Internship Progress Report 1
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The first three weeks of my internship with FREAC has been very interesting and enjoyable. The project was created in response to my inquiry about a GIS internship that would also provide experience using remote sensing in the application of GIS principles and techniques.

A State Wildlife Grant from the Florida Fish and Wildlife Conservation Commission titled SWG060-041 *Statewide Assessment of the Current Status and Distribution of FNAI's Tracked Butterfly Species on Florida Conservation Lands* was given to FNAI (part of FREAC) and will begin on July 1, 2022. It will provide funding for three years to track specified endangered butterfly species found on Florida's conservation lands. My supervisor, John Smith, felt a GIS internship involving remote sensing could be helpful in this project. I will be investigating GIS-based procedures to efficiently survey potential butterfly habitat locations on Florida conservation lands with the help of remote sensing.

The main idea is that the spectral signatures of areas where the endangered butterflies have been found can be identified through remote sensing and used to locate similar areas on other Florida conservation lands. This involves the use of FNAI's GIS database layer of mapped butterfly locations and their Florida conservation land layer. These are going to be used with state and county shape files, and 2021 Landsat images covering the entire state of Florida.

I work at the FREAC office where most of the processing resources and expertise are located (although I am the only one with any significant remote sensing knowledge). I also go to the

FNAI office once or twice a week, as needed, to make use of their natural resources references and databases. John is a liaison between the two offices and goes to FNAI more frequently than I do. He brings some of the necessary database layer files back to FREAC for me when I don't have any other need to go to FNAI.

I spent the first two days meeting people at both offices and becoming familiar with the data files and general goals of my internship. I was shown the Nature Serve Mapper and Tracker databases at FNAI from which the mapped butterfly layers would come.

The rest of the first week I worked on several aspects of the project. First, I spent a day or two figuring out how to mosaic Landsat images (which I had never done). Fourteen 2021 Landsat images (covering the entire state) were mosaicked into three groups for easier processing in later steps.

I have also been collecting butterfly habitat information from the four butterfly reference books I borrowed from the FNAI office. This information is being used to create an Excel database file containing habitat information such as host plants, food source plants, and generalized habitat types for each of the four species we will study first.

The second week began with downloading a Florida county boundary shape file from the FGDL website. From this, I created individual shape files in ArcMap for each of Florida's 67 counties (after changing the projection in ArcCatalog to match the Landsat images' projection). Later in

the week, these files were converted to county boundary aoi files. Again, I had to figure out how to run both of these procedures.

The aoi files were checked by overlaying them on the corresponding mosaicked images. I discovered during this process that one of the mosaicking process options needed to be changed in order to cover the entire state area. (Some of the county boundary aoi's ran off the "edge" of the mosaicked Landsat images.) The three mosaicked files were rerun this week to include the changed option.

This week, I started subsetting the mosaicked images with the 67 county boundary aoi files. This was a process I had done once for a past remote sensing project but needed to "rediscover" for this application. Ultimately, these subsetted county images will be used to classify the land cover found in close proximity to the butterfly sighting locations.

All the steps and options I have used in the above processing are being documented so they can be reproduced in the future by anyone working on the project after I leave. I am doing this while the steps are being run so they can be checked at the same time.

A quick test run-through, to the point of overlaying the mapped butterfly locations and Florida conservation land layers for one county, led me to question the feasibility of using imagery at this coarse resolution (30 meter) to adequately identify the habitat characteristics required by our set of test butterflies. After some discussion with John and his superior, one meter resolution imagery will be evaluated for its usefulness in this situation (once it is located by the department

member in charge of it). Although a higher resolution would seem to be the unquestioned solution to the problem of mixed pixel Landsat data, the number of images that would have to be mosaicked together to cover the whole state may make it impractical for this study.

John has spoken from the start about using object-oriented segmentation as the method for classifying the county subset files. He gave me a book on the topic which I have been reading when time allows. Their office (FREAC) does not own a copy of eCognition or ENVI software, so I will inquire about its availability in the Geography lab. If this would be good software to use, John will order a student copy for me to use for this research.

What I had not realized before starting this internship is that it is more about developing an efficient set of procedures to use for their upcoming grant than an actual set of items that MUST be completed by a certain date. My preliminary work will save time and grant funds allotted for this butterfly project by working through some of the potential methodologies and problems ahead of time.