

P10, **Accordi, Iury A.**, PPG Ecologia UFRGS, RS, Brazil, curiangodobanhado@hotmail.com;
Hartz, Sandra M., PPG Ecologia UFRGS, RS, Brazil;

***NEOTROPICAL WATERBIRD MOVEMENTS: A SOUTHERN BRAZILIAN WETLAND CASE STUDY**

Most waterbirds live in metapopulations maintained mediate migration, and or dispersal. There are many seasonal movements among Neotropical waterbirds, in general poorly documented, and still not comprehensives. The "Banhado Grande System" is a wetland complex placed in southern Brazilian state of Rio Grande do Sul. Quantitative avifauna samplings through four seasons were conducted among December 2001, December 2002. Sixty waterbird species were recorded (including passerines wetland dependents), in that ones to less 29 accomplished local, and or wide seasonal movements, and three was globally endangered (*Xanthopsar flavus*, *Heteroxolmis dominicana*, and *Scytalopus iraiensis*). For this fact the "Banhado Grande System" assumes an important role for ecosystem maintenance in the Neotropics. The knowledge about waterbird's migration flyways assumes vital importance to tracking conservation strategies. Whether displacement strategy for migrant waterbirds involve non stop flies, habitat use during migration can be insignificant. For other hand, whether these ones accomplish stopovers along his migratory flyways, habitat can be a major resource during movements. With many species, and populations involved in seasonal movements, should there are various displacement strategies, involved as non-stop as stopover flies. So habitat use patterns, migratory timing, and major flyways are priority research. Only extensive and wide studies will can clarify about Neotropical waterbird seasonal movements and propose efficient policies for wetlands, and his dependent waterbirds conservation.

P07, **Alvarado Ghisselle M.**, National Museum of Costa Rica, octrop@racsa.co.cr;
CHARACTERIZATION OF THE AQUATIC AVIFAUNA AT THE LOWER BASIN OF THE SAVEGRE AND NARANJO RIVER, CENTRAL PACIFIC, COSTA RICA

The Savegre and Naranjo rivers are located on the Central Pacific of Costa Rica. The high and medium river basins are considered one of the best preserved in Costa Rica; however, the lower basin is widely altered by human impact. I studied the relative bird abundance, diversity and the species similarity in different wetlands (rivers, lakes, beach, estuaries and colonial nesting places) twice in the wet season and twice in the dry season through 2002. I used point counts and transects to evaluate bird abundance. I saw 54 water bird species, 33% of the Costa Rican aquatic avifauna. 26 species (48%) were residents, 21 migratory species (39%) and 7 (13%) were migratory-resident species. The species richness was bigger in river-estuary than in other aquatic ecosystems ($x^2 = 38.46$, g.l. = 5, $P < 0.01$). Birds were more abundant in island and rivers ($x^2 = 7,511$, 5 g.l., $P < 0.01$) than in orders wetlands. The islands were very important for colonial water bird species like Brown Booby, White Ibis and Bridled Tern. Lakes and rice growth showed the biggest species similarity, contrary to island-lakes, island-river and island-rice growth. I saw two aquatic bird species not previously seen at the lower basin of the Savegre and Navajo rivers, these species were Southern Lapwing and Bridled Tern.

P08, **Alvarado Ghisselle M.**, National Museum of Costa Rica., octrop@racsa.co.cr;
THE IMPORTANCE OF MANUEL ANTONIO NATIONAL PARK ISLANDS AS A BREEDING AND ROOSTING PLACE FOR WATERBIRDS

Manuel Antonio National Park is located on the Central Pacific of Costa Rica. It has a group of islands (Mogotes, Olocuitas, Toro Amarillo, Gemelas y Picuda) used as breeding and roosting places for waterbirds. In 2002, I made four transects by boat around each island (two in the dry season and two in the wet season) to estimate bird abundance, diversity and habitat use. Waterbirds

breeding biology (average clutch size, weight, length and breadth of the eggs) was studied during 2002-2003 at Olocuitas for White Ibis and Brown Booby, and for Bridled Tern at Gemelas. The islands were important for the breeding of Brown Booby, White Ibis and Bridled Tern and as roosting places for Magnificent Frigatebird and Brown Pelican. The nest and eggs of Bridled Tern, the breeding potential of these islands, and the nesting of Bridled Tern in the Central Pacific of Costa Rica were unknown before this study. The greater bird abundance occurred during July 2002. Brown Booby was the more abundant species. Olocuitas and Toro Amarillo were the places with more nests and bird abundance. I report the mean clutch size, weight, length and breadth of the eggs for Brown Booby, White Ibis and Bridled Tern. The Brown Booby and White Ibis weight, and the length and breadth of their eggs did not change between 2002-2003.

50, **Apanius, Victor**, Dept. Biol. Sci., Florida International Univ., Miami, FL 33199, USA, apanius@fiu.edu;

Nisbet, Ian C.T*, 150 Alder Lane, North Falmouth, MA 02556, USA;

SERUM IMMUNOGLOBULIN G LEVELS ACROSS THE LIFESPAN OF COMMON TERNS
Serum immunoglobulin G (IgG) is the predominant form of antibodies in the blood and circulating levels represent the systemic production of the B-lymphocyte compartment of the immune system. We measured IgG levels in common terns (*Sterna hirundo*) at Bird Island, Massachusetts, USA, at ages 1-27 days (chicks) and 6-25 years (adults). At hatching, IgG levels in chicks were comparable to adult levels due to maternal (in ovo) transfer. The lowest levels were found between 4-8 days of age and adult levels were attained by 21 days of age. In breeding adults, IgG levels were lower in 2002, when food limitation was evident, than in 1999. IgG levels remained constant across the reproductive cycle, in contrast to other avian species that show a decline. IgG levels were not different in the very oldest (>95% percentile age) birds compared to young and middle-aged breeders. Unlike mammals, which typically show increased IgG levels at the end of lifespan, common terns do not appear to show signs of immunosenescence.

Saturday, 14:10, Room A

56, **Arnold, Jennifer M.**, Auburn University, Auburn, AL, 36849, arnolj1@auburn.edu;

Grand, J. Barry, USGS, ALCWFU, Auburn University, Auburn, AL 36849;

Koons, Dave N., Auburn University, Auburn, AL 36849;

Yogi, Nitin V., Auburn University, Auburn, AL 36849,

THE ROLE OF POPULATION MODELING IN NATURAL RESOURCE DAMAGE ASSESSMENT

Currently oil spill damage assessments focus on acute mortalities of birds. As a general rule, injury assessments fail to address population level, long-term, sub-lethal, and cumulative effects of spills. We use case studies of the arctic tern (*Sterna paradisaea*) and common eider (*Somateria mollissima*) to demonstrate that understanding the impacts of direct and indirect effects of oiling on the population level is necessary to conduct accurate damage assessments that achieve the goals mandated under the Oil Pollution Act. We present a series of matrix population models that illustrate the costs in terms of natural resource losses of limiting injury assessment to acute mortalities and the validity of multiple approaches to modeling and parameter estimation. The models presented will illustrate the utility of stochastic versus deterministic models. We will also suggest several ways of estimating vital rates when information for a specific population is limited or missing. Finally, we introduce a newly developed, multifaceted, database and modeling software tool that is designed to assist natural resource managers in conducting spill related injury

assessments at the population level.
Saturday, 16:30, Room A

18, **Balan, Andre**, Univ. of Sao Paulo, Av. Trabalhador SaoCarlense 400, CEP 13560-970, Sao Paulo - SP, Brazil, agrbalan@icmc.usp.br;
Batista, Joao, Univ. of Sao Paulo, Av. Trabalhador SaoCarlense 400, CEP 13560-970, Sao Paulo - SP, Brazil;

***IMAGE SEGMENTATION TECHNIQUES FOR AUTOMATIC DETECTION AND COUNTING OF WATER BIRDS**

Biological monitoring of certain species of birds represents an important source of information related to the quality of the environment. The census, which consists of the quantification of individuals, is one of the key factors in this process. This work presents an image segmentation method that automatically identifies and counts the individuals of a population of birds. The method is based on Markov Random Fields and the images have been acquired through an radio-controlled, reduced-scale aeroplane with an embedded digital camera. The good accuracy achieved in identifying white herons individuals from aerial images acquired in the state of Sao Paulo and Pantanal (Brazil) has made us believe that the developed method could be adopted as an advantageous technique for monitoring bird's populations when compared with that of onsite observation by an expert, as the process can be done faster and is also capable of monitoring areas which experts have difficulties to reach.

Thursday, 17:10, Room A

P27, **Barquete, Viviane**, Fundação Univer. Federal do Rio Grande, Depto. Oceanografia, C.P. 479 CEP: 96201-900, Rio Grande, Brasil, vibarquete@yahoo.com.br;

Bugoni, Leandro;

Vooren, Carolus M;

***FEEDING ECOLOGY OF NEOTROPIC CORMORANT IN SOUTHERN BRAZIL**

The Patos Lagoon estuary has a non-breeding population of Neotropic Cormorant (*Phalacrocorax brasilianus*) estimated in 1400 birds. Pellets were collected year-round from a night roosting site in the estuary. The main food item in 289 pellets was the White croaker (*Micropogonias furnieri*) with frequency of occurrence of 73.7%, and proportions of 48.9% by mass and 41.2% by number. Catfish (Ariidae) occurred in 43.6% of pellets, with 12.7% by mass and 10.3% by number. Total length of White croaker was 113.5 mm on average, but differed significantly between months. Body mass of Neotropic cormorant (1.68 kg), calorific content of fish (5.9 kJ/g), assimilation efficiency (80%), field metabolic rate (2099.6 kJ/day), and population size were parameters used to construct a trophic model of the population in the estuary. The individual mean food consumption estimated by the bioenergetic model was 444.9 g/day. The annual fish consumption by cormorant population in Patos Lagoon was 139 tonnes of juvenile and subadult fish, which represent 1.3% of artisanal fishery landings of the White croaker and Catfish in the estuary. This amount corresponds to 5.8 million individual fish, suggesting a non-negligible impact on estuarine fish mortality and recruitment.

36, **Barros, Luciano A.**, Depto de Produção Animal, Faculdade de Agronomia e Medicina Veterinária: Av. Fernando Correa s/n 78069-900, Cuiabá, MT, Brazil, labarros@terra.com.br;
Rodrigo Friciello Texeira, Fundação Parque Zoológico de São Paulo. Av. Miguel Stefano, 4241, São Paulo, SP, Brazil. CEP 04301-905;
Delir Corrêa Gomes, Depto Helminologia, Instituto Oswaldo Cruz-RJ: Av. Brasil s/n, Rio de

Janeiro, RJ, Brazil. CEP 78000-000;

Roberto Magalhães Pinto, Depto Helminologia, Instituto Oswaldo Cruz-RJ: Av. Brasil s/n, Rio de Janeiro, RJ, Brazil. CEP 78000-000;

PARASITES WITH ZOONOTIC IMPORTANCE IN CICONIIFORMS FROM MATO GROSSO, BRAZIL

Eight species of Ciconiiforms (n = 108), captured in the Pantanal of Mato Grosso, Brazil, were infected with three nematodes (*Contracaecum multipapillatum*, *Eustrongylides ignotus* and *Desmidocercella ardeae*), one cestode (*Valipora mutabilis*) and four trematodes (*Ascocotyle longa*, *Cotylotretus grandis*, *Clinostomum marginatum* and *Ithyoclinostomum dimorphum*). The prevalence of infected birds with at least one helminth of zoonotic importance was of 81.7% (165). Among the other helminths, two nematodes were the most prevalent. (*Eustrongylides ignotus*) caused tubular lesions on the wall and disruption of the mucosa of the stomach. Microscopically there was a mixed inflammatory cell infiltrate, marked fibrosis, hemorrhage, and necrosis. (*Contracaecum multipapillatum*) resulted in hyperemia of the gastric mucosa. At attachment sites a mixed leukocyte infiltrate with areas of necrosis reaching the submucosa were observed. Both parasites have low host specificity being found in both piscivorous birds and mammals. The pathology caused in their natural hosts is important to study with regard to piscivorous bird populations and the health of other animals, including human beings.

Saturday, 9:50, Room A

26, **Bart, Jonathan**, U.S. Geological Survey, Boise, Idaho, USA, Garry.Donaldson@ec.gc.ca;

Andres, Brad, U.S. Fish and Wildlife Service (FWS), Arlington, VA, USA;

Brown, Stephen, Manomet Center for Conserv. Sciences., Manomet, MA, USA;

Donaldson, Garry, Canadian Wildlife Service, Gatineau, Quebec, Canada;

Morrison, R. I. G, CWS, Ottawa, Ontario, Canada;

Johnston, Vicky, CWS, Yellowknife, Canada;

Jones, Stephanie, FWS, Denver, Colorado, USA;

Skagen, Susan, USGS, Fort Collins, Colorado, USA;

THE PROGRAM FOR REGIONAL AND INTERNATIONAL SHOREBIRD MONITORING (PRISM)

PRISM is designed to be a comprehensive approach to shorebird monitoring at a scale that reflects the broad ranges of shorebird species. The goals of PRISM are to: (1) estimate the size of breeding populations of migratory shorebirds; (2) describe the distribution, abundance, and habitat relationships for each of these taxa; (3) monitor trends in shorebird population size; (4) monitor shorebird numbers at stopover locations, and; (5) assist local managers in meeting their shorebird conservation goals. PRISM has 3 main components: breeding surveys in arctic, boreal, and temperate regions, migrations surveys, and surveys to be conducted during non-breeding periods. Current activities have focused on breeding and migration surveys in Canada and the US but as the program grows and partnerships are expanded, other parts of the program will be developed.

Friday, 12:00, Room A

19, **Becker, Peter H**, Institut für Vogelforschung, D-26386 Wilhelmshaven, Germany,

peter.becker@ifv.terramare.de;

THE INDIVIDUAL IN LONG-TERM FOCUS: NEW INSIGHTS INTO COMMON TERN LIFE-HISTORY

In order to understand the complex relationships between an individual's development, reproductive

tactics and fitness in fluctuating environments, all stages of the life cycle have to be investigated as they can influence each other. This is a challenge in long-lived birds, and only a few studies followed individuals throughout life. Since 1992 all fledged Common Terns (*Sterna hirundo*) of a flourishing colony on the German North Sea coast have been fitted with transponders, allowing automatic recording of marked breeders and non-breeders for life span. Besides standard reproductive parameters other individual traits such as arrival date, body mass, mate, nest site, sex of young were recorded. The paper gives an interim overview of methods, demography and relationships between life history traits, and focuses the recruitment process. Body mass and reproductive parameters are consistent individual characteristics which differ between individuals and are positively related, especially in males. Prospectors advance arrival date with increasing age, enhancing the probability of recruitment, which is earlier in females (3.2y) than males (3.6y). Body mass and breeding competence improve with age and experience during the early breeding career, and intrinsic age-related changes support the constraint hypothesis. The individual state affects reproductive output and obviously survival, which are rather positively related. The ongoing longitudinal studies provide insight into trade-offs between fecundity and survival and into selection processes. Supported by the Deutsche Forschungsgemeinschaft.

Friday, 8:30, Room A

P09, **Bella, Samanta D.**, Univ. Federal de Pernambuco, Av. Prof. Moraes Rego, s/n, Cidade Universitária, Recife/PE, 50670-420, sadellabella@bol.com.br;
Azevedo-Junior, Severino M., Univer. Federal de Pernambuco, Av. Prof. Moraes Rego, s/n, Cidade Universitária, Recife/PE, 50670-420;

***OCCURRENCE AND REPRODUCTION OF THE CATTLE EGRET IN THE NORTHEAST OF BRAZIL**

The Cattle Egret (*Bubulcus ibis*) was originally from Mediterranean Europe and Africa, and in early 20th century colonized the American Continent. This range expansion is close related to environmental changes due human activities and the heron's opportunistic biology. There are few information on the Cattle Egret in Brazil. This work aimed to provide information about its occurrence and reproduction in the northeast of Brazil, especially in the Agreste Region of Pernambuco. During several expeditions to the Agreste region of Pernambuco between 2000-03 we found three breeding colonies, one roosting place and indications of another breeding site. We believe that these records are just a part of the total heronries that must exist in this region. The number of nests and individuals was monitored on the only mixed colony observed (*B. ibis* and *Ardea alba*), suggesting that the Cattle Egret has biological potential to nest year round, depending on the environmental conditions and human disturbances. A variable number of Cattle Egrets were observed, while driving along roads in the Agreste, between May 2002 and April 2003. This variation is due to the diversity of roads and months of observation and is probably related to the movement (translocation and migration) of Cattle Egret populations, which are unknown in Brazil. In accordance with the species habits, most individuals observed during excursions were foraging in association with the cattle. The presence of the Cattle Egret in the Agreste seems to benefits the cattle industry, but its occurrence might impact the native fauna.

P26, **Sedano, Raul E.**, Internat. Center of Tropical Agriculture (CIAT), A.A. 6713 Cali, Colombia.
rsedano@cgiar.org

WATERBIRDS AND ARTIFICIAL WATER PONDS IN AGROSYSTEMS AT THE SOUTHWEST OF COLOMBIA.

Evaluating the importance of artificial water bodies to sustain waterbirds in agricultural landscape. Richness and abundance of birdfauna were surveyed in water ponds (1-3 hectares), during five years. Water ponds which were watering 540 ha of agricultural field (3 * 31' N; 76 * 19' W). The list of waterbirds species 1998-2002 can be divided in 31 residents' species and 14 migratory waterbirds from North America. Current aquatic bird fauna in 10 ha of small waterponds represent 64.3% of all waterbirds registered in the middle upper basin of Cauca River valley (400.000 hectares) in the last 35 years. By climate there were no variations in waterbirds abundance, which had been equivalent in 2000, 2001, and 2002. In addition 64.5% of waterbirds species had developed reproductive activity, which indicates short-term potential for housing waterbirds. They seem benefit from water deposits even when water ponds management has been toward elementary water storage or agrosystems watering. However several species registered in the past were not observed at the present time. This historical species account reveal migratory birds over the past 20 years but the disappearance some resident species (*Rallus nigricans*, *Porzana Carolina*, *Porzana flaviventer*, *Porzana albicollis* and *Rallus maculates*) could indicate that given the current land use at the agrosystem, water ponds capacity is limited to sustain long term viable birds populations of *Ralliformes*.

13, **Bravo, Gustavo**, Apto. 503, Bogotá, Colombia, gbravo@cablenet.co;

FORAGING ECOLOGY OF PISCIVORE BIRDS DURING DRY SEASON IN THE CONFLUENCE OF THE META AND ORINOCO RIVERS

The main objective of this work is to estimate the importance of the confluence of the Meta and Orinoco Rivers (Puerto Carreño, Colombia) to the foraging activity of piscivore birds during 2002 dry season (February - April). The species seen permanently were Neotropic Cormorants, Ospreys, Large-billed Terns, Great Egrets, White-necked Herons, Snowy Egrets and Black Skimmers. Neotropic Cormorants were the most abundant species and foraged all over the confluence, especially around noon and ate relatively large fish. Ospreys foraged constantly during daytime mainly far from the river bank and consumed large fish. Large-billed Terns primarily foraged near the river bank and fed on small fish, primarily around noon. Herons and egrets foraged only near the bank of the river and showed regular activity during daytime. Black-Skimmers foraged all over the confluence very early in the morning and late in the afternoon. Opportunistic sporadic inter-specific interactions involving Ospreys, Long-billed Terns, Neotropic Cormorants, Yellow-billed Terns and River Dolphins during foraging activities were observed. Despite certain habitat overlapping among species, differences primarily in foraging place and prey size captured were found. It was concluded that the confluence of the Meta River and the Orinoco River is an important feeding area that offers high-quality conditions and enough resources for the piscivore bird community in the Llanos during dry season.

Thursday, 14:50, Room A

41, **Bremer, Ricardo Esteban**, Fundacion Vida Silvestre Argentina, C.C. No. 16, 7105 San Clemente del Tuyu, Argentina, ebremer@rpm-net.com.ar;

DiCostanzo, Joseph, Amer. Mus. Nat. Hist., CPW at 79 St., New York, NY, USA;

ORIGINS OF A CONCENTRATION OF COMMON TERNS IN EASTERN ARGENTINA

Each year from November to April, tens of thousands of Common Terns (*Sterna hirundo*) spend the non-breeding season at Punta Rasa, Argentina. Punta Rasa is a sandspit forming the southern border of Bahia Samborombon on the south side of the mouth of the Rio de la Plata in Buenos

Aires province. In 1994 - 2003, terns were mist netted at night by teams from Argentina and the United States. Analysis of these recoveries show that most of these birds come from breeding colonies on the east coast of North America from Maryland, USA north to Nova Scotia, Canada. Additionally four birds were originally banded in colonies in the Azores Archipelago in the eastern Atlantic. Recoveries of birds banded at Punta Rasa at Punta Rasa in subsequent years demonstrate site fidelity for non-breeding birds. However, recoveries of birds banded in Brazil indicate at least some interchange of birds between Punta Rasa and other concentrations of non-breeding birds in South America.

Saturday, 9:25, Room B

P17, **Bridge, Eli S.**, Univ. of Minnesota, Dept. of Ecol., Evol., and Behav., 1987 Upper Buford Cir., St. Paul, MN, USA, brid0030@tc.umn.edu;

***HOW DOES INTENSE WING MOLT IN ALCIDS AFFECT DIVING ABILITY?**

Large and medium-sized alcids have a very intense wing molt wherein many flight feathers are shed almost simultaneously and wing surface area is reduced by as much as 40%. Although these birds are rendered flightless during wing molt, they still use their wings to propel themselves underwater. A molt-induced loss of wing area could simply reduce diving efficiency, or it could reduce drag on the wings making a bird more penguin-like and actually enhancing diving ability. I addressed this issue by filming captive alcids using an array of security cameras in order to plot the birds' movements in three dimensions. From these coordinate data I calculated swimming velocities, angles of descent, and absolute depths, which allowed me to estimate the forces due to drag and buoyancy that must be counteracted by flapping and the amount of work done during each flap. Preliminary results from within-bird comparisons of diving performance before, during, and after wing molt suggested that molt is associated with less powerful and more frequent flapping. However, the magnitude of this effect on diving efficiency is small relative to the reduction in wing size. This line of research may have important conservation and management implications as wing molt may constitute a vulnerable period for many alcids wherein mobility (i.e. flight ability) and underwater foraging ability are substantially reduced.

51, **Bridge, Eli S.**, Univ. of Minnesota, Dept. of Ecol., Evol., and Behav., 1987 Upper Buford Cir., St. Paul, MN, USA, brid0030@tc.umn.edu;

Jones, Andrew W., Univ. of Minnesota, Dept. of Ecol., Evol., and Behav., 1987 Upper Buford Cir., St. Paul, MN, USA;

Baker, Allan J., Royal Ontario Museum, 100 Queens Park, Toronto, ON, Canada;

***A MTDNA PHYLOGENY OF THE TERNS**

Forty-five species of terns (Sternae) occupy shorelines the world over and demonstrate an interesting array of variations on a life history centered around aquatic foraging and colonial nesting. An understanding of the evolutionary relationships among the terns could shed new light on adaptive radiation in this group by allowing us to trace divergences in the behavior, morphology, and population distributions among tern species. We constructed a mitochondrial DNA phylogeny for the terns based on ~2800 base pairs of sequence from three regions of the mitochondrial genome (the cytB and ND2 genes and the 12S ribosomal subunit). We used Bayesian partitioned likelihood tests to produce a well-resolved phylogeny that includes all but nine tern species. Our tree confirms several traditionally assumed species groups, such as the marsh-nesting terns, the little terns, and the noddies. However, there also appears to be a clade of pan-tropical species as well as a number of other species that do not fall into the traditionally accepted evolutionary framework. Additionally our tree allows us to estimate ancestral states with

regard to life-history evolution, indicating that the terns originated from a sedentary, tropical-nesting ancestor and that many life-history characteristics, such as long-distance migration and seasonal nesting, probably evolved as derived species expanded into temperate regions.

Saturday, 14:30, Room A

42, **Bugoni, Leandro**, Museu Oceanográfico Eliézer C. Rios, C.P. 379, 96200-970, Rio Grande, RS, Brazil, pgoblb@furg.br;

Hays, Helen, American Museum of Natural History, Central Park West, 79th Street, New York, NY, 10024, USA;

Cormons, Thomas, Great Gull Island Project, Central Park West, 79th Street, New York, NY, 10024, USA;

FEEDING GROUNDS, DAILY FORAGING ACTIVITIES, AND DISPLACEMENT OF COMMON TERNS DETERMINED BY RADIO-TELEMETRY

Fourteen Common Terns (*Sterna hirundo*) were radio-tagged on their wintering grounds at Lagoa do Peixe, Rio Grande do Sul, Brazil (31°21S; 051°02W). We performed aerial radio-tracking along 850 km from northern Rio Grande do Sul state to Montevideo, Uruguay. During 23.56 h of tracking in February 2003 we recorded 100 locations of 12 radio tagged terns. Each bird was located 4 to 14 times (mean=8.3 locations/bird). Most locations were at sea (74 at sea vs. 26 roosting), in a range of 50 km from tagging site. Common Terns fed predominantly between 15-20 m isobaths (55.5% of at sea locations), and 10-15 m (32.4% of locations), which correspond a maximum of 8 km offshore. Minimum traveled distances in 5 days of intensive tracking was 45.7 km, and maximum of 166.9 km. Daily displacement was 19.2 km in average (minimum 6.4, maximum 49.2 km/d). Nine out of 12 birds were found at sea in both early morning and end afternoon shifts. In the same way, 8 out of 12 birds were record feeding at sea in consecutive shifts, clearly indicating two feeding trips a day.

Saturday, 9:40, Room B

33, **Burger, Joanna**, Division of Life Sciences, Consortium for Risk Evaluation with Stakeholder Participation, and EOSHI, Rutgers University, Piscataway, New Jersey 08854, Burger@Biology.Rutgers.Edu;

Gochfeld, Michael, UMDNJ-Robert Wood Johnson Medical School, Piscataway New Jersey 08854, USA;

BIRDS AS BIOINDICATORS OF ENVIRONMENTAL CONTAMINATION

The assessment process involves understanding exposure pathways from source to receptor, and determining how best to interdict these pathways. Environmental characterization and exposure assesment, indicator and biomarker identification, and biomonitoring and surveillance are the major components of ecological assessment for contaminants. Each of these involves several tools and approaches. Indicators, such as bioindicators and biomarkers, are the key component of biomonitoring schemes. Identification of indicators for both exposure and effects is also critical. Since it is not possible to monitor all species, interactions and functions of ecosystems, the development of bioindicators and biomarkers is critical. Top-level carnivores are often used as bioindicators because they are exposed to higher levels of contaminants than species that are lower on the food chain. Seabirds, herons and egrets, and other fish-eating birds are ideal bioindicators of environmental contaminants because they are often at the top of food chains. They are also common and widespread, numerous, and are long-lived. They are of interest to the general public, and their demise or population declines are readily observed. Feathers and eggs are the primary

tissues used. Feathers from fledglings are used for assessing heavy metal contamination because they are non-destructive, and indicative of local exposure. Eggs are used for other contaminants, and by collecting only one egg from birds that lay more than one egg, collection does not usually disrupt overall reproductive success. Feathers can be easily archived, and comparisons can be made with feathers in museum collections, allowing for assessment of temporal trends. Examples will be given of the various aspects discussed above.

Saturday, 8:00, Room A

28, **Butler, Robert W.**, Pacific Wildlife Research Centre, Canadian Wildlife Service, 5421 Robertson Road, Delta, B.C. Canada V4K 3N2, rob.butler@ec.gc.ca;
Harrington, Brian, Manomet Center for Conservation Sciences, 81 Stage Road P.O. Box 1770, Manomet, MA 02345, USA;

HUMAN DISTURBANCE IMPACTS ON SHOREBIRDS

Much research on shorebird migration has focused on the acquisition of food and energy use at stop over sites and during long migration flights. We focus on the consequences of disturbance by humans at stop over sites on the ability of shorebirds to fatten and migrate. Our general hypothesis is that disturbance has fitness consequences on shorebirds by reducing the time available for individuals to acquire food energy for migration which results in reduced local survival. Our findings from the Atlantic seaboard suggest that shorebirds avoid heavily disturbed areas and that return rates of marked individuals is related to departure masses the previous year. We propose means to assess how shorebirds might adjust their behaviour to mitigate against disturbance. We discuss these results in the light of recent concern about declines in censuses of shorebirds in North America.

Friday, 14:30, Room A

P14, **Buzzell, Joshua M.**, Dept. Biol., Loras College, Dubuque, IA, USA, josh.buzzell@loras.edu;
Heiar, Jonathan P., Dept. Biol., Loras College, Dubuque, IA, USA;
Woyczik, Wendy, USFWS, Horicon NWR, Mayville, WI, USA;
Krapfl, Jon, USFWS, Horicon NWR, Mayville, WI, USA;

*USE OF FLOATING NEST PLATFORMS TO ENHANCE NESTING HABITAT FOR BLACK TERNS

Grassy Lake (Columbia Co., Wisconsin, USA) was identified by surveys conducted by the Wisconsin DNR as an important breeding site for black terns. However, our research at Grassy Lake since 2000 indicated extremely low breeding success there, due primarily to nest loss by storms and a lack of suitable nesting substrate. In 2003, we constructed 41 floating nest platforms in an attempt to provide supplemental breeding habitat for black terns and to improve breeding success. Terns laid eggs on 27 (66%) of the 41 platforms, and the chronology of nest starts early in the season suggested that they preferred the platforms over natural substrates. However, this preference diminished as the season progressed and more natural substrate became available. Both hatching success and fledging success were similar between terns nesting on the platforms and those using natural substrates, and overall productivity in 2003 was much higher than in previous years. The difference was likely due to unusually low water levels in 2003, which resulted in more extensive and less vulnerable nesting substrate for black terns. We predict that in a more typical year of higher water levels, black terns nesting on the platforms would realize higher breeding success than those nesting on natural substrates.

06, **Cafferata, Adriana E.**, Fundacion Vida Silvestre Argentina, Defensa 251, Capital Federal - Argentina, socios@vidasilvestre.org.ar;

IMPLEMENTATION OF SHOREBIRD SISTER SCHOOLS PROGRAM IN SOUTH AMERICA, OUR WORK WITH THE COMMUNITIES

Numerous migratory shorebird species that nest in the Northern Hemisphere fly to the Southern Hemisphere and feed in different areas of South America, in some cases being Tierra del Fuego, Argentina, the end of their migratory route, after having traveled 35,000 Km. Their presence there is indicative of the good environmental conditions in the sites they use for feeding, resting and nesting. The current decline in the shorebird population has led us to approach the educational task as a complement to the scientific work done in this field. From 1998, the implementation of the US Fish and Wildlife Service's Shorebird Sister Schools Program (SSSP) in South America (Argentina, Paraguay, Uruguay, Chile and Brazil) has caused a greater part of the community to recognize the presence of migratory birds as a symbol of a healthy environment as well as to take an active part in its preservation and "sensible use through concrete actions. Working at the school level ensures us that the participants will act as real multiplication agents of our message and, even when they graduate from school, they will continue developing actions in their community in order to protect the local environment. Working together with other members of the community, apart from schoolchildren, ensures us that local people know the environment they live in, identify the environmental problems in each region, that they recognize who causes such problems, and work jointly with the purpose of finding solutions.

Thursday, 11:20, Room A

62, **Campos, Alberto Alves**, Aquasis, Praia de Iparana s/n, SESC Iparana, 61600-000, CAUCAIA-CE, Brazil, alberto@aquasis.org;

AQUACULTURE - PRESENT DAY PRACTICES AND ALTERNATIVE MANAGEMENT SCENARIOS

Aquaculture's role in the conservation of coastal ecosystems in Brazil is rapidly growing. This presentation will discuss the opportunities available within Brazil to work with the aquaculture industry to move towards sustainably managed facilities that promote benefits for multiple species, including migratory birds, fish and local communities.

Saturday, 15:40, Room B

21, **Caziani, Sandra**, Universidad Nacional de Salta/CONICET, Buenos Aires 177, 4400 Salta, Argentina, caziani@unsa.edu.ar;

Rocha, Omar, Edificio Iturri 1 'B', Calle Campos esq. 6 de agosto, La Paz, Casilla 4778, Bolivia;

Rodríguez, Eduardo, CONAF II Región, Av. Argentina 2510, Antofagasta, Chile;

Ricalde, David, Perú Verde, Calle Manuel Bañoñ 461, San Isidro, Lima 27, Perú;

HIGH-ANDES FLAMINGOS: DISTRIBUTION AND SEASONAL ABUNDANCE IN THEIR GLOBAL RANGE

James' and Andean Flamingos are the rarest of the six flamingo species of the world. Argentina, Chile, Bolivia and Peru share the range of these species. Four international simultaneous censuses of High-Andes Flamingos were performed (summer 1997, 1998, winter 1998, 2000), involving over eighty experts in the field activities. Censuses aimed at identifying key areas and elaborating an integrated conservation and management proposal for the High-Andes flamingos and their habitats. The first population estimates of High-Andes Flamingos were obtained for their whole range, concluding that the Andean Flamingo populations are in more critical conditions than James

Flamingo populations. The James' Flamingo population (approximately 60,000 individuals) doubles in size the Andean Flamingo population. Nesting colonies of James' Flamingo and Andean Flamingo are concentrated in Bolivia and Chile, respectively. The distribution of the Andean Flamingo is more widespread, including not only altiplano wetlands but also several wetlands outside the ecoregion during the winter. In spite of the 2000 winter census great effort, the winter grounds remain ignored in a great percentage and a more appropriated methodology, i.e. satellite tracking, need to be applied. Long-term conservation goals would best be achieved by considering these species and their habitats from a landscape perspective, and thus proposing their protection and integrated management through cooperative action of the four nations.

Friday, 10:00, Room A

49 **Caziani, Sandra**, Universidad Nacional de Salta-CONICET, Buenos Aires 177, 4400 Salta, Argentina, caziani@unsa.edu.ar;

Arengo, Felicity, Wildlife Conservation Society, 2300 Southern Blvd., Bronx, NY, 10460, USA.

MOVEMENTS AND HABITAT USE OF ANDEAN FLAMINGOS

The Central Dry Puna is a unique ecoregion within the Andes Mountains of South America consisting of a high-altitude desert plateau (3,000-4,500masl) matrix with shallow saline lakes characterized by a rich and endemic avifauna. Three species of flamingo can be found using the high-Andes wetlands: the Chilean Flamingo (*Phoenicopterus chilensis*), Andean Flamingo (*P. andinus*) and James' Flamingo. The Andean Flamingo is the rarest of the six flamingo species of the world, with current populations estimated at about 34,000 individuals. We tracked 5 Andean Flamingos with satellite transmitters to identify wintering sites and determine dispersal patterns in time and space. Results show high variation among individuals, with one individual remaining at the capture site for the tracking period while another traveled up to 1,150 km over a four-day period and used more than four sites over the study period. Used habitats included not only salt lakes but also rivers and flooded areas. Flamingos moved among sites frequently during summer and autumn (January-May), but in winter (June-August) individuals tended to remain in Poopo Lake (Bolivia), Mar Chiquita Lake (Argentina) and Salar de Atacama (Chile). This information is crucial to design a regional conservation program that will ensure conserving the functional integrity of the wetland complex.

59, **Cintron-Molero, Gilberto**, US Fish and Wildlife Service, 4401 Fairfax Drive, Room 730, Arlington, Virginia 22203, USA, Gil_Cintron@fws.gov;

SPATIAL EXTENT OF COASTAL ECOSYSTEMS: PAST, PRESENT, AND FUTURE

Coastal ecosystems throughout North, Central and South America are feeling the pressures of rapid human development and activity. This presentation will address the history of coastal wetlands with a focus on the spatial extent wetland habitats over the past few decades.

Saturday, 14:20, Room B

61, **Coelho, Clemente**, University of Sao Paulo, Brazil, coelhojr@usp.br;

BRAZIL'S FRAMEWORK FOR MANAGING AQUACULTURE AND COASTAL WETLAND CONSERVATION

Policies exist in Brazil to address the conservation of coastal ecosystems. This presentation will consider the weaknesses and strengths of existing policies, and discuss potential future steps to

successfully protect and manage Brazil's coastal ecosystems.
Saturday, 15:00, Room B

55, **Cooke, Fred**, 6 Lynn Road, Castle Rising, Norfolk, UK, f.cooke@uea.ac.uk;
Dov Lank;

Yuri Zharikov; Falk Huettmann; Emmanuelle Cam, Simon Fraser University, Burnaby BC.;
NESTING HABITAT SELECTION IN MARBLED MURRELETS

We studied habitat selection and breeding success in Marbled Murrelets (*Brachyramphus marmoratus*) at a fragmented forest landscape (Desolation Sound, n=121 nests) and a relatively intact forest landscape (Clayoquot Sound, n=36 nests) in southwest British Columbia. Nests were located by radio-tracking birds captured at-sea, producing reasonably unbiased samples with respect to habitat features. Murrelets selected old-growth forest patches, including scrubby sites with few large veterans. They used trees with similar characteristics to those found in other studies. They used forest patches either in proportion to their size frequency distribution (Clayoquot, where forest patch distribution included much larger areas) or nested disproportionately in smaller fragments (Desolation, mode ca. 10 ha.), thus showing no selection at either site for larger areas. They strongly avoided flatter sites in favor of sloped ones. Nest sites were closer than expected to transitions between old-growth and unvegetated areas, particularly streams. An index of nesting success showed generally similar variation as that shown by site selection, although slope did not remain a predictor in multivariate models. At both fragmented and unfragmented areas, nesting success was substantially higher than at US sites further south, and appear high enough to sustain demographic stability. Stability was also indicated from a separate analysis based on mark-recapture techniques that included immigration.

Saturday, 16:10, Room A

10, **Custer, Christine M.**, USGS, Upper Midwest Environmental Sciences Center (UMESC), 2630 Fanta Reed Rd., La Crosse, WI, USA, christine_custer@usgs.gov;

Suarez, Sarah A., USGS, UMESC, 2630 Fanta Reed Rd., La Crosse, WI, USA;

Olsen, Douglas A., USGS, UMESC, 2630 Fanta Reed Rd., La Crosse, WI, USA;

FEEDING HABITAT SELECTION BY HERONS AND EGRETS ON THE UPPER MISSISSIPPI RIVER, USA

Great blue heron (*Ardea herodias*) and great egret (*Casmerodius albus*) breeding populations have declined in certain stretches of the Upper Mississippi River. This decline has been attributed to loss of backwater habitats because of floodplain drainage and channelization. Characterization of preferred feeding habitat in the areas where populations are stable will assist managers in preserving and augmenting appropriate feeding habitat. In this study, selection ratios are used to determine whether a particular resource is being selected, avoided, or used in proportion to availability. Selection ratios are advantageous because they do not depend on what habitats are deemed available (unlike chi-squared tests). Individual great blue herons were followed to feeding sites by airplane from 7 colonies in Illinois, Iowa, Wisconsin and Minnesota. Great egrets were followed from 2 colonies. Both species preferred backwater habitats. Great egrets avoided open pool and main navigation channel habitats, whereas great blue herons also avoided open pool habitat but used main navigation channels in proportion to availability. Distance from the breeding colony was also an important selection factor. Herons and egrets preferred feeding habitats within 5 km of the colony and avoided feeding >20 km from the colony.

Thursday, 13:50, Room A

31, **Custer, Thomas W.**, USGS Upper Midwest Environmental Sciences Center, 2630 Fanta Reed Road, La Crosse, WI, USA, tom_w_custer@usgs.gov;

ENVIRONMENTAL CONTAMINANTS AND NORTH AMERICAN SHOREBIRD POPULATIONS

Decreases in the populations of several North American shorebird species have raised concern. At the last Waterbird Society meeting in La Crosse, WI, the Shorebird Research Group of the Americas proposed five major hypotheses (climate change, predation, human disturbance, habitat degradation, and contamination) that could influence shorebird declines. In this presentation I briefly summarize what is known about the effects of environmental contaminants on bird populations and the extent of our knowledge of contaminant exposure to shorebirds. I also evaluate whether there are any obvious associations in the trends of shorebird numbers in relation to patterns of environmental contaminants. Environmental contaminants can cause declines in avian populations directly through breeding failures or deaths. Contaminants can also act indirectly by reducing food supply or altering the physical structure of habitats. There are numerous examples of the relationship between contaminants and decreased reproduction and death of birds. However, there are very few examples of widespread population declines in relation to contaminants. Additionally, very few studies have addressed the impacts of contaminants on shorebird numbers and no studies to date suggest a relationship of contaminants to large-scale shorebird population declines. The patterns of shorebird declines observed in the North Atlantic of Canada and the United States will be discussed in relation to patterns of environmental contaminants.

Friday, 15:30, Room A

27, **Cuthbert, Francesca J.**, Dept. Fisheries, Wildlife, & Conservation Biology, U. Minnesota, 1980 Folwell Ave., St. Paul, MN, 55108, USA, cuthb001@umn.edu;

Wires, Linda R., Dept. Fisheries, Wildlife & Conservation Biology, U. Minnesota, 1980 Folwell, Ave., St. Paul, MN, 55108, USA;

THREE DECADES OF MONITORING COLONIAL WATERBIRDS IN THE U.S. GREAT LAKES; CONTRIBUTIONS AND CHALLENGES

Since the mid-1970s, three comprehensive censuses of colonial waterbirds have been conducted in the U.S. Great Lakes. Seventeen species were found breeding at > 770 sites. Most colony sizes were estimated by direct nest counts. The most important product from these efforts is an extensive database that has been used by natural resource agencies, NGOs, academic institutions, and individuals to study diverse topics (e.g., population sizes, distribution and large scale trends; rare and abundant species; conservation planning). Because surveys were conducted infrequently, few population data points are available; thus, ability to detect species population trends and change is limited. To obtain more precise estimates, we recommend retention of the complete count-decadal census to inventory species distribution, colony size and activity, but suggest a more frequent census for some species based on species biology, monitoring priority and statistical design. Also, we recommend development of sampling strategies (as opposed to complete nest counts) for species sensitive to disturbance or difficult to census (e.g. large size; challenging accessibility).

Additionally, mean detectability rates for and among observers for each species in specific habitat types should be determined before future census efforts are undertaken.

Friday, 12:20, Room A

02, **Del Lama, Silvia N.**, Universidade Federal de Sao Carlos, S. Carlos, SP, Brazil, dsdl@power.ufscar.br;

Lopes Iara F.; Seccomandi Alessandra M. T.; Rocha Cristiano D.;

WOOD STORK POPULATIONS: IS THERE GENE FLOW AMONG COLONIES?

We used molecular genetic methodology to understanding gene flow among WoodStork colonies. Eight Pantanal sub-populations were studied using nuclear markers (allozyme and microsatellite) and mtDNA marker (control region). Eleven North American sub-populations were studied using nuclear markers (microsatellites). No significant genetic differentiation was founded among Pantanal sub-populations using alozymes ($F_{st}=0.005$), four microsatellites ($F_{st}=0,025$), twelve microsatellite ($F_{st}=0,003$), and mtDNA sequences ($F_{st}=0.034$). Comparative analysis between North and South American populations showed low genetic differentiation using alozymes ($F_{st}=0.023$), andt no differentiation using four microsatellites ($F_{st}=0,044$) or twelve microsatellites ($F_{st}=0,009$). Weak genetic differentiation using both slowly (alozyme) and rapidly (microsatellite mtDNA) evolving markers can be explained by historical and contemporary gene flow among Wood Stork colonies. Otherwise, if an assumption of equilibrium of the Wright-Fisher model was violated the gene flow can be lower than estimated or not real. .The number of migrant females per generation among Pantanal sub-populations was 14.34 and values estimated by alozymes and microsatellites were 49.8 and 11.11, respectively .Comparison of markers with different modes of inheritance can be used to provide insights into pattern of sex-biased dispersal. This dispersal pattern can be explained by either female-mediated gene flow or movements of both females and males but never as result of male -mediated gene flow.

Thursday, 10:00, Room A

11, **Diamond, Antony W.**, Atlantic Cooperative Wildlife Ecology Research Network, University of New Brunswick, P.O. Box 45111, Fredericton, N.B. Canada E3B 6E1, diamond@unb.ca;

FOOD QUALITY VERSUS QUANTITY: IMPLICATIONS OF VARIABILITY IN ENERGY DENSITY OF SEABIRD PREY

An aspect of seabird diet not usually addressed by seabird biologists is the year-to-year variation in energy density of their prey; it is normally treated as a constant. Four species of seabirds breeding on Machias Seal Island ate mostly herring (*Clupea harengus*) between 1995 and 2000, but changed to other species thereafter. Energy density of herring was measured directly in 1995 and 1996, and estimated from water content (which varies inversely with fat content) in 1997-2002. The energy density of herring varied markedly between years, in a surprisingly close relationship with productivity of the seabirds until 2000, after which seabird productivity and energy density became uncoupled. After 2000, herring was no longer the predominant prey item in any of the seabirds, so the breeding success of seabirds was no longer driven by, or a good indicator of, the condition of the herring. Clearly energy density of prey cannot be treated as a constant, and its year-to-year variation may have important implications both for seabirds and for those trying to understand interactions between seabirds and the marine ecosystems that support them.

Thursday, 14:10, Room A

29, **Donaldson, Garry**, Canadian Wildlife Service National Office, 351 St. Joseph Blvd., Gatineau, Quebec, Canada, K1A 0H3, Garry.Donaldson@ec.gc.ca;

SHOREBIRDS AND THEIR HABITATS - GOING, GOING, GONE?

As shorebirds migrate across the vast landscapes of the Americas they encounter a variety of habitats that have been altered to varying degrees by human presence. Changes to the landscape

range from the obvious development of wetlands and shorelines to less obvious changes such as those associated with pesticide use and climate change. These alterations have been implicated as a likely cause in the large number of Western Hemisphere shorebird species that are in decline and will be discussed in that context.

Friday, 14:50, Room A

57, **Donaldson, Garry**, Canadian Wildlife Service National Office, 351 St. Joseph Blvd., Gatineau, Quebec, Canada, K1A 0H3, melanie_steinkamp@fws.gov;

COASTAL HABITATS - LIFE SUPPORT FOR MIGRATORY WATERBIRDS

Coastal areas contain highly productive habitats that are attractive to a wide variety of waterbird species. Throughout the Americas these habitats are becoming increasingly under threat from human associated activities. This talk explores the natural history of coastal ecosystems and highlights the significant role they play in lives of the birds that occur there. Special consideration will be given to migratory birds and the conservation problems that arise when these habitats are degraded.

Saturday, 13:40, Room B

17, **Espinoza, Frank**, Apdo. 184, Maracay, Venezuela, museoebrg@cantv.net;

EL FLAMENCO DEL SUR DEL CARIBE EN LOS HUMEDALES COSTEROS DEL ESTADO ZULIA, VENEZUELA

Entre 1995 y 2001, se desarrollo el proyecto Conservación y Manejo de Flamencos del sur del Caribe en el estado Zulia. Con el objeto de conocer el estatus y distribución de la población, en los principales humedales del estado, realizar un seguimiento de la colonia de anidación y una operación de anillado de pollos. Se seleccionaron el Refugio de Los Olivitos y las Catanejas, ubicada a 40 km. al oeste del Refugio. Se realizaron censos simultáneos (con binoculares 10x30 y telescopios 15x45) desde las 0800 horas un domingo por mes. El seguimiento de la isla de anidación, se realice desde un escondite ubicado a unos 50., de la colonia. Para el anillado de los pollos, se utilizaron bandas de PVC y anillos metálicos. En total se realizaron 34 censos en el Refugio y 25 en las Catanejas. El número mayor de flamencos censados en las Catanejas (enero, 1998) fue de 27.900 (Refugio 68 individuos) y en el Refugio (mayo, 1996) 24.000 (Catanejas 28). Ambas localidades mostraron diferencias menos significativas (diciembre, 1997) con 3.364 (Refugio) y 4.419 (Catanejas) flamencos. Dependiendo del mes del año, las dos localidades llegan a sumar entre el 78% (junio 1996) y 71% (junio 1997 y enero 1998) del total de flamencos censados en Venezuela. El éxito reproductivo de la colonia del Refugio fue: 1.500 pollos (1999), 1.900 (2000) y 2.700 (2001). se anillaron 54 pollos (1999), 132 (2000) y 120 (2001). Queda demostrado la importancia de ambos humedales para el flamenco del sur del Caribe.

Thursday, 16:50, Room A

47, **Faria, Patricia J**, Depto de Biologia, IB-USP, patfaria@ib.usp.br;

Campos, Fausto P, Fundação Florestal/SMA, SP;

Branco, Joaquim O, CTTmar, Univali, Itajaí, SC;

Musso, Cezar, M., Avidepa, ES;

Yorio, Pablo, CONICET and Wildlife Conservation Society, Argentina;

Quintana, Flavio, CONICET & Wildlife Conserv. Soc., Morgante, João S. Depto de Biologia, IB-USP;

Bruford, Michael W., Cardiff University, UK;

CHARACTERIZATION OF SOUTH AMERICAN TERN POPULATIONS IN THE COASTS OF BRAZIL AND ARGENTINA USING MOLECULAR MARKERS: PRELIMINARY RESULTS

The South American tern (*Sterna hirundinacea*) can be found breeding along the Brazilian coast as well as in Argentina, Chile and southern Peru. In this study we analyzed individuals from 6 different breeding colonies to characterize their populations. One hundred and sixty two individuals were analyzed: 74 from three different colonies in Sao Paulo state (Laje de Santos, Ilha do Apará and Ilha Itacuce), 34 from Ilha dos Cardos (SC), 37 from Ilha Escalvada (ES) and 17 from Punta Loma, Argentina. DNA was extracted from blood samples. In total, 320 bp of cytochrome b mitochondrial DNA gene were sequenced and 3 microsatellite loci previously described in the literature were also analyzed. Significant values of genetic structure were obtained with both molecular markers when populations of the Brazilian coast were compared with individuals from the colony in Argentina. These results indicate that the terns from Argentina are genetically distinct from those found in the Brazilian coast. A microsatellite library is being constructed to increase the number of polymorphic loci in the analysis, and other populations will be also sampled to confirm the obtained results.

Saturday, 11:15, Room B

46, **Favero, Marco**, University of Mar del Plata, Funes 3250 (B7602AYJ) Mar del Plata, Argentina, mafavero@mdp.edu.ar;

Becker, Peter H., Institut für Vogelforschung 'Vogelwarte Helgoland'. An der Vogelwarte 21. D-26386 Wilhelmshaven. Germany;

INFLUENCE OF ENSO AND NAO ON THE DEMOGRAPHY AND TIMING OF MIGRATION IN COMMON TERNS BREEDING IN GERMANY

In long-distance migratory waterbirds, oceanographic and weather conditions at breeding and wintering areas as well as on migration routes may have complex effects on the demography of populations. In this work, we report correlations between climate variability and demography and condition of Common Terns breeding in Northern Germany "Banter See" and wintering in West Africa. Since 1992, all fledglings and some adults have been marked with transponders, and automatically monitored every season by antennas and electronic balances distributed at the colony site. We studied arrival date (AD), body mass at arrival (BM), and return rates (RR) of adult and subadult (2 years old) individuals. Climate variability was defined by North Atlantic Oscillation Index (NAOI), Southern Oscillation Index (SOI, representing ENSO conditions) and Sea Surface Temperature (SST). Adult RR and juvenile AD showed significant relationships with NAOI, while adult AD and juvenile RR were significantly correlated with SOI. SST was strongly correlated with juvenile RR. NAO has been shown to affect the structure of fish assemblages, and ENSO to be, in some degree, coupled with upwelling processes and rainfall in wintering areas. Some of the relations found might be attributed to the variation of food availability along the Common Tern's distribution area.

Saturday, 11:00, Room B

P29, **Fedrizzi, Carmem E.**, Mes. em Biologia Animal, Univ. Federal de Pernambuco. Av. Prof. Nelson Chaves 1235, Cidade Universitária, Recife-PE 5067-420, cefedrizzi@uol.com.br;

Azevedo Júnior, Severino M., Mes. em Biologia Animal, Univer. Federal de Pernambuco. Av. Prof. Nelson Chaves 1235, Cidade Universitária, Recife-PE 5067-420;

Larrazábal, Maria Eduarda, Mes. em Biologia Animal, Univer. Federal de Pernambuco. Av. Prof. Nelson Chaves 1235, Cidade Universitária, Recife-PE 5067-420;

***BODY MASS AND ACQUISITION OF BREEDING PLUMAGE IN SEMIPALMATED SANDPIPER, NORTHEASTERN BRAZIL**

Large flocks of Semipalmated Sandpiper (*Calidris pusilla*) winter along South America, September-April. They accumulate body mass, molt and return to their breeding grounds. We compare body masses and plumage of adults Semipalmated Sandpipers during the departure month to verify if individuals in breeding plumage present higher body masses when compared with other plumages. Fieldwork was conducted at Coroa do Avião Pernambuco. Between April 1990-97, birds were weighed, and age determined through plumage analysis. Adults were placed into one of the following plumage categories (1) non-breeding, (2) intermediate, and (3) breeding. A total of 213 adults were weighed and examined. Of these, 7.98% (17) presented non-breeding plumage, 53.99% (115) intermediate, and 38.02% (81) breeding. There is a significant difference among body mass of individuals of the three plumage categories ($F=29.492$, $d.f.=2$, $P<0.001$). Tukey's test indicated significant differences between non-breeding and intermediate ($P=0.000022$), non-breeding and breeding ($P=0.000022$), and intermediate and breeding ($P=0.004394$). In Semipalmated Sandpiper, 25g is the minimum body mass required to migrate. All individuals with breeding plumage and most with intermediate were aptest to migrate. Individuals in non-breeding presented lower values. Physiological problems and infestation may be significant factors to explain over-summering, i.e., individuals remaining in the wintering grounds during the boreal summer.

P4, **Fedrizzi, Carmem E.**, Mestrado em Biologia Animal, Univ. Federal de Pernambuco. Av. Prof. Nelson Chaves 1235, Cidade Universitária, Recife-PE 5067-420, Brazil, cefedrizzi@uol.com.br; Carlos, Caio J., Rua Setúbal 860-A/apto.301, Boa Viagem, Recife-PE 51030-010, Brazil; Azevedo Júnior, Severino M., Mestrado em Biologia Animal, Univ. Federal de Pernambuco. Av. Prof. Nelson Chaves 1235, Cidade Universitária, Recife-PE 5067-420, Brazil;

***ON SOME SEABIRDS OF PERNAMBUCO COAST, NORTHEASTERN BRAZIL**

Located in the northeast Brazil, the state of Pernambuco (PE) presents a coastline of c. 160 km from about 7°30'S to 9oS. There is little information on the seabirds that occur along the state's coast. We present a review of, and include new data on the distribution of some seabirds known to occur in the coast of PE. This is based mainly on literature surveys, and our recent fieldwork. So far, 24 taxa of 10 families were recorded in PE. The two first authors record for first time, the Pomarine Jaeger (*Stercorarius pomarinus*) and sighted, after 55 years the Sandwich Tern (*Sterna sandvicensis acuflavida*). Most seabirds were seen in PE while migrating to and from their wintering areas in southern Brazil. The occurrence of both north-hemisphere migrants like the Cory's Shearwater (*Calonectris borealis*) and sub-Antarctic birds like the Yellow-nosed Albatross (*Thalassarche chlororhynchos*) in PE as well as in other parts of northeastern Brazil, a region with dystrophic seas, is probably linked to the high input of nutrients from associated mainland ecosystems such as mangroves and large estuarine complexes. It is not surprise that most records of coastal and pelagic-birds come from the estuarine complex of the Canal de Santa Cruz, a area with extensive mangroves on the north of PE. Future researches will probably show that these birds are more common in the region than previously known.

P30, **Figueira, José E.C.**, Dept. Biologia Geral/Zoologia Univ. Federal de Minas Gerais, cortes@icb.ufmg.br;

Oliveira, Túlio D.; Coelho Angelita S.; Michelin, Vânia B.; Rodrigues, M.;

THE 'APA CARSTE DE LAGOA SANTA', SOUTHEAST BRAZIL, A UNIQUE SYSTEM OF LAKES, THREATENED FOR WATERBIRDS

The "APA Carste de Lagoa Santa" is a conservation unit situated inland of southeastern Brazil. The

region lies within the Cerrado domain, a savannah-like ecosystem of central South America. The area is unique for holding several limestone caves and a system of nearly 60 lakes inter-connected through subterranean channels. These lakes harbor around 50 waterbirds species. Most of these lakes disappear, or nearly so, during the dry season (April to September). The length of the drought of the lakes depends on their topography, water volume, and the previous annual precipitation. As a consequence, an heterogeneous landscape holding lakes of several sizes and depths is formed. This highly seasonal changes in landscape determine the availability of habitat and resources for many of these waterbirds. The lakes that do not dry, and its surrounding habitats, act as a refuge for thousands of birds every year. This fact is unknown for most ornithologists and conservation biologists so far. Many of these waterbirds species are becoming rare in southeastern Brazil, such as *Rostrhamus sociabilis*, *Sterna superciliaris*, *Euxenura maguari*, *Ajaia ajaja* and *Tringa flavipes*. However, this system is currently being threatened by urbanization, mining, and farming. The destruction of such a system will represent a dramatic change in the landscape and consequent species and biodiversity loss.

03, **Frederick, P.C.**, Department of Wildlife Ecology and Conservation, P.O. Box 110430 University of Florida, Gainesville Fl. 32611-0430 USA, pcf@mail.ifas.ufl.edu;

NOMADIC MOVEMENTS OF WATERBIRDS IN THE NON-ARID SOUTHEASTERN UNITED STATES: THE IMPORTANCE OF DISCONTINUITIES AND DISTURBANCES

Nomadism is a distinct movement pattern implying lack of philopatry or typical migration pattern, and has been reported for wetland birds in arid and oceanic regions. Here, I review evidence of nomadism in several waterbirds in the non-arid southeastern United States and explore the ramifications for conservation strategies. Movements of Snail Kites (*Rostrhamus sociabilis*) seem to be grossly predictable on the basis of surface water conditions. For White Ibises, geographic population shifts between 1930 and 2003 were associated with large-scale ecological disturbances that may include drought, fire, and floods, which strongly affect prey availability. In the case of the ibises, this pattern is consistent with several aspects of foraging ecology that require dense, available prey for foraging. For both species, the continuous availability of refugia is dependent on decoupled weather patterns in different parts of the range. This information indicates that nomadic waterbird movement patterns may be generated by predictable discontinuities in weather patterns in non-arid regions. Conservation strategies for waterbirds have typically been focused on protection of wintering or stopover habitat and protection of breeding sites. Nomadic species probably require a different approach, including a) emphasis on protection of foraging habitat rather than breeding sites, b) preservation of the disturbance processes that create foraging opportunities, and c) design of a refuge network that ensures the persistence of refugia in different hydrological or meteorological regimes.

Thursday, 10:20, Room A

39, **Frederick, P.C.**, Department of Wildlife Ecology and Conservation, P.O. Box 110430 University of Florida Gainesville Fl. 32611 USA, pcf@mail.ifas.ufl.edu;

Spalding, M, Department of Pathobiology, University of Florida, Gainesville, FL;

Heath, J., Department of Biology, 130 Gittleston Hall, Hofstra University, Hempstead, New York 11549-1000;

EFFECTS OF MERCURY ON WADING BIRDS IN THE EVERGLADES

This presentation reviews the effects of mercury on wading birds, and the dynamics of mercury contamination in the Everglades of Florida during the last century. At contamination levels ambient in the Everglades during the mid-1990s, methylmercury has significant effects on health

parameters, appetite, weight gain, behavior, and liver biochemistry in pre fledging great egrets (*Ardea albus*), with effects apparent at 0.5 mg/kg ww or less in food. Feather-mercury concentrations in free-ranging adult White Ibises (*Eudocimus albus*) were inversely correlated with both testosterone (males) and estrogen (females), suggesting that mercury may affect reproductive behavior and success through endocrine disruption. Using feather tissue from museum specimens, we have demonstrated that most of the contamination in the Everglades has occurred after 1980, probably as a result of local waste incineration. Using feather tissue from pre fledging Great Egrets, we have also found a sharp reduction (75%) in mercury contamination between 1994 and 2000, suggesting a general recent decontamination of the ecosystem. There has also been a sharp increase in numbers of nesting wading birds between 1998 and 2003, though it is not clear that this is due to the lack of mercury.

Saturday, 11:10, Room A

05, Friesen, Vicki, Dept. Biology, Queen's University, Kingston, Ont.,
friesenv@biology.queensu.ca;

METAPOPULATION DYNAMICS IN SEABIRDS: HISTORICAL AND CONTEMPORARY PATTERNS AND PROCESSES

The extent of natal dispersal in waterbirds can affect both the extent of genetic differentiation of local populations, and the ability of populations to recover from local disturbances. Common murre (*Uria aalge*), pigeon guillemots (*Cepphus grylle*) and marbled murrelets (*Brachyramphus marmoratus*) all breed in the North Pacific. On the basis of life history and/or morphology, we predicted that natal dispersal is greatest in common murre, and lowest in pigeon guillemots. We compared variation in the mitochondrial control region and several nuclear loci among populations of each species. Population genetic structure in common murre was weak, and assignment tests suggested that at least 17 (4.6%) of 366 murre originated in populations other than where they were sampled. In contrast, population genetic structure in pigeon guillemots was strong, and three (1.6%) of 187 individuals had high probabilities of being immigrants. Results for marbled murrelets were intermediate: population genetic structure was moderate, and three (2.5%) of 121 murrelets appeared to be immigrants. Results for all three species suggested dynamic demographic histories, including Isolation-by-distance, range expansions, and long-distance dispersal; none appeared to have been fragmented genetically by Pleistocene glaciers. Whereas all three species suffered heavy mortality following the Exxon Valdez Oil Spill, the number of murre breeding in the Gulf of Alaska has since returned to its original size, but murrelets and guillemots are slower to recover.

Thursday, 11:00, Room A

22, Guadagnin, Demetrio L., Unisinos, Av. Unisinos 950, 93022-000 Sao Leopoldo RS Brazil,
dlg@bios.unisinos.br;

Menegheti, Joao O., UFRGS, Av. Bento Goncalves 9500, Porto Alegre RS Brazil;

Burger, Maria I.;

Velez, Eduardo;

Dotto, Joao C.P., FZB-RS, Av. Salvador Franca 1427, Porto Alegre RS Brazil;

Ramos, Ricardo A.;

Melo, Maria T.Q., FZB-RS, Av. Salvador Franca 1427, Porto Alegre RS Brazil;

Cruz, Rafael C., FZB-RS, Av. Salvador Franca 1427, Porto Alegre RS Brazil;

*WATERBIRD POPULATION TRENDS IN RIO GRANDE DO SUL, SOUTHERN BRAZIL

This paper analyzes data for 12 resident species during two periods - 1990-1992 and 1995-2000 - in southwestern Rio Grande do Sul (Brasil) as part of the Research and Monitoring Program of Hunting Species in this state. Terrestrial censuses were conducted each winter in 53 natural or artificial wetlands. Population indices and trends were calculated using the software UINDEX4. In the first period *Chauna torquata*, *Phalacrocorax brasilianus*, *Podiceps major*, *Podilymbus podiceps*, *Jacana jacana* and *Gallinula melanops* showed no significant trends, *Casmerodius albus* ($r=0.494$), *Egretta thula* ($r=0.6646$), *Ardea cocoi* ($r=0.5285$), *Ciconia maguari* ($r=0.7589$) and *Gallinula chloropus* ($r=0.4828$) increased their abundances, while *Himantopus himantopus* declined ($r=-0.4548$). Between 1995 and 2000 four species showed a decline - *Podilymbus podiceps*, ($r=-0.1880$), *Phalacrocorax brasilianus* ($r=-0.1963$), *Podiceps major* ($r=-0.1053$) and *Himantopus himantopus* ($r=-0.3158$). The other species showed no significant trends, but most of them underwent wide fluctuations. Despite specific patterns, species of the same guild shared several similarities. 1991, 1998 and 2000 were years of low abundance for seven of the 12 species. Fluctuations in water availability and movements, both related with large scale climatic patterns are factors under investigation to explain these variations.

Friday, 10:40, Room A

P11, **Guadagnin, Demetrio L.**, Unisinos, Av. Unisinos 950, 93022-000 Sao Leopoldo RS Brazil, dlg@bios.unisinos.br;

***WATERBIRD COMMUNITY STRUCTURE IN WETLAND FRAGMENTS OF THE COASTAL ZONE OF RIO GRANDE DO SUL, BRAZIL**

This paper presents preliminary results of an ongoing project about the effects of wetland fragmentation on waterbird communities. Fifty-four fragments ranging 0.2 to 2000 ha in size, surrounded by a matrix of rice and cattle fields are being censused monthly since December 2002. Until now 74,581 individuals, belonging to 54 species, 18 families and eight orders have been registered. Three species are summer migrants (*Butorides striatus*, *Mycteria americana* and *Porphyrio martinica*), two are nearctic visitors (*Pluvialis dominica* and *Tringa melanoleuca*), one is a southern visitor (*Anas platalea*) and the others being resident species. Anseriformes accounted for 62% of the birds and *Dendrocygna viduata* alone for 58.83%. A marked increase of abundance was detected starting in February (3,349 birds) and peaking in June (23,500), possibly as a result of recruitment and movement from fields to wetlands after rice harvest. Species richness was a little higher in winter, but diversity decreased due to the increase in Anatidae and Rallidae dominance. Abundance ($R^2=0.5437$) and richness ($R^2=0.7112$) increased with wetland size. Microhabitat diversity and matrix characteristics are main factors under investigation to explain departure from expected values according to size. Larger areas showed more uniform abundances and more stable communities and included species that were not found in smaller ones, being probably more important for waterbird conservation.

P31, **Gurd, Brent**, Centre for Wildlife Ecology, Simon Fraser Univ., 8888 University Dr., Burnaby, BC, Canada, dgurd@sfu.ca;

Kenyon, James K.*, Centre for Wildlife Ecology, Simon Fraser Univ., 8888 University Dr., Burnaby, BC, Canada;

***DO PHENOTYPIC DIFFERENCES MEDIATE INTERSPECIFIC COMPETITION BETWEEN WATERFOWL?**

Ecological theory of adaptive radiation predicts competition for resources will lead to divergence of phenotypic traits involved in resource exploitation. We used frequencies of aggressive, interspecific interactions to estimate resource overlap and test three cases of character divergence

among breeding waterfowl: prey size partitioning through differences in lamellar density, vertical habitat partitioning through differences in body length and temporal partitioning through differences in nest initiation chronology. Aggressive interactions indicate waterfowl form two independent guilds: surface-feeding dabbling ducks and diving ducks. Frequencies of interspecific aggression were different from predictions of a null model that assumed equal resource overlap, but accounted for differences in relative abundance, except within the dabbling guild. Differences in all three traits were negatively related to estimates of resource overlap among dabblers, but not among divers. We suggest that these three traits are co-evolved. Aggression between divers was hierarchical and strongly related to nest initiation chronology as predicted by habitat selection theory, inferring active suppression of nesting through interference leads to resource partitioning through time, rather than through qualitative differences as in dabblers. Accordingly, nesting in the diving guild is temporally extended compared to dabblers. All three traits mediate competition among waterfowl as predicted by the ecological theory of adaptive radiation, but guilds are organized by different mechanisms.

04, **Haig, Susan M**, USGS Forest and Rangeland Ecosystem Science Center, 3200 SW Jefferson Way, Corvallis OR 97331 USA, susan_haig@usgs.gov;

Oring, Lewis W., Dept. of Environmental Resource Mgmt., University of Nevada, 1000 Valley Rd., Reno NV 89512 USA;

DETERMINATION OF POPULATION CONNECTIVITY FOR SHOREBIRDS BREEDING IN THE NORTH AMERICAN GREAT BASIN: IMPLICATIONS FOR CONSERVATION

Wetland conservation plans generally focus on single sites and rarely consider the diversity of space needed by the myriad of waterbirds using them. In dynamic areas such as the arid Great Basin, conservation efforts using this approach will fail to provide adequate habitat. The region is an enormously rich shorebird area--both in species diversity and total numbers. The nine breeding shorebird species use space in three general ways: some species breed, then move long distances within the region to spend an extended staging period at a few hypersaline sites; others spend an extended postbreeding time at their breeding site prior to migration; the remaining species breed and quickly leave the region. Here, we summarize movement patterns of three species, one from each category. American Avocets (*Recurvirostra americana*) remained tightly tied to breeding waterbodies but then most flew 100-300 km north where they staged at saline or hypersaline lakes for 3-6 months. Conversely, Killdeer (*Charadrius vociferus*) remained within 1 km of their breeding territory, even during a protracted post-breeding period. Intermediate in space-use, Willets (*Catoptophorus semipalmatus*) spent a short time on breeding grounds and moved immediately to coastal areas. Within-season movement data are relatively rare among shorebirds as is the comparative nature of the study. These movement data provide perspective on wetland connectivity and are being incorporated into a wetland conservation plan for the Great Basin.

Thursday, 10:40, Room A

P01, **Havelka, Tania**, Canadian Wildlife Service (CWS), 4905 Dufferin St., Downsview, Ontario, Canada M3H 5T4, Tania.havelka@ec.gc.ca;

Pekarik, Cynthia, CWS, Burlington, ON;

Weseloh, D.V., CWS, Downsview, ON;

Cuthbert, Francie, University of Minnesota, Dep. Fisheries and Wildlife, 1980 Folwell Ave., St. Paul MN 55108;

POPULATION TRENDS AND CONTAMINANT LEVELS IN COLONIAL WATERBIRDS OF LAKE ERIE AND CONNECTING CHANNELS

During 1997-99, Canadian and American government agencies completed the third bi-national survey of nesting colonial waterbirds on Lake Erie and the Detroit and Niagara Rivers. Eleven species were confirmed nesting; we report on four in detail (Double-crested Cormorants, Herring and Ring-billed Gulls, and Common Terns). Common Tern populations declined 19% since 1990, predominantly in Canadian Lake Erie. The most numerous species was the Ring-billed Gull with 131,000 nests, a 13% increase since 1990. Herring Gulls declined by 20% to 9,300 nests. Double-crested Cormorant numbers increased 3.8-fold since 1990 to 9,300 pairs. Since 1974, the Canadian Wildlife Service has monitored contaminant levels in Great Lakes Herring Gull eggs. Data from four sites in this study area indicated that contaminant levels had decreased significantly (1974-2002). Using change-point regression analysis, we examined trends of: DDE, HE, HCB, mirex, dieldrin, PCB and 2,3,7,8-dioxin. Of the 28 analyses, 17 (61%) had declined at a constant rate. Of the remaining 11 analyses, five (18%) declined faster after the change-point, three (11%) declined slower after the change-point, two (7%) increased after the change-point and one (4%) had no trend throughout the study period.

43, **Hays, Helen**, Amer. Mus. Nat. Hist., CPW at 79 St., New York, NY, USA, hays@amnh.org;
Cormons, Thomas, 26201 Dennis Rd., Parksley, VA, USA;
Lima, Pedro, Cetrel, Interligacao Estrada Do Coco Km 9, Camacari, Bahia, Brazil;
Bremer, Ricardo E., Fundacion Vida Silvestre Argentina, C.C. No. 16, 7105 San Clemente del Tuyu, Argentina;

Cormons, Grace, 26201 Dennis Rd., Parksley, VA, USA;

FOLLOWING RADIO-TAGGED TERNS OFF BRAZIL AND ARGENTINA

Small flocks of Roseate Terns (*Sterna dougallii*) and Common Terns (*S. hirundo*) can be found on the coast of Bahia, Brazil during the day, but large concentrations of both species roost at night on three extensive off-shore sandbars, coming in after dark and leaving before first light. In Argentina a few Common Terns may be seen at Punta Rasa, near the mouth of the La Plata River, during the day, but thousands come in to roost there at dusk. To determine where the birds in the night roosts go during the day we radio-tagged Roseate Terns in Brazil and Common Terns in Argentina. Tracking was done from a boat in 2000 and a plane in 2001 - 2003. We found Roseate Terns feeding up to about fifty kms. off-shore in Brazil and Common Terns feeding up to about 100 kms. off-shore in Argentina. In Brazil, Roseate Terns use the three large roosts interchangeably. Signals from Common Terns radio-tagged in Argentina were picked up off the coast of Uruguay and in Rio Grande do Sul in southern Brazil.

Saturday, 9:55, Room B

P33, **Hinojosa-Huerta, Osvel**, 104 Biological Sciences East, University of Arizona, Tucson, AZ, 85721, osvel@email.arizona.edu;

*POPULATION TRENDS OF THE YUMA CLAPPER RAIL IN THE COLORADO RIVER DELTA, MEXICO, 1999-2002

The Yuma Clapper Rail (*Rallus longirostris yumanensis*) is an endemic and binational protected marshbird to the Lower Colorado River in northwestern Mexico and southwestern U.S. I have monitored the population of Clapper Rails in the Colorado River delta, Mexico from 1999 to 2002. The monitoring program consists of call-response surveys at 20 transects (five point counts each) randomly located in the marshlands of the delta and visited twice per breeding season. The population of Yuma Clapper Rails declined 52.85% during the period of study (95% C.I. 32.31 ? 73.38; $p < 0.001$, $\eta^2 = 0.99$). However, the Ciénega de Santa Clara still maintains the largest population of the subspecies, with an estimate of 3,420 individuals (95% C.I. 2,307 ? 4,523). These

declines are associated with marshland dynamics in relation to fire. Part of the Ciénega was burned in 1998, promoting the growth of young stands of cattail. Over the last 5 years, the cattail stands have been decaying and becoming more dense, thus reducing the rails/ha they can support. At other areas, habitat has been created by drainage seepage and instream flows, showing that a dynamic system of marshlands is critical for maintaining healthy populations of Yuma Clapper Rails. The long-term monitoring program is essential for the effective management of protected wetlands in the Colorado River delta and the conservation of the subspecies.

15, **Hylton, Rebecca A.**, Department of Wildlife Ecology and Conservation, University of Florida, Gainesville, FL 32611 USA, bhylton@ufl.edu;

Frederick, Peter C., Department of Wildlife Ecology and Conservation, University of Florida, Gainesville, FL 32611 USA;

***SURVIVAL AND DISPERSAL OF JUVENILE WOOD STORKS ACROSS THE SOUTHEASTERN U.S. AS REVEALED BY SATELLITE TELEMETRY**

Although the Wood Stork (*Mycteria americana*) is federally endangered in the southeastern United States, too little demographic information is available to predict population responses at known levels of productivity. As a first step towards filling in the demographic picture for this species, we began following the survival of nestling and fledgling storks in the Florida Everglades. Ideally, studying the movement-dependent survival of these individuals will also identify specific wetland areas or habitat types used most heavily. Incubation and nestling survival rates (Mayfield) were 49.66% (SE= 1.02, n=54) and 89.29% (SE=1.63, n=97) in 2002 and 19.04% (SE=0.57, n=84) and 49.66% (SE=1.02, n=54) in 2003 respectively. We placed 45 g radio/solar satellite transmitter packages on 33 (2002) and 39 (2003) nestlings. In both years storks initially dispersed into the nearby wetland habitats in south Florida, but quickly spread north throughout Florida, Georgia, South Carolina, Alabama, and Mississippi. All 2002 juveniles returned to central and south Florida by mid-October and remained until June 2003 when northerly movements commenced again. Of 29 and 17 tagged fledglings from the 2002 and 2003 cohorts respectively, satellite data suggests a 36.36% and 48.48% survival rate as of July 2003. Thirty-four post-fledging mortalities occurred in Florida (29), Georgia (3), South Carolina (1) and Alabama (1). Since the satellite transmitters are solar-powered, we hope to continue gathering adult survival information for some individuals. We plan to similarly transmitter 30+ juvenile storks in 2004.

Thursday, 16:10, Room A

16, **Kenyon, James K.**, Centre for Wildlife Ecology, Simon Fraser Univ., 8888 University Dr., Burnaby, BC, Canada;

Smith, Barry D., Canadian Wildlife Service, 5421 Robertson Rd., Delta, BC, Canada;

Ydenberg, Ronald C., Centre for Wildlife Ecology, Simon Fraser Univ., 8888 University Dr., Burnaby, BC, Canada;

Butler, Robert W., Canadian Wildlife Service, 5421 Robertson Rd., Delta, BC, Canada;

***POTENTIAL RESPONSE OF GREAT BLUE HERON NESTING DISTRIBUTION TO INCREASED BALD EAGLE PREDATION**

Abandonment of large breeding colonies of the Great Blue Heron (*Ardea herodias fannini*), with a concomitant total breeding failure, have been attributed to intense Bald Eagle (*Haliaeetus leucocephalus*) predation of nestlings. An increasing number of territorial eagles on the landscape has led us to investigate the long-term ecological response of herons to this increase for mitigating such lost reproduction. With evidence that herons can breed in variously sized colonies, we developed a probabilistic model incorporating search and depredation times to evaluate competing

strategies for maximizing reproductive success. A range of possible colony distributions (number of colonies and colony sizes) was subjected to combinations of eagle numbers (territories) and daily attack rates to determine what distribution of colonies on the landscape maximizes annual expected reproductive success. The model predicts that low predator levels and high daily attack rates favor a dispersed colony distribution. High predator numbers and low daily attack rates favor a clumped colony distribution. We defend why the distribution of colonies around key foraging areas supports the dispersed colony distribution hypothesis.

Thursday, 16:30, Room A

40, **Lima, Pedro**, Cetrel, Interligacao Estrada Do Coco Km 9, Camacari, Bahia, Brazil, pedro@cetrel.com.br;

DiCostanzo, Joseph, Amer. Mus. Nat. Hist., CPW at 79 St., New York, NY, USA;

Hays, Helen, Amer. Mus. Nat. Hist., CPW at 79 St., New York, NY, USA;

CONCENTRATIONS OF NONBREEDING COMMON AND ROSEATE TERNS ALONG THE COAST OF BAHIA, BRAZIL

In 1995 Lima discovered a large roost of terns at Mangue Seco at the mouth of the Rio Real in northern Bahia, Brazil. Subsequent mist netting showed that the roost consisted primarily of Common Terns (*Sterna hirundo*) and Roseate Terns (*S. dougallii*). Later surveys by boat and small plane discovered additional roosts along the coast of Bahia at Caixa Pregos (Itaparica Island), Ponta do Curral (Morro de Sao Paulo), Bahia da Camamu (Itubera) and Ponta de Corumbau (Porto Seguro). Between 1995 and 2003 mist netting at these roosts has caught 648 banded Common Terns and 181 Roseate Terns. Most banded birds of both species have come from North America, but the recoveries have revealed an apparently regular migration of both species between Brazil and the Azores Archipelago in the eastern Atlantic Ocean. Other recoveries have included Roseate Terns from the Caribbean and an individual from Rockabill Island, Ireland. In addition to North America, there have been recoveries of Common Terns originally banded in Brazil, Argentina and Spain.

Saturday, 9:10, Room B

P19, **Lopes, Iara F**, Univ. Federal de São Carlos, São Carlos, SP, Brazil, pifl@power.ufscar.br; Del Lama, Silvia N, De Brito, Reinaldo A, Univ, Federal de Minas Gerais, Belo Horizonte, MG, Brasil;

Silva, Flavio H.;

*DISPERSAL AND GENE FLOW AMONG BRAZILIAN WOOD STORK POPULATIONS

Previous genetic studies of Wood Stork populations using only nuclear markers, showed no genetic differentiation among regional colonies and low level of differentiation between North and South American populations. In the present, study, the genetic structure of Pantanal Stork populations were determined using sequence analysis of mitochondrial DNA (mtDNA) control region from 62 nestlings sampled in eight colonies and Nested Clade Analyses (NCA) to investigate the evolutionary processes responsible for the observed patterns. Were identified 19 haplotypes in a 389 base pair fragment of the mtDNA. The AMOVA revealed low genetic subdivision among colonies that could be indicating that females disperse more or both females and males have the same level of dispersal. The NCA suggested historical range expansion events joined with restrict gene flow due isolation by distance and north-south direction of this flow was detected. This result suggests that the population of Storks found in the Pantanal was originated from a reduced number of founders that expanded in size. We suppose that founders of Pantanal population occupied

northern regions of South America and expanded to south after the Late Pleistocene. During the late glaciation the Pantanal region period had a semi-arid climate that may have limited the establishment of breeding colonies.

58, **Lopez, Elmer**, Tropico Verde, Tropicoverde Va 6, 4-25 Zona 4 Edificio Castaeda, oficina 41. Guatemala, elmer@tropicoverde.org;

COASTAL ECOSYSTEMS AND THEIR CONTRIBUTION TO LOCAL COMMUNITIES IN CENTRAL AMERICA

Coastal wetland habitats in Guatemala are undergoing tremendous pressure by human activities. Pressure from agriculture via drainage, aquaculture, unsustainable hunting and fishing, extraction of firewood, and other industries all threaten the integrity of Guatemala's coastal wetlands. Coastal wetlands provide critical habitats for many species and are essential for the quality of life for local communities that rely on their resources. This presentation will focus on the value of coastal ecosystems to local communities in Guatemala and will show the connection between conserving wetlands ecosystems for migratory birds and other species and thriving local communities
Saturday, 14:00, Room B

48, **López, Leticia**, Guyra Paraguay, CC 1132, Asunción, Paraguay; mleticialopez@hotmail.com
Clay, Rob, Guyra Paraguay, CC 1132, Asunción, Paraguay;

Lesterhuis, Arne, Van Hall Institute, Agora 1, Leeuwarden, Holland

***STATUS AND DISTRIBUTION OF WATERBIRDS IN PARAGUAY**

Scant ornithological or conservation attention has been focused on the waterbirds of Paraguay, despite over 25 % of the country comprising wetlands. Here we present a review of current knowledge of waterbirds in Paraguay, as a first step to identifying conservation priorities. To date, 113 waterbird species have been recorded, of which 23 are Nearctic migrants and 4 are known to be Austral migrants. Seven species are considered as vagrants and a further 17 species are best considered of unproven occurrence. Six waterbird species are currently listed as of global conservation concern, including the Critically Endangered Brazilian Merganser (*Mergus octosetaceus*), a species last observed in 1984, and Eskimo Curlew (*Numenius borealis*), formerly an abundant migrant but not recorded since the late 19th century. Recent surveys have shown several species, such as White-cheeked Teal (*Anas bahamensis*) and Collared Plover (*Charadrius collaris*), to be more common than previously documented. The Chilean Flamingo (*Phoenicopterus chilensis*), a Near Threatened species previously only recorded in small numbers, occurs in concentrations of up to 1 % of the global population, while numbers of other large wading birds, such as the three species of stork, are believed to approach, if not surpass, such levels. Despite the recent advances, much remains to be learnt about the status and distribution of waterbirds in Paraguay.

Saturday, 13:30, Room A

P23, **Mariano-Jelicich, Rocío**, CONICET. Rivadavia 1917 Buenos Aires, Argentina, rmjelic@mdp.edu.ar;

Favero, Marco, University of Mar del Plata, Funes 3250, Mar del Plata, Argentina;

***FORAGING STRATEGY OF BLACK SKIMMERS DURING THE NON-BREEDING SEASON**

Skimmers are known because of their characteristic bill and foraging tactic. Although previous works from North America describe aspects about their foraging behavior, little is known about them during the non-breeding season. In this work we present new information on the foraging

ecology of Black skimmers (*Rynchops niger*) in estuarine non-breeding areas in Argentina. Information on the diet was obtained analyzing regurgitated casts. The structure of fish assemblages was estimated at different areas used by skimmers to forage. Behavioral observations were carried out to estimate the use of foraging patches, foraging effort and success. Silverfishes and Anchovies, comprising both marine and estuarine species, mainly constituted the diet of skimmers. Wind direction had no effect on the relative consumption of marine or estuarine prey; however wind intensity was negatively correlated with the importance of marine ones. Non-significant differences between foraging areas were found in the composition of fish assemblages. However, significant differences were found when only fish found in the diet were considered. Significant differences were found in the use of foraging patches by skimmers, but those were not related neither with the abundance nor the diversity of fish assemblages. Foraging effort increased in areas with higher fish-prey abundance. Tide level had a significant effect on success rates and the number of birds foraging in a patch.

12, **Martínez, Carlos**, Departamento de Biologia Universidade Federal do Maranhão Av. dos Portugueses S/N Campus Universitário do Bacanga São Luís - MA Brazil, nyctic@yahoo.com;
FOOD OF BLACK-CROWNED NIGHT HERON IN A NORTHERN BRAZILIAN MANGROVE SWAMP

A study of the diet of Black-crowned Night Heron nestlings (*Nycticorax nycticorax*) in a colony located in a mangrove swamp in Brazil from 1994 to 1996. Regurgitated boluses were taken. Five additional ciconiiforms were breeding at the same site. The Night Heron fed mainly on fish (81.9% by number of items, 74.5% by biomass), with some amphibians, insects, crustaceans and birds. Several fish species were common in the bird's diet, including green morays (*Gymnothorax* sp., Muraenidae), cichlids (mainly *Cichlasoma* sp.), wolf fish (*Hoplias* sp., Erythrinidae) and characids (*Astyanax* sp.). Most of items were freshwater prey, morays being the only euryhaline species among frequent items. The biomass of most items was between 11 and 100 g. The remaining ciconiiforms at the site fed mostly on euryhaline or saltwater prey. The morays were more frequent in 1994 than in the following years, when freshwater preys were more abundant. The differences were significant. There were only little differences between 1995 and 1996. The diversity of the Night Heron diet was higher in Brazil (3.45 by classifying prey at family level, Brillouin) than that found in temperate sites. It is remarkable that all bird prey items were Egret and Heron chicks (*Egretta* spp.). While being rare by number of items, ardeid nestlings were 11.4% of Night Heron prey biomass. Ardeid nestlings were found always in boluses regurgitated by chicks of 20-25 days old. It is even possible that those nestlings were captured by the Night Heron chicks themselves.
Thursday, 14:30, Room A

P28, **Martínez, Carlos**, Departamento de Biologia Universidade Federal do Maranhão Av. dos Portugueses S/N Campus Universitário do Bacanga São Luís - MA Brazil, nyctic@yahoo.com;
USE OF FORAGING HABITATS BY FIVE CICONIIFORMS IN A NEOTROPICAL MANGROVE SWAMP

A preliminary study on ciconiiform foraging distribution on mangrove habitats in Northern Brazil. I studied the distribution of the Snowy Egret (*Egretta thula*), the Little Blue Heron (*E. caerulea*), the Tricolored Heron (*E. tricolor*), the Yellow-crowned Night Heron (*Nyctanassa violacea*) and the Scarlet Ibis (*Eudocimus ruber*) in each of six different intertidal habitats in a mangrove swamp. The habitats were: Sandy Beaches; Mudflats A (without sand); Mudflats B (20% to 50% sand); Creeks (crossing mudflats A and B); Streams; and Mangrove Forest. The birds showed significant differences between species in their distribution by foraging habitat ($G_{20}=893$, $p<0.00001$). The

Snowy Egret was widely distributed, being more numerous on beaches; the Little Blue Heron was more concentrated on mudflats A and streams; the Tricolored Heron was the rarest of the five birds, and was concentrated on mudflats A; the Yellow-crowned Night Heron appeared in very high densities in creeks and streams, being nearly absent in the remaining habitats; and Scarlet Ibis showed high densities in all habitats except beaches, being especially dense in streams. Comparing between species, broader spatial niches were related to higher total bird numbers. Ecotonal habitats tended to show higher bird densities and diversity, especially mudflats A, creeks and streams. More productive muddier substrates showed higher bird numbers.

P24, **Mascitti, Virginia**, FCEN-UBA-Buenos Aires, mascitti@bg.fcen.uba.ar;
Castañera, Mónica;

HABITAT USE AND PREFERENCES IN MULTISPECIFIC FLAMINGO FLOCKS

Habitat use and preference of multispecific flamingo flocks (*Phoenicopterus chilensis*, *Phoenicoparrus andinus*, *P. jamesi*) were studied between 1990-1991 (Laguna de Pozuelos, Jujuy, Argentina). Bird counts were made at three points in four foraging microhabitats (shallow: S1-S2; deep: D3-D4), ranging 2-50 cm depth. Microhabitat availability was measured at one of those points. Multispecific flocks (3/6) were mainly recorded in the dry season (winter-spring), in relation to the winter arrival of Andean and James. In these flocks, Chilean used D4 (winter) and D3 (spring), James mainly S1 (spring), and Andean behaved in the same way as the species dominating in each flock. In the other flocks one of each species was dominant in a proportion over 65%: Chilean used D3-D4, James S1-S2 and Andean mainly D3. In the wet season (summer-autumn), Chilean dominated (75-98%) and exclusively used D3-D4. Most available microhabitats in the wet season were: D4 (52%) and D3 (28%); in the dry season: D4 (82%) in winter; S2 (27%) and D3 (59%) in spring. In the four recorded flocks, Chilean did not prefer S1 and used D4, when other species were presented (winter). James did not prefer D3 and D4, and preferred S1 in spring. Andean did not prefer S1 and used the rest of the microhabitats according to their availability. Conversely to Chilean, James, a vulnerable species, preferred shallow microhabitats. Andean showed a grouping behaviour related to the habitat preference of the other species.

P16, **Mauco, Laura**, Lab. de Vertebrados, Depart. de Biología, Universidad Nacional de Mar del Plata, Funes 3250 Mar del Plata, Argentina, Imauco@mdp.edu.ar;

Favero, Marco, Lab. de Vertebrados, Depart. de Biología, Universidad Nacional de Mar del Plata, Funes 3250 Mar del Plata, Argentina;

MONITORING THE FOOD AND FEEDING BIOLOGY OF COMMON TERNS AT WINTERING AREAS IN ARGENTINA: INFLUENCE OF ENVIRONMENTAL CONDITIONS

In long-distance migratory species like the Common Tern (*Sterna hirundo*), the situation during the non-breeding season can largely differ from that in breeding areas. However, aspects of their wintering strategies like food acquisition, foraging strategies and energy storage can affect the reproductive performance during the following season. During six consecutive nonbreeding seasons (1997-98 to 2002-03) we studied the food and feeding biology of Common Terns in Punta Rasa (Samborombón Bay). We show results of this monitoring compared with information about variability of prey and environmental conditions (wind, sea surface temperature, estuarine runoff, ENSO). An average of ten fish and nine insects species were found in the diet, with significant variations observed between and within seasons. In all seasons fish constituted more than 60% of the diet in terms of biomass. Wind intensity was negatively correlated with fish in the diet and positively with insects. The importance of Argentine anchovy (*Engraulis anchoita*) in the diet was positively correlated with anchovies' biomass stock and sea surface temperature. Inter-seasonal

variations in the diet were also correlated with variability in Rio de la Plata runoff, with more marine fish (Argentine Anchovy, among others) observed during overflowing years, particularly after 1997 El Niño event.

25, **Mellink, Eric**, CICESE; Apartado Postal 2732; Ensenada, B.C. Mexico, emellink@cicese.mx;
MONITORING, SURVEYING, OR EXPLORING?: APPROACHES TO FILLING THE GAPS IN
KNOWLEDGE ON WATERBIRDS IN LATIN AMERICA

Long-term monitoring is currently an integral part of many conservation and management schemes, especially in the U.S.A. and Canada, where the status of waterbirds is relatively well known. But is this the appropriate approach to waterbird conservation in Latin America? Here there are huge gaps in knowledge on waterbird status, and severe limitations on filling them (especially in resources and trained professionals). A researcher must decide among studying the ecology of common species (favored in academic circles), filling in the knowledge gaps on the distribution and numbers of particular species, conducting comprehensive inventories of selected areas, or attempting to understand the causes of temporal fluctuations in population size. I believe that comprehensive surveys of species should be the top priority. Although including bibliographic reviews and mail questionnaires at their onset, surveys should be based on comprehensive field work focused on target species. The sampling scheme should be completely flexible for on-the-spot decisions. Surveys should be concurrent or followed by short-term monitoring, which may develop into long-term monitoring programs. Whereas research scientists can participate in the conduction of surveys and short-term monitoring; NGOs and teaching-oriented university professors seem more suitable for long-term studies. Through such an approach, Eduardo Palacios and I obtained an accurate picture of the status of vanRossem's Gull-billed Tern (*Sterna nilotica vanrossemii*) in Mexico.

Friday, 11:40, Room A

P05, **Morgan, Ken H.**, Institute of Ocean Sciences, Box 6000, Sidney, BC, Canada,
morgank@pac.dfo-mpo.gc.ca;

O'Hara, Patrick D, Institute of Ocean Sciences, Box 6000, Sidney, BC, Canada;
INTRA- AND INTER-DIURNAL VARIABILITY IN THE COMPOSITION, ABUNDANCE
AND DISTRIBUTION OF A COASTAL MARINE BIRD COMMUNITY

Many studies have concluded that patterns of at-sea distribution and abundance of seabirds vary as a function of the spatial and temporal scales at which they occur. While most studies have discussed interrelationships between birds and spatial heterogeneity, few have considered variations in avian parameters relative to temporal scales. Between 23 August, 1994 and 22 September, 1995, 166 bird surveys were conducted aboard a ferry traveling between Vancouver Island and mainland British Columbia. Surveys were carried out as follows: 4 surveys per day, 3 consecutive days each month. The marine waters surrounding the Gulf Islands, provide rich protected habitat for thousands of breeding, migrating and over-wintering marine birds. Active Pass, separating several of the Gulf Islands, is a busy marine transportation corridor. At both ends, strong tidal currents (to 6.5 knots) encounter submarine walls, with the resultant upwards forcing of cold, nutrient rich water to the surface. Throughout the study, Active Pass supported the highest density and diversity of birds. We describe intra- and inter-daily variation in numbers, composition and distribution of marine birds along the route, with emphasis on Active Pass. Variations in bird abundance and distribution were related to tidal phase and time of day (a surrogate for cumulative vessel disturbance).

52, **Nisbet, Ian C.T.**, 150 Alder Lane, N. Falmouth, MA 02556, USA, icnisbet@cape.com;
Sims, Michele A, Long Island Sea Turtle Project, Riverhead Foundation, Riverhead, NY 11901,
USA;

Victor Apanius, Dept. Biol. Sci., Florida International Univ., Miami, FL 33199, USA;

HAEMATOLOGICAL CHANGES IN COMMON TERNS IMMEDIATELY FOLLOWING AN OIL SPILL

On 27 April 2003, about 200,000 L of No. 6 fuel oil were released into Buzzards Bay, Massachusetts, USA, leading to contamination of a common tern (*Sterna hirundo*) colony that we have studied since 1970. Terns initiated nesting on 13 May 2003; we collected haematological data from 17 May to 5 June. About 30% of the birds had traces of oil on the plumage in mid-May, decreasing during the study period, probably through preening. During 17-31 May, we documented anemia (decreased packed cell volume) and immunosuppression (decreased total white blood cell counts), but these parameters returned to normal levels (pre-spill data from 1999 and 2002) by 3 June. Age, sex, laying date and day of the reproductive cycle were not related to haematological parameters or recovery dynamics. We expect that our ongoing analysis of leukocyte differentials and serum protein profiles will support our preliminary conclusion that haematological assessment is a more sensitive indicator of exposure to oil than external examination of plumage.

Saturday, 14:50, Room A

44, **O'Neill, Paul**, QPWS, Cnr. Yeppoon & Norman Roads, Rockhampton, Qld., 4701, Australia, paul.oneill@epa.qld.gov.au;

Minton, Clive, 165 Dalgetty Road, Beaumauris, Victoria, 3193 Australia;

Ozaki, Kiyooki, Yamashina Institute for Ornithology, 115 Konoyama, Abiko 270-1145, Japan;

White, Rebecca, QPWS, Cnr. Yeppoon & Norman Roads, Rockhampton, Qld., 4701, Australia;

THREE POPULATIONS OF NON-BREEDING ROSEATE TERNS IN THE SWAIN REEFS, AUSTRALIA

The Swain Reefs is a vast area of reefs and small coral cays at the southern end of the Great Barrier Reef in Queensland, Australia. Up to 5,000 non-breeding Roseate Terns (*Sterna dougallii*) had previously been observed in the area during the Austral winter months and 25,000 in the summer months. We used a small cannon net to capture birds that were banded and leg-flagged, with biometric and molt data also being collected on appropriate samples. We captured 368 Roseate Terns in July of 1999, 2000 and 2001 and 3044 in January of 2002 and 2003. We determined that the Roseate Terns in the Swain Reefs during July belong to the local Queensland breeding population (*S. d. gracilis*). Amongst the January captures were 44 birds carrying Japanese leg bands and three carrying Taiwanese leg bands. We determined that 60% of the Roseate Terns present in Swain Reefs in January (15,000 birds) belong to the Asian (*S. d. bangsi*) population, 1.5% belong to the local (*S. d. gracilis*) population (375 birds), with the remaining 38% of unknown origin (9,500 birds).

Saturday, 10:30, Room B

01, **Ogden, John C.**, South Florida Water Management District, 3301 Gun Club Road, West Palm Beach, FL, USA, jogden@sfwmd.gov;

SCIENCE AND CONSERVATION IN THE EVERGLADES AND PANTANAL

Similarities in scale, climate, ecology, and the nature and scope of conservation issues have been suggested for the Florida Everglades and Brazilian Pantanal. It has been proposed that formal exchanges of people and information among the scientists and resource officials from the two

systems can produce benefits for both systems. I examine the similarities and dissimilarities between the two systems, and suggest where the focus for exchanges might be most profitable. In general, the two systems are most similar in spatial scales and climitological patterns, and in some faunal components, but show great differences in many other components and measures. The most useful exchanges may be in lessons learned from the application of science to large regional-scaled restoration and protection programs. The effectiveness of science in supporting such programs might best be evaluated through examination of the scientific framework in regional plans, and in how well adaptive management strategies are applied during implementation of regional plans.
Thursday, 8:30, Room A

P13, **Palacios, Eduardo**, CICESE, Unidad La Paz, Miraflores 334 e/ Mulegé y La Paz Fracc. Bella Vista, La Paz, B.C.S., 23050, Méxi, epalacio@cicese.mx;
Mellink, Eric, CICESE, km 107 Carr. Tijuana-Ensenada, B.C., México;
CURRENT POPULATION STATUS OF THE VANROSSEMI GULL-BILLED TERN IN MEXICO

During the 2003 breeding season, we surveyed historical, potential, and current nesting sites of the vanrossemi Gull-billed Tern (*Sterna nilotica vanrossemi*) along the Pacific coast of Mexico. We documented previously unrecorded nesting colony locations and provided an estimate of the current population size. We found six colonies, two were new and four were already known nesting locations, plus two potential nesting sites. Colony size was 7-153 breeding pairs. We estimated a total population of 340 breeding pairs distributed mostly (80%) in two relatively large colonies, Cerro Prieto, Baja California and Laguna de Pericos, Nayarit. All colonies, but one in Colima, were located in coastal wetlands of northwestern Mexico. Gull-billed Terns nested on islets in very shallow waters or at shallow sea -front sites. Colony associates included other terns, black skimmers, gulls, and egrets. The nesting population of this subspecies is very small, and its nesting habitat is threatened by coastal development along the Pacific coast. This subspecies should be listed as endangered on the official Mexican list of sensitive species, and a management plan must be implemented to assure the conservation of the wetland habitat on which this and other bird species depend.

P12, **Palacios, Eduardo**, CICESE, Unidad La Paz, and Pronatura, A.C. (Noroeste Mar de Cortés), Miraflores 334 e/ Mulegé y La Paz Fracc. Bella Vista, La Paz, B.C.S., 23050, Méxi, epalacio@cicese.mx;
Martinez Ríos del Río, Laura, PRO ESTEROS, Calle 4ta. #210 esq. Ave. Moctezuma, Zona Centro, Ensenada, Baja California, CP 22800 México;
BAJA CALIFORNIA SMALL WETLANDS INVENTORY

Small coastal wetlands are very important but overlooked habitats in Baja California. Although small in area, compared to larger wetlands, these habitats have a special value for wildlife and provide important ecological functions such as riverbank protection, erosion control, water quality improvement, as well as numerous aesthetic, scientific and recreational values. PRO ESTEROSs Baja California Small Wetlands Inventory is a database of information on ecological conditions, land use and tenure, and hydrology for 12 small coastal wetlands located on the Mediterranean type northwest coast of Baja California. We documented 193 species of plants, 168 of birds, 20 of fish, and 91 of other wildlife depend on these wetlands. Their biodiversity is higher than any of the major Baja California wetlands. Fifty five species (15 species of bird, 2 of fish, 3 of amphibia, 16 of reptile, 7 of mammal, and 12 plants) are sensitive species. Threats to these habitats include: invasive species of plants, dredging, pollution, agriculture and cattle, water and sand extraction,

housing and tourism development. The inventory's primary function is a planning and educational tool. It constitutes a foundation upon which new and other types of data can be added and/or linked to it.

20, **Parsons, Katharine C.**, Manomet Center for Conservation Sciences, Manomet, MA USA, parsonsk@manomet.org;

Bart, Jonathan, USGS Forest and Rangeland Ecosystem Science Center, Snake River Field Station, 970 Lusk St., Boise, ID 83706;

USING FLIGHT OBSERVATIONS TO ESTIMATE WADING BIRD ABUNDANCE AT NESTING COLONIES

Assessing abundance of waterbirds is critical to achieving many research, management and conservation objectives. Obtaining information on abundance is constrained by the time and personnel resources of wildlife scientists and managers, and by the cost to waterbird populations that results from investigator disturbance. Disturbance is a primary concern in estimating abundance of colonially-nesting waterbirds. We investigated the efficacy of using flight observations, obtained without disturbance to the birds, to estimate abundance of nesting wading birds at several colonies in northeastern US. At colonies in Boston Harbor (1993-1995), Cape Cod (1991-1994), New York Harbor (1986-1990; 1992-1993), and Delaware Bay (1993-1995; 2000), we obtained weekly flight rates of birds leaving and arriving at each colony over the four-month breeding season. In addition, we conducted ground counts of all wading bird nests during late incubation. Flight rates obtained during incubation provided the best predictor of wading bird abundance; rates during the nestling phase were highly variable. Tide and time of day variables sometimes co-varied with flight rate for some species. In general, a reasonable index of abundance may be obtained by collecting limited flight data during incubation.

Friday, 9:40, Room A

P03, **Pekarik, Cynthia**, Canadian Wildlife Service (CWS), Box 5050, Burlington, Ontario, Canada, cynthia.pekarik@ec.gc.ca;

Barker, Ian K., University of Guelph, Guelph, ON;

Weseloh, D.V., CWS, Downsview, ON;

Shutt, J. Laird, CWS, National Wildlife Research Centre, Ottawa, ON;

*ENDOCRINE DISRUPTION AND IMMUNE RESPONSES IN GREAT LAKES GULLS (LARUS SP.)

Great Black-backed Gulls (*Larus marinus*) breeding at contaminated colonies on the Laurentian Great Lakes have higher levels of organochlorine contaminants than Herring Gulls (*Larus argentatus*) breeding at the same locations. The objective of this research was to determine if the significant difference in contaminant levels between the two species was associated with endocrine disruption in adult gulls (measured by the presence/absence of vitellogenin in males) and suppressed immune responses (cell and antibody-mediated) in pre-fledgling chicks. Results confirmed that contaminant levels in eggs were significantly ($p < 0.05$) higher in Great Black-backed Gulls than in Herring Gull eggs for the majority (80%) of the compounds analyzed, at two contaminated colonies in Lake Ontario. For birds nesting at the control site in the Bay of Fundy (New Brunswick, Canada), there were no differences in contaminant levels between species for any of the organochlorine compounds, though total mercury levels were significantly higher in Great Black-backed Gulls. Plasma was collected from 83 adult birds (51 male, 32 female), vitellogenin was not detected in any of the male birds from the contaminated (N=25) or control sites (N=26). T-cell mediated immune responses were significantly lower in Herring Gull chicks from one

contaminated site, relative to the control site. There were no significant differences in T-cell mediated immunity between sites for Great Black-backed Gulls. Antibody-mediated immunity was assessed at one contaminated site, there were no significant differences between species at that location.

P02, **Pekarik, Cynthia**, Canadian Wildlife Service (CWS) Box 5050, Burlington, Ontario, Canada, cynthia.pekarik@ec.gc.ca;

Matkovich, Carolyn;

Weseloh, D.V., CWS, Downsview, ON;

***MERCURY LEVELS IN COLONIAL WATERBIRDS NESTING ON THE GREAT LAKES (1973-2002)**

The Canadian Wildlife Service has monitored (total) mercury levels in eggs of several species of colonial water birds. Data for Herring Gulls (*Larus argentatus*), Great Black-backed Gulls (*Larus marinus*) and Black-crowned Night-Herons (*Nycticorax nycticorax*) were sufficient for inter-species comparisons and trend analysis. In 2000, at four Great Lakes colonies, levels in night-heron eggs were 30% > in Herring Gulls (0.21 and 0.16 ug/g wet weight, respectively) ($p = 0.28$). In 2001, at two colonies in Lake Ontario, levels were 3x greater in black-backed gull eggs (0.64 ug/g) than in Herring Gulls (0.21 ug/g) ($p < 0.0001$). Temporal trend analysis was conducted on Herring Gull eggs from fifteen Great Lakes colonies collected annually since the early 1970s (eight sites) and early 1980s (seven sites). In 2002, values ranged from 0.08 to 0.21 ug/g (wet weight), levels were lowest in eastern Lake Erie and highest in eastern Lake Ontario. Results indicated significant declining trends at eleven colonies and non-significant declines at three sites. Significant declines occurred at all sites sampled on Lakes Ontario, Erie and Superior, the Niagara and Detroit Rivers and two sites on Lake Huron. Non-significant declines occurred at both sites on Lake Michigan and one on the St. Lawrence River. A non-significant increasing trend was observed at Saginaw Bay, Lake Huron.

14, **Peters, Kimberly A.**, South Carolina Cooperative Research Unit, Clemson University, Clemson, SC, USA, kapeter@clemson.edu;

Otis, David L., Iowa State Cooperative Research Unit, Iowa State University, Ames, IA, USA;

***AMERICAN OYSTERCATCHER FORAGING BEHAVIOR: EFFECTS OF DISTURBANCE AND PREDATION RISK**

The predation-disturbance theory asserts that animals perceive human disturbance similarly to non-lethal predation stimuli, and exhibit similar responses in the form of optimization tradeoffs.

However, few studies have examined how natural predation risk factors interact with human disturbance stimuli to elicit such responses. We observed American oystercatcher (*Haematopus palliatus*) foraging and vigilance behavior from September-December 2002 on the Cape Romain National Wildlife Refuge, South Carolina. A series of models were constructed based on 340 focal-animal samples and revealed relationships between vigilance behavior, predator density and boat activity. Oystercatchers increased vigilance in response to aerial predators, particularly late in the season when predator species composition was dominated by northern harriers. At a broader temporal scale, oystercatchers exhibited highest vigilance rates during the peak boating period, a finding that may have been confounded by osprey activity which also peaked during that period. Forage rates were not associated with predators or boats and appeared to be driven by habitat and tidal stage, indicating that time lost to vigilance did not reduce intake. Taken together, these findings provide some support for the predation-disturbance theory, underscore the sensitivity of disturbance studies to temporal scaling, and draw attention to the potential confounding effects of

natural predation risk.

Thursday, 15:50, Room A

P25, **Renninger, Heather**, Department of Biological Sciences, East Stroudsburg University, East Stroudsburg, PA, USA, terry.master@po-box.esu.edu;

Master, Terry, Department of Biological Sciences, East Stroudsburg University, East Stroudsburg, PA, USA;

***SNOWY EGRET FORAGING BEHAVIOR: COMPARING JUVENILES AND ADULTS**

Choice of foraging position/behavior and resulting measures of success were compared between juvenile and adult snowy egrets at the Wetlands Institute in Stone Harbor, New Jersey during 1998 and 1999. Observations of focal individuals were made in a variety of habitats with emphasis on salt marsh pools. Postures, involving both body and neck positions, and specific foraging behaviors were recorded along with measures of foraging efficiency including attempt rate, capture rate, capture efficiency and stepping rate. Adults displayed specific postures more frequently than juveniles, especially those used to move closer to the surface of the water such as a below parallel body position and a "low S" neck orientation. Nearly all foraging behaviors, including relatively sophisticated hops and foot stirs, were used more frequently by adults indicating greater activity on their part compared to juveniles who stood still more often. Perhaps as a consequence of chosen postures and behaviors, juveniles exhibited lower values for all measures of efficiency. This may have been compensated for, at least somewhat, by lower stepping rates. Thus, Snowy Egrets appear to develop their typically active foraging behavior and improve their foraging success with age and experience.

P21, **Rocha, Cristiano D.**, Univ. of Brasília, SQN 314 F 505, Brasília, DF, Brazil, cristiano@altern.org;

Del Lama, Sílvia N., Univ. of São Carlos, Rod. Washington Km 235, São Carlos, SP, Brazil, Regitano, Luciana C. A., Embrapa Sudeste, São Carlos, SP, Brazil;

***GENETIC VARIABILITY IN THE BRAZILIAN PANTANAL WOOD STORK SUBPOPULATIONS AND COMPARATIVE ANALYSES BETWEEN BRAZILIAN PANTANAL WOOD STORK POPULATION AND NORTH AMERICAN WOOD STORK POPULATION**

The Wood Stork (*Mycteria americana*) is a wading bird inhabiting subtropical and tropical regions of the American continent. Variability and genetic structuring of nine Brazilian Pantanal subpopulations were determined using eight allozyme loci (Mpi, Icd, Nsp, Est-D, Ldh, Pgm, 6-Pgd, Pep-A) and four microsatellite loci (WS1, WS2, WS4, WS6). Comparative analyses between North and South American populations were made based on allele frequencies. Average expected heterozygosity of the Pantanal population was similar (0.198 ± 0.065) to that expected for the North American population (0.231 ± 0.066). No significant differences were found among Pantanal subpopulations using the eight allozyme loci data ($F_{st} = 0.005$; $P = 0.7792$) and the four microsatellite loci data ($F_{st} = 0.022$; $P = 0.1233$). No significant differentiation was detected between North and South America populations based on allozyme data ($F_{st} = 0.001$; $P = 0.2273$), but limited differentiation was found using microsatellite data ($F_{st} = 0.044$; $P < 0.0001$). Lack of differentiation among the Pantanal subpopulations was discussed assuming a high gene flow among birds of neighboring breeding colonies and low site natal philopatry. In discussing the low differentiation detected between North and South American populations we supposed that these populations occupied neighboring regions during the late glaciation or that there was a continuous gene flow between them, intermediated by a Central American or Northern South American

population. The lack of differentiation among these populations should be considered in conservation strategies and in the review of the endangered status of the North American population.

24, **Rocha, Omar**, Wildlife Conservation Society/Bolivia, Calle Campos No. 334, Edificio Iturri 1° B, La Paz, Bolivia, orochoa@entelnet.bo;

ABUNDANCE AND HABITAT CHARACTERISTICS OF THREE SPECIES OF FLAMINGOS IN THE SOUTHWESTERN BOLIVIAN ALTIPLANO

Three species of flamingos are found in the lakes of the high Andean Bolivian Altiplano, the Andean Flamingo (*Phoenicoparrus andinus*), James Flamingo (*P. jamesi*), and the Chilean Flamingo (*Phoenicopterus chilensis*). In order to estimate the abundance of these three species in the southwestern Bolivian Altiplano, between 1997 and 2000 a total of 8 censuses (4 summer and 4 winter) in 23 lakes totaling 18,000 has and ranging from 4,111 to 4,767m.a.s.l were undertaken. Flamingo abundance was variable and depended on season, with higher concentrations during the austral summer and lower concentrations in austral winter. During austral summer (November to April) more than 80% of the known Bolivian populations for James Flamingo and Andean Flamingo concentrate at the study area making this region one of the most important sites for flamingos in the country. Abundance for all three species is also related to lake size, water chemistry, zooplankton levels, phytoplankton levels, macroinvertebrates and waterbird community structures. Many of the studied lakes were visited for the first time by biologists since the 1980's, and some had never previously been studied. This study is therefore of great importance in terms of wetland identification and preliminary ornithological and limnological assessments in a poorly known high Andean region.

Friday, 11:20, Room A

37, **Rocke, Tonie E**, USGS National Wildlife Health Center, 6006 Schroeder Rd., Madison, WI 53711, Tonie_Rocke@usgs.gov;

Samuel, Michael D., USGS National Wildlife Health Center, 6006 Schroeder Rd., Madison, WI 53711;

WETLAND CONDITIONS ASSOCIATED WITH AVIAN BOTULISM OUTBREAKS

Avian botulism, a disease caused by ingestion of toxin produced by the bacterium *Clostridium botulinum* type C, kills hundreds of thousands of waterbirds every year throughout the world. Botulism outbreaks occur primarily in freshwater wetlands during warm weather; however, the ecological factors or events that increase the risk of botulism are not well understood and the location and timing of outbreaks are unpredictable. To determine environmental conditions associated with the occurrence of avian botulism, we measured various wetland factors, including depth, temperature, redox potential, pH, electrical conductivity, percent organic matter and dissolved oxygen, in the sediments and water column during outbreaks. Our study was conducted at 30 outbreak and matched control sites throughout the central and western U.S. Wetland conditions that increase the risk of botulism outbreaks in birds were identified by the consistent patterns found at these paired sites. Our findings demonstrate a complex relationship between environmental conditions such as pH, water temperature and redox potential, and the risk of botulism outbreaks in waterbirds.

Saturday, 10:30, Room A

07, **Roshier, David A.**, Johnstone Centre, Charles Sturt University, Locked Bag 588, Wagga Wagga, NSW 2678, AUSTRALIA, droshier@csu.edu.au;

UNDERSTANDING WATERBIRD MOVEMENTS IN DYNAMIC LANDSCAPES - AN AUSTRALIAN PERSPECTIVE

Few landscapes are static and patterns of resource distribution can vary markedly in time and space. Patterns of movement and dispersal in response to environmental change are equally diverse and occur on a broad range of temporal scales. It is the strength of the relationship between patterns of resource distribution and patterns of movement that provides insight into the ecological and evolutionary consequences of mobility and movement. For instance, among migratory species there may be considerable annual variation in settling patterns on the breeding grounds and waterfowl provide several examples of this. In these species, lack of breeding-site philopatry between successive breeding events may constitute breeding dispersal or simply the spatial rearrangement of the population within an extensive breeding range. Thus, the use of a spatial and temporal context defined by the annual breeding cycle is not always the appropriate framework for describing the ecological and evolutionary consequences of movement and dispersal. This is particularly so in the Australian context where the vast majority of wetland resources are temporary. In order to understand movement responses there is a need to identify whether they are in response to first-order processes determined by hydrological and climatic processes or second-order processes determined by prey abundance. In this paper I discuss first-order processes driving the distribution of waterbird populations in arid Australia.

Thursday, 11:40, Room A

P18, **Santos Mateus H**, DGE, Universidade Federal de São Carlos, Via Washington Luiz km 235, mateushenrique@yahoo.com.br;

Del Lama SN;

*GENETIC CHARACTERIZATION OF THE PANTANAL ROSEATE SPOONBILL POPULATION

No population genetics information is available in this species. The genetic characterization of the Brazilian populations of Roseate Spoonbill can contribute to clarify if these sub-populations are isolated or not. The identification of polymorphic loci of different types of markers represent the first step in this analyzes and it is the aim of this research. We screened three types of genetic markers: allozymes, microsatellites and RAPD. We collected 29 nestling blood samples in the Pantanal and used that for microsatellites and RAPD analyses, and 27 growing feather samples for allozyme analyses. From 20 allozyme loci tested, three showed variation: Icd-1 (0,962; 0,038), Ldh (0,673; 0,327), Nsp (0,982; 0,018). The mean heterozigosity using the allozyme data was 0,022. We did not find genetic variation in the three microsatellite loci described as polymorphic in Wood Stork (WS2, WS4, WS6). Three RAPD primers were tested. No variation was found in tests using W6 e L15, however, R11 showed variation in 6 loci: 2 (0,39; 0,61), 3 (0,96; 0,04), 4 (0,48; 0,52), 6 (0,88; 0,12), 7 (0,88; 0,12), 8 (0,62; 0,38). South America populations are generally classified as reservoirs of genetic diversity. The characterization of Brazilian Roseate Spoonbill populations will show their real level of diversity. Spatial scales of populations vary widely among species. Using markers described in this study we will check if Spoonbill populations show no genetic differentiation and high level of gene flow among colonies, as it was found for Wood Stork populations.

60, **Schaeffer-Novelli, Yara**, University of Sao Paulo, Brazil, novelly@usp.br;

Cintron-Molero, Gilberto, WHP/ICD, U.S. F & WS, Department of the Interior, USA;

AQUACULTURE IN COASTAL WETLANDS: BRAZIL'S NORTH COAST CASE STUDY

The Neotropical Realm of Central America, the Caribbean Basin, and South America was, until

recently, the most biologically rich and one of the least disturbed of the Planet's eight biogeographic regions. This has changed in the last three decades, and continues to change at an alarming rate due to landscape level modifications particularly the transformation of coastal wetlands by economic activities like expansion of industry, agriculture, urban sprawl, aquaculture. Brazil's large intertidal flats along the Northeastern-Central Coast provide plentiful feeding and roosting habitats for shorebirds. But a new threat is posed by rapidly expanding coastal shrimp farming. The region most sought after for shrimp farming developments in Northeast Brazil is also one of the nations most important for migratory birds, and probably for the conservation of the integrity of the Atlantic Nearctic Shorebirds Flyway along South America. Over the last four years Brazil's agribusiness output increased to become 3.1 percent of the world production, bringing it to the 8th place among shrimp producers. The remaining intertidal areas are quickly capturing the attention of numerous national and foreign investors seeking quick profits. Numerous entrepreneurs are discovering this economic miracle, and projections presented by GeoBrazil 2002 (2002) indicate that this will be one of the most important economic activities in the next years.

Saturday, 14:40, Room B

P22, **Seccomandi, Aislan**, Univ. de Mogi das Cruzes, Mogi das Cruzes, SP, Brasil,
pamt@iris.ufscar.br;

Tomasulo-Seccomandi, Alessandra, Del Lama, Sílvia, Bryan, Lawrence, Jr, SREL, University of Georgia, GA, USA;

***BIASES IN THE SEX RATIO IN NORTH AND SOUTH AMERICA NESTING COLONIES OF WOOD STORK**

Whereas sex ratio in most birds is close to 1:1, several instances have been described showing a bias towards one of the genders. The aim of this work was to determine sex ratios in Wood Stork populations from Brazilian Pantanal and from US Southeastern region. 632 blood samples were collected from nestling in seventeen colonies from Brazil (10) and USA (7) and sex was determined by CHD gene amplification. Two significant biases in the 1:1 sex ratio were founded: one in the Brazilian colony (Fazenda Ipiranga) favoring females ($X^2=3.93$), and other in the American colony (Everglades) favoring males ($X^2=5.76$). South America has higher level of predation than North America. Fazenda Ipiranga has been an unstable colony, and presents a large number of predators. Everglades's site suffered a population retraction and has few predators. We hypothesize that in low level predation sites and where there is a population expansion, female produce more males to optimize the reproduction. Otherwise, in a low quality sites females favor females because it is probably the dispersive sex in this species. These results indicate that the sex manipulation is an adaptive strategy of this species.

P26 **Sedano, Raul E.**, Internat. Center of Tropical Agriculture (CIAT), A.A. 6713 Cali, Colombia.
rsedano@cgiar.org

WATERBIRDS AND ARTIFICIAL WATER PONDS IN AGROSYSTEMS AT THE SOUTHWEST OF COLOMBIA.

Evaluating the importance of artificial water bodies to sustain waterbirds in agricultural landscape. Richness and abundance of birdfauna were surveyed in water ponds (1-3 hectares), during five years. Water ponds which were watering 540 ha of agricultural field (3 * 31' N; 76 * 19' W). The list of waterbirds species 1998-2002 can be divided in 31 residents' species and 14 migratory waterbirds from North America. Current aquatic bird fauna in 10 ha of small waterponds represent 64.3% of all waterbirds registered in the middle upper basin of Cauca River valley (400.000 hectares) in the last 35 years. By climate there were no variations in waterbirds abundance, which

had been equivalent in 2000, 2001, and 2002. In addition 64.5% of waterbirds species had developed reproductive activity, which indicates short-term potential for housing waterbirds. They seem benefit from water deposits even when water ponds management has been toward elementary water storage or agrosystems watering. However several species registered in the past were not observed at the present time. This historical species account reveal migratory birds over the past 20 years but the disappearance some resident species (*Rallus nigricans*, *Porzana Carolina*, *Porzana flaviventer*, *Porzana albicollis* and *Rallus maculates*) could indicate that given the current land use at the agrosystem, water ponds capacity is limited to sustain long term viable birds populations of Ralliformes.

53, **Shealer, David A.**, Dept. Biol., Loras College, Dubuque, IA, USA, david.shealer@loras.edu;
SOURCE-SINK DYNAMICS AND THE ENIGMA OF LOCAL POPULATION STABILITY IN
BLACK TERNS

A five-year study of black terns breeding in southeastern Wisconsin (USA) has shown that breeding success is extremely low in all but the smallest colonies. However, the number of breeding birds has remained stable in some colonies and increased in others, suggesting that local populations are being maintained by immigration. Mark-recapture models based on over 1,300 black terns banded since 1999 suggest extremely low (ca 30%) annual survival (or breeding site fidelity) of adults, and recruitment of first-time breeders to their natal colonies also is low. These findings suggest that all of the colonies examined in this region are population sinks, and local population stability is being maintained from colonies outside the study area that experience surplus productivity. To date, no such areas have been identified in North America that exhibit consistently high productivity; thus, the enigma of local population stability remains to be explained.

Saturday, 15:30, Room A

13, **Sousa, Leandra**, SFOS/IMS, University of Alaska Fairbanks, 245 O'Neil Bldg, Fairbanks AK 99775, sousa@ims.uaf.edu;

Coyle, Kenneth, O., SFOS/IMS, University of Alaska Fairbanks, 245 O'Neil Bldg, Fairbanks AK 99775;

Weingartner, Thomas, SFOS/IMS, University of Alaska Fairbanks, 245 O'Neil Bldg, Fairbanks AK 99775;

*SEABIRD SPATIAL DISTRIBUTION PATTERNS IN RELATION TO PHYSICAL
HYDROGRAPHY AND ZOOPLANKTON VOLUME SCATTERING

We studied the distribution and abundance of seabirds in the Northern Gulf of Alaska, in relation to the distribution of water masses and acoustic measures of water column volume scattering. We surveyed a 222 km transect (inner-shelf, mid-shelf, shelf break, and oceanic domains) along the Seward line. This study presents the spatial distribution patterns of seabirds encountered in oceanographic surveys conducted during late winter, spring and fall 2001 as part of the multidisciplinary study - Long Term Observation Program in the Northern Gulf of Alaska. Seabird distribution, abundance and species composition were related to physical hydrography zooplankton biomass and volume backscattering. Stratification increased seasonally due to surface layer freshening, and warming of the shallow mixed layer. During winter surface feeders such as procellariids and gulls were most abundant off the shelf break while divers were more abundant in the mid shelf. During spring divers were most abundant in the inner shelf while surface feeders such as gulls occurred in the mid shelf and procellariids were more abundant off the shelf break.

During fall, seabird abundance was low with fulmars and gulls concentrated on the inner and mid shelf, respectively. Evolution of the physical properties of the water column in association with changes in and volume scattering along the transect suggests that the cross shelf circulation may have a fundamental role in shaping the distribution and abundance of seabirds.

Thursday, 15:30, Room A

35, **Spalding, Marilyn G.**, Univ. of Florida, Box 110880, Gainesville, FL, USA,
rosie@nersp.nerdc.ufl.edu;

EUSTRONGYLIDOSIS: AN EXAMPLE OF NUTRIENTS AS WETLAND POLLUTANTS

Eustrongylidosis is a disease of picivorous birds caused by infection with a large dioctophymoid nematode of the genus (*Eustrongylides*). The distribution of these parasites is worldwide in tropical and temperate climates. Although a large number of species have been described, only three are considered valid at the present time. These parasites, ingested along with infected fish, perforate the stomach wall causing a severe tubular fibrino-fibrous peritonitis in ciconiiforms, or a tumorous mass in anseriforms and pelecyaniforms. Young birds, particularly ardeids, can die from hemorrhage or secondary bacterial infection. Older birds frequently survive the infection but suffer the consequences of chronic peritonitis. High prevalences of this disease and significant mortality of nestlings have been associated with eutrophication of wading bird foraging sites. Morbidity and mortality can be especially high in nestling ardeids infected with (*E. ignotus*). In wading bird colonies located within foraging distance of nutrient polluted fresh water sites a large proportion of the nestlings may fail to fledge. Recent investigation of the life cycle indicates several possible variations may be responsible for the wide distribution and wide range of both definitive and intermediate hosts used. Control of this parasite needs to be focused on the prevention of nutrient input into wetlands that attract fish-eating birds.

Saturday, 9:30, Room A

P15, **Spendelov, Jeffrey A.**, USGS Patuxent Wildlife Research Center, 11510 American Holly Drive, Laurel, MD, USA, Jeff_Spendelov@usgs.gov;

Mostello, Carolyn S., Massachusetts Division of Fisheries and Wildlife, Westborough, MA, USA;

Nisbet, Ian C.T., 150 Alder Lane, North Falmouth, MA, USA;

Hatch, Jeremy J., University of Massachusetts, Boston, MA, USA;

Ziel, Heather L., and Maguire, Kathleen L., MDFW, USA;

ORIGINS AND AGES OF ROSEATE TERNS COLONIZING PENIKESE ISLAND, MA, IN 2003

As part of the Recovery Plan for endangered Roseate Terns in North America, since 1998 we have been trying to attract them to Penikese Island to establish a third colony site in Buzzards Bay, Massachusetts. A late April 2003 oil spill caused heavily oiling of Ram Island, one of the two existing colony sites, and terns attempting to settle there were "hazed" throughout May to prevent them from becoming oiled during clean-up efforts. Apparently as a result, about one-quarter of the Roseate Terns that had nested at Ram in 2002 moved north to the other established colony at Bird Island, while about one-quarter (250 pairs) moved south to colonize Penikese. We have identified more than 250 breeding adults at Penikese by trapping and band reading in 2003. Preliminary results indicate that most colonizing birds were banded as chicks or adults at Bird and Ram, and few came from colonies in Connecticut and New York, or the Gulf of Maine. Information on the ages of the colonizing Roseate Terns at Penikese will be compared with those from the earlier colonization of Ram Island.

P06, **Sureda, Ana L.**, Universidad Nacional de Salta/Delegación Regional Noroeste, Administración de Parques Nacionales, Santa Fe 23, 4400 Salta, Argentina, alsureda@apn.gov.ar; Caziani, Sandra M., Universidad Nacional de Salta-CONICET, Buenos Aires 177, 4400 Salta, Argentina;

Boyle, Terence P., U.S. Geological Service-Colorado State University, 335 Aylesworth NW, Ft. Collins, CO 80523-9143, USA;

***WATERBIRDS OF HIGHLAND SALT LAKES IN CATAMARCA, NORTHWESTERN ARGENTINA**

Numerous endorheic salt lakes and surrounding bogs dot the deserts in the puna of Catamarca and provide habitat for waterbirds. From 1998 to 2001, winter and summer waterbird censuses were conducted on 21 lakes (S25°34'41"/34°31'18", W67°17'15"/69°13'56", 2900-4590 m). Physico-chemical and plankton samples of 10 major lakes were taken. The lakes differed in water composition, plankton and macrophytes, and also underwent dramatic seasonal changes, ranging from shallow hypersaline lakes, with diatoms and flamingo species (e.g. Purulla, Los Aparejos), to saline lakes, with submergent and emergent vegetation and a rich avifauna (e.g. La Alumbreira). Of 27 waterbird species recorded, 9 were Puna endemics and 5 nearctic migrants, including vulnerable species (e.g. Andean and James' flamingos -*Phoenicoparrus andinus* and *P. jamesi*, and Horned Coot -*Fulica cornuta*), nesting sites for the Horned Coot (eg. La Alumbreira, Pabellón) and roosting sites for migratory species (e.g. *Phalaropus tricolor*, *Calidris bairdii*, *Pluvialis dominica*). A single lake, Laguna Grande, hosts summer aggregations of 10,000 James' flamingos, 20% of the known population. Most lakes freeze in winter; however some maintain minor wintering populations. The lakes are threatened by unregulated tourism, overgrazing and mining development. In Catamarca, none has effective protection in the Argentina National System of Protected Areas and Laguna Blanca alone is included in the homonymous Biosphere Reserve. "Las Parinas" National Park project would protect 75% of Puna and High-Andean wetlands in Catamarca.

54, **Szczys, Patricia**, University of Massachusetts, Boston, 100 Morrissey Blvd, Boston, MA, USA, patty.szczys@umb.edu;

***SEX RATIO BIAS IN ROSEATE TERNS AT FALKNER ISLAND, CT CONTRASTS WITH BIRD ISLAND, MA**

Previous studies at Bird Island, MA (BIMA, Szczys et al. 2001; Hatch and Nisbet, 1999) have shown a female sex ratio bias in Roseate Terns, (*Sterna dougallii*). Here we present data on sex ratios at hatching and fledging during five breeding seasons (1998-2002) at a nearby colony, Falkner Island, CT (FICT). We found a similar trend of female bias at breeding; at BIMA between 1-7% of nests are tended by two or more females (Nisbet and Hatch 1999) and at FICT between 4-11%. We do not, however, see similar patterns from hatching to fledging. At BIMA 55% of hatchlings, and 56% of fledglings, and 56% of breeders are female. At FICT there was no sex ratio bias at hatching (50%), or at fledging (48%) but at breeding 54% are female. The sex ratio at hatching fluctuated from 43% to 60% female between years. This suggests that our results from Bird Island are just a snapshot, and emphasizes the need for long-term data from several sites within a population in order to obtain an accurate view of sex ratio bias in wild bird populations. Saturday, 15:50, Room A

P20, **Tomasulo-Seccomandi, Alessandra M**, Univ. Federal de São Carlos, Dep. Genética e Evolução, São Carlos - SP, Brasil, pamt@iris.ufscar.br; DelLama, Silvia N, Glenn, Travis C, Univ. of Georgia, Savannah River Ecology Laboratory, Aiken, SC, USA;

Bryan, A. Lawrence, Jr,

***ISOLATION OF TWELVE POLYMORPHIC WOOD STORK MICROSATELLITE DNA LOCI; GENETIC VARIABILITY COMPARISON BETWEEN NORTH AND SOUTH AMERICA POPULATIONS**

We describe PCR primers and conditions to amplify five dinucleotide, one trinucleotide and six tetranucleotide microsatellite DNA loci isolated from the Wood Stork. This species distribution extends from the southeastern United States through South America. Better understanding of stork population genetic structure is essential for the conservation of this species. Our objective was to isolate new polymorphic microsatellite loci and to analyze these polymorphisms in stork populations from North and South America. Primers were isolated from stork DNA and 24 loci were screened. A total of 301 individuals from these two populations were genotyped with the 12 polymorphic primers obtained. North and South America populations presented a mean observed heterozygosity of 0.315 and 0.303 respectively. South America population showed 6 private alleles and North America population showed 8 private alleles. In comparison with other vertebrates our results showed a low level of polymorphism, 2 to 5 alleles per locus, what is consistent with previous studies of this species. The first effect of a population retraction is the elimination of private alleles. The results showed that the retraction suffered by the North American population did not compromise their genetic diversity.

45, **Tree, A. J.**, Box 211, Bathurst, East Cape, South Africa;

UNRAVELING THE MYSTERIES OF THE SOUTH AFRICAN ROSEATE TERN

There is a small population of South African Roseate Terns (*Sterna dougallii*) on the Bird Island group, Eastern Cape Province. Breeding birds numbered in the hundreds in 1937. By 1971 about 70 pairs remained. With some protection numbers rose to 134 pairs in 1986 and 152 pairs in 1996, peaking at 240-250 pairs in 2000/2001. Following breeding failure in 2002 only 75 pairs returned in 2003. A small colony persisted 640 km west on Dyer I. to 1971 and again from the late 1990s, but is not self-sustaining. The nearest known breeding population to Bird I. is 2,400 km away in Madagascar. In June 2003 a displaying group of 60 pairs was found in Mozambique and may have bred on the Bazaruto Archipelago, 1,650 km from Bird I. Despite their isolation, it has been suggested the South African birds belong to the apparently morphologically identical Madagascan population. In the Eastern Cape, 205 adult and 242 young were ringed 1998-2002 with a very low subsequent return. The north-west Indian Ocean population (*S. d. arideensis*) shows apparent shifts over considerable distances though it has been suggested colonies and/or individuals may not breed every year. Whether this is caused by disturbance at colonies or a variable food supply is unknown. The South African population suffers considerable annual turnover and is probably a peripheral element of a larger metapopulation.

Saturday, 10:45, Room B

34, **Weseloh, D. V.**, Canadian Wildlife Service (CWS), 4905 Dufferin St., Downsview, Ontario, Canada M3H 5T4, chip.weseloh@ec.gc.ca;

Shutt, J. Laird, CWS, Ottawa, Canada, Craig, E. Herbert, CWS, Ottawa, Canada;

Grasman, Keith, Wright State Univ., Dayton, OH, Fox, Glen A., CWS, Ottawa, Canada;

CONTAMINANT-RELATED HEALTH EFFECTS MEASURES IN HERRING GULLS ON THE NORTH AMERICAN GREAT LAKES

Several contaminant-related health effects measures in Herring Gulls (sex ratios at hatching, occurrence of vitellogenin in adult males, embryonic viability, immune response) were measured at three sites in the western Lake Erie-Detroit River-Lake Huron corridor of the Great Lakes during

2001 and 2002. The Detroit River is a designated Area of Concern because of its contaminants levels. In one or both years at the more contaminated sites, sex ratio at hatch was significantly skewed towards males, vitellogenin was found in a small per cent of the breeding males and embryonic viability and immune response were significantly depressed. Although contaminant levels in gull eggs from the same sites have been declining for more than 20 years and were often only 10% or less of what they were in the 1970s, subtle health effects were still present.

Saturday, 9:10, Room A

38, **Weseloh, D.V.**, Canadian Wildlife Service, 4905 Dufferin St., Downsview, Ontario M3H 5T4, Chip.Weseloh@ec.gc.ca;

THE 29 YEAR-OLD GREAT LAKES HERRING GULL EGG CONTAMINANTS MONITORING PROGRAM - IS THERE AN APPLICATION FOR BRAZIL?

Herring Gull (*Larus argentatus*) eggs have been analyzed annually for organochlorine contaminants from the same 15 Great Lakes sites since as early as 1974. For the first 12 years, the eggs were analyzed individually (N= 195); since 1986 they have been analyzed as site pools (N = 15). Mean contaminant values (1988-2002) for 7 compounds showed significant differences among sites: DDE, heptachlor epoxide and dieldrin were greatest in eggs from Lake Michigan, mirex was greatest at Lake Ontario sites, and PCBs and TCDD were greatest in Saginaw Bay (L. Huron). Change-point regression analysis showed changes in the rate of decline during 1974-2002.

Seventy-six (or 72.4%) of 105 site-compound comparisons (7 compounds x 15 sites) showed trends that have declined at a constant rate over the duration of the study or are declining faster now than earlier in the study. Twenty-two percent (23/105) are declining slower now than they did previously and 6% (6/105) show no temporal trend over the study period. This monitoring system is easily transferred to other locations with colonial waterbird populations. In Brazil and elsewhere in South America, cormorants, anhingas, herons, egrets, night-herons, storks, ibises and some gull and tern species could be used to monitor inland situations. More pelagic colonial nesters could be used for coastal and offshore situations.

Saturday, 10:50, Room A

30, **Ydenberg, Ronald C.**, Centre for Wildlife Ecology, Simon Fraser University, Burnaby, B.C. Canada V5A 1S6, ydenberg@sfu.ca;

PREDATION DANGER AND SHOREBIRD CONSERVATION

Most work on the evolutionary ecology of shorebird migration has focused on food and foraging, on the ecological and physiological demands of long flights, and how these factors interact. In this paper I focus on the danger posed by predators, and its importance in the behavioral and evolutionary ecology of shorebird migration. The general hypothesis is that the recovery of raptor populations in the Americas since restrictions on the use of DDT is increasing predation danger for shorebirds, and that migration patterns are changing as birds alter behavior to mitigate the danger.

Our data reveal that reductions in migratory fuel load and stopover duration of western sandpipers (*Calidris mauri*) measured over two decades are associated with the recovery of peregrine falcons (*Falco peregrinus*). These changes affect census numbers, and the decade-long ongoing steep decline in western sandpiper numbers on our study site is explained entirely by the shortening stopover duration, rather than by a smaller number of individuals using the site. Other possible behavioral changes to predation danger may have analogous effects. Recent analyses of shorebird census data in North America indicate generally declining trends during the 1980s and 1990s, raising concern about many of the thirty or so species in this group. I consider the extent to which

behavioral effects may be contributing to widespread downward trends in census numbers.
Friday, 15:10, Room A

P32, **Zambrano, Ricardo**, Florida Fish and Wildlife Conservation Commission, 8535 Northlake Boulevard, West Palm Beach, FL 33460, USA, Ricardo.zambrano@fwc.state.fl.us;
HABITAT MANAGEMENT FOR WADING BIRDS AT A DREDGED MATERIAL DISPOSAL ISLAND IN THE INDIAN RIVER LAGOON, FLORIDA, USA

A one hectare dredge material disposal island in Florida provides nesting habitat for at least ten species of breeding wading birds, including the state and federally endangered Wood Stork (*Mycteria americana*). Five of those species are also listed as Species of Special Concern by the State of Florida. Other species of waterbirds such as American Oystercatchers (*Haematopus palliatus*) and Magnificent Frigate Birds (*Fregata magnificens*) also utilize the island for roosting or breeding. Our management goal was to improve nesting habitat on the island by removing invasive exotic trees such as the Australian pine (*Casuarina* spp.) and Brazilian pepper (*Schinus terebinthifolius*). These species were increasing erosion, suppressing native vegetation, and/or providing roosting areas for nest predators on the island. Seventeen species of native vegetation were planted, including species that are nesting substrate for wading birds such as red mangrove (*Rhizophora mangle*) and seagrass (*Coccoloba uvifera*). Mangroves were planted along one shoreline to try to reduce erosion. The project was completed through a joint effort of four governmental agencies and a nongovernmental organization. Despite the concern of a local eco-tour operator that the loss of exotic vegetation would result in nesting wading birds abandoning the island, surveys did not detect a decrease in the general abundance and diversity of nesting species on the island.

09, **Zavalaga, C. B.**, University of North Carolina, Department of Biological Sciences, Wilmington, NC 28403 USA, cbz3724@uncwil.edu;
Emslie, S., University of North Carolina, Department of Biological Sciences, Wilmington, NC 28403 USA;

*THE FORAGING ECOLOGY OF BLUE-FOOTED BOOBIES AT ISLA LOBOS DE TIERRA, PERU

The Blue-footed Booby is a tropical seabird ranging from southern California to northern Peru. Nevertheless, in Isla Lobos de Tierra, northern Peru, these birds breed and forage within the limits of the cold Humboldt Current, where they feed primarily on Peruvian Anchovetas (*Engraulis ringens*). To investigate how the foraging behavior of boobies has been shaped to exploit anchovetas, we determined dive durations and depths, foraging routes and diet of breeding Blue-footed boobies at Isla Lobos de Tierra during June-July 2002. Foraging behavior was recorded by attaching small data loggers to the bird's back or tail feathers, whereas diet composition was assessed by analysis of regurgitations. Median dive duration and depth were 5.5 s and 4 m, respectively. Dives around noon were longer and deeper than those during dawn and dusk. Feeding areas were mainly located less than 50 km southeast of the island where tongues of cold water occurred. Anchovetas were the primary prey eaten by the boobies accounting on average for 97% of total regurgitation mass. Our findings also are relevant to the fishing industry and suggest that boobies may be used as bio-indicators of anchovy stocks in northern Peru.

Thursday, 13:30, Room A