GCPO
Gulf Coastal Plains & Ozarks
Landscape Conservation Cooperative

SCIENCE PORTFOLIO SUMMARY

On November 21, 2013 the GCPO LCC Steering Committee voted 15-0 to unanimously approve funding totaling $1,483,344 for 9 projects in 5 Topic Areas:

Topic 1: Integrating Multidisciplinary Conservation Goals
McGowan et al. "Grassland habitat management for diverse taxa and stakeholders" $77,110.
Riffell et al. "Open pine habitat: Desired ecological states provided by managed forests" $91,368.

Topic 2: Evaluating Species and Landscape Endpoints
Conner and Smith. "Using wildlife habitat models to evaluate management endpoints for open pine woodland and savanna" $132,104.
Murrow et al. "GCPO LCC Black bear habitat assessment with associated landscape endpoints" $50,831.
Robinson and Davis. "Advancing science-based aquatic resources of the GCPO LCC region" $170,000.

Topic 3: Characterization of Flow
LaFontaine et al. "Assessment of water availability and streamflow characteristics in the Gulf Coastal Plains and Ozarks Landscape Conservation Cooperative for current and future climatic and landscape conditions" $349,787.

Topic 4: Economic and Cultural Indicators
Grala et al. "Assessment of ecosystem service value and program delivery options: Establishment of a scalable model for understanding landowner engagement opportunities" $227,148.

Topic 5: Addressing Science Needs from Science Agenda
He et al. "Changes in forested landscapes of Gulf Coastal Plains and Ozarks under alternative climate and urban growth scenarios" $259,500.
White et al. "Developing and applying desired forest condition metrics to enhance wildlife habitat and biodiversity within Southern 'open pine' ecosystems" $125,496.

Proposal abstracts for each of these projects can be found in the Appendix of this document.

Topic 1: Integrating Multidisciplinary Conservation Goals

Project Title: Grassland habitat management for diverse taxa and stakeholders

PIs: Conor P. McGowan[1], Eric Lonsdorf[2], Craig Guyer[3], J. Barry Grand[4]

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Project Abstract:
The proposed work will focus on expanding an existing project and model for grassland bird habitat management in the East Gulf Coastal Plain. The existing model evaluates landscapes with respect to avian populations and predicts bird population responses to adding habitat or converting/improving existing habitat. The model can be used by land managers to identify priority areas of adding or retaining grassland habitats. With this research we propose to expand the existing modeling framework to include non-avian species of conservation concern in the GCPO LCC land area and incorporate non-biological economics and cost effectiveness objectives into the decision framework. Researchers with the USGS, Auburn University and the Chicago Botanic Gardens will supervise a Masters student and collaborate on focal species selection, model development and data gathering and analysis.

Topic 1: Integrating Multidisciplinary Conservation Goals

Project Title: Open pine habitat: Desired ecological states provided by managed forests

PIs: Sam Riffell[1], T. Bently Wigley[2], Darren A. Miller[3], Paul Van Deusen[4]

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Project Abstract:
Planted pine forests can mimic historical, open pine habitat conditions with a variety of management actions (thinning, mid-rotation burning, herbicide, planting densities, etc.), and thus provide habitat for wildlife species adapted to those conditions. Because planted pine is a dominant land cover across the Southeast, there is potential for them to provide substantial amount of open-pine Desired Ecological States. Therefore, we propose to evaluate the extent to which planted pine can provide Desired Ecological States via literature review and meta-analyses. Based on this review, we will use harvest scheduling software (HabPlan) to simulate Desired Ecological States in large ($\approx$ 40,000 acre) landscapes across a 50-year time span under a variety of management scenarios. We will quantify availability of Desired Ecological States over the course of each simulation and identify options for providing open pine conditions in managed forests across the Gulf Coastal Plains and Ozarks LCC.

Topic 2: Evaluating Species and Landscape Endpoints

Project Title: Using wildlife habitat models to evaluate management endpoints for open pine woodland and savanna

PIs: Mike Conner[1], Lora Smith[2]

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Project Abstract:
The Integrated Science Agenda (ISA) for the Gulf Coastal Plains and Ozarks Landscape Conservation Cooperative (GCPO LCC) identified 10 species as representatives of desired landscape endpoints for the Open Pine Woodland and Savanna Priority System. The Joseph W. Jones Ecological Research Center has monitoring data spanning at least 10 years for all but one (Louisiana pine snake) of these species from a 12,000 ha site within the range of the endangered longleaf pine savanna ecosystem. We also have spatially-explicit data for fox squirrels and 5 species of isolated wetland-breeding amphibians within this system. We propose to develop biometric habitat models for each of the species resident on-site; we will include models for the resident Florida pine snake, which can serve as a surrogate for the Louisiana pine snake. Where possible, we will also predict persistence of these species over time as functions of habitat variables, including vegetation structure, and use results of our models to evaluate the desired landscape endpoints. All models will be validated using either cross-validation techniques or independent data. Resulting models will also be evaluated for their ability to identify habitat attributes that can be manipulated to make habitat conditions suitable for a given wildlife species. Because little additional data will need to be collected, our project will be very cost efficient while permitting evaluation of effects of habitat variables on indicator species presence.

Topic 2: Evaluating Species and Landscape Endpoints

Project Title: GCPO LCC Black bear habitat assessment with associated landscape endpoints

PIs: Jennifer Murrow[1], Joseph D. Clark[2], Cindy Thatcher[3]

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Project Abstract:
We will improve both the existing Louisiana and the existing Ozarks black bear habitat model. Improvements to these models will be made by incorporating more accurate, up-to-date landcover data (such as the GCPO LCC landcover database), detailed agricultural data (National Agricultural Statistics Service CropScape), and urbanization data. These modifications are necessary to parse out agricultural crops that are a food source for bears and to allow for assessments of potential impact on bear habitat because of future land use change, such as the changes in crop type for biofuel production, or increases in urban land cover around fast-growing towns. Then, we will couple both models together to create a seamless model throughout the GCPO LCC. The next step will be to determine micro endpoints of "good" bear habitat by deriving spatial layers of forest characteristics (Canopy Density, Forest Height, Forest Biomass) from Lidar data. A regression analysis of the relationship between bear locations, bear home ranges, habitat quality index values from the model, and the corresponding forest characteristics will be used to determine endpoints for forest best management practices to optimize bear habitat in the GCPO LCC. The final products will be a landscape scale model of black bear habitat throughout the LCC that identifies areas of importance for bears and specific forest management endpoints needed to maintain or create quality bear habitat.

Topic 2: Evaluating Species and Landscape Endpoints

Project Title: Advancing science-based aquatic resources of the GCPO LCC region

PIs: Scott Robinson[1], Mary Davis[2]

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Project Abstract:
The GCPO LCC has recognized the need to protect instream flows for healthy aquatic systems necessary for the health and survival of many fish and wildlife species, as well as the need for better science to support effective policies and management practices. The Southeast Aquatic Resource Partnership (SARP) proposes to advance instream flow science in the GCPO LCC by developing state-of-the-science resources and facilitating collaboration among researchers and water resource managers. The objectives of this project are to develop baseline water resource information and a plan for future instream flow research in the GCPO LCC that builds on existing efforts. Work that SARP has initiated in the South Atlantic and Gulf Coast Prairie LCCs will serve as a draft set of regional water resource information products for this project. Specifically, priority flow-ecology relationships will be developed using a committee approach similar to that used by aquatic experts in the GCPLCC. The SARP river classification for flow characteristics and other drivers of flow-ecology relationships will be revised as needed for the region. Condition assessments will be made of flow regimes in the region's priority aquatic habitats to identify and manage the drivers of change. SARP will document this information for on-line use by water resource managers and decision-makers as standalone resources and will hold a regional workshop to compile research priorities into a plan to advance instream flow science in the GPCO LCC. Workshops with states will ensure that these products are available to and applicable for decision-makers and conservation of the region's freshwater aquatic resources and the fish and wildlife species that depend on them. As a regional leader in instream flow science, SARP brings added value to these products by coordinating them with similar resources produced in adjoining LCCs and across the region. The advancements in instream flow science developed in this project will be used to benefit all southern aquatic ecosystems. This will create seamless science-based aquatic resources across 14 southeastern states to support decisions made by aquatic resource managers, policy makers and conservation planners for current and future conditions. SARP, its partners, and other southern LCCs have invested more than $500,000 in these resources over the past five years. This project will benefit from and leverage that investment to continue to refine and develop products. The outcome of this project will help inform water resource managers and policy makers about flow requirements of streams, rivers, and estuaries throughout the GCPO LCC region. It will also identify critical information gaps that must be filled to reduce the uncertainty of streamflow requirements for aquatic ecosystems used by state and federal agencies to protect water resources. Further, the results of this project will be necessary for assessments of the likely impacts of climate change to the region's aquatic resources. The benefits of this effort are to leverage new and existing resources into an integrated body of

scientifically credible information that water resource managers can use to effectively protect aquatic resources now and in the future.

Topic 3: Characterization of Flow

Project Title: Assessment of water availability and streamflow characteristics in the Gulf Coastal Plains and Ozarks Landscape Conservation Cooperative for current and future climatic and landscape conditions

PIs: Jacob H. LaFontaine[1], Lauren E. Hay[2], Stacey A. Archfield[6], Andrew R. Bock[3], Rheannon M. Hart[4], Steven L. Markstrom[2], R. Steven Regan[2], Roland J. Viger[2], Alexandria M. Hunt[5], Tim Kern[7], Gail Montgomery[7]

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Project Abstract:
The objective of this proposed research is to provide an automated methodology and data products to the GCPO LCC partners by (1) developing a multi-model synthesis to simulate streamflow using a monthly water balance model and daily time step hydrologic models (physical process-based and statistical) for all watersheds of the GCPO LCC geographic region and (2) providing products from these models (flow characteristics – magnitude, timing, duration, rate of change, and frequency) for a range of configurations (current and future climate and landscape) through a web interface hosted on the ScienceBase platform which can be used to inform management decisions.

Topic 4: Economic and Cultural Indicators

Project Title: Assessment of ecosystem service value and program delivery options: Establishment of a scalable model for understanding landowner engagement opportunities

PIs: Dr. Robert K. Grala[1], Dr. Jason S. Gordon[1], Dr. Kevin M. Hunt[2], Dr. William H. Cooke[3], Christopher S. Galik[4], Dr. Lydia P. Olander[4], Dr. Dean L. Urban[5], Kevin D. Nelms[6], Andy Wittingdon[7]

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Project Abstract:
This research project will identify effective landowner engagement strategies for promoting and sustaining ecosystem services (e.g., clean water, biodiversity, wildlife habitat, recreation, aesthetics) in the Southeastern United States through a focused case in three major habitat types (bottomland hardwoods, open pine stands, and grasslands) in the GCPO LCC territory. The project will begin by using the strategic habitats and desired ecological states determined by the GCPO LCC to develop a list of priority ecosystem services for selected habitats. We will then use qualitative methods to review landowner motivations, strategies, incentives, and communication tools for landowners to inform the development of a mail survey. The mail survey will identify and quantify the monetary value of conservation, cultural, and economic attributes appreciated by landowners. This will enable us to assess landowners' willingness to manage their resources for increased provision of ecosystem benefits, and to evaluate the types of tools and programs which would most help them achieve their resource management objectives. A geospatial analysis will then be used to quantify program participation and expected costs for selected landowner engagement scenarios and program delivery options. The overarching objective is to not only increase our understanding of landowners' willingness to manage land for ecosystem services in the GCPO LCC region, but to also provide a template for future research which may be repeated to assess changing landowner resource management objectives over time and applied to the entire GCPO LCC region as well as other LCCs. This project complements another proposal submitted by Mississippi State University within this RFP topic. Whereas the other proposal will develop an economic analysis and decision support

tool for different timber and wildlife based management approaches in bottomland hardwood forests, this project will conduct a survey to examine decision-making process to quantify monetary value of ecosystem services, identify economic and cultural endpoints for priority habitats, and determine best communication pathways to achieve desired conservation goals.

Topic 5: Addressing Science Needs from Science Agenda

Project Title: Changes in forested landscapes of Gulf Coastal Plains and Ozarks under alternative climate and urban growth scenarios

PIs: Hong S. He[1], Frank R. Thompson III[2], Louis R. Iverson[3], James M. Guldin[4]

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Project Abstract:
We will determine the effects of climate change, urbanization, succession, disturbance, and management on forest landscape change in the Gulf Coastal Plains and Ozarks (GCPO) region for the period 2000-2100. We will build on our landscape modeling efforts in the Central Hardwoods and existing GCPO products for urbanization, and complete forest landscape modeling for this entire region under multiple climate, forest management, and urban growth scenarios. We will link downscaled climate data with an ecosystem model (LINKAGES II) and forest landscape model (LANDIS PRO) to simulate landscape change at a 90 m resolution from year 2000 to 2100 at 5-year intervals. We will forecast landscape change under current and future climate based on IPCC climate and emission scenarios (GFDL-A1fi, CGCM3 (T47)-A2, PCM-B1). We will explicitly incorporate urban growth projections produced by NC State for the LCC to account for loss of forest. We will use this process based modeling approach in combination with a statistically derived tree distribution modeling approach (TreeAtlas/DISTRIB) to produce a comprehensive assessment of how forests in the GCPO may be expected to change as the climate and other drivers change. By incorporating multiple climate scenarios and modeling approaches, we will capture major sources and ranges of uncertainty so it can be appropriately addressed in decision making. This project covers the entire GCPO landscape, is integrative because it provides important GIS products for assessing impacts on many natural and cultural resources, is explicitly forward looking, provides the types of information needed for adaptive decision making, and directly addresses the need to understand the prominent drivers of forest landscape change in the region. Because similar analyses have been or are being conducted in the Northwoods, Central Hardwoods, Central Appalachian, and New England regions, this project advances interests in having compatible approaches and products across the LCC network. The investigators on this project are internationally acknowledged in forest, landscape, and population modeling, and have demonstrated their ability to work in partnership with LCCs, Bird Joint Ventures, and USGS Climate Science Centers.

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Topic 5: Addressing Science Needs from Science Agenda

<u>Project Title</u>: Developing and applying desired forest condition metrics to enhance wildlife habitat and biodiversity within Southern 'open pine' ecosystems

<u>PIs</u>: Rickie White[1], Randy Wilson[2], Clay Ware[3]

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<u>Project Abstract</u>:
The GCPO LCC has identified the development of "open pine woodland and savanna ecosystem desired ecological states" as a priority science needs theme (Appendix 1; Draft IV Integrated Science Agenda for the GCPO LCC). The East Gulf Coastal Plain Joint Venture (EGCPJV), US Fish and Wildlife Service (USFWS), NatureServe, and US Forest Service (USFS) have been working independently in recent years to develop forest metrics to define desired forest conditions to enhance wildlife habitat and also to define and assess ecological integrity. Each group has made great progress, and the group members have recently initiated discussions on how to cross–walk the different metrics and approaches resulting in a single, definitive set of metrics for use by the conservation community. This proposal seeks resources to build the capacity needed to complete the project, which includes merging the two metrics–based approaches, developing a set of protocols to allow rapid assessment implementation by landowners, and publishing and disseminating the final results to key stakeholders. The deliverables will 1) create a standardized, regional desired forest condition metrics–based approach for wildlife habitat in open pine systems (i.e., define desired ecological points and relationships) and 2) create a "user's guide" to allow landowners to quickly and effectively assess the health, ecological integrity, and condition of wildlife habitat in their open pine systems.