

THEMATIC AREA:

TERRESTRIAL: FOREST LANDS

MISSION: *Identify and prioritize regional forest habitats and natural communities to foster resiliency in the face of current and future threats while supporting a larger multi-jurisdictional framework for planning and management.*

[Science objective] Inventory significant regional forest habitats while evaluating present and future conditions (including threats), importance, and connectivity of these habitats (in order).

[Management objective] To carry-out conservation planning, based on landscape-scale scientific assessments, so that LCC partners and stakeholders can develop and implement cohesive regional management strategies to protect and manage forest resources across jurisdictions.

A. HEADING: REGIONAL LEVEL

1. PROGRAM: Landscape-level Disturbances & System-level Response

Examines major disturbances (includes climate change) as well as the impacts associated with these, regardless of ecological organization (e.g., community, species, population).

PROGRAM DESCRIPTION: *Describe how forested systems respond to large-scale transformation of biotic and/or abiotic conditions. Examine major disturbances (including climate change) as well as the impacts associated with these, regardless of ecological organization (e.g., community, species, population). Describe the major system stressors and response to those stressors. Work with partners and stakeholders to develop and compile information about how stressors individually and cumulatively impact forest sustainability and rare and unique species and communities.*

(Grouping) – Foundational/Stock-taking Assessment/Classification System

- **Project Description:** Map extent of existing forest, fragmenting features, and developed areas for the entire region, then discriminate between and map the extent of managed/human altered forests and natural/intact forests.

(Grouping) – Climate Change Impacts on Ecological Function and Response to Changes

- **Project Description:** Describe how forest biochemical cycles (e.g. nutrient, etc.) are altered due to changing climate and if those changes affect ecosystem services.
- **Project Description:** Investigate impacts of climate change on chemistry of the soil and/or biota needs to include potential interactions with chemical changes caused by deposition of acids, nitrogen, mercury, etc.

- **Project Description:** Assess Priority Amphibian & Reptile Conservation Areas (PARCAs) and vulnerability to climate change in the Appalachians. *[COP Comment: This project is already going on in the southeast (SEPARC and the South Atlantic LCC). Maybe what they've done could be used as a framework.]*
- **Project Description:** Evaluate the synergistic impacts of deer over-browsing and climate change. *[COP Comments: 1) Considered here due to cumulative effects of atmospheric pollution on regeneration, species composition, calcium, invasives (replacing natives suppressed by excess deer browse); 2) and, conversely, are some climate change impacts mitigated by deer over-browsing? There is some indication that certain boreal conifers (especially spruce) may actually benefit from deer preferentially browsing more palatable hardwoods.]*

(Grouping) – *Energy and Related Infrastructure and Roads*

(Grouping) – *Urbanization, Population Growth and (Domestic or Industrial) Water Demands*

(Grouping) – *Agricultural Expansion and (Ag-related) Water Demands*

(Grouping) – *Effects of Air Pollution*

- **Project Description:** Determine air quality impacts due to acidic deposition (sulfur & nitrogen), mercury, and ozone.

(Grouping) – *Non-human Biotic Stressors and Disturbance Agents*

- **Project Description:** Identify areas where excessive deer (or other) herbivory is threatening forest resiliency. Establish sustainable carrying capacities and identify indicators for determining sustainable levels of herbivory.
- **Project Description:** Determine impacts of forest tree pests on forest community health at landscape scales.
- **Project Description:** Determine impacts of non-native invasive species on forest community health at landscape scales.

(Grouping) – *Cumulative Impacts*

- **Project Description:** Describe the interaction among identified threats (e.g., fragmentation and invasive species/disease introduction, spread) on communities and species. Determine effects of individual or groups of stressors (e.g., urbanization, energy development) on forest integrity/functionality and endemic species. *[COP Comments: "Integrity" and functionality" are vague terms that need further definition before this project could move forward. Any assessment of the stressors in the Apps needs to consider their cumulative impacts and interactions, as no one stressor*

operates in a vacuum. It is critical that urbanization be addressed as one of these stressors.]

B. HEADING: HUMAN DIMENSIONS

2. PROGRAM: Social Component

PROGRAM DESCRIPTION: *This program outlines the social values of ecosystem services.*

(Grouping) – *Value/Ecosystem Services and Conflict*

- **Project Description:** Conduct water value case study to show the ecological, economic, and human health importance of water coming from the high elevations of Appalachian forests to large human population centers on the East Coast.

(Grouping) – *Recreational, Commercial, Subsistence Use*

C. HEADING: SYSTEM LEVEL

3. PROGRAM: Ecological Functions of Managed/Human-Altered Systems

PROGRAM DESCRIPTION: *Describe community level population responses to non-natural disturbance.*

(Grouping) – *Foundational/Stock-taking Assessment/Classification System*

- **Project Description:** Map extent of existing forest, fragmenting features, and developed areas for the entire region, then discriminate between and map the extent of managed/human altered forests and natural/intact forests.
- **Project Description:** Compile data resources that exist in various forms, and provide it in a usable/accessible format for LCC partners (e.g., comprehensive mine lands layer, Regional Conservation Database of protected/easement lands, invasive species maps).
- **Project Description:** Complete Environmental Compliance and Protection (ECAP) for entire region—what is the natural range of variability in forested systems, and where are we now in relation to reference conditions – with focus on building resiliency? [*COP Comment: This is important work, but there is great potential for re-inventing wheels. Synthesize and build on the substantial existing work that has been done by TNC, Landfire, state Natural Heritage programs, and many academic researchers. Historical data are scant and most of it has already been reported before. Focus on 1) searching out and inventorying any existing old growth stands that have not been previously inventoried, 2) conducting additional dendrochronology studies of fire regime in stands that still contain presettlement and early settlement age trees, 3) analyzing pre-logging era witness tree data, 4)*

refining existing reference condition descriptions, with a focus on clearly identifying the parts of those descriptions that are based on empirical data vs. informed speculation.]

- **Project Description:** Crosswalk existing Ecological Land Units (ELUs) to other initiatives (e.g., LandFire, Ecological Zone Modeling).
- **Project Description:** Utilize existing intact ecosystems/communities to identify important functional, structural, compositional (species composition), and distributional ties/relationships with other ecosystems/communities necessary for the sustained health of one or both of those systems.

[AppLCC FY11-12 Funded Project (Baldwin, Clemson University) “Data Needs Assessment”]

(Grouping) – *Barriers (Flows and Species Movement)*

(Grouping) – *Mitigating Ag and Forestry Impacts*

- **Project Description:** Describe carbon sequestration dynamics and potential for use of this mitigation approach for Appalachian forest systems.
- **Project Description:** Complete and compare forest block modeling/prioritization (e.g. TNC connectivity/flow models, Atlantic Flyway Initiative with Audubon and Joint Ventures). Identify minimum area requirements [need to explain, for what?]. [COP Comments: For the central and northern Apps, this has largely been done by TNC. Focus on finishing up that effort and extending to southern Apps and central hardwoods. There are a lot of these types of efforts ongoing in the Apps, and a synthesis of such efforts would 1) minimize redundancy given the work already invested in this work, 2) provide a comprehensive assessment of what partners feel are critical forest blocks, 3) illustrate both overlap and gaps/conflicts in areas of prioritization and 4) foster and improve cooperation and communication among the many LCC partners involved in this work.]

(Grouping) – *Protection & Restoration Approaches*

- **Project Description:** Develop and compile data regarding the utility of silvicultural tools, invasive species management approaches, prescribed burning, and other activities as restoration and management tools for a full complement of forest communities.
 - o **(related) Project Description:** Research how these practices (above) might facilitate habitat conservation and coordination of forest conservation actions across regional boundaries under changing conditions.
 - o **(related)Project Description:** Identify spruce forest reference conditions to support

restoration design and planning purposes. *[COP Comments: This should probably be included within the project (four bullets up) that addresses nrv/reference conditions of all ecosystems. The Central Appalachian Spruce Restoration Initiative (CASRI) partnership has already done a good bit of work toward this end; recommend building on that work and incorporating it into the larger nrv/reference condition project.]*

(Grouping) – *Effects of Fire on Ecosystems*

- **Project Description:** Develop Best Management Practices (BMPs) for use of prescribed fire for ecosystem restoration. *[COP Comment: All Appalachian Fire Learning Networks are working on this, as part of their process. Also active Prescribed Fire Councils at the state level. Currently active FLNs in GA/NC/TN/VA/KY/WV/PA.]*
- **Project Description:** Detail use and efficacy of prescribed fire in the presence of and control of invasive fauna, flora, and pathogens.

4. PROGRAM: Ecological Functions of Natural/Intact Systems

PROGRAM DESCRIPTION: *Understanding the system relatedness and dependency.*

(Grouping) – *Foundational/Stock-taking Assessment/Classification System*

- **Project Description:** Update and refine the regional classification for natural forests, bringing together quantitative data (plots) on forest structure and composition and experts from the entire region to perform statistical analysis and hold workshops to validate, revise, and fill gaps in the U. S. National Vegetation Classification (USNVC).
- **Project Description:** Map extent of existing forest, fragmenting features, and developed areas for the entire region, then discriminate between and map the extent of managed/human altered forests and natural/intact forests.
- **Project Description:** Develop, describe, and apply broad-scale, regionally consistent units for mapping forested ecosystems across the LCC.
- **Project Description:** Complete ELU mapping for entire Appalachian region. *[COP Comment: Need this in order to do credible ECAP analyses.]*
- **Project Description:** Collate existing LiDAR efforts and curate data to identify and prioritize new data capture. *[COP Comment: Need to specify an application for the data.]*

(Grouping) – *Relationship/Ecological Flows and Nutrient Dynamics*

- **Project Description:** Determine disturbance impacts on nutrient cycling (e.g., fire, pests, erosion).
- **Project Description:** Set canopy targets for the region’s forest to reduce stormwater flows. *[COP Comment: Consider are conflicts with management restrictions for certain species that need resolution (e.g. Indiana bat restrictions may impede (temporary) canopy reduction from young forest management.)]*

(Grouping) – *Ecosystem Integrity/Resiliency*

- **Project Description:** Identify important functional, structural, compositional (species composition), and distributional relationships within and among ecosystems/communities necessary for the sustained health of one or both of those systems. *[COP Comment: We need to understand dynamic thresholds that cause system failure or serious degradation including water quantity and quality, canopy cover etc. This will ultimately get us at some of the big cumulative impact questions we are currently struggling with right now. I think we have some good handles on the no regrets levels (like maintaining >80% canopy for forest interior birds, but the struggle comes at being more precise at the limiting effects level and is likely to vary by community or species guilds etc. Good easily I think be rolled into E.6 below in some regard.)]*

D. HEADING: COMMUNITY LEVEL

5. PROGRAM: Community Level (Description and Function or Basic Community Ecology)

PROGRAM DESCRIPTION: *Describe community-level population responses to disturbance. Develop and compile information about the distribution and status of existing high priority forest communities and work with partners to develop management strategies that will either conserve existing forest types under changing climatic conditions or will facilitate successional transition to other forest types, if appropriate to public and management needs.*

(Grouping) – *Basic Ecology/Ecological Relationships*

- **Project Description:** Based on a revised USNVC of natural forests of the region (see classification project added under program 4) assign and/or revise conservation status ranks (rarity/imperilment) for individual associations and map and determine relative viability/ecological integrity for occurrences of the most vulnerable associations, to establish priority conservation sites.
- **Project Description:** Need for up-to-date landcover data and refined modeling techniques for determining the appropriate amount of each stage within each community type; must be

able to down-scale to local area to incorporate species-specific needs/ data. [COP Comments: 1) Some current forest service products get us close to this and should more broadly applied; 2) This seems like too much to bite off for an LCC-wide project. The “appropriate amount of each stage within each community type” will be broadly defined by the hrv/reference conditions project. When down-scaling to local areas, the landowner’s/manager’s goals and objectives become the main driving factor behind the distribution of stages across the landscape; 3) National Fire Plan Landfire efforts started this and several Fire Learning Networks are refining these models for their particular areas.]

E. HEADING: SPECIES/POPULATION LEVEL

6. PROGRAM: Basic Biological Understanding (Species-level)

PROGRAM DESCRIPTION: Work with partners and stakeholders to develop and compile information about priority species and priority conservation areas within the LCC, their habitat requirements, and changes in the distribution of those species and habitats to facilitate the regional management of those resources. Develop and compile information about the LCC’s terrestrial species, work with partners to better estimate their current degree of imperilment, and coordinate the development of regional management strategies that will help conserve these species in the face of changing land-use and climatic conditions. Describe needs for additional study to support sustainable populations and outlines emerging threats.

(Grouping) – Basic Biological Information

- **Project Description:** Develop statistically sound inference methods to be able to develop models based on existing data sources (e.g., methods that would allow us to relate detection probability to a process of establishing scientifically valid population trend analyses). COP needs to verify scope and intent of this science need. [COP Comment: Existing data sources are often not appropriate for this type of analysis, so in each case need to address their suitability to the specific questions being asked.]

(Grouping) – At-Risk Species/Populations & Endemics

- **Project Description:** Adapt standardized approach for developing at-risk wildlife and plant species/community list. [COP Comment: Suggest the LCC instead adopt NatureServe G/N/S ranks as the criteria for determining what constitutes “at risk”.]
- **Project Description:** Develop and overlay taxa-specific priority areas (e.g., terrestrial salamanders, priority birds). [COP Comment: Goal would be to develop synergy between taxa based on ecosystems. Examples: aid rare insect taxa by managing scrub barrens for GWWA. Protect rare wetland plants & insects by protecting swamp (wide buffers) for CAWA.]

- **Project Description:** Document the incidence/cumulative impacts of forest pests/pathogens/invasives on forest/wildlife species and investigate mitigative measures.
- **Project Description:** Identify and fill gaps in basic distribution and abundance data for at-risk species. *[COP Comment: This information is expensive and time-consuming to collect, but it is absolutely necessary if we are to get the fine-filter component of the LCC’s conservation strategy right.]*
- **Project Description:** Identify and fill gaps in basic life history and ecology data for at-risk species.
- **Project Description:** Transition from nest-box surveys to acoustical surveys for the endangered Carolina and Virginia northern flying squirrel.
 - o **(related) Project Description:** Determine linkages between northern flying squirrel habitat preferences for conifer-dominated, i.e., red spruce, mature hemlock and fir systems. *[COP Comment: DOT Corridor H mitigation is funding USGS study investigating these two projects above.]*

(Grouping) – *Contaminants/Pollutants Effects on Species/Populations*

(Grouping) – *Invasive Organisms Effect on Species and Populations*

(Grouping) – *Effects of Disease (on a Species or Taxonomic Group)*

- **Project Description:** Describe Chytrid fungus: incidence and impact on Appalachian amphibians.

F. HEADING: “HOW THE LCC SHOULD DO BUSINESS”

- Coordinate management plans / treatments across jurisdictional and ownership boundaries (including private lands) to achieve broader conservation goals (e.g., regional connectivity).
- LCC should support two initiatives underway that are working on spruce restoration, CASRI (central apps) and SASRI (southern apps).
- Develop finer-scale conservation objectives that are based on existing regional data/ layers.
- Identify availability/scale/format/source of existing resources, provide access to those resources, and identify gaps for addressing existing science needs.