2012\_ScienceNeedsPortfolio\_(9)\_ClimateChange\_Restructured.docx

Thematic Area: Climate Change (Impacts, Downscale/Coupled Modeling, Adaptation

**MISSION:** Create an effective adaptation strategy for climate change based on the best available science.

*[science objective]* Work to provide the best available predictions of how the regional climate might change, and estimate the impacts those changes might have on the region's natural and cultural resources (in order)

*[management objective]* to work with partners and stakeholders to determine adaptation and mitigation strategies that can be implemented and coordinated at a regional scale.

A. Heading: Regional Level

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

**PROGRAM DESCRIPTION:**~~Develop/compile scientific tools to~~ Project likely impacts climate change will have on the LCC, how those changes could affect the region, and work with partners to develop strategies to help human communities, industry, aquatic species and other conservation management interests, plan for, and adapt to those changes.

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

* **PROJECT DESCRIPTION:** Develop a data catalog “Database of databases” [to document historic or current long-term datasets being collected] in the region.
  + **(related)** Archive important regional data that may be lost (e.g. such as SAMAB, or University research data sets).
  + **(related)** Develop a catalog of important climate publications; subset of the national work.
  + **(related)** Index of technology and availability of ecologically scalable habitat-type focused imagery data (veg/forest types, talus, boulder or ground types, wetlands/water body) for application in species/habitat range and habitat modeling/shifts.

[**AppLCC** FY 11/12 **Funded Project: (Baldwin, Clemson University) “**Data Needs Assessment, to Support Conservation Planning for the Appalachian LCC**“]**

(Grouping) – *Climate Change Science and abiotic or mechanical aspects*

* **Project Description:** Measure and model hydrologic regime changes related to climate change. (Need to understand the impact of precipitation and temperature change on surface-water and groundwater hydrology in the context of regional land use, water use, recreation, industrial, municipal, agriculture.)
* **Project Description:** Measure and track inter-annual variations in snow pack [to support analysis of] effects on high elevation species.

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

* **Project Description:** Identify effect of changing climate on hydrology, soils, disturbance events, mercury methylation.
* **Project Description:** [Characterize] soil processes and chemistry changes due to changes in temperature and precipitation/moisture (as related to climate change). Identify parameters for highly vulnerable soils and map these areas (soil type, slope, position, elevation, land use).
* **Project Description:** [Examine how] nutrient dynamics [are influenced by climate change]
* **Project Description:** Use remote sensing technology to identify impact of climate change on edge habitat and migration corridors.
* **Project Description:** [Identify] biological responses to hydrologic regime changes related to climate change. [Editor: *COP needs to identify specific concerns*/focus]
* **Project Description:** Assess the vulnerability of species, habitats, and human resources to changing climatic conditions within the LCC and work to make those tools available to partners to make findings known within the LCC community; provide an opportunity for others to improve upon existing efforts, and limit the duplication of effort.} [Editor: COP need to provide focus]
* **Project Description:** Landscape simulation models (e.g., LANDIS) that predict spatial and temporal dynamics of land-use/land cover under alternative scenarios (e.g., climate change, urban growth, energy development).

(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*

(Grouping) – *Cumulative Impacts*

* **Project Description:** Evaluate the interaction among land use, climate change, invasive species, and/or other environmental stressors to develop guidelines and principles for adaptation strategies. [Strategies: human interactions, biological augmentation, genetic banking, restoration efforts.]

B. Heading: Human Dimensions

**2. PROGRAM: Social Component**

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

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

* **Project Description:** Determine climate impacts on Recreation.
* **Project Description:** Determine climate impacts on Subsistence.

C. Heading: System Level

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

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

(Grouping) – *Barriers (flows and species movement)*

(Grouping) – *Mitigating Ag and Forestry Impacts*

(Grouping) – *Protection & Restoration Approaches*

* **Project Description:** [Develop a] common set of parameters and data standards to facilitate integration of multi-agency/organization restoration, protection, and management (geo)databases into a more comprehensive conservation tracking system to: monitor land use land cover changes, refine decision support tools, and serve as sampling universe to test underlying assumptions.

**4. PROGRAM: Ecological Functions of Natural/Intact Systems**

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

* **Project Description:** Consistent land-use/landcover classification and mapping using common ecological systems or similar nationally consistent classification system, ideally with 5-year updates.
* **Project Description:** Updated, complete and coordinated land cover data (NLCD, NWI, etc.). [Editor: *COP needs to provide details on purpose, uses for information*.]
* **Project Description:** Use/availability of LIDAR technology and infra-red mapping in water/land thermal mapping (temporal/spatial applications for aquatic, wetland terrestrial habitat etc.). [*COP needs to provide details on purpose, uses for information*.]
* **Project Description:** Consistent secured (protected) lands spatial data system that allows assessment of lands and habitat types in the conservation estate. Should include conservation easements. Should be updated annually. (Purpose: Needed for analysis of how well habitats are represented in the conservation estate.)

(Grouping) – *Effects of Fire on Ecosystems*

(Grouping) – *Relationship/ Ecological flows and Nutrient dynamics*

* **Project Description:** Stream classification system and subsequent geospatial data used to quantify the amount and types of streams and rivers allowing conservation partners to better allocate conservation actions and resources, and recommend flow and hydrology policies and management actions for streams that lack site specific data

**[AppLCC FY11/12 Funded Project:** (Anderson et al., The Nature Conservancy & ORNL) “A Stream Classification System for the Appalachian Landscape Conservation Cooperative”]

(Grouping) – *Ecosystem Integrity / Resiliency*

* **Project Description:** Coarse-filter assessments of ecological integrity and resilience to complement priority species approach. *{Examples include CAPS in Massachusetts and Geophysical and Resilient System Approach to Climate Change Adaptation proposed by TNC in the Northeast.*}
* **Project Description:** Comprehensive/validated road/transportation maps/data layers (for use in corridor, connectivity, invasive species analyses etc.).
* **Project Description:** Develop comprehensive models that consider terrestrial and aquatic conservation needs by incorporating an aquatic component (e.g. stream and river networks) into terrestrial landscape models.

D. Heading: Community Level

**5. PROGRAM: Community level (description and function or basic community ecology)**

(Grouping) – *Basic Ecology/Ecological Relationships*

* **Project Description:** Assessment of assumptions related to use of focal or representative species approach to guide development of decision support tools, i.e. do these approaches adequately represent larger sets of species and how do they compare to coarse-filter approaches.

E. Heading: Species/Population Level

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

(Grouping) *– Basic Biological Information*

* **Project Description:** Develop a phenological index of ecological health using high elevation communities.
* **Project Description:** Basic biological response information as it relates to key species/populations. [Editor: *COP needs to elaborate, provide specific details on areas of interest/importance*.]
* **Project Description:** Support a multi-scale vulnerability assessment (that incorporate species-specific physiological data) to identify habitats and species that would be most vulnerable to climate change in the LCC. (Coarse and fine scale). {Notes: physiology includes environmental physiology, species specific data- what are the thermal tolerances, and seasonal cues for organisms, and when plugged into population models, the predicted impact on the population level processes.}

**[AppLCC** **FY11/12 Funded Project:** (Young et al., NatureServe) “Understanding Land Use and Climate Change in the Appalachian Landscape “]

* **Project Description:** Identify effect of changing climate on species migration and distribution [across the AppLCC].
* **Project Description:** Landscape genetics-mine data from multi-species, multi-organizations to add as layers on landscape level spatial analysis. This will allow the identification of "genetic corridors" for obvious or cryptic movement of organisms, and "genetic hot-spots," or areas that multiple species have high levels of genetic diversity to facilitate biological planning.
* **Project Description:** Species-habitat models that allow for the assessment of the capability of habitats to support populations at objective levels at present and in the future. Most existing species-habitat models do not allow for assessments of capacity, abundance or persistence/[resilience].
* **Project Description:** Updated comprehensive population surveys-what are the current distributions, habitat preferences, and community/ecological necessities for organisms.

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

* **Project Description:** Climate change impacts on endemic and other native communities within the LCC including disease, range/habitat, breeding/spawning locations, migration routes {esp. aquatics}.[Editor: COP needs to provide focus]
  + **(related) Project Description:** Establish endemic species population trends [to investigate possible] relationships to climate change influences.

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

(Grouping) – *Invasive organisms effect on species and populations*

* **Project Description:** Identify [inter-related] effect of changing climate on invasives including: zoonotic and wildlife diseases, exotic plant and animal distribution *{esp. in forests}.*
* **Project Description:** [Document] climate change influences on invasive species across the US.

(Grouping) – *Effects of Disease (on a species or taxonomic group)*

F. Heading: “How (the LCC) Should Do Business”

* Participate in national enterprise systems [through the networks of LCCs and CSCs] that will compile information from multiple sources [at larger relevant scales than the AppLCC]. “Don’t build your own.”
* Work with partners to develop regional climate adaptation strategies that will, to the extent possible, help ensure the persistence of healthy human and fish and wildlife communities in the face of changing climatic conditions.}
* Identify natural sources/examples of adaptation. (Species that are less sensitive to climate change serve as an example of strategies to manage throughout the LCC.)
* Serve as a clearinghouse to ensure that there is coordination and sharing of datasets and current climate change research products; host datasets and products that have no other established “home.”
* Support large-scale monitoring efforts to document and track impacts of climate change on Appalachia.

[2010-xx **NASA/URI Funded Project**] Mega-Transect - large-scale, multi-agency/research for climate change monitoring and impact studies. and [2012 NASA/NPS Funded Project] across the Appalachian and Rocky Mt Transcect

* [Compile, develop, and make available] consistent managed-lands spatial [data and products].

**Notes:** version posted: 2012-12-18