Learning Objectives:

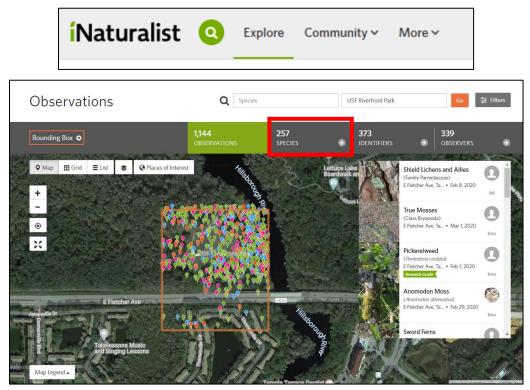
- 1. Describe key concepts like ecological succession and the intermediate disturbance hypothesis
- 2. Identify plant species that characterize Florida's wetland and upland habitats
- 3. Explain how environmental gradients and disturbance patterns influence plant community structure and succession

Lab Activities:

This lab has **three** parts. Use the timing guide provided at the heading of each section to help you complete the lab activities during the allotted class time. As always, you will have 72 hours to refine and submit your responses to the questions provided throughout for your post-lab report.

Part I: Introduction to Florida's plant communities (45 minutes)

- 1. Go to <u>iNaturalist.org</u>, select "Explore" and type USF Riverfront Park into the location search option (the map should zoom to USF Riverfront Park and place a boundary around that area (see the screenshots below).
- 2. Select the "Species" option at the top of the page.



- 3. Scroll through the list of species and select five wetland (obligate or facultative) and five upland (obligate or facultative) species.
 - a. To determine if a plant is upland or wetland, you can review the difference at <u>this website</u> under "Indicator categories" (main page, just scroll down a bit or check out the screenshot below).

Wetland Indicator Status
mage Gallery

- b. You can also search within this website by scientific name and under the "Wetland" page, view what type it is.
- c. Do <u>NOT</u> select any animal species, plants only!

Indicator categories				
Indicator Code Indicator Status		Designation	Comment	
OBL	Obligate Wetland		Hydrophyte	Almost always occur in wetlands
FACW	Facultative Wetland		Hydrophyte	Usually occur in wetlands, but may occur in non- wetlands
FAC	Facultative		Hydrophyte	Occur in wetlands and non-wetlands
FACU	Facultative Upland		Nonhydrophyte	Usually occur in non-wetlands, but may occur in wetlands
UPL	Obligate Upland		Nonhydrophyte	Almost never occur in wetlands
Search Name Search serenoa repens Scientific Name ▼ Go ◇ State Search ◇ Advanced Search ◇ State Search ◇ Advanced Search ◇ State Search ◇ Cover Crops > Culturally Significant > Distribution Update > Documentation > Fact Sheets & Plant Guides > Introduced, Invasive, and Noxious Plants > Threatened & Endangered	You are here: Home / Plant Profile GENERAL IMAGES Serenca repens (W. Bartra saw palmetto Interpreting Wetland Status North America Atlantic and Gulf Coastal Plain Eastern Mountains and Pledmont	SYNONYMS m) Small FACU FACU	CLASSIFICATION WETL	ND RELATED LINKS WILDLIFE

- 4. Fill out the table below (10 pts) and include your selected species common or scientific name, their preferred habitat (based on your research), the number of observations of that species in Riverfront Park, and a picture of the plant from the iNaturalist website.
 - a. You should also include a **brief** description. Here are some examples of what to consider: is it a shrub or a tree? A grass, fern, etc.? Does it have flowers? What color are they? Are the leaves round or linear?

5. Include this table in your post-lab report. Don't forget a caption!

Organism name (common or scientific)	Habitat preferred (upland or wetland)	No. observations on iNaturalist	Brief description and picture

<u>OUESTION 1</u>: Which two **plant** species have the highest number of observations in Riverfront Park (1 pt)?

<u>QUESTION 2</u>: Are those species native to any location outside of Florida (**Hint**: select the desired species and scroll down to view the map of the species' range; 1 pt)?

Part II: Types of sampling methods (75 minutes)

- 1. Go to this <u>website</u> to read about different sampling methods usually completed by ecologists to measure plant communities.
- 2. Complete the table below based on the above website (3 pts). Include this table in your post-lab report. Don't forget a caption!

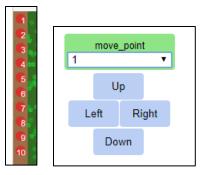
Sampling method	Random sampling — quadrat sampling	Systematic sampling — line transect	Systematic sampling — belt transect
Benefits of this method			
Drawbacks of this method			

<u>QUESTION 3</u>: If you were to sample an upland-to-wetland gradient in USF Riverfront Park, which sampling strategy might you use and why (2 pts).

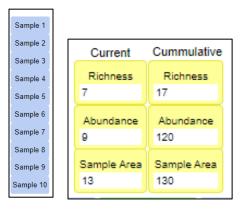
3. Launch this <u>plant simulation</u>. We will now measure plant diversity using some of the sampling methods described above. If you get confused by the following instructions, you can read more about how the model works at the bottom of the screen (see screenshot below).

	Model Info	
Edit Mode		
Estimating P	ant Biodiversity	
(northwest) of the ridge, the habitat. There are 25 differe wildflowers common to the s which may be found in both. random. The total abundance	present in two habitats that are separated into a southeast-facing xeric siope and a northwest-facing mesic siope. To th background is green, symbolizing mesic habitat, and to the right (southeast) of the ridge it is a yellow-brown, simulating the drive species in the entrie simulation that all appear similar, except for signity differences in corts. These species repre- outhern Appalachians, with some being more characteristic of mesic habitat, others more characteristic of xeric, and so in both habitats are of the species are common while some are rare, individual species distributions are littler clump a diplants in the xeric habitat is about half that of the mesic habitat. There are a variety of controls and banks of monto were of the habitat to be sampled. Individue is a list of all of the plants simulated in the model.	xeric sent me ed or
Using the model		
circles are the sampling poin dropping with the computer each sample points by clicki corresponding point will turn Radiusãe TM slider). The cou will remain black, with the bl the cumulative counts of each	pened, or if å€ Reset AllåE™ is clicked, ten numbered red circles appear in a side-bar on the left of the world-view. Thes ts. Move Pt's should be clicked first, and then the sample points can be placed in the habitat world-view by dragping ar nouse. After all the desired sample points (maximum of ten) are placed in the habitat, then a sample can be obtained fr ng the corresponding sample button in the right-most column (Sample 1 - Sample 10). When a sample turbon is clicked back and a black rigwil appear around it that roughly corresponds to the sampling radus (size set by the åE'Sample to fack ring denoting will appear around it that roughly corresponds to the sampling radus (size set by the åE'Sample to fack ring denoting will charger around it that roughly das the current sampling radus (size set by the åE'Sample to fack ring denoting wilch sample point is being displayed as the current sample. The nght-hand bank (25 monitors display the species among all the points sample. Between the two main monitor banks are two columns of three monitors that gourdance, and sample area for the current and currentiative samples.	nd om , the pled lays
points back on the side-bar the sample points in place, I schemes for robust compari from the â€"Species' dr sample point 2 is located in	are designed to allow students to experiment with various sampling schemes. The å€ Reset Pts å€ [™] button puts the si without Cearing the cumulative data. This allows further sampling of the current world. The ቆ€ Replicated ^{2™} button hear U clears all the data, and resets the distilbution of plants in the word. This allows students to quickly replicate sampling consor of different communities. Finally, students can check to see where individuals of a species are by roneoing a speci- po-down meru and clicking åðylinghtä£. For exempting, in the word' with ever of Figure 3 species 3 is hutplighted. The the modified or a clump of species 3 and the abundance of species 3 in the å€ Current Sampla€ [™] monitor is correspon specific species allows students to see how offferent sampling schemes myth miss entre species.	res Ig es

4. We will start with **random sampling**. Start moving the sampling points (red circles on the left of the screen) by utilizing the up, down, left, and right arrows on the bottom right of the sampling site (see screenshots below). Move all the points (1–10) onto the screen in a "random pattern" (you can decide what is random).



- 5. Attach a screenshot of your field sampling site to your post-lab report. Don't forget to caption the screenshot.
- 6. Once you've moved all ten of the sampling points (red circles) on to the sampling site, you can select the "Sample" rectangles lined on the right of the field site. You need to select all of them to turn them "on" (**red circles should turn black**)
- 7. Note the species richness and abundance values on the bottom of the screen. The "current" window indicates the richness and abundance for only that particular sample (e.g., sample 4). The "cumulative" window indicates the total richness and abundance from that individual sample and all samples taken prior to that one (e.g., the cumulative window for sample 4 would include the species richness and abundances of individuals within sample 4's area as well as samples 1 through 3).



- 8. Include a screenshot of the current and cumulative windows for **sample 10**. Don't forget to caption the screenshot.
- 9. Reset your sampling area by selecting the "Reset all" button. Repeat the steps above except this time using a **line transect** sampling method (e.g., place all ten sampling points in a line across a gradient. Be sure to think carefully about what that gradient should be).
- 10. Attach a **screenshot** of your field sampling site to your post-lab report. Don't forget to caption the screenshot.
- 11. Include a screenshot of the current and cumulative windows for sample 10. Be sure to turn all your samples on first so that the cumulative window represents all 10 samples. Don't forget to caption the screenshot.

<u>QUESTION 4</u>: Was your first sampling method truly random? Explain why or why not and be sure to reference any relevant screenshots (1 pt).

<u>QUESTION 5</u>: Which sampling method do you think better captured the true diversity of the sampling site? Explain why you selected the method you did and be sure to reference any relevant screenshots (1 pt).

QUESTION 6: How do you think you could make both sampling methods more representative of the actual population of species in the sampling field (2 pts)? You can see where all the species are located if you select each one and click the "Highlight" button below the species richness tables.



Part III: Influence of disturbance on biodiversity (60 minutes)

1. Launch this <u>stream simulation</u>. We will now measure stream diversity and discover how different levels of disturbance can alter species richness and abundance. Similar to the previous simulation, if you get confused by the following instructions, you can read more about how the model works at the bottom of the screen (figure below).

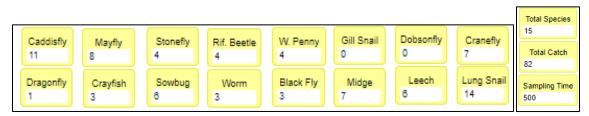
Model Info 🔺
Edit Mode
Quantifying Stream Biodiversity
It is common to hear ecologists talking about biodiversity, particularly in terms of conservation biology. It is one of those terms that is used a lot, and is considered to refer to something important, yet, rarely is it clear exactly what is being discussed. In fact, a biodiversity at "to can refer to many things, and has many specific definitions.
The most common definition of biodiversity refers to the number of different species in a given area or species diversity. The greatest biodiversity by this measure would be the number of different species found in tropical rain forests which is estimated to be in the millions. Sometimes biologists refer to the diversity within a particular faxon. For example, the southern Appalachians are the world候s å€hotspot候 for salamander diversity. There are many indices of species diversity that uve will explore later.
Biodiversity, in the broad sense, can also refer to variation within species, or among populations. Many species have populations which can be differentiated by morphology or behavior. Typically this occurs within species with large ranges. Consider for example, the extraordinary differences among human populations across the globor. This variation reflects underlying differences in allel proportions among populations and is called genetic diversity. Genetic diversity, to end to diversity is off special concern to endangered species because small populations tend to lose genetic diversity through random genetic diversity, denetic diversity, populations is obstituint and to changing environments, and are more susceptible to be deemated by disease. In populations with normal genetic diversity there will a range of disease resistance among individuals. An extreme example of a species with low genetic diversity is the cheetan. Cheetah&E ^m s are so similar genetically that they can accept sith grafts from unrelated individuals without tissue rejection.
On a larger scale, we can consider ecosystem diversity. In this case we are not considering individual species, rather a species assemblage in a particular habitat. Ecosystem diversity is a toroad concept, encompassing any level of ecological organization above species (e.g. habitat, community, and ecosystem). An example of a major threat to ecosystem diversity in the US is the loss of wetlands to development. It is not easy to quantify ecosystem diversity, as the edges of things like habitat and communities are hard to define. However, it can be argued that the most natural way to preserve all levels of biodiversity is to protect as much and as varied habitat as possible, and then le nature take care of the rest.
Using the Model
When this model opens, you will see a section of stream with 16 containers lined up on the bank. Using the control buttons you can open a seine in the middle of the stream and catch any of the animals that float into it. Ceptured animals are then sorted into the appropriate containers. The controls and reporters are described below.

2. Before you start your first simulation, we need to update some of the settings. First, change the pollution level to **none**. Pollution will be our disturbance event, so we'll start with business-as-usual. You should leave your sampling time at 500 but can increase the speed bar at the top to make the time go faster. (**WARNING**: If you increase the speed too much, you may crash your computer!) Next, select the "Open Seine" button as that is the net that will be used to collect individuals from the stream. All set? Press go and watch all the creatures that get caught by your net!

Reset			
Go		_	
Pollution None ▼	Sampling-Time	500	Open Seine



3. Once the simulation is complete, you will have a table similar to the first simulation with your species richness and total abundance (total catch) calculated. You can view the abundance of each species in the boxes to the left of that table.



- 4. Attach a screenshot of your results to your post-lab report. Don't forget to caption the screenshot.
- 5. Run the simulation again, except this time change the pollution level to **moderate**. Do not change any other settings. Hit the reset button to release your captured organisms back into the stream and then press go!
- 6. Attach a screenshot of your results to your post-lab report. Don't forget to caption the screenshot.
- 7. Run the simulation one last time with the pollution level now set to **severe**.
- 8. Attach a screenshot of your results to your post-lab report. Don't forget to caption the screenshot.

<u>QUESTION 7</u>: Which simulation had the highest number species richness? What about abundance? Be sure to reference any relevant screenshots (1 pts)

QUESTION 8: Review the composition of species for each simulation. Were there one or two dominant species in any of the simulations (e.g., a species that had a much higher abundance than the other species)? Did those dominant species change between simulations? Explain your response and be sure to reference any relevant screenshots (3 pts).

<u>QUESTION 9</u>: Which simulation do you think had the highest diversity? Remember from your reading that biodiversity accounts for both species richness <u>**AND**</u> evenness. Explain your response and be sure to reference any relevant screenshots (3 pts).

<u>QUESTION 10</u>: Does your response to question nine support the intermediate disturbance hypothesis? Explain your response and be sure to reference any relevant screenshots (2 pts).

Post-Lab Report Submission Instructions

As you work through the online activities and simulations, complete questions 1-10 and submit your responses as a PDF file. You will also need to include all the requested screenshots and tables you filled out throughout the lab. There are no thought questions for you to complete. Title your file "LastName_CommunityEcology" and upload here. Each question or table has an allotted point value.