. In recent years, chicks that have been lost early enough in the season have been replaced by a new clutch of eggs. More generally, laying interruptions associated with cold snaps raise many questions about the physiology of reproduction. Available evidence suggests that higher temperatures are not yet a direct concern for swallow breeding in Ithaca, and predicting the effects of climatic warming on swallow reproduction paradoxically remains a study of the effects of cold.

Abstract (5538); Session G05, Thu 13 August, Location: Irvine Auditorium, Amado Recital Room, Oral at 10:45

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#### GENOME SIZE EVOLUTION IN HUMMINGBIRDS

The high metabolic demands of hovering flight and the link between nuclear DNA content and red blood cell size predict that the genomes of hummingbird should be small relative to those of other tetrapods. We report genome size measurements for 37 species of hummingbirds that resoundingly confirm this prediction. Genome size was markedly reduced before the most recent common ancestor of extant hummingbirds, but no substantial additional reduction occurred during hummingbird diversification. Unlike other bird groups, variation within hummingbirds is not explained by variation in respiratory and flight-related parameters. Unexpectedly, genome size has increased substantially in four unrelated hummingbird species whose distributions are centered on humid forests of the upper-tropical elevational zone on the eastern slope of the Andes. This suggests that secondary expansion of the genome may have been mediated by biogeographical constraints on evolutionary effective population size.

Abstract (5528); Session G18, Sat 15 August, Location: Irvine Auditorium, Amado Recital Room, Oral at 11:15

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#### FRUIT AND BUGS: HABITAT USE OF FALL MIGRANTS IN NORTHEASTERN COSTA RICA

Vast numbers of migrant birds replenish energy reserves during semiannual migratory stopover periods in Northeastern Costa Rica. Despite the importance of tropical staging areas to migrant birds, very little research has focused on tropical stopover ecology. Using bird banding data in association with a priori modeling methodologies, I examined the influence of habitat structure and resource distribution (fruit and arthropods) on habitat use of 11 migrant landbird species during fall migration in Northeastern Costa Rica. Capture rate was positively associated with fruit for predominantly frugivorous species. Conversely, predominantly insectivorous species had top candidate models that emphasized vegetative attributes without resource variables. These results suggest that frugivorous birds distribute in correspondence with food supply and insectivorous birds distribute in correspondence with structure, possibly due to inherent difficulties associated with assessing arthropod availability. Thus, understanding the influence of structural characteristics and resource abundance on migrant habitat use during stopover in tropical latitudes may be particularly important for the management of tropical staging areas.

Abstract (5382); Session G19, Sat 15 August, Location: Houston Hall, Bodek Lounge, Oral at 12:15

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#### AVIAN RESPONSE TO TWO-AGE FOREST MANAGEMENT ON THE MONONGAHELA NATIONAL FOREST

We examined short- and long-term avian response in two-age and clearcut harvests and in unharvested reference areas on the Monongahela National Forest and the Fernow Experimental Forest. In 1993-1996, we quantified avian abundance and nesting success in 31 stands ~15 years post-harvest. Abundance and daily nest survival rates did not differ among treatments ( $p > 0.05$ ) for four of the five most common species. Nest parasitism rates were low (6%) but were associated with two-age harvests. Thus, in the short-term, two-age management is a viable alternative to clearcutting in forested landscapes where cowbird parasitism is low. In 2005-2006, we quantified avian abundance in 17 of these stands. Although older harvests had lower species richness and diversity, they were beginning to provide habitat for some late-successional forest songbirds that were absent or uncommon in young harvests. Overall, these species were more flexible in their use of different seral stages; several species used both age classes and harvest types in addition to mature forest. Consequently, in the long-term, two-age management provides habitat for a diverse group of species as these stands mature.

Abstract (5245); Session S06, Fri 14 August, Location: Houston Hall, Class of '49 Auditorium, Oral at 09:30

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#### WHAT IS SPECIAL ABOUT HOW THE BRAIN HEARS SONG

Songbirds are highly skilled in recognizing the individual songs of other birds, and use song recognition to guide social interactions. We are studying how auditory neurons in the songbird brain encode songs such that recognition and appropriate behavioral responses are achieved. Across taxa, many auditory neurons are particularly responsive to the acoustic features of vocalizations. In zebra finches, neurons in the auditory midbrain show stimulus-dependent

tuning; the complex sound features to which they respond differ depending on whether the bird hears song or other sounds that are matched in power and frequency to song but do not have the spectrotemporal statistics of zebra finch song. Using single neuron electrophysiology, we have found that neurons are more broadly tuned in frequency and more precisely temporally tuned during song processing than during noise processing. I will describe our studies examining the physiological basis of this stimulus-dependent tuning by comparing the responses of neurons to songs, noise and tones. This work contributes to our understanding of how the tuning properties of auditory neurons facilitate song perception and the accurate recognition of individual songs.

Abstract (5246); Session S03, Fri 14 August, Location: Cohen Hall, G17 Auditorium, Oral at 11:30

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#### GENE FLOW AND DIVERGENCE IN BIRDS ON THE ISLANDS OF TRINIDAD AND TOBAGO

To better understand what makes a bird a good overwater disperser, I investigated both genetic and morphological divergence between populations of two species of birds on the continental islands of Trinidad and Tobago. I measured 22 morphological characters and sequenced the ND2 gene of the mitochondrion for the Copper-rumped Hummingbird (*Amazilia tobaci*) and Bananaquit (*Coereba flaveola*). For Bananaquit, I also sequenced the control region of the mitochondrion. Populations of both species on Tobago are morphologically and genetically distinct from those on Trinidad. The  $F_{st}$  value for the Copper-rumped Hummingbird of 0.7 and the fact that the two islands share no haplotypes indicates high levels of genetic differentiation between the two island populations. Likewise, the  $F_{st}$  value of 0.46 for Bananaquit indicates fairly high levels of genetic differentiation between the two islands. Based on both morphological and genetic data, it seems unlikely that either of these species is experiencing regular gene flow between the two islands.

Abstract (5434); Session G08, Thu 13 August, Location: Houston Hall, Bodek Lounge, Oral at 16:45

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#### HYBRID CHICKADEES SHOW HIGHER SURVIVORSHIP THAN CAROLINA CHICKADEES IN SOUTHEASTERN PENNSYLVANIA, USA

The Black-capped (*Poecile atricapillus*) and Carolina (*P. carolinensis*) chickadee hybrid zone is a rare moving hybrid zone: it is shifting northward, but the exact causes for this movement are unknown. Our goal was to use AIC to investigate the influence of site, sex, and year on the survival and recapture rates of Carolina and hybrid chickadees over ten years at two sites, a Carolina Chickadee-only site and a hybrid-only site. Hybrid chickadees showed higher average survival rates with no difference in recapture rates between the sexes, while Carolina Chickadees exhibited lower survival rates and a wide range in recapture rates. These data indicate that hybrid chickadees may have survival advantages over Carolina Chickadees despite evidence that they may be reproductively less successful. The evolutionary divergence between the Carolina Chickadee and Black-capped Chickadee clades is at least 2.5 million years, a number in agreement with estimates for the minimum divergence required for the hybrids of two avian species to show hybrid vigor. These results indicate the potential for some hybrid vigor, a trend not yet noted in the chickadee literature.

Abstract (5239); Session GP02, Fri 14 August, Location: Houston Hall, Hall of Flags, Poster Num: 101

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#### AVIAN STUDIES AND HURRICANE DISTURBANCE IN THE LUQUILLO EXPERIMENTAL FOREST, PUERTO RICO

The Luquillo Experimental Forest (LEF) in the mountains of eastern Puerto Rico was proclaimed in 1956, partially from Spanish crown lands transferred to the US in 1903. The LEF has since become one of the most thoroughly studied tropical forests, in which some aspects of its avifauna have been well studied. For example, the remnant Puerto Rican Parrot (*Amazona vittata*) population has been the focus of long-term research and conservation. These parrot studies illustrate the complexity of extrinsic and intrinsic factors maintaining a population bottleneck and have resulted in recovery methods applicable to other endangered species. The Pearly-eyed Thrasher (*Margarops fuscatus*), a major nest predator and competitor for parrot nest cavities, has also been studied for many years. These studies have uncovered adaptations typical of a "supertramp" that enable the thrasher to readily colonize disturbed sites with depauperate bird communities. The thrasher's abundance and the parrot's population bottleneck are partially attributable to hurricanes. Studies of these and other species in the LEF contribute to our understanding of the effects of hurricanes on biotic communities.

Abstract (5200); Session S06, Fri 14 August, Location: Houston Hall, Class of '49 Auditorium, Oral at 11:30

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#### SILVICULTURAL SYSTEMS AND FOREST BIRD COMMUNITIES: LONG-TERM RESEARCH ON THE BARTLETT EXPERIMENTAL FOREST

We studied the effects of silviculture on songbirds and two raptors on the Bartlett Experimental Forest and surrounding forest over a 15-year period; providing managers with necessary information to effectively conserve wildlife habitat values in working forests. Songbirds were studied both during the nesting and post-fledging periods and in even-aged and uneven-aged habitats, as were small mammals. Songbird diversity during the nesting season was richer across managed than reserved forest landscapes. Barred owl and northern goshawk activity varied from year to year. Videography of active nests showed that a diversity of species were responsible for depredating nests, including northern goshawks. Radio-telemetry showed that fledgling ovenbirds did not use early-successional habitats, though they did shift their habitat use towards structurally complex habitats that differed from nesting sites. Species richness was greater in larger clearcut openings than smaller group selection openings. Some of the most abundant species in regenerating clearcuts during the post-fledging period were species that nest in mature forests. Such early successional habitats in extensive forests provide resources needed for foraging, nesting, and brood rearing not found in mature forests.

Abstract (5506); Session S06, Fri 14 August, Location: Houston Hall, Class of '49 Auditorium, Oral at 09:00

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#### TERRITORIAL AGGRESSION AND PARENTAL CARE OF MALE ORANGE-CROWNED WARBLERS BREEDING IN ALASKA AND CALIFORNIA

Male reproductive strategies should reflect the costs and benefits of providing parental care, which may differ depending on life-history strategies and ecological conditions. We compared the reproductive behaviors of male orange-crowned warblers (*Vermivora celata*) breeding in southern California (*V. c. sordida*) and central Alaska (*V. c. celata*). Alaskan warblers have faster life history strategies, breed in a lower density environment, and have higher breeding synchrony than their counterparts in California. To understand how these factors affect male behaviors, we examined territorial aggression by conducting song playback experiments during the incubation period, and parental care by recording offspring provisioning rates during the nestling period in both populations. Californian males showed stronger aggression in response to playback than did Alaskan males. Also, the proportion of nestling provisioning trips provided by the male was significantly lower in California than in Alaska. These behavioral differences suggest that Californian males invest more heavily in competitive ability while Alaskan males invest more heavily in parental care.

Abstract (5569); Session G24, Sat 15 August, Location: Cohen Hall, Terrace Room, Oral at 17:00

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#### NORTH AMERICAN BIRD PHENOLOGY PROGRAM: THE WORLD'S LARGEST AND LONGEST DATASET ON BIRD MIGRATION

The North American Bird Phenology Program was a network of volunteer observers who recorded information on first arrival dates, maximum abundance, and departure dates of migratory birds across North America. Active between 1880 and 1970, the program was coordinated by the Federal government and sponsored by the American Ornithologist's Union. It exists now as a historic collection of six million migration card observations, illuminating almost a century of migration patterns and population status of birds. Today, in an innovative project to curate the data and make them publicly available, the records are being scanned and placed on the internet, where volunteers worldwide transcribe these records and add them into a database for analysis. In the program's first year, 245,000 cards have been scanned, and with over 1,300 participants, 98,000 records transcribed in the first 3 months of the online data entry program. We describe an analysis that uses hierarchical log-linear models to document change in arrival dates of Barn Swallows as a function of historical weather data, providing a framework for documenting climate change effects on arrival dates.

Abstract (5316); Session GP21, Fri 14 August, Location: Houston Hall, Hall of Flags, Poster Num: 116

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#### THE DYNAMIC ROLE OF TEMPERATURE IN LIMITING WINTERING BIRD DISTRIBUTIONS

Winter temperature has long been considered an important factor limiting bird distributions on many levels, but most recent studies have focused solely on “snapshots” of species distributions and coarse-scale temperature data. By combining data from Project FeederWatch (a long-term winter-long survey of birds that visit feeders) and new daily temperature interpolations, we examined the relationship between temperature and bird distributions at multiple spatio-temporal scales for over 4,000 sites across the northeastern United States and Canada. For 15 bird species, we found winter birds responded differently to minimum temperature at scales ranging from daily fluctuations to winter-long isotherms. At the finest temporal scale, we found daily minimum temperature to be negatively associated with feeder visitation rates resulting in an increased likelihood of feeder visitation as the temperature dropped. At a coarser scale, however, minimum temperature was a strong limiting factor for birds such as Carolina Wren and Song Sparrow whereas Downy Woodpeckers and Black-capped Chickadees showed little response. Quantifying the dynamic relationship between species distributions and temperature is of critical importance in elucidating the effects of climate change on bird populations.

Abstract (5334); Session G05, Thu 13 August, Location: Irvine Auditorium, Amado Recital Room, Oral at 11:00

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#### FACTORS AFFECTING NEST-SITE FIDELITY IN A HYBRID POPULATION OF CHICKADEES

Passerines that nest in artificial structures (nest boxes and variants) provide opportunities for examining whether the use of a nest site is influenced by prior success or by other factors, such as pair stability. We examined patterns of nest-site reuse between 1998 and 2007 in a population within the Carolina/Black-capped chickadee hybrid zone in SE Pennsylvania provided with 152 artificial snags and 4 nest boxes (“sites”). The sample comprised 170 cases where at least one member of a pair used sites that we provided in more than one year. Overall, chickadees were less likely to reuse the same site in successive years after failure (5%) than after success (95%); however, our analysis was constrained by difficulties in identifying breeders prior to nest failure. When both members of a pair survived (42% of cases), they usually remained together (93%), but divorced rarely (7%). Pair stability had little influence on nest-site reuse, and patterns by sex were similar, suggesting that both sexes are involved in site choice. Continuing work focuses on spatial patterns associated with multi-year residency.

Abstract (5628); Session GP29, Fri 14 August, Location: Houston Hall, Hall of Flags, Poster Num: 124