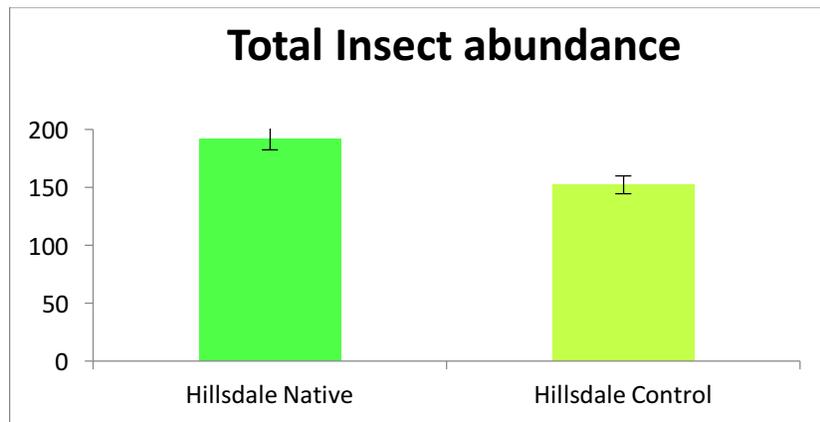


## **In what ways are native plants in your garden better than ornamental plants?**

Thanks to your participation, our team of Portland State University researchers has been studying the plants, arthropods, and birds that occur in yards with native plants. We chose three neighborhoods to compare, based upon overall abundance of yards having native plants, proximity to greenspaces, and differences in tree cover. The central question we have is: Do native plants help maintain or offset the loss of biodiversity in urban areas as is claimed? Native arthropods are part of a local food web. Both predacious arthropods such as spiders, as well as birds eat plant-eating arthropods. We expected native plants to be more ecologically productive and have more arthropods overall than non-native plants. Ornamental plants typically harbor fewer insects because their leaves are usually not palatable to insects; plants produce defensive chemicals to avoid being eaten. Native arthropods are adapted to the chemicals that local native plants produce. We want to know if native plants actually “out-perform” non-native plants ecologically in gardens and yards. That is: can more arthropods live on native plants than on ornamental plants? This has not been well studied until now.

Students, graduate students, and professors are running several experiments:

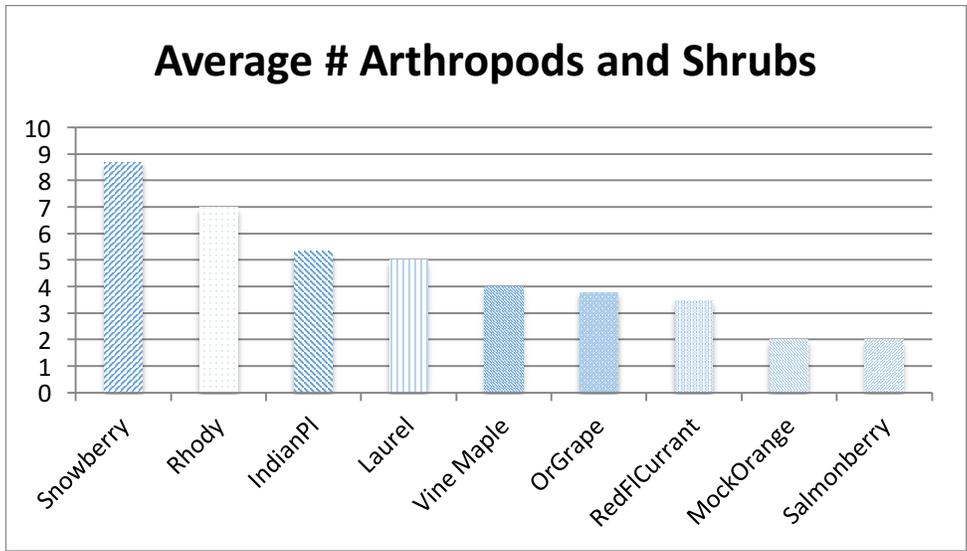
- 1- Overall, do yards planted with native shrubs have more arthropods, specifically insects and spiders, than yards with only ornamental plants? We compared yards in the same neighborhoods having native plant habits with control yards having only ornamental plants.



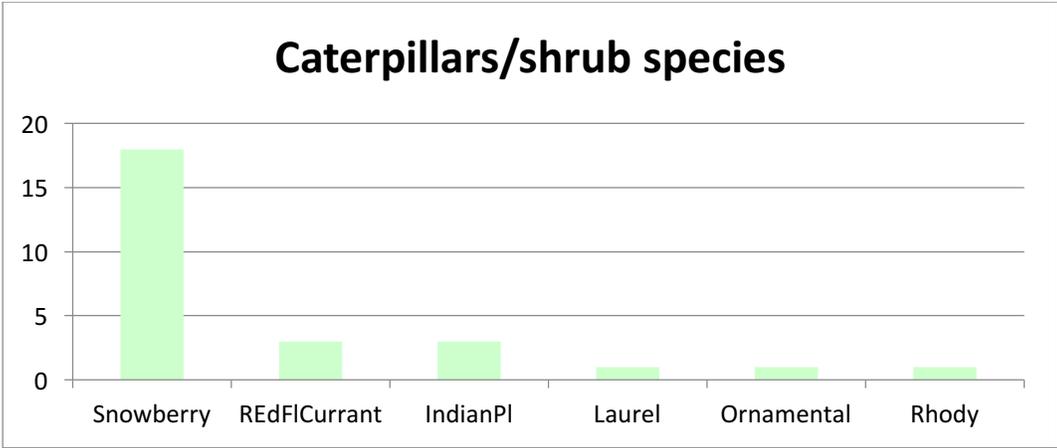
As depicted on this graph of total insect abundance, it appears that yards with native plants have more arthropods, and therefore are more likely to support more birds as well, but we need to survey many more yards to have more certainty.

- 2- Do particular types of shrubs host more arthropod species or greater arthropod abundance?

Based on a small number (23) of yards, the graph below shows that on average, snowberry, rhododendron, Indian plum, vine maple, Oregon grape, and red flowering currant are more ecologically productive (in terms of abundance of arthropods) than other shrubs. Rhododendron in most yards is of the same genus but not the same species as the native variety.



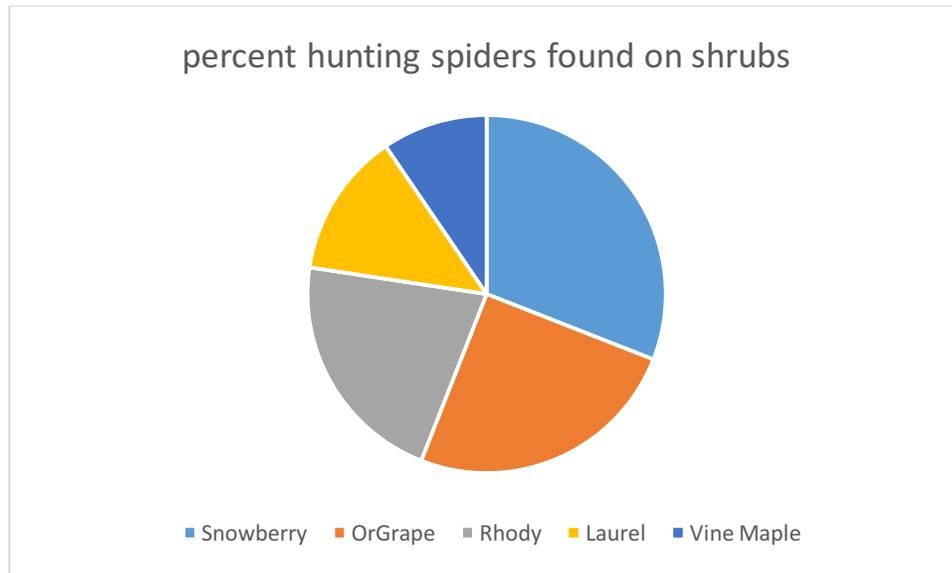
Spring caterpillars are of particular importance since these are preferred food for birds to feed their nestlings in spring. The graph below shows that snowberry hosted the most number of caterpillars (collected in mid-April).



Many birds rely on arthropods for at least part of their diet throughout the year. Birds eat spiders, beetles, ants, and insect larvae. Small birds may rely more on spiders than other arthropods during the winter months (Adams 2014). We have found many more spiders than other arthropod orders. Spiders are beneficial because they also predate insects.

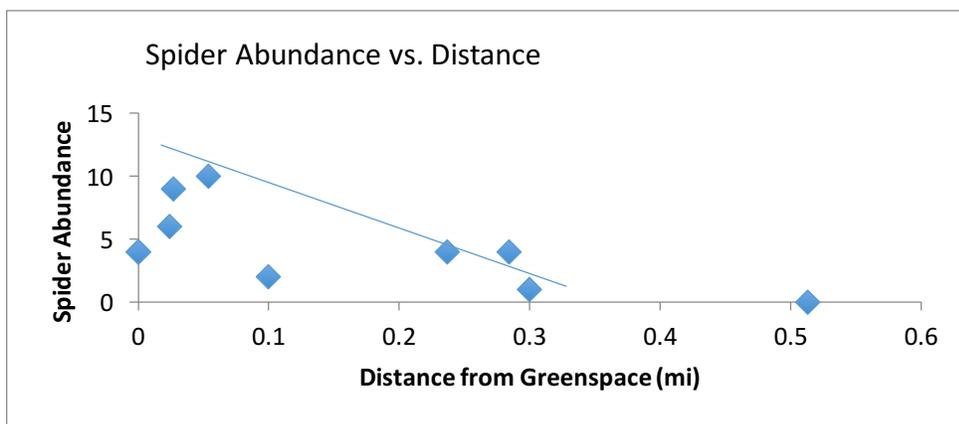
During spring, The Mt Tabor neighborhood had the most spiders, and Hillsdale had the fewest. In the fall, the Hillsdale yards showed the greatest species richness of spiders, the Mt Tabor the second highest, and the yards near Woods Memorial Park the lowest. The difference in abundance may be due to other factors besides ecological productivity of yards. One explanation is that birds in the Hillsdale neighborhood had eaten more spiders in spring.

Taking a look at all families of spiders, Snowberry, Red flowering currant, and Rhododendron hosted the most spiders. Three spider families are ambush hunters, and may be the best indicators of the number of smaller insect prey; these are crab spiders, jumping spiders, and running crab spiders. If we just look at these hunting families, shown in the graph below, snowberry has the greatest abundance, followed by Oregon grape, rhododendron, laurel, and vine maple.



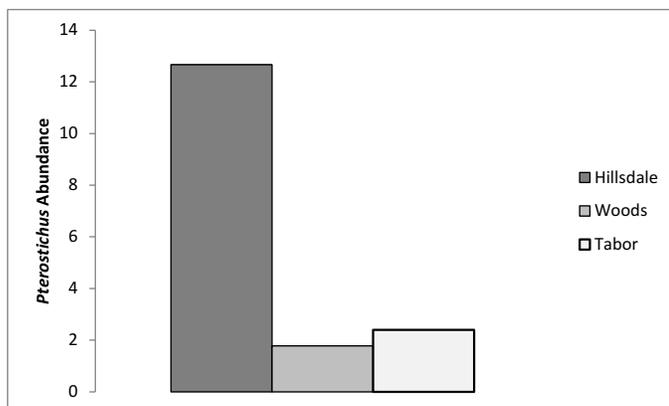
3- Do yards having native shrubs that are closest to greenspaces or parks have greater abundance of insects, spiders, and birds than the same types that are further away?

If we compare the abundance of spiders with the distance from a greenspace, there is a trend of a decrease in spider abundance as the distance from green space increases, shown below.



We also sampled for ground-dwelling beetles, specifically for carabid beetles. Predatory carabids, like *Pterostichus*, help regulate herbivorous arthropod populations (Forsythe 1982). Many are eaten by ground dwelling birds. Since they are relatively limited in their ability to colonize new habitats, the abundance of ground beetles within a yard is likely related to how the

habitat is connected to nearby patches of natural land cover, or green spaces. The figure below shows that Hillsdale, with its numerous small patches of habitat, had the highest abundance of this beetle.



**Figure 1.** Average *Pterostichus* Abundance

4- Does it matter in which neighborhood the yard occurs? Are some neighborhoods more conducive to beneficial ecological effects?

According to the city of Portland Planning Bureau, the Mt. Tabor neighborhood had the lowest amount of relative tree cover, while Hillsdale had the most and the Woods Memorial Park neighborhood had an intermediate amount. We think tree cover has an overall influence on the abundance of both arthropods and birds. If you live in a neighborhood having high tree cover and/or if your yard is connected to other natural areas, the ecological benefit of planting natives in your yard is enhanced.

We still have a lot to do. We think we will find that yard habitat patches in tighter clusters will have more ecological productivity than isolated yards. One of the best ways to improve connectivity between yards is the creation of more patches of habitat. More patches in tighter clusters allow more connectivity over the landscape as a whole. The idea is that organisms move between habitat patches (such as your yard) along green highways. The green highways themselves may provide important habitat as well. Most organisms can utilize habitat stepping-stones in this manner and these may support populations or desirable wildlife while deterring pest movement (Ignatieva and Meurk 2011).

Further studies will be necessary to understand the relationship between ecological diversity and the number of interconnected yard patches. To make this happen would require a community effort. Encouraging your neighbors to plant natives and remove invasive species might increase the ecological merits of your own yard!

For more information, contact Dr. Marion Dresner at [dresnem@pdx.edu](mailto:dresnem@pdx.edu)