GREAVER, TARA,* LEONEL STERNBERG and ALEX DIAZ. University of Miami, Department of Biology, Coral Gables, Fl. **Water uptake and use efficiency of fore and back dune vegetation: integrating plant physiology and hydrology.**

Coastal beaches are transitional landscapes at the interface of land and sea. As such, beaches are characterized by gradients of environmental factors and zonal plant distributions that change with increasing distance from the ocean. Zonal patterns of vegetation in coastal communities are often attributed to the quality and availability of underground water resources, however the relationship between the hydrologic conditions and vegetation of beach dunes have not been closely examined, particularly in tropical and subtropical beaches. This study investigated the interaction between vegetation and hydrology of subtropical beaches in South Florida and the Bahamas. Although environmental gradients are continuous, here we compare the extremes of the gradient to use natural conditions as *in situ* experimental treatments. Thus, zones closest and furthest from the ocean were demarcated as the fore dune and the back dune, respectively. Vadose soil water conditions, plant water uptake, and plant water use efficiency (WUE) were compared between dune positions. Results indicate that fore dune soil waters were consistently more saline that those of the back dune at every depth. Natural abundance of D and ^{18}O, used as water tracers, identified ocean water deposition in shallow soil waters of the fore dunes at both sites and ocean water intrusion into the fresh water lens of the fore dune at the Bahamian site. Mixing models calculated the proportion of environmental water sources in stem water, indicating that fore dune species are likely to use some proportion of ocean water whereas those of back dune do not. Thus their water harvesting strategies differ. Accordingly, $\delta^{13}C$ values of leaf tissues suggest fore dune species have higher WUE than those from the back dune. Our findings suggest fore and back dune plant associations differ in their ability to utilize ocean water, therefore predicted sea level rise will affect these species differently.

GREEN, DOUGLAS M.[1,*] and DOUGLAS E. JOHNSON.[2] [1] Arizona State University East, Mesa, AZ, USA; [2] Oregon State University, Corvallis, OR, USA. **Long-term changes in species richness, diversity and eveness in a northeastern Oregon riparian area.**

Species richness and diversity of undisturbed sites have been suggested as one of many metrics to evaluate the health or condition of managed ecosystems. We compared species richness, species diversity (H'), and species evenness (J') over a twenty year period from eight late season grazed and ungrazed plant communities in a northeastern Oregon riparian zone. Communities measured were dry meadows, moist meadows, cheatgrass (*Bromus tectorum*) Douglas hawthorn (*Crataegus douglasii*), ponderosa pine (*Pinus ponderosa*), black cottonwood (*Populus tricocarpa*), thinleaf alder (*Alnus incana*), gravel bars. Six stands of each community were measured with thirty 25X25cm quadrats in late June or July of 1979, 1980, 1987, 1989, and 1999. Mean species richness was greatest on gravel bars (33.0), moist meadows (28.4), Douglas hawthorn (24.9), thinleaf alder (24.9), dry meadow (21.0), ponderosa pine (21.0, black cottonwood (18.9) and cheatgrass (17.0). Gravel bars and moist meadows had the highest mean H' (3.03 and 2.75 respectively) and mean species evenness (J') 0.8732 and 0.8640 respectively). Lowest mean diversity and evenness was found in black cottonwood (H' = 2.36, J' 0.8229) and cheatgrass (H' 2.22, J' 0.8196). With the exception of dry meadow communities no community had a consistent grazing effect over the study period. This may be due to application of sustainable stocking rates. Large year-to-year variation in species richness, diversity, and evenness independent of the grazing treatment may be due to study design, proper stocking rates, climatic variations or random error. The large year-to-year variation observed raises questions about the usefulness of the selected indicators to evaluate ecosystem health in this riparian system.

GREEN, WALTON A.* and LEO J. HICKEY. Yale University, New Haven, CT. **Using leaf architecture to compare fossil and modern forests: Preliminary results from hierarchical cluster analysis and graphical representation.**

We have developed a methodology for numerically describing dicot forests that allows direct comparison of fossil and modern stands. We use readily observed characteristics of the form and venation of angiosperm leaves as proxies for environment because comparable leaf-architectural data are easily obtainable from imperfectly preserved or insufficiently described fossil and modern floras, and because a strong prima facie case has been made for the presence of an ecological signal in leaf morphology. Descriptions of forest stands based on both the two main published systems of leaf architectural analysis—Climate Leaf Analysis Multivariate Program (CLAMP), and Compendium Index Categories (CICs)—confirm expected relationships among modern forests and allow semi-quantitative analogies to be drawn between, for instance, the Puryear flora from the Lower Eocene of Tennessee and a dry tropical forest currently growing in lowland Cuba. We are working to expand this strategy into a standard methodology for reporting paleoecological data on leaf litter assemblages that (1) provides a readily visualized way of comparing forest ecosystems on a meso- or macroscopic spatial scale, (2) allows us to track vegetational changes through geological time, and (3) enables data from the leaf fossil record to inform explanations of modern vegetation patterns like the similarity of mixed mesophytic forests in Asia and North America.

GREENBERG, CATHRYN H.[1,*] and DOUGLAS J. LEVEY.[2] [1] USDA Forest Service, Southern Research Station, Bent Creek Experimental Forest, Asheville, NC; [2] University of Florida, Gainesville, FL. **Fruit production in mature and harvested cove and upland hardwood forest of the southern Appalachians.**

Fleshy fruit is an important dietary component of many vertebrates, yet little is known about fruit availability or management strategies. Since 1999, we've monitored fleshy fruit abundance monthly in 31 plots (0.1 ha)within cove hardwood forest (CHF)and upland hardwood forests (UHF)and recently harvested areas of each(CH2 and UF2, respectively). Thirty-nine species produced fruit during 1999-2002. Production ranged 570 (C56) to 1,629 (CHF) g (dry mass of pulp)/ha in 1999, and 796 (C53) to13,644 (UF2) g/ha in 2002. Total fruit production increased during the second year post-harvest, and remained highest in the harvested treatments. *Phytolacca* fruit production peaked in CH2 and UH2 2 and 3 years post-harvest. *Rubus* also increased only in harvested treatments 3 and 4 years postharvest. *Gaylussacia* production was highest in both UHF and UH2 but varied among years. A few species dominated fruit production, but dominant species varied among treatments. In 2002 *Gaylussacia* composed 67% of biomass in UHF, 31% in UH2, 20% in CHF, and 7% in CH2; *Rubus* was absent from CHF and UHF but composed 45% (UHF) and 54% (CH2) in harvested treatments. Fruit was available from June through December, but peak availability differed among treatments due to differences in species composition and fruiting phenology. We conclude that fruit abundance and composition are influenced by forest type and age, and fruit production varies in space and time.

GREENBERG, DAVID B.,[1,*] JOSEPH H. CONNELL[1] and LLOYD GOLDWASSER.[1,2] [1] Department of Ecology, Evolution, and Marine Biology, University of California, Santa Barbara, CA, 93106; [2] Department of Demography, University of California, Berkeley, CA, 94720-2120. **Direct competition for space between coral colonies at Heron Island, Australia.**

Competition for space on the sea floor, both within and between species, is an important factor governing the abundance and species diversity of reef corals. Corals may compete for space via overgrowth and overtopping, or via physical and chemical attacks between neighboring colonies. We have studied the extent to which competition via direct attack occurs between coral colonies at Heron Island, Great Barrier Reef, Australia, using census data collected from fixed square meter plots at intervals since 1963. Attacks between coral colonies occur along neighboring portions of their perimeters, where each colony's polyps can physically reach each other. Competition for space should then constrain growth along these closely-neighboring perimeters more than along other regions further from neighbors. We tested this hypothesis using maps drawn from color photographs which show the perimeters of all colonies within each plot for each census year. The maps allow us to track changes in size and position of individual colonies as a function of their proximity to other colonies. We regard parts of colony perimeters relatively far from any neighbors as controls for the neighbored portions, but also analyze the extent to which this "neighbor