

VA 23298. During development, oligodendrocyte (OL) lineage cells progress from simple bipolar cells to complex branched cells. The transition from this simple to the complex morphology temporally corresponds with the appearance of the OL sphingolipid sulfatide. Sulfatide has been identified as a potential regulator of OL differentiation and morphology. Our laboratory has reported that mice incapable of synthesizing sulfatide maintain OLs that exhibit a less complex morphology by extending fewer myelin forming processes than wild type (WT) mice. Since cellular morphology is regulated by cytoskeletal elements, we investigated the distribution and phosphorylation state of the microtubule associated protein tau. Phosphorylated tau was not observed in either OLs of 15 day old WT or sulfatide null mice. Surprisingly, accumulations of phosphorylated tau were observed in OLs of both WT and null OLs at 1 month of age. By 7 months of age, the prevalence of tau clusters was maintained in the WT cells but increased in the sulfatide null cells. Based on our data we propose that phosphorylated tau plays a role in normal OL development and myelination; however it remains to be determined how and why sulfatide depletion results in an increased accumulation of phosphorylated tau in OLs.

### Natural History & Biodiversity

DRAGONFLY PERCH SELECTION RELATED TO PERCH HEIGHT AND LOCATION. Jessica Beard & Deborah Waller, Dept. of Biological Sciences, Old Dominion Univ., Norfolk, VA 23529. A community of dragonflies (Odonata) was studied in July and August, 2011, at Hoffer Creek Wildlife Preserve, Portsmouth, VA. Male dragonflies patrol territories to secure food and mates and rest on perches. Two experiments were conducted with bamboo poles to study perch selection by adult males in relation to perch height and location, respectively. Four out of eight species present competed for the experimental perches (*Pachydiplax longipennis*, *Brachymesia gravia*, *Celithemis eponia*, and *Libellula needhami*). In the first experiment, two species used short perches (30cm) most frequently and two species used tall perches (90cm) over short perches. Perch height selection was not related to dragonfly size. Pole tops were preferred perching sites for all species but *L. needhami* frequently perched mid-pole. *Brachymesia gravida* was the dominant perching species in the beginning of the season and the least common species at the end of the season. In the second experiment, perches farther from shore (2m) were selected more frequently than those closer to shore (0.5m), regardless of perch height. Overall, species differences in perch height and seasonal use of perches could have implications in niche partitioning and competition among these species.

DEMOGRAPHY OF THE MEADOW VOLE (*MICROTUS PENNSYLVANICUS*) IN SOUTHEASTERN VIRGINIA. Jana F. Eggleston & Robert K. Rose, Dept. of Biological Sciences, Old Dominion Univ., Norfolk, VA 23529. We conducted a mark-capture-release (MCR) monitoring program of the meadow vole on the Su Tract from 2002 through 2005 and began one on the Stephens Tract in 2005. These sites are a part of the Nature Conservancy Stewardship of lands and were acquired via the Virginia Wetland Restoration Trust Fund as mitigation sites on the Northwest River drainage basin in Chesapeake, Virginia. On both tracts we established an 8 x 8 research grid, at 12.5m intervals, and with two modified Fitch traps per station. We

trapped on both grids for three days each month, averaging 4600 trap nights per year. From these sites, we were interested in evaluating the life traits of these two southeastern populations. Previous analyses of the early data collected determine the growth rates and average survival rates on Su, as well as the body mass for residents versus transients, as well as found that transients were only greater than residents in spring for both sites. In this analysis, we present the data collected to date for both sites for the body mass for juveniles and adults with respect to sex ratios, the average survival rates, yearly and seasonal density variations, as well as the periods of breeding and recruitment for meadow voles.

**BAIT SIZE SELECTION BY CARRION BEETLES.** Jonathan M. Schmude & Deborah A. Waller, Dept. of Biol., Old Dominion Univ., Norfolk VA 23529. This work is an ongoing study on the carcass selection tendencies of carrion beetles of the family Silphidae found in Southeastern Virginia using a pitfall trap. Pitfall traps are baited with 25, 50, or 75g of a cat food/mackerel mixture and left to decay and attract beetles for one week to investigate if any Silphidae species prefer a single mass over another. The study further investigates seasonality, and mark/re-capture traveling of Silphidae. Current data suggests that all species will select any carrion found and that larger masses support greater numbers of beetles. *Nicrophorus tomentosus* significantly prefer 75g baits while *Nicrophila americana* and *Oiceotoma inaequale* prefer the 50g carrion baits. The rest of the seven carrion beetles found in southeastern Virginia resulted in either non-significant results or not enough data collected to interpret. Micro-habitat and seasonality seems to have a great affect on carrion beetle carcass selection for most species. No data has been collected yet on distance for a carrion beetle to locate a carcass in this study.

**HABITAT SELECTION BY DRAGONFLY NYMPHS RELATED TO PREY DENSITY.** Stefanie Snyder & Deborah Waller, Dept. of Biological Sciences, Old Dominion Univ., Norfolk, VA 23529. Dragonflies (Odonata) are important predators both as terrestrial adults and aquatic nymphs. In nature nymphs inhabit lakes, streams and ponds with a variety of bottom substrates including sand, mud, rocks and aquatic vegetation. The objective of this research was to investigate if odonate nymphs can learn to associate substrate type with food abundance. Nymphs were tested on aquarium stone and sand alone and in choice conditions to determine if they exhibited an innate preference for substrate type. Nymphs showed no color preferences among green, red, clear, or dark or light blue stones. They preferred aquarium stone over bare container bottoms, but moved randomly between substrates in choice tests with half stone/ half sand bottoms. To test nymphs for a food/substrate association, seven containers with stone bottoms and seven containers with sand substrates housed a nymph who was fed mosquito larvae for two days and then switched to the opposite substrate and starved for two days. In the following choice tests, nymphs significantly preferred the fed substrate if they had received 10 mosquito larvae/day during the trials but not if they had been fed only one larva/day. These preliminary results indicate that dragonfly nymphs can associate substrate type with food rewards.

**OVIPOSITION BEHAVIOR BY DRAGONFLY SPECIES AT HOFFLER CREEK PRESERVE.** Laura Campbell, Jessica Beard & Deborah Waller, Dept. of Biological

Sciences, Old Dominion Univ, Norfolk, VA 23529. Oviposition in eight species of dragonflies (Odonata) was studied in July and August, 2011, at Hoffler Creek Wildlife Preserve, Portsmouth, VA. Females oviposited either in open water or on aquatic vegetation, and eggs were either widely scattered or clustered. Males frequently mate guarded ovipositing females by either flying in tandem with them or circling them as they lay eggs. Oviposition and mate-guarding patterns were likely related to nymphal ecology as follows: Nymphs that develop in open water must be scattered to avoid inter- and intraspecific predation, while clustered nymphs can be protected from predation in dense aquatic vegetation. Females that deposit eggs in open water (*Celithemis eponina*, *Tramea lacerata*) fly in tandem with males due to the long distances they traverse; females that lay eggs near shore in aquatic vegetation (*Brachymesia gravida*, *Erythemis simplicicollis*, *Libellula needhami*, *Pachydiplax longipennis*, *Perithemis tenera*, *Plathemis lydia*) can be monitored by hovering or perching males. Females varied in oviposition behavior related to biotic and abiotic influences. Factors that affect female oviposition patterns include seasonality (to avoid peak nymphal crowding times), time of day (to avoid male harassment), and weather (sun, rain and wind conditions).

OVIPOSITION BEHAVIOR BY DRAGONFLY SPECIES AT HOFFLER CREEK PRESERVE. Laura Campbell, Jessica Beard & Deborah Waller, Dept. of Biological Sciences, Old Dominion Univ, Norfolk, VA 23529. Oviposition in eight species of dragonflies (Odonata) was studied in July and August, 2011, at Hoffler Creek Wildlife Preserve, Portsmouth, VA. Females oviposited either in open water or on aquatic vegetation, and eggs were either widely scattered or clustered. Males frequently mate guarded ovipositing females by either flying in tandem with them or circling them as they lay eggs. Oviposition and mate-guarding patterns were likely related to nymphal ecology as follows: Nymphs that develop in open water must be scattered to avoid inter- and intraspecific predation, while clustered nymphs can be protected from predation in dense aquatic vegetation. Females that deposit eggs in open water (*Celithemis eponina*, *Tramea lacerata*) fly in tandem with males due to the long distances they traverse; females that lay eggs near shore in aquatic vegetation (*Brachymesia gravida*, *Erythemis simplicicollis*, *Libellula needhami*, *Pachydiplax longipennis*, *Perithemis tenera*, *Plathemis lydia*) can be monitored by hovering or perching males. Females varied in oviposition behavior related to biotic and abiotic influences. Factors that affect female oviposition patterns include seasonality (to avoid peak nymphal crowding times), time of day (to avoid male harassment), and weather (sun, rain and wind conditions).

DISRUPTIVE EFFECTS OF TROPICAL STORMS ON ALGAL BLOOMS IN THE JAMES RIVER. T.A. Egerton<sup>1</sup>, K.C. Filippino<sup>2</sup> & H.G. Marshall<sup>1</sup>, <sup>1</sup>Dept. of Biological Sciences, ODU, and <sup>2</sup>Dept. of Ocean, Earth and Atmospheric Sciences, ODU, Norfolk, VA 23529. Algal species respond to numerous environmental variables, including pulses of nutrient concentrations. In estuarine systems, the main source of nitrogen and phosphorus is from terrestrial runoff, leading to a positive correlation between precipitation, nutrient inputs, and algal growth. This relationship can be observed in the Chesapeake Bay and its tributaries. Many cyanobacteria and dinoflagellate blooms including those in the James River occur following precipitation events. While

precipitation/ streamflow has a positive effect on algal abundance, it significantly reduces the level of phytoplankton diversity observed annually. During September 2011, the James River watershed was subjected to hurricane Irene and tropical storm Lee. Prior to the storms, there were ongoing algal blooms dominated by cyanobacteria upstream and dinoflagellates downstream undergoing high rates of nitrogen uptake and primary productivity with relatively low levels of diversity. Following the storms, the bloom species were washed out, with decreased cell densities, nutrient uptake and productivity, and an increase in diversity as other taxa became reestablished in the wake of the blooms. The intermediate disturbance hypothesis states diversity will be highest when disruptive forces are neither too little nor too great. While the 2011 storms are an example of disturbance reducing the competitive advantage of bloom species and increasing local diversity, the long term data suggests the predicted increase in precipitation may lead to a more eutrophic, less diverse phytoplankton community. This work was supported by Virginia DEQ

POPULATION DYNAMICS AND HABITAT RESTORATION OF AMBYSTOMATIDAE SALAMANDERS IN FAUQUIER COUNTY VIRGINIA. Douglas Messier & Thomas C. Wood, New Century College, George Mason University, Fairfax, VA. Two species of *Ambystoma* salamanders, *A. jeffersonianum* (Jefferson) and *A. maculatum* (spotted) were investigated as part of a long-term monitoring program at Environmental Studies on the Piedmont in Warrenton, Virginia. Population monitoring in previous years indicates a relatively small Jefferson population among a large population of spotted salamanders in common breeding pools. We hypothesized interspecies competition during larval development in the spring pools would favor spotted larvae, thus resulting in a smaller adult Jefferson population. Our initial results from one common breeding pool suggest the alternative hypothesis to be correct. Despite larger numbers of egg masses and eggs laid, spotted larvae were fewer and less developed than Jefferson larvae x weeks after hatching. Jefferson larvae were more abundant ( $J_n=33$ ;  $S_n=16$ ) and had a larger mean body length ( $J_l=24.8$ ;  $S_l=16.0$ ) at this intermediate stage of development. These results suggest that vernal pool conditions from January through May of 2012 favored Jefferson larvae development. Therefore, differences in adult population structure may be due to factors influencing other phases of the life cycle outside the breeding pools. Continued monitoring of larvae populations in subsequent years will help us understand the dynamics of these species and additional factors that influence their reproduction and survival.

BROWNIAN PARTICLES OR BROWN LITTLE PARTICLES? RACCOON (*PROCYON LOTOR*) MOVEMENT ON THE VIRGINIA BARRIER ISLANDS. R. D. Dueser<sup>1,2</sup>, N. D. Moncrief<sup>2</sup>, O. Keiřs<sup>1,3</sup>, & J. H. Porter<sup>4,1</sup>Utah State University. <sup>2</sup>Virginia Museum of Natural History. <sup>3</sup>University of Latvia, <sup>4</sup>University of Virginia. Circumstantial evidence suggests that the distribution of raccoons (*Procyon lotor*) has increased on the Virginia barrier islands over the past 30+ years. Estimates of the timing, frequency, and trajectory of movements by individuals are among the most challenging data to obtain. We examined evidence for raccoon movements in this

island system between 1999 and 2007. We observed inter-island movement by 5 of 203 individuals that were ear-tagged and released at the site of capture on 9 islands. We documented inter-island movement by 3 of 50 animals that were radio-collared and released at the site of capture on 8 islands. We also radio-collared and translocated 27 animals to a different island before releasing them. We observed return movements by 19 of those individuals. Finally, we examined frequency of re-colonization for 6 islands subject to biennial removal of raccoons. The 3 islands near the mainland were re-colonized repeatedly. Our translocation experiments confirm that raccoons are readily capable of crossing marshes and open water in order to move between islands. However, evidence from animals that were marked and released at the site of capture suggests that such movements are relatively rare. Except for islands very near the mainland, we suspect that island-to-island movements are more important in determining the distribution of raccoons on the Virginia barrier islands than are mainland-to-island movements.

DIAGNOSTIC TEST TO IDENTIFY FOSSILS OF THE EASTERN FOX SQUIRREL (*SCIURUS NIGER*) USING FLUORESCENT PROPERTIES OF BONES AND TEETH. A. C. Dooley, Jr. & N. D. Moncrief. Virginia Museum of Natural History, Martinsville, VA 24112. Remains of tree squirrels of the genus *Sciurus* are relatively common components of Pleistocene microvertebrate assemblages and Holocene archaeological deposits. In eastern North America, two species (the eastern gray squirrel, *S. carolinensis*, and the eastern fox squirrel, *S. niger*) are frequently reported. However, their morphological similarity and generally sympatric distributions make it difficult to distinguish between these taxa in mixed assemblages, complicating paleobiogeographic and paleoenvironmental studies. A genetic condition, congenital erythropoietic porphyria (CEP), occurs in most, if not all, living eastern fox squirrels but is absent in eastern gray squirrels and other members of the genus *Sciurus*. Due to an excess of uroporphyrin I, the bones of animals with CEP fluoresce pink under ultraviolet (UV) light, especially at approximately 400 nm. Examination of sciurid remains from several paleontological and archaeological sites has confirmed that UV fluorescence can be detected in ancient *S. niger* remains. This technique provides an inexpensive, non-destructive test that can definitively distinguish between *S. niger* and *S. carolinensis* in mixed fossil assemblages, and may aid in understanding how *Sciurus* populations repopulated eastern North America following the Wisconsinan glaciation.

THE OCCURRENCE OF THE HISPID COTTON RAT (*SIGMODON HISPIDUS*) IN A SUCCESSIONAL WETLAND IN SOUTHEASTERN VIRGINIA. Meredith E. Bowles & Jana F. Eggleston, Dept. of Biological Sciences, Old Dominion Univ., Norfolk, VA 23529. In 2005, we began a mark-capture-release (MCR) monitoring program of the small mammal community on a site known as the Stephens Tract. This site was purchased by The Nature Conservancy via the Virginia Wetland Restoration Trust Fund as a mitigation site on the Northwest River drainage basin in Chesapeake, Virginia. As such, with a rapid rate of vegetative succession indicative of the Tidewater Region, the small mammal community changed from one dominated by herbivorous old field species to those of forested wetlands, with an increase in species richness with the decline of the small mammal population, and a shift in dominance from meadow voles to hispid cotton rats. With the shift in dominance, we expected the adult female

hispid cotton rats, previously found to be residents, to show a significant increase in body weight over time. With this increase, we expected to find the females clustering on the grid, reflecting the partitioning of preferred resources. Our study site consisted of an 8 x 8 grid, at 12.5m intervals, with two modified Fitch traps per station. We trapped for three days per month, averaging 4600 trap nights per year. Using ArcGIS, we analyzed the average yearly weights of females by location. Our analysis showed a steady yearly increase in weights, as well as a yearly shift in habitat use. We believe continued monitoring and the inclusion of specific preferred resources such as vegetation, as well as possible competition with the meadow voles may better resolve their occurrence on the study site.

THE OCCURRENCE OF THE MEADOW VOLE (*MICROTUS PENNSYLVANICUS*) IN A SUCCESSIONAL WETLAND IN SOUTHEASTERN VIRGINIA. Leah E. Thiel & Jana F. Eggleston, Dept. of Biological Sciences, Old Dominion Univ., Norfolk, VA 23529. In 2005, an ongoing monitoring program of the meadow vole population was begun on a site owned by The Nature Conservancy. Given this site is an example of the rapid rate of old field to forested wetland succession common in southeastern Virginia, it was expected that the small mammal community would change from herbivorous old field species to those of forested wetlands, as well as increase in species richness. After peaking, we expected the densities of the numerically dominant meadow vole to decline along with that of the small mammal community. Our study site consisted of an 8 x 8 grid, at 12.5m intervals, and had two modified Fitch traps per station. We trapped for three days each month, averaging 4600 trap nights per year. After determining the yearly and seasonal densities for the meadow voles, we used ArcGIS to map and conduct a cluster analysis of the yearly meadow vole occurrence on the study site. With the progression of succession, this site indeed has experienced a general decline of all old field species, as well as the expected slight increase in species richness. Our densities showed a parallel decline in meadow voles both yearly and seasonally, and our cluster analysis yielded nothing significant. For our future analysis, we believe by including the hispid cotton rat data with that of dominant vegetation, we will be better able to resolve the occurrence of the meadow voles on the study site.

CONSERVATION GENETICS OF THE CRITICALLY ENDANGERED BLACK RHINOCEROS AT ADDO ELEPHANT NATIONAL PARK, SOUTH AFRICA. S. Josway<sup>1</sup>, C.W. Edwards<sup>2</sup>, J.M. Meyer<sup>3</sup>, R. Santymire<sup>4</sup>, & E. Freeman<sup>5</sup>,<sup>1</sup>Dept. of Environmental Science and Policy, George Mason University, Fairfax VA 22030, <sup>2</sup>College of Science, George Mason University, Fairfax VA 22030, <sup>3</sup>Freewalker Volunteer and Adventure for Charity, Port Elizabeth, Eastern Cape 6001, <sup>4</sup>Davee Center for Epidemiology and Endocrinology, Lincoln Park Zoo, Chicago IL 60614 and <sup>5</sup>New Century College, George Mason University, Fairfax VA 22030. Genetic diversity and mating strategies will be investigated in two subpopulations of wild black rhinos, *Diceros bicornis bicornis*, at Addo Elephant National Park (AENP) using appropriate molecular techniques. DNA was isolated from 76 non-invasively collected fecal samples from the Addo Section (1 male; 3 females; 13 unknown) and the Nyathi Section (8 males; 6 females; 47 unknown) of AENP. A total of 10 microsatellite loci will be screened for polymorphisms. This research will provide novel data that will

help inform conservation strategies to maximize breeding success and genetic health in the wild populations of this critically endangered species at AENP and throughout southern Africa.

SIBLING SPECIES OR SUBSPECIES? MOLECULAR PHYLOGENETICS OF *NEOTOMA MEXICANA* FOUND SOUTH OF THE ISTHMUS OF TEHUANTEPEC. M. K. Unkefer<sup>1</sup>, R. D. Bradley<sup>2,3</sup>, N. Ordonez-Garza<sup>2</sup>, & C. W. Edwards<sup>1</sup>, <sup>1</sup>College of Science, George Mason University, Fairfax VA 22030, <sup>2</sup>Department of Biological Sciences, Texas Tech University, Lubbock TX, 79409 and <sup>3</sup>Natural Science Research Laboratory, The Museum, Texas Tech University, Lubbock TX 79409. Phylogenetic relationships between members of *Neotoma mexicana* were investigated using standard molecular techniques. Mitochondrial DNA was isolated from tissue samples from 11 woodrat specimens collected from locations south of the Isthmus of Tehuantepec in southern Mexico. Sequences from the mitochondrial DNA cytochrome-*b* gene were amplified and used to elucidate the phylogenetic relationships among select *N. mexicana* subspecies and to verify the subspecific integrity of *N. mexicana* found south of the Isthmus of Tehuantepec. In the future, results from this study will be used to examine phylogenetics of the *N. mexicana* clade and to describe the historical role of the Isthmus of Tehuantepec in the evolution of rodents in North and South America.

### Psychology

ANALYSIS OF EYE TRACKING PATTERNS DURING A SIMULATED LUGGAGE-SCREENING TASK. Ivory B. Miller & Molly Liechty. Dept. of Psychology, Old Dominion University, Norfolk, VA 23508. This study assessed the impact of context in the visual scene on decision-making through a luggage-screening task. It was hypothesized that the participants would implicitly associate the distractor with the target and apply it to their visual search resulting in biased decision-making. 40 undergraduate participants performed a luggage-screening task in which spatial context was manipulated. First, participants were trained using 25 luggage images, each of which contained a target (i.e., knife) and a specific distractor (i.e., iPod). During the post-training session, participants screened 100 bags with a target base rate set at 50%. The bags contained either the distractor and the target (25 bags), the target only (25 bags), the distractor only (25 bags), or neither the distractor nor the target (25 bags). The visual search pattern was investigated through the Eyelink 1000 eye tracking system that recorded dwell time, fixation count, saccade count, saccade amplitude, and scan paths. It was found that when the spatial context of the distractor and target were relatively close, participants appeared to encode the objects together, thereby improving search efficiency. The results suggest that participants utilized relationship between objects in the visual scene to simplify the visual scene.

DOES SIMULATION STYLE MATTER? INFLUENCES OF SIMULATION STYLE ON LUGGAGE SCREENING PERFORMANCE. Rachel R. Phillips, Chelsea Nash & Poornima Madhavan, Dept. of Psychology, Old Dominion University, Norfolk VA 23529. Movement captures attention and, when incorporated into visual presentations, results in altered search patterns. Luggage-screening displays incorporate movement; however, many luggage-screening simulations rely on static image display.