Annotated Bibliography, Plant-Animal Interactions, Fall 2004
Invasive Vegetation and Native Arthropods
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Burger, J.C., R.A. Redak, E.B. Allen, J.T. Rotenberry, M.F. Allen. 2003. Restoring arthropod communities in coastal sage scrub. Conservation Biology. 17:460-467.
This is another paper looking at restored sage scrub areas. The restoration here consisted mainly of planting a single species of bush (or at least that was all the researchers looked at). They sampled invertebrates from these bushes and found that planted shrubs had higher abundance, but fewer rare species. Trophic assemblages were also impacted. Due to the length of time since planting, and the methods used, I would call this study fairly convincing in its results.

Connor, E.F. 1991. Colonization, survival, and causes of mortality of *Cameraria hamadryadella* (Lepidoptera: Gracillariidae) on four species of host plants. Ecological Entomology. 16: 315-322.
The title is pretty self-explanatory, except that two of the trees are native and two were exotic species. The study looks at two types of trees with differing abundances of *Cameraria*, red and white oak. The study found significant differences in the distribution of mortality causes between native and exotic species. The study did not find any significant difference of overall mortality between native and exotic species of the same subgenus (red or white). The study suggests that invasive plants closely related to native species will more likely be colonized by phytophagous insects. This paper is good for explanatory value, when dealing with predictions about the impact of invasive plants and how they will be incorporated into the new habitat.

Connor, E.F., S.H. Faeth, D. Simberloff, P.A. Opler. 1980. Taxonomic isolation and the accumulation of herbivorous insects: a comparison of introduced and native trees. Ecological Entomology. 5:205-211.
The title is pretty self-explanatory. The results indicate that the accumulation of herbivorous insects is based firstly on how closely related or distantly isolated an introduced species is to native vegetation in the same range. If the invasive vegetation is taxonomically close to native vegetation in the same area, it will accumulate herbivores much more quickly, from the native vegetation, than if it were distantly related. The paper argues that comparisons of herbivore accumulation should remove taxonomic relatedness before exploring the impact of time and range.

Crisp, P.N., K. Dickinson, G. Gibbs. 1998. Does native invertebrate diversity reflect native plant diversity? A case study from New Zealand and implications for conservation. Biological Conservation. 83:209-220.
This paper was not that convincing. It did find a general trend of increasing percentage of native beetles and percentage of native plants. Areas with high proportions of invasive

species still showed high beetle diversity. It calls for reexamination of protection strategies, which typically ignore areas of high invasive vegetation percentages.

Crooks, J.A. 2002. Characterizing ecosystem-level consequences of biological invasions: the role of ecosystem engineers. Oikos. 97:153-166.

This is a mini-review of other papers that have examined the impact of invasive species. The table summarizing invasive species, their impacts and the sources for the information is a good place to find additional literature. It gives a good review of some general principles developed thus far in invasion ecology, and indicates areas of need for future research. It's definitely a good read for anyone interested in exploring potential research or understanding the impacts of invasion.

Ghazoul, J. 2002. Flowers at the front line of invasion? Ecological Entomology. 27:638-640.

This short paper explores the potential influence of lost pollinator-plant mutualisms due to invasive species. It argues that flowers are at the front line of such invasions. Although not completely convincing, the paper develops some interesting ideas, and indicates some characteristics of invasive plants that may cause such break-downs in native plant-insect interactions.

Gratton, C. and R.F. Denno. In press. Restoration of arthropod assemblages in a *Spartina* salt marsh following removal of the invasive plant *Phragmites australis*. Restoration Ecology.

This paper looks at the food web aspects of arthropod assemblages. It examines *Spartina, Phragmites*, and mixed habitats. They uncovered three patterns. They found that *Spartina*-containing habitats were similar. *Phragmites* dominated habitats had lower richness and diversity. They also had different assemblages than *Spartina* dominated systems. Long-standing *Phragmites* stands were the most different from others. They also found that reference and restored habitats had similar trophic assemblages indicating successful restoration of the arthropod community. This paper is in press and should be published within the next year. It is one of the few papers I could find focusing on the restoration of trophic structure.

Harris, R.J., R.J. Toft, J.S. Dugdale, P.A. Williams, J.S. Rees. 2004. Insect assemblages in a native (kanuka- *Kunzea ericoides*) and an invasive (gorse – *Ulex europaeus*) shrubland. New Zealand Journal of Ecology. 28:35-47.

I used this paper for the discussion in class. I found it very interesting, because the authors did not find the usual trends of reduced arthropod diversity and richness in invasive vegetation. In fact, they found no clear trends in these characteristics. They did find a significant difference in assemblages, but could not indicate whether one assemblage was better than the other. I felt it was good for discussion.

Herrera, A.M. and T.L. Dudley. 2003. Reduction of riparian arthropod abundance and diversity as a consequence of giant reed (*Arundo donax*) invasion. Biological Invasions. 5:167-177.

This was the other paper I used for the discussion in class. This paper found a reduction in abundance, biomass and richness of aerial invertebrates in invasive vegetation. All of the values were about one half of what they were in native vegetation. During the discussion, we were resolved that the results of the study could only indicate the use of the giant reed habitat, specifically. It could not indicate whether the plant impacted the regional community, since insects may have chosen to fly over or around reed patches. This paper was good for discussion, as it found interesting trends, but these trends may only exist on small scales. It is a good discussion piece for alternative and additional sampling techniques.

Hilty, J. and A. Merenlender. 2000. Faunal indicator taxa selection for monitoring ecosystem health. Biological Conservation. 92:185-197.

While not directly related to invasion ecology, this paper points out some important characteristics that should be considered when choosing a representative group to study ecosystem health. Of course, you can extend this to picking a good group for studying the general impacts of invasive species. It is a helpful and interesting paper, although I would say incomplete. Not bad for a 12-page paper trying to explain the process of choosing a focal group to examine ecosystem health for any situation. I would say a little too bold, but good show.

Kennedy, C.E.J. and T.R.E. Southwood. 1984. The number of species of insects associated with British trees: A re-analysis. Journal of Animal Ecology. 53: 455-478.

This paper is a re-analysis of previous data, which was one of the founding papers arguing for the accumulation of herbivores based on a plant's range. This paper finds new and additional factors to be significant predictors of herbivore abundance. It uses fairly straight-forward means to explore the possible significant predictors. Most of the results agree with previous work, however some predictors, such as taxonomic isolation were found to be a very small predictor, while it was found to be the most important factor in other studies. Overall, it was an interesting paper with straight-forward results.

Longcore, T. 2003. Terrestrial arthropods as indicators of ecological restoration success in coastal sage scrub (California, USA). Restoration Ecology. 11:397-409.

This paper explores the restoration of sage scrub, and the impact it has on arthropods. Restorations included both removal of invasive plants and planting natives, or sometimes just planting/seeding native plants. They found positive relationships between native vegetation and arthropods. While confounded and confusing at times, the paper is able to get across that there is an impact, due to restoration, on the arthropod assemblages, and it seems to be positive. However, it is not as clear as it could be, and some of the techniques do not seem all that sound. I am not convinced by the results of this paper.

Shapiro, A.M. 2002. The California urban butterfly fauna is dependent on alien plants. Diversity and Distributions. 8:31-40.

An interesting paper based on personal observations in a limited area. It provides some neat ideas for discussion and some possible complications to typical restoration behavior by scientists and managers.

Slobodchikoff, C.N. and J.T. Doyen. 1977. Effects of *Ammophila arenaria* on sand dune arthropod communities. Ecology. 58:1171-1175.

This was the earliest example I found of studying the impact of an invasive plant on arthropod communities. They found large reductions in arthropod communities due to small percentages of cover by *Ammophila*. This is in direct opposition to a positive correlation of native plant cover and arthropod abundance. Although mechanisms are unclear, the trends are obvious. *Ammophila* has a large, negative impact on native arthropods. This paper is well-done and a good example of early work in this area.

Strong, D. 1974. The insects of British trees: Community equilibration in ecological time. Annals of the Missouri Botanical Garden. 61:692-701.

This study is a follow-up to previous papers that regarded the accumulation of herbivores to be based on the length of time the plant species had been around. This paper concludes that insect community formation occurs on a shorter scale, and is based on the distribution of a plant species. Good background on the theories that could explain the lack of herbivores for invasive plants, and possible impacts on the native arthropod communities.

Strong, D Jr., E. McCoy, J. Rey. 1977. Time and number of herbivore species: the pests of sugarcane. Ecology. 58:167-175.

Another paper looking at herbivore accumulation. This paper further rules out age as the determining factor for accumulation. Using sugarcane, for which age of introduction was well documented, they were able to strengthen their distribution argument, see above.

Toft, R.J., R.J. Harris, P.A. Williams. 2001. Impacts of the weed *Trasescantia fluminensis* on insect communities in fragmented forests in New Zealand. Biological Conservation. 102:31-46.

There only seemed to be some very minor differences in composition between native and invasive vegetation in one site. There seemed to be no clear trends that would indicate an impact of invasive vegetation on arthropod assemblages. There seemed to be a lot of heterogeneity throughout their study area. They found that assemblages clustered according to site, rather than treatment. This study was not very convincing. It only used one kind of trapping, and this method seems to only sample very mobile arthropods, which seem to make poor indicators.