

Effects of Chinese Privet (*Ligustrum sinense*) on Bird Species in a Southeastern Piedmont Forest

Joshua Wilcox¹, Christopher Beck², & Andrew Davis³

¹Emory University, Atlanta, GA ²Department of Biology, Emory University, Atlanta, GA ³Department of Environmental Studies, Emory University, Atlanta, GA



ABSTRACT

Invasive plant species are known to have substantial effects on the native flora and fauna of the habitats they invade. Chinese Privet (*Ligustrum sinense*) invades forested areas, creating dense, mono-specific stands of very dense understory. We predicted that the highest density and greatest species diversity of birds would be found in areas with the highest densities of privet, expecting that the dense privet would provide desirable cover for the birds. To determine the effects of Chinese Privet (*Ligustrum sinense*) on bird species, we performed an observational study in the piedmont of Georgia. Plots were chosen based on privet density and each plot was surveyed for birds seven times over a ten-week period, recording number, species, and behavior of the birds. On any given survey day, the highest density of birds and the largest species variation could be found in the plots with high privet density as compared with the plots of low privet density. When these numbers were averaged for the whole eight-week period across all samples, we found no significant effect of privet density on either bird density or species diversity. Therefore, privet density does seem to have an impact on the bird species of a southeastern piedmont forest, providing a more desirable habitat on a day to day basis for these birds, as compared to the native vegetation. However, our data suggests that removal of invasive privet would not adversely affect bird populations over longer time scales.



This is an example of Chinese privet. It can vary in size from <0.1m to over 10m tall. Trunk size may vary from <1cm diameter to more than 30cm diameter.

- Note the characteristic berries
- Leaves are opposite, small, and round. They often have a waxy feel

INTRODUCTION

Recently, conservationists have begun to realize that non-indigenous species invasions are a major environmental threat both to native habitats and the species that live in them. Many species of exotic plants and animals are able to outcompete native species for resources through superior reproductive potential, quick growth, alleopathic qualities, and a number of other survival mechanisms. These types of invasives tend to dominate their new environment, pushing out the native species. They have been known to cause mass extinctions, habitat destruction, as well as costing billions of dollars annually in control measures (Simberloff 1997).

Ligustrum sinense, Chinese privet, is such a species. Privet is a member of the family Oleaceae, the olive family. There are three species of privet that have been classified as invasive, common privet (*Ligustrum vulgare*), native to Europe, Chinese privet (*Ligustrum sinense*), and Japanese privet, (*Ligustrum japonicum*) (Ward 2002). Chinese privet poses the biggest threat to the native habitats of Georgia, being the most invasive of the three species, and the most suited to the Georgia climate. Introduced in the mid 1850s, Chinese privet has naturalized itself in nineteen known states east of the Rockies, ranging from Massachusetts to Texas, and as far south as Florida. It was brought to this continent as a cheap, fast growing alternative to Common privet (*Ligustrum vulgare*), a native of Europe, used as a hedge for farming and as an ornamental bush in horticulture. Common privet was more susceptible to the native pests of the New World than its Asian counterpart, which proved to be a hardier species, surviving the variety of adverse weather conditions found in the Americas. Chinese privet is still a popular landscaping species and is easily purchased at most nurseries in the country, making it particularly difficult to limit its spread (Ward 2002).

Chinese privet is able to outcompete the native understory species of a habitat through its rapid seed dispersal and quick growth to reproductive maturity. Producing an abundant amount of berries that are dispersed by animals, it is able to spread through an area with surprising speed. It is also able to clonally reproduce by root suckering, making it especially difficult to completely remove. Preferring moist, well-drained soils with large amounts of sunlight, *Ligustrum sinense* is commonly found in lowland floodplains, but has been known to populate widely varied habitats and can tolerate drought-like condition and low soil fertility. It will often form large, mono-specific stands, completely dominating the area (Langland 1998). These stands can have dramatic effects on the abiotic environment because the privet plants are able to catch sediment in their root structures during floods, elevating the soil and making the habitat more suitable for their reproduction (LIPD 2001).



This is a picture of a Male American Cardinal, The most common species Observed during the project.



Removal of Chinese privet can be a long and arduous process. Cutting of mature trees will actually lead to an increased regrowth and uprooting is extremely difficult because of their extensive root structure and ability to clonally reproduce. Application of glyphosate herbicides has been found to be the most successful but, because of their non-discriminatory nature, they are also dangerous to most native species (Miller 1998). Stump cutting, accompanied with a small, localized application of this herbicide on the site of the cut is the most effective method of removal that seems to work on both large and small specimens (LIPD 2001).

Much of the problem with privet is the lack of research on how it affects native species of flora and fauna. There has been some research done on deer grazing on privet leaves during the winter, but no studies to date have looked at the bird dispersal of privet berries or its direct effects on resource competition with native understory and groundcover plant species. In particular, the use of privet by various bird species has also been ignored, leaving a big gap in the literature.

METHODS

Plot Selection

- The study site selected was an urban nature preserve in DeKalb County containing approximately 30 acres of secondary growth forest (South Peachtree Creek Nature Preserve)
- 14 plots were selected based on overall privet density inside the plot; 5 high density privet, 5 low density privet, and 4 medium density privet
- Each plot was a 15m by 15m square
- Each plot was a minimum of 30 meters away from any other plot

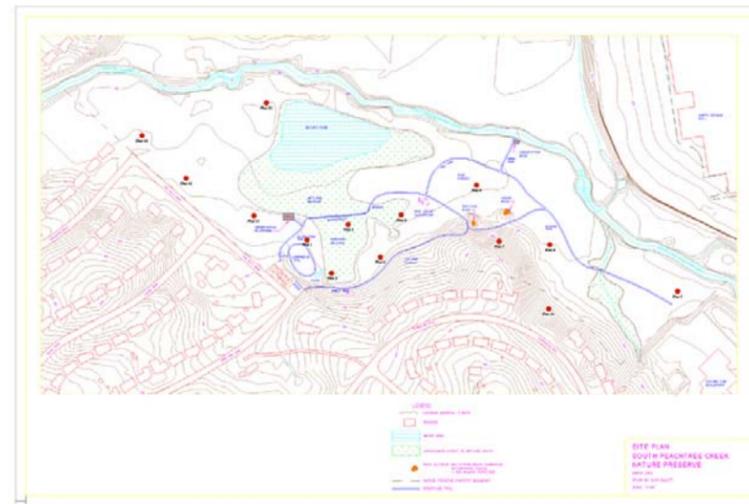


Observations were conducted using the naked eye and binoculars, when necessary.

Bird Sampling

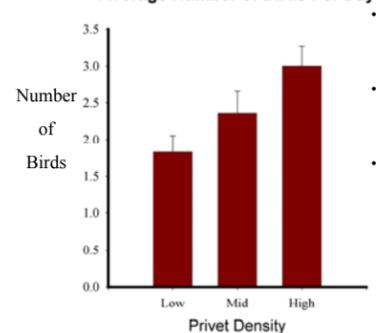
- Birds were observed using a stationary survey point in the center of the plot for a period of 20-minutes
- Species, number of birds, and behavior were recorded for each plot
- All fourteen plots were surveyed once a week, over a period of three days
- All plots were surveyed during the hours of 7:00am and 11:00am, times for each plot were selected randomly each week
- No surveys were completed during rain, or other abnormally adverse weather conditions

Map of the Preserve Labeled with the Plots



RESULTS

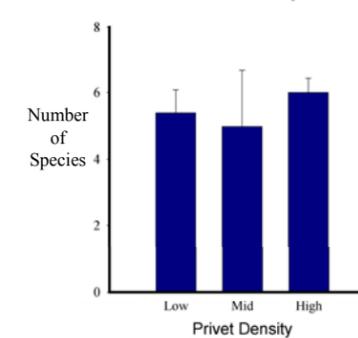
Average Number of Birds Per Day



- This graph shows the average number of birds observed in each type of plot on each survey day, divided into low, medium, and high-density privet plots.
- The data in this graph indicates that on any given day, the largest number of birds could be found in the high-density privet plots.
- There is a significant difference in the number of birds found in high-density privet plots as compared to low-density privet plots (P = 0.004), but that there is no significant difference between mid-density and either high or low-density plots.

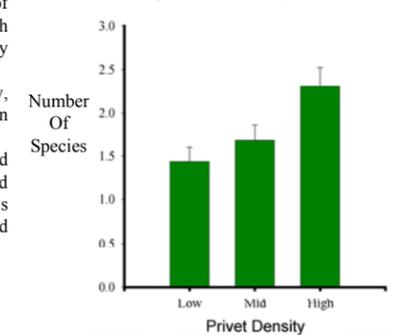
- The graph to the right shows the average number of species of birds observed in each type of plot on each survey day, divided into low, medium, and high-density privet plots.
- The data in this graph indicates that on any given day, the largest number of species of birds could be found in the high-density privet plots.
- There is a significant difference in the number of bird species found in high-density privet plots as compared to low-density privet plots (P = 0.003), but that there is no significant difference between mid-density and either high or low density plots.

Total Number of Species



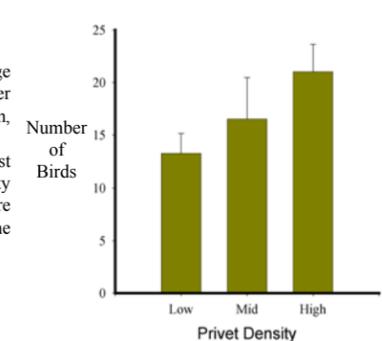
- This graph to the left shows the total, average number of bird species observed in each type of plot over the course of the study, divided into low, medium, and high-density privet plots.
- The data in this graph indicates that, when looking at a longer period of time, each plot type has approximately the same number of bird species, with no significant differences between any of the plot types.

Average Number of Species Per Day



- The graph to the right shows the total, average number of birds observed in each type of plot over the course of the study, divided into low, medium, and high-density privet plots.
- The data in this graph indicates that the largest number of birds will be found in high-density privet plots over a longer period of time, but there are no significant differences between any of the plot types.

Total Number of Birds



CONCLUSIONS AND FUTURE DIRECTIONS

On any given day, a larger number of birds and a larger variety of bird species can be found in high-density privet areas, as compared to low-density privet areas. This data indicates a larger number and variety of birds make the daily choice to enter areas of high privet density. Over a longer period of time, however, the significance of these difference disappear, indicating that birds are not necessarily making their habitat choice long term and any privet removal would not adversely affect bird species on a long time span. The insignificant results may prove significant with further testing and more plots, giving a larger data bank. Due to time constraints, this project cannot be presented in its completed form. In the future, ten sample days for each plot will be recorded. Other future examinations will include individual behavior of the birds, individual preferences of different species, and the significance of location within the park. In addition, an in depth analysis of the effects privet has on native flora will also be conducted.

ACKNOWLEDGEMENTS AND FUNDING ATTRIBUTIONS

This material is based upon work supported by the Howard Hughes Medical Institute under Grant No. 52003727 and the support of the South Peachtree Creek Nature Preserve.

IN PLAIN ENGLISH

Invasive species are different types of plants or animals that are not native to a certain habitat, but are able to thrive there. These species are a major threat to the other plants and animals that normally live in the invaded habitat. Chinese Privet, a leafy bush, is an example of such an invasive species. My research looked at how different species of birds use privet for habitat and nesting. To do this, I observed the birds that came into areas with large amounts of privet and the birds that came into areas with very little privet.

1. Domboise, Dieter M. and Ellenberg, Heinz. *Aims and Methods of Vegetative Ecology*. John Wiley & Sons. New York, NY. 1974.
2. Ekert, Peter. December 1999. "Winter Use of Large-Leafed Privet *Ligustrum lucidum*." *Proceedings of the Linnean Society of New South Wales*. 121: 29-38.
3. Langland, K.A. and Craddock Burks, K. *Identification and Biology of Non-native Plants in Florida's Natural Areas*. University of Florida. Gainesville, FL. 1998.
4. Louisiana Invasive Plants Database 2001. 2001. Species: *Ligustrum sinense* Lour. Available at <http://www.lsuagcenter.com/invasive/chinesprivet.asp>
5. Miller, James H. January 26-28 1998. "Primary Screening of Forestry Herbicides for Control of Chinese Privet, Chinese Wisteria, and Trumpet creeper." *Proceedings, 51st Annual Southern Weed Science Society meeting: Southern Weed Science Society*. 161-162.
6. Simberloff, Daniel, Schmitz, Don, and Brown, Tom. *Strangers in Paradise: Impact and Management of Nonindigenous Species in Florida*. Island Press, Washington D.C. 1997.
7. Ward, Ronald W. May 2002. "Extent and Dispersal Rates of Chinese Privet (*Ligustrum sinense*) Invasion on the Upper Oconee River Floodplain, North Georgia." *Southeastern Geographer* Vol. XXXII, No. 1: 29-48.