

High School Marine Biology Research Projects

Vegetative Survey: Invasive Species

I. Introduction

Invasive species are organisms that spread rapidly and potentially cause harm to other organisms that naturally occur in a given area. Invasive species may also be called exotic, non-native or introduce species (Krasny, 2003).

Native to Australia, Southeast Asia and the south Pacific Islands, Australian pine (*Casuarina equisetifolia*) is an exotic inhabitant of the U.S. and Bahamas that was introduced in the 1800's to provide erosion control, windbreak and shade along beaches. This tree is not a pine but an angiosperm (flowering plant) and produces a thick layer of cover, casting a great amount of shade over surrounding plants (Sweringen, 2007).

In this project, we will assess the impact of the presence of Australian pine (*Casuarina equisetifolia*) by measuring Australian pine canopy cover and presence of native Bahamian plants.

II. Research question

Does the presence of Australian pine (*Casuarina equisetifolia*) impact the occurrence of native plant species in the surrounding area?

III. Hypothesis

a. Null H_0 : _____

b. Alternate H_a : _____

IV. Prediction: _____

IV. Materials

- Clinometers (2)
- Densimeters (2)
- FatMax laser distance reader
- Measuring tapes (2)
- Quadrats (2)
- Bahamian Plant ID sheets
- Data sheets
- Flags to mark the 0, 6, and 12 meter points
- Pencils
- Clipboards (2)
- Orange Shore Box with radio
- Digital Camera
- Insect repellent
- Sunscreen
- Cooler with water

Student materials:

- Water Bottles (in cooler)
- Gloves
- Water Shoes
- Personal sunscreen
- Personal insect repellent
- Snorkel Gear
- Hat
- Sunglasses
- Shorts and Shirts

V. Procedure

1. With the assistance of your instructors, two random 12 meter transects will be chosen.
2. Along the transect, mark the 0, 6 and 12 meter marks by firmly placing orange flags into the ground at each distance.
 - a. At the 0 meter flag, find the closest Australian pine where the top and the bottom of the tree are visible
 - b. Measure your distance from this tree using the FatMax laser distance reader or a tape measure
 - c. Measure the height of the tree from the 0 meter flag using the clinometer (see Appendix B) [each person in your group should repeat this at each interval to get an average]
 - d. Measure the canopy cover 1 meter from the tree to estimate canopy cover (see Appendix A) [each person in your group should repeat this at each interval to get an average]
 - e. At the same location you measured canopy cover, place a quadrat on the ground and identify any native vegetation using the Bahamian plant identification sheet
 - f. Record all data
3. Repeat steps a-f at the 6 meter and 12 meter flags. If time permits, more transects may be completed.

Literature cited

Sweringen, J. 2005, "Australian Pine." Plant Conservation Alliance's Alien Plant Working Group. <<http://www.nps.gov/plants/alien/fact/caeql.htm>> Aug. 2007.

Krasny, M. Invasion Ecology. Arlington, Virginia: NSTA Press, 2003

Appendix A.

Using a Forest Densitometer to Determine Canopy Cover

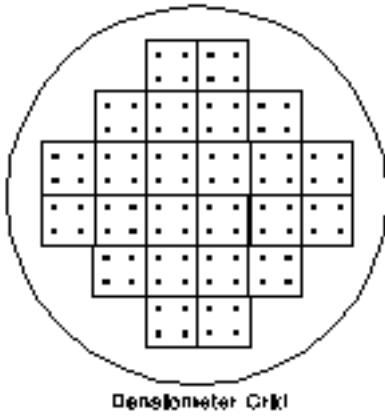


Figure 1. Visualizing a densitometer reading

Under the selected tree:

- Hold the densitometer level and far enough from your body that so that you head is not in the reading
- Each square can be mentally subdivided into 4 smaller squares and represented by imaginary dots in the center of each smaller square.
- Thus, a total of 96 dots representing smaller squares can be counted
- Count the number of dots of canopy *openings* (or that contain only sky/clouds)
- Multiply that number by 1.04 to get the total area **NOT** covered by canopy
- Subtract this number from 100= Percentage of canopy cover

Calculating Canopy Cover:

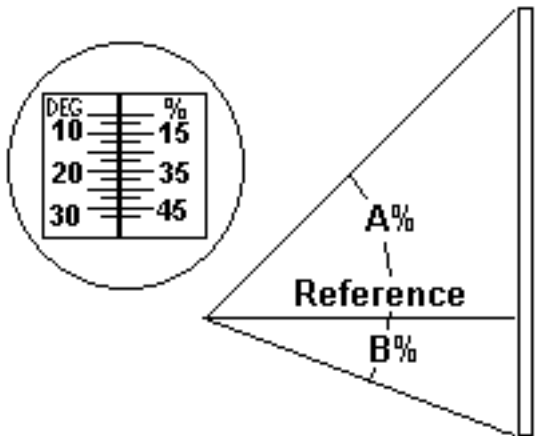
x=number of dots with no canopy cover (usually sky)

1.04x=total area NOT covered by canopy

100-1.04x=% of canopy cover

Appendix B.

Using a Clinometer to Measure Tree Height



Height on Level Ground (percent)

Height = A + B x Distance

example: 40% + 20% x 80' = 48'

0.60 x 80' = 48 feet (height)

- Hold the Clinometer so the eye opening faces you and the degree gauge is on your left
- With both eyes open, look through the eye opening and find your “zero point”
- Now move the clinometer and superimpose the black line onto the top of the object you are measuring [record the number in your view on the right (%)]
- Do the same for the bottom of the object you are measuring, record the number on the right again (%)

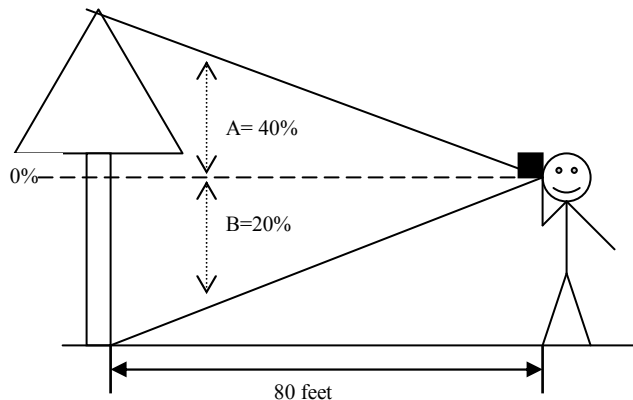


Figure 2. Reading a Clinometer