

## ***Northwest Science Abstracts, Summer 2003, Volume 77 (#3)***

**Charles J. Flora and Philip S. Ely**

### **Surface growth rings of *Porites lutea* microatolls accurately track their annual growth**

Microatolls are disk-shaped coral colonies, having perimeters of live coral surrounding dead centers, that are limited in their upward growth by exposure at extreme low tide. We looked at surface annuli of microatolls of *Porites lutea* on the open ocean reef flat of Abaiang Atoll, in the Republic of Kiribati, as potential external indicators of microatoll yearly growth pattern. We measured surface annuli width and disk diameters of 10 microatolls, from March 1998 to October 2000, and found a mean growth rate of 2.2 cm/yr. X-radiography was used to establish a direct connection between surface annuli and internal growth bands. Comparison of the growth pattern of surface annuli to observed monthly mean lower low waters showed that these corals closely track fluctuations in local mean sea level. This suggests that there is a potential for using the surface annuli of *Porites lutea* microatolls on well drained, open ocean reef flats as an ongoing, low cost, non-destructive method of assessing trends in local mean sea level.

**M. Anne Fox and Lee E. Eddleman**

### **A Time Comparison Study of Vegetation on The Island Research Natural Area in Central Oregon**

This study on The Island, a Research Natural Area (IRNA) in the central Oregon western juniper zone, measured vegetation cover during the early 1990s and compared it to an earlier study conducted in the early 1960s. Two plant associations were studied: western juniper/big sagebrush/bluebunch wheatgrass and western juniper/bitterbrush/bluebunch wheatgrass. The same study design and measurement techniques were used in both studies to document percent cover of vegetation on study-site macroplots, microplots, and aerial photographs. Major differences noted by 1993 included greater juniper and shrub cover, primarily big sagebrush, a more even mix of grass species rather than a dominance of bluebunch wheatgrass and cheatgrass as noted in the 1960 study, and higher litter cover. Weather data from 1952-1993 were analyzed, and no major events or trends were found in the 30 yr period between studies. This study also compared present-day IRNA sites in both plant associations with sites located in the nearby grasslands that had experienced greater impact from livestock and humans. The comparison sites had higher tree and shrub cover than IRNA and differed in Idaho fescue and bluebunch wheatgrass cover. Finally our study was compared to another recent study in the western juniper/big sagebrush/bluebunch wheatgrass plant association on IRNA. We established new representative macroplots whereas the other study used the exact plots of the 1960s study. Results were similar showing that either method may be satisfactory. A continuing bank of data sets of vegetation change and land use will assist us to understand the complexities of plant community dynamics over time.

**Lucina Hernandez and John W. Laundr**

### **Home range use of coyotes: Revisited**

The sagebrush-steppe is a seemingly homogeneous community in southeastern Idaho, nevertheless coyotes in this community do not use their home ranges uniformly. Also, they display two different movements: back-and-forth (B) and ranging (C). We used a GIS analysis to test if coyotes were selecting specific habitat characteristics in this community and if there was a relationship between habitats selected and B and C type movements. Our results show that coyotes exhibit habitat selection within their home range with sagebrush on and off lava as the preferred habitats. They also selected primarily sagebrush-steppe on lava habitat for B movements and sagebrush off lava habitat for C movements. During their 24 hr travels, males and females used different habitat combinations for both B and C movements. Males primarily used the sagebrush on and off lava habitats while females commonly used a wider range of habitat types. There were significant differences in habitat composition of areas coyotes used daily relative to season. Coyotes in general used a greater diversity of habitat types during the pair formation and pup rearing but concentrated their activity in the sagebrush-steppe on lava habitat during gestation. We suggest that coyotes used differing behaviors in different habitat types to meet their daily/seasonal food needs.

**James R. Karr and Diana N. Kimberling**

### **A Terrestrial Arthropod Index of Biological Integrity for Shrub-Steppe Landscapes**

We studied arthropods in shrub-steppe at the Idaho National Engineering and Environmental Laboratory to identify scientifically sound indicators of ecological condition and to develop a terrestrial index of biological integrity (T-IBI), an analog of the multimetric indexes used to manage water resources. We sampled terrestrial arthropods with pitfall traps in late spring at nine sites selected to reflect little or no human disturbance and diverse histories of human activity (livestock grazing, chemical contamination, physical disturbance, restoration). Our evaluation of 56 assemblage attributes—measured as taxa richness or the relative abundance of key taxonomic, trophic, or ecological groups—sought measures that varied systematically with human influence. From 21 attributes that did vary significantly with disturbance, we selected 8 for a T-IBI. This Idaho T-IBI correlated significantly with human influence across the nine sites. We compared this index with an independently developed T-IBI, also comprising eight metrics, from three years' study at the Hanford Nuclear Reservation in Washington State. Six metrics were identical in both indexes. Combining our Idaho and Hanford results, we propose a nine-metric T-IBI for shrub-steppe lands. Concordance of metrics and the index in two widely separated shrub-steppe environments suggests that T-IBI offers an effective means of measuring biological condition. Parallels in this terrestrial system with the extensive aquatic work applying the same principles further suggest that this T-IBI could be effective in guiding conservation and restoration decisions in shrub-steppe landscapes.

**David A. Manuwal**

### **Bird Communities in Oak Woodlands of Southcentral Washington**

This study was initiated because there was a perception that oak woodlands are unique habitats for birds, particularly Neotropical migrants. The objectives of this study were to determine species composition and relative abundance of bird populations in oak and oak-conifer woodlands; and to evaluate the importance of these habitats to nesting birds. This study was undertaken near the northern limit of the Garry oak habitat in North America. The study design consisted of three replicates each of five upland habitats and three riparian habitats. Seventy-two bird species (53 Neotropical migrants and 19 permanent residents) were found at least twice on the 18 study sites. There were no significant differences in species richness among upland habitats. An average of 12 neotropical migrant species were detected per study site in both upland and riparian areas. Neotropical species comprised 62% of all birds detected. Bird abundance was highest in study sites with large amounts of small oak and small pine; it was lowest in riparian study sites. The most abundant species was the Nashville warbler. Bird species composition in the Washington Garry oak habitat was different from those previously reported from Oregon and California.

**Todd A. Sanders and Robert L. Jarvis**

### **Band-tailed Pigeon Distribution and Habitat Component Availability in Western Oregon**

Abundance of Pacific coast band-tailed pigeons has declined; this decline is thought to be due, in part, to habitat alteration associated with current forestry practices. We examined distribution of Pacific coast band-tailed pigeons and availability of habitat components (known mineral sites and potential nesting and feeding areas) in the central Coast Range of Oregon. Also, we evaluated associations of relative pigeon abundance at 323 randomly selected sample points and 97 known nest sites with adjacent habitat component availability. We detected 1-8 pigeons during a 1-hr point count at 83% of sample points from mid-June to July. Eighty-four percent of the study area was classified as potential nesting (66%) and feeding (18%) areas. The maximum distance to the closest known mineral site was 37 km, but 91% of the study area was within 25 km of the nearest known mineral site. Availability of habitat components around known nest sites was similar to that at sample points and reflected availability within the study area. Relative pigeon abundance was not associated with availability of known mineral sites, or potential nesting and feeding areas. Pigeons were 62% more abundant along the western one-third of the Coast Range than along the eastern one-third, however, and this pattern was correlated with the apparent availability of red elder and cascara. Possibly the availability of red elder and cascara imposed a constraint on band-tailed pigeon distribution and abundance.

**Carolyn L. Sanscrainte, David L. Peterson, and Steven McKay**

### **Carbon storage in subalpine tree islands, North Cascade Range, Washington**

Quantifying carbon (C) pools in subalpine systems is an important first step to understanding the effects of climatic variability on terrestrial C dynamics in temperate mountainous regions. We quantified C and other soil characteristics for tree islands and the vegetatively distinct meadows surrounding the tree islands at three subalpine sites (Thornton Lakes, Heather Pass, and Harts Pass) in the North Cascade Range. O-horizon C storage ranged from 0.6 to 2.6 kg m<sup>-2</sup> in meadows and from 3.1 to 5.8 kg m<sup>-2</sup> in tree islands. Gradual vegetative transitions and similar soil depths result in similar quantities of mineral soil C in meadows and tree islands at Thornton Lakes (8.1 vs. 8.3 kg m<sup>-2</sup>) and Heather Pass (7.9 vs. 10.3 kg m<sup>-2</sup>). Abrupt vegetative transitions and deeper soils may allow more mineral-soil C to be stored in meadows than tree islands at Harts Pass (14.1 vs. 7.2 kg m<sup>-2</sup>), although these mean values are not significantly different due to high variability in soil profile properties. Mean C concentrations in mineral soil horizons have no consistent relationship with vegetation type (tree island vs. meadow). Total ecosystem C storage is higher in tree islands (range, 35.1 to 98.5 kg m<sup>-2</sup>) than meadows (range, 7.4 to 18.0 kg m<sup>-2</sup>), primarily due to large amounts of C in the aboveground biomass of trees. Consequently, the effects of future climatic variability on C storage in subalpine ecosystems will largely depend on the degree to which conditions that limit tree island expansion (winter snowpack, summer drought) are affected.

**Thomas P. Sullivan, Druscilla S. Sullivan, and Eugene J. Hogue**

### **Demography of Montane Voles in Old Field and Orchard Habitats in Southern British Columbia**

Voles occupy perennial grasslands and agricultural areas in many parts of North America. This study was designed to provide a detailed analysis of the population dynamics of montane voles in old field and orchard habitats. Vole populations were intensively live-trapped in replicate old field and orchard sites over a 4-yr period at Summerland, British Columbia. Populations of montane voles reached peak densities of 186 and 144 voles/ha in old field sites before declining to numbers averaging <60 voles/ha. Orchard populations of montane voles also followed this pattern but at consistently lower numbers than old field sites. This difference in abundance ranged from 2.3-3.6 times during the peak year to 23.8-116.3 times in the decline year, at which time montane voles had declined to a mean number of 0.3-2.4 voles/ha in orchard sites. Length of breeding seasons, proportion of reproductive voles, and mean number of recruits were generally similar in old field and orchard sites. Overall mean survival of voles tended to decline through time in orchard sites, averaging 0.47 compared with old field survival of 0.76. Mean body mass of voles was consistently higher in old field than orchard sites. Montane vole populations in orchards seemed to be linked to source area dynamics of populations in old fields.