PENINSULAR FLORIDA
LANDSCAPE CONSERVATION COOPERATIVE

# *Science Plan*

## Executive Summary

This Science Plan will establish and define the focus of the Peninsular Florida Landscape Conservation Cooperative (PFLCC) science investments. The data and products derived from science activities will provide information that will guide natural resource management decisions and help define desired outcomes. The plan will identify and address science and management information needs that are shared across the region, including uncertainties in natural systems' responses to drivers of landscape change. The geography of the PFLCC is very rich in data, providing a solid foundation to build upon. PFLCC science activities will build upon existing data to identify and fill information voids to identify priority resources and set conservation targets.

This Science Plan was developed by PFLCC staff with review and feedback provided by the PFLCC Steering Committee. This document is expected to be modified as needed to incorporate emerging issues and to continue to build upon partner/stakeholder efforts as they are completed.

A Strategic Science Plan will be developed to guide specific science tasks and actions over a 3-5 year planning horizon. The Strategic Science Plan will be built upon the framework outlined within this document.

## Introduction

The PFLCC is an applied conservation science partnership among federal, state and local agencies, tribes, non-governmental organizations, universities, and other stakeholders to benefit fish and wildlife and their habitats. The PFLCC's role is to facilitate 1) planning, 2) design, and 3) implementation of conservation strategies for fish and wildlife species at the landscape level.

> *The Mission of the PFLCC is: "To foster landscape scale conservation to sustain natural and cultural resources for future generations."*

The PFLCC will use the adaptive management framework of Strategic Habitat Conservation (SHC) (figure 1), integrating planning, design, delivery and implementation. The SHC approach uses a consistent

framework that enables practitioners to plan, design and deliver conservation actions more strategically and transparently, with increased accountability and in a more coordinated and collaborative way. It provides a science-driven conservation investment decision-making process that focuses programmatic efforts towards shared outcomes.

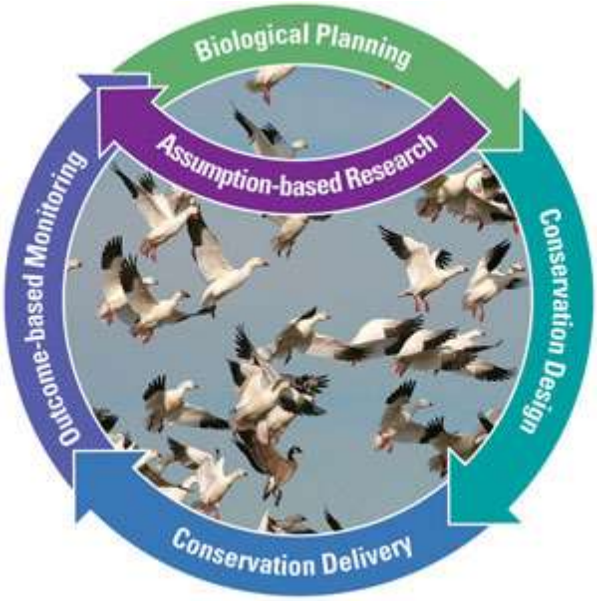


Figure 1. The U.S. Fish and Wildlife Service's Strategic Habitat Conservation adaptive management framework.

Geography: The PFLCC extends from north-central peninsular Florida south to the Florida Keys (figure 2). This region represents a unique and complex set of systems, connecting subtropical and temperate climate zones. This region features hundreds of miles of beach and dune habitats, the St. John's River watershed, xeric scrub uplands of the Lake Wales Ridge, the freshwater marshes of the Kissimmee River and Lake Okeechobee, the expansive freshwater marshes and swamps of the Everglades, extensive mangrove swamps and salt marshes, and unique pine rocklands and tropical hardwood hammocks of the Florida Keys. This region also includes a wide array of marine features, including nearshore and offshore systems such as extensive sea grass beds, oyster reefs and the only living coral reef in the continental United States.

The PFLCC staff and Steering Committee have agreed that science activities will include all of Florida. Many foundational assessments and associated data sets that the PFLCC will build upon are statewide in geographic scope. Extending PFLCC science activities to the statewide level will continue to provide overlapping data and analyses with the South Atlantic LCC and Gulf Coastal Plain and Ozarks LCC, allowing for comparison and coordination across the three LCCs.

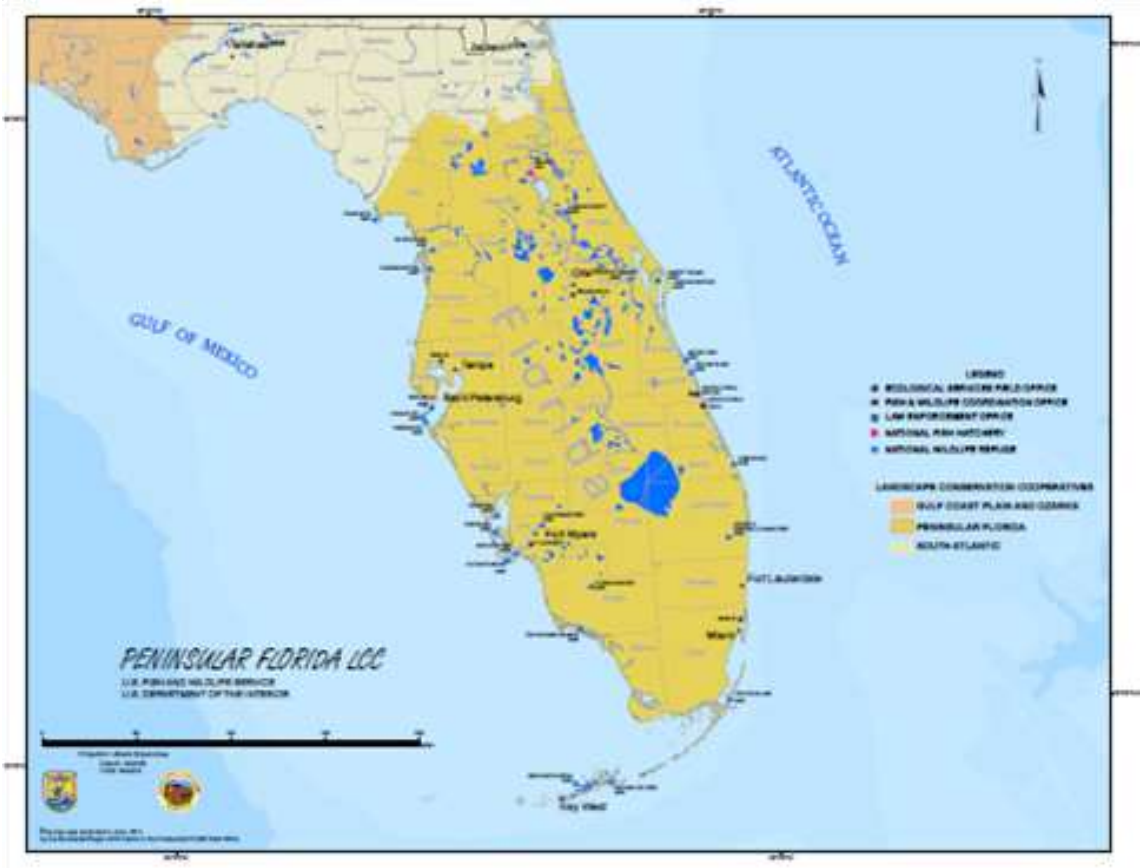


Figure 2. Geography of the Peninsular Florida Landscape Conservation Cooperative.

Biodiversity: Florida is home to more than 16,000 species of native fish, wildlife and invertebrates, with approximately 147 endemic vertebrate species and subspecies. There are 125 Federally listed plant and animal species and 120 State listed. The Florida's State Wildlife Action Plan identifies 1,036 Species of Greatest Conservation Need, including 21 amphibians, 56 reptiles, 52 mammals, 161 birds, 78 fish and 668 invertebrates. The central Florida Lake Wales Ridge is a center of plant and animal endemism and an international biodiversity hotspot that includes Florida scrub jay, sand skink, numerous threatened and endangered scrub plant species and some of the largest meta-populations of gopher tortoise in Florida. One of the greatest wading-bird nesting concentrations in the world is found in the Everglades, with breeding colonies of wood stork, glossy ibis and at least 16 other wading bird species. Florida's diversity of wildlife species includes iconic species such as the Florida panther, American alligator, black bear and manatee. Five species of marine turtles routinely nest on the sand beaches of Florida.

Stressors: The primary conservation challenges within the PFLCC include habitat destruction and fragmentation, invasive species, management of pyric communities, and hydrological

alterations – all of which are expected to be exacerbated by climate change. Habitat loss and fragmentation due to development and associated land use changes are widespread threats in Florida, affecting many species and communities through direct impacts, associated infrastructure and actions of Florida residents. These include roads, surface water diversion and withdrawal, residential activities, nutrient loading caused by impervious surfaces and non point-source pollution (FWC 2012). Further habitat loss and fragmentation will result as sea level rises, directly impacting coastal species' habitats, and causing relocation of coastal communities to more inland sites. As minimum and maximum temperatures shift warmer in the future, invasive exotic plants and animals may have a greater impact on native species and their habitats. Florida is already host to over 400 non-native species of plants and animals. Warmer temperatures may allow invasive species to expand their range, increase their productivity or allow for establishment of new invasive species.

Florida has multiple plant communities and associated species that depend upon periodic fire. If fire frequency, seasonal timing, intensity or extent are not properly managed it can result in loss of suitable habitat for many species dependent upon the pyric communities such as sandhill and scrub. Current size, location, and proximity of these plant communities to developed areas already make prescribed burning a challenge. In the future, additional fragmentation and changing precipitation patterns will make fire management practices even more challenging. Altered hydrology, including those impacting freshwater, estuarine, and marine systems, is a widespread threat to Florida's natural resources. Increased demands of water for consumptive purposes, contamination from agricultural operations, channel modifications, drainage of wetlands, and increased salt water intrusion as sea levels rise all threaten the aquatic systems, associated terrestrial systems and the species that depend upon them. Cultural resources, evidence of past human activity (e.g., historic and prehistoric artifacts, buildings, villages, burial sites), are directly and indirectly affected by all these stressors and will be considered in assessments and actions to reduce or eliminate effects from these threats.

## Science Focus Areas

The PFLCC has identified four main Science Focus Areas. These include land conservation, water resources, climate, and human demographics. These focus areas will help define and prioritize PFLCC science initiatives and projects.

<u>Land Conservation and Restoration:</u>

- Critical habitat, Connectivity, Invasive species, Management tools (fire)

Water Resources:

- Quantity, Quality, Hydrology, Connectivity

Climate:

- Impacts, Resilience, Adaptation strategies

Cultural and Socioeconomics:

- Growth demands, Infrastructure development, Socioeconomic and Cultural values

## Science Plan Major Components

Ecological Planning – Ecological planning is the integral first (although still iterative) step that provides the science upon which subsequent conservation actions are based. Planning includes compiling, organizing and assessing existing information on status, trends, and current and emerging threats and limiting factors for natural and cultural resources. Through this process, ways to improve and build upon existing efforts, and identification of gaps in data and conservation efforts will be defined. Planning will also include development of agreed upon priority ecological/natural resources and definition of conservation targets (measurable objectives).

- Identify priority resources ( biological, ecological and cultural features and processes)
    - Assess existing conservation efforts
    - Develop and maintain lists of relevant reports and associated data
    - Identify data gaps
    - Select priority resources representing:
        - Species
        - Habitats
        - Landscapes
        - Ecological processes
        - Cultural
    - Assess current conditions (status/trend)
- Establish Conservation Targets and measureable objectives
    - Define Conservation Targets
    - Set Metrics
        - Compile metrics from existing plans where available
        - Work with partners to develop metrics
    - Define Limiting factors

        - Compile existing information on threats and limiting factors
        - Identify data/information gaps
        - Identify Management actions to overcome limiting factors
    - Identify gaps between current levels and target levels set for each priority resource

Conservation Design - Conservation design is the step that includes determining the quantity, quality, location, and spatial configuration of resources across the landscape needed to support the identified priority resources at the levels set by the conservation targets. Much of this work is accomplished through use of Geographic Information Systems (GIS) to spatially model and define specific areas on the landscape that support priority resources and/or are at high or increasingly higher levels of threats.

- Assemble or develop spatially explicit data to define and predict landscape patterns
    - Land cover mapping
    - Vulnerability Assessments
    - Climate related modeling (e.g., SLAMM)
- Assess ability of landscape to support populations
    - Scenario planning
    - Climate Envelope modeling
    - Socioeconomic/cultural assessments
    - Refine species-habitat relationships (develop and apply models)
- Develop decision support tools and information to define areas for targeted conservation actions
    - Risk management tools
        - Alternative scenarios to avoid fragmentation
    - Data/information to provide guidance on development of :
        - Adaptation strategies
        - Alternative management approaches
- Identify priority areas for conservation/restoration actions (locations to effect the greatest change, in the most cost effective way ($$, resources, etc.)
- Determine best strategies/incentives for attaining desired conservation outcomes (designate priority areas)
    - Assess these strategies to determine which provide the optimal outcomes which meet the conservation targets.

Conservation Delivery – This step includes facilitation of conservation actions and development of planning tools with the goal of efficiently and effectively affecting conservation targets. Conservation delivery includes actions of restoring, conserving or enhancing the condition of

the priority resource. Within the PFLCC and the LCC network, the success of conservation delivery is dependent upon a diverse suite of engaged partners. The partners, acting independently or collaboratively – basing their actions on the shared science and vision of the LCC, are the ones who will deliver the on-the-ground conservation actions. The PFLCC and LCC network provide the forums to initiate and maintain cooperation and collaboration among the partners and provide relevant and timely information and decision support tools.

- Develop decision support information and tools for use by partners to implement strategies that will meet priority resource conservation targets
    - Develop delivery techniques (data access – e.g. conservation planning atlas, data visualization, data integration, workshops, etc.)
    - Develop product delivery tracking process
    - Track priority resource targets - incorporation into planning and implementation
- Identify opportunities to facilitate conservation delivery across partnership

Research and Monitoring – Monitoring step will provide tracking and assessment of the progress in reaching or maintaining the conservation targets set for each priority resource. Monitoring will provide the status of the priority resource, if the conservation target has been met, and track changes over time. Monitoring can provide an evaluation of the effectiveness of conservation actions and influence future conservation actions – following the adaptive nature of the SHC cycle. Research will focus on addressing key uncertainties, data gaps, and assumptions within the various steps and processes. This research will focus both on the ecological aspects as well as the human dimension side of conservation. Results from research will inform the future iterations of the planning, design and delivery phases – again based on the adaptive conservation framework.

- Develop monitoring objectives and establish a timeline
    - Identify existing monitoring efforts
    - Determine monitoring scale and frequency for each priority resource
    - Assess effectiveness of GIS-based tracking of habitats identified as priority resources
    - Link monitoring to key conservation issues/decisions
- Develop targeted research based on key uncertainties related to priority resources
    - Identify key uncertainties and data gaps
    - Prioritize and target research needs based on key uncertainties and data gaps

    - Serve as a forum in which partners can discuss and prioritize research to best meet mutually agreed upon priorities and to coordinate the design and implementation of research projects
- Assess the ability of the priority resources and the associated conservation targets to represent the health of other landscape components within the PFLCC
    - Identify natural and cultural resources potentially represented by each priority resource
    - Evaluate the ability of the priority resources and conservation targets to represent other resources
    - Assess similarity and differences in responses of priority resources to threats/barriers to the other resources they potentially represent
- Develop process and timeline to reassess priority resources and conservation targets based on the results and products of research, monitoring and modeling activities.

Data Sharing and Coordination – The goal of data sharing and coordination is to provide core data products based on sound science and conservation principles and provide these to the partnership in a way that the data used to meet the conservation objectives of the individual partners. Development of ways to share data will be a continually evolving process as new data are received, partnerships develop and mature and technology changes.

- Develop a data management plan
- Collaborate/coordinate within the LCC Network, particularly with neighboring LCCs
- Develop mechanisms to track use of data provided by the PFLCC
- Develop metrics to measure the successful incorporation and implementation of PFLCC priorities into partner's planning and management activities

## Evaluating Success and Adaptation

The PFLCC will conduct self-evaluations on the effectiveness with which it delivers and achieves its mission. The Science initiatives of LCCs are currently measured using the Science Investment and Accountability Schedule (SIAS). The SIAS process is conducted as a self-evaluation on an annual basis, scoring various aspects of Science application and delivery. The format of this PFLCC Science Plan, in part, is modeled after some of the major sections within SIAS (e.g., Planning, Design, and Delivery). Many of the SIAS metrics are straightforward and easily scored, while others are more challenging to quantify and score. Key steps defined within this document and more detailed tasks identified in the PFLCC Science Strategic Plan were designed to align with SIAS benchmarks and metrics to increase the efficiency and ability to accurately score the progress of PFLCC Science activities.

As previously mentioned, the PFLCC will use adaptive management practices, including the SHC framework. The PFLCC will work to continually refine the information on which priority conservation planning, design and delivery are based. Research initiatives and project designs will be adaptive, based on feedback from all components of the Science Plan framework and input from partners. Based on annual assessments of progress made and new and emerging issues/threats, the PFLCC will re-evaluate science priorities and re-align as needed to continue to move forward in the most effective and efficient manner to successfully meet our Mission.