

**Louisiana Association of Professional Biologists
and the
The Wildlife Society Louisiana Chapter**

*2016 Fall Symposium on
Recent Natural Resource Research in Louisiana*

*with a Focus Session on
Restoration Activities and Lessons Learned
Post BP Oil Spill*

**September 15-16, 2016
Burden Conference Center
4560 Essen Lane (I-10 at Essen Lane)
Baton Rouge, LA 70809**

LAPB 2016 Fall Symposium: Oral Presentations
Thursday, 15 September 2016

- 8:00-9:00 **Registration, Coffee and Welcome**
- 9:00-9:15 **Modeling bird distributions in coastal Louisiana.** *Katrina Hucks and Paul Leberg, Department of Biology, University of Louisiana at Lafayette.*
- 9:15-9:30 **Prothonotary Warbler Occupancy and Reproductive Success in Wooden versus Plastic Nest Boxes.** *Ryan C. Hudgins^{1,2}, Madelyn B. McFarland^{1,2}, Katie L. Percy¹, and Erik I. Johnson¹.* ¹ *Audubon Louisiana, National Audubon Society, Baton Rouge, LA,* ² *Renewable Natural Resources Building, Louisiana State University, Baton Rouge, LA.*
- 9:30-9:45 **Prothonotary Warbler Nestling Diet and Parental Provisioning Rates at BREC's Bluebonnet Swamp Nature Center, in Baton Rouge, LA.** *Madelyn B. McFarland^{1,2}, Ryan C. Hudgins^{1,2}, Katie L. Percy¹, and Erik I. Johnson¹.* ¹ *Audubon Louisiana, National Audubon Society, Baton Rouge, LA,* ² *Renewable Natural Resources Building, Louisiana State University, Baton Rouge, LA.*
- 9:45-10:00 **Determining Sex of Two Monomorphic Seabirds at the Isles Dernieres Barrier Island Refuge in Louisiana.** *Megan Nepshinsky¹, Jeff Liechty¹, Ashlee Minor¹, Sabrina Taylor² and Aaron Pierce¹.* ¹ *Department of Biological Sciences, Nicholls State University,* ² *School of Renewable Natural Resources, Louisiana State University.*
- 10:00-10:15 **Living on the edge: Multi-scale Analyses of Waterbird use in Estuarine Wetlands of Barataria Basin, LA, USA.** *Brett A. Patton¹ and John A. Nyman².* ¹ *Louisiana State University, c/o Livestock Show Office, Parker Coliseum, Baton Rouge, LA 70803,* ² *Louisiana State University, 327 Renewable Natural Resources, Baton Rouge, LA 70803.*
- 10:15-10:30 Break**
- 10:30-10:45 **Effects of Energy Development on Waterfowl Nesting Ecology in the Bakken Formation of North Dakota.** *Cassandra G. Skaggs^{1*}, Kevin M. Ringelman¹, Kaylan Carrlson², Tanner Gue², Chuck Loesch³, Frank Rohwer⁴, and Michael L. Szymanski⁵.* ¹ *Renewable Natural Resources, Louisiana State University AgCenter, Baton Rouge, LA, 70803, USA,* cskagg2@lsu.edu, ² *Ducks Unlimited, Inc., Bismarck, ND 58503, USA,* ³ *United States Fish and Wildlife Service- Habitat and Population Evaluation Team, Bismarck, ND 58501, USA,* ⁴ *Delta Waterfowl, Bismarck, ND 58502, USA,* ⁵ *North Dakota Game and Fish Department, Bismarck, ND 58501, USA.*
- 10:45-11:00 **Evidence of Predation and Disturbance in Nesting Waterbird Colonies on a Louisiana Barrier Island System using Video Monitoring.** *Eva D. Windhoffer and Aaron Pierce.* *Department of Biological Sciences, Nicholls State University.*
- 11:00-11:15 **Effects of Silvicultural Treatment on the Biodiversity of a Bottomland Hardwood Forest Plantation.** *Marshall Hart and J. Bhattacharjee* *Plant Ecology Laboratory, Biology Program – School of Sciences, University of Louisiana, Monroe, 700 University Avenue, Monroe LA, 71209*

- 11:15-11:30 **Environmental drivers of seasonal variability in coastal marsh SAV communities along a salinity gradient in Barataria basin, Louisiana.** *Eva Hillmann¹, Kristin DeMarco¹, Megan La Peyre² and Andrew J. Nyman³. ¹School of Renewable Natural Resources, Louisiana State University, Agricultural Center, Baton Rouge, LA, ²U.S. Geological Survey, Louisiana Cooperative Fish and Wildlife Research Unit, School of Renewable Natural Resources, Louisiana State University Agricultural Center, Baton Rouge, LA, ³School of Renewable natural Resources, Louisiana State University, Baton Rouge, LA.*
- 11:30-1:30 **Lunch on your own**
- 1:30-1:45 **An Analysis of Seedling Dynamics in Two Hydrologically Altered Louisiana Floodplains.** *Whitney A. Kroschel¹ and Sammy L. King². ¹School of Renewable Natural Resources, Louisiana State University, Baton Rouge, LA 70803, ²U.S. Geological Survey, Louisiana Cooperative Fish and Wildlife Research Unit, LSU School of Renewable Natural Resources, Baton Rouge, LA 70803.*
- 1:45-2:00 **Evaluation of Wild Crawfishing Practices Within the Atchafalaya River Basin.** *Ivan A. Vargas-Lopez, Michael D. Kaller, and William E. Kelso. School of Renewable Natural Resources, Louisiana State University Agricultural Center, Baton Rouge, LA.*
- 2:00-2:15 **Distribution of Carnivores in Coastal Louisiana.** *Mirka Zapletal and Paul Leberg. Department of Biology, University of Louisiana at Lafayette.*
- 2:15-2:30 **Evaluating Survival of Released Ranched American Alligator in Coastal Louisiana.** *Kristy D. Capelle¹, Michael D. Kaller¹, and Ruth M. Elsey². School of Renewable Natural Resources, ¹Louisiana State University Agricultural Center, ²Louisiana Department of Wildlife and Fisheries.*
- 2:30-2:45 **Tortoise Immunomes Shed Light on Genetic Variation Underlying Infectious Disease.** *Jean P. Elbers¹, Mary B. Brown², Sabrina S. Taylor¹. ¹School of Renewable Natural Resources, 227 RNR Bldg., Louisiana State University and AgCenter, Baton Rouge, Louisiana, 70803, ²Department of Infectious Diseases and Pathology, College of Veterinary Medicine, University of Florida, Gainesville, FL 32611.*
- 2:45-3:00 **Break**
- 3:00-4:00 **LAPB Fall Business Meeting**
- 4:00-7:00 **Social (Fried Catfish, Orzo Salad, French Fries, Dessert)**

LAPB 2016 Fall Symposium: Poster Presentations and Focus Session
Friday, 16 September 2016

8:00-9:20 **Poster Session (with coffee)**

Monitoring Pollinators and Pollinator Habitat in the Coastal Prairie across the Chenier Plain. *Larry Allain¹, Heather Baldwin¹, Steve Hartley¹, and John B. Pascarella².* ¹US Geological Service Wetlands and Aquatic Research Center, ²College of Science, Plant Ecology, Sam Houston State University.

The Use of Unmanned Aerial Systems In Forest Management. *Melissa Bloch and J. Bhattacharjee, Plant Ecology Laboratory, Biology Program – School of Sciences, University of Louisiana, Monroe, 700 University Avenue, Monroe LA, 71209.*

Least Tern and Wilson's Plover Nesting Success on Restored and Unrestored Beaches in Louisiana. *Kiah Williams¹, Katie Barnes¹, Kelly Dempsey¹, Katie Percy¹, Samantha Collins³, Kacy Ray², and Erik I. Johnson¹.* ¹ Audubon Louisiana, National Audubon Society, Baton Rouge, LA, ² American Bird Conservancy, The Plains, VA, ³ Louisiana Department of Wildlife and Fisheries, Rockefeller Wildlife Refuge, Grand Chenier, LA.

The Louisiana Bird Observatory: Six Years of Avian Monitoring and a Platform for Scientific Investigations. *Erik Johnson^{1,2}, Kristin Brzeski³, Scott Duke-Sylvester⁴, Allyson Jackson⁵, Crystal Johnson⁶, Irvin Louque⁷, Eddie Lyons⁷, Dan Mooney⁸, Don Norman⁹, Katie Percy¹, and Jared Wolfe^{2,9}.* ¹ Audubon Louisiana, National Audubon Society, Baton Rouge, LA, ² Baton Rouge Audubon Society, Baton Rouge, LA, ³ Princeton University, Princeton, NJ, ⁴ University of Louisiana, Lafayette, LA, ⁵ Oregon State University, Corvallis, OR, ⁶ Louisiana State University, Baton Rouge, LA, ⁷ McNeese State University, Lake Charles, LA, ⁸ Baton Rouge Audubon Society, Baton Rouge, LA, ⁹ Norman Wildlife Consulting, New Orleans, LA, ¹⁰ Pacific SW Research Station, U.S. Forest Service, Arcada, CA.

An Inventory of Chiropterans at Felsenthal National Wildlife Refuge in Southeast Arkansas. *Tyler J. Porter and Kim Marie Tolson, Department of Biology, School of Sciences, University of Louisiana at Monroe, Monroe, Louisiana.*

Habitat-related drivers of benthic invertebrate distributions on Whiskey Island, Terrebonne Parish, Louisiana. *Jessica L. Schulz, Robert C. Dobbs, and J. Hardin Waddle. U.S. Geological Survey, Wetland and Aquatic Research Center, 700 Cajundome Blvd., Lafayette, LA 70506.*

Relating diets and food availability to long-term population trends of Lesser Scaup wintering on Lake Pontchartrain, Louisiana. *Clay M. Stroud¹, Kevin M. Ringelman¹, Michael A. Poirrier², Larry Reynolds³, and Paul Link³.* ¹ Louisiana State University, School of Renewable Natural Resources, Baton Rouge, LA 70803, ² University of New Orleans, Department of Biological Sciences, New Orleans, LA 70148, ³ Louisiana Department of Wildlife and Fisheries, Baton Rouge, LA 70808.

Innovations in VHF Telemetry Technology: Contribution and Potential of Passive Monitoring Stations to the Study of Avian Ecology along the Louisiana Coast and the Mississippi Flyway. *Curtis Walker¹, Richard Demay¹, Michael Seymour² and Samuel Holcomb².* ¹Barataria-Terrebonne National Estuary Program, 320 Audubon Dr. #105, Thibodaux, LA 70301, ²Louisiana Department of Wildlife and Fisheries, 2000 Quail Dr., Baton Rouge, LA 70808.

9:30-11:40 **FOCUS SESSION: RESTORATION ACTIVITIES AND LESSONS LEARNED POST BP OIL SPILL**

9:30-10:00 **Oil Spill Funding: Focus on RESTORE Act.**

10:00-10:30 **Impacts to Salt marsh Vegetation in Louisiana, Mississippi, and Alabama from the Deepwater Horizon oil spill: a Natural Resource Damage Assessment Synthesis.** *Jonathan M. Willis¹, Mark W. Hester¹, Shahrokh Rouhani², Marla Steinhoff³, Mary Baker³.* ¹ Institute for Coastal and Water Research, University of Louisiana at Lafayette, Lafayette, LA, ² NewFields, Inc., Atlanta, GA, ³ National Oceanic and Atmospheric Administration, Assessment and Restoration Division Seattle, WA.

10:30-11:00 **Looking Back at Bird Impacts by the Deepwater Horizon Oil Spill, and Looking Ahead.** *Erik I. Johnson, Audubon Louisiana, National Audubon Society, Baton Rouge, LA.*

11:00-11:30 **Impact of the Deepwater Horizon oil spill on salt marshes: Lessons from Seaside Sparrows.** *Phillip C. Stouffer and Sabrina S. Taylor. Louisiana State University, 327 Renewable Natural Resources, Baton Rouge, LA 70803.*

11:30-11:45 **Open Discussion**

11:45-12:00 **PRESENTATION OF POSTER AWARD AND CLOSING COMMENTS**

Abstracts
Louisiana Association of Professional Biologists
2016 Fall Symposium

MODELING BIRD DISTRIBUTIONS IN COASTAL LOUISIANA.

Katrina Hucks and Paul Leberg

Department of Biology, University of Louisiana at Lafayette

Coastal systems are facing many challenges including climate change, sea level rise, storm surge, and erosion, all of which contribute to land loss. In Louisiana, this has led to the development of the coastal Master Plan supported by Habitat Suitability Index models to predict wildlife responses under various management scenarios. However, these models were not originally intended for this purpose and their functionality at large spatial scales is unclear. The goal of this project is to use Maxent to predict how various bird distributions might change with coastal restoration and management. During the summer of 2015, we surveyed southern Louisiana for Mottled Duck, Brown Pelican, and Roseate Spoonbill. We measured salinity, temperature, water depth, SAV presence and cover, and recorded surrounding vegetation. Using a predictive vegetation model, we projected the probability of occurrence for each target species. We had strong model fit for all models. Important variables for Mottled Duck were water, *Schoenoplectus californicus*, bare ground, *Paspalum vaginatum*, and *Typha domingensis*. Important variables for Brown Pelican were water, *Spartina alterniflora*, *T. domingensis*, *Sagittaria lancifolia*, and *Taxodium distichum*. Important variables for Roseate Spoonbill were water, bare ground, *S. californicus*, *T. domingensis*, and SAV. We plan to incorporate other environmental variables in future analyses to project habitat changes over a 50 year period. These results will help us understand how coastal change is affecting distributions of avifauna in southern Louisiana.

PROTHONOTARY WARBLER OCCUPANCY AND REPRODUCTIVE SUCCESS IN WOODEN VERSUS PLASTIC NEST BOXES

Ryan C. Hudgins^{1,2}, Madelyn B. McFarland^{1,2}, Katie L. Percy¹, Erik I. Johnson¹

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The Prothonotary Warbler (*Protonotaria citrea*) is recognized as a conservation priority species that occupies bottomland hardwood forests and swamps. Populations have declined by >1%/year, but concordant rates of habitat loss on the breeding grounds have not been as rapid, suggesting population declines may be driven by habitat fragmentation (e.g., edge effects) or by factors away from the breeding grounds. Prothonotary Warblers are secondary cavity nesters that will readily use man-made nest boxes, which are used by researchers and conservation organizations to monitor and boost local nesting success, but rarely are occupancy and productivity effects evaluated with regard to box design and materials. To test for selection and differences in nest success between boxes made out of wood versus plastic containers, we placed 30 plastic and 30 wooden boxes at four study sites across south Louisiana before the 2016 breeding season began. Each plastic box was paired with a wood box within 60 meters. We constructed wooden boxes to approximate the dimensions and volume (~125 in²) of the plastic containers. Nest box occupancy was not equally distributed as Prothonotary Warblers nested in 18 plastic boxes and only 7 wooden boxes ($X^2_1 = 8.30$, $P = 0.004$). Clutch size between plastic ($\bar{x} = 4.89 \pm 0.14$ SE) and wooden ($\bar{x} = 4.86 \pm 0.05$) boxes, however, were not significantly different ($t_{23} = 0.133$, $P = 0.896$), nor were the number of chicks fledged per brood ($\bar{x}_{\text{plastic}} = 3.72 \pm 0.40$ SE; $\bar{x}_{\text{wooden}} = 4.14 \pm 0.17$ SE; $t_{23} = -0.573$, $P = 0.572$). Because nest boxes are widely used for Prothonotary Warbler conservation and monitoring, our results suggest that plastic boxes may be more readily accepted by nesting Prothonotary Warblers.

PROTHONOTARY WARBLER NESTLING DIET AND PARENTAL PROVISIONING RATES AT BREC'S BLUEBONNET SWAMP NATURE CENTER, IN BATON ROUGE, LA

Madelyn B. McFarland^{1,2}, Ryan C. Hudgins^{1,2}, Katie L. Percy¹, Erik I. Johnson¹

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The Prothonotary Warbler (*Protonotaria citrea*) is a migratory songbird that breeds in bottomland hardwood forests and cypress-tupelo swamps throughout the eastern United States. About 25% of the global breeding population is found in Louisiana, where the annual decline has been 1.8%/year. Understanding the relationship between habitat quality and breeding productivity is important in developing strategic conservation guidelines and one factor that may be important in interpreting nesting success is food availability. We quantified nestling diet and parental provision rates were video observations at BREC's Bluebonnet Swamp Nature Center, located in Baton Rouge, LA. All video observations were conducted in the mornings (6:00-12:00) when nestlings were 7-11 days old at 13 nest boxes. We quantified provisioning rates and average time spent at the nest box by each parent, as well as the types of food being brought to the nestlings. Feeding rate was calculated as the number of visits per hour per the number of nestlings. The average feeding rate of males ($\bar{x} = 1.32 \pm 0.17$ SE) did not significantly differ from the average feeding rate of females ($\bar{x} = 1.97 \pm 0.38$ SE; $t_{12} = 1.457$, $P = 0.171$), nor did the average time (seconds) spent at the nest per visit ($\bar{x}_{\text{male}} = 14.51 \pm 2.48$ SE; $\bar{x}_{\text{female}} = 23.83 \pm 5.11$; $t_{12} = 1.582$, $P = 0.140$). Unfortunately, we were not able to identify food items for the majority of visits ($n = 253$) because of the camera angle and as a consequence of how quickly some birds entered nest boxes. Of the food items that were identifiable, caterpillars were the most common ($n = 145$), followed by grasshoppers ($n = 21$), spiders ($n=10$), mayflies ($n = 4$) and dragonflies ($n = 4$). These results are preliminary and will serve as a starting point for future analysis of the effects of parental age, patch size, and habitat type, on provisioning rates, as well as potential carryover effects experienced by parents from habitat quality during the previous winter.

DETERMINING SEX OF TWO MONOMORPHIC SEABIRDS AT THE ISLES DERNIERES BARRIER ISLAND REFUGE IN LOUISIANA

Megan Nepshinsky¹, Jeff Liechty¹, Ashlee Minor¹, Sabrina Taylor² and Aaron Pierce¹

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²*School of Renewable Natural Resources, Louisiana State University.*

Most seabirds are sexually monomorphic and do not display conspicuous differences in plumage or size. Two sexually monomorphic seabird species, Royal Tern (*Thalasseus maximus*) and Sandwich Tern (*Thalasseus sandvicensis*), have been intensely studied on the Isles Dernieres Barrier Island Refuge (IDBIR) in Louisiana. However, sex-bias of parameters, such as natal recruits, survivorship, foraging movements, parental care, and site fidelity, have not been addressed due to the difficulty of sexing individuals. The goal of this study was to determine if morphometric measurements are a reliable method of sex determination for Royal and Sandwich Terns. During the 2014 and 2015 breeding seasons, we captured adult Royal and Sandwich Terns, measured morphometric attributes (mass, wing chord, bill length, head+bill length, and tarsus) and collected blood samples to determine sex using molecular techniques. Analysis of blood samples identified the sex of 82 Royal Terns (57 males and 25 females) and 84 Sandwich Terns (40 males and 44 females). Discriminant function analysis (DFA) was used to determine if morphometric measurements were effective in determining sex of each species. DFA resulted in a correct classification rate of 75.6% for Royal Terns based on wing chord and head+bill length and 79.8% for Sandwich Tern based on mass and head+bill length. The ability to determine sex of monomorphic seabirds using morphometric measurements will allow for rapid sexing and enhance ecological investigation of these species.

LIVING ON THE EDGE: MULTI-SCALE ANALYSES OF WATERBIRD USE IN ESTUARINE WETLANDS OF BARATARIA BASIN, LA, USA

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Wetland loss in Louisiana is estimated at the rapid rate of 42.9 km² yr⁻¹ and the trend is expected to continue. This combined with expected sea-level rise will likely cause extensive shifts to vegetation and salinity regimes that may have deleterious effects on the wildlife species dependent on these ecosystems. Waterbirds serve as indicator species of ecosystem health in estuarine wetland habitats; therefore, these species are often the targets of wetland management goals and metrics of restoration success in Louisiana. However, many of the proposed wetland restoration projects are focused primarily on social impacts with only a few specific waterbird species designated for management. Additionally, the majority of waterbird habitat-use studies in Louisiana wetlands have focused on waterfowl species and their abundance in wetland habitats during migration and winter. Therefore, I examined the effects of a comprehensive set of spatial, temporal, and environmental parameters on waterbird habitat use within Louisiana estuarine wetlands. I compared the habitat use of all waterbird taxa in fresh and saline estuarine wetland habitats as well as their use at finer spatial scales to assess a possible preference for marsh edge microhabitats when compared to open water and interior emergent vegetation. Additionally, I investigated waterbird associations with the environmental parameters of emergent and aquatic species composition, percentage of open water, and salinity. From July 2014 to December 2015, I compared waterbird density and species richness both spatially and temporally to assess habitat use. I found that species richness differed between fresh and saline habitats depending on the month. The edge habitat supported 1.9 times more waterbird species richness and 1.8 times more guild richness than emergent and open water habitat regardless of salinity type or month. The ratio of waterbirds in edge habitat compared to open water was 1.4:1.0 in fresh marsh but 1.2:1.0 in saline marsh, and birds utilized this habitat up to 15 m from the edge. Waterbird density was greatest among edge microhabitat regardless of salinity type, but within open water plots, density did not vary in relation to salinity type. There was a significant relationship ($p=0.002$) between environmental variables and species (guilds) with emergent and aquatic vegetation structures being the strongest predictors of waterbird use. These data will be useful in attempts to simulate the effects of wetland loss and salinity changes on habitat quality for waterbirds in coastal Louisiana, and will inform habitat restoration and management decisions for optimal waterbird use.

EFFECTS OF ENERGY DEVELOPMENT ON WATERFOWL NESTING ECOLOGY IN THE BAKKEN FORMATION OF NORTH DAKOTA

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The Prairie Pothole Region (PPR) is responsible for producing more than half of the dabbling ducks in North America, many of which winter or migrate through Louisiana. The PPR in northwestern North Dakota coincides with the Bakken shale formation, where rapidly accelerating oil and gas development has the potential to impact more than 1 million duck pairs. Our goal is to assess the effect of energy development in the Bakken on waterfowl nest density and success. We selected sites that were stratified by the intensity of energy development as measured by the number of well pads present (Control: 0, Low: 1, Medium: 2-3, High: >3). We searched for waterfowl nests on at least two 32-ha grassland replicates on each of 28 plots (7 in each category) between 30 April-30 June 2015 and 28 April-15 July 2016. We searched for nests every three weeks using a chain drag and revisited every 5-7 days to determine nest fate. In 2015 and 2016, we searched over 2,600 hectares and found over 2,531 nests total. Blue-winged Teal (*Anas discors*), Mallard (*Anas platyrhynchos*), and Gadwall (*Anas strepera*) comprised 75% of nests that were located. Preliminary results suggest nest survival weakly increases with the intensity of petroleum development. While areas of high extraction activity may lead to an increase in nest success, an irreversible decrease in nest density could lower the waterfowl production capacity of the region due to habitat loss and fragmentation.

EVIDENCE OF PREDATION AND DISTURBANCE IN NESTING WATERBIRD COLONIES ON A LOUISIANA BARRIER ISLAND SYSTEM USING VIDEO MONITORING

Eva D. Windhoffer and Aaron Pierce.

Department of Biological Sciences, Nicholls State University

The Isles Dernieres Barrier Islands Refuge (IDBIR) in coastal Louisiana provides critical breeding habitat for numerous species of colonial nesting waterbirds. These islands are also inhabited by mammalian and avian species that have the potential to reduce overall waterbird breeding success, primarily through nest predation and disturbance. Nutria (*Myocastor coypus*) and Laughing Gull (*Leucophaeus atricilla*) are two primary species that are believed to affect the breeding success of waterbirds on IDBIR. In conjunction with *in-situ* nest monitoring, three video systems were deployed for the first time on East Raccoon Island to determine disturbances to nesting colonies and specific nest predators of Royal Tern (*Thalasseus maximus*) and Sandwich Tern (*Thalasseus sandvicensis*) during the 2015 breeding season. In addition, we also identify egg scavengers. Our video recordings indicated recurrent and oftentimes aggressive predation of tern eggs by nutria. Video footage (1,834 hours) revealed that nutria predation accounted for 42.3% of all recorded predation events and that nutria were the most common cause of disturbance. Laughing Gulls contributed the most to predation of tern eggs, accounting for 52.6% of all predation events. Ruddy Turnstones (*Arenaria interpres*) preyed the least amount of eggs, however they were the most common scavenger. To our knowledge, this is the first non-anecdotal evidence of nutria predation of bird eggs. Our video data from the 2015 breeding season illustrates the important effects that nutria have on waterbird nesting success. Video monitoring for predation in Royal and Sandwich tern colonies will continue during the 2016 breeding season.

EFFECTS OF SILVICULTURAL TREATMENT ON THE BIODIVERSITY OF A BOTTOMLAND HARDWOOD FOREST PLANTATION

Marshall Hart and J. Bhattacharjee

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Reforestation of bottomlands in the past involved row planting of hardwood species, often resulting in monotypic stands with no structural heterogeneity and providing poor wildlife habitat. We proposed that creating artificial canopy gaps will result in increased species richness as new niches open up. Increased plant species diversity and structural heterogeneity is expected to increase the diversity of both invertebrates and avian species. In 2013, three silvicultural treatments were applied to a bottomland hardwood plantation in the former Ouachita Wildlife Management Area. The treatments include - 5 tree retention, 9 tree retention, row thinning, and a control. Each of these treatments had three replicate units and each unit had 5 plots where sampling was carried out. Results indicate that the overall plants species richness has increased in all experimental units from 48 species before thinning to 117 after. We also evaluated the diversity of birds, invertebrates, pollinators, understory vegetation, and stand growth. Avian sampling has been carried out using a modified point-count method during and after the breeding season for 2016. Invertebrates were sampled during the summer using a total of 10 light and pitfall traps. Combined pitfall and light traps showed an average number of invertebrate families to be 14.33 for row thinning, 12.66 families for both 5 tree retention and 9 tree retention units, and 16 for the control. Pollinators in plots were captured by netting and data on nearby flowering plants was recorded to show any specific plant-pollinator associations. Preliminary data analysis showed an average of 6 pollinator species in each treated unit while there were 0 pollinators captured in the control unit. Sampling of the understory vegetation include species, % cover, and height of all stems within the sub-plot being sampled. Average growth in basal area per tree was 0.012 m²/ha/year for 5 tree retention, 0.014 m²/ha/year for row thinning treatment, 0.013 m²/ha/year for 9 tree retention, and 0.010 m²/ha/year for the control. The results of this study can be used for future restoration projects in the Lower Mississippi Alluvial Valley by providing information on the effects of various silvicultural treatments on the biodiversity in a bottomland hardwood forest ecosystem.

ENVIRONMENTAL DRIVERS OF SEASONAL VARIABILITY IN COASTAL MARSH SAV COMMUNITIES ALONG A SALINITY GRADIENT IN BARATARIA BASIN, LOUISIANA

Eva Hillmann¹, Kristin DeMarco¹, Megan La Peyre² and Andrew J. Nyman³

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Predicted effects of climate change are expected to alter the distribution of habitat types and composition of vegetation communities within coastal estuaries. Submerged aquatic vegetation (SAV) is ecologically and economically significant and grows along the estuarine salinity gradient from fresh to saline. While several studies indicate that water depth, water clarity and salinity are key predictors of SAV biomass and community composition, their accuracy in highly variable estuarine environments, such as coastal Louisiana, is limited. We documented bi-monthly changes in SAV assemblages, biomass and local water quality (salinity, water depth, photosynthetically active radiation, dissolved oxygen, water ph) at sixteen sites, stratified by salinity in Barataria Bay, Louisiana over a 12 month period. Ten species of SAV were observed at least once and seven species of SAV were observed throughout the study period.

Ceratophyllum demersum and *Myriophyllum spicatum* were the most ubiquitous species of SAV found throughout the basin. However, only *Ruppia maritima* was observed across the entire salinity gradient. Fresh and intermediate salinity sites exhibited higher species richness and biomass than brackish and saline sites ($p < 0.0001$) throughout the year. Two peaks of SAV biomass were detected (May and July), while lowest total SAV biomass was seen in winter (December) ($p = 0.0009$). While temperature variation and turbidity were similar between all sites, salinity, water levels, and light penetration varied significantly temporally *within* each site, and spatially *between* sites, with brackish and saline sites being exposed to the greatest ranges of values. Discrete annual sampling or predictive models based only on annual sampling likely only represent a small fraction of the diversity and variability in SAV biomass across a dynamic salinity gradient in the northern Gulf of Mexico. Further, these data suggest that intra annual variability in water quality parameters, as opposed to overall means, may be a better predictor of SAV species richness and total biomass. Improved understanding of relationships between environmental variation and SAV response throughout the year is critical to accurately quantify these resources. More precise models will enable resource managers to more precisely predict effects of climate change and restoration on SAV and their associated fish and wildlife.

AN ANALYSIS OF SEEDLING DYNAMICS IN TWO HYDROLOGICALLY ALTERED LOUISIANA FLOODPLAINS

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Within the past century modifications to Southeastern U. S. river systems for navigation and flood control have permanently altered the natural hydrologic and geomorphic processes of most bottomland hardwood forest (BLH) floodplains. Some BLH ecosystems are subsequently exhibiting a transition from hydric to more mesic tree species communities; the mechanisms for this change could be related to the regeneration process. The purpose of this study is to identify the effect of hydrologic patterns on the regeneration process of BLH tree species. We established 100 1 x 1 m plots in floodplains of two wildlife management areas (WMAs) in northern Louisiana to examine seedling dynamics in relation to surface flooding for the 2016-2018 growing seasons. We also established five groundwater monitoring wells in the WMAs to collect long term data on surface and groundwater patterns in these BLHs. Preliminary results suggest the presence of long term (>30 d) flooding can delay seedling emergence to early July of some BLH species, but in areas with limited or no flooding, emergence timing is related to other post-dispersal, environmental factors. By continuing to monitor seedling dynamics over the next two growing seasons, we aim to identify and better understand the biotic and abiotic factors that influence BLH regeneration.

EVALUATION OF WILD CRAWFISHING PRACTICES WITHIN THE ATCHAFALAYA RIVER BASIN

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In Louisiana, crawfish harvesting is a valuable economic activity, which is based on culture practices within farms and wild harvest. Although wild harvested crawfish represent only 8% of the economic value of the Louisiana crawfish industry, wild harvested crawfish are highly desired by some consumers because of larger sizes and a strong socioeconomic and cultural importance. Decades of assessment have shown that since 1990, wild crawfish harvesters have been challenged by rising operational costs, natural disasters that have affected harvesting areas, and loss of crawfishing habitat. Despite considerable data on landings, the practices of the individual harvesters are not well documented. In order to help wild harvesters, resources have been made available, such as the Atchafalaya Basin Program's Natural Resource Inventory and Assessment System. However, it is unclear whether harvesters use this source of information or what information is used in selection of trapping sites. This project evaluated harvesting practices by: 1) field observation and mapping of harvest sites in the southwestern Atchafalaya River Basin; and 2) directed interviews with individual harvesters. Field observations included trap locations, water quality, habitat components, and fishery independent sampling. Field observations were conducted along four transects across a gradient of water quality over two seasons (2015 and 2016) weekly during the active harvest period. We also assessed connectivity with floodplain and river water sources by conservative tracers (isotopes) biweekly during 2016. Directed interviews (25 harvesters) asked about frequency and intensity of effort, gear used, factors in deciding where to trap, and their experiences. We will present preliminary results of relationships between trapping effort with habitat and water quality and whether these field observations reflect reported practices.

DISTRIBUTION OF CARNIVORES IN COASTAL LOUISIANA

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Carnivore distribution and assemblage have been little studied in coastal Louisiana, and responses to human activity and habitat change within this rapidly evolving ecosystem are largely unknown. Better understanding of carnivore biogeography within the coastal environment will facilitate management of both carnivore and prey populations in the face of long-term climate change. This study investigated carnivore species distribution at mainland and barrier island sites in Vermilion, Terrebonne, and Barataria Bays to develop models for carnivore presence at Gulf-facing sites in Louisiana. Track plates, cameras, trapping sessions, and opportunistic records determined carnivore presence, including species fulfilling ecological carnivore roles (e.g. *Rattus* spp.). Prey surveys (i.e., crab counts, bird counts, etc.), vegetation plots, beach surveys, and GIS data (i.e., site size, distance to nearest landmass, etc.) provided environmental data for locations with and without carnivore species. We used AIC model selection with variable weighting for carnivore species as a group and individually to determine the environmental characteristics most indicative of carnivore presence. Carnivore diversity in coastal Louisiana was responsive to plant species richness. At the species level, coyote presence was impacted by elevation and site isolation, while raccoons were more likely in locations with complex vertical vegetation. Our results suggest that planning for ecosystem maintenance in coastal Louisiana cannot utilize a “one size fits all” approach for either removal or support of carnivore species. Projected impacts of climate change will alter carnivore distribution within Louisiana’s coastal zone, and AIC model selection suggests that carnivore species will respond individually to future conditions.

EVALUATING SURVIVAL OF RELEASED RANCHED AMERICAN ALLIGATOR IN COASTAL LOUISIANA

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Since 1986, ranching programs in Louisiana have required the release of hatched American Alligators (*Alligator mississippiensis*) collected from wild nests to maintain alligator populations throughout the state. Over the years, the proportion and size of released ranched alligators has been modified, based on preliminary survival data. This project assessed long-term harvest data (1991-present) from the release program to estimate survival of alligators released as part of the program. Specifically, the management objective of this project was to determine the impact of release length on survival. First, wildlife and fishery harvest models and general survival models were evaluated to determine best fit to the data. Second, once the best fitting model for overall release length survival of the farm-released alligators was established, environmental data (including precipitation and temperature) from alligator release areas were added into the models to investigate further influences on survival estimates. Inclusion of release length and variable entry (interval censoring) improved the precision of survival estimates, although the relationship between release length with survival differed between male and female alligators. Alligator survival in response to additional variables will continue to be evaluated to give a better understanding of the effects of extreme weather events on future management of American Alligators in Louisiana.

TORTOISE IMMUNOMES SHED LIGHT ON GENETIC VARIATION UNDERLYING INFECTIOUS DISEASE

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Immune response genes control the immune system's response to pathogens and because changes in these genes can alter disease susceptibility, they are likely to be influenced by selection. Populations of threatened species generally possess low levels of genetic variation, and genetically depauperate hosts may be at greater risk of infectious disease contributing to extirpations. To better understand the genetic basis of infectious disease susceptibility in a species of conservation concern, we sequenced the immune response genes (i.e., immunomes) in 16 free-ranging gopher tortoises *Gopherus polyphemus* from 3 Florida populations (CF, FC, and OLD) with (n=10) or without (n=6) clinical signs and that produced antibodies against *Mycoplasma agassizii*, an etiologic agent of infectious upper respiratory tract disease (URTD). We found several synonymous and non-synonymous SNPs and indels associated with URTD phenotypes. Genetic diversity was lowest in CF followed by OLD and FC. Population differentiation and admixture were as expected based on geographic proximity of populations. There were two SNPs putatively under selection according to F_{ST} outlier tests, and there were 35 genes that deviated from neutrality according to Tajima's D . These results demonstrate that immunome sequencing of individuals with symptomatic and asymptomatic phenotypes from several populations may be conducive to better understanding the genetic basis of infectious disease by elucidating what genetic variation is associated with disease susceptibility. Immunome sequencing can also provide valuable information on levels of population genetic diversity, how populations are genetically differentiated, and what genetic variation may be under selection or deviating from neutrality.

MONITORING POLLINATORS AND POLLINATOR HABITAT IN THE COASTAL PRAIRIE ACROSS THE CHENIER PLAIN

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Declines in pollinator populations and their impact on natural and managed landscapes have recently received considerable attention. This interest is reflected by the Presidential Memorandum of June 2014 directing federal agencies to support research on pollinator status and distribution. The reproduction of 87.5% of flowering plants and 70% of crops relies on animal pollination. Of the insects providing this keystone ecosystem service bees are the principal pollinators of both wild and cultivated plants. Data on the status of wild bees is scant and research efforts to study bee populations are expensive and limited by taxonomic expertise. Emerging literature regarding native bee populations suggests that abundance and availability of nectar resources positively correlates with native bee populations. Therefore, monitoring habitat availability and condition of grasslands may be a strong indicator of native pollinator population health for all classes of pollinators. Scientists at USGS-WARC in collaboration with the EPA, and GCP LCC will conduct a baseline assessment of grasslands across the Chenier Plain in conjunction with an ongoing pollinator study. Our goal is to identify and assess remnant prairies, and other high quality grasslands, then examine local and landscape scale drivers associated with pollinator populations throughout the Chenier Plain.

THE USE OF UNMANNED AERIAL SYSTEMS IN FOREST MANAGEMENT

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Accurate mapping of species composition in forests is an essential aspect of forest ecology and management. Detailed maps generated by multispectral cameras and image processing software can be used to improve ecosystem functions and services through targeted management. The objective of this study was to investigate the use of high resolution multispectral data in generating detailed species distribution maps for a given forest. Existing methods for identifying tree species stocks collected through field surveys and interpretations of satellite imagery, are often time-consuming and cost intensive. While satellite imagery have been used for a multitude of vegetation related matrices, such imagery are too coarse and constrained, not providing accurate and up to date information about the site. In contrast, when near-surface images are obtained using unmanned aerial systems (UAS) with a high resolution multispectral camera, it is possible to collect data at the individual tree level in a forest. UAS are cost-effective, reliable, and can readily be used in forests at any time, including during post flooding, hurricane, or fire events. Currently, research is under way to use UAS to assess various attributes of forest stands, such as carbon sequestration, wildlife habitat quality, bole quality, tree disease detection, biomass productivity and invasive species distribution/spread. In this study, we present our case showing the versatility of such a technique carried out at a relatively undisturbed bottomland hardwood stand within the Russell Sage Wildlife Management Area.

LEAST TERN AND WILSON'S PLOVER NESTING SUCCESS ON RESTORED AND UNRESTORED BEACHES IN LOUISIANA

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Beach-nesting birds face a multitude of threats, both anthropogenic and natural. Coastal habitats are dynamic systems in which storms and hurricanes serve as important disturbance events, scouring beachfronts and shifting sediment to reduce vegetation cover. Beach renourishment projects and vegetation plantings can roughly emulate these dynamics, but resulting elevational and predator-prey dynamics differ from natural disturbance regimes. Our objectives were to first protect nesting sites used by Least Terns (*Sternula antillarum*) and Wilson's Plovers (*Charadrius wilsonia*) from human disturbance, and then identify factors that limit breeding productivity at restored and unrestored beaches in coastal Louisiana in 2016. Least Tern hatching success averaged 26% (n=348 nests), and did not differ between restored sites and unrestored sites ($\chi^2_1 = 0.649$, $P = 0.420$). Hatching success was instead site-dependent ranging from 2% (n=49 nests, Elmer's Island) to 61% (n=23 nests, Town of Holly Beach), and was affected by high water events, coyote depredation, or both. Wilson's Plover hatching success averaged to 64% (n=67 nests), and did not differ between restored and unrestored sites ($\chi^2_1 = 0.208$, $P = 0.649$). Rockefeller Wildlife Refuge, one of four Globally Important Breeding Areas (Zdravkovic 2013) for this species in the U.S., had the lowest hatching success (38%, n=21) among eight sites monitored, mainly because of spring flooding. Our results reveal the need to protect beach-nesting areas from human disturbance and provide elevated nesting sites that are relatively predator free to benefit these species of conservation concern.

THE LOUISIANA BIRD OBSERVATORY: SIX YEARS OF AVIAN MONITORING AND A PLATFORM FOR SCIENTIFIC INVESTIGATIONS

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The Louisiana Bird Observatory was established in March 2010 as a project at Bluebonnet Swamp Nature Center to learn about year-round demographics of understory bird species in an urban forest fragment. It has since expanded to include three additional year-round banding sites, and has tallied over 10,000 bird captures. It has also expanded in scope and questions, and has provided opportunities for collaborations to study Prothonotary Warbler migration, avian malaria, anti-microbial resistant bacteria, mercury exposure, and epigenetics. The comparison of bird populations across sites that vary in patch size and landscape context provides opportunities for understanding how Louisiana's birds respond to habitat alterations, including consequences on community structure, population demographics, and contaminant and disease exposure risk. The program has been involved in eight scientific publications that span a variety of topics including behavioral observations, bill deformities, bird migration, avian molt, and aging criteria refinements, and avian demographics. The program has also focused on training the next generation of avian researchers and conservation leaders, and over 200 volunteers have supported banding operations to help provide opportunities for outreach and education to nearly 1,000 visitors per year.

AN INVENTORY OF CHIROPTERANS AT FELSENTHAL NATIONAL WILDLIFE REFUGE IN SOUTHEAST ARKANSAS.

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Chiropterans (bats) are the second largest mammalian order on earth, second to only rodents. Felsenthal NWR is a ~65,000 acre refuge composed of three distinct habitat types: bottomland hardwood forest, cypress-tupelo swamp, and upland pine systems. Up until 2015, only mobile acoustic monitoring was done twice annually to account for the presence/absence of bat species. During the summer of 2014, it was discovered that *Myotis septentrionalis* (northern long-eared bat), which was recently listed as “threatened” by the U.S. Fish and Wildlife Service, was present on the refuge according to acoustic data. Over the course of 18 months, we are utilizing mist netting, acoustic monitoring, and tree cavity searches to record bat species present throughout the three habitat types present on the refuge. Both passive and mobile acoustic surveys are being conducted monthly to account for presence/absence of species and determine habitat preferences. Mist netting is employed to confirm our acoustic samples of bat echolocation calls. All bats collected in mist nets are screened for white-nose syndrome lesions. Tree cavity searches are performed to identify roost sites, maternity colonies, and hibernacula preferences. Results for data collected through the month of August will be presented.

HABITAT-RELATED DRIVERS OF BENTHIC INVERTEBRATE DISTRIBUTIONS ON WHISKEY ISLAND, TERREBONNE PARISH, LOUISIANA.

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Over 20 shorebird species rely on barrier island habitat in Louisiana, including several federally listed species and species of concern. The value of this habitat for wildlife can be affected by restoration methods; for example, beach “nourishment”, a commonly used restoration method, increases beach area and elevation but can also cause changes in the benthic invertebrate prey base for shorebirds. In anticipation of an upcoming nourishment project, we conducted swash-zone benthic invertebrate sampling on a barrier island in Terrebonne Parish, Louisiana to characterize the natural distributions of invertebrates used as prey by resident and migrating shorebirds. We used hierarchical models to estimate densities of three key prey types (amphipods, polychaetes, and insects) as a function of habitat type while accounting for imperfect detection of individuals. Understanding the ecological drivers of invertebrate prey distributions will be crucial for planning and assessing restoration projects that have the potential to impact populations of imperiled species.

RELATING DIETS AND FOOD AVAILABILITY TO LONG-TERM POPULATION TRENDS OF LESSER SCAUP WINTERING ON LAKE PONTCHARTRAIN, LOUISIANA

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Coastal Louisiana provides wintering habitat for a continentally-significant proportion of Lesser Scaup (*Aythya affinis*), a species which has been of conservation concern since population declines began in the 1980s. Lake Pontchartrain is an important wintering area for scaup, though annual populations fluctuate from a few thousand birds to nearly half a million in some years. Benthic invertebrate abundance, species composition, and size classes also vary drastically between years due to natural and anthropogenic disturbances. As wintering scaup have been documented to feed primarily on mollusks, it is likely that changes to benthic communities affect annual scaup populations of Lake Pontchartrain. I will examine the diet composition of wintering scaup utilizing Lake Pontchartrain, and simultaneously sample the benthic invertebrate communities where scaup are collected to determine food availability and scaup diet preferences. Using these empirical diet data, I will analyze long-term datasets on both scaup abundance and benthic invertebrate community assemblage to diagnose the causes of annual variation in waterfowl populations on Lake Pontchartrain. I will also evaluate the impact of environmental disturbance and intense perturbation events on scaup food sources and subsequent changes in scaup populations. Moreover, this study will serve as a baseline for future research to be conducted after the next major disturbance event strikes this system.

INNOVATIONS IN VHF TELEMETRY TECHNOLOGY: CONTRIBUTION AND POTENTIAL OF PASSIVE MONITORING STATIONS TO THE STUDY OF AVIAN ECOLOGY ALONG THE LOUISIANA COAST AND THE MISSISSIPPI FLYWAY

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For decades, the use of very high frequency (VHF) radio-telemetry in wildlife research has led to tremendous advances in our understanding of avian ecology. VHF telemetry has gone largely unaltered since its inception due to unequivocal efficacy. While proving to be an invaluable technology, its primary limitations have been (1) the requirement of intensive tracking effort on the ground resulting in relatively small geographic scales for individual studies and (2) that few available frequencies meant fewer tracked individuals. However, recent innovations in VHF radio-telemetry technology in the form of passive monitoring stations greatly reduce logistical constraints and increase both spatial influence and data volume. When used in conjunction with coded transmitters, passive monitoring stations have the ability to continuously track hundreds of target individuals simultaneously, maximizing potential for new research in wildlife bionomics. Through a partnership with the Louisiana Wildlife and Fisheries Foundation, the Barataria-Terrebonne National Estuary Program, and the Louisiana Department of Wildlife and Fisheries, a network of automated telemetry stations is being constructed along the Louisiana coastline. The primary objective of this collaboration is to provide infrastructure for and facilitation of comprehensive research and monitoring of resident and migratory wildlife species, including movements during breeding and nonbreeding seasons. The expansion of this network benefits researchers across North and South America and addresses, in part, data gaps that would otherwise prevent effective conservation and management, bringing scientists closer to the goal of complete life cycle conservation.

OIL SPILL FUNDING: FOCUS ON RESTORE ACT.

Chris Barnes

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In the aftermath of the April 2010 Deepwater Horizon oil spill, one of the largest environmental disasters in our nation's history, the health of the Gulf Coast ecosystem and the challenges faced by this ecosystem were brought to the forefront of the nation's attention. The efforts to address the injuries from the spill, as well as the broader ecosystem challenges facing the region brought on by storms, development pressures and other pressures were focused through several different oil-spill related recovery efforts including the Natural Resource Damage Assessment, the criminal penalties administered by the National Fish and Wildlife Foundation and the Gulf Coast Restoration Trust Fund established under the RESTORE Act. The State of Louisiana is well-positioned to effectively and efficiently use these funds through its ambitious 50-year, \$50 billion Coastal Master Plan and is setting the bar for how to coordinate local, state and federal efforts to achieve comprehensive coastal protection and restoration. As such, this presentation will provide a brief overview of the different oil spill-related funding streams as well as Louisiana's plans for those funds as guided and informed by its Coastal Master Plan. This presentation will also provide a detailed focus on the RESTORE Act, which is the most flexible of these oil spill-related funding sources, and will discuss projects to be funded as well as RESTORE Council updates.

IMPACTS TO SALT MARSH VEGETATION IN LOUISIANA, MISSISSIPPI, AND ALABAMA FROM THE *DEEPWATER HORIZON* OIL SPILL: A NATURAL RESOURCE DAMAGE ASSESSMENT SYNTHESIS

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The *Deepwater Horizon* oil spill is the largest marine oil spill to have occurred in U.S. waters to date and resulted in substantial oiling of coastal habitats throughout the Northern Gulf of Mexico, including the highly valuable salt marshes of Louisiana, Mississippi, and Alabama. A series of Coastal Wetland Vegetation (CWV) studies were initiated that were specific to the salt marsh habitats of Louisiana, and to the salt marshes of the Mississippi-Alabama region as a portion of the overarching Natural Resource Damage Assessment (NRDA). Separate assessments were employed for these regions because of the inherent differences in their hydrogeomorphic setting and plant community composition. In Louisiana, trace or greater vertical oiling of plant tissues reduced live and total vegetation cover and live and total peak standing crop relative to reference marshes for the majority of the four year study (2010 – 2014). Significant erosion of Louisiana study plots occurred over the course of the study, which likely affected the ability to detect significant impacts to key metrics towards the end of the study. Thus, the decrease in significant impacts to Louisiana salt marsh plant production and health in the latter years of the study should not necessarily be considered indicative of recovery. Salt marshes in Mississippi and Alabama that experienced greater than 10% vertical oiling of plant tissues demonstrated reduced live vegetation cover and live standing crop relative to reference sites in this region through fall of 2012. Interestingly, these reductions were generally associated with lower presence and health of *Juncus roemerianus*, a key salt marsh macrophyte in Mississippi and Alabama. Fewer significant reductions in live vegetation cover and aboveground biomass were detected by fall 2013, which in combination with the low levels of soil oiling in this area suggests that vegetation in oiled salt marshes may have begun to recover.

LOOKING BACK AT BIRD IMPACTS BY THE DEEPWATER HORIZON OIL SPILL, AND LOOKING AHEAD

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Northern Gulf of Mexico coastal habitats support millions of birds during at least one part of their life cycle. On 20 April 2010, the Deepwater Horizon oil rig exploded about 75 kilometers from the southeastern coast of Louisiana, spewing an estimated 4.9 million barrels of crude oil into the northern Gulf of Mexico. Currents brought this crude to shore, impacting more than 1,700 km of shoreline and putting wildlife at high risk of exposure. Efforts to understand the scope and severity of the impact on birds included a citizen science-based monitoring program, Natural Damage Resource Assessment, and independent scientific research. At least 93 species of birds were exposed to oiling, and estimates of the number of birds killed outright during the spill ranged from at least 56,100 to over a million; uncertainty around these estimates will likely remain large. Rescue and rehabilitation efforts saved over 1,000 birds, although no long-term studies are evaluating the long-term reproductive opportunities for those birds. More detailed efforts to understand short- and long-term consequences of oil exposure to birds in the environment include evaluations of PAH exposure and its consequences, body condition, nesting success, demography, and population genetics on a variety of model species that include Brown Pelican (*Pelecanus occidentalis*), Double-crested Cormorant (*Phalacrocorax auritus*), Black Skimmer (*Rynchops niger*), American Oystercatcher (*Haematopus palliatus*), Western Sandpiper (*Calidris mauri*), Northern Gannet (*Morus bassanus*), Common Loon (*Gavia immer*), and Seaside Sparrow (*Ammodramus maritimus*). Despite the oil spill extent and the numbers of birds impacted, ongoing surveys of colonial waterbirds, shorebirds, and seabirds have not identified evidence of widespread die-offs that impact regional populations. Even so, the scope and scale of assessing bird populations and mechanisms that drive population change continue to be challenging, in part because of lack of baseline data. Going forward, understanding the long-term impact of the spill on bird populations will require strategic and coordinated monitoring to understand and distinguish simultaneous impacts of land loss, hurricanes, and other natural and anthropogenic perturbations.

IMPACT OF THE DEEPWATER HORIZON OIL SPILL ON SALT MARSHES: LESSONS FROM SEASIDE SPARROWS.

Philip C Stouffer.

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Seaside Sparrows provide an opportunity to examine how the Deepwater Horizon oil spill affected processes that link marine and terrestrial systems in salt marshes. These sparrows spend their entire lives in salt marshes, feeding on seeds, arthropods taken from foliage, and marine arthropods gleaned from the marsh substrate. We've used a variety of techniques to reveal individual and population level effects of oil exposure. Seaside Sparrows were contaminated by oil, as revealed by isotopic evidence of oil in sparrow tissue. Birds also showed metabolic response to oil. Birds in contaminated marshes showed elevated expression of CYP1A, a gene involved in response to PAHs. Annual variation in gene expression suggests that weather events can redistribute oil that had apparently disappeared from marshes. A more extensive analysis of gene expression revealed activity of genes involved in DNA repair and programmed cell death in birds from contaminated marshes. Sparrow abundance on our study plots may be related to oiling, but weather events also have a strong influence. Nest success was consistently lower on oiled plots, although the vast majority of nests failed on all plots. Collectively, these results show that Seaside Sparrows are still responding to the stress of the Deepwater Horizon spill, although we have not seen extreme consequences for populations of this abundant bird.
