Monitoring Oriental Bittersweet *(Celastrus orbiculatus)* in the Indiana Dunes National Lakeshore

Introduction

The Indiana Dunes National Lakeshore was established as a National Park in 1966 (Ney & Nichols, 2010). The Indiana Dunes National Lakeshore was well known among nature enthusiasts long before it became an official National Park. Botanist Henry Chandler Cowles of the University of Chicago utilized the changing dune landscape to establish the t heory of ecological succession (Kohler, 2002). The Indiana Dunes National Lakeshore is home to the endangered Karner blue butterfly (*Lycaeides melissa samuelis)* and the threatened Pitcher's thistle (*Cirsium pitcheri*) (Kolher, 2010). The Indiana Dunes National Lakeshore is a fragile, and important ecosystem that continues to be the center of ecological research.

Like many National Parks, the Indiana Dunes National Lakeshore is home to many invasive plants. Oriental bittersweet *(Celastrus orbiculatus)* is an invasive that was first collected by Floyd Swink at the Dunes State Park in 1975. "The species was then listed in the first Special Vegetation Report by Wilhelm in 1980" (Dr. Noel Pavlovic, personal communication, January 26, 2012). Oriental bittersweet has the abilty to "blanket the vegetation that it uses as support for climbing, to overtop neighboring vegetation, girdle trees, and weigh down tree limbs" (Leicht-Young, Pavlovic, Frohnapple, and Mulconrey, 2009). Dr. Pavlovic has been monitoring the progress of invasive plants in the park. Although Oriental Bittersweet is known to be an invasive in the park, it is often hard to identify. Oriental Bittersweet and the native American bittersweet are morphologically similar. Dr. Pavlovic, Stacey A. Leicht-Young, Ralph Grundel, and Krystalynn J. Frohnapple were able to develop methods to distinguish between both species (Leicht-Young, Pavlovic, Grundel, & Frohnapple, 2007). A key for determining the differences between the species can be found on page 7 of this document.

Monitoring distribution of Oriental bittersweet in the park is vital to understanding the behavior of the invasive plant. "Long-term monitoring before and during the invasion as well as before, during and after any control attempts can provide valuable ecological information" (Blossey, 1999). One way to monitor Oriental bittersweet is to measure percent cover of the species (Dreyer, 2005). The following activities will provide students with the skills to measure Oriental bittersweet in the field.

Field Work

Grade Level: 9-12

Subject: Biology, Environmental Science

Time Requirement: 120 minutes

Materials:

- 10 PVC Quadrats
- Meter tape
- GPS
- Pen
- Data sheets for students

Objective: Students will learn methods to measure presence of Oriental bittersweet. Students will use the quadrat method to determine presence of Oriental bittersweet.

Preparation: Construct a 1m quadrat by connecting 4 PVC pipes. PVC pipes can be constructed by purchasing 1m lengths of PVC pipe from a local hardware store. Construct at least 1 quadrat for groups of 2 or 3 students.

Instructor Notes: Students should use the measuring tape to determine a 50m transect in the area to be studied. Groups of 2 students should begin observing their sample 5m apart. The first group should begin at 5m, the next group will begin at 10m, etc. Students should circle their position on the data sheet. Students should lay their PVC quadrat on the transect line. Students will continue sample percent cover at 1m sections away from the transect line. Students should attempt to sample percent cover in a straight line away from the transect line. Every other meter should be sampled. Students should record percent cover in the data sheet as well as complete a small sketch in the Map of Quadrat on the data sheet. Each plot should be labeled on the data sheet. Students should attempt to record samples 19m away from the transect line. One student should record the GPS coordinates at the beginning and end of the transect line. If time allows students should work with officials to remove invasives outside of the sample.

Data Collection: Students will enter data in the National Geographic Fieldscope website. http://dunes.fieldscope.org/

Indiana Dunes National Lakeshore
Oriental Bittersweet
Percent Cover Data Sheet

Names in Group____________________
Location Name ____________________
GPS ________________________________

Position on Transect 5m 10m 15m 20m 25m 30m 35m 45m 50m
(Circle One)

Plot 1m 3m 5m 7m 9m 11m 13m 15m 17m 19m
(Circle One)

Species	**% Cover**
Oriental Bittersweet (*Celastrus orbiculatus)*	

Map of Quadrat

Position on Transect 5m 10m 15m 20m 25m 30m 35m 45m 50m
(Circle One)

Plot 1m 3m 5m 7m 9m 11m 13m 15m 17m 19m
(Circle One)

Species	**% Cover**
Oriental Bittersweet (*Celastrus orbiculatus)*	

Map of Quadrat

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Species	**% Cover**
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Map of Quadrat

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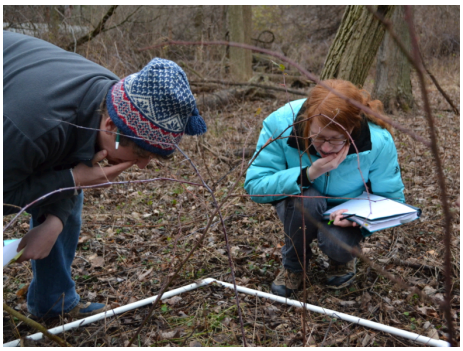
Plot 1m 3m 5m 7m 9m 11m 13m 15m 17m 19m
(Circle One)

Species	**% Cover**
Oriental Bittersweet (*Celastrus orbiculatus)*	

Map of Quadrat

Pictures of Student Work



Calvin and Amy count Bittersweet

Students determine transect

Halley and Megan use quadrat to determine percent cover of Oriental Bittersweet

Emily removes Oriental Bittersweet

Students receive removal instruction

Student Responses

Students were asked to respond to this question: Did you understand the overall purpose of the trip? If yes, what experience helped you understand the purpose? If not, what could have helped you understand better?

"I did understand the overall purpose of the trip as an educational experience, exploring the impact of invasive species, waste, and irresponsible behavior on an environment. While on this trip we saw first hand how lack of knowledge about the highly invasive nature of oriental bittersweet led people to plant it in their gardens for decorative purposes with the consequence of that species killing native species, such as the American bittersweet."

"We did oriental bittersweet percent cover so that in future visits for other classes, they can know where the majority of it is, and where to look for it. We removed the oriental bittersweet, because it is invasive, and it is harmful to the environment."

References

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