Ecotone Lab
Biology 370L

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Ecotones are transition zones between two structurally different communities. These transition zones can be characterized by either abrupt replacement of species or less distinct shifts in diversity. Regardless, ecotones are sites of relatively high diversity and often represent unique components of the landscape.

Today, we're going to examine an ecotone that occurs between heavily vegetated Carolina Bays and adjacent pine savannas. The pine savannas are occasionally burned to maintain native species at Lewis Ocean Bay Heritage Preserve. Carolina bays are unique and intriguing features of the coastal landscape. When viewed from the air, they appear as elliptic basins, all of which are oriented in a southeast-northwest direction. Sand ridges or rims are typically present. The origin of these bays is still the subject of much debate. Some scientists think that these are impact structures; others think that they were formed as a result of wind erosion. The vegetation of bays is variable depending on the presence of peat. If fires have burned into the peat, then bays have open water habitats. More commonly, bays support a dense thicket of shrub vegetation. Our job is to document how the plant community changes as we move from a bay to the sand rim and then into the surrounding savanna vegetation. This represents a topographic gradient as well as an environmental gradient. Such an exercise is not trivial, as many rare carnivorous plants are known to occur at the edges of bays. Just why carnivorous plants occur at this spot is a mystery.

In groups you will collect data on herb-shrub vegetation in quadrats placed regularly along transects connecting these two habitats. These data will then be used to examine the relative importance of different plant species along this gradient from Carolina Bay to pine savanna.

Procedures:

In the field:
Each group will establish a 63-m transect from the Carolina Bay towards the road. You should place one end of the tape at least a few meters into the shrub-dominated bay. This can be difficult as the shrub vegetation is usually very dense. Place a 1-m^2 quadrat next to the meter tape at **eight regular intervals** (**every 9 m**, with 0-m being the first quadrat in the Bay) along the transect. Be sure to alternate which side of the meter tape you place the quadrat.

For each quadrat, record the **number** AND **cover** (%) of each plant species using the data sheet. If necessary, use multiple data sheets (from the different members of your group).

In the lab:
After you return to lab, calculate the **relative density** for each plant species in each quadrat. Relative density is just the number of individuals of one species divided by the total number of individuals of all species in each quadrat. Be sure to multiply your relative density by 100 to convert it to a percentage. You'll need the relative density values to calculate importance values (see below).

Next, calculate an **importance value** (Curtis and McIntosh, 1951) for each species in each quadrat. The importance value is simply the sum of the relative density (%) and the cover (%) of each species, and will range from 0 to 200%. The importance value will provide an estimate of the overall influence or importance of each species in the community (Smith and Smith, 2001).

Finally, calculate the **species richness** (the total number of species) of plants in each quadrat.

For your lab report, present two graphs:

1) A graph of the distance along the transect in meters (x-axis, with zero being at the edge of the Carolina Bay) vs. the importance value of the top **five** plant species (y-axis, with top 5 based on importance values across the transect, which you think best represents the species present). This graph is best done as a single graph showing all of the importance values for the 5 species (chart type: x-y scatter plot with the symbols for each species connected by lines).
2) A graph of transect length vs. plant species richness (bar or line graph OK).

In your discussion, be sure to think about what may be explaining the patterns in species richness and importance along the gradient.

Common understory plants encountered in the ecotone lab at Lewis Ocean Bay and some identification hints:

Blazing star (*Liatris graminifolia*): tall stalk with purple flowers
Bracken fern (*Pteridium aquilinum*): repeating triangular fronds
Broomsedge (*Andropogon virginicus*): tall grass with feathery top
Cinnamon fern (*Osmunda cinnamomea*): tall narrow fronds, sometimes with cinnamon-colored fertile frond
Chokeberry (*Aronia* sp.): small circular leaves with fine regular teeth on margins, comes to a point
Coastal doghobble (*Leucothoe axillaris*): ovoid leaves with small teethed margins, comes to a narrow point
Creeping blueberry (*Vaccinium crassifolium*): vine along ground with tiny waxy leaves
Eupatorium sp.: tall with leaves in whorls, leaves triangular with obvious teeth, purplish margins
Fetterbush (*Lyonia lucida*): small waxy leaves with light green mid-vein and margins
Gerardia (*Agalinis* spp.): tiny repeating thread-like leaves
Highbush blueberry (*Vaccinium corymbosum*): rounded leaves often with purple patches
Honey-cups (*Zenobia pulverulenta*): rounded thick leaves with scalloped margins
Inkberry (*Ilex glabra*): small waxy leaves with teeth at anterior tip
Large or sweet gallberry (*Ilex coriacea*): small waxy leaves with several minute spiky teeth along margins
Laurelleaf greenbrier (*Smilax laurifolia)*: vine with thorns
Loblolly bay (*Gordonia lasianthus*): large thick waxy leaves with a light green underside (compare to sweet bay)
Longleaf pine in the 'grass' stage (*Pinus palustris*): clumped, grass-like, dark green
Smooth meadow-beauty (*Rhexia alifanus*): urn-shaped sporangia, purple flower
Southern blueberry (*Vaccinium tenellum*): small, very narrow leaves coming to a point with purple margins
Swamp red bay (*Persea palustris*): thick waxy leaves with galls usually
Sweet bay (*Magnolia virginiana*): large thick waxy leaves with a white underside
Sweet pepperbush (*Clethra alnifolia*): many shallow teeth on margins of small leaves
Switch cane (*Arundinaria gigantea*): bamboo-like
Wax myrtle (*Myrica cerifera*): shrub, slender leaves with anterior notches, very small orange dots on underside
Wiregrass (*Aristida stricta*): clumped, thick wire-like blades that are yellow/brown
Yellow jasmine (*Gelsemium sempevirens*): vine, narrow triangular leaves, yellow flower

Group members:____

Quadrat #	Plant species	Number	Cover (%)