Southeast Region GIS Newsletter

November, 2013

Notes from the Regional Coordinator

Jason Duke

The GIS practitioners in the Southeast Region are truly working on some amazing projects. Our users are writing Python scripts, building models in ModelBuilder, using 3D and Spatial Analyst to model habitat change and sea level rise, conducting map algebra to determine the effects of urbanization on our priority habitats, and supporting local users at Refuges, ES Offices, Fish Hatcheries, and other offices throughout our Region. We are steadfastly moving to web mapping technologies and wrestling with database migrations from Access to SQL and other enterprise platforms. We also find ourselves printing fewer maps and see the move to PDF files and graphic images for web-based distribution. The advent of web mapping technologies and the ability to connect to data sources thousands of miles away are making data management easier in some ways, but complicating the situation with too many choices.

The annual meeting of our Southeast Region GIS Committee will be held in Atlanta in November and the Committee will work on planning the 2014 Regional GIS Training, work to update our Regional GIS Plan, debate ways to use the Regional GIS Server and web mapping applications, present various methods of analysis and ask others for input, and hold a session to discuss a Region 4 GIS Assessment. Our Regional GIS Committee is working hard to stay abreast of changing technologies and to deliver them to our users as efficiently as possible. Contact your Regional GIS Committee members today to provide input into the process or ask questions. Remember to visit our websites and join our R4 GIS listserver.

Regional GIS Sharepoint site
https://fishnet.fws.doi.net/projects/gisnew/r4/SitePages/Home.aspx

2014 Regional GIS Training (will update in December)
http://www.fws.gov/southeast/gis/gistraining_cookeville_2k14.htm

Legacy Regional Site (updated)
https://intranet.fws.gov/region4/ba/gis/gis_home.htm.

Calendar:

January 28-31, 2014 – Cartographic Design Course – Vero Beach, FL

February 10-12, 2014 – ESRI Federal GIS User Conference in Washington, DC

May 20-22, 2014 – Region 4 GIS Training at Tennessee Technological University in Cookeville, TN

June 17-19, 2014 – FWS GIS Conference at NCTC in Shepherdstown, WV

July 14-18, 2014 – ESRI International GIS User Conference in San Diego, CA

Stories from the field

Inventory and Monitoring

Steve Holzman – Inventory and Monitoring – Athens, GA

Louisiana's Coastal Wetlands Restoration Projects Monitored Using GIS

Robert Greco – Louisiana Ecological Services – Lafayette, LA

SLEUTH

Matt Snider – Southeast Region GIS team – Cookeville, TN

Southeast Aquatic Resources Partnership (SARP)

Emily Granstaff – SARP – Cookeville, TN

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Jim Besley – Arkansas Ecological Services, Kurt Snider – Tennessee Ecological Services, John Eaton – Silvio O. Conte National Wildlife Refuge

Shameless Plug – Map Creation and Design Course

Barry Wood – Vero Beach Ecological Services

Inventory and Monitoring

Steve Holzman – Inventory and Monitoring – Athens, GA

The USFWS Refuges Inventory & Monitoring Group has been actively entering data into the PRIMR (Planning and Review of Inventory and Monitoring on Refuges) database and entry is complete for 90% of the refuges in the Southeastern Region. Information in PRIMR includes: the species to be inventoried and the time frame, as well as survey objectives, protocols and methodologies. Refuge biologists and I&M staff will use PRIMR to assist in the development of the Inventory & Monitoring Plan that each refuge will complete in the coming years. This centralized database will allow the Service to achieve a better understanding of where surveys

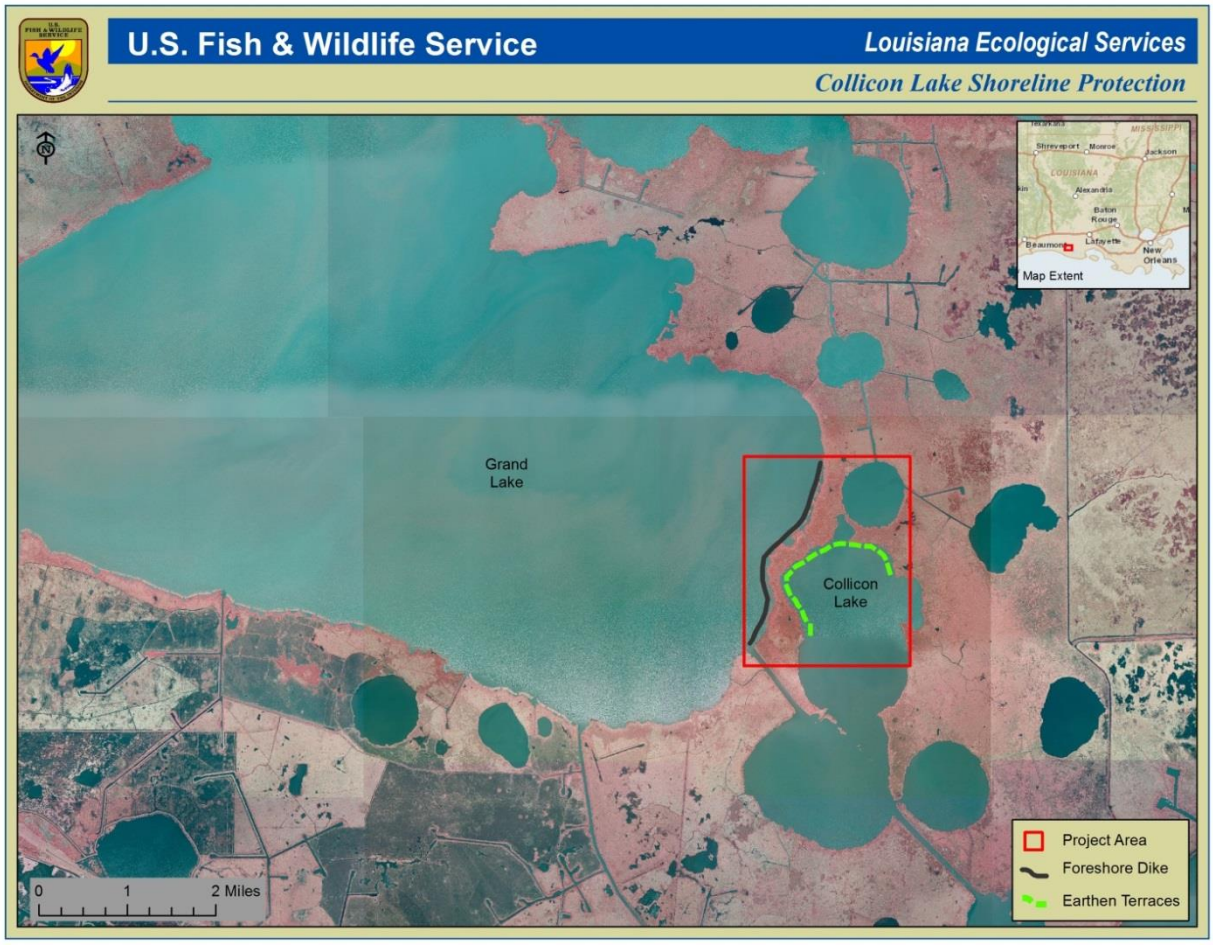
are conducted across a landscape and make recommendations to increase the ability of surveys to answer important questions about species of concern or trust resources. Data in PRIMR can be linked to GIS data and visualized across the region.

Louisiana's Coastal Wetlands Restoration Projects Monitored Using GIS

Robert Greco – Louisiana Ecological Services – Lafayette, LA

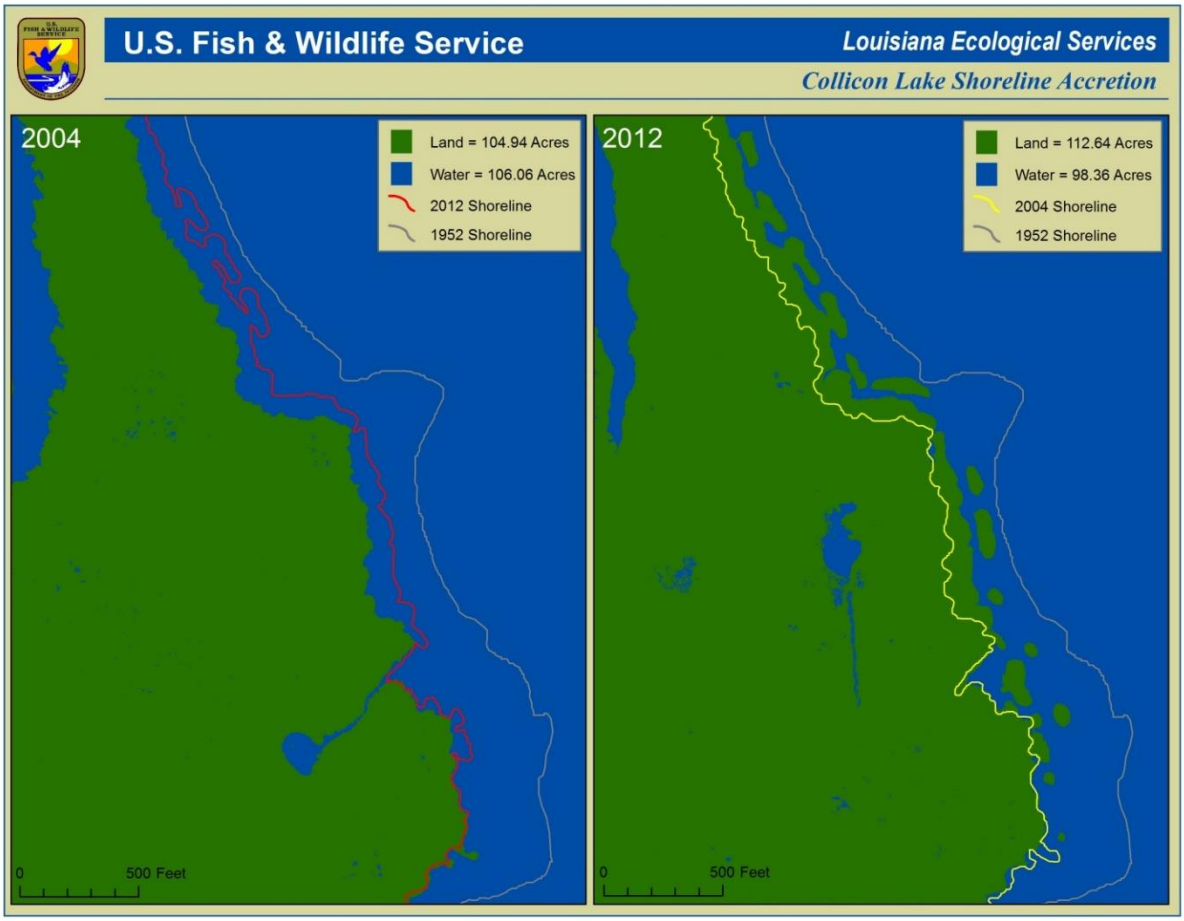
Louisiana has over 40% of the coastal wetlands in the lower 48 States, yet has suffered over 90% of the nation's coastal wetland loss. Louisiana Ecological Services is using GIS to identify areas of greatest wetland loss and to evaluate wetland restoration projects. One of those projects, Collicon Lake (http://lacoast.gov/reports/project/3890796~1.pdf) is part of the Grand-White Lake Land Bridge Protection project, funded through the Coastal Wetlands Planning, Protection, and Restoration Act (CWPPRA, http://lacoast.gov/new/About/Default.aspx)

Over time, Collicon Lake's western shore, a land bridge, has experienced shoreline erosion due



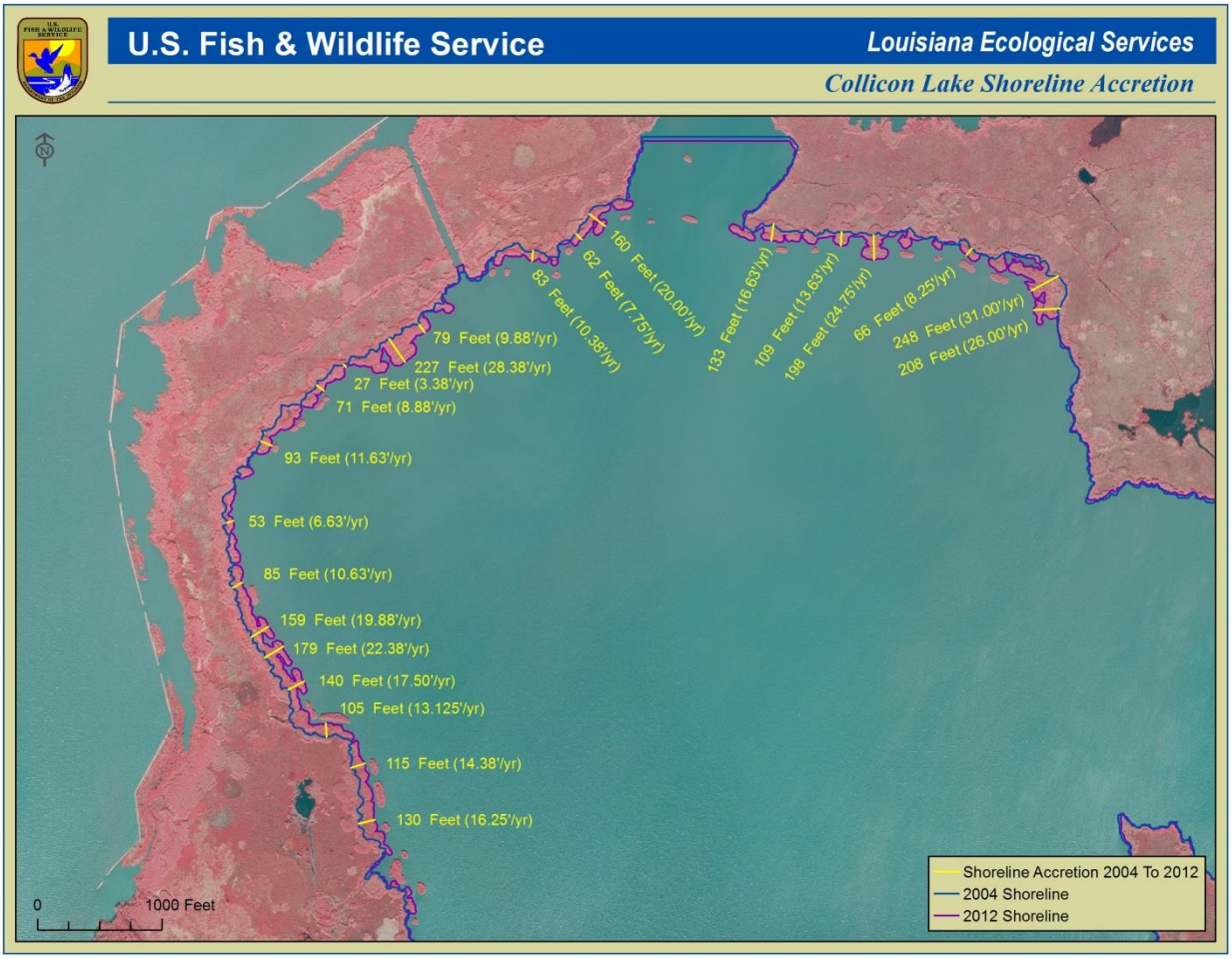
to many factors, one being from wave energy. Without some type of restoration, Collicon Lake could lose its western shore and become part of Grand Lake, creating greater wave energy and erosion to surrounding wetlands. Two of the project features are 1) shoreline stabilization – limestone rock foreshore dike and 2) the land bridge's eastern shoreline - earthed terraces. Project features were completed in 2004 and after eight years GIS was used to evaluate the successfulness of the earthen terraces.

ArcGIS 10.1 Image Classification – Iso Cluster Unsupervised Classification was used to classify pre and post construction aerial photography into land/water classes. Fifty classes were chosen to capture the variations in habitat signatures; high sediment waters have light blue signatures and low sediment waters give a black signature. Wetlands that have been burned (common during fall months in preparation for waterfowl hunting season to generate new vegetation, same time skies are clear and good to collect aerial photography) give a black signature. By choosing many classes in the image classification tool, the goal is to spread out the different shades of blacks and other similar habitat signature colors to be able to distinguish land vs water categories. Similar habitats are grouped and acreages are computed to determine the successfulness of the project's earthed terraces.



This project has a twenty year monitoring plan/budget and project managers were trying to determine if the western shoreline of the land bridge would need a limestone foreshore dike due to some of the terraces erosion rates. There were two rows of earthen terraces built, the lake side terraces were sacrificial – would expect to experience high erosion rates, and the landward side terraces which would become established and permanent, providing shoreline protection and the mechanism for sediment trapping and natural vegetation growth resulting in

shoreline stabilization. Aerial photography from the year of project construction and current photography were used to delineate shoreline locations and shoreline accretion rates.



This GIS analysis provided the scientific results to assist project planners, managers and engineers in determining that an artificial and costly limestone foreshore dike was not needed at this time.

SLEUTH

Matt Snider – Southeast Region GIS team

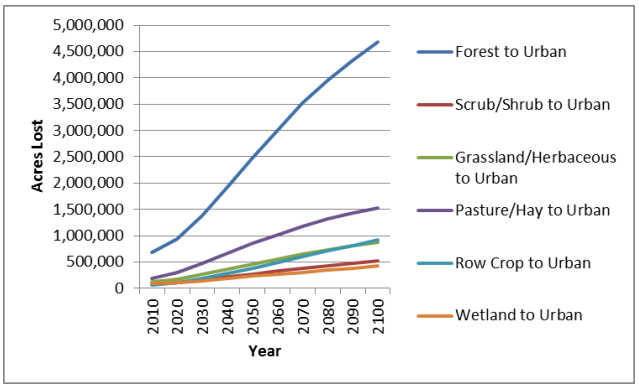
The rate of urbanization in America is rapidly increasing. The SLEUTH model, developed by USGS and the UC Santa Barbara Geography Department, aims at simulating this rapid urban growth. SLEUTH is the result of the Clarke Urban Growth Model that uses advanced processes to help project urban growth. There are six datasets required to implement the SLEUTH model : slope, land use, excluded, urban, transportation, and hillshade. Once the proper data are acquired, powerful super computers are used to

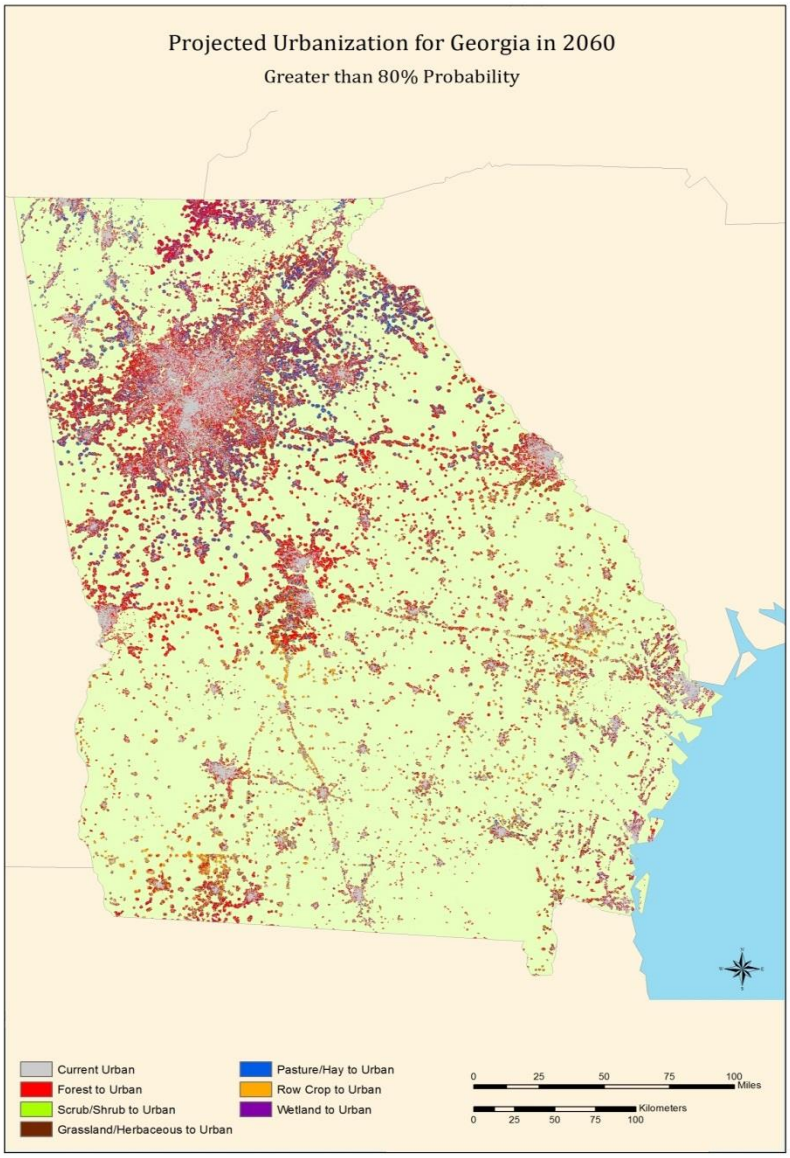
successfully execute the intricate model. The model then outputs a single image where each class is represented by a range of probability percentages. More detailed information on the full process can be found at http://www.ncgia.ucsb.edu/projects/gig/index.html .

From a conservation perspective, increasing rates of urbanization pose a problem as precious wildlife habitat is at risk of being destroyed. A pilot study was completed for the state of Tennessee using SLEUTH data to project what land use categories will be converted to urban areas in the future. The time period analyzed ranged from 2010 to 2100. Further analyses are being completed for Tennessee that will hopefully be able to be applied to other states in the Southeast region. Recently the same analysis was done for the state of Georgia. The SLEUTH data was reclassified twice to show greater than 50% and greater than 80% probability of urbanization as 1 and everything else as 0 (Urban and Non-Urban). The greater than 80% probability proved to be a more accurate representation of the future urban landscape. The 2006 Southeast GAP land cover was used as well in running the analysis. This data set was multiplied by 1,000 to insure duplicate land use values would not be recreated when running the next step of the analysis. Raster Calculator was used to subtract the SLEUTH layer from the land cover layer which then created an output showing areas of change. Another reclassification was done to simplify the categories of change. The change categories consist of forest to urban, scrub/shrub to urban, grassland/herbaceous to urban, pasture/hay to urban, row crop to urban, and wetland to urban. Once the change categories were determined and reclassified, statistics were run in Microsoft Excel to determine the projected number of acres lost to urbanization for each time period.

Below is a table and graph showing the results of the analysis.

80% Probability										
	2010	2020	2030	2040	2050	2060	2070	2080	2090	2100
Forest to Urban	675,813	937,951	1,386,698	1,933,415	2,480,706	3,009,795	3,512,439	3,945,812	4,327,978	4,685,679
Scrub/Shrub to Urban	72,755	105,942	158,091	216,679	274,584	330,381	383,813	431,159	474,229	515,544
Grassland/Herbaceous to Urban	118,264	178,756	267,584	365,440	463,119	557,729	648,402	730,775	806,852	879,103
Pasture/Hay to Urban	193,288	303,690	474,518	663,834	849,791	1,023,937	1,184,001	1,317,464	1,429,600	1,529,708
Row Crop to Urban	61,135	109,396	189,526	283,615	385,174	491,657	601,365	709,807	817,005	922,907
Wetland to Urban	86,394	110,864	147,535	188,100	228,436	267,895	306,681	344,773	381,681	419,962





Southeast Aquatic Resources Partnership (SARP)

Emily Granstaff – SARP – Cookeville, TN

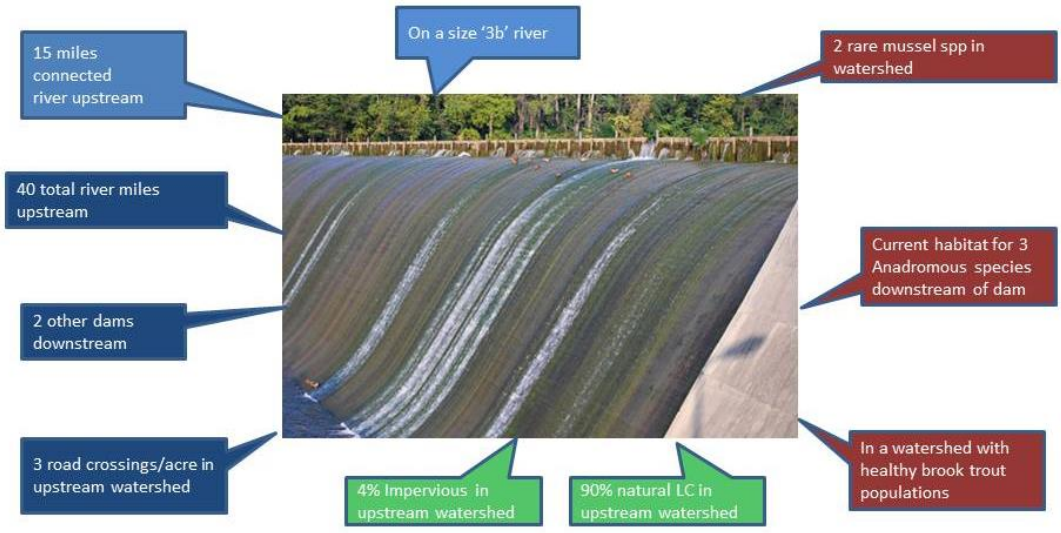
The Southeast Aquatic Resources Partnership (link: www.southeastaquatics.net) and The Nature Conservancy (link: http://www.conservationgateway.org/ConservationByGeography/NorthAmerica/UnitedStates/edc/reportsdata/freshwater/Pages/default.aspx) are teaming up to manage a GIS-based assessment of dams and other fish barriers in the Southeast. With funding from the South Atlantic Landscape Conservation Cooperative

(SALCC), the Southeast Aquatic Connectivity Assessment Project (SEACAP) seeks to help support planners and managers in their efforts to target fish passage and other aquatic connectivity projects where they can have the most ecological benefit.

Building off similar projects conducted in the Northeast, dam information is compiled and evaluated based on a suite of metrics in a GIS. These metrics include the number of river miles that would be opened upstream of a dam, the number of other dams downstream of a dam, the presence of diadromous fish species downstream of a dam, and metrics which assess watershed condition and the ecological condition of the stream on which the dam is located. Metrics are combined to produce a relative prioritization and displayed in an interactive web map with a custom analysis tool for running user-defined scenarios.

Numerous aquatic biologists from several state agencies, federal agencies, and NGOs serve as Workgroup members to provide input on available datasets, prioritization scenarios, and the decision support tool development.

For more information on the project, please visit the project page on the SARP website (link:http://www.southeastaquatics.net/groups/seacap)



Wetland Conservation Prioritization Model

Paul Lang – Panama City Ecological Services – Panama City, FL

The SHC approach challenges us to work strategically, to employ means to help us to place our limited resources in those places that give us the most conservation benefit. In an effort to embrace this paradigm shift, in some respects, the Panama City Field Office is looking to develop prioritization models for the major ecosystem that occur within their work area (wetlands, coastal, bays & estuaries, etc.). To this end, we decided to attempt to tackle wetlands first for several reasons: availability of data, importance of this resource within our work area, etc. Therefore, our wetland biologist, Ted Martin, convened a meeting of our Pinelands & Wetlands Ecosystem Team to pose them the question: "What makes a wetland important?" Their response(s) became the foundation from which we built our model. On the surface a fairly simple question, but the answer(s) can be a bit more complex. Structure, function, arrangement, context, etc., all come into play when attempting to answer the question. Nevertheless, in the end we got a long list of parameters the biologists felt made a wetland important or have greater value. Our first challenge was to decide what type of model (species based, resource based, ecological based, etc.) would best. In the end we decided on a general ecological based model, meaning we would not focus on or emphasize one aspect of the ecological picture (i.e. species or habitat), but rather account for many ecological factors (water quality, species, function, etc.). In further defining our modeling approach, we chose to take a two-tiered, hierarchical, spatially explicit modeling approach because it would afford us the ability to focus wetland conservation at the broad or landscape scale (large contiguous areas deemed of higher conservation importance at the landscape level) and then target high-valued wetlands at the local level. In this way, we attempted to narrow our focus on the perceived best of the best: the best wetlands within the best places on the landscape.

Through a process of density surface analysis, defining density thresholds and subsequent overlay

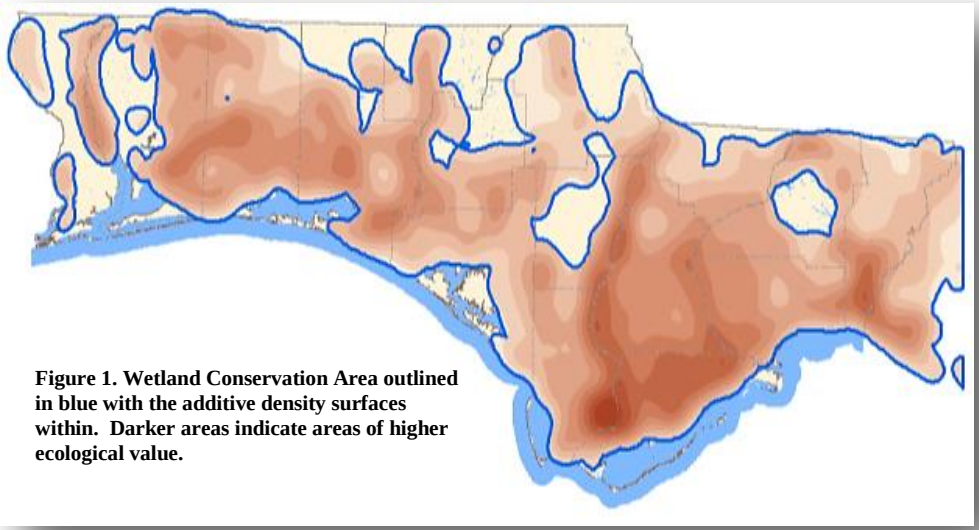


Figure 1. Wetland Conservation Area outlined in blue with the additive density surfaces within. Darker areas indicate areas of higher ecological value.

analysis we focused our project area to a suite of areas making up almost 6.5 million acres (just over 2.5 million ha), we called the Wetland Conservation Area (WCA) (Figure 1). We then used 16 factors the biologists identified in their initial meeting to inform our model development for assigning priority values to the wetlands within the WCA (Figure 2). In all, we prioritized 81,808 wetlands, making up 1,750,901 acres (684,672 ha).

We realize that we cannot protect all of the wetlands within our work area, but we believe that if we strategically target wetlands, the conservation actions we place on the ground (i.e., protection, restoration, easements) will collectively feed into the overall conservation of the landscape scale ecological services and integrity. This strategic approach affords us the opportunity to step back, look at the big picture and then focus our on-the-ground conservation efforts in the "right" places.

If you want to learn more about our modeling effort and all the technical aspect of the project, feel free to send me an email (paul_lang@fws.gov). You can also obtain a copy of the technical report from our Panama City Field Office's GIS webpages. The technical report goes into detail about the process steps used in this project.

We would also be very interested in any comments or suggestions for improvements to this model. We hope to continue development of this to better assess the real world value of the wetlands in our area.

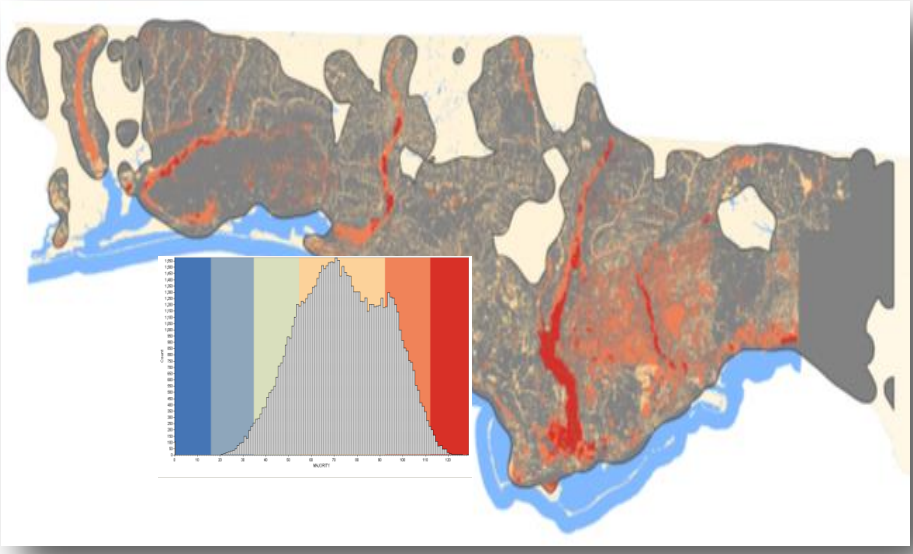


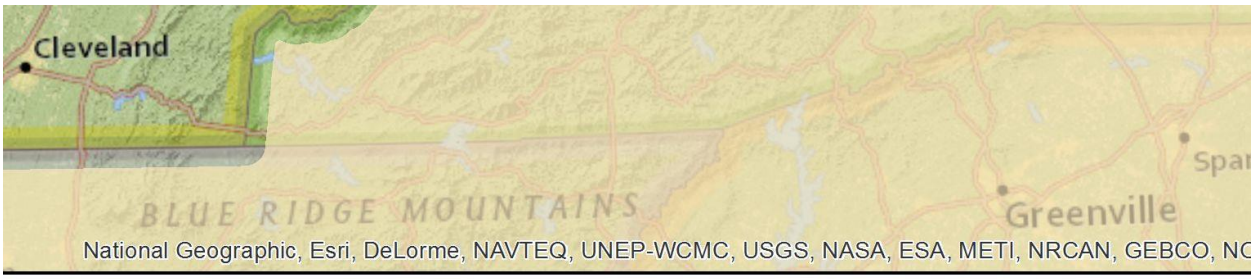
Figure 2. Wetland Prioritization Model with a histogram of the distribution of wetlands corresponding to the final priority classes shown in the map using a standard deviation classification scheme (warmer colors correspond to higher value)

Cartographic Design Tips

Jim Besley – Arkansas Ecological Services, Kurt Snider – Tennessee Ecological Services, John Eaton – Silvio O. Conte National Wildlife Refuge

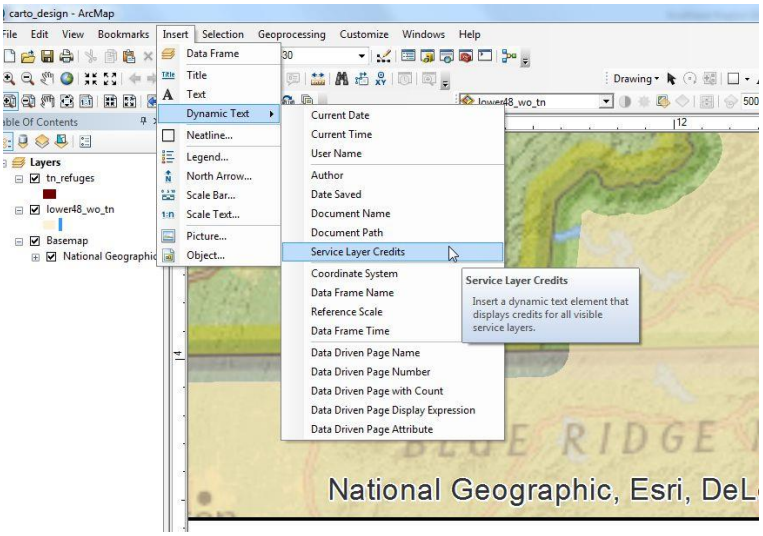
Controlling Service Layer Credits with Dynamic Text

Are you tired of the credit information from the ESRI online basemaps displaying in inconvenient locations on you map compositions?

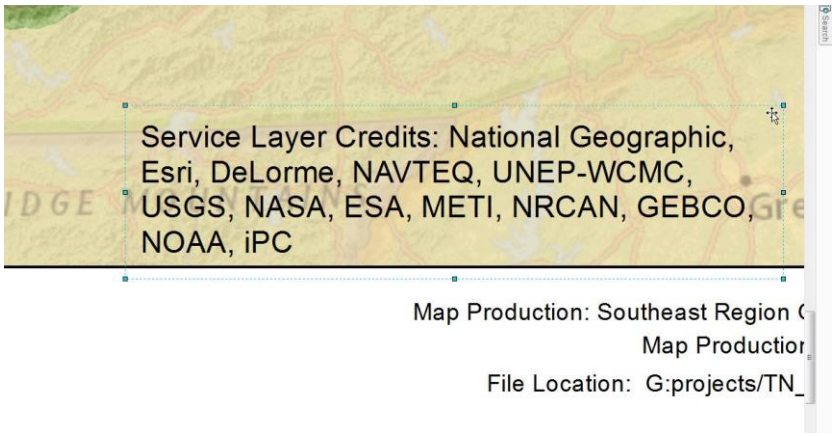


Map Production: Southeast Region GIS Center in Cook
Map Production Date: Septembe
File Location: G:projects/TN_NWR_map/tn_nwr

Here's a way to control the text: From the insert pull down menu, hold your cursor over the **Dynamic Text** option and then select **Service Layer Credits**.



The Service Layer Credit text that was imbedded as part of the image is now free floating and editable.



Of course you are thinking "Hey, I can just delete it." Not so fast. If you delete the text it reverts back to displaying as part of the image. But, now you can change all of the characteristics of the text and placement. We want to give credit where credit is due. We just don't want it detracting from the design and message of the composition.

Shameless Plug – Map Creation and Design Course

Barry Wood – Vero Beach Ecological Services

Is it part of your regular duties to produce various map products for print, display, or the web? If the answer is yes, there is a course being offered in January 2014 that will enrich the cartographer within you! Offered by The National Conservation Training Center (NCTC), "Map Creation and Design" (CSP7203) is an intermediate GIS course which presents participants an overview of the cartographic design process. Topics discussed include: map elements and layout, color, symbology, typography, and map design theory. The 3.5 day class uses instruction in the morning immediately followed by the students applying their new-found knowledge to create maps each afternoon. Maps are constructively critiqued and discussed by the instructors along with the participants. The final half-day of the course concludes with an all-encompassing map project incorporating the skills and expertise learned during the week.

Our instructors are Jim Besley and Kurt Snider.

- Jim is a GIS/IT Specialist with the U.S. Fish & Wildlife Service (Service) in Conway, Arkansas.
- Jim worked as a Computer Specialist in the U. S. Air Force before attending the University of Arkansas at Monticello where he earned a degree in forestry. He began working with the U.S. Geological Survey in Rolla, Missouri in 1988 , first as a Cartographic Technician, and then as a

Cartographer after completing their two year Cartographer Development Program. He transferred into his current position with the Service back in his home state of Arkansas in 2000.

- Kurt is a Cartographer with the U.S. Fish & Wildlife Service in Cookeville, Tennessee.
- Kurt has a graduate degree in geography from the University of South Florida. He has worked as a cartographer for the Service for 20 years, serving for 7 at the National Wetlands Inventory before transferring to Cookeville in 1999. Kurt is an active member of the Tennessee Geographic Information Council (TNGIC) and is an accomplished drummer … Bada Boom!
- Jim and Kurt have been teaching a version of this course together for over 10 years. They have a passion for good cartographic design and are eager to help everyone learn how to produce maps that are effective communication tools.

The Map Creation and Design class has been very popular and fills up quickly. The course will be offered January 28th- 31st at the South Florida Field Office in Vero Beach. The average temperature in Vero Beach in late-January is approximately 73° Fahrenheit. What better way to spend your January but with learning how to make better maps … in Florida!