

The Effects of Invasive Plants on Bird Communities

Conclusion

Invasive plants can affect the population, community composition and stability of bird communities by altering resource availability, changing habitat structure and quality, or disturbing the stability of the whole food chain.

References

- 1) Maria E.A. and J.H. Cushman (2002). Community-level consequences of a plant invasion: effects on three habits in coastal California. *Ecological Applications* 12(5):1434–1444.

This paper investigated the influence of an invasive evergreen vine (Cape ivy) on three habitat types in coastal regions by using comparative and experimental field studies. Results indicated that Cape ivy had significantly changed the composition of three different habitat types, it was a prior control. Cape ivy negatively affected the richness of both native and nonnative plant species. Removing Cape ivy from invaded areas may lead to the proliferation of other nonnative species.

- 2) Douglas W.T. (2004). Do Alien Plants Reduce Insect Biomass? *Conservation Biology* 18(6):1689-1692.

*The aim of this study is to examine the relationship between exotic species and nest predation rates. These results revealed that exotic *Lonicera* and *Rhamnus* affected songbird nest success in two ways. First, exotic shrubs directly enhanced nest predation, perhaps through a combination of lower nest height, the absence of sharp thorns, and a branch architecture that may facilitate predator movement. The other way, predation among nesting Wood Thrushes was higher in *Lonicera* than the pooled native species, but not compared with *Viburnum*. Moreover, predation among thrushes nesting in *Lonicera* was influenced by the number of robins nesting in *Lonicera*.*

- 3) Daniel M.S., E.K. Bollinger, and D.H. Johnson (2003). Effects of Leafy Spurge Infestation on Grassland Birds. *The Journal of Wildlife Management* 67(1): 115-121.

The aim of this experiment is to assess whether exotic grass affects the abundance of birds, plants, and arthropods. Results indicated that bird abundance was significantly lower on exotic-grass-dominated study sites. Density of the

ground-foraging bird guild was lower on exotic sites. This is because the seeds and insect resources located on the ground were less abundant on exotic sites. Exotic grasses have negative effects on the functional relationships between birds, their prey, and prey habitat. Exotic grasses provide less food for breeding bird communities because native plants species richness is significantly suppressed by exotic grass infestations, so reducing the number of niches available for arthropods.

- 4) S. J.M. et al. (2007). Invasive alien plants infiltrate bird-mediated shrub nucleation processes in arid savanna. *Journal of Ecology* 95:648-661.

An abundant seed source will increase the probability of invasion of a natural ecosystem by alien species. Alien fleshy-fruited plants can infiltrate natural savanna woodland more easily than woodlands invaded by mesquite. Replacement of native by alien hosts would see a decline in overall species richness. Alien hosts and subcanopy invaders may differently respond to disturbances or alter a variety of species interactions, leading to unpredictable changes in vegetation dynamics. Alien species also can change the intensity of fires beneath tree canopies. Invasive species can potentially change dispersal dynamics. Alien species are likely to increase the competition for indigenous species to disperser.

- 5) Yvette K.O., K.S. McKelvey, and D.L. Six (2006). Invasion of an exotic forb impacts reproductive success and site fidelity of a migratory songbird. *Oecologia* 149:340–351.

This study researched the effects and underlying mechanisms of exotic forb on migratory songbirds. Results showed that initiation of first nests was delayed at exotic plants because of low food availability. Breeding delays were due to diminished fecundity. Site fidelity of breeding adults was also reduced in exotic habitats. In addition, grasshoppers, which were important prey resource, were substantially reduced in exotic habitats. The author concluded that knapweed invasion can impact chipping sparrow populations by reducing food availability and changing food chain. Food availability is an important factor of habitat quality for songbirds. Spotted knapweed, which was as strong invader, would continue to spread and impacts on higher trophic levels seriously.

- 6) NSW National Parks and Wildlife Service (2003). Invasion of native plant communities by exotic perennial grasses—as a key threatening process – an overview. www.nationalparks.nsw.gov.au.

I picked up some useful information for my presentation.

A relatively great number of exotic perennial grasses threaten native plant communities. Increasing evidence that some perennial grass species have significant adverse impacts on biodiversity has led to the listing of “Invasion of native plant communities by exotic perennial grasses” as a key threatening process. And several

endangered ecological communities are threatened by exotic perennial grasses. The author pointed out exotic perennial grasses negatively influence biodiversity and ecological communities. So I think disturbed biodiversity and ecological communities can influence bird communities.

- 7) Jonathan M. L. (2003). Mechanisms underlying the impacts of exotic plant invasions. *The Royal Society* 270:775–781.

In this paper, the author reviewed over 150 papers to discuss the mechanisms underlying the impacts of exotic plant invasions on plant and animal community structure, nutrient cycling, hydrology and fire regimes. Almost all studies hypothesized that there is a strong competition between native plants and invasive plants. Exotic species have strong competitive effects. Exotic plant species can change plant community structure and impacts on higher trophic levels. Nitrogen cycling, hydrology and fire regimes are generally highly mechanistic, often motivated by specific invader traits.

- 8) J.H. Sarasola and J.J. Negro (2006). Role of exotic tree stands on the current distribution and social behaviour of Swainson's hawk, *Buteo swainsoni* in the Argentine Pampas. *Journal of Biogeography* 33:1096–1101.

The aim of this study is to characterize the sites used by hawks for communal roosting in the Pampas of Argentina. The author concluded that the exotic trees may lead to the expansion of the suitable habitat for Swainson's hawks. Tree stands may have also changed the communal roosting behavior of Swainson's hawks, due to their providing new structural elements in a region that almost completely lacked trees prior to European occupation.

- 9) J.D. Lloyd and T.E. Martin (2005). Reproductive Success of Chestnut-Collared Longspurs in Native and Exotic Grassland. *The Condor* 107:363–374.

This study examined habitat specific demography of grassland birds, and how changes in breeding habitat may be related to population declines. Results and conclusions indicated that the average number of young produced per nest was significantly higher in native prairie because of lower predation in the native habitat. Nestling longspurs in the exotic habitat gained mass more slowly and reached a smaller final mass than did nestlings in the native habitat. Not only does slow growth extend the period of vulnerability to nest predators, but the smaller mass achieved by nestlings in the exotic habitat may reduce future survival. Introduction and spread of a commonly planted exotic grass has adverse fitness consequences for a grassland bird, and highlight the importance of maintaining native prairie.

- 10) George H.W., L.L. Loope, and A.C. Medeiros (1993). Study on Use of Alien versus Native Plants by Nectarivorous Forest Birds on Maui, Hawaii. *The Auk*

The researches studied the foraging behavior of birds on three prolonged-flowering plant species, including native and exotic plant species. The results showed that the alien plant as especially utilized as a food source early in the day by native birds. Native birds heavily utilized the alien Cytisus plant as a food source during the January-March study period, especially in the early hours of the day; by midday few birds visited Cytisus blossoms. Analysis of interspecific competition suggests that Japanese White-eyes have negative impacts on at least some native passerine. These white-eyes tend to be more common along broad forest edges than within forest interiors.

- 11) Gan X. et al. (2007). The ecological effects of biological invasions on birds. *Biodiversity Science* 15(5):548–557.

The author reviews several previous papers about the effects of biological invasions on birds. The biological invasions in this paper included exotic mammals, exotic birds, exotic invertebrate and exotic plants. Then the author concluded that exotic mammals affect the eggs and pullus of native birds, resulting in the decreased population of native birds. Exotic birds compete with native birds for habitats and food. In addition, exotic birds will lead to the loss of the genetic diversity by hybridization with the closely-related native species. Exotic invertebrate directly or indirectly affect the habitat environment and food resources, and may prey native birds. Exotic plants can alter native bird species composition, the structure of native plant communities and food chain.

- 12) Antonio D. et al. (1998). The response of native species to removal of invasive exotic grasses in a seasonally dry Hawaiian woodland. *Journal of Vegetation Science* 9:699-712.

*In this study, the researchers researched the effects of non-native perennial grasses on native species in Hawaii Volcanoes National Park. Results showed that two fast growing shrub species increased in size significantly more in removal areas than in controls, however, their architecture changes. Most species had significantly increased leaf tissue nitrogen in removal plots, suggesting that removal plot shrubs had greater access to soil nitrogen. Seedlings of all woody species were greatly more abundant in removal plots after removal. Initially high sapling mortality was balanced by high recruitment into the sapling class. Removal of introduced grasses led to an increase in plant growth and tissue nitrogen in the native woody species in this community. $\Delta^{13}\text{C}$ of *Dodonaea* and *Osteomeles* were significantly less negative in removal plots compared to controls. With the presence of grasses, shrub growth in these woodlands was reduced and biomass was shifting towards grasses.*

- 13) Drummond B.A. (2005). The Selection of Native and Invasive Plants by

Frugivorous Birds in Maine. *Northeastern Naturalist* 12(1):33-34.

The aim of this study is to research whether birds select invasive versus native fruits. The author concluded that although the two native plain species had significantly higher calorie content than the two invasive species, higher energy density of native plants was not directly correlated with more rapid fruit removal or fruit preference. Frugivores may eat some fruits only after other more preferred foods are scarce, and given that secondary metabolites may affect frugivores in different ways. The quality of fruit depends on the digestive capabilities and nutritional requirements of individual frugivores. Invasive plant species with persistent winter fruit are likely to have a significant impact on native frugivory because of the limited number of species of plants and birds.

- 14) French K., R. Major, and K. Hely (2004). Use of native and exotic garden plants by suburban nectarivorous birds. *Biological Conservation* 121(2005):545–559.

The aim of this study is to research the use of exotic and native nectar resources by the nectarivore guild of birds. Results showed that two native plant species produced high volumes of nectar and sugar per floral unit and per plant. Native plant species obtained significantly more attention and were significantly more attractive than the exotic genera to all birds and particularly to native species. The genus of the observation plant and the number of floral display units per plant were positively correlated with both the total time each bird spent within the plant and the number of birds visiting. The author then concluded that the native plant species were more valuable food source than the exotic plant species. Native plant species were also the preferred foraging sites for suburban nectarivorous birds.

- 15) Flanders A.A. et al. (2006). Effects of Invasive Exotic Grasses on South Texas Rangeland Breeding Birds. *The Auk* 123(1):171-182.

The aim of this study is to research the effect of invasive exotic grasses on breeding birds in southwestern rangelands. The researchers compared the abundance and species richness of breeding birds, native flora, and arthropods on South Texas rangeland plots dominated by native grasses and plots dominated by two invasive exotic grasses. Results showed that invasive plant species altered vegetation structure, thereby affecting the availability of resources for birds, and hence affect bird community composition.

- 16) Hitchcock L.E. Temporal variation in the consequences of an exotic shrub on avian nest predation. *School of Environment and Natural Resources.*

This study determined whether the risk associated with nesting in native substrates and exotic shrubs varied temporally across the breeding season. The author concluded that the temporal change in nest survival rates hypothesizes that advanced

leaf phenology may be a mechanism underlying the increased vulnerability to predation in some exotic substrates. Different nest height among native and exotic substrates maybe lead to differences in predation risk due to lower nests may be more accessible to a greater range of predators. Temporal patterns in differences in daily survival rates may be because of seasonal changes in distribution of nests among substrates. The change of nesting substrate may result in a decrease in nest density, which may have reduced predator search efficiency caused by higher nest densities.

This paper is not very helpful for my research.

- 17) VLADIMÍR R. (2003). Effects of Exotic Habitat on Nesting Success, Territory Density, and Settlement Patterns in the Blackcap (*Sylvia atricapilla*). *Conservation Biology* 17(4):1127-1133.

The author monitored the nesting success of Blackcaps in two types of forest to research their breeding density and territory size. Results indicated that there could simply be different densities of nest predators on the two study sites. The high density of birds in the black locust plantation could lead to low nesting success caused by density-dependent nest predation. A high density concentration of nests in one shrub species could facilitate nest searching by predators. The author then concluded that it is impossible to assess habitat quality based solely on breeding densities. Human-modified habitats can function as ecological traps by luring settling birds into unsuitable habitats. People can restore native communities and increase the breeding productivity of bird populations by replacing exotic plant species with native ones.

This paper is not very helpful for my research.

- 18) David M. R. and B.W. Wilgen (2004). Invasive alien plants in South Africa: how well do we understand the ecological impacts? *South African Journal of Science* 100:45-52.

The author began with a brief review of what is known about the extent of invasions and influences of invasive alien plants in South Africa, and then he discussed the consequences for the delivery of ecosystem goods and services to people. The author pointed out that altered climate patterns could have significant consequences for the distribution of alien plant species. Further strategic innovations are needed to direct appropriate research in the field of invasion ecology while giving attention to capacity building and social transformation.

This paper is not very helpful for my research.

- 19) Ragan M.C. and E.T. Aschehoug (2000). Invasive Plants versus Their New and Old Neighbors: A Mechanism for Exotic Invasion. *Science* 290.

*The researchers studied *Centaurea diffusa*, a noxious weed in North America and found that it negatively impact grass species from North America than on closely related grass species from communities to which *Centraurea* is native. The advantage*

of Centaurea diffusa is because of the differences of its root exudates and how these root exudates affect competition for resources. This paper helps to explain why some exotic species so successfully invade native plant communities.

This paper is not very helpful for my research.

20) Kenneth A.S., L.C. Nelis, N. Briggs, and R.S. Ostfeld (2005). Invasive Shrubs and Songbird Nesting Success: Effects of Climate Variability and Predator Abundance. *Ecological Applications* 15(1):258–265.

This study determined whether predation rates differed between nests placed on the ground, in barberry shrubs, or in alternative native substrates. The results showed that Veery nests in barberry had lower nest predation rates than nests placed on the ground. Veeries built nests more often in barberry than in any other substrates. The ratio of daily mortality rates of barberry to non barberry nests was negatively related to the annual density of rodents. Nests in both barberry and oak saplings had lower predation rates than their paired ground nests. The author then concluded that strong differences in the density of barberry or chronic changes in climate can have long-term impacts on songbird populations.

This paper is not very helpful for my research.

21) Jonathan M.L. (2000). Species Diversity and Biological Invasions: Relating Local Process to Community Pattern. *Science* 288:852-854.

The results in this paper suggest that species loss at small scales may reduce invasion resistance. Diversity can significantly enhance resistance to biological invasions, supporting the relevance of studies conducted in more homogeneous settings to complex natural communities. Factors covarying with diversity are likely determinants of the community-wide patterns. The most diverse assemblages might be at the greatest risk of invasion, an important point for managing invasive species. However, losses of species, if they affect neighborhood-scale diversity, may erode invasion resistance.

This paper is not very helpful for my research.