HANSEN, W. D.[1] and A. J. HANSEN.[2] [1]Gallatin Gateway School, Gallatin Gateway, MT 59730 USA; [2]Montana State University, Bozeman, MT 59717 USA. **Kids on nature: Children's knowledge of ecological issues in Greater Yellowstone.**

While it is increasingly apparent that ecology is highly relevant to human wellbeing, ecological education for citizens in the U.S. is ad hoc and occurs largely via the popular media. The effectiveness of this education is especially poorly known for children. The information received by boys and girls may be filtered by parents and reflect value judgements more heavily than scientific knowledge. We surveyed 6–8th grade students in the Yellowstone region to determine: the accuracy of ecological knowledge of children relative to their parents; if boys and girls differ in ecological understanding; if children in fast-growing urban counties differ in ecological knowledge from those in slow-growing agricultural counties; and if accuracy of ecological understanding was related to the child's source of information. A pilot study of 68 students revealed that less than 50% adequately understood key facts about three prominent issues: wolf reintroduction; brucellosis infection of bison and cattle; and whirling disease in trout. The source of information most commonly identified was television. Integrating ecological education into public school curricula may be a more effective means of improving the ecological knowledge of children.

HARLEY, C. D. G. University of Washington, Seattle, WA 98195, USA. **Recruitment, density thresholds, and interannual variability in interaction strength.**

In order to make generalizations beyond the typically limited scope of ecological experiments, we need to understand the ways in which the results are context dependent. I measured the per capita interaction strength of an intertidal predator (*Pisaster ochraceus*) on its invertebrate prey in the same location in two different years. Although *Pisaster* densities were similar between years, the recruitment of prey species was much heavier in 1998 than in 1999. Because *Pisaster* cannot suppress a dominant prey item (*Balanus glandula*) below a certain density, the weak recruitment year resulted in little difference between exclosures and controls, and low measured interaction strengths. In the heavy recruitment year, *Pisaster* exclusion resulted in rapid community changes, and identified *Pisaster* as a much stronger interactor. Spatial and temporal variation in *Pisaster*'s effects can therefore be determined, at least in part, by variability in the recruitment of its resource base.

HARMON, J. P. and D. A. ANDOW. University of Minnesota, St. Paul, MN 55108, USA. **Predation of European corn borer eggs by *Coleomegilla maculata* DeGeer in the presence of alternative foods.**

Generalist arthropod predators can have an enormous influence on the population dynamics of target prey, yet their interactions with alternative foods often make it difficult to predict the predator's response to different communities of target and alternative foods. To investigate the effects of alternative food on predation, we studied the polyphagous coccinellid, *Coleomegilla maculata* DeGeer and its most common prey in Minnesota maize: European corn borer eggs, corn leaf aphids, and corn pollen. We conducted a study with large field cages to determine how the presence of aphids and pollen influence the predation of high and low densities of European corn borer eggs by *C. maculata*. Our results indicate (1) Per capita predation on European corn borer eggs was density dependent in the absence of alternative foods; (2) Per capita predation on eggs was lower and inversely density dependent when corn pollen was available; and (3) Cages with large corn leaf aphid densities had small and inconsistent differences in egg predation from cages with low aphid densities, regardless of pollen availability. Laboratory studies help show how the foraging behavior of individual *C. maculata* can be influenced by the type and density of available foods. An understanding of how alternative prey influence predator foraging for target prey could be an important step in facilitating effective biological control by generalist arthropod predators.

HARMON, M. E. Oregon State University, Corvallis, OR, 97331-5752, USA. **Decomposition of the third kind: Results from the LIDET project.**

Although decomposition is a continuously evolving process, three stages are generally recognized: 1) an early one of rapid losses dominated by leaching; 2) a middle stage dominated by the degradation of cellulose and the formation of stable organic matter; and 3) the last stage of very slow loss dominated by the degradation of stable organic matter. The LIDET (Longterm Intersite Decomposition Experiment Team) project was designed to examine the degree climate and substrate quality controlled the second and to a lesser extent the third stage of decomposition. A total of 28 sites participated and after 9 years this team effort has yielded interesting insights on the way these two basic controls interact. Climate and substrate quality both controlled the rate of decomposition and the formation of stable organic matter in the second stage. Their influence on the decomposition during the stage dominated by stable organic matter was less clear and may require new experiments that separate the formation and degradation of this material. Several future experiments are suggested that would offer additional insight into controls on decomposition of the third kind.

HARMS, K. E. University of California, Santa Barbara, CA, 93106, USA. **Habitat associations of tropical trees and shrubs within a 50-ha forest plot in Panama.**

Traditional analyses of habitat associations of plants often make the assumption that individual stems can be treated as independent sample units. Due primarily to limited dispersal distances and the generally contagious spatial patterns of recruitment, this assumption is untenable for most species of plants. I developed a statistical test for examining habitat associations of mapped plants which incorporates the spatial structure of plant populations, eliminating the assumption of independence among stems. I applied the test to tropical trees and shrubs within the 50-ha Forest Dynamics Project plot in Panama. Few species were significantly associated with specific habitat types, but many species avoided a seasonally inundated swamp, i.e., most species' distribution patterns with respect to habitat heterogeneity within the 50-ha plot were similar. These results support the hypothesis that specialization to the physical environment is not among the principal mechanisms maintaining diversity in this tropical forest.

HARRIS, L. C., M. A. KHAN, B. N. SMITH and L. D. HANSEN. Brigham Young University, Provo, UT 84602 USA. **Effects of salinity and temperature on respiratory metabolism of *Salicornia utahensis* from a Great Basin playa.**

Plants that live in desert playas of the Great Basin must simultaneously tolerate very high concentrations of salt and high temperature. An isothermal calorimetric method was used to measure metabolic heat rates and CO_2 rates of stem tips and leaves from *Salicornia utahensis* grown from seed in different NaCl concentrations of 0 to 1 M. Metabolic rates were measured at nine temperatures from 5 to 45°C. The predicted optimal growth rate was at 0.8 to 1 M salt and 25°C. The maximum temperature tolerated is an approximately linear function of salt concentration, about 20°C at 0 M salt and about 32°C at 1 M. Thus salt and temperature stresses are not additive, rather they oppose one another (i.e. at higher salt concentrations plants will tolerate higher temperatures). This is exactly the pattern seen in the field.

HARRISON, J. A. and P. A. MATSON. Stanford University, Stanford, CA, USA. **Greenhouse gas emissions from drainage waters in an intensively farmed, subtropical valley.**

The production and emission of nitrous oxide (N_2O), methane (CH_4), and carbon dioxide (CO_2) from surface waters draining agricultural regions is not well understood, especially in non-temperate regions where the most rapid agricultural intensification is currently occurring. We measured the rates and patterns of N_2O, CH_4, and CO_2 emissions from freshwater drainage systems and estuaries receiving agricultural and mixed agricultural/urban drainage water from the intensively farmed Yaqui Valley of Sonora, Mexico. N_2O emissions in both pure agriculture and mixed urban/agriculture drainage systems were high (means: 4.02-23.5 ng N_2O-N cm^{-2} hr^{-1}) with N_2O emissions increasing as much as 600% following a valley-wide fertilization/irrigation event. Flux measurements along estuarine transects revealed that N_2O production is sustained above levels predicted by dilution calculations, suggesting that N_2O production is not limited by dissolved inorganic nitrogen in the drainage system. Rates of CO_2 and CH_4 emission varied dramatically over the course of a growing season (0.81–20.46 µg

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ABSTRACTS

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