

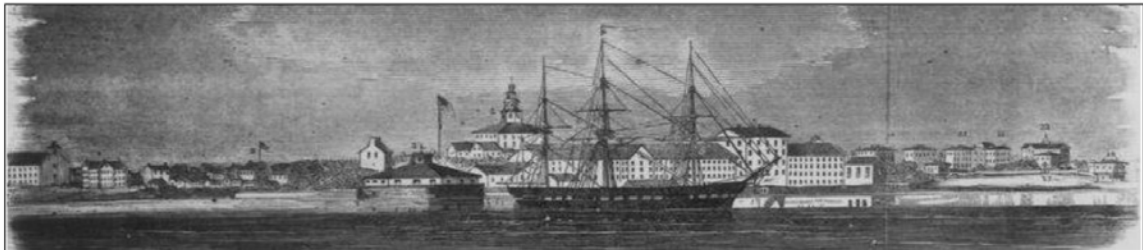
A black and white illustration of several waterbirds, likely terns, shown in profile. They have dark wings and backs, white chests, and dark caps. They are arranged in two columns, facing each other as if in conversation. The birds are rendered with fine lines and shading to show their feathers and features.

The Waterbird  
Society

35<sup>th</sup> Annual Meeting

9-12 November  
2011

Annapolis,  
Maryland



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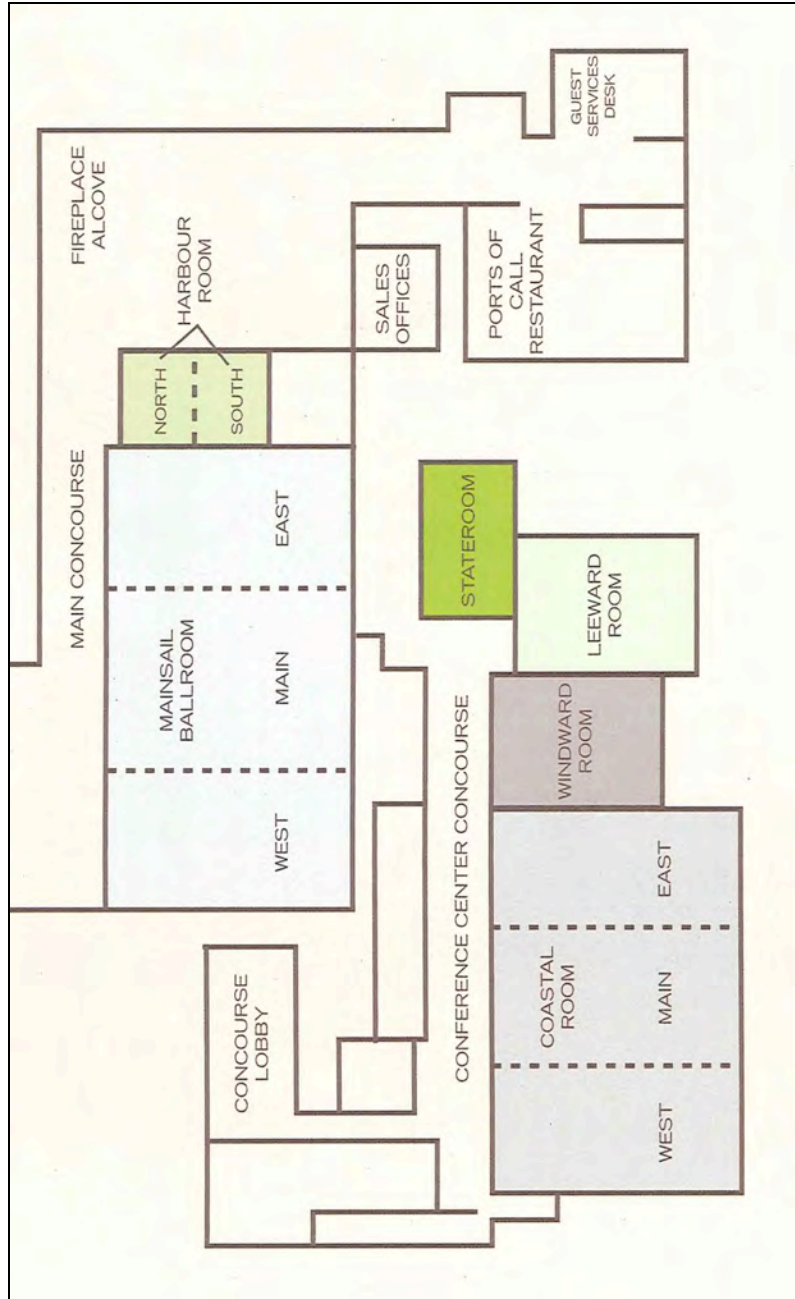
Committee on Local Arrangements:  
Ellen Paul, Melanie Steinkamp, Andy Bernick

## Sincere thanks to our sponsors



**Meeting Location:** Doubletree Hotel  
210 Holiday Court  
Annapolis, Maryland  
21401  
Tel: 1-410-224-3150 | Fax: 1-410-224-3413

**Doubletree Hotel Floor Plan**



## **Welcome from the President of The Waterbird Society**

Welcome to the 35<sup>th</sup> annual general and scientific meeting and conference of the Waterbird Society (WbS) held in historic and charming Annapolis, Maryland: home of the U.S. Naval Academy, the capitol of Maryland and on the shores of the Chesapeake Bay. The annual meeting is the highlight of the year for our society. It's a chance for researchers, faculty, students and all others interesting in waterbird biology to get together and discuss the issues of the day.

This year's Local Organizing Committee, comprised of Ellen Paul, Melanie Steinkamp and Andy Bernick, has done an outstanding job of finding a venue and organizing the meeting in Annapolis, amid all the other activities that are going on in the D.C. area this autumn.

Kathy Parsons, the Scientific Program Chair (and President-elect for 2012-13) has put together a very interesting program complete with a follow-up on the Deepwater Horizon Oil Spill. This year, 2011, is the first breeding season, post-spill, so it will be interesting to see how breeding populations may (or may not) have been impacted. It is encouraging to once again see that so many of the contributions to our Scientific Program are coming from students. The students of today are the WbS Councilors, local conference organizers and researchers of tomorrow. So it is good to see so many student participants; our future looks bright!

The WbS has begun to plan our annual meetings farther in advance. I encourage all of you to attend our Business Meeting on Friday 11 November (16:30 – 17:30). An announcement will be made for Society conference plans for the next four years, 2012 – 2015. You'll be surprised to see where we are intending to go!!! ☺

I look forward to seeing everyone in Annapolis...at the ice breaker, the poster session, the scientific sessions and at the Silent Auction and Banquet.....see you there!!

D.V.Chip Weseloh, President  
The Waterbird Society

## **Welcome from the Scientific Program Committee**

We are delighted to welcome you to Annapolis, Maryland. This charming, historical waterfront town is located on the shores of Chesapeake Bay which provides habitat for extraordinary waterbird populations including 2000 pairs of Osprey and over a million migrating waterfowl. The Patuxent Wildlife Research Center of the U.S. Geological Survey in nearby Laurel, Maryland is celebrating 75 years of distinguished work in research and management; the Waterbird Society is honored to share in this celebration with special offerings in the scientific program.

Authors are providing a rich array of sessions on emerging areas of waterbird science including new methodologies, critical conservation topics such as endangered species management, and updated information on the impacts of the Deepwater Horizon oil spill. Our distinguished plenary speakers, Jim Kushlan and Ted Simons, will lead us in stimulating thought and discussion about the trajectory of colonial waterbird conservation in North America, and collaborative management research on American Oystercatcher, respectively.

Eighty oral presentations and 31 posters comprise three symposia, two special sessions, seven general sessions and the poster session. Students are presenting 23 oral presentations (29%) and 13 posters (42%)—a highly significant contribution to our scientific program! We welcome all those embarking on a career of aquatic bird study and conservation.

Many thanks to all authors enriching the meeting with presentations of your research and management projects. We hope the information sharing and discussions that take place here will lead to new insights, future collaborations, and advancements in waterbird science and conservation.

Kathy Parsons and Andy Bernick  
Scientific Program Committee

## Daily Schedule

### **Wednesday 9 November**

<b>Activity</b>	<b>Time (hrs)</b>	<b>Location</b>
WBS Council meeting	08:00 – 17:00	Leeward Room
Registration	13:00 – 17:00	Conference Center Concourse
<i>Ice breaker</i>	<i>18:00 – 20:00</i>	<i>Mainsail Ballroom</i>

### **Thursday 10 November**

Breakfast	06:30 – 08:00	Mainsail Ballroom
Registration	07:30 – 17:00	Main Concourse
Plenary	08:15 – 09:15	Coastal Main/East
Scientific sessions	09:30 – 12:30	Coastal Main/East, Coastal West
Lunch	12:30 - 13:30	Mainsail Ballroom
Scientific sessions	13:30 – 15:50	Coastal Main/East, Coastal West
<i>Poster session and reception</i>	<i>18:00 - 20:00</i>	<i>Mainsail Ballroom</i>

### **Friday 11 November**

Breakfast	06:30 – 08:00	Mainsail Ballroom
Registration	08:00 – 17:00	Main Concourse
Plenary	08:15 – 09:15	Coastal Main/East
Scientific Sessions	09:30 – 12:30	Coastal Main/East, Coastal West
Lunch	12:30 – 13:30	Mainsail Ballroom
Scientific Sessions	13:30 – 16:30	Coastal Main/East, Coastal West
<i>Business meeting</i>	<i>16:30 – 17:30</i>	<i>Coastal Main/East</i>
Ciconiiform Working Group	20:00 – 21:00	Mainsail Ballroom

## **Saturday 12 November**

Breakfast	07:30 – 09:00	Mainsail Ballroom
Registration	09:30 – 12:30	Main Concourse
Scientific Sessions	09:30 – 12:10	Coastal Main/East, Coastal West
Lunch	12:15 – 13:30	Mainsail Ballroom
Scientific Sessions	13:30 – 16:30	Coastal Main/East, Coastal West
SE Coordinated Waterbird Monitoring Workshop	13:00 – 14:50	Mainsail Ballroom
Reddish Egret Working Group	15:10 – 17:00	Coastal West
Banquet		
Cash bar	18:00 – 18:30	Mainsail Ballroom
Dinner & Silent Auction	18:30 – 20:30	Mainsail Ballroom
Pool party (BYO RUDU)	All night long!	

## **Special Events Schedule**

### **Wednesday 9 November**

*18:00 – 20:00 hrs*

**Ice breaker reception** (Mainsail)

### **Thursday 10 November**

*18:00 – 20:00 hrs*

**Poster Session** (Mainsail)

### **Friday 11 November**

*16:30 – 17:30 hrs*

*20:00 – 21:00 hrs*

**Waterbird Society Business Meeting** (Coastal Main/East)

**Ciconiiform Working Group Meeting** (Mainsail)

### **Saturday 12 November**

*13:00 – 14:50 hrs*

*15:10 – 17:00 hrs*

*18:30 – 20:30 hrs*

**SE Coordinated Waterbird Monitoring Workshop** (Mainsail)

**Reddish Egret Working Group Meeting** (Coastal West)

**Banquet and Silent Auction** (Mainsail)

## General Meeting and Travel Information

### Silent Auction

The Waterbird Society will hold its traditional Silent Auction on Saturday 12 November from 18:30 to 20:30 hrs. Please donate your best artifacts to **help raise money for The Waterbird Society student travel funds!** Please help by donating interesting, exciting, unusual, priceless, whimsical, fantastic or just plain weird items to be auctioned. You may bring your items to the registration desk when you arrive. If you can, please fill out the form which describes the item. Items will be displayed during the evening of the banquet for final bidding. Remember, also, bid early and bid often. Thanks for helping us with this worthy cause!!

### Poster Session

The official poster session, when authors should be by their posters, will be in the Mainsail Ballroom from 18:00-20:00 hrs on Thursday 10 November. Please hang your posters no later than 13:30 hrs on Thursday. You are encouraged to hang your poster any time after you arrive, and please leave it in place until 12:00 hrs on Saturday to give everyone ample time to view. More information is provided below in the Scientific Program section.

### Bags & coffee mugs/water bottles

Ornithologists can be aged by the number of canvas bags sitting in a box in the closet. We've all got enough canvas bags to circle the globe. Reach into your closet, pull one out, and throw it in your suitcase. We will not be supplying canvas bags at this meeting. **THE OLDEST WATERBIRD SOCIETY BAG GETS A PRIZE!** (no, not another bag...)

We are also asking you to bring your own re-useable coffee mugs and/or water bottles.

### Transportation and driving information

*Train:* Take Amtrak to the BWI Train Station (<http://www.amtrak.com/>), take the free airport shuttle to Main Terminal, and connect to *Ground Transfer* or *Car Service* (described below).

*Bus:* From National Airport, take the Blue Line to Metro Center and transfer to the Orange Line to the New Carrollton metro station. From the New Carrollton metro station, take Dillon's Bus Service to Annapolis. Schedule here: [http://www.dillonbus.com/pdf/921\\_1.pdf](http://www.dillonbus.com/pdf/921_1.pdf). *Please re-check schedule prior to conference.*

*Ground transfer:* Round-trip shuttle service on Super Shuttle (<http://www.supershuttle.com>) from BWI is \$70; from National, the round-trip fare is \$82.

*Car service:* We have also arranged discount rates with a private car service:

**Extraordinary Limousine, Inc.**

**Contact: Tim Konig**

**E-mail: [tim@bigcars.com](mailto:tim@bigcars.com) or [info@bigcars.com](mailto:info@bigcars.com)**

**Phone (800) 633-5466 | Cell (443) 463-8845**

Car service rates are as follows:



**Sedan from BWI \$78 per car (maximum three per car)**

**Sedan from National \$90 (maximum three per car)**

**Van from BWI \$125 (maximum 10 per van)**

**Van from National \$175 (maximum 10 per van)**

The car service will need your flight information and will assemble groups for a fixed airport departure time. Therefore, you may have a short wait at the airport for other members of your group to arrive. Your rate will depend on the number of people in each vehicle. Note, however, that if members of your group are delayed, the cost will be shared among those who are actually in that vehicle. If you miss your scheduled van, you will need to use Super Shuttle.

#### Detailed driving instructions

##### From **Baltimore Washington International (MD):**

*Note – Google Maps directions will take you to a dead-end.*

- Exit the airport onto I-95 West.
- Take Exit 1 for MD 170 (Aviation Boulevard) east (toward I-97).
- Where 170 and 162 meet, go straight onto 162 (Hammond's Ferry Road); it will turn to the south.
- Turn left onto 176 East (Dorsey Road)
- Take ramp onto I-97 South
- Follow I-97 South to Exit 23
- Stay in the right lane of the exit ramp
- At the bottom of the ramp, go straight to cross West St. onto Riva Road (it will look like you are entering a driveway into the Holiday Inn but it is actually a short connector to Riva Road)
- Go through one light
- At next light, turn right onto Holiday Court

##### From **National Airport (D.C.):**

Note – this is a tricky route, even for locals, so be sure to follow the directions carefully. The first key is to realize that although you are on I-395 as you cross the Potomac River, and that although you remain on that same highway, you will actually end up on the Southeast/Southwest Freeway. In other words, I-395 actually exits itself. The second key is to realize that there are two roads numbered “295” in almost the same place. One is I-295, marked with the regular red-and-blue interstate highway shield, and the other (the one you want) is DC 295, virtually unmarked except for a small black-and-white sign on the left-hand stanchion of an overhead sign structure (i.e., on the Jersey barrier in the middle of the road). And that although you will be crossing the Anacostia River on the Sousa Bridge, there are no signs for the Sousa Bridge.

- Follow airport exit signs to George Washington Parkway northbound (sign reads “To 395/66/50)
- Stay in far right lane and take ramp to I-395 northbound towards Washington, D.C.
- Cross bridge and stay in right lane to follow I-395 North. Sign says “Capitol Hill, Verizon Center and Nationals Park.”
- I-395 will become the Southeast Freeway at the overpass that has a sign on the left reading “Exit 6 C St. S.W., U.S. Capitol, The House” and a sign on the right reading “395 North, U.S. Senate. “At this point, stay to the left. DO NOT FOLLOW I-395 north. There is no sign that says Southeast Freeway so don't look for one.
- The next set of signs reads, from left: “I-295 South Jct 1 ¼ mile; So. Capitol Street Nationals Park Exit ½ mile, C St., S.W. U.S. Capitol The House; North 395 D. St. N.W., U.S. Senate.”

- At that same point, on the stanchion on the jersey barrier on the left, there is a small black-and-white sign that reads “TO NORTH DC 295 KEEP LEFT”
- Move into the two left lanes at this point.
- Do NOT take I-295 South (which you can’t do as long as you’ve moved to and stayed in the two left lanes)
- Take two left lanes to follow Pennsylvania Avenue exit southeast across the John Philip Sousa Bridge, staying in the left lane.
- Turn left at the first intersection after the bridge onto DC-295 North (Anacostia Freeway)
- Continue on DC-295 until you see the signs for MD-50 East.
- Exit onto MD-50 East towards Annapolis
- Take exit 23 for MD 450 east.
- Stay in the right lane of the exit ramp
- At the bottom of the ramp, go straight to cross West St. onto Riva Road (it will look like you are entering a driveway into the Holiday Inn but it is actually a short connector to Riva Road)
- Go through one light
- At next light, turn right onto Holiday Court

**From I-95 (north or south):**

- Exit onto I-95/I-495 of the Capital Beltway (the eastern half of the loop); if you are coming from the north, the exit will be a left-hand exit over a high sky ramp. If you are coming from the south, you will go through a set of ramps known as the mixing bowl; the exits are very clearly marked and the sign will read North I-95 East I-495 Baltimore.
- Take the North I-95 East I-495 (eastern side/outer loop of the Beltway) to MD-50 east
- Take exit 23 for MD 450 east
- Stay in the right lane of the exit ramp
- At the bottom of the ramp, go straight to cross West St. onto Riva Road (it will look like you are entering a driveway into the Holiday Inn but it is actually a short connector to Riva Road)
- Go through one light
- At next light, turn right onto Holiday Court

**Local trip suggestions**

Unfortunately, there will be no scheduled post-meeting trips. For those attendees who are interested in birding or visiting sights in Maryland, D.C., and Virginia, please stop by the registration desk and we'll do what we can to facilitate your visit. There are several rental car agencies in Annapolis including Avis, Enterprise, and Hertz - and all have locations within the free shuttle route offered by the Doubletree. We will have a bulletin board at the registration desk where attendees may post information and plan their own informal trips. Below are some suggested activities:

*Easton Waterfowl Festival*

The Easton Waterfowl Festival (<http://www.waterfowlfestival.org/>) features twelve venues in the historic town of Easton, Maryland with wildlife paintings, sculpture, carvings, and other events. Easton, MD is approximately 40 miles southeast of the Doubletree. Festival passes can be purchased online for \$10.

*Local Birding*

There are numerous locations within 50 miles of the Doubletree where attendees can look for birds. There will be many local residents at the meeting, so don't be shy to ask them about their favorite haunts. Some interesting locations include:

Eastern Neck National Wildlife Refuge: <http://www.fws.gov/northeast/easternneck/visit.html>  
Remington Farms: [http://www.stateparks.com/remington\\_farms\\_national\\_wildlife\\_preserve.html](http://www.stateparks.com/remington_farms_national_wildlife_preserve.html)  
National Wildlife Visitors Center: <http://www.fws.gov/northeast/patuxent/NWVCTrails.html>

Some initial information on birding in Maryland, DC, and Northern Virginia can be found at <http://www.chesapeakeaudubon.org/areabirding.htm>.

### *Huntley Meadows*

If you are departing on Sunday 13 November and are interested in a little birding before heading to National Airport, we will be facilitating volunteer carpools to Huntley Meadows, a popular birding site with a boardwalk through freshwater wetlands and several upland trails, and then on to National Airport. The park is located in Fairfax County, Virginia, approximately 12 miles south of National Airport. This trip would not be recommended for those flying from BWI. If you are interested in doing this, please come to the registration desk and we will discuss transportation options with you.

## **SCIENTIFIC PROGRAM**

### **Locations**

All plenaries, symposia, special sessions, and paper sessions will be held in the Coastal rooms on the lower level of the hotel.

### **Oral Presenters**

The total time for each oral presentation is 20 minutes. Keeping oral sessions on time is very important for all speakers, so please rehearse your presentation so that your talk takes no more than 16 minutes, leaving three minutes for questions, and a full minute for the transition to the next paper.

All oral presenters are asked to bring their power point presentation for loading onto the appropriate computer the day prior to your presentation if at all possible. Please make sure your file title uses the following format: “Day\_Time\_LastName” (e.g. Sat\_0910\_Green.ppt). You should load your presentation on the computer in the room where your session will be as early as possible but no later than the break before your session begins. There will be someone there to load your file starting Wednesday afternoon and then each day 60 minutes before sessions start.

Please plan to arrive at your session at least 20 minutes prior to the starting time of the session, and find your session chair so that they can introduce you correctly, and rehearse with you the signals that they will use to ensure a timely presentation.

### **Posters**

The poster session will be held on Thursday 10 November from 18:00-20:00 hrs in the Mainsail Ballroom. Drinks and hors d’oeuvres will be served.

Poster boards will be in place throughout the meeting and you are encouraged to hang your poster any time after you arrive but no later than 1330 hrs on Thursday. Please leave it in place until 12:00 hrs Saturday to give everyone ample time to view the posters.

Please plan to stand by your poster to answer questions and field comments during the evening session.

The poster boards are 4’ x 8’ and we will provide pushpins and number tags. Be sure to find the number tag that corresponds to your abstract number.

### **Meals and breaks**

All meals and breaks will be held in the Mainsail Ballroom.

**Notice to all attendees: As a courtesy to all presenters, we request that all attendees turn off all cellular phones while attending the symposia and sessions.**

## Plenary Speaker Biographies

### Plenary: Thursday 10 November 2011

#### **Conserving North American Colonial Waterbirds - How we got where we are**

**James A. Kushlan** is a writer, scientist, educator, and conservationist. His research and conservation work focuses on waterbirds, seabirds, and wetlands. He has written over 200 papers and several books including *Hérons Handbook* (1984), *The Freshwater Fishes of Southern Florida* (1987), *Storks, Ibises and Spoonbills of the World* (1993), *Heron Conservation* (2000), *The Herons* (2005), *Waterbird Conservation for the Americas* (2005), and *Conserving Herons* (2007). Dr. Kushlan has held positions as research biologist for the National Park Service, professor of biology and director Center for Water Resources Texas A&M University (Commerce), professor and chair of biology University of Mississippi, director Patuxent Wildlife Research Center, senior science advisor US Geological Survey, and research associate Smithsonian Institution. He has served as president of the American Ornithologists' Union and the Waterbird Society, editor of *Waterbirds* and *Florida Field Naturalist*. He is the founder and current council member of Waterbird Conservation for the Americas, president of the Bahamas Environment Fund, co-founder and chair of the IUCN Heron Specialist Group, and serves on the boards of the Everglades Foundation, Friends of the Everglades, Fairchild Tropical Botanic Garden, History-Miami, American Ornithologists' Union, John Cabot University (emeritus), and Biscayne Nature Center. His accomplishments have been recognized by the Waterbird Society's Kai Curry Lindahl International Conservation Award, as a Fellow of the American Ornithologists' Union, as a Paul Harris Fellow of Rotary International, by a Distinguished Faculty Award at Texas A&M – Commerce, and honorary doctor of science degrees by John Cabot University and by Thiel College.

#### *Plenary Description*

Dr. Kushlan will investigate, from his personal perspective, threads of the story of colonial waterbird conservation in North America over the past 40 years, often noting the roles played by Patuxent Wildlife Research Center. He will discuss the development of some of the major academic and conservation themes in colonial waterbird conservation – inventory and monitoring, populations, behavior and ecology, and conservation action revealing the stories behind the stories as to how we got where we are today. There has been a remarkable amount of success and some disappointments along the way. But the future of colonial waterbird conservation in North America seems clear- hemispheric planning for local conservation action.

## **Plenary: Friday 11 November 2011**

### **Haematology – collaborative focal species research and management in waterbird conservation**

**Ted Simons** is a Professor and Assistant Unit Leader in the US Geological Survey Cooperative Fish and Wildlife Research Unit, Department of Biology, NC State University. He earned his BS at the University of Wisconsin, Madison, and his M.S. and Ph.D. at the University of Washington, Seattle. He served as a research biologist with the National Park Service and the Director of the NPS Cooperative Park Studies at the University of Virginia before coming to NCSU in 1993. His research strives to improve species conservation and monitoring programs, and the management of protected areas through a better understanding of wildlife habitat relationships and sampling methods. Central to that research has been the application of ecological principles to the conservation of rare, endangered, or declining species and their habitats. Recent research has been directed toward the conservation of Neotropical migratory landbirds, including studies of the stopover ecology of birds during migration and breeding birds in southern Appalachian forests, and the conservation of marine birds, including the endangered Hawaiian Petrel, Black - capped Petrels in the Dominican Republic, and American Oystercatchers on the Outer Banks of North Carolina. Research is focused in three broad areas: (1) understanding the ecological factors that constrain species diversity and abundance; (2) modeling wildlife habitat relationships at the population and landscape level; and (3) improving wildlife population sampling methods.

#### *Plenary Description*

In this presentation I will highlight the collaborative achievements of the American Oystercatcher Working Group over the past 10 years including; the establishment of range-wide surveys, color-banding protocols, mark-resight studies, a revision of the Birds of North America species account, and new mechanisms for sharing information and data. Collaborations among state, federal, and private sector scientists, natural resource managers, and dedicated volunteers have provided insights into the biology and conservation of oystercatchers in the U.S. and abroad that would not have been possible without the relationships formed through the working group. I will argue that broad collaborative approaches and the engagement of the public are key elements of effective species conservation programs.

## **Symposia and Special Session**

### **Symposium: The USGS Patuxent Wildlife Research Center—contributions to waterbird science and conservation**

Beginning in 1936, with the establishment of the unique Patuxent Wildlife Research Refuge, and later the Center (PWRC), Patuxent scientists have had a long interest and dedication to understanding the biology of waterbirds. Although the emphasis and programs have evolved over the decades, one of the major consistent themes at Patuxent has focused on understanding the life-histories and factors that drive the population dynamics of a number of species ranging from captive black ducks to endangered Whooping Cranes to Mallards to Chesapeake Bay Ospreys and seaducks to nesting terns and shorebirds. Approaches have included single-species studies at one location to international projects involving many scientists across several national boundaries. Methods have evolved over the years from collecting basic natural history information (e.g. behavioral repertoires, diet) to development of waterfowl banding analysis, to continually refining chemical analytical techniques for contaminant studies, to applications of telemetry (now using satellite packages), to sophisticated statistical models for estimating populations, survival, and dispersal dynamics. This special symposium commemorates the 75th anniversary of PWRC. A series of talks will include Patuxent scientists, both present and past. The talks will encompass the history of the Center, and focused papers on waterfowl, contaminants, colonial waterbird ecology, avian diseases, and related topics. The presentations will review some of the major advances in the field that PWRC scientists helped to promote and will point to where future efforts should be directed to take us to the next levels. (Symposium organizer: Mike Erwin rme5g@virginia.edu)

### **Symposium: Reddish Egret Conservation**

The Reddish Egret Working Group (a multi-organization partnership dedicated to advancing reddish egret conservation) will hold a Reddish Egret Conservation Symposium during the upcoming 2011 Waterbird Society meeting in Annapolis, MD. This symposium will be comprised of various presentations from researchers and land managers who are currently engaged in ongoing reddish egret research and conservation projects. Beginning in 2005, the U.S. Fish and Wildlife Service (USFWS) adopted a strategy to provide a process for better measuring its success in achieving bird conservation priorities. The purpose of this "Focal Species Strategy" was to provide explicit, strategic, and adaptive sets of conservation actions necessary for returning species of concern to healthy and sustainable population levels. The reddish egret is on this list of species, and the USFWS has funded many of these studies as part of this strategy. The Working Group first met in October 2005 to discuss the status of reddish egret populations in Texas, Mexico, and Florida. From there, it was decided a status assessment was necessary as the majority of information was at least a decade old (Paul 1991). The Status Assessment was completed in 2006 (Green 2006) and formed the basis for the guidance from the working group, the development of the conservation plan continues. This symposium offers an opportunity to continue to move forward with range-wide conservation and to synthesize our work to achieve coordinated and cooperative conservation actions directed at insuring reddish egret sustainability. (Symposium organizer: Troy Wilson Troy\_Wilson@fws.gov)

### **Symposium: The BP/Deepwater Horizon oil spill and waterbird conservation: first looks**

The BP/Deepwater Horizon oil spill was the largest ever accidental marine oil spill. With a total volume of 4.9 million barrels of oil plus 1.84 million gallons of dispersants, contamination stretched across a vertical extent of 5,000 feet from sea floor to ocean surface in the eastern and central Gulf of Mexico. Over the nearly three months of active spillage, surface contamination was approximately equivalent to the size of Oklahoma in cumulative area. Pelagic, open water, coastal, estuarine, and tidal habitats for waterbirds were all affected. Direct impacts extended to five states and 950 miles of shoreline, including salt marshes, sandy beaches, mudflats and mangroves. This symposium will feature the earliest patterns of injuries detected to various waterbird species and guilds found in the Gulf of Mexico, using only data and analyses in the public domain that are not precluded from full disclosure by the ongoing Natural Resource Damage Assessment. (Symposium organizer: Chris Haney [chaney@defenders.org](mailto:chaney@defenders.org))

### **Special Session: Migration and Wintering areas of Arctic- and Temperate-nesting Waterbirds**

With the advent of satellite telemetry, geolocators and even the greater use of field-readable bands and markers, it is now readily possible to show migration routes, stopover locations and specific wintering areas for regional populations of Arctic- and Temperate-nesting waterbirds. For some species, such data were not available even 10-20 years ago for the BNA accounts. These kinds of information are useful in assessing the annual cycle of Species at Risk (e.g. Piping Plovers, Whimbrels), in the management of abundant species (e.g. Double-crested Cormorants, Ring-billed Gulls) and in identifying turnover rates and population sizes at Important Bird Areas (Bonaparte's Gulls, Red Knots, Western Sandpipers). In this session, researchers with these kinds of data are invited to share their findings with Waterbird Society members. (Session organizer: Chip Weseloh [chip.weseloh@ec.gc.ca](mailto:chip.weseloh@ec.gc.ca))

### **Special Session: American Oystercatcher Conservation Science**

(Session Organizer: Patrick Jodice [pjodice@clemsun.edu](mailto:pjodice@clemsun.edu))



## Thursday 10 November

## Morning Sessions

	ROOM: COASTAL MAIN/EAST	ROOM: COASTAL WEST
0815-0915	<b>Plenary Speaker: James Kushlan</b> <b>Conserving North American Colonial Waterbirds - How we got where we are</b>	
	<b>Symposium:</b> <b>USGS Patuxent Wildlife Research Center—Contributions to Waterbird Science and Conservation</b> <b>Chair: Michael Erwin</b>	<b>General Session:</b> <b>Interactions at Breeding Sites</b> <b>Chair: Samantha Collins</b>
0930-0950	<b>0116 Seventy-Five Year History Of Patuxent Wildlife Research Center</b> <u>Matthew Perry</u>	<b>0042 Yodel-lay-hee-who? In what context does recognition of individual male yodels appear to be important among Common Loons?</b> <u>Jay Mager</u> , Charles Walcott
0950-1010	<b>0063 Research on wintering waterfowl on Chesapeake Bay: What we have learned and where we are headed.</b> <u>Alicia Wells-Berlin</u> , <u>Matthew Perry</u> , G. Michael Haramis, Glenn Olsen	<b>0021 The effects of Bald Eagle (<i>Haliaeetus leucocephalus</i>) predation on Herring Gull (<i>Larus argentatus</i>) nesting colonies in Maine, USA</b> <u>*Katherine Shlepr</u>
1010-1030	<b>0009 Waterbirds and contaminant research: the nexus of Patuxent and the Waterbird Society</b> <u>Christine Custer</u> , Thomas Custer	<b>0030 Kleptoparasitism of Black Guillemots (<i>Cepphus grylle</i>) by Herring Gulls (<i>Larus argentatus</i>)</b> <u>*Amanda Posey</u>
1030-1050	<b>0028 Emerging diseases in waterbirds - A look at Patuxent research</b> <u>*Diann Prosser</u> , Glenn Olsen, John Takekawa, Scott Newman, Baoping Yan, Mike Erwin	<b>0095 Low survival of adult Audubon's Shearwaters in the Bahamas and Caribbean consistent with a slow decrease in population</b> <u>William Mackin</u>
1050-1110	<b>Break</b>	
1110-1130	<b>0106 Adaptive management for shorebirds on National Wildlife Refuges</b> <u>Michael C Runge</u> , Harold P Laskowski, James E Lyons, William L Kendall	<b>0017 Site familiarity increases fledging success in Piping Plovers</b> <u>*Sarah Saunders</u> , Erin Roche, Todd Arnold, Francesca Cuthbert
1130-1150	<b>0015 Strategic habitat conservation through the Integrated Waterbird Management and Monitoring Program</b> <u>Andy Wilson</u> , Jennifer Casey, Jorge Coppen, Janet Ertel, Patricia Heglund, Sarah Jacobi, Tim Jones, Melinda Knutson, Katie Koch, Harold Laskowski, Brian Loges, Eric Lonsdorf James Lyons, Mike Runge, John Stanton, Todd Sutherland, Bill Thompson, John Tirpak	<b>0034 Symbiosis between birds and alligators? Testing the nest protector hypothesis</b> <u>*Brittany Burtner</u> , Peter Frederick, Frank Mazzotti
1150-1210	<b>0093 Waterbird population dynamics: Patuxent contributions to methods, models and inferences</b> <u>Jim Hines</u> , Jeffery Spendelow, James Nichols	
1210-1230	<b>0012 Waterbird habitat management research through the Patuxent prism</b> <u>Michael Erwin</u>	
1230-1330	<b>Lunch</b>	

(Underlined authors are presenting, \*starred presenters are students)

**Thursday 10 November**

**Afternoon Sessions**

	<b>ROOM: COASTAL MAIN/EAST</b>	<b>ROOM: COASTAL WEST</b>
	<b>Special Session:</b> <b>Migration and Wintering Areas of Arctic- and Temperate-nesting Waterbirds</b> <b>Chair: Chip Weseloh</b>	<b>General Session:</b> <b>Climate Change</b> <b>Chair: Christy Hand</b>
1330-1350	<b>0048 Local and long range movements of two populations of Great Egrets in the southeastern US.</b> <u>Jason Fidorra</u> , Peter Frederick, Ken Meyer, Dave Evers	<b>0018 Caribbean Roseate Terns: A potentially distinct population segment threatened by sea level rise.</b> <u>Jorge E. Saliva</u>
1350-1410	<b>0049 Migration movements and foraging patterns of Common Loons breeding in the Upper Midwest United States</b> <u>Kevin Kenow</u> , Michael Meyer, Darryl Heard, Robert Kratt, Timothy Fox, Steven Houdek, Luke Fara, Pete Boma	<b>0045 Potential impact of sea-level rise and climate change on seabird nesting colonies in Maine, USA</b> <u>John Anderson</u>
1410-1430	<b>0118 A primer on Common Loon winter ecology</b> <u>James Paruk</u> , Darwin Long, David Evers	<b>0024 Black Rail status and threats along the Atlantic Coast</b> <u>Michael Wilson</u> , David Brinker, Bryan Watts, Jim McCann, Fletcher Smith
1430-1450	<b>0060 Migration and fidelity to wintering areas of Manx Shearwaters <i>Puffinus puffinus</i> nesting in Iceland</b> * <u>Yann Kolbeinsson</u> , Ingvar Atli Sigurðsson, Jacob González-Solís	<b>0011 Habitat selection of Upland Sandpipers (<i>Bartramia longicauda</i>) in Ivavik National Park, Yukon</b> * <u>Valerie Miller</u> , Erica Nol, Linh Nguyen
1450-1510	<b>Break – Posters Up</b>	
1510-1530	<b>0066 Stable isotopes infer origins of shorebirds utilizing an Alaskan estuary during migration</b> * <u>Sadie Ulman</u> , John Morton, Chris Williams	<b>0082 Ecological and conservation implications of melanic primary feather pigmentation in waterbirds with an emphasis on Charadriiformes</b> * <u>Joshua Kreitzer</u> , Lisa Horth
1530-1550	<b>0074 Population dynamics of the Red Knot (<i>Calidris canutus rufa</i>) in Virginia during spring migration.</b> <u>Fletcher Smith</u> , Bryan Watts, Adam Duerr	<b>0105 Utility of sea eagle population data for global climate change monitoring and assessment</b> <u>William W. Bowerman</u> , David Best, Teryl Grubb, Bjorn Helander, Alison MacLennan, Vladimir Masterov, Peter Nye, Jill Shephard, Russell Thorstrom, Munir Virani, Robert Baldwin, William Bridges, Latice Fuentes, Christopher Post, Tanya Shenk, David Tonkyn
1800-2000	<b>ROOM: MAINSAIL BALLROOM</b>	
	<b>Poster Session</b>	

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**Friday 11 November**

**Morning Sessions**

	ROOM: COASTAL MAIN/EAST	ROOM: COASTAL WEST
0815-0915	<b>Plenary Speaker: Theodore Simons</b> <b>Haematopology - collaborative focal species research and management in waterbird conservation</b>	
	<b>Special Session:</b> <b>American Oystercatcher Conservation Science</b> <b>Chair: Patrick Jodice</b>	<b>General Session:</b> <b>Landscape Scale Analyses and Habitat Management</b> <b>Chair: Jane Austin</b>
0930-0950	<b>0070 State-wide monitoring of the American Oystercatcher population in North Carolina</b> <u>Sara Schweitzer</u> , Walker Golder, David Allen, Ted Simons, Sue Cameron	<b>0004 Simplified landscapes, complex patterns: factors influencing waterbird abundance in the perennially cultivated Gangetic floodplains, India</b> <b>*Kolla Gopisundar</b>
0950-1010	<b>0038 Conservation of American Oystercatchers <i>Haematopus palliatus</i> within an urbanized barrier island complex</b> <u>Thomas Virzi</u> , Julie L. Lockwood, David Drake, Steven Grodsky, Todd Pover	<b>0110 Characterization of Sandhill Crane wintering areas through GLMMs in Mexico</b> <b>*Edgar G. Lopez-Saut, Felipe Chavez-Ramirez, Ricardo Rodriguez-Estrella</b>
1010-1030	<b>0099 American Oystercatcher nesting on the Gulf of Mexico Coast of peninsular Florida, USA</b> <u>Ann Hodgson</u> , Ann Paul, Matthew Smith, Mark Rachal	
1030-1050	<b>0014 American Oystercatcher Nesting Patterns in Texas</b> <u>Susan Heath</u> , Alexandra Munters	
1050-1110	<b>Break</b>	
1110-1130	<b>0023 Headstarting: An experimental study to improve nest success of American Oystercatchers.</b> <b>*Samantha Collins, Patrick Jodice, Felicia Sanders</b>	<b>0083 Effects of vegetative cover on reproductive success of common terns (<i>Sterna hirundo</i>)</b> <u>Jennifer Arnold</u> , Stephen Oswald
1130-1150	<b>0019 Effects of human activity on American Oystercatchers breeding at Cape Lookout National Seashore, North Carolina</b> <b>*Tracy Borneman, Theodore Simons</b>	<b>0003 Nesting ecology of the Yellow-breasted Crane <i>Porzana flaviventer</i> in Puerto Rico</b> <u>Francisco Vilella</u>
1150-1210	<b>0087 A Comparison of American Oystercatcher reproductive success among three habitat Types in coastal Virginia</b> <u>Ruth Boettcher</u> , Alexandra Wilke, Pamela Denmon, Kevin Holcomb	<b>0052 Fire management and yellow rails: Response of Yellow Rails to habitat conditions and fire history at Seney NWR, Michigan</b> <u>Jane Austin</u> , Deborah Buhl
1210-1230		<b>0117 Assessment of fall shorebird habitat availability on inland managed wetlands within the Gulf Coast Joint Venture</b> <u>William Vermillion</u> , Mark Parr, Nicholas Enwright, Barry Wilson
1230-1330	<b>Lunch</b>	

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**Friday 11 November**

**Afternoon Sessions**

	<b>ROOM: COASTAL MAIN/EAST</b>	<b>ROOM: COASTAL WEST</b>
	<b>Symposium: Reddish Egret Conservation Chair: Troy Wilson</b>	<b>General Session: Foraging and Diet Chair: Elizabeth Craig</b>
1330-1350	<b>0053 Seasonal movements of adult Reddish Egrets marked with satellite transmitters</b> <u>*Daniel Reed</u> , Brock Geary, Bart Ballard, Clay Green, William Howe	<b>0075 Influence of spatial scale in assessing Least Tern foraging habitats on the Missouri River</b> <u>Jennifer Stucker</u> , Deborah Buhl, Mark Sherfy, Laurence Strong
1350-1410	<b>0047 Foraging behavior and foraging habitat dynamics of Reddish Egrets in the Laguna Madre of Texas</b> <u>Elizabeth Bates</u> , <u>Bart Ballard</u>	<b>0056 Fine-scale foraging movements and tern colony site attendance of a generalist forager, the Gull-billed Tern (<i>Gelochelidon nilotica vanrossemi</i>)</b> <u>*Katharine Goodenough</u> , Rebecca Lewison
1410-1430	<b>0054 Use of satellite telemetry to observe first-year movements and survival of juvenile Reddish Egrets on the Gulf Coast</b> <u>Brock Geary</u> , M. Clay Green, Bart Ballard, Daniel Reed, William Howe	<b>0084 The flight speed of parent Common Terns (<i>Sterna hirundo</i>) in relation to brood energy requirement and provisioning currencies</b> <u>Dave Moore</u>
1430-1450	<b>0098 Reddish Egret (<i>Egretta rufescens</i>) re-colonization of the Tampa Bay region, Florida, USA 1974-2011</b> <u>Ann Hodgson</u> , <u>Ann Paul</u>	<b>0020 A telemetry-based study of Great Egret (<i>Ardea alba</i>) food-provisioning rates and nest-attendance patterns</b> <u>Heather Stone</u> , Alan Maccarone, John Brzorad
1450-1510	<b>Break</b>	
1510-1530	<b>0100 Reddish Egret (<i>Egretta rufescens</i>) population changes in Florida, USA 1832-2011</b> <u>Ann Hodgson</u> , Ann Paul	<b>0029 Activity patterns of Great Egrets and Snowy Egrets: A seasonal comparison</b> <u>John Brzorad</u> , Alan Maccarone
1530-1550	<b>0039 Management responses to changes in Reddish Egret colony sites and nesting habitat in Texas</b> <u>Owen Fitzsimmons</u> , David Newstead	<b>0088 “You are what you eat... plus a few permil.” Diet-tissue fractionation in the Double-crested Cormorant</b> <u>*Elizabeth Craig</u> , Brian Dorr, Katie Hanson-Dorr
1550-1610	<b>0041 Reddish Egret movements and mortality in the Florida Keys</b> <u>Ken Meyer</u> , Gina Kent, Tom Wilmers, Stefani Melvin	
1610-1630	<b>0122 Status of the Reddish Egret Conservation Plan: Developing conservation actions for addressing threats and limiting factors</b> <u>Troy Wilson</u> , Stefani Melvin	

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**Saturday 12 November**

**Morning Sessions**

	ROOM: COASTAL MAIN/EAST	ROOM: COASTAL WEST
	<b>Symposium:</b> <b>BP/Deepwater Horizon Oil Spill and Waterbird Conservation</b> <b>Chair: J. Christopher Haney</b>	<b>General Session:</b> <b>Monitoring Techniques</b> <b>Chair: Linda Wires</b>
0930-950	<b>0076 Occurrence of pelagic birds and Macondo source oil in a Loop Current frontal eddy and associated features in June, 2010</b> A. Michelle Wood, Thomas N. Lee, <u>J. Christopher Haney</u> , Vassiliki H. Kourafalou, Nelson Melo, M. Scott Miles, Mitchell R. Roffer, Greg J. Gawlikowski, David S. Lee	<b>0094 A new approach for monitoring and conserving high arctic shorebirds</b> <u>Jonathan Bart</u> , Larry Niles, Mandy Dey, Paul Smith, Leah Dunn
0950-1010	<b>0112 Post-breeding movements in Gulf of Mexico Seaside Sparrow Populations (<i>Ammodramus maritimus fisheri</i>)</b> <u>Evan Adams</u> , David Evers	<b>0035 What, if anything, can point-count surveys reveal about abundance and long-term population trends of Black Terns?</b> <u>David Shealer</u> , Christopher Comstock, Michael Alexander
1010-1030	<b>0091 Movements of Brown Pelicans and Black Skimmers from the Deepwater Horizon oil spill injury assessment</b> * <u>Lisa Eggert</u> , David Evers, Patrick Jodice, Michael Yates, David Yates, Jennifer Goyette, Dustin Meattay	<b>0061 Vessel surveys reveal distributions of marine birds in the Gulf of Maine</b> * <u>Emily Connelly</u> , William Montevocchi
1030-1050	<b>0073 Oceanography of the Gulf of Mexico and exposure and recovery of marine birds injured by the BP/Deepwater Horizon oil spill</b> <u>J. Christopher Haney</u>	<b>0065 Monitoring colonial waterbirds in the U.S. Great Lakes: A new approach to an old survey</b> <u>Linda Wires</u> , Francie Cuthbert
1050-1110	<b>Break</b>	
1110-1130	<b>0046 Asynchronous morbidity, mortality, and media coverage of marine birds injured by the BP/Deepwater Horizon oil spill</b> <u>J. Christopher Haney</u>	<b>0025 Waterbird Monitoring in and above offshore waters of Western Lake Michigan</b> <u>Noel Cutright</u> , William Mueller
1130-1150	<b>0044 Tracking long-distance seabird migration to assess marine pollution impact</b> W. A. Montevocchi, D. A. Fifield, C. M. Burke, S. Garthe, A. Hedd, J.-F. Rail, G. J. Robertson. Presented by * <u>Emily Connelly</u> .	<b>0016 Advancing conservation of waterbirds through the Midwest Coordinated Bird Monitoring Partnership</b> <u>Katie Koch</u>
1150-1210	<b>0077 Nesting productivity of Black Skimmers in Coastal Louisiana following the BP oil spill</b> * <u>Brehan Furfey</u> , Tabitha Owens, Aaron Pierce, James Bednarz	<b>0079 Distribution of colonial waterbirds in Oregon: Survey results from 2009-2011</b> <u>Karen Hussey</u> , Jaime Stephens, Jenny Hoskins, Bob Altman
1215-1330	<b>Lunch</b>	

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**Saturday 12 November**

**Afternoon Sessions**

	ROOM: COASTAL MAIN/EAST	ROOM: COASTAL WEST
	<b>General Session: Diverse Topics Chair: Andy Bernick</b>	<b>General Session: Status and Abundance Chair: Dave Moore</b>
1330-1350	<b>0032 Conservation genetics of the Common Tern in the North Atlantic region; implications for the critically endangered population at Bermuda</b> <u>Patricia Szczyś</u> , Ian Nisbet, David Wingate	<b>0085 Breeding site tenacity and productivity of Common Terns nesting on the North Channel of Lake Huron</b> <u>Dave Moore</u> , D.V. Chip Weseloh
1350-1410	<b>0008 Female reproductive investment and sexual selection on males of waterfowl</b> <u>Austin Hughes</u>	<b>0033 Species-specific responses to breeding site characteristics predict colony persistence in Great Lakes colonial waterbirds</b> * <u>Katherine Wyman</u> , Francesca Cuthbert, Linda Wires
1410-1430	<b>0010 Ptilochronology is an efficient predictor of mercury (MeHg) stress in waterbird nestlings</b> * <u>Charles Clarkson</u> , Michael Erwin, Ami Riscassi	<b>0090 Changes in seabird abundance on the continental slope of the eastern USA, 1970s to present</b> Timothy White, <u>Richard Veit</u> , Marie Martin, Andrew Gilbert, Melanie Steinkamp
1430-1450	<b>0097 Re-evaluation of Great Lakes Fish Passage and effects on Bald Eagles nesting along the Au Sable, Manistee and Muskegon Rivers</b> * <u>Peter Datema</u> , William Bowerman, Lisa Williams	<b>0089 Hotspots of seabird abundance in the Northwest Atlantic</b> Richard Veit, Jarrod Santora, Timothy White, Marie Martin, Andrew Gilbert, Melanie Steinkamp
1450-1510	<b>Break</b>	
1510-1530	<b>0051 Marine and hydrokinetic energy development: Technology, regulation, and potential impacts to diving birds</b> <u>Andrew Bernick</u> , Stephen Bowler	
1530-1550	<b>0013 A hypothesis on the internal processes of pellet production in Double-crested Cormorants, <i>Phalacrocorax auritus</i></b> * <u>Colin Grubel</u> , John Waldman	
1550-1610	<b>0102 Mass latex balloons releases and the potential effects on wildlife</b> * <u>Stephan Irwin</u> , Mary Beck, William Bowerman, William Bridges, Jeffrey Foltz	
1610-1630	<b>0114 Metal contaminant levels in Canada Geese of the New Jersey Meadowlands</b> <u>Nellie Tsipoura</u> , Joanna Burger, Michael Newhouse, Chris Jeitner, Michael Gochfeld, David Mizrahi	

(Underlined authors are presenting, \*starred presenters are students)

## Poster Titles

(Underlined authors are presenting, \*starred presenters are students)

**0006**

### **Carriage of bacterial and protozoan pathogens among Common Tern chicks on Pettit Island, Barnegat Bay, NJ**

\*William Rivera<sup>1</sup>, Corey Gaylets<sup>1</sup>, Roy Mosher<sup>1</sup>, Brian Palestis<sup>1</sup>, Adam Houlihan<sup>1,2</sup>

<sup>1</sup>Wagner College, Staten Island, NY, USA, <sup>2</sup>Randolph College, Lynchburg, VA, USA

**0007**

### **Least Terns in winter: Where are they?**

Jonathan Atwood<sup>1</sup>, Robin Cassiopo<sup>2</sup>. Presented by Evan Adams<sup>1</sup>.

<sup>1</sup>BioDiversity Research Institute, Gorham, ME, USA, <sup>2</sup>Antioch University, New England, Keene, NH, USA

**0022**

### **PCBs and DDE in Common and Roseate Tern eggs from three breeding colonies in Buzzards Bay, MA, USA, 1972-2005**

Ian Nisbet<sup>1</sup>, Saro Jayaraman<sup>2</sup>, Carolyn Mostello<sup>3</sup>, Diane Nacci<sup>2</sup>

<sup>1</sup>I. C. T. Nisbet & Company, North Falmouth, MA, USA, <sup>2</sup>US Environmental Protection Agency, Narragansett, RI, USA, <sup>3</sup>Massachusetts Division of Fisheries & Wildlife, Westborough, MA, USA

**0026**

### **Few Happy Returns: Low return rates of Common Terns banded at Pettit Island, New Jersey**

Brian Palestis<sup>1</sup>, Kaitlin Eppinger<sup>1,2</sup>

<sup>1</sup>Wagner College, Staten Island, NY, USA, <sup>2</sup>Montclair State University, Montclair, NJ, USA

**0027**

### **The Bureau of Ocean Energy Management's Avian Research in the Western Atlantic Sally Valdes**

*Bureau of Ocean Energy Management, Herndon, VA, USA*

**0031**

### **Human disturbance of breeding Snowy Plovers (*Charadrius alexandrinus*) in Northwest Florida: A pilot study**

\*Maureen Durkin<sup>1</sup>, Jonathan Cohen<sup>1</sup>, Margo Zdravkovic<sup>2</sup>

<sup>1</sup>State University of New York College of Environmental Science and Forestry, Syracuse, NY, USA, <sup>2</sup>Coastal Bird Conservation/Conservian Inc., Big Pine Key, FL, USA

**0040**

### **Winter distribution of Horned Grebes breeding in Iceland**

Thorkell Lindberg Thorarinsson, Yann Kolbeinsson, Adalsteinn Orn Snaethorsson

*Northeast Iceland Nature Center, Husavik, Iceland*

**0062**

**Unexpected use of bedrock habitat for nesting by American Oystercatchers in Rhode Island**

Andrew MacLachlan<sup>1</sup>, Pamela Loring<sup>2</sup>

<sup>1</sup>*U.S. Fish and Wildlife Service, Charlestown, RI, USA*, <sup>2</sup>*University of Rhode Island, Kingston, RI, USA*

**0064**

**An assessment of data quantity and quality provided by the North American Breeding Bird Survey for wetland-breeding species.**

\*Suzanne Whitney, Joseph Veech

*Texas State University, San Marcos, TX, USA*

**0068**

**Foraging activity across the diel cycle of nesting Black Skimmers**

\*Stephen Wurfel, Matthew Hillman, Sarah Karpanty

*Virginia Tech, Blacksburg, VA, USA*

**0069**

**Effects of sea-level rise and altered storminess on Piping Plover habitat along the U.S. Atlantic and Gulf Coasts**

\*Katherina Gieder, Sarah Karpanty, James Fraser, Daniel Catlin

*Virginia Tech, Blacksburg, VA, USA*

**0071**

**Transmitter use and American Oystercatcher leg injury, Fisherman Island National Wildlife Refuge, Virginia**

Pamela Denmon, Jeremy Tarwater

*U.S. Fish and Wildlife Service, Eastern Shore of Virginia NWR, Cape Charles, VA, USA*

**0072**

**Total reproductive failure of least tern (*Sternula antillarum*) colonies in coastal Georgia due to intense predation; and predator management strategies**

\*Gabrielle Robinson, Sonia Hernandez

*University of Georgia, Athens, GA, USA*

**0078**

**Variability in dispersal movements of flighted juvenile Wood Storks (*Mycteria americana*)**

Rena Borkhataria<sup>1</sup>, Peter Frederick<sup>2</sup>, Lawrence Bryan<sup>3</sup>

<sup>1</sup>*Everglades Research and Education Center, University of Florida, Belle Glade, FL, USA*,

<sup>2</sup>*University of Florida, Gainesville, FL, USA*, <sup>3</sup>*Savannah River Ecological Laboratory, University of Georgia, Savannah, GA, USA*



**0080**

**The impact of major weather events on migrating Whimbrel (*Numenius phaeopus*)**

Fletcher Smith<sup>1</sup>, Bryan Watts<sup>1</sup>, Elizabeth Mojica<sup>1</sup>, Tim Keyes<sup>2</sup>, Barry Truitt<sup>3</sup>, Brad Winn<sup>4</sup>

<sup>1</sup>*The Center for Conservation Biology, The College of William and Mary & Virginia Commonwealth University, Williamsburg, VA, USA*, <sup>2</sup>*Georgia Department of Natural Resources, Brunswick, GA, USA*, <sup>3</sup>*The Nature Conservancy, Nassawadox, VA, USA*, <sup>4</sup>*Manomet Center for Conservation Sciences, Manomet, MA, USA*

**0081**

**Assessing the effects of aircraft and human beach use on nesting terns and skimmers at Cape Lookout National Seashore, NC**

Matthew Hillman, Sarah Karpanty, James Fraser  
*Virginia Tech, Blacksburg, VA, USA*

**0086**

**Diet analysis of the Double-crested Cormorant *Phalacrocorax auritus albociliatus* in the San Diego Bay National Wildlife Refuge**

\*Lesley Handa

*Mesa College, San Diego, CA, USA*

**0092**

**Regional differences in mercury exposure in Brown Pelicans and Black Skimmers**

\*Lisa Eggert<sup>1</sup>, David Evers<sup>1</sup>, Jennifer Goyette<sup>1</sup>, Patrick Jodice<sup>2</sup>, Dustin Meattey<sup>1</sup>, Michael Yates<sup>1</sup>

<sup>1</sup>*Biodiversity Research Institute, Gorham, ME, USA*, <sup>2</sup>*U.S. Geological Survey South Carolina Cooperative Research Unit, Clemson University, Clemson, SC, USA*

**0096**

**Effects of gulls on the nesting behavior of sparrows**

\*Matthew Dickinson

*College of the Atlantic, Bar Harbor, ME, USA*

**0101**

**Investigation of levels of toxicological contamination in the endangered African penguin (*Spheniscus demersus*)**

\*Carly Summers<sup>1</sup>, William Bowerman<sup>2</sup>, Nola Parsons<sup>3</sup>

<sup>1</sup>*Clemson University, Clemson, SC, USA*, <sup>2</sup>*University of Maryland, College Park, MD, USA*, <sup>3</sup>*Southern African Foundation for the Conservation of Coastal Birds, Bloubaerg, South Africa*

**0103**

**Changes in water quality affect the food supply of lesser flamingos (*Phoeniconaias minor*) at Kamfers Dam in Kimberley, South Africa**

\*Lindsay Moore<sup>1</sup>, William Bowerman<sup>2</sup>, William Bridges<sup>1</sup>, Patrick Jodice<sup>1</sup>

<sup>1</sup>*Clemson University, Clemson, South Carolina, USA*, <sup>2</sup>*University of Maryland, College Park, MD, USA*

**0104**

**Investigating changes in morphometric measurements of nestling Bald Eagles**

\*Latice Fuentes<sup>1</sup>, William W Bowerman<sup>2</sup>, William C Bridges<sup>1</sup>

<sup>1</sup>*Clemson University, Clemson, SC, USA*, <sup>2</sup>*University of Maryland, College Park, MD, USA*

**0107**

**Photographic documentation of the morphological development from hatching to fledging of American Oystercatcher (*Haematopus palliatus*) chicks**

Ann Hodgson<sup>1</sup>, Ann Paul<sup>2</sup>, Mark Rachal<sup>2</sup>, Carol Cassels<sup>2</sup>

<sup>1</sup>*Resource Designs Inc., Natural Resource Research & Planning, Brooksville, Florida, USA*,

<sup>2</sup>*Florida Coastal Islands Sanctuaries, Audubon of Florida, Tampa, FL, USA*

**0111**

**Monthly abundance and seasonal spatial distribution of shorebirds on Cape Romain National Wildlife Refuge, South Carolina**

\*Nicholas Wallover<sup>1</sup>, Mary-Catherine Martin<sup>1</sup>, Felicia Sanders<sup>1</sup>, Norm Levine<sup>1</sup>, Sarah Dawsey<sup>1</sup>

<sup>1</sup>*College of Charleston, Charleston, SC, USA*, <sup>2</sup>*South Carolina Department of Natural*

*Resources, McClellanville, SC, USA*, <sup>3</sup>*US Fish and Wildlife Service, Awendaw, SC, USA*

**0113**

**The Atlantic Flyway Shorebird Conservation Action Plan: a new strategy for addressing major shorebird declines**

Caleb Spiegel<sup>1</sup>, Brad Winn<sup>2</sup>, Scott Johnston<sup>1</sup>, Stephen Brown<sup>2</sup>

<sup>1</sup>*U.S. Fish and Wildlife Service, Division of Migratory Birds, Hadley, MA, USA*, <sup>2</sup>*Manomet Center for Conservation Sciences, Manomet, MA, USA*

**0114**

**Metal contaminant levels in Canada Geese of the New Jersey Meadowlands**

Nellie Tsipoura<sup>1</sup>, Joanna Burger<sup>2</sup>, Michael Newhouse<sup>4</sup>, Chris Jeitner<sup>2</sup>, Michael Gochfeld<sup>3</sup>, David Mizrahi<sup>1</sup>

<sup>1</sup>*New Jersey Audubon, Bernardsville, NJ, USA*, <sup>2</sup>*Rutgers University, Piscataway, NJ, USA*,

<sup>3</sup>*Robert Wood Johnson Medical School, Piscataway, NJ, USA*, <sup>4</sup>*New Jersey Meadowlands Commission, Lyndhurst, NJ, USA*

**0115**

**Mass Audubon's Coastal Waterbird Program - 25 years of bird and habitat protection**

Katharine Parsons, Ellen Jedrey, Rebecca Harris, Scott Hecker, Andrea Jones

*Mass Audubon, Cummaquid, MA, USA*

**0119**

**Philopatry, age structure and roosting habits during the post-breeding season of Great Egrets in the southern Ontario region**

\*Tina Knezevic, Chip Weseloh, Linda McLaren, Clive Hodder, Dave J. Moore

*Canadian Wildlife Service, Toronto, Ontario, Canada*

**0120**

**Developing a method to census waterbirds in Canada's boreal forest: Year 2**

D.V. Chip Weseloh<sup>1</sup>, Russ Weeber<sup>2</sup>, David J. Moore<sup>1</sup>, Rich Russell<sup>2</sup>

<sup>1</sup>*Canadian Wildlife Service - Environment Canada, Toronto, Ontario, Canada,* <sup>2</sup>*Canadian Wildlife Service - Environment Canada, Ottawa, Ontario, Canada*

**0121**

**On the shores of Jamaica Bay: What have three years of monitoring shown us about shorebirds and horseshoe crabs?**

John Rowden, Susan Elbin

*New York City Audubon, New York, NY, USA*

## Abstracts

(Underlined authors are presenting, \*starred presenters are students)

### Plenary Abstracts

**0067**

#### **Conserving North American colonial waterbirds - How we got where we are**

James Kushlan

*Key Biscayne, FL, USA*

This talk investigates, from one participant's perspective, threads of the story of colonial waterbird conservation over the past 40 years, roles of Patuxent Wildlife Research Center as touch points. It discusses the development of some of the major academic and conservation themes in colonial waterbird conservation - inventory and monitoring, populations, behavior and ecology, and conservation action. Early inventory programs proved essential in sparking the maturation of colonial waterbird research and conservation community in North America. Monitoring has not much progressed owing to the lack of long term institutional commitment and the unwillingness of individuals and institutions to change. Similarly progress is miniscule on providing a long term repository of colonial waterbird data. Nonetheless, the status and some idea of trends of colonial waterbirds in North America are now reasonably well understood. One result of widespread professional and amateur engagement was the creation of the Waterbird Society, whose influence can scarcely be overstated, and, much later, Waterbird Conservation for the Americas, which expanded both the geographic range and the perspective of waterbird conservation. Waterbirds are now well integrated in conservation planning and action in the United States. And we now know well how to protect and manage sites of importance. In some areas, such as population estimation, the North American waterbird conservation movement has not shone. However the future path, focusing on hemispheric planning and local conservation action, is quite clear. The future of colonial waterbird conservation, indeed, is in the hands not of international planners but of local stakeholders.

**0050**

#### **Haematopology - collaborative focal species research and management in waterbird conservation**

Theodore Simons

*U.S. Geological Survey, North Carolina Cooperative Fish and Wildlife Research Unit,  
Department of Biology, North Carolina State University, Raleigh, NC, USA*

In this presentation I will highlight the collaborative achievements of the American Oystercatcher Working Group over the past 10 years including; the establishment of range-wide surveys, color-banding protocols, mark-resight studies, a revision of the Birds of North America species account, and new mechanisms for sharing information and data. Collaborations among state, federal, and private sector scientists, natural resource managers, and dedicated volunteers have provided insights into the biology and conservation of oystercatchers in the U.S. and abroad that would not have been possible without the relationships formed through the working group. I will argue that broad collaborative approaches and the engagement of the public are key elements of effective species conservation programs.

## **Oral Presentation Abstracts**

**0003**

### **Nesting ecology of the Yellow-breasted Crake *Porzana flaviventer* in Puerto Rico**

Francisco Vilella

*USGS Cooperative Research Unit, Mississippi State, MS, USA*

The Yellow-breasted Crake (*Porzana flaviventer*) is a poorly known Neotropical rail found in densely vegetated freshwater wetlands; a single nest record exists for Puerto Rico. In May 2001 the Yellow-breasted Crake was detected in managed impoundments of the Humacao Nature Reserve, located in southeastern Puerto Rico. Yellow-breasted Crakes were regularly observed during monthly surveys of the impoundments with as many as nine individuals detected during an April 2002 survey. Systematic nest searches by teams of observers walking across the impoundments during 2001-2002 located 15 nests of the Yellow-breasted Crake in approximately 13 ha of newly created wetlands. The nests of the Yellow-breasted Crake were more commonly found in *Eleocharis mutata*, *Cyperus ligularis*, and *Paspalum vaginatum*. Nests had an average clutch size of 3.73 ( $\pm$  0.31) eggs and brood size of 2.71 ( $\pm$  0.5) chicks; hatching success was 65% and nesting success 40%. Six of the Yellow-breasted Crake nests were depredated. Nest success of the Yellow-breasted Crake at the Humacao Nature Reserve was closer to estimates for mainland congeners than other rail species of oceanic islands. This may reflect habitat conditions of the Humacao Nature Reserve wetlands after years of disturbance from sugarcane cultivation or the more species-rich predator community of the islands of the Greater Antilles. The nesting activity of the Yellow-breasted Crake at the Humacao Nature Reserve suggested wetland management in abandoned sugarcane areas of coastal Puerto Rico may benefit waterbird species of concern. Future research should determine abundance estimates and habitat relationships for this secretive species of Neotropical waterbird.

**0004**

### **Simplified landscapes, complex patterns: factors influencing waterbird abundance in the perennially cultivated Gangetic floodplains, India**

\*Kolla Gopisundar

*University of Minnesota and International Crane Foundation, St. Paul, MN, USA*

Waterbird abundance on agricultural landscapes is affected by multiple factors acting at different spatial scales, and seasonal effects due to changing crops. Using a multi-season landscape-scale design, I surveyed 24 districts in Uttar Pradesh state located in the crop-and-human dominated Gangetic floodplains to evaluate factors (extent of wetlands and landscape heterogeneity at two spatial scales; intensity of cultivation or IOC; location; and season) affecting waterbird abundance. Wetland birds dominated (37%) sampled bird species richness (229 species). Indicator species analyses identified 16 waterbirds affected by IOC, 75% of which were associated with the lowest IOC. The smallest number of indicator species occurred during the rainy season when rice-paddies were the primary crop suggesting high homogenization in that season. I used hierarchical partitioning to understand the relative importance of explanatory variables for waterbird abundance. Total waterbird abundance was influenced most by extent of remnant wetlands at the smaller spatial scale suggesting weak landscape-scale effects due to

simplification. Species abundance was influenced by different variables (primarily wetland extent and landscape heterogeneity at different spatial scales; IOC; location), and patterns varied with season suggesting different individual responses corresponding to seasonal landscape conditions. To maximize waterbird abundance on Uttar Pradesh's simplified landscape, relatively complex interventions at both spatial and temporal scales appear to be required. These include improving wetland habitat especially in areas with high intensities of cultivation, and understanding which locations experience proportionally higher wetland reduction in the dry season.

**0008**

**Female reproductive investment and sexual selection on males of waterfowl**

Austin Hughes

*University of South Carolina, Columbia SC, USA*

To test the hypothesis that female reproductive investment influences sexual selection on males, the degree of sexual dichromatism in waterfowl (Anseriformes:Anatidae) was correlated with female reproductive investment, measured as average clutch mass expressed as a percentage of adult female body mass. Using an innovative statistical approach that can take into account comparisons at different phylogenetic levels, sexual dichromatism in 150 OTUs (species or subspecies) was found to be significantly positively associated with female reproductive investment at most phylogenetic levels. On the other hand, sexual dichromatism was negatively associated with a tropical breeding distribution and with breeding on one or more oceanic islands. In order to separate statistically the effects of these different factors, the same approach was applied separately to comparisons classified by breeding distribution. Whether both OTUs were tropical in breeding distribution, only one OTU was tropical, or neither OTU was tropical, the significant positive association between sexual dichromatism and female reproductive investment remained. Likewise, there was a significant positive association between sexual dichromatism and female reproductive investment whether one, both, or neither of the species had an insular breeding distribution. The results are consistent with the hypothesis that increased female reproductive investment increases competition among males for access to females and thus the strength of sexual selection.

**0009**

**Waterbirds and contaminant research: the nexus of Patuxent and the Waterbird Society**

Christine Custer, Thomas Custer

*USGS, La Crosse, WI, USA*

Almost from the beginning of the modern environmental movement, Patuxent Wildlife Research Center (PWRC) personnel have been on the forefront of wildlife-contaminant research. Waterbirds, especially colonialy-nesting species, were one of the primary study taxa. A number of the founding members of the Society (who are in many cases still members today) were waterbird contaminant scientists at PWRC. One of the first published contaminant / waterbird papers by PWRC authors was in 1970 by L. Blus on brown pelican eggshells thickness followed shortly thereafter by C. Henny who published on DDE levels in great blue heron eggs on the West Coast in 1971. The publishing juggernaut continues through today culminating in a host of book chapters written by PWRC authors or ex-PWRC authors in *Environmental contaminants in*

*biota: interpreting tissue concentrations, 2nd edition* which was edited by W. Nelson Beyer also of PWRC. Key findings from four decades of research will be presented and include the revelations that the most contaminated night-herons wintered in California not Mexico, DDE (still) and not PCBs were associated with adverse effects in cormorants in the Great Lakes, and the solution to pollution was not dilution along the Carson River, NV. In addition to field studies, PWRC personnel were engaged in laboratory studies, as well as, biomarker development and application.

**0010**

**Ptilochronology is an efficient predictor of mercury (MeHg) stress in waterbird nestlings**

\*Charles Clarkson, Michael Erwin, Ami Riscassi

*University of Virginia, Charlottesville, VA, USA*

Methylmercury (MeHg) depuration into growing feathers is a well-studied phenomenon in waterbirds. While the kinetics of MeHg excretion in relation to moult and diet has been studied extensively, the effects of MeHg accumulation on feather growth and development has not been investigated. I analyzed feather growth-rates for nestlings of two waterbird species occupying different trophic positions on the aquatic food web to determine the relationship between methylmercury (MeHg) depuration and feather formation. Combining MeHg analysis with the technique of ptilochronology, average daily rates of deposition into a growing feather was determined for glossy ibis (*Plegadis falcinellus*) and double-crested cormorant (*Phalacrocorax auritus*) nestlings occupying four mixed-species waterbird colonies in New York and Virginia. Candidate models consisting of nestling body condition, average feather growth-rate, and nestling age were compared using Akaike's information criterion corrected for small sample sizes. For both species, the top-performing model contained the sole parameter average feather growth-rate (glossy ibis:  $w_i = 0.25$ , double-crested cormorant:  $w_i = 0.40$ ). The effect of MeHg on feather growth-rate was exaggerated in double-crested cormorant nestlings, which had higher rates of MeHg depuration. Although models containing the body condition parameter could not be discounted ( $AIC_c < 2$ ), I suggest the use of ptilochronology as the more efficient and less invasive predictive tool for determining MeHg stress in waterbird nestlings

**0011**

**Habitat selection of Upland Sandpipers (*Bartramia longicauda*) in Ivvavik National Park, Yukon**

\*Valerie Miller<sup>1</sup>, Erica Nol<sup>1</sup>, Linh Nguyen<sup>2</sup>

<sup>1</sup>*Trent University, Peterborough, Ontario, Canada,* <sup>2</sup>*Parks Canada, Inuvik, NWT, Canada*

Nest site selection is influenced by a variety of factors and can impact how a species responds to changes in the environment, such as climate change. Nesting Upland Sandpipers (*Bartramia longicauda*), a grassland shorebird, were studied to determine nest and territory selection characteristics at the northern edge of their range within Ivvavik National Park in the Yukon Territory, Canada. Micro- and mesohabitat characteristics were assessed at nests and random points within the territory of each nest, and at random points throughout the study site. Microhabitat characteristics included percent vegetation cover, tallest vegetation, vertical visibility and slope in a 1m radius of the site and mesohabitat characteristics included elevation, number of trees and shrubs, percent cover of trees, shrubs, herbaceous and bareground and

distance to nearest tree. Upland Sandpipers selected territories with greater herbaceous cover and fewer trees than random sites throughout the park and, within those territories, randomly selected nest sites. Nevertheless, territories and nest sites in the Yukon were more treed than sites of Upland Sandpipers nesting in the continental Great Plains. With an advancing tree line associated with climate change, loss of grassland habitat in northern sites may negatively impact Upland Sandpipers at the edge of their range. Further assessment of the consequences of habitat selection to nest survival will improve our ability to predict the effects of climate change on this grassland species

## 0012

### **Waterbird habitat management research through the Patuxent prism**

Michael Erwin

*USGS Patuxent Wildlife Research Center; Dept. of Envir. Sciences, University of Virginia, Charlottesville, VA, USA*

Interest in managing habitats to either enhance feeding, roosting, and/or nesting for a variety of waterbirds has a long history at the Patuxent Wildlife Research Center (PWRC). Creating large impoundments at federal refuges and state wildlife management areas has had major impacts. In the 1950s, PWRC manmade impoundments served as experimental units to test submerged aquatic plant viability for dabbling ducks. In addition, early work on controlling invasive SAV species began at PWRC. Results of these studies were applied at a number of national wildlife refuges. Habitat manipulations to enhance nesting of various waterbird species have included experimenting with different nest designs for wood ducks and Canada geese to using tires to improve nest success of roseate terns at coastal refuges. In addition to these small "plot scale" approaches, PWRC scientists later engaged in large-scale "landscape" level projects usually with a number of cooperators: (1) the use of impoundments and Chesapeake islands by American black ducks; (2) evaluating use of open marsh water management habitats by waterbirds; (3) conducting habitat restoration on six northeastern wildlife refuges to restore ecosystem function and waterbird use; (4) using adaptive management to evaluate impoundment management methods to enhance shorebird use; and (5) creating and/or restoring island habitats to attract waterbirds during nesting, migration, and wintering periods. USGS Patuxent science will continue to provide leadership in the future to meld research, monitoring, and management approaches as adaptive management and structured decision making become more embedded among federal and state management agencies.

## 0013

### **A hypothesis on the internal processes of pellet production in Double-crested Cormorants, *Phalacrocorax auritus***

\*Colin Grubel<sup>1,2</sup>, John Waldman<sup>2</sup>

<sup>1</sup>CUNY Graduate Center, New York, NY, USA, <sup>2</sup>Queens College, Flushing, NY, USA

While much interest has been given to the process by which owls produce and expel pellets, little research has been devoted to it outside of order Strigiformes. Understanding the process in cormorants has the potential to help us better understand the frequency of pellet production within individual birds and through that, allow us to provide better models to track the impact of cormorant populations on fish species. The digestive tracts (N=34) of adult Double-crested



cormorants, *Phalacrocorax auritus*, culled in Jamaica Bay and Lake Ontario were dissected. The crop, stomach and intestines were individually weighed and measured, and gently rinsed in water to remove the remains of food items found. A thin layer of mucous was observed lining the stomachs. The color of the mucous ranged from orange (N=1), to pink (N=24), to ochre (N=3), with a few having mucous of two colors (N=4). The physical qualities of the mucous appear to differ between pink and brown mucous, with the brown being tougher. Mucous color does not appear to correlate with the mass of hard material collected in the stomach. Based on these preliminary results and observations, it is hypothesized that the mucous lining of the stomachs changes from pink to brown shortly before the pellet is ejected. Dissection of intestines revealed that few if any otoliths or other bones pass beyond the stomach during digestion, indicating that all otoliths and bones ingested are either digested in the stomach or ejected in the form of a pellet.

#### **0014**

##### **American Oystercatcher nesting patterns in Texas**

Susan Heath<sup>1</sup>, Alexandra Munters<sup>2</sup>

<sup>1</sup>*Gulf Coast Bird Observatory, Lake Jackson, TX, USA*, <sup>2</sup>*Texas State University, San Marcos, TX, USA*

There has been much research on Atlantic Coast American Oystercatchers, but little is known about the Western Gulf Coast population. It is assumed they are non-migratory but this has not been investigated. Therefore, the Gulf Coast Bird Observatory has initiated a multi-year study to determine the breeding parameters of this species in Texas and determine if these birds are resident or are part of regional or international populations. We completed our first field season in August 2011 and will continue this effort in 2012. We color-banded 63 adults and 40 chicks. We discovered the first nest in February and the last nest in June. We monitored 53 nests on a weekly basis and volunteers monitored another 42 nests less frequently. The last chicks fledged in August. All adults stayed on territory until their chick(s) fledged and some remained longer. Most, but not all adults with failed nests also remained on territory through June. Overall productivity was .78 but productivity differed by bay system and type of nesting location. Our data show that Texas oystercatchers prefer to nest on bay islands and have the highest productivity on islands without large Laughing Gull colonies. While mammals do predate mainland nests, the bulk of the population does not nest on the mainland so Laughing Gull predation of eggs and chicks on islands is a far greater threat. Through observational data, we learned that human disturbance often facilitates Laughing Gull predation by keeping adults off their nest or away from their chicks.

#### **0015**

##### **Strategic Habitat Conservation through the Integrated Waterbird Management and Monitoring Program**

Andy Wilson<sup>1,8</sup>, Jennifer Casey<sup>2</sup>, Jorge Coppen<sup>3</sup>, Janet Ertel<sup>4</sup>, Patricia Heglund<sup>5</sup>, Sarah Jacobi<sup>6</sup>, Tim Jones<sup>2</sup>, Melinda Knutson<sup>5</sup>, Katie Koch<sup>5</sup>, Harold Laskowski<sup>2</sup>, Brian Loges<sup>5</sup>, Eric Lonsdorf<sup>6</sup>, James Lyons<sup>3</sup>, Mike Runge<sup>1</sup>, John Stanton<sup>4</sup>, Todd Sutherland<sup>7</sup>, Bill Thompson<sup>2</sup>, John Tirpak<sup>4</sup>

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Managing wetland resources for migratory waterbird populations should be predicated on coordination of conservation efforts throughout migratory flyways, across conservation agencies and across spatial scales. Further, management and conservation actions often require decisions about which species or species guilds to manage for, and at what times of the year management actions would most benefit waterbird populations. To achieve this, decision making at three spatial scales: local, regional and flyway, should be coordinated and supported by defensible data and models to reduce potential conflicts. With this aim, the Integrated Waterbird Management and Monitoring (IWMM) program was established in 2010. The IWMM program utilizes Structured Decision Making tools, supported by monitoring data, to inform Strategic Habitat Conservation for migratory waterbirds. This will be achieved in an adaptive management framework applied across three spatial scales to inform management decisions at each scale. Ninety wetland sites across the Atlantic and Mississippi Flyways participated in a pilot season in 2010/11. The IWMM program is now moving into an operational phase, in which protocols and models will be refined, and decision support tools will be developed.

**0016**

### **Advancing Conservation of Waterbirds through the Midwest Coordinated Bird Monitoring Partnership**

Katie Koch

*US Fish and Wildlife Service, Marquette, MI, USA*

Monitoring is essential to successful bird conservation planning, guiding design of on-the-ground activities and evaluation of implementation practices to inform adaptive management. Bird monitoring programs have proliferated under the direction of government agencies, universities, and non-governmental organizations. In 2009, the Midwest Coordinated Bird Monitoring Partnership became established to fully integrate monitoring programs into bird conservation decision making throughout the region and beyond. This coordinated approach also increases our collective ability to detect spatial patterns and temporal trends while placing local results in a regional context. Additionally, gains in efficiency will reduce costs of monitoring and can enable greater attention to traditionally under-surveyed species. Our regional network is predicated upon a well-developed framework, regular workshops, interactive website, registry of Midwest bird monitoring programs, focused working groups, and a state-of-the-art system for archiving, analyzing, and accessing data (the Midwest Avian Data Center). Through several examples, I will illustrate our progress helping waterbird conservationists: 1) integrate monitoring into bird management and conservation; 2) broaden the scope of monitoring for species most at risk or for which we lack adequate information to make effective decisions; 3) coordinate programs among organizations and across spatial scales; 4) improve survey design, field methods and data analysis; and 5) deploy modern data management strategies to effectively package monitoring information for managers. Through our commitment to informed bird conservation decisions, we provide a means to help wildlife professionals better understand and interface waterbird conservation needs with climate change, energy development, land use practices, and urbanization across the Midwestern landscape.

0017

**Site familiarity increases fledging success in Piping Plovers**

\*Sarah Saunders<sup>1</sup>, Erin Roche<sup>2</sup>, Todd Arnold<sup>3</sup>, Francesca Cuthbert<sup>3</sup>

<sup>1</sup>University of Minnesota, Conservation Biology Graduate Program, St. Paul, Minnesota, USA,

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Reproductive success commonly improves with age in birds, but it is difficult to determine whether this phenomenon is due to breeding experience per se or other age-related factors because all potential explanatory factors tend to vary in parallel. Using a 17-year database, we investigated how age, prior breeding experience, prior nesting location experience, and prior experience with a given mate influenced reproductive success in Piping Plover (*Charadrius melodus*) pairs breeding in the Great Lakes. Reproductive success was measured as number of chicks fledged per pair for 415 successfully hatched nests during 1993-2009. Using Poisson regression, we determined that reproductive success increased with location experience of the breeding female ( $\beta_{\text{yloc}} = 0.069$ , SE = 0.026), but after statistically controlling for this effect, there was no additional effect of location experience of the male or the pair, age, prior breeding experience, or prior mate experience. Additionally, fledging success declined with later hatching dates, so we examined the relative influence of age and experience on Julian hatch date. We found that both female and male ages were the best predictors of earlier hatch dates. Our results suggest improvements in reproductive success with age in Piping Plovers have two components: a direct effect of female location experience on fledging success, and an indirect effect of timing of breeding which leads to greater reproductive success through earlier nesting by older males and females.

0018

**Caribbean Roseate Terns: A potentially distinct population segment threatened by sea level rise**

Jorge E. Saliva

U.S. Fish and Wildlife Service, Boquerón, PR, USA

The western north Atlantic and Caribbean Roseate Terns (*Sterna dougallii*) differ markedly in the coloration of the bill, linear measurements and body-masses, egg and clutch size, chick growth and asymptotic mass and average productivity. Additionally, they differ in nesting island size and vegetation composition, and range of prey species. Close to half the Caribbean population nests on islands barely above sea level, and most are small, decreasing in size, or abandoned historic sites. The colony at Cayo Guayanilla, Puerto Rico, dwindled by 2004, when over 90% of nesting habitat was submerged. After 2005, this island did not re-emerge in subsequent summers. Significant fluctuations in southwestern Puerto Rico colonies were observed between 1990 and 2000, but an increasing trend is apparent as of 2011. The Caribbean population is the only tropical population of Roseate Terns in the North or South Atlantic Oceans, and hence the only tropical population of the subspecies *S. d. dougallii*. If it were lost, re-colonization from the tropical populations in the Indian or Pacific Oceans would be extremely unlikely. The Roseate Tern is a good indicator species of the impact of global warming and sea level rise, because of its selection of nesting habitat at or near sea level and its dependence on juvenile fish for food. This presentation discusses reasons for a potential classification as a

distinct population segment, current status of this population, and vulnerability to the effects of climate change.

**0019**

**Effects of human activity on American Oystercatchers breeding at Cape Lookout National Seashore, North Carolina**

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<sup>1</sup>North Carolina Cooperative Fish and Wildlife Research Unit, Department of Biology, North Carolina State University, Raleigh, NC, USA, <sup>2</sup>U.S. Geological Survey, North Carolina Cooperative Fish and Wildlife Research Unit, Department of Biology, North Carolina State University, Raleigh, NC, USA

As human populations and associated development increase, human-wildlife conflicts are occurring with greater frequency. Anthropogenic noise is an often overlooked and poorly understood source of potential wildlife disturbance. We seek to assess the effects of human noise and activity on American Oystercatchers (*Haematopus palliatus*), nesting at Cape Lookout National Seashore in North Carolina. The species has a federal designation with the U.S. Fish and Wildlife Service as a "bird of conservation concern" and is deemed of "special concern" by the State of North Carolina. Our study is focused on the effects of various forms of anthropogenic activity, including military jet overflights, vehicles, and park visitors, on the behavior, physiology, reproductive success, and survival of American Oystercatchers at Cape Lookout. We employed a variety of technologies including; audio recorders to monitor sound levels, video cameras to monitor oystercatcher incubating behavior and beach activity, and microphones to monitor heart rates of incubating birds, to assess effects. Initial results show a minimal behavioral response to aircraft, and a potential behavioral response to vehicles. Average daily nest attendance was high, with successfully hatched nests exhibiting greater overall nest attendance. Preliminary results from heart rate monitoring show a small, but insignificant, physiological response to human activity. Oystercatchers may be an example of a species' ability to adapt to some anthropogenic encroachment, allowing for a balance of human pursuits and wildlife population survival.

**0020**

**A telemetry-based study of Great Egret (*Ardea alba*) food-provisioning rates and nest-attendance patterns**

Heather Stone<sup>1</sup>, Alan Maccarone<sup>1</sup>, John Brzorad<sup>2</sup>

<sup>1</sup>Friends University, Wichita, Kansas, USA, <sup>2</sup>Lenoir-Rhyne University, Hickory, NC, USA

Seven Great Egrets (*Ardea alba*) captured at feeding sites in Wichita, Kansas, were outfitted with leg-mounted radio transmitters. From mid-May through late July, these birds were followed by automobile as they departed the breeding colony or were located at foraging sites when their signals were detected. Here we document seasonal patterns in food-provisioning rates, foraging habitat use, and foraging flight distances. A data logger set out in the colony in mid-May recorded daily and seasonal nest-attendance patterns for six of these birds. The use of radio-telemetry illuminated Great Egret activity patterns that changed throughout the breeding season. For example, nest attendance was highest during the egg and small-chick stages, but decreased steadily as chicks grew. We also document differences among individuals in virtually every

activity category. This included food-provisioning intervals, for which some birds were consistent in the duration of feeding trips but others showed more variation. Some birds stayed at the colony at night for most of the breeding season, whereas others consistently roosted at one or two alternate locations. Foraging flight distances were yet another measure that showed variation. One bird made several round trips each day of ~4 km, whereas another bird regularly made round trips of up to 70 km, and often remained away from the nest for most of the day. Distances to foraging sites were combined with published values on Great Egret energetics to estimate caloric requirements for food-provisioning flights. These costs are then examined as part of a Great Egret's overall time-and-activity budget.

## 0021

### **The effects of Bald Eagle (*Haliaeetus leucocephalus*) predation on Herring Gull (*Larus argentatus*) nesting colonies in Maine, USA**

\*Katherine Shlepr

*College of the Atlantic, Bar Harbor, ME, USA*

Nesting Bald Eagle numbers in coastal Maine have increased from approximately 100 pairs in 1906 to over 1000 pairs in 2011. Herring Gull populations in parts of Maine have declined over 60% in the last decade, with several in-shore nesting colonies being completely abandoned. The impact of Bald Eagle activity on Herring Gull nesting behavior was recorded on Great Duck Island, ME (lat. 44 8'N, long. 68 10'W). The distribution of Herring Gulls was mapped and compared to data collected over the past 21 years; eagle activity in the most densely populated gull colony was recorded, as was gull behavior before, during, and after Bald Eagle sightings. Eagle fly-bys or attacks were recorded on 46 days of a 58-day season, with as many as 15 incidents in a single day. Immature eagles were the most common intruders, but adults often accompanied juveniles or foraged on their own. When eagle sightings became most frequent, crows and ravens were seen scavenging in the gull colony, and gull eggs were found at the base of a raven nest on the island. Gull and cormorant populations on nearby islands were also surveyed in order to assess how numbers have shifted elsewhere. Eagle predation raises questions about the management of gulls and eagles alike.

## 0023

### **Headstarting: An experimental study to improve nest success of American Oystercatchers**

\*Samantha Collins<sup>1,2</sup>, Patrick Jodice<sup>1,2</sup>, Felicia Sanders<sup>3</sup>

<sup>1</sup>*School of Agricultural, Forestry and Environmental Sciences, Clemson University, Clemson, SC, USA,* <sup>2</sup>*U.S. Geological Survey South Carolina Cooperative Fish and Wildlife Research Unit, Clemson University, Clemson, SC, USA,* <sup>3</sup>*Department of Natural Resources, Santee Coastal Reserve, McClellanville, SC, USA*

The Cape Romain Region (CRR) is located along the coast of South Carolina and supports over half of the breeding pairs (approximately 200 pairs) of American oystercatchers (*Haematopus palliatus*) in the state. Oystercatcher productivity in this area is often low due in part to nest predation and over-wash of nests from high tides and boat wakes. The purpose of this study was to determine if reproductive failure due to nest loss could be reduced. We employed a headstarting program in an effort to increase nest success during the 2010 and 2011 breeding seasons. We randomly collected partial clutches from nests in two study areas within CRR.

Wooden dummy eggs that were painted to resemble oystercatcher eggs were secured in the nest scrape and a single 'real' egg was also left in the nest to assess predation activity. We incubated eggs in a poultry incubator until hatching and then returned eggs to their original nests. 65% of headstarted nests hatched across both years, however, only 22% of headstarted nests that hatched had chicks survive to fledging. Predation appeared to account for a substantial proportion of chick loss. Therefore, although headstarting may enhance nest survival in the CRR, predator control also may be needed to allow chicks to survive to fledging age.

**0024**

**Black Rail status and threats along the Atlantic Coast**

Michael Wilson<sup>1</sup>, David Brinker<sup>2</sup>, Bryan Watts<sup>1</sup>, Jim McCann<sup>2</sup>, Fletcher Smith<sup>1</sup>

<sup>1</sup>*Center for Conservation Biology, Williamsburg, VA, USA*, <sup>2</sup>*Maryland Department of Natural Resources, Wildlife and Heritage Service, Catonsville, MD, USA*

The Black Rail may be the most imperiled bird species along the U.S. Atlantic Coast. Black Rail populations have been declining in the eastern United States for over a century resulting in a retraction of its breeding range, an overall reduction in the number of breeding locations within its core range, and a loss of individuals within historic strongholds. Historically, the northern edge of this breeding range may have once extended as far as Massachusetts but contracted south to New York sometime in the early twentieth century. Populations in the Chesapeake Bay have declined more than 85 % over the past 15 years. Recent evidence suggests that Black Rails may only breed in a dozen or fewer places in each state along the eastern U.S. coast. It is unlikely that Black Rails will persist in many portions of this range without timely and appropriate conservation action. The reason for the dramatic decline of Black Rails is not completely known but may be a result of one or more factors. Negative impacts can include habitat loss and degradation, predation, and environmental contaminants. Black Rails also occupy habitats that are vulnerable to land - use change or sensitive to changes in climate. Catastrophic losses of Black Rail habitat are expected with accelerated rises in sea - level.

**0025**

**Waterbird monitoring in and above offshore waters of western Lake Michigan**

Noel Cutright, William Mueller

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The emerging development of wind power may pose many challenges to the wildlife of the Great Lakes region. Among these challenges include an array of as-yet-unknown effects on avian populations that utilize the airspace above the surface of the Great Lakes as well as the water surface itself. Assessing potential risks to birds utilizing the Great Lakes is a key to moving forward with wind power development. Fourteen, twin-engine, fixed-wing, aircraft surveys were conducted along transects 3.2-16.1 km off the western shore of Lake Michigan from Evanston, IL to central Door County, WI between October 12, 2010 and May 4, 2011. A double-observer protocol was utilized to help eliminate potential detectability concerns regarding survey results. Transects were oriented north-south as a fuel-conservation strategy and spaced 5 km apart throughout the surveyed region. Transects were subdivided longitudinally into 2.5-km segments for recording purposes. The aircraft flew at 148 km/hr ground speed following the mapped transects in alternating directions. Surveys were flown at a 100 m aircraft altitude in favorable

weather for flying and observing. Long-tailed Duck, Red-breasted Merganser, and Common Goldeneye accounted for >87 percent of the >64,000 individuals of the 16 species identified. Totals were not recorded for Ring-billed and Herring Gulls. Seasonality, distribution, and relationship to water depths will be presented.

## 0028

### **Emerging diseases in waterbirds - A look at Patuxent Research**

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Threats of infectious diseases in wildlife, humans, and domestic animals have increased over the past quarter century. Waterbird species are commonly affected by these diseases but the extent to which they are victims of infection or vectors of dispersal is not always clear. Here we introduce two programs focusing on waterbirds and disease at Patuxent: vaccination and control of diseases in captive colonies, and the USGS Wild Bird Avian Influenza Program. As part of the captive colony work, Patuxent scientists have developed vaccination programs for the endangered Whooping Cranes (*Grus Americana*) against eastern equine encephalitis and West Nile virus as well as control for disseminated visceral coccidiosis; avian malaria has also been studied in the seaduck colony. The USGS Wild Bird Avian Influenza program began in 2006 in an attempt to understand the role wild birds play in the spread of highly pathogenic avian influenza H5N1. The program began with the study of migration patterns of wild waterfowl from the large influenza outbreak on the Qinghai-Tibetan Plateau of China that killed more than 6000 birds in 2005. We investigated patterns of migration movement and timing in relation to disease outbreaks, domestic poultry, and human activity. The program expanded under partnership with the United Nations Food and Agriculture Organization to apply these questions in areas of persistent emergence and re-emergence across 12 countries of Asia and Africa from 2007 through 2011. Multiple migratory links have been discovered through this work and potential patterns of viral dispersal have been identified among regions.

## 0029

### **Activity patterns of Great Egrets and Snowy Egrets: A seasonal comparison**

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We recorded the foraging activities breeding of Snowy Egrets (*Egretta thula*) and Great Egrets (*Ardea alba*) in Kansas, and of non-breeding birds in Florida. For Snowy Egrets, we supported the hypothesis that seasonal changes in energy demand manifest themselves in differences in foraging behavior. Based on scan samples, ambulation was the most common activity for breeding Snowy Egrets (56% of all birds), but 51% of all non-breeding birds were loafing. Based on focal samples, the energy devoted to ambulation during the breeding season averaged 0.38 W in open rivers and 0.22 W at weirs, but only 0.17 W during the non-breeding season. For Great Egrets, we falsified the same hypothesis. Based on scan samples, standing-foraging was the most common activity both for breeding (54%) and non-breeding (38%) birds. Energy spent on

ambulation differed only slightly: 0.11 W during the breeding season vs. 0.09 W during the non-breeding season. Detailed focal behavioral observations revealed that few of the 16 behaviors associated with foraging influenced caloric gain. For non-breeding Snowy Egrets, flying relocations within the foraging patch increased caloric gain; during the breeding season, bill-clapping had similar predictive power. For non-breeding Great Egrets, 46-90° turns predicted caloric gain, but no independent variables predicted caloric gain among breeding birds.

### 0030

#### **Kleptoparasitism of Black Guillemots (*Cepphus grylle*) by Herring Gulls (*Larus argentatus*)**

\*Amanda Posey

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Kleptoparasitism by Herring Gulls (*Larus argentatus*) and other larids has been discussed in a number of studies and is of concern in conservation efforts in the Gulf of Maine. The extent and possible impact of these interactions requires quantification as part of any management assessment. Black Guillemots (*Cepphus grylle*) nest under large irregularly shaped rocks in berm areas along the shoreline of Great Duck Island, ME, USA, and primarily feed on Rock Gummel (*Pholis gunnellus*) which they carry openly in their beaks. In the summer of 2011, I observed the frequency of kleptoparasitism of Guillemots by Herring Gulls with Guillemots nesting in a densely populated gull colony. Previous studies suggest that Guillemots will make multiple circling trips over the berm before entering their nests in the presence of other seabirds. I recorded attempts by gulls to take fish from Guillemots as well as the number of times an adult would circle the berm, comparing it to a site without gulls. In over 700 samples, there were seven occurrences of kleptoparasitism, suggesting that there is little impact by gulls on Guillemots in that area. In the site with nesting gulls, approximately 30% of Guillemots circled their nests before entering. In comparison, the control site results showed only 2% of Guillemots exhibited circling behavior. Overall, my results suggest that while Guillemots may have to expend some additional energy in avoidance behavior in areas with gulls, there is only limited evidence of a heavy impact from kleptoparasitism by Herring Gulls.

### 0032

#### **Conservation genetics of the Common Tern in the North Atlantic region; implications for the critically endangered population at Bermuda**

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Common Terns nesting in Bermuda are isolated by 1,000 km from the mainland of North America, by 2,300 km from the Gulf coast of USA and the southern Caribbean, by 3,000 km from the Azores, and by >4,000 km from those in the Canary Islands and mainland Europe. This population experienced a severe demographic bottleneck as a result of Hurricane Fabian in 2003 and was subsequently re-established by four males and four females. Using seven microsatellite loci, we compared the genetic diversity of the pre- and post-bottleneck populations, compared the genetic profile of the Bermuda population with those of other populations around the North Atlantic Ocean and mainland Europe, and assessed the relative contribution of immigration to genetic diversity. We found a loss of genetic diversity (number of alleles and heterozygosity) in



the post-bottleneck Bermudian population (4.6 to 2.9 and 0.56 to 0.52). We also report strong differentiation between all sampled locations ( $F_{ST} = 0.16$ ) with little evidence for immigration influencing population dynamics in Bermuda. Common Terns from the Azores were genetically more similar to those from mainland North America than to those from Bermuda or mainland Europe. Our results suggest that the critically endangered population in Bermuda is genetically distinct and requires continued and enhanced conservation priority.

**0033**

**Species-specific responses to breeding site characteristics predict colony persistence in Great Lakes colonial waterbirds**

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Sixteen species of colonial waterbirds nest at both island and mainland sites on the North American Great Lakes. In this dynamic environment, many breeding colony locations change from year to year; the ability to predict which currently occupied sites will persist as breeding sites in future years will help conservationists and wildlife managers to better protect this diverse and unique avian community. We hypothesized that site-specific variables can be used to predict the likelihood of colony persistence at a given site. We investigated four environmental variables (geographic location, landform, susceptibility to flooding or connection with the mainland, vegetative history) and two social variables (species richness, nest abundance) as potential predictors of future site use. Using nest census data obtained during the Great Lakes Colonial Waterbird Survey (1976-2010), we generated a dataset of species-specific detections at over 700 unique waterbird colony sites in the U.S. Great Lakes and connecting waterways. We analyzed site use patterns with a hierarchical model of occupancy and species detection, evaluated with Bayesian statistical methods in the program WinBUGS. Responses to site-specific variables varied by species. Thus, when selecting colony sites for perpetual protection, the best criteria for predicting colony persistence will depend on the identity of target species.

**0034**

**Symbiosis between birds and alligators? Testing the nest protector hypothesis**

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Wading birds (Ciconiiformes) appear to preferentially nest above alligators and alligator habitat. Alligators could benefit nesting birds by deterring mammalian predators. Chicks or food dropped from the bird nests could provide alligators with food. We tested selected predictions of this hypothesis using small willow-dominated colonies of little blue herons (*Egretta caerulea*), tricolored herons (*Egretta tricolor*), and snowy egrets (*Egretta thula*) in the central Everglades as experimental units. Using throughfall traps we estimated that a colony of 50 pairs has the potential to drop 170 grams of food over a 50-day nesting cycle. This may be nutritionally important to alligators, particularly during the dry season when movements may be limited and food is harder to find. We deployed predator tracking stations and found that raccoon presence in the Everglades was strongly dependent upon low water levels. Using helicopter surveys, we

found that alligators and wading birds associated significantly more often than expected by chance ( $p=0.007667$ , Fisher's Exact Test,  $N=40$ ). We also experimentally manipulated apparent densities of alligators and conspecific birds using alligator and white bird decoys to determine if wading birds were attracted to alligators via visual cues. Small wading birds showed a strong preference for sites with both alligator and bird decoys X2,  $p=0.0001$  ( $N=261$ ). Our evidence suggests that wading birds are attracted to nest near alligators, and that alligators receive nontrivial food benefits from nesting birds.

**0035**

**What, if anything, can point-count surveys reveal about abundance and long-term population trends of Black Terns?**

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The results of a shoreline survey of Black Terns (*Chlidonias niger*) in Wisconsin suggest a catastrophic (~70%) statewide decline in abundance and site occupancy between 1980 and 2011. However, due to potential biases associated with the survey design, alternative explanations for this apparent decline are possible. We evaluated the reliability of the survey in 2010 and 2011 by assessing habitat suitability and conducting additional surveys to rule out habitat degradation and compensatory site use. We also used a double-observer approach to test for detection and counting biases among observers, and we conducted flush counts to evaluate the assumption of a consistent index ratio between shoreline counts and actual abundance. Many of the sites on the transect survey were considered unsuitable breeding habitat for Black Terns, but the sum total of birds recorded on the additional surveys did not account for the decline noted between 1980 and 2011. Individual detection probabilities for observers all were  $\geq 0.90$ , and the combined detection probability for two independent observers exceeded 0.99. Abundance estimates from paired observers were strongly and positively correlated. The overall index ratio between shoreline counts and true abundance was 0.53, indicating that observers detected only about half the birds actually present. The index ratio differed according to wetland type but not according to the stage of the breeding cycle. The results of our critical assessment appear to confirm an actual large-scale decline in the Wisconsin Black Tern population since 1980, although it is probably lower than the transect survey indicates.

**0038**

**Conservation of American Oystercatchers *Haematopus palliatus* within an urbanized barrier island complex**

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Urbanization on the barrier islands along the Atlantic coast of North America has severely altered the traditional breeding habitat for many ground-nesting waterbirds in this region, including the American oystercatcher. We used an information theoretic approach to analyze various human-induced effects on oystercatcher daily nest survival rates and overall reproductive performance in an urbanized coastal ecosystem. We used explanatory variables including habitat

type, level of human disturbance, presence of mammalian predators, gull density and nest height as nest-specific covariates in our models to explore their effects on the daily survival rates of clutches and broods separately. We found an overall nest success rate of 4% in our study areas, which is far below the level necessary to sustain the local population. The principal factor negatively influencing daily survival rates of both clutches and broods was the presence of mammalian predators. The nest success rate on predator-free inlet and back-bay islands (21%) was an order of magnitude greater than the rate reported on barrier islands (2%), which have relatively high densities of predatory mammals. Ours is one of the few studies to comprehensively evaluate the nest success of American oystercatchers within alternative breeding habitats such as inlet and back-bay islands. Our results confirm the management conclusions of others that the best way to ensure the long-term population viability of American oystercatchers is to concentrate management on these alternative habitats. This protection strategy likely also has spillover benefits for other ground-nesting waterbirds.

**0039**

**Management responses to changes in Reddish Egret colony sites and nesting habitat in Texas**

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Most of the U.S. population of Reddish Egrets (*Egretta rufescens*) breeds on the Texas Coast, and data from annual colonial waterbird surveys, conducted in Texas since 1973, suggest a decline in Reddish Egret populations. The most recent comprehensive status report on Reddish Egrets was developed in 2006 (Green 2006). Many of the historically productive colony sites are supporting few or no breeding waterbirds. Though much of the Texas breeding population colonizes a small number of key island sites, the importance of smaller colonies (1 - 50 breeding pairs) should not be underestimated, particularly when key islands are abandoned or supporting predators. Threats like habitat loss, predation, and human disturbance may be more substantial now than in years past. Successful management is critical to meet target population objectives. We provide an update on the current status of Reddish Egrets colony sites in Texas as well as the current direction of on-the-ground management efforts.

**0041**

**Reddish Egret movements and mortality in the Florida Keys.**

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We fitted 8 Reddish Egrets (7 females, 1 male) with satellite transmitters in the lower Florida Keys during the 2009 and 2010 non-breeding seasons, resulting in 94 bird-months of tracking results. Five of the 8 were trapped on Boca Grande Key, a small, uninhabited island 18 km west of Key West with an unusually high density of Reddish Egrets. Of the 4 presumed mortalities, 2 occurred during cold temperatures in the winter of 2009-2010. The tagged egrets consistently foraged in a specific habitat that is limited in occurrence and extent: shallow tidal streams with firm, unvegetated bottoms that flow between areas of deeper water or drain tidal pools. All 8

egrets had relatively small within-season home ranges and made limited seasonal movements. Five of the 8 made only local excursions, traveling briefly to within 10 km of where they were tagged. The other 3 moved among several islands, ranging over 50 km from their capture locations. However, only 1, a female tagged on Boca Grande, lingered for an extended period at a distant site, spending both the 2010 and 2011 breeding seasons on Cudjoe Key before returning each year to Boca Grande (54 km). In summary, satellite-tracking data combined with direct observations suggested strong site fidelity with limited range areas and seasonal movements; highly competitive and aggressive foraging interactions; lower-than expected adult survival; and narrow habitat selection, which may further constrain this small, resident population. Funding was provided by the USFWS and the Felburn Foundation.

**0042**

**Yodel-lay-hee-who? In what context does recognition of individual male yodels appear to be important among common loons?**

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In addition to fighting ability and aggressive motivation, male Common Loons convey information about individual identity within territorial yodels. Though the yodel's importance in neighbor/non-neighbor discrimination has been demonstrated, individual recognition may also be important for mate recognition and conspecific prospecting/assessment of territorial rivals. We conducted experiments that considered the responses of resident females (N = 40) and prospecting conspecifics (N = 43) to acoustic playbacks of resident and non-resident male yodels. We found solitary females were less likely to approach yodels from non-resident males in comparison to their mates, but responded no differently to the two types of yodels when their mate was present. Additionally, conspecific prospectors did not land more or less frequently to playback yodels from the territorial resident versus a non-resident, but did land more frequently to playback yodels having higher peak frequencies (reflecting poorer fighting ability). These preliminary findings support the idea that females discriminate their mates' yodels from non-mates, and thus mate recognition, in addition to neighbor/non-neighbor discrimination, may be an important function of this complex territorial signal. These findings also indicate that assessment of fighting ability rather than the identity of a male may be important to a prospecting loon's decision to intrude and possibly compete for a breeding territory.

**0044**

**Tracking long-distance seabird migration to assess marine pollution impact**

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Animal tracking provides new means to assess far-reaching environmental impacts. In the aftermath of the *Deepwater Horizon* explosion in the Gulf of Mexico, a long-distance migrant - the Northern Gannet (*Morus bassanus*) suffered the highest oiling rates and considerable mortality. Analysis of bird-borne tracking data indicated that 25% of the North American

population of gannets from multiple colonies in eastern Canada migrated to the pollution zone. Findings contrasted sharply with available mark-recapture (band recoveries) data. Movement patterns implicate that most oil-induced mortality was absorbed by immature birds which will result in either of two outcomes: a lagged (likely difficult to assess) population decrease, or an undetectable response buffered by age-related life history adaptations. Tracking research is especially useful when little information on animal distributions in pollution zones is available, as is the case in the Gulf of Mexico. Ongoing research highlights current risks and conservation concerns.

**0045**

**Potential impact of sea-level rise and climate change on seabird nesting colonies in Maine, USA**

John Anderson

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Islands in the Gulf of Maine currently provide nesting sites to as much as 50% of seabirds nesting in the contiguous United States east of the Mississippi. Species include Herring and Black-backed Gulls, Black Guillemots, Double-crested and Great Cormorants, several species of terns, and Leach's Storm Petrels. Nesting islands in Maine are low, rocky, and subject to partial or total wash-over in major storms. With an expected sea-level rise of 1 to 1.5 meters in the next century, the National Park Service is concerned about loss of nesting species in areas under Park jurisdiction. I report here the results of initial surveys of islands owned or under easement to Acadia National Park in eastern Maine. Most islands were small, ranging from less than 2 to 20 hectares in area and consisted of heath-shrub uplands surrounded by a rocky berm. Elevation above sea-level was obtained using a survey quality total station, and evidence of nesting and species composition was recorded. While some islands have relatively steep sides and may be less vulnerable to initial sea-level rise, others proved much flatter and are at greater risk of wash-over. Species such as Black Guillemots that nest in the peripheral rocky berm and whose nesting period extends into the hurricane season are at greatest vulnerability to both sea-level rise and anticipated increase in frequency and intensity of storms.

**0046**

**Asynchronous morbidity, mortality, and media coverage of marine birds injured by the BP/Deepwater Horizon oil spill**

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Prolonged perturbation of the Gulf of Mexico ecosystem by the BP/Deepwater Horizon (DWH) oil spill contaminated vast areas of water column and ocean surface. Five weeks after the DWH well exploded on April 22, 2010, less than 100 birds had been tallied as oiled in the Consolidated Fish and Wildlife Collection Reports released through the Unified Area Command. After well-plugging on July 15, 2010, about 1,000 dead oiled and 1,200 live oiled birds then comprised the official tally. Daily collection reports ultimately showed, however, that 45% of cumulative acute morbidity and 67% of cumulative acute mortality was compiled only after well-plugging three months after the spill began. Tallies of dead oiled birds did not exceed tallies of live oiled birds until still later, on August 17, 2010, four months after the blowout. Cumulative acute mortality

that lags the cumulative acute morbidity by four months is an unusually delayed chronology in a marine bird community exposed to a large, point-source oil discharge. Google content analysis of media articles date-lined April 22 through December 15, 2010, showed that news coverage of the spill, measured by all stories, wildlife-focused stories, bird-focused stories, and stories alleging exaggeration of environmental impacts from the DWH spill, all crested during May-June 2010 before more than 70% of bird morbidity and mortality combined had yet even been tallied. Protracted tallies of mortality and morbidity statistics, reinforced by asynchronous, sparse, and/or inaccurate media coverage, cultivated an inaccurate perception of inconsequential impacts to marine birds from the DWH spill.

**0047**

### **Foraging behavior and foraging habitat dynamics of Reddish Egrets in the Laguna Madre of Texas**

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The Reddish Egret (*Egretta rufescens*) is the rarest species of heron in North America and relies strictly on coastal habitat. The majority of the North American breeding population occurs along the Texas Coast with greatest concentrations occurring in the Laguna Madre of Texas. Successful management of Reddish Egrets depends on having a clear understanding of habitat requirements. Our research objectives were to delineate foraging habitat and to evaluate the relationship between foraging tactics and environmental conditions. We recorded 20-min foraging bouts by 386 Reddish Egrets and assessed the types and success of foraging tactics used. We measured water depth, seagrass coverage, ambient light, and wind speed at each foraging site. Water depth at foraging locations averaged 11.68 cm. The average percent seagrass coverage was 13%; most birds foraged in areas with <10% coverage. We identified eight foraging behaviors and modeled foraging behavior in relation to environmental variables using canonical correlation analysis. Low redundancy values (< 0.16) indicate that the four habitat variates created were not effective in explaining variation in foraging behavior. Foraging habitat fluctuated between 1,400 and 14,000 ha throughout the annual cycle with only 101 ha available  $\geq$  50 percent of the time. Large amounts of stable foraging habitat were available from August-October when both post-breeding adults and young of the year are present. Foraging habitat fluctuated widely during the breeding season. Identification of key foraging habitat will facilitate our understanding of impacts from future development plans in the Laguna Madre.

**0048**

### **Local and long-range movements of two populations of Great Egrets in the southeastern US**

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Egrets and other ardeids in the southeastern US are inferred to be wide-ranging, capable of large movement steps, and to some extent seasonally migratory. While local feeding movements are well documented, little is known about movement behavior at larger scales, especially during the nonbreeding season and especially with reference to local and regional environmental conditions.

We documented the movements of over 80 Great Egrets (*Ardea alba*) over the course of nine months. We captured nonbreeding adults in southeastern Louisiana (41), and in coastal South Carolina (40), predominantly via air powered net gun. Captured birds were fitted with satellite telemetry backpacks during the late summer, fall and winter of 2010-11. Nearly all of the Louisiana egrets captured maintained wintering and breeding home ranges within the southeast portion of the state, and no long distance movements were observed in this group. This evidence suggests that in appropriate habitat, coastal systems in the southern end of the US range can support year-round populations of egrets. In contrast, over half of the South Carolina birds traveled >300km to breeding sites during the spring of 2011. These migrations were typically conducted at night, rarely included stopovers, and could cover 900km within a 24 hour period. These results confirm the existence of highly migratory individuals, and demonstrate the importance of particular coastal habitats to wintering birds.

#### 0049

##### **Migration movements and foraging patterns of Common Loons breeding in the upper Midwest United States**

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Common Loons (*Gavia immer*) breeding in Minnesota, Wisconsin, and the Upper Peninsula of Michigan were equipped with satellite transmitters during summers 2010 and 2011 to provide information on movements and wintering ground affiliations. The project was part of an effort to study the migratory movements and foraging patterns of sentinel fish-eating waterbirds while migrating through the Great Lakes in association with a USGS study on avian botulism. Botulism intoxication, which causes the paralysis and death of intoxicated vertebrates, is caused by ingestion of neurotoxins produced by the bacterium *Clostridium botulinum*. Periodic outbreaks of type E botulism have resulted in die-offs of fish and fish-eating birds in the Great Lakes since at least the 1960s, but outbreaks have become more common and widespread since 1999, particularly in Lakes Michigan and Erie. Archival geolocator tags were also attached to the 31 radiomarked loons, and an additional 83 loons were equipped with geolocator tags only. These devices were programmed to record a daily location estimate, temperature, and pressure data to provide information on foraging depths. An understanding of feeding patterns and exposure routes of sentinel waterbird species historically at risk to botulism die-offs, such as the common loon, is central to developing ecological studies to assess pathways of botulism exposure through aquatic food chains in the Great Lakes. Movements of radiomarked loons are posted on the UMESC public website ([http://www.umesc.usgs.gov/terrestrial/migratory\\_birds/loons/migrations.html](http://www.umesc.usgs.gov/terrestrial/migratory_birds/loons/migrations.html)).

**0051**

**Marine and hydrokinetic energy development: technology, regulation, and potential impacts to diving birds**

Andrew Bernick, Stephen Bowler

*Federal Energy Regulatory Commission, Washington, DC, USA*

Marine and hydrokinetic energy (MHK) projects generate electricity from wave action or the unimpounded flow of tides, ocean currents, or inland waterways. There are presently over 200 MHK projects proposed for U.S. waters. Projects in coastal and inland waters are under the jurisdiction of the Federal Energy Regulatory Commission (FERC), while those sited on the Outer Continental Shelf are under FERC and the Bureau of Ocean Energy Management, Regulation and Enforcement (BOEMRE) jurisdiction. MHK technologies vary greatly in form (from buoy-type devices to rotor and helical turbines) and in their placement within the water column. Risk assessments of MHK projects indicate a range of possible interactions with diving birds (i.e., seabirds, diving ducks, loons, cormorants, and others) during construction and operation, with potential effects ranging from mortality due to collision or entanglement with equipment to behavioral changes. Because of the large number and varied locations of proposed MHK projects, development of robust and efficient methods to assess potential effects on diving birds are necessary to provide adequate information for project siting, review, and licensing. Studies, monitoring plans, and adaptive management strategies have been developed for U.S. projects operating on a pilot basis in riverine and estuarine systems. As some MHK project effects may be analogous to the potential effects associated with the construction and operation of wind energy projects, recent research on diving birds and offshore wind development could be valuable in understanding impacts of MHK projects.

**0052**

**Fire management and Yellow Rails: Response of Yellow Rails to habitat conditions and fire history at Seney NWR, Michigan**

Jane Austin, Deborah Buhl

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The Yellow Rail is a focal species of concern associated with shallowly flooded emergent wetlands, most commonly sedge meadows. Yellow Rail populations are believed to be limited by loss or degradation of wetland habitat due to drainage, altered hydrology, and fire suppression, factors which have resulted in encroachment of shrubs and change in vegetative cover in many sedge meadows. We conducted nocturnal tape-playback surveys for Yellow Rails at 64-69 points each of 3 years at Seney National Wildlife Refuge in the Upper Peninsula of Michigan. We used generalized linear mixed models to assess the effects of covariates on the detection of Yellow Rails. Covariates included water depth, litter depth, graminoids and forb cover, graminoid height, shrub cover, visual obstruction (cover board), time since last fire, and land cover types at 2 scales around each point; year was included in all models as a repeated measure. In preliminary analyses, the best model contained year and time since last fire (0-2, 3-5, and >5 yrs) ( $w = 0.926$ ). Next best models ( $\Delta AIC > 5$ ) included covariates of cover types and water depth. The probability of detecting a Yellow rail was 0.41 for points burned within the previous 2 years, 0.13 for points burned 3-5 years previously, and <0.05 for points burned >5



years previously. Results from further analyses of these data and data on fire effects on the plant community and structure will help wetland managers restore and maintain open sedge systems.

### 0053

#### **Seasonal movements of adult Reddish Egrets marked with satellite transmitters**

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Movements, migration routes, and wintering areas of Reddish Egrets (*Egretta rufescens*) are relatively unknown. We studied movements of adult Reddish Egrets marked with satellite transmitters to understand movements during the breeding season, migration, and winter. We attached satellite-GPS transmitters to 11 adults in 2010 and 10 additional adults in 2011 and obtained 6 locations each day throughout the annual cycle. We lost signal on 2 individuals prior to migration in November 2010. Two other adults died on return trips from wintering areas in spring 2011. Four adults did not migrate from the Texas Laguna Madre during winter and remained relatively close to breeding colonies. The remaining 5 adults migrated to Mexico to winter (2 in the Tamaulipan Laguna Madre, 1 to Campeche on the Yucatan Peninsula, and 2 to the Pacific Coast of Mexico [1 to Chiapas and 1 to Oaxaca]). Migratory movements were initiated in mid- to late November in 2010 and adults that migrated returned to the Texas Laguna Madre in late March to early April. All migratory individuals heavily used wetlands along the eastern Gulf Coast of Mexico during migration. Three individuals made non-stop flights of over 500 km during migration. Identification of important stopover and wintering areas will help guide management plans and increase our understanding of the connectivity among breeding populations.

### 0054

#### **Use of satellite telemetry to observe first-year movements and survival of juvenile Reddish Egrets on the Gulf coast**

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Data on the life history of juvenile Reddish Egrets (*Egretta rufescens*) are scarce. Information pertaining to post-fledging dispersal is potentially integral for the development of effective conservation planning. In addition to providing this basic information about the species, knowledge of differences in movements between the two plumage morphs could illuminate additional mechanisms that play a role in the maintenance of the species' plumage dimorphism. In this ongoing study, dispersal and survival of juvenile Reddish Egrets are measured using satellite telemetry. Data on 25 juveniles from the Texas coast were collected from mid-June 2010--August 2011. Through this 15-month period, the cohort has shown highly erratic and unpredictable movements and have ventured an average of ~200 km from their natal colonies. Moving an average of ~3 km/day, individuals have traveled as far east as Florida and south to Tamaulipas, Mexico. The highly variable movements may indicate declines in quality habitat across this population's range. If foraging grounds are becoming increasingly unavailable,

inexperienced juveniles may have difficulty establishing territories, leading to higher mortality due to exhaustion, starvation or predation. This hypothesis holds implications for the entire Laguna Madre ecosystem. Survival has been difficult to determine due to the size of our study site, but measures of transmitter survival do not show any differences between plumage morphs. Differences in movements between sexes are also assessed. The satellite transmitters attached to the birds have a potential lifespan of 3 years, providing the opportunity for further data collection through the summer of 2013.

**0056**

**Fine-scale foraging movements and tern colony site-attendance of a generalist forager, the Gull-billed Tern (*Gelochelidon nilotica vanrossemi*)**

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Gull-billed Terns (*Gelochelidon nilotica vanrossemi*) are a local summer resident to Southern California and have been petitioned for listing under the U.S. Endangered Species Act. They are linked to depredation of other ESA listed seabirds yet little is known about their foraging behavior. As part of a project exploring the foraging ecology of Gull-billed Terns breeding in San Diego Bay, we are using a combination of field techniques, VHF radio telemetry and colony monitoring, to obtain data on fine scale foraging movements and diet of both Gull-billed Tern adults and chicks. Tracking radio-tagged Gull-billed Terns via standard VHF telemetry protocols is challenging: the terns are sensitive to disturbance, have a wide range of foraging habitats, and forage on the wing. To meet the challenge of discerning fine scale movements of individual terns, we paired stationary radio telemetry with active telemetry. Stationary telemetry documents the frequency and length of radio-tagged tern visits to a particular site, while manual telemetry provides information on the general presence of radio-tagged terns throughout the Bay. With the careful placement of these receiver stations, we are developing a clearer picture of Gull-billed Tern distribution in and around San Diego Bay, identifying important foraging sites, preferences, and potential interactions with other listed seabirds.

**0060**

**Migration and fidelity to wintering areas of Manx Shearwaters *Puffinus puffinus* nesting in Iceland**

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The Manx Shearwater *Puffinus puffinus* nests across the North Atlantic with its northernmost population located in the Vestmannaeyjar archipelago off the south coast of Iceland. There are indications that the Icelandic population has declined considerably during the last 20 years, at least within its largest colony of the archipelago on the island of Heimaey. While a part of this has been attributed to the presence of feral cats originating from Heimaey's town it is necessary to gain more knowledge of the species on both the nesting grounds and the wintering areas in order to develop comprehensive conservation measures. Geolocators, a light-based tracking

device, were deployed on nesting Manx Shearwaters in the archipelago during 2006 to 2010 and retrieved annually until 2011. Data were obtained from fourteen birds and their winter distribution analysed, with up to five consecutive years of data for some birds. All fourteen birds spent their winters on the Patagonian shelf in the South Atlantic, south to Tierra del Fuego. Most birds seemed to favour the same areas within the shelf year after year. This study, together with those on Manx Shearwater populations from the United Kingdom, suggest that virtually all Manx Shearwaters in the world winter every year on Patagonian waters, pointing out the management of this area as critical for the survival of the species.

## 0061

### **Vessel surveys reveal distributions of marine birds in the Gulf of Maine**

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The Gulf of Maine and Scotian Shelf are productive habitats for seabirds from both northern and southern hemispheres. Anthropogenic impacts have and are continuing to influence Gulf of Maine ecosystems. Knowledge of the current status of seabird populations in this area is needed to provide effective protection and to monitor change. We examined the Canadian Wildlife Service vessel surveys from the summers of 2006-2010 for the following objectives: 1) determine dominant seabird species, 2) investigate species composition and differences in distribution of bird groups, 3) compare distributions of Wilson's (*Oceanites oceanicus*, WISP) and Leach's Storm-petrels (*Oceanodroma leucorhoa*, LESP) to study differences in habitat use between locally breeding and non-breeding similar species. Dominant seabird species were Greater Shearwaters (*Puffinus gravis*, 44% total birds), followed by phalaropes (30%) and storm-petrels (10%). More species of non-breeding birds were observed compared to breeding, and biomass calculations revealed more than 4 times greater biomass of non-breeders versus breeders. Diving species were less diverse than surface foragers, but more diving birds were observed overall. WISP were distributed closer to shore, though higher densities of LESP were seen inshore. Niche overlap of 50% kernel densities was less than 1% for the two species. Low numbers of both storm-petrel species were widely dispersed throughout the study region, and overlap at 100% kernel densities was 43%. The Jordan Basin is highlighted as an area of consistent high bird densities and should be considered as a candidate area for protection.

## 0063

### **Research on wintering waterfowl on Chesapeake Bay: What we have learned and where we are headed**

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The Patuxent Wildlife Research Center has always had an active role in waterfowl research on the Chesapeake Bay. When the submerged aquatic vegetation declined, especially after hurricane Agnes in 1972, it directly affected the wintering populations of Canvasbacks (*Aythya valisineria*) and Redheads (*Aythya americana*). The Canvasbacks were able to adapt to the changing food resources and took advantage of the abundant availability of Baltic macoma (*Macoma balthica*). In contrast, the Redheads, being preferably herbivorous, left the Bay for more favorable habitats and are seen in relatively small numbers now. Present research focuses on seaducks and Black

Ducks (*Anas rubripes*). Recent studies in the central Chesapeake Bay have demonstrated that wintering scoters (*Melanitta* sp.) feed on bivalves, primarily *Ischadium recurvum* and secondarily on *Mulinia lateralis*, species found on hard bottom oyster reef and sand habitats, respectively. Based on nutrient content, metabolizability, intake rates, and energy expenditure, the foraging value for *M. lateralis* is significantly lower than *I. recurvum*. If scoters were forced to feed only on *M. lateralis*, we found this food source would be only marginally sufficient to maintain wintering populations on the Bay. In response to Executive Order 13508, resource agencies and partners are now collaborating with Patuxent scientists in modeling the ecological services of oyster reefs as vital living resource habitats. In addition, new research is being undertaken to estimate the energetic winter carrying capacity of Bay habitats for Black Ducks, including future potential alterations due to sea level rise and land use changes.

## 0065

### **Monitoring colonial waterbirds in the U.S. Great Lakes: A new approach to an old survey**

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The Great Lakes comprise the largest freshwater island system in the world. Since the 1970s, monitoring to regularly assess status of Great Lakes colonial waterbirds has included a complete decadal count of all nesting birds at all sites. However, colonial waterbirds can undergo dramatic population changes over short periods and can experience slow rates of recovery. Therefore, a ten year interval between survey efforts may allow important changes or problems in a population to go undetected, and additionally has resulted in obtaining only four data points over approximately thirty years. Here, we present a method to estimate colonial waterbird population trends for all species except marsh terns based on more frequent monitoring at a limited number of focal sites. Criteria used to identify focal monitoring sites included high species diversity, significant concentrations defined for most species, productivity, frequency of site use and / or management potential. A total of 102 focal sites was identified, 13% of the total known colonial waterbird sites, and captured the majority (61 – 100%) of pairs of each colonial waterbird species breeding in the Great Lakes. Comparing growth rates for seven species as detected by monitoring all Great Lakes sites vs. focal sites indicated trends detected by both approaches were similar for all species with few exceptions. We recommend transitioning to this focal site approach in the Great Lakes, incorporating adaptive efforts as necessary to identify and track important population changes, and verifying focal sites every 10-15 years through aerial reconnaissance work.

## 0066

### **Stable isotopes infer origins of shorebirds utilizing an Alaskan estuary during migration**

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Chickaloon Flats, Kenai National Wildlife Refuge, Alaska, is a 70 km<sup>2</sup> tidal mudflats located along the northern part of the Kenai Peninsula in upper Cook Inlet. It is a smaller protected coastal estuary stopover site along the Pacific Flyway. Almost one third (23 of 73) of shorebird species recorded in Alaska utilize this stopover during spring and/or fall migrations. This study utilized a multi-isotopic approach to estimate probable breeding and/or wintering origins of six

species of shorebirds utilizing Chickaloon during spring and fall migration of 2009 and 2010. Hydrogen ( $\delta D$ ), Carbon ( $\delta^{13}C$ ), and Nitrogen ( $\delta^{15}N$ ) were analyzed from feathers and a likelihood-based assignment was used to inform North American (NA) and South American (SA) origins. Only Lesser Yellowlegs feathers (*Tringa flavipes*) indicated wintering (n=4, coastal SA) and breeding (n=26, central Alaska) ranges. Estimated wintering ranges for least sandpipers (*Calidris minutilla*, n=13) occurred in Southern NA to northern SA, Long-billed Dowitchers (*Limnodromus scolopaceus*, n=8) occurred in Mexico, and pectoral sandpipers (*Calidris melanotos*, n=11) occurred in northeastern SA. Estimated breeding ranges for Greater Yellowlegs (*Tringa melanoleuca*, n=67) occurred in southwest Alaska, and Short-billed Dowitcher (*Limnodromus griseus caurinus*, n=26) occurred in south-central Alaska. The use of stable isotopes to infer molt origins of birds has proven to be a useful and important tool in migration and conservation studies. This study has shown probable origins of long-distance shorebird migrants, some of high conservation concern, utilizing an Alaskan stopover site, and has helped in identifying habitats and previously unknown areas used by Alaskan breeding shorebirds.

## 0070

### **State-wide monitoring of the American Oystercatcher population in North Carolina**

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In 1999, an examination of the U.S. Shorebird Conservation Plan and its priority species recognized the American Oystercatcher (*Haematopus palliatus*) as a species needing significant conservation efforts due to declining abundance. The American Oystercatcher is present in North Carolina during all seasons and is, thus, dependent on many coastal habitats. Surveys of oystercatchers during winter, migration, and nesting seasons to estimate abundance, distribution, and types of habitat selected began in the late 1990s via collaborative efforts of state, federal, and non-governmental organizations. Data are used to direct conservation efforts at factors effecting population decline, displacement, or habitat loss. Winter roost sites host >500 birds from Oregon Inlet to islands within the Cape Fear River. Consistently-used staging sites during fall and spring migrations have been identified, and movement of birds from other states through North Carolina has been revealed via banding and resighting efforts. Summer coast-wide surveys in 1999, 2004, 2007, and 2010 detected  $336 \pm 14$  (mean  $\pm$  SE) oystercatcher pairs. These data and intensive studies that precipitated from them, are providing greater understanding of the American Oystercatcher population in North Carolina and conservation efforts necessary to protect it.

0073

**Oceanography of the Gulf of Mexico and exposure and recovery of marine birds injured by the BP/Deepwater Horizon oil spill**

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As the largest accidental marine oil spill in history, the BP/Deepwater Horizon (DWH) blowout discharged 206 million gallons of liquid petroleum and 500,000 tons of gaseous hydrocarbons into the Gulf of Mexico. Hydrocarbons and 1.84 million additional gallons of dispersant contaminated extensive portions of the water column and ocean surface. By May 24, 2010, surface area of the DWH slick was 75,000 km<sup>2</sup>, with the cumulative footprint eventually reaching 176,119 km<sup>2</sup>. Although the slick's extent and location varied with atmospheric and oceanographic conditions, both oil and the injured birds deposited on coastlines generally conformed to model predictions for prevailing currents in this region and season. In 2010, however, the large, anti-cyclonic "Eddy Franklin" detached from the Loop Current, with the atypical result that DWH oil was less likely to disperse via exiting the Gulf proper. A complex system of frontal eddies and jets associated with the eastern side of the Loop Current during the spill entrained oil (some traced back to DWH) to just north and northwest of seabird colonies in the Florida Keys. Furthermore, oil and its weathered by-products were concentrated with pelagic seabirds at these current convergences. In 2011, an atypically large volume of freshwater outflow from the Mississippi River covered much of the northern and northeastern Gulf, replacing the higher salinity waters favored by pelagic bird species. Potential consequences of the Gulf's typical and atypical oceanography are discussed within the context of the DWH oil spill and its injuries to the marine bird community.

0074

**Population dynamics of the Red Knot (*Calidris canutus rufa*) in Virginia during spring migration**

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The Western Hemispheric population of subspecies of Red Knot (*C.c.rufa*) has declined by 80-90% in North America. Most conservation efforts to date have focused on the Delaware Bay, where the Red Knot is a specialist feeding on eggs of Horseshoe Crabs. In the spring of 2006 The Center for Conservation Biology started a Red Knot resight program along the Virginia barrier island chain. Objectives for this study are to determine stopover duration for knots that use Virginia, estimate annual survival and annual fidelity to Virginia, develop a population model for Virginia, and determine total population size passing through Virginia annually. We scanned for Red Knots along transects once or twice per week. We observed 882 individually marked Red Knots from 2006-2010. Stopover duration in Virginia was 7-8 days through 25 May increasing to 9-12 days from 26 May to 6 June. Estimated annual survival was high ( $0.87 \pm 0.182SE$ ) and annual fidelity to Virginia was low ( $0.40 \pm 0.122SE$ ). The estimated annual number of Red Knots that pass through Virginia from 2007 to 2010 ranged from 12,600 to 14,700. The barrier islands along the Delmarva Peninsula in Virginia provide high quality habitat

for migrating Red Knots. This area contributes to high survival and supports thousands of birds in migration. Numbers of Red Knots using the Virginia barrier islands are more stable than in Delaware Bay in recent years. Our data indicate that the barrier islands of Virginia play an important role in the long-term persistence of the Red Knot population.

## 0075

### **Influence of spatial scale in assessing Least Tern foraging habitats on the Missouri River**

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Least Tern (*Sternula antillarum*) foraging habitats are classified as aquatic, but few systematic quantitative studies of these habitats have been conducted. We explored the importance of spatial scale in assessing how terns choose foraging habitats on the Missouri River. Habitat features were quantified at observed locations and random points during focal sampling (2007-2008), and during systematic surveys of the river for airborne birds (2006-2008). Multinomial and matched pairs logistic regressions were used to model habitat characteristics at foraging locations versus paired random locations, while logistic regression was used to compare landscape scale features from land cover maps derived from annually acquired high resolution satellite imagery. For each observation land cover habitats were summarized at multiple scales ( $\leq 50\text{m}$  radius,  $\leq 200\text{m}$  radius), and straight-line distances to potentially important habitat features (e.g., trees, wet sand, river bank). Within 200m, terns were associated with wet sand and sandbar habitats, while at 50m with trees and water; predictive accuracy of models was  $>85\text{-}99\%$ . Differences in landscape habitat use between foraging and flying Least Terns suggests foraging terns may optimize their proximity to areas with shallow water. Least Tern foraging site use was best explained by shallower water depths than at paired random locations. Foraging sites exhibited substrate variability, and were associated with landforms consistent with bar forms. Results demonstrate some consistency across spatial scales and years in Least Tern foraging habitat selection in the Gavins Point Reach of the Missouri River. Predicting Least Tern foraging habitat can aid assessment of planning and conservation efforts.

## 0076

### **Occurrence of pelagic birds and Macondo source oil in a Loop Current frontal eddy and associated features in June, 2010**

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Fronts and convergences are well-known physical oceanographic features that attract foraging seabirds and other animals. Within a month after the explosion of the Deepwater Horizon drilling rig, and during the time period that oil was freely flowing from the damaged Macondo-252 (MC-

252) well, circulation in the northern Gulf provided conditions in which weathered oil might accumulate at offshore convergences, increasing the potential for seabird exposure to petroleum and dispersants. Here we report the collection of weathered petroleum from a relatively large oiled water mass approximately 220 km southeast of the Macondo well in early June. The material was found in a convergence of flow between a cyclonic frontal eddy on the northeast edge of the Loop Current and an anticyclonic ring that appeared to have recently separated from the Loop Current. Band-rumped Storm-petrels (*Oceanodroma castro*) were observed foraging in this convergence zone and tar balls collected from the region were confirmed as originating from the MC-252 source with forensic analysis based on gas chromatography-mass spectrometry. To our knowledge, no other investigation simultaneously examined oceanographic features, oil presence, and pelagic birds during June in this deep-water region of the Gulf of Mexico while oil was still actively flowing from the damaged MC-252 well.

**0077**

**Nesting productivity of Black Skimmers in coastal Louisiana following the BP oil spill**

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We monitored the nest survival of Black Skimmers (*Rynchops niger*) to understand their reproductive response following the BP oil spill from May-July 2011 on the Isles Dernieres Barrier Refuge (IDBR) in coastal Louisiana. Similar to many coastal birds, there is a paucity of information on the effects of oiling events on skimmer reproductive ecology. The IDBR represents an ecologically sensitive area that is historically important habitat for wintering and breeding waterbirds, and is currently threatened by habitat loss, disturbance, and climate change. During the breeding seasons of 2009-2011, we monitored 469 skimmer nests on the IDBR. Daily nest survival rates (DSR) varied by year and was (0.958) in 2009, lowest in 2010 (0.923), and then increased in 2011 (0.973). In 2009, the estimated mean nest survival was 37.3% ( $n=240$  nests), in 2010 there was a decline in estimated success (15.8%,  $n=167$ ), and nest success seemed to improve (53.3%,  $n=62$ ) in 2011. Although skimmers historically nested on 4 islands in the refuge, only two islands supported breeding skimmers in 2011, west and east Raccoon Islands. Of the nests monitored ( $n = 62$ ), 53.2% of nests hatched successfully, while 46.8% of the nests failed due to abandonment, predation, or flooding. Our data suggest that the BP spill or associated activities may have had a negative impact on the reproductive performance of Black Skimmers in coastal Louisiana in 2010.

**0079**

**Distribution of colonial waterbirds in Oregon: Survey results from 2009-2011**

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According to the North American Waterbird Conservation Plan, one third of colonial waterbirds are at risk of population loss. It is unclear however, what this means for western colonial waterbirds because the population status of many species is not well understood. Population estimates are difficult to obtain because colony locations fluctuate temporally as existing locations become less habitable and more suitable locations emerge. Estimating population size



of species with these temporal-spatial shifts requires a coordinated inventory effort. Contributing to the US Fish & Wildlife Service's Western Colonial Waterbird Survey, Klamath Bird Observatory in conjunction with American Bird Conservancy coordinated monitoring efforts for 16 colonial focal species in Oregon from 2009 to 2011. Specifically, Klamath Bird Observatory implemented surveys in southern Oregon at 47 sites in 2009 for tree nesting and ground nesting colonies and 171 sites in 2010 for marsh nesting colonies. In 2011, tree and ground-nesting species surveys were expanded to approximately 200 sites statewide. Preliminary survey results on species occurrence and distribution will be presented. These data will be used to estimate populations in Oregon as well as contribute to west-wide population estimates and the Western Colonial Waterbird Survey Atlas.

**0082**

**Ecological and conservation implications of melanic primary feather pigmentation in waterbirds with an emphasis on Charadriiformes**

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Black melanic pigmentation confers strength to bird feathers. Feathers involved in flight are the most likely to benefit from the added strength. We assessed the frequency of black melanic pigmentation in the outer primaries and upper-back feathers of birds. Black melanic pigment was found in the flight-essential primary feathers more often than in the upper-back feathers, which do not play a major role in flight. Species in Charadriiformes (shorebirds, gulls, terns, and alcids) have black in their primaries more often than in other groups. Ecological factors that may increase feather wear in this group include wind and particulate abrasion, feather hydration due to swimming or diving, and exposure to ultraviolet radiation due to exposed habitats. The Ivory Gull *Pagophila eburnea*, lives year-round in the Arctic where conditions may preclude the necessity of melanic pigmentation. Since the Arctic environment has been altered by climate change, it is possible that the Ivory Gull may have difficulty adapting.

**0083**

**Effects of vegetative cover on reproductive success of Common Terns (*Sterna hirundo*)**

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Habitat selection may play an important role in the subsequent reproductive success of ground nesting waterbirds. Previous work suggests that Common Terns (*Sterna hirundo*) prefer to nest on sand, gravel or shell substrates with some relief (scattered, low vegetation; rocks; logs). However, in a mixed-species breeding colony at Presqu'ile Provincial Park, Ontario, common tern nesting habitat includes tall and dense vegetation, such that by fledging nests in some areas are surrounded by plants > 1 m in height. In our four year study of all nests at this site, six plant species predominated: each species provided different vegetative cover at ground level. We hypothesized that vegetative cover would have a positive effect on breeding performance (productivity, growth, time to nest failure) at Presqu'ile because of predation risk posed by neighboring gulls and Black-crowned Night Herons (*Nycticorax nycticorax*). We characterized nests based on vegetation type (species), height, and amount of exposed ground within 0.5 m. After controlling for lay-date, year and nesting density, our results showed that high levels of

vegetative cover can be important in some years. More specifically breeding performance was increased for pairs that nested in thicker shrubbier vegetation that provided dense cover throughout the chick rearing period. Nests laid in tall but sparse vegetation or vegetation that died back as the season progressed were generally less successful. Our results may have important implications for common tern habitat management in the Great Lakes, especially in light of recent population declines in this region.

**0084**

**The flight speed of parent Common Terns (*Sterna hirundo*) in relation to brood energy requirement and provisioning currencies**

Dave Moore

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One tactic parent birds can employ to increase delivery is to fly faster as they travel between foraging areas and their centrally located nest. To assess this, I measured the flight speed of Common Terns provisioning experimental broods of 1, 3, and 5 nestlings. Flight speed was affected negatively by wind effect, sidewind angle, flight altitude, and payload mass. Parents flew faster on inbound (delivery) flights than on outbound (foraging) flights. However, parents *did not* adjust their flight speed as a function of brood size. I evaluated parental performance by comparing measured airspeeds with the predictions made by three provisioning currencies. Simulation was used to find the combination of outbound and inbound airspeeds that maximized: (i) efficiency (EFF), (ii) rate of delivery (R), or (iii) the rate of delivery, subject to parents maintaining an energy balance (D). The later model predicts that parents should fly faster as the opportunity for self-feeding increases (here varied from 8 W to 58 W). Measured airspeeds were markedly slower than those predicted by either R or D (58 W) currencies. Inbound airspeeds were faster than predicted by EFF and slower than predicted by D (8 W). For outbound flight, the D (8 W) currency provided a slightly better fit with observed airspeeds than EFF. Flying at a speed that maximizes efficiency (or an efficiency-like currency; D at 8 W) is the only option that allows parents to forage for the entire daylight period without exceeding the theoretical limit to daily energy expenditure ( $DEE_{max}$ ).

**0085**

**Breeding site tenacity and productivity of Common Terns nesting on the North Channel of Lake Huron**

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During 2008-2011, we surveyed breeding colonies on northern Lake Huron, and recorded the number of nests in June to assess site tenacity. In 2010 and 2011, we also enclosed 10-30 nests at each of 4-5 colonies per year, and collected data on: egg size, hatching success, chick morphology, nestling survival to 21 d. There was considerable within-season movement of terns among colonies. Despite a net gain of nests between the first and last week of June, 2008, nests declined at 4 (15%) of 27 colonies, 8 (30%) sites were abandoned and 7 (26%) new colonies were established. We also observed inter-annual variation in site use, despite similar maximum annual nest counts (2,805 in 2008; 2,983 in 2010; 3,066 in 2011). Of the 27 sites occupied in

2008, 20 (74%) were not re-used and 5 new colonies were established in 2010; 5 of 12 (42%) colonies occupied in 2010 were abandoned and 10 new sites were established in 2011. In 2010, mean hatching success was intermediate ( $1.3 \pm 1.4$  eggs/clutch) and variable (range=0-2.4 per site), compared to high success in 2011 ( $2.4 \pm 1.0$  eggs/clutch; range=1.8-2.9 per site). In contrast, nestling survival to 21 d was low in both years (2010: mean brood size = 0.08, range=0-0.22 per site; 2011: mean= $0.25 \pm 0.61$ , range=0-1.40 per site). The apparent causes of egg and chick loss were related to weather/storm surge at some sites and predation at others. The observed low site tenacity and poor breeding success may have important implications for population dynamics in this region.

## 0087

### **A comparison of American Oystercatcher reproductive success among three habitat types in coastal Virginia**

Ruth Boettcher<sup>1</sup>, Alexandra Wilke<sup>2</sup>, Pamela Denmon<sup>3</sup>, Kevin Holcomb<sup>4</sup>

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Virginia supports the largest American Oystercatcher (*Haematopus palliatus*) breeding population along the eastern seaboard (731 pairs). Oystercatchers utilize four habitat types in the Commonwealth: (1) barrier beaches 395 pairs, 54%; (2) the seaside marshes 220 pairs, 34%; (3) the eastern Chesapeake Bay shoreline and adjacent islands (Eastern Bay) 103 pairs, 14%; and (4) the western Chesapeake Bay shoreline 13 pairs, 2%. From 2009 - 2011, we monitored oystercatcher breeding success in the first three habitats to obtain a more comprehensive estimate of statewide reproductive success and quantify differences in productivity based on habitat type. Annual statewide productivity estimates (range = 0.37 - 0.85 fledged young/pair) were near or above 0.38 fledged young/pair, the minimum value needed to maintain a stable population. Productivity estimates for the barrier islands ranged from 0.31 - 0.89 fledged young/pair, while estimates for the seaside marshes and Eastern Bay ranged from 0.42 - 0.70 fledged young/pair and 0.42 - 0.78 fledged young/pair, respectively. Barrier beaches exhibited the greatest range in productivity whereas annual estimates for seaside marshes and Eastern Bay were relatively similar. The barrier beaches are more stable in the long term and less subject to flooding, but harbor mammalian predators known to affect breeding success. Conversely, the seaside marshes and Eastern Bay are prone to annual tidal inundation and erosion, but are devoid of mammalian predators. While all three habitats currently support source populations, sea level rise and increased storm frequency may pose a more immediate threat to seaside marsh and Eastern Bay populations.

## 0088

### **“You are what you eat... plus a few permil.” Diet-tissue fractionation in the Double-crested Cormorant**

\*Elizabeth Craig<sup>1</sup>, Brian Dorr<sup>2</sup>, Katie Hanson-Dorr<sup>2</sup>

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Stable isotope analysis has become a valuable and widely used method in studying foraging ecology of colonial waterbirds. Stable isotope signatures in the tissues of fish-eating birds

correspond to the signatures of the fish they consume. However, it is not as simple as the saying “you are what you eat.” In reality “you are what you eat... *plus a few permil.*” The biochemical processes that turn your lunch into your own body tissue have the potential to alter isotope signatures; this phenomenon is referred to as diet-tissue fractionation. There is no universal diet-tissue fractionation rate for all species, or even for all tissue types within a single species. Therefore, before we can use isotope signatures to determine diet, we must first know the diet-tissue fractionation rate for both the species and tissue of interest. This study is the first to identify diet-tissue fractionation rates in the Double-crested Cormorant, a species whose foraging ecology and diet are of great interest to a wide range of biologists and wildlife managers. After feeding captive cormorants a diet of farm-raised channel catfish for six to eight weeks, we determined diet-tissue fractionation rates of carbon, nitrogen and sulfur isotopes for six tissue types: feathers, red blood cells, plasma, liver, muscle, and fat. With this information, cormorant researchers can now use stable isotope signatures of these tissues to identify the diet and explore the foraging ecology of this highly charismatic and controversial species.

**0089**

### **Hotspots of seabird abundance in the northwest Atlantic**

Richard Veit<sup>1</sup>, Jarrod Santora<sup>2</sup>, Timothy White<sup>1</sup>, Marie Martin<sup>1</sup>, Andrew Gilbert<sup>3</sup>, Melanie Steinkamp<sup>3</sup>

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We used 30 years of abundance data on seabird abundance collected from ships and airplanes on the United States continental shelf to ask what areas persistently attracted aggregations of birds. We define "persistently" and "aggregation" in precise statistical language; basically these places we identify are places where seabirds aggregate for some portion of the year on a regular basis, during either breeding or nonbreeding seasons. We suggest that the identification of such Hotspots will be useful for conservation decisions pertaining to the U.S. continental shelf.

**0090**

### **Changes in seabird abundance on the continental slope of the Eastern USA, 1970s to present**

Timothy White<sup>1</sup>, Richard Veit<sup>1</sup>, Marie Martin<sup>1</sup>, Andrew Gilbert<sup>2</sup>, Melanie Steinkamp<sup>2</sup>

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Seabird abundance of the eastern US continental shelf was thoroughly surveyed using shipboard surveys by the Manomet Bird Observatory in the 1970s and 1980s. We have recently had the opportunity to survey much of the same region using ships and airplanes during 2007-present. In this preliminary analysis, we draw comparisons between the two time periods to look for evidence of change. We noticed significant increases of Northern Gannets and some alcids, especially Dovekies and Razorbills, and significant declines of gulls. We discuss possible causes of these changes, especially those related to climate and fisheries.

**0091**

**Movements of Brown Pelicans and Black Skimmers from the Deepwater Horizon oil spill injury assessment**

\*Lisa Eggert<sup>1</sup>, David Evers<sup>1</sup>, Patrick Jodice<sup>2</sup>, Michael Yates<sup>1</sup>, David Yates<sup>1</sup>, Jennifer Goyette<sup>1</sup>, Dustin Meattey<sup>1</sup>

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In response to the Deepwater Horizon oil spill, locations of Brown Pelicans (*Pelecanus occidentalis*) and Black Skimmers (*Rynchops niger*) were determined via satellite and/or VHF radio transmitter as part of a Natural Resource Damage Assessment (NRDA) study to assess injury to colonial waterbirds. We captured pelicans and skimmers in Louisiana and Mississippi (impacted area) and in South Carolina and Georgia (reference area). In each study area we fit 40 pelicans and 52 skimmers with backpacked satellite and/or VHF radio transmitters and assessed the degree of external oiling. From July 2010 to April 2011 locations of tagged birds were monitored by satellite and by airplane, boat, and ground surveys along the US coasts of the Gulf of Mexico and Atlantic Ocean. We present ecological data pertaining to movements of pelicans and skimmers from impacted and reference areas.

**0093**

**Waterbird population dynamics: Patuxent contributions to methods, models and inferences**

Jim Hines, Jeffery Spendelow, James Nichols  
*USGS, PWRC, Laurel, MD, USA*

Change in population size over time and space is the phenomenon of primary interest in population ecology and conservation. Scientists involved with research and management at Patuxent Wildlife Research Center (PWRC) have a long history of contributions to our knowledge of waterbird population dynamics. Estimation of key demographic parameters is always difficult for free-ranging animal populations, and PWRC scientists working with North American waterfowl and colonial waterbirds have made substantial contributions to the estimation of population size, survival rate, reproductive rate, and rates of movement in and out of a population. In the case of colonial waterbirds, PWRC scientists developed inference methods for colony dynamics (local rates of extinction and colonization). Recent methodological research involves development of integrated models that utilize data from multiple sources to develop synthetic inferences about population dynamics. Given estimates of key parameters, both science and management require models that project state variable (population or colony) dynamics. PWRC scientists have been leaders in development of such models and especially in their application to management. This development of estimation methods and projection models has been for the dual purposes of drawing inferences about population dynamics (science) and managing waterbird populations (management). Examples are presented of the conduct of waterbird science and management by PWRC scientists.

**0094**

**A new approach for monitoring and conserving high arctic shorebirds**

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<sup>1</sup>*US Geological Survey, Boise, ID, USA*, <sup>2</sup>*Conserve Wildlife New Jersey, Bordentown, NJ, USA*,

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*Wildlife Service, Ottawa, Ontario, Canada*, <sup>5</sup>*Great Basin Bird Observatory, Reno, NV, USA*

Although several species of arctic-nesting shorebirds are thought to be in serious decline, we still lack conclusive evidence of the declines and a coordinated program to restore these species. The approach we will describe includes (1) explicit hypotheses for the declines and how they can be reversed and (2) a new approach, inspired by recent work at Patuxent, for estimating and monitoring population size. Six explanations for declines and how to reverse them are being investigated for each species in each season to formulate testable hypotheses which will be evaluated as part of the field work. The new method for status monitoring involves work throughout the annual cycle and simple capture-recapture methods. The Delaware Bay will be used as a detailed example of how the field surveys would be conducted, costs, and expected benefits. We hope this talk will encourage groups throughout the western hemisphere to consider becoming collaborators in this new effort.

**0095**

**Low survival of adult Audubon's Shearwaters in the Bahamas and Caribbean consistent with a slow decrease in population**

William Mackin

*Visiting Research Scholar, UNC-CH, Chapel Hill, NC, USA*

Two long-term banding studies of Audubon's Shearwater at colonies in Martinique and The Bahamas indicate that adult survival is lower than basic demographic models require for the population to persist. Using Program Mark, Precheur (2009) found survival of 77% at the St. Anne's Islets, Martinique while this study found average survivorship of adult shearwaters at Long Cay, Exuma Cays Land and Sea Park is 76% for adults captured on the surface of the colony and 80% for adults first banded when they were feeding chicks in accessible nests. With these levels of survival, it is impossible to create a demographic model using reasonable estimates of reproductive success and juvenile survival that produces a net reproductive rate equal to or greater than 1. In the Bahamas, the cause of the low adult survivorship appears to be 'hyperpredation' by Barn Owls (*Tyto alba*), where dozens to hundreds of adults are killed and mostly not eaten each season. These data are consistent with long term trends in the region, but more surveys are needed to obtain estimates of sufficient precision to detect slow declines. Evidence indicates that owl populations may be inflated by the local presence of rats and mice, and conservation of shearwaters may require control of owl populations. Studies of movements by owls and the effects of local control are needed.

**0097**

**Reevaluation of Great Lakes Fish Passage and effects on Bald Eagles nesting along the Au Sable, Manistee and Muskegon Rivers**

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Michigan's Bald Eagle (*Haliaeetus leucocephalus*) population has been steadily increasing since the ban of DDT and other organochlorine pesticides in the 1970's but not all areas have increased their population at the same rate. Previous studies have determined that Great Lake fishes have had a higher concentration of organochlorine compounds and PCBs above thresholds for effects to Bald Eagle reproduction. Barrier dams have protected Michigan's inland waterway from anadromous fishes of the Great Lakes. During relicensing of hydroelectric operations in Michigan in the 1980s and 1990s, the question was raised as to whether wildlife would be impacted from passage of Great Lakes fishes over these barrier dams. The US Fish and Wildlife Service reserved their right to require fish passage until concentrations in fish would be below thresholds that would impact wildlife. The objective of study is to re-evaluate the question to determine if fish passage should be allowed past the barrier dams on the Au Sable, Manistee and Muskegon rivers and if wildlife would be affected. Blood and feather samples from nestling Bald Eagles and fish samples were both collected from above and below the dams will determine if the Great Lakes fishes have reached a point below the no observable effect concentration (NOEC). With the declining rate of pollutants being released into the Great Lakes in the 20 years since the original study was conducted, we are examining new methods of risk assessment and toxic reference values to see if fish could be passed over barrier dams.

**0098**

**Reddish Egret (*Egretta rufescens*) re-colonization of the Tampa Bay region, Florida, USA 1974-2011**

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<sup>1</sup>Florida Coastal Islands Sanctuaries, Audubon of Florida, Tampa, FL, USA, <sup>2</sup>Resource Designs Inc., Natural Resource Research & Planning, Brooksville, FL, USA

Reddish Egrets (*Egretta rufescens*) bred commonly in Tampa Bay on the Gulf of Mexico coast of peninsular Florida, but were extirpated by plume hunting around the late 1880s, and from Florida by 1900. Nesting re-established in Tampa Bay at Audubon's Alafia Bank Bird Sanctuary in 1974. Between 1974-2011, egrets nested at least once at 25 waterbird colonies between Tampa Bay and northern Sarasota Bay and the 38-year average was 48.1 pairs, estimated using direct and flight-line counts. The population growth showed 3 periods of change: increased 350% from 2 pairs in 1974 to 98 pairs in 2004, decreased 73% to 26 pairs in 2008, then rebounded to 48 pairs by 2011. Nesting averaged 28.4 pairs (approximately 10% of the estimated state population) at 3-4 colonies routinely surveyed in Tampa Bay from 1974-1992. Comprehensive regional surveys initiated in 1993 had a 19-year average of 69.4 pairs/year at 11 sites/year between 1993-2011 (approximately 20% of the 2006 statewide estimate). Between 1993-2011, when all bay segments had nesting, mean occupancy was <3.0 pairs/year at 11 islands, except the Washburn (5.6 pairs) and Alafia Bank (36.0 pairs) sanctuaries. Mean hatched brood size was 1.61 nestlings/nest (N = 288 live young). Since 1974, Reddish Egrets re-occupied their historical

range in Tampa Bay, often exploiting novel habitats on dredged material spoil islands. Future conservation measures should include preventing anthropogenic disturbance during nesting, meso-carnivore and other predator control, habitat acquisition and management, educational outreach to the boating public, and continuation of the Audubon-initiated inter-agency colony management program.

#### **0099**

##### **American Oystercatcher nesting on the Gulf of Mexico Coast of peninsular Florida, USA**

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The American Oystercatcher (*Haematopus palliatus*) is a Species of High Concern in shorebird conservation plans for the United States and a Species of Special Concern in Florida, because of its small overall population, widespread habitat loss, narrow ecological niche, and threats during the breeding and non-breeding seasons. Oystercatchers occur only in the coastal zone in areas that support intertidal shellfish beds. In 2001, the Florida Fish and Wildlife Conservation Commission (FWC) statewide survey found about 400 pairs. During the 2010 nesting season, we comprehensively surveyed by boat >200 miles of shoreline along the Intracoastal Waterway and Gulf of Mexico coast in 10 counties from Levy to northern Lee County in west-central Florida. Using GPS, we mapped 136 territories (including observations by FWC and shorebird partnerships, and not including roof-top nesting birds). We characterized the habitat, determined the nesting stage, noted the number and age of chicks if present, and evidence of anthropogenic disturbance. Neither FWC nor we tracked all the nests found in the respective surveys from initiation to fledging, so hatching survivorship is not known. Using ARC GIS software, we compared nesting occupancy in 2001 and 2010. Oystercatchers showed high territory fidelity, and 90.7% of territories were occupied persistently. Fourteen territories either submersed or were developed. Future conservation measures to improve nesting success of this imperiled shorebird should include preventing anthropogenic disturbance during nesting, meso-carnivore and other predator control, habitat acquisition and management, educational outreach to the boating public, and continuation of the Audubon-initiated inter-agency colony management program.

#### **0100**

##### **Reddish Egret (*Egretta rufescens*) population changes in Florida, USA 1832-2011**

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Reddish Egrets (*Egretta rufescens*) were prominent in Florida's coastal avifauna when early ornithologists and illustrators explored the state in the 1830s-1880s. Most large waterbird colonies were decimated by plume hunting in the late 1880s, and egrets were extirpated from Florida by 1900. The first nest documented in Florida since 1900 was found in eastern Florida Bay in 1938, followed by a slow population increase there. From Florida Bay, egrets expanded north along both coasts to the Tampa Bay system on the west coast and Indian River Lagoon on the east coast by the 1980s. Although regional surveys were accomplished from 1970-2000, a statewide survey was never conducted. None of the statewide waterbird, breeding bird, or



Christmas Bird Count surveys comprehensively counted the breeding population. The statewide population was estimated at 50, 150, and 300 birds in 1944, 1954, and 1974, respectively, then 250-300, 375, and 250-300 nesting pairs in 1980, 1991, and 2006, respectively. While the statewide population estimate between 1980-2006 remained static, the population increased 350% on the west-central coast as egrets re-occupied their breeding range. The inter-annual mobility of nesting birds between colonies and number of non-breeding adults is unknown. Comprehensive regional surveys in Tampa Bay account currently for approximately 20% of the 2006 statewide estimate. Reddish Egrets have reoccupied their historical range statewide since the 1960s, often exploiting novel habitats on dredged material spoil islands. Future conservation should focus on colony protection, management, and a comprehensive statewide survey.

## 0102

### **Mass latex balloon releases and the potential effects on wildlife**

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This study sought to examine the possibly harmful effect that mass latex balloon releases might represent to wildlife through ingestion, as no concrete evidence on either side of this topic has been examined before. Degradation studies to determine the length of time latex can persist in the environment after exposure to various environmental conditions were conducted. Effects on the structural integrity of the latex balloon as it reached the upper atmosphere was researched to determine what physical state the fragments returned to earth, and tagged releases from sporting events gave estimates of mean distances travelled from releases. Animal feeding trials were conducted on three representative species and blood samples to examine H/L or N/L ratios were taken to determine if there were physiological stress effects as a result of ingestion. Necropsies were also performed to examine the digestive tract for anomalies. It was found that balloons travelled a mean distance of 70 miles from point of origin, and they do not burst into small pieces as suggested. Latex does break down to a brittle stage within 8-10 weeks when exposed to air. Balloons submerged in water degrade more slowly, retaining elasticity beyond 5 months. Animal trials revealed that representative species will readily consume the material, with results showing no apparent effect on leukocyte ratios or the digestive tract from ingestion of latex. Results from the different aspects of this research will enhance our understanding of the potential effects latex balloons from mass balloon releases may have on various wildlife species.

## 0105

### **Utility of sea eagle population data for global climate change monitoring and assessment**

William W. Bowerman<sup>1</sup>, David Best<sup>2</sup>, Teryl Grubb<sup>3</sup>, Bjorn Helander<sup>4</sup>, Alison MacLennan<sup>5</sup>, Vladimir Masterov<sup>6</sup>, Peter Nye<sup>7</sup>, Jill Shephard<sup>8</sup>, Russell Thorstrom<sup>9</sup>, Munir Virani<sup>9</sup>, Robert Baldwin<sup>10</sup>, William Bridges<sup>10</sup>, Latice Fuentes<sup>10</sup>, Christopher Post<sup>10</sup>, Tanya Shenk<sup>11</sup>, David Tonkyn<sup>10</sup>

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Sea Eagle (*Haliaeetus* spp.) populations have been intensely monitored around the world for years. Six of the 8 species have ongoing, long term research programs. Large scale projects include continual data from 20-70 years, with over 70,000 known breeding outcomes, representing some of the longest and largest continual monitoring programs in existence. Lessons learned from assessing effects of environmental pollutants on sea eagles can be used to develop monitoring programs for Global Climate Change. Validation of methods for use of morphometric measurements allow for accurate aging and sexing of nestlings, which facilitates determining dates of first egg laying in nests. Over 2400 first egg laid dates from Michigan show bald eagles nesting near the Great Lakes have the greatest change in nesting chronology documented to date (~0.9d/y), most likely related to ice cover changes on the lakes. Qualitative assessment of other *Haliaeetus* species shows similar patterns. Other areas of research include risk of extirpation from climate events, changes in migratory patterns, changes in habitat quality and distribution, and testing changes in morphology in sea eagle nestlings related to climate change. SEA EAGLE was formed with scientists from 19 countries on 4 continents to coordinate and collaborate among ongoing Sea Eagle projects for both monitoring environmental pollution and global climate change. Data has been collected across North America, Europe, Australasia, and Africa at many latitudes and altitudes. Ongoing projects and future research projects developed at a 2011 meeting of Sea Eagle experts related to this collaborative effort will be discussed.

## **0106**

### **Adaptive management for shorebirds on National Wildlife Refuges**

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For over a decade, scientists at the USGS Patuxent Wildlife Research Center have been working with biologists and managers of the USFWS National Wildlife Refuge System to implement an adaptive program for management of impounded wetlands. For many Refuges, migrating shorebirds are an important trust resource, but a number of uncertainties have impeded effective management of habitats used by shorebirds. In the first shorebird study, 16 Refuges in the northeast U.S. participated in a two-year crossover experiment to compare alternative spring drawdown treatments. This study demonstrated the significant advantages of a slow drawdown timed to bracket the northward shorebird migration. In the second study, 23 Refuges in the northeast and Midwest U.S. participated in a three-year experiment to compare the effects of spring and fall drawdowns on shorebirds, waterfowl, and waders. This study demonstrated: (1) the compatibility of shorebird and waterfowl management across the annual cycle; and (2) the potential to manage wetlands for southward migrating shorebirds. Both of these studies were grounded in the Refuge management context, and sought to provide the motivation, structure, and tools needed for ongoing adaptive management. These studies also provided a template for other fruitful collaboration between USGS and USFWS, and laid the groundwork for the Integrated Waterbird Management and Monitoring program.

**0110**

**Characterization of Sandhill Crane wintering areas through GLMMs in Mexico**

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Sandhill Cranes are listed as Threatened under Mexican conservation laws. However, little information exists on wintering areas of cranes in Mexico. We surveyed the wintering areas of Sandhill Crane in Mexico during three winter seasons since 2007. Generalized Linear Mixed Models are useful to assess landscape components important for birds' habitat selection. Sandhill cranes were present in 45% of 74 wetlands. In each wetland we measured the distance to field crops, to urban centers, to highways and roads, and the horizon visual obstruction, shore slope, wetland surface, and crops surface. We generated GLMMs to identify the landscape components that influence the Sandhill Crane wetland selection. This information is important for managers and conservation plans.

**0112**

**Post-breeding movements in Gulf of Mexico Seaside Sparrow (*Ammodramus maritimus fisheri*) populations**

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The post-breeding period is a poorly understood time in most birds due to difficulty of capture and monitoring, however events during this period are critical for juvenile survival and establishing territories for the next year's breeding season. Seaside Sparrows (*Ammodramus maritimus fisheri*) in the Gulf of Mexico are poorly understood in general despite the conservation concerns that surround them and the salt marsh habitats that they rely upon. To determine post-breeding movements we attached radio frequency transmitters to 149 adult and juvenile Seaside Sparrows in marshes in Mississippi and Louisiana from July to September 2010 and tracked them for 4 weeks using boats and occasionally planes. Despite this effort a quarter of the individuals went missing with no trace of departure. Of the birds that remained in the area we estimated space use by minimum convex polygons. There was no difference in space use among adult and juvenile birds, but different sites had dramatically different spatial usage. These data suggest differences in habitat quality or behavior across a variety of salt marsh habitats.

**0116**

**Seventy-five year history of Patuxent Wildlife Research Center**

Matthew Perry

*USGS Patuxent Wildlife Research Center, Laurel, MD, USA*

Federally funded wildlife research in the United States in the late 1800s and early 1900s was related to the impact wildlife had on humans, especially effects on agriculture. Bird depredation studies, especially with crows, blackbirds, sparrows, cormorants, and pelicans attempted to document losses to farmers and fishermen. Wetland drainage and excessive hunting devastated waterfowl populations and brought awareness of the impact humans were having on wildlife.

Patuxent was established in 1936 as "the nation's first wildlife experiment station." In 1939, all wildlife research conducted by the Department of Agriculture was transferred to the Department of Interior, reflecting the change from thinking of impacts of wildlife on humans to the impacts of humans on wildlife. Early research at Patuxent emphasized techniques (e.g., hedgerows, field borders, impoundments) that optimized wildlife populations without impacting agricultural production. The increased use of pesticides such as DDT after World War II precipitated more research on persistent chemicals that affected wildlife, leading to the ban of several organo-chlorine pesticides in 1972. Concerns about migratory birds focused on waterfowl studies and addressing national wildlife refuge needs. With passage of National Environmental Protection Act in 1970, there was sudden concern with all birds especially nongame and endangered species. Patuxent led the nation with studies on numerous bird species of concern. Computer sophistication in the 1980s allowed for greater manipulation of data sets and advanced statistical modelling to better understand wildlife populations. The role of Patuxent science continues to address regional, national, and international issues of natural resource significance.

**0117**

**Assessment of fall shorebird habitat availability on inland managed wetlands within the Gulf Coast Joint Venture**

William Vermillion, Mark Parr, Nicholas Enwright, Barry Wilson  
*Gulf Coast Joint Venture, Lafayette, LA, USA*

The Gulf Coast Joint Venture (GCJV) is a collaborative partnership between federal and state agencies and non-profit organizations dedicated to the conservation of priority bird habitat along the western U.S. Gulf of Mexico. The GCJV region encompasses coastal portions of Texas, Louisiana, Mississippi, and Alabama, and provides critical habitat for many priority waterfowl, shorebird, landbird, and waterbird species. The GCJV works with partner organizations to provide and enhance habitat for these species, based on population objectives established by international and national bird conservation plans. The GCJV's Shorebird Working Group developed population and habitat objectives for a set of shorebird species that use inland and/or managed wetlands, such as waterfowl impoundments, rice fields, and aquaculture ponds. This shallow water/mudflat habitat is assumed to be limited during the period of southbound shorebird migration (July 15-November 5) in the GCJV region. To determine the amount of this shallow water/mudflat habitat, and the between- and within-year variability, we classified Landsat satellite imagery from 1999, 2002, and 2004 into 4 classes: water, flooded vegetation, saturated soil, and other. Additional groundtruthing data was used to estimate the proportion of shallow versus deep water in the inland/agricultural zone, which was then applied to the total water acreage derived from classifications to determine a final amount of shallow water habitat. The analysis indicates that inland/managed shorebird habitat objectives were met in the Chenier Plain Initiative Area of the GCJV region each year during the three years analyzed, but not in any other Initiative Areas for any years considered.

**0118**

**A primer on Common Loon winter ecology**

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Common Loon (*Gavia immer*) winter ecology has been little studied and our knowledge of its nonbreeding biology is sorely lacking behind our knowledge of its breeding biology. We examined the occurrence and frequency of flock foraging along the Louisiana and Mississippi coastlines, Feb-Mar, 2011 by conducting 3-5x/week surveys ranging from nearshore to 40 km offshore. To identify the region these loons came from we captured them, took morphometric measurements, and then compared our values with established loon databases. We also implanted two satellite transmitters to examine potential breeding locations and migratory routes. Flock foraging has been observed in Common Loons prior to our investigation, but we report on a couple of unusual findings. First, it was much more prevalent than ever reported. We observed 8 separate flocks, ranging from 21-150 individuals. Second, we observed one very large flock we estimated to be > 700 individuals. Third, Northern Gannets were found in association with the flocks roughly half the time. A total of 17 individuals were caught, 15 adults and 2 juveniles. The average weight of the adults and juveniles were very small (3,253g ± 456 and 3,440g ± 233, respectively) indicative of a long-distant migrant. The two birds with satellite transmitters migrated to central and northern Saskatchewan, undertaking a migration route of over 2500 miles.

**0122**

**Status of the Reddish Egret Conservation Plan: Developing conservation actions for addressing threats and limiting factors**

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The Reddish Egret (*Egretta rufescens*) is the rarest and least known of the North American Ardeids. It is globally restricted and a habitat specialist, using a narrow fringe of coastal habitats for all aspects of its life cycle. The total population is estimated to be 6,000 - 10,000 adults. Its historic range included the Gulf Coast of the United States and Mexico, the Baja Peninsula and west coast of Mexico, the Bahamas, Cuba, and potentially Belize. The population was nearly decimated by the actions of plume hunters around the turn of the 20<sup>th</sup> century. Although breeding populations have significantly recovered, they are still nowhere near the pre-hunting levels. In addition, the species is thought to be declining in key nesting areas such as the Florida Keys and Florida Bay. Because of its status, the Reddish Egret has been designated as a Focal Species by the U.S. Fish & Wildlife Service's Migratory Bird Program. The purpose of the Focal Species Strategy is to provide explicit, strategic, and adaptive sets of conservation actions necessary for returning species of concern to healthy and sustainable population levels. Inclusion as a Focal Species has brought new attention and funding to the conservation challenges facing Reddish Egrets today. This presentation summarizes proposed goals and strategies for range-wide conservation action and describes the current status of the conservation plan.

## Poster abstracts

0006

### Carriage of bacterial and protozoan pathogens among Common Tern chicks on Pettit Island, Barnegat Bay, NJ

\*William Rivera<sup>1</sup>, Corey Gaylets<sup>1</sup>, Roy Mosher<sup>1</sup>, Brian Palestis<sup>1</sup>, Adam Houlihan<sup>1,2</sup>

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Little is known about the intestinal microflora of migratory seabirds. If these avian species harbor gastrointestinal pathogens, they may disseminate them along migratory flyways. To assess this possibility, Common Tern (*Sterna hirundo*) chicks on Pettit Island in Barnegat Bay, NJ were evaluated for carriage of bacterial and protozoan pathogens and nematodes. Oropharyngeal and cloacal swabs were taken for culture-based detection of bacterial gastrointestinal pathogens during the 2009 and 2010 breeding seasons. Bulk fecal samples were also taken during the 2010 breeding season to determine nematode and *Cryptosporidium* oocyst loads. Of 125 birds samples in 2009, none carried *Salmonella* and only 1 carried *Campylobacter*. In 2010, 1 of the 54 birds sampled carried *Salmonella* and none of them had *Campylobacter* in their intestines. Microscopic examination of fecal smears obtained in 2010 revealed that 39 of 54 Common Tern chicks had *Cryptosporidium* oocysts in their intestines and 10 of 54 carried adult and larval nematodes. Preliminary data indicate that Common Tern chicks in Barnegat Bay have low intestinal carriage of bacterial pathogens but relatively high carriage of protozoan parasites and nematodes.

0007

### Least Terns in winter: Where are they?

Jonathan Atwood<sup>1</sup>, Robin Cassiopo<sup>2</sup>. Presented by Evan Adams<sup>1</sup>

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During the summer months (May - August), Least Terns (*Sternula antillarum*) annually receive substantial research and management attention. During the remaining months of the year, however, almost nothing is known about the species' ecology or behavior, including any assessment of possible threats it might face away from the breeding range. This poster reviews what little information is known about the winter distribution of Least Terns, based on (1) publications describing status in Central and South America, (2) review of banding recoveries south of the U.S., (3) synthesis of data available from eBird submissions (Avian Knowledge Network), and (4) Wiki Aves, an interactive web site dedicated to the Brazilian birding community. Additionally, we outline plans for field work during winter 2012 aimed at preliminary study of Least Tern wintering ecology, and solicit contacts and potential collaborators in coastal Brazil.

0022

**PCBs and DDE in Common and Roseate Tern eggs from three breeding colonies in Buzzards Bay, MA, USA, 1972-2005**

Ian Nisbet<sup>1</sup>, Saro Jayaraman<sup>2</sup>, Carolyn Mostello<sup>3</sup>, Diane Nacci<sup>2</sup>

<sup>1</sup>*I. C. T. Nisbet & Company, North Falmouth, MA, USA*, <sup>2</sup>*US Environmental Protection Agency, Narragansett, RI, USA*, <sup>3</sup>*Massachusetts Division of Fisheries & Wildlife, Westborough, MA, USA*

We measured concentrations of polychlorinated biphenyls (PCBs) and DDE in eggs of Common and Roseate Terns from three breeding colonies in Buzzards Bay, MA, near the PCB Superfund site at New Bedford Harbor. Eggs were collected in 1994-96, 1998-99 and 2005; archived extracts from eggs collected in 1972 were re-analyzed using the same methods to provide long-term comparisons. Total PCB concentrations were calculated as the sum of the eighteen PCB congeners selected by the NOAA National Status and Trends Program. Selected samples from each year were also analyzed for toxic coplanar PCBs. Results were compared to PCB concentrations measured previously for sediments, fish and Tree Swallows from the Superfund site. Mean PCB concentrations in Common Tern eggs declined by a factor of 7.6 since 1972, and PCB congener patterns shifted from the predominance of lower chlorinated congeners characteristic of the Superfund site towards the higher chlorinated congeners characteristic of the general environment. PCB congener patterns in tern eggs were enriched in the higher chlorinated congeners relative to those in sediments. Among coplanar PCBs, both PCB77 and PCB126 were present in all samples and some had elevated concentrations of PCB126. In the samples collected since 1994, we found no significant differences in PCB or DDE concentrations among sites, among years or between species. This contrasts with studies in the same area in the 1970s and 1980s, which had shown spatial and temporal gradients and higher levels of PCBs in Common than in Roseate Terns.

0026

**Few happy returns: Low return rates of Common Terns banded at Pettit Island, New Jersey**

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<sup>1</sup>*Wagner College, Staten Island, NY, USA*, <sup>2</sup>*Montclair State University, Montclair, NJ, USA*

Pettit Island, in the Manahawkin Bay section of Barnegat Bay in New Jersey, is the site of a long-studied Common Tern (*Sterna hirundo*) colony. The number of terns nesting on this saltmarsh island is typically around 200 breeding pairs, but has recently fluctuated, reaching a low of 125 in 2008 and a high of approximately 300 in 2010. Since 1996 over 1700 chicks have been banded at Pettit Island, but adults were banded only occasionally and banding effort for chicks varied from year to year. In 2010 and 2011 we trapped a total of 111 adult terns at Pettit Island. Only two of these represented returns of birds banded on the island as chicks and none were returns of adults banded at Pettit. Two of these terns had been banded in Argentina during winter, and all others (107 of 111) were unbanded. Similarly, of 45 adults trapped in previous years, only one tern had been previously banded. There are other breeding colonies of Common Terns in Barnegat Bay, and these results suggest that terns frequently move between sites, showing unusually low site fidelity, and may also suggest low post-fledging survival. In 2011 forty additional terns were trapped at other Barnegat Bay islands and none had been previously banded, but these individuals represent only a small fraction of the population.

**0027**

**The Bureau of Ocean Energy Management's Avian Research in the Western Atlantic**

Sally Valdes

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The Bureau of Ocean Energy Management (BOEM) is responsible for managing offshore energy development in federal waters, including offshore wind development. The Atlantic Outer Continental Shelf (OCS) is where offshore wind development is most likely to occur near-term. A major concern associated with wind development is its potential impact on birds. To prevent or minimize impacts to birds it is important to have a better understanding of how birds use the Atlantic OCS. In furtherance of this goal, BOEM has provided support to a number of avian studies including: a database that compiles georeferenced seabird and shorebird information for the entire Atlantic coast (in cooperation with the U.S. Geological Survey (USGS) and the U.S. Fish and Wildlife Service (FWS)); shipboard seabird surveys (in cooperation with the National Marine Fisheries Service, FWS, USGS, the Manomet Center for Conservation Science, and the College of Staten Island/City University of New York); a pilot study of aerial, high-definition imagery surveys; development of automated analysis of bird vocalization recordings; and a study focused on potential interactions of endangered, threatened and candidate bird species with offshore wind that includes tracking of Red Knots.

**0031**

**Human disturbance of breeding Snowy Plovers (*Charadrius alexandrinus*) in northwest Florida: A pilot study**

\*Maureen Durkin<sup>1</sup>, Jonathan Cohen<sup>1</sup>, Margo Zdravkovic<sup>2</sup>

<sup>1</sup>*State University of New York College of Environmental Science and Forestry, Syracuse, NY, USA,* <sup>2</sup>*Coastal Bird Conservation/Conservian Inc., Big Pine Key, FL, USA*

Snowy Plovers (*Charadrius alexandrinus*), a state-threatened shorebird in the Florida Panhandle, are subject to human-caused disturbance due to the proximity of their habitat to coastal development and recreation. While fencing often protects nesting areas from disturbance, foraging and brood-rearing areas are typically unprotected. The effects of disturbance on Florida Snowy Plovers have not been fully evaluated, nor has the efficacy of current protective measures. Our objectives were to measure rates of disturbance to Snowy Plovers, and to determine distances at which behavioral responses occurred. We estimated disturbance levels in plover habitat by conducting 10-minute counts of potential disturbances. We also conducted 30-minute continuous disturbance response observations, recording distances at which birds reacted to disturbances, and types of reaction behavior. We also recorded presence of tracks of potential disturbances along transects, as an indicator of past disturbance. Our results suggested a buffer distance of 35-m could prevent flushing of foraging adults by pedestrians, while a 50-m buffer would prevent alertness responses to pedestrians and vehicles. Foraging adult plovers were generally more sensitive to human disturbance than other types such as competitors and potential predators, and chicks were less responsive than adults. Disturbance responsiveness was correlated with track counts for certain disturbance sources, but not with 10-minute counts. While further study with a larger sample is needed to better understand relationships between levels of disturbance and responses to disturbance, our initial results show promise for the ability



of our methods to determine disturbance impacts and inform management decisions for Snowy Plovers.

**0040**

**Winter distribution of Horned Grebes breeding in Iceland**

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An isolated, but mostly migratory, population of Horned Grebes (*Podiceps auritus*) in Iceland has gone through drastic changes in recent decades. To help understand the reasons for these changes, a better understanding of the non-breeding distribution and ecology of the population is essential. Light-based geolocation was used to study the wintering distribution and migration strategies of Horned Grebes. Geolocation data loggers were deployed on breeding Horned Grebes at Lake Vikingavatn, NE Iceland, in 2009 and 2010 and retrieved in 2010 and 2011. Data from six loggers show different wintering areas of adult Horned Grebes, all nesting at the same lake. Four tracked birds wintered in coastal areas around Scotland, while two showed completely different strategies, wintering by the west coast of Iceland and in the English Channel. Coastal areas around Scotland could be the most important wintering areas for the population, but different migration and wintering strategies are likely to make the breeding population less sensitive to potentially local deteriorating environmental conditions in that area. With very limited information from previous ringing recoveries, these findings give a new and more comprehensive understanding of the winter distribution of Horned Grebes breeding in Iceland.

**0062**

**Unexpected use of bedrock habitat for nesting by American Oystercatchers in Rhode Island.**

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<sup>1</sup>*U.S. Fish and Wildlife Service, Charlestown, RI, USA*, <sup>2</sup>*University of Rhode Island, Kingston, RI, USA*

As part of a regional conservation project in the coastal Northeastern U.S., nest productivity of more than 20 pairs of American Oystercatchers was surveyed in Rhode Island during 2011. These large solitary nesting shorebirds traditionally use saltmarsh, sand dune and beach habitats (Birds of North America, <http://bna.birds.cornell.edu/bna/species/082/articles/habitat>). This survey discovered that the majority of successfully nesting birds were in habitats dominated by bedrock, boulders, or other large man-made debris. The structure of this bedrock habitat appears to provide improved protection to nests, eggs and young from some important environmental elements that cause nest failure. Productivity comparisons show that American Oystercatchers nesting in the bedrock habitat fledged more young birds than those in the traditional open, sandy habitats.

**0064**

**An assessment of data quantity and quality provided by the North American Breeding Bird Survey for wetland-breeding species**

\*Suzanne Whitney, Joseph Veech

*Texas State University, San Marcos, TX, USA*

The North American Breeding Bird Survey (BBS) has been conducted annually since 1966 and includes more than 3000 routes within the conterminous United States, providing spatially and temporally extensive data on avian communities. BBS data are rarely used for studies that target wetland-breeding species because of concern that these species are not surveyed as thoroughly as other species. Specifically, wetland habitats are often underrepresented along BBS routes and BBS methodology does not specifically target wetland-breeding species. Researchers using BBS data must be cautious in any analysis that includes species having low abundances or high variability in count data. The goal of this study was to identify wetland-breeding species for which the BBS has data of sufficient quantity and quality for reliable use in analyses and application. We assessed BBS data based on three factors, the proportion of years that a species was detected on potentially occupied routes, the route-level year-to-year variability in population counts and the number of routes within a BCR (Bird Conservation Region) where the species has been recorded. Separate assessments were conducted for 87 wetland-breeding species in each of 26 BCRs as species may be well-surveyed in certain portions of their range and not in others. Each BCR had between seven and 44 species that were considered well-surveyed by our criteria, representing a range of functional and taxonomic classifications. We believe that, with care, BBS data for certain wetland-breeding species and BCRs can be used for a variety of basic and applied ecological purposes.

**0068**

**Foraging activity across the diel cycle of nesting Black Skimmers**

\*Stephen Wurfel, Matthew Hillman, Sarah Karpanty

*Virginia Tech, Blacksburg, VA, USA*

Black Skimmers (*Rynchops niger*) are tactile foragers and thus well adapted for foraging in calm, shallow waters during low tide. Foraging primarily occurs at night, dawn, and dusk, as calm surface waters are often associated with these time periods. However, skimmers are also known to forage during the day. Previous research has come to different conclusions as to what time period is preferred for foraging and whether time of day or tidal stage is the factor driving the timing of foraging forays. We hypothesized that Black Skimmers would primarily feed at night, but that tidal stage would be the most influential factor in determining foraging time as we also expected to observe daytime feeding to occur only around low tide. We quantified skimmer feeding patterns by time of day and tidal period by deploying time-lapse covert infrared cameras from May - August 2010 and 2011 on a total 30 nests from initiation until hatch or failure at Cape Lookout National Seashore, NC. We sampled adult Black Skimmer nest attendance during six 10-minute time periods per 24 hour period, stratified such that two samples were during daylight hours and two each during night, dawn and dusk. Preliminary analyses suggest that skimmers do forage primarily at night, but also during daytime low tide. Understanding how Black Skimmers partition foraging activity across the diel cycle is an essential first step in

designing management strategies to minimize disturbance impacts and in beginning to understand skimmer foraging ecology in greater depth.

**0069**

**Effects of sea-level rise and altered storminess on Piping Plover habitat along the U.S. Atlantic and Gulf Coasts**

\*Katherina Gieder, Sarah Karpanty, James Fraser, Daniel Catlin  
*Virginia Tech, Blacksburg, VA, USA*

As cleanup continues in the wake of the recent Hurricane Irene, sea level rise and associated changes in storm magnitude and frequency associated with climate change have once again been thrust to the forefront of coastal management concerns. Low lying coastal areas are of paramount importance because they are most vulnerable to such climate change effects. Piping Plovers (*Charadrius melodus*) respond rapidly to change and depend on these areas throughout their life cycle, making them excellent indicators of climate change effects. We aim to develop predictions of how Piping Plover breeding and wintering habitat will change as a result of sea level rise and altered storminess using a coupled risk assessment model. The first portion of the model assesses changes to coastal geomorphology using dynamic sea-level rise predictions and is linked to the second portion of the model that assesses plover habitat selection. The model, developed in collaboration with the USGS as part of a coast-wide sea level rise hazards assessment, is being developed using a Bayesian Network (BN). We will present the first phase of model assessment where we are predicting historical Piping Plover nest selection at Assateague Island National Seashore in Maryland and Chincoteague National Wildlife Refuge in Virginia. Model development is based on Piping Plover nest locations at these sites from 1992 to 2011 and associated habitat variables (e.g., beach elevation, dune height, vegetation density, distance to moist substrate, distance to high tide line) derived from field-data collection, aerial- and ground-LiDAR, and aerial true and color-IR photography.

**0071**

**Transmitter use and American Oystercatcher leg injury, Fisherman Island National Wildlife Refuge, Virginia**

Pamela Denmon, Jeremy Tarwater

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Fisherman Island National Wildlife Refuge has reported poor American Oystercatcher (*Haematopus palliatus*) reproductive success (10% - 50% of chicks fledged per breeding pair) since monitoring began in 2002. In 2010, American Oystercatcher hatch success was high at 65.1%; however, fledge success was low with only 19 birds (30.6%) surviving to fledge. Nineteen chicks older than 21 days were lost to unknown predators. Refuge staff manages for mammal and avian nest predation, but more information is needed as chick mortality remains an unknown aspect of nest failure. In 2011 radio telemetry was used to determine factors in older chick loss (20 days and older). Transmitters were applied to darvic field readable leg bands on the right tibia. A transmitter and darvic band weighed 4.8 grams. Initial minimum physiological requirements for deploying transmitters on chicks were a weight of 200 grams (2.4% of body weight) and age of 20 days. Transmitters were deployed on 10 chicks ranging in age from 20-34 days. Birds were recaptured at 7-22 days after transmitter deployment to check for leg injuries.

Results led to morphometric requirements for transmitter deployment changing to a combined minimum age of 26 days, mass of 270 g, and natural wing chord of 100 mm. Edges of darvic bands were also sanded with fine sandpaper to reduce leg irritation. Birds had slight bruising using these recommendations after initial recapture, but healing was evident at four days.

**0072**

**Total reproductive failure of Least Tern (*Sternula antillarum*) colonies in coastal Georgia due to intense predation; and predator management strategies**

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Least Terns (*Sternula antillarum*) on the east coast are declining across their range, and are deemed "rare" in the state of Georgia. However, least terns have not recently been studied in Georgia, and little is known about their current population size, or productivity at breeding colonies. In an attempt to gather data on the effects of persistent environmental contaminants on least tern health and productivity, we monitored least tern breeding colonies at six different coastal Georgia sites during the summer of 2011. Our colony sites included two undeveloped barrier islands, two dredge spoil disposal sites, one offshore sandbar, and one rooftop colony. We documented total reproductive failure due to intense predation pressure in half (three of six) of these colonies; two were barrier islands and one was a dredge spoil island. Success at the remaining sites was minimal (3 fledged/15 pairs, and 18 fledged/200 pairs) to moderate (67 fledged/60 pairs). The highest-impact predators documented were American Crows (*Corvus brachyrhynchos*), coyotes (*Canis latrans*), raccoons (*Procyon lotor*), feral hogs (*Sus scrofa*), and ghost crabs (*Ocypode quadrata*), but we also documented others including bobcats (*Lynx rufus*) and armadillos (*Dasypus novemcinctus*). We found that crow effigies and homemade ghost crab traps were functionally-effective, and plan to gauge their efficacy in increasing least tern productivity during the next breeding season. We will implement a predator management strategy at these sites in the 2012 breeding season that will include the use of electric fencing, crow effigies, ghost crab traps, and crow culling (if necessary).

**0078**

**Variability in pre-dispersal movements of flighted juvenile Wood Storks (*Mycteria americana*)**

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Many species of wading birds exhibit delayed maturity and juveniles may return to their nests for days or weeks after attaining flight capability. It is generally accepted that juvenile wading birds use this period to learn critical foraging skills that will be necessary upon attaining independence, but little is known about their movements at this time. It is also a time when mortality may be high due to the lack of experience and physical skills. To manage habitat for birds during this critical life stage, it is important to understand how they use the landscape around the colony and how variable movements are among individuals, colonies, and years. Here we describe the movement patterns, flight characteristics, pre-dispersal home range sizes, and

habitat use of juvenile Wood Storks prior to dispersal from their natal colony, and compare these parameters between years and geographic regions (Georgia vs. Florida). We found that the time between birds achieving flight capabilities and dispersing permanently from the colony varied significantly between regions and years, ranging from 5-57 days. The maximum distance from their nest that individual birds were located on any given day ranged from 0.02-43.6 km (N = 50 birds) and birds were most active in the morning before 10 am. Home range sizes also differed significantly between regions and years, with 95% kernel home range sizes ranging from less than 1 km sq. to more than 180 km sq. These results indicate the need for caution when extrapolating results across colonies and years.

## 0080

### **The impact of major weather events on migrating Whimbrel (*Numenius phaeopus*)**

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Many shorebird species that breed in eastern Canada have experienced precipitous declines in recent decades. All of these species are highly migratory. However, the details of their migration and what factors they encounter during migratory flights are poorly understood. The eastern population of Whimbrel (*Numenius phaeopus*) has declined in recent years and migrates between breeding grounds within the high latitudes of Canada and northern South America. From 2008 to 2011 we outfitted 19 migrating Whimbrel with satellite transmitters. Our objectives were to connect breeding grounds to winter areas, delineate migration routes, identify key stopover areas, and investigate factors confronting Whimbrels en route. During this long-term tracking study we documented encounters between migrating Whimbrel and major storm systems including 7 with hurricanes, 6 with tropical storms, and 6 with large fronts. Many of these encounters have been within the Caribbean Basin, a major corridor for the development of tropical systems and an area that represents a significant flyway for many shorebirds during fall migration. Two examples from 2011 include one Whimbrel that flew into the eye of Hurricane Irene, averaging 48kph throughout, and another that flew through Tropical Storm Gert, flying 400km in 27 hours before averaging 144kph after encountering tailwinds of that storm. The movement of large numbers of birds through the Caribbean coincides with peak hurricane season. The impact of these storms on migrant shorebird populations remains an open question with relevance to climate change. Encounters documented between Whimbrel and tropical storms may have implications for other Caribbean migrants.

## 0081

### **Assessing the effects of aircraft and human beach use on nesting terns and skimmers at Cape Lookout National Seashore, NC**

Matthew Hillman, Sarah Karpanty, James Fraser  
Virginia Tech, Blacksburg, VA, USA

As human development, tourism, and aircraft use increase along the ocean front, it is critical to document the relative effects of these activities on nesting waterbirds. We studied the behavioral

and demographic effects of civilian and military fixed wing and rotary aircraft, all-terrain vehicles, off-road vehicles, and pedestrians on Least Tern (*Sternula antillarum*), Common Tern (*Sterna hirundo*), Gull-billed Tern (*Gelochelidon nilotica*), and Black Skimmer (*Rynchops niger*) colonies at Cape Lookout National Seashore (CALO), North Carolina. We deployed digital audio recorders and time-lapse covert infrared cameras on individual nests from initiation until hatch or failure at 2 mixed species colonies and 4 monospecific Least Tern colonies from May-August, 2010-2011. Post-hoc data provided by the United States Marine Corps including the type of military aircraft, its location, altitude, velocity, and time of entry/exit over CALO were supplemented by data collected opportunistically for all types of human events. We post-processed audio recordings and analyzed 1/3 octave band-level spectrograms, the maximum 1-second equivalent average (LEQ) sound level, and the sound exposure level (SEL) to determine if the duration, frequency, and intensity of auditory stimuli were good predictors of behavioral response, and if these metrics were correlated with post-hoc flight data. Preliminary analyses suggest that the 150-ft human buffer placed around waterbird colonies by the National Park Service is sufficient in limiting behavioral and demographic responses by each species to vehicles and pedestrians. Other types of aircraft flights had minimal effects to nesting birds.

**0086**

**Diet analysis of the Double-crested Cormorant *Phalacrocorax auritus albociliatus* in the San Diego Bay National Wildlife Refuge**

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Seabirds with a generalist diet are more likely to reflect available prey assemblages, as they often sample the most abundant prey species from a range of trophic levels. This study proposes to evaluate the diet of both adult and chick Double-crested Cormorant (*Phalacrocorax auritus albociliatus*) for the purpose of establishing local baseline prey availability for the San Diego region and evaluate the use of Double-crested cormorants as a regional surrogate species for several seabirds of conservation concern nesting and wintering in San Diego. The study location will be the South Bay Unit of the San Diego National Wildlife Refuge, one of the few stable nesting colonies for Double-crested Cormorants in San Diego County. Previous research indicates that this species of Cormorant preys on 250 or more fish species, making them a good choice for evaluation as a surrogate for other local piscivore seabird diets. Surrogate species have often been used as habitat suitability indicators for other members of their guild for purposes of conservation and management. Additionally, no diet studies for Double-crested Cormorants exist south of Santa Barbara and north of San Martin Island in Mexico. Research such as this study is needed not only to better understand the ecological niche and resources that the Double-crested Cormorant consumes in San Diego, but will also provide crucial information about activity in several ecosystems at different trophic levels which can inform conservation and management purposes for both nesting seabirds and prey fish species in San Diego.

**0092**

**Regional differences in mercury exposure in Brown Pelicans and Black Skimmers**

\*Lisa Eggert<sup>1</sup>, David Evers<sup>1</sup>, Jennifer Goyette<sup>1</sup>, Patrick Jodice<sup>2</sup>, Dustin Meattey<sup>1</sup>, Michael Yates<sup>1</sup>

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Elevated levels of mercury in waterbirds can adversely affect reproduction, behavior, and physiology. Bioaccumulation of mercury is of particular concern for long-lived, piscivorous waterbirds, though dietary exposure and sensitivity to mercury varies by species and region. We examined mercury concentrations in Black Skimmers (*Rynchops niger*) and Brown Pelicans (*Pelecanus occidentalis*) from coastal areas along the northern Gulf of Mexico (GOM) and South Atlantic Bight (SAB). Blood mercury concentrations were significantly higher in Black Skimmers (n = 129, range = 0.06 - 1.92 µg/g) than in Brown Pelicans (n = 91, range = 0.002 - 0.59 µg/g). Mercury concentrations in feathers of a subset of Black Skimmers from SAB (n = 26) were not correlated to blood sample concentrations in these individuals. For both species mercury levels of blood samples collected in SAB were higher than those collected in GOM. We hypothesize that differences in local environmental factors, such as nutrient input, influence the degree of contaminant exposure for these top predators by affecting the production and biomagnification of methylmercury in marine food webs. Overall, the majority of birds sampled did not exceed levels that could negatively impact reproduction; however, further study is needed to better understand how diet and environmental factors affect mercury levels in both regions.

**0096**

**Effects of gulls on the nesting behavior of sparrows**

\*Matthew Dickinson

College of the Atlantic, Bar Harbor, ME, USA

Great Duck Island, on the coast of Maine, is an important nesting area for a variety of seabirds, including Herring and Great Black-backed Gulls (*Larus argentatus* and *L. Marinus*). In addition, the island supports three species of sparrows, Savannah Sparrow (*Passerculus sandwichensis*), Song Sparrow (*Melospiza melodia*), and Nelson's Sharp-tailed Sparrow (*Ammodramus nelsoni*). These species live in relatively high densities and in close proximity to nesting gulls. It could be assumed that gulls are predators of sparrows and thus would affect nesting patterns of the three species, causing them to nest farther away from the gull colony. Alternately, previous studies on Kent Island in the nearby Bay of Fundy have suggested that the presence of gulls may deter corvid predators, and thus provide a measure of protection for nesting passerines. Through the use of artificial nests I tested the vulnerability of sparrow nests to gulls and found little evidence of gull predation. Comparisons of the density of gull nests to the density of associated sparrow territories revealed little influence of gulls on nest site selection. Vegetation structure and food availability may play a much greater role than predation in sparrow nest choices.

## 0101

### **Investigation of levels of toxicological contamination in the endangered African penguin (*Spheniscus demersus*)**

\*Carly Summers<sup>1</sup>, William Bowerman<sup>2</sup>, Nola Parsons<sup>3</sup>

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African penguins (*Spheniscus demersus*) are the only breeding penguin species on the African continent. Classified as an endangered species, the African penguin population is estimated to be 10% of what it was at the turn of the 20th century and has experienced a 60% decrease within the most recent three generations. Numerous ecological and toxicological stressors have been recorded to reduce breeding success. The Southern African Foundation for the Conservation of Coastal Birds (SANCCOB) has been rehabilitating oiled, injured, and ill seabirds for over 43 years. SANCCOB also collaborates with researchers involved with the Seabird Health Survey by collecting blood, feather, guano, and parasite specimens from seabirds admitted to SANCCOB and birds sampled in wild colonies, such as those on Robben, Dyer, and Marion islands. Samples collected between 2007 and 2011 will be utilized in future analyses. An ecological risk assessment for toxicants, particularly polychlorinated biphenyls (PCBs), organochlorines (OCs), polycyclic aromatic hydrocarbons (PAHs), and heavy metals such as lead and mercury, will be conducted to determine the impacts of key stressors on the African penguin population. Furthermore, completing the same battery of tests will make comparisons across bird species, including Cape gannets, Cape cormorants, and Rockhopper penguins, possible. The objectives of this study are: 1) Identify the stressors that impact the African penguin population, 2) develop mitigation strategies to halt and reverse population decline, and 3) examine and discuss similarities and differences across species.

## 0103

### **Changes in water quality affect the food supply of lesser flamingos (*Phoeniconaias minor*) at Kamfers Dam in Kimberley, South Africa**

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Kamfers Dam, a large wetland situated in Kimberley, South Africa, was home to over 80,000 breeding lesser flamingos, a near-threatened species. For more than 30 years, the Homevale Sewage Works outflow has drained into this once ephemeral pan. This sewage treatment plant is operating over maximum capacity and is discharging untreated sewage water directly into Kamfers Dam creating extremely poor water quality and hypereutrophication. Rising water levels and poor water quality have ceased successful breeding and decreased the flamingo population numbers to approximately 15,000 birds. The constantly changing water quality has caused changes in the algal community composition. *Arthrospira fusiformis*, the flamingos' preferred food source, accounted for 99.5% of the algal cells present and was found at extremely high concentrations, over six million cells per milliliter, as recently as April 2009. A crash in the *Arthrospira* population has compromised the food source of the lesser flamingo population and allowed other algal species to become dominant including toxin producing species. The objectives of this study were (1) to monitor the water quality and algal community in Kamfers



Dam, (2) model the food requirements of the lesser flamingos at Kamfers Dam using a bioenergetics model, and (3) determine how human water management affects the lesser flamingo population at Kamfers Dam in Kimberley, South Africa.

**0104**

**Investigating changes in morphometric measurements of nestling Bald Eagles**

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The Michigan Bald Eagle Biosentinel Project was initiated in 1998 to monitor trends of persistent chemicals in the Great Lakes ecosystem. For the past 13 years, samples have been taken from nestling Bald Eagles (*Haliaeetus leucocephalus*) along with a series of morphometric measurements to determine the age and sex of the birds. The footpad, hallux claw, 8<sup>th</sup> primary feather, culmen length, and bill depth were measured for over 1600 nestling bald eagles between 1998 and 2011. Preliminary analysis has shown that there is a decrease in the body size of nestling bald eagles within the state of Michigan over the past decade. These measurements taken over long periods of monitoring may prove to be useful in assessing the species response to variables such as population density, habitat quality, and food availability with particular focus on changes in climate. Six of the eight sea eagle species (*Haliaeetus spp.*) have ongoing, long term research programs that may also include morphometric data that can be used to assess responses of the entire genus spanning four continents. This information will help development management strategies for the protection of these apex predators and their associated food chains within changing environments.

**0107**

**Photographic documentation of the morphological development from hatching to fledging of American Oystercatcher (*Haematopus palliatus*) chicks**

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The American Oystercatcher (*Haematopus palliatus*) is a Species of High Concern in shorebird conservation plans for the United States and a Species of Special Concern in Florida because of its small range-wide population, widespread habitat loss, narrow ecological niche, and threats during the breeding and non-breeding seasons. Oystercatchers occur only in the coastal zone in areas that support intertidal shellfish beds. In Hillsborough Bay, the northeast section of Tampa Bay, 15% (60 pairs) of Florida's estimated 400 pairs nest annually on the shorelines of 3 dredged spoil material islands. Spoil Islands 2D and 3D are owned by the Tampa Port Authority, the Alafia Bank Bird Sanctuary is owned by Mosaic, and all 3 are managed by Audubon. The shorelines are dynamic bare beaches that were rapidly colonized by oystercatchers.

Oystercatcher pairs persistently occupied territories that we identified and mapped annually for >20 years from 1990-2010. From 2008-2010, we monitored nesting pairs on shorelines daily from a boat offshore and recorded the hatching dates of chicks at each nest. We acquired photographs of various known-age chicks and documented their daily morphological development from hatching to fledging. Over a period of 35 days, chicks progress through 7 developmental stages, each stage lasting 5-6 days, that we characterized as small, medium, and

large downy, small feathered, medium feathered, and large feathered chicks, and a final stage termed large feathered flighted young. We present a photographic series documenting the daily development of an oystercatcher chick from hatching to fledging.

## 0111

### **Monthly abundance and seasonal spatial distribution of shorebirds on Cape Romain National Wildlife Refuge, South Carolina**

\*Nicholas Wallover<sup>1</sup>, Mary-Catherine Martin<sup>1</sup>, Felicia Sanders<sup>1</sup>, Norm Levine<sup>1</sup>, Sarah Dawsey<sup>1</sup>  
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Relative yearly abundance, mean monthly abundance, and seasonal spatial distribution were documented for 23 shorebird species in the Cape Romain Wildlife Refuge (CRNWR) in Awendaw, South Carolina. Located 37 km north of Charleston, SC, CRNWR features 35 km of coastline and is a Western Hemisphere Shorebird Reserve Network Site of Hemispheric Importance. Monthly shorebird surveys between November 2007 and October 2010 included barrier island beaches, shell rakes adjacent to marsh, and shell rake islands, including beachfront habitat which had never been censused prior to this study. A Kernel Density hotspot analysis was used to identify regions of CRNWR that host primary and secondary high densities of the most abundant three species and Piping Plovers during Fall (August through October), Winter (December through February) and Spring (March through July) seasons. Primary and secondary hotspots for each species/season were defined by categorizing all densities into five equal intervals based on the maximum density value for each run. All regions identified in the highest interval (80<sup>th</sup> percentile and above) were considered primary, and all regions identified in the second interval were considered secondary hotspots. The most common species observed were Dunlin (53%), Short-billed Dowitcher (8.5%), and American Oystercatcher (6.4%). For each of these four species and Piping Plover, between one and four primary hotspots were found for each season. Identification of the most important sites for shorebirds in CRNWR will help managers focus efforts to minimize disturbance by humans to shorebirds.

## 0113

### **The Atlantic Flyway Shorebird Conservation Action Plan: a new strategy for addressing major shorebird declines**

Caleb Spiegel<sup>1</sup>, Brad Winn<sup>2</sup>, Scott Johnston<sup>1</sup>, Stephen Brown<sup>2</sup>  
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Several Atlantic Flyway shorebird populations have declined by up to 90% during the last 30 years. Numbers of eastern Red Knots wintering in Patagonia dropped from 70,000 to 10,000 between 1985 and 2011, Semipalmated Sandpipers wintering in South America declined over 80% since the 1980s, and other species, including Whimbrel, Willet, dowitcher, and yellowlegs, experienced similar trends. Two regional U.S. Shorebird Conservation Plans identified conservation priorities for parts of the Atlantic Flyway, but have not been revised in >10 years and do not offer clear implementation methods or success measures for up-to-date actions. Increasing human pressures, such as wetland alteration, contamination, fisheries conflicts, recreational disturbance, and hunting, continue to threaten Atlantic Flyway shorebirds. A new

strategy is needed to bring shorebirds to the forefront of actions taken by resource agencies and conservation organizations. This strategy must include a coordinated planning and implementation process. We describe an effort to draft an Atlantic Flyway Shorebird Conservation Action Plan with shorebird experts and regulators from across the Flyway. During a February 5-9, 2012 working meeting, participants will break into focus groups to tackle different aspects of the plan including surveying and assessment, threat management, data management, engaging institutional support structures, developing funding sources, and establishing international partnerships. The plan will identify updated priority conservation actions, provide well-defined pathways and timetables for implementing actions, and formalize management objectives. An immediate, concerted effort from wildlife regulators and conservationists is required to ensure the future of shorebirds along the Atlantic Flyway. We encourage direct participation.

#### **0114**

##### **Metal contaminant levels in Canada Geese of the New Jersey Meadowlands**

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The New Jersey Meadowlands are located within the heavily urbanized New York/New Jersey Harbor Estuary and have been subject to contamination due to effluent and runoff from industry, traffic, and homes along the Hackensack River and nearby waterways. These extensive wetlands, though heavily impacted by development and pollution, support a wide array of bird and other wildlife species. Persistent contaminants may pose threats to birds in these habitats, affecting reproduction, egg hatchability, nestling survival and neurobehavioral development. Arsenic, cadmium, chromium, lead and mercury were analyzed in eggs, feathers, muscle and liver of Canada geese (*Branta canadensis*) breeding in four wetland sites. We sampled geese collected during control culling and collected eggs from goose nests. Levels of arsenic and cadmium were low in all tissues sampled. Chromium levels were high in feather samples. Mercury levels in eggs of Canada geese, an almost exclusively herbivorous species, were lower than in eggs of omnivorous Mallards (*Anas platyrhynchos*), and insectivorous Red-winged Blackbirds (*Agelaius phoeniceus*) and Marsh Wrens (*Cistothorus palustris*) from the Meadowlands, consistent with trophic level differences. Lead levels were higher in the goose eggs and feathers than in the other Meadowlands species. By contrast, muscle and liver lead levels were within the range reported in waterfowl elsewhere, possibly a reflection of metal sequestration in eggs and feathers. Elevated lead levels may be the result of sediment ingestion or ingestion of lead shot and sinkers. Finally, lead levels in goose liver and eggs may pose a risk if consumed frequently by humans.

#### **0115**

##### **Mass Audubon's Coastal Waterbird Program - 25 years of bird and habitat protection**

Katharine Parsons, Ellen Jedrey, Rebecca Harris, Scott Hecker, Andrea Jones

Mass Audubon, Cummaquid, MA, USA

Mass Audubon's Coastal Waterbird Program is one of the most effective entities working to protect coastal birds and barrier beaches in New England. Launched in 1987 in response to declining populations of Piping Plovers and terns in Massachusetts, the Coastal Waterbird Program's primary objective is to protect nesting and foraging areas throughout the state. This is accomplished through management best practices such as fencing, monitoring and education. The program works in cooperation with federal, state, and municipal agencies, and with private landowners. Since its first year, the program has successfully helped to recover the Massachusetts population of Piping Plovers from 135 pairs in 1986 to 650 pairs in 2011. Massachusetts is integral to the recovery of the federally threatened Atlantic Coast population of the Piping Plover, supporting roughly one-third of the breeding population. The Coastal Waterbird Program monitors 150 sites on the Massachusetts coastline and protects approximately 50% of the state's Piping Plovers, 60% of Massachusetts Least Terns, and 20% of Massachusetts American Oystercatchers. Although the primary focus of the program at its inception was the protection of the most threatened species of nesting coastal birds, today, the Coastal Waterbird Program advocates for the protection of the entire coastal ecosystem and serves as a model for integrated coastal resource management.

**0119**

**Philopatry, age structure and roosting habits during the post-breeding season of Great Egrets in the southern Ontario region**

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Very little information is available on the ecology of Great Egrets (GREGs, *Ardea alba*) during the breeding and post-breeding season at the northern limit of their range in the area of southern Ontario. Since 2001, we colour-banded and/or wing-tagged approximately 1400 GREGs at 4 sites in this area, searched for and monitored post-breeding roost sites and, in 2011, searched the Nottawasaga Island (NI) breeding colony (the largest egret colony in Canada) for marked birds. In 2011, we identified 59 marked egrets at NI during April to July. The age structure was as follows: 2 years old = 10.2%, 3 yrs = 22.0%, 4 yrs = 23.7%, 5 yrs = 20.3%, 6 yrs = 13.6%, 7 yrs = 5.1%, 8 yrs = 3.4% and 10 yrs = 1.7%; birds aged 1 or 9 years old were not observed during this period. The percent of each annual cohort banded at Nottawasaga showing natal philopatry to that breeding site in 2011 ranged from 0% to 9.33%. In 2010, we confirmed 30 post-breeding roosting sites in southern Ontario, upstate New York, Michigan and Ohio. They ranged in peak size from 1 to 384 individuals. The modal nearest neighbour distance among egret roost sites was 8 km (median = 24 km, range = 1-160 km). Egrets usually roosted in trees or shrubs, in or near standing water, but were also found roosting on mudflats or directly in shallow water. Occasionally, at a given site, they would move from roosting in water/mudflats to roosting in trees.

**0120**

**Developing a method to census waterbirds in Canada's boreal forest: Year 2**

D.V. Chip Weseloh<sup>1</sup>, Russ Weeber<sup>2</sup>, David J. Moore<sup>1</sup>, Rich Russell<sup>2</sup>

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With increased development slated for Canada's Boreal Forest, an area equal to the eastern 2/3s of the U.S., methods must be developed to estimate trends in numbers and distribution of colonial waterbirds. This study is being designed to track colonial waterbird populations. In 2010, all water courses in six 5 km<sup>2</sup> waterfowl survey plots and the eastern half of Lake St. Joseph (near Pickle Lake, Ontario) were surveyed by helicopter; surveying the waterfowl plots proved ineffective, as reported here last year. In 2011, we used a float plane to survey lakes across five tertiary watersheds in NW Ontario based on a stratified (by surface area and the presence of unvegetated islands and/or shoals (rocks) random design. A nearby large lake, North Caribou Lake (NCL), was also surveyed. In both years, colonies of Common Terns (*Sterna hirundo*, COTES), Herring Gulls (*Larus argentatus*, HERGs) and Ring-billed Gulls (*L. delawarensis*, RBGUs) were the most frequently encountered nesting aggregations; Common Loons (*Gavia immer*) and Bald Eagles (*Haliaeetus leucocephalus*) also were encountered regularly. In 2011, we tallied 90 HERG nests (at 44 sites), 339 COTE nests (15 sites) and 193 RBGU nests (10 sites) on 574 lakes and 33, 125 and 104 nests of those species, respectively on NCL. Those were the only nests located of colonial waterbirds. Most nests were found on lakes with both rocks and islands. Next year we hope to conduct surveys elsewhere in the boreal to assess the generality of these observations and evaluate model predictions of waterbird occurrence.

**0121**

**On the shores of Jamaica Bay: What have three years of monitoring shown us about shorebirds and horseshoe crabs?**

John Rowden, Susan Elbin

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The relationship between horseshoe crabs and migratory shorebirds has been well-studied, particularly in the Delaware Bay and estuary. Observers are well aware that Jamaica Bay is also an important spawning site for horseshoe crabs and stopover site for migrating shorebirds. In 2009 and with the support of the National Park Service, New York City Audubon initiated a three-year Citizen Science project to systematically monitor horseshoe crabs and migratory shorebirds at several sites in Jamaica Bay during the spring spawning and migratory season to 1) identify important sites and 2) to track local population trends. Monitors used the International Shorebird Survey protocol and data sheets (as modified by NJ Audubon Society) to record shorebirds at Plumb Beach, the Jamaica Bay Wildlife Refuge West Pond, Big Egg Marsh and Bay Dunes. Horseshoe crab monitors used a standard New York State DEC/Cornell Cooperative Extension protocol to survey horseshoe crabs at Plumb Beach for three years and added surveys at Dead Horse Bay and Big Egg in 2011. Our data indicate that horseshoe crabs spawn at high density (up to 4 crabs per square meter) on Plumb Beach, and their numbers have been stable during the three years of monitoring (n = 149, 136 and 135 crabs per sample night, respectively).

Shorebirds were present in varying densities at the monitored sites and numbers have declined from 1,196 per sample visit to 128 per sample visit during the three years of monitoring.

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## Nearby Restaurants and Amenities

**NOTE: The hotel has a free shuttle service that will take you anywhere with a five-mile radius. It is available from 0700 to 22:45. It is probably the best way to get to the downtown area of Annapolis and the City Dock, as well as the Westfield Mall, which is within walking distance but entails crossing busy roads.**

*If you are concerned about healthy eating or obtaining special foods that the hotel does not offer, there is a Whole Foods Market in the Annapolis Towne Centre (see below).*

### **About Annapolis**

Maryland's charming capital was founded in 1649. Here, you can walk along the old brick sidewalks much as George Washington or Thomas Jefferson did in the days when Annapolis was the capital of the United States. The city looks remarkably similar to what our Founding Fathers saw in their day. Architecturally, Annapolis boasts some of the finest 17th and 18th Century buildings in the country - including the residences of all four Maryland signers of the Declaration of Independence. Annapolis is home to the United States Naval Academy, founded in 1845, and to St. John's College, founded in 1696 as King William's School and the third oldest institution of higher learning in the United States.

Stroll along the famed waterfront or sit at City Dock and imagine what Annapolis must have been during the 1700s, when the City was a bustling seaport with vessels sailing in to trade from all over the world. The many historic buildings, shops, bars, and restaurants are clustered along the streets centering on the State House (State Circle) and around Church Circle.

Although Maryland is famous for its blue crabs, November is well outside the peak time for blue crabs. Prices will be very high and the crabs will probably not be local. Even crab cakes are frequently made using crab meat from Southeast Asia by this time of year.

### **Westfield Mall**

Your standard mall, but it is clean and pleasant and has a wide selection of chain restaurants, including Austin Grill, California Pizza Kitchen, Cheesecake Factory, Macaroni Grill, McCormick and Schmick Seafood, and, of course, a food court.

### **Annapolis Town Centre**

Walk to the end of the hotel driveway, cross the street, and the Annapolis Town Centre is about a half block down the street on the left. It houses the Paladar Kitchen and Rum Bar, the Brio Tuscan Grille, the Gordon Biersch microbrewery and restaurant, Ziki Japanese Steakhouse, Saladworks, the Chop House, and several other restaurants as well as a wide variety of stores, ATMs, and a Whole Foods Market (on the far side of the mall).

## Notes