Science Needs Portfolio Summary Review

The Science Needs Portfolio is a guiding framework for the LCC that is being used to help facilitate and support the conservation planning, delivery, and applied research and monitoring efforts that address conservation challenges and opportunities across the Appalachian landscape. It was initially developed in late 2011 through a 3-day interactive workshop engaging 139 researchers, biologists and managers from across the region. Every state fish and wildlife agency was asked to participate! Actual participation was evenly split between managers and researchers; approximately 50% of all participants worked for federal agencies, ¼ for states and ¼ NGOs/universities/business. In February 2013, almost 50 experts from a wide range of technical background in both natural and social sciences, as well as geographic expertise across the entire region, volunteered to participate in a review of the Appalachian LCC Science Needs Portfolio, which marked the first revision of the Portfolio. Some of you participated in one or both of these processes!

The Science Needs Portfolio is the cornerstone of the Appalachian LCC Science Program. It is organized into 8 broad, thematic areas. Priority projects have been initiated in most areas. What follows is a brief summary of the thematic areas and App LCC funded work:

[1] **Aquatic**: Maintain native habitats and endemic aquatic species in their current locations or support these as they migrate with land use and climate changes in the future. Objective - Quantitatively describe current and future hydrologic and structural habitat conditions, and aquatic population trends.

Project Description: Develop a classification system and map for stream and river systems for the Appalachian LCC that represents the region's natural flowing-water aquatic habitats. [*AppLCC Funded Project*: Anderson et al., The Nature Conservancy & ORNL. " A stream classification system for the Appalachian Landscape Conservation Cooperative"]

Project Description: Develop a riparian planting and restoration decision support-tool to address the immediate conservation planning efforts of resource managers to safeguard valued aquatic resources under predicted climate changes. The *Riparian Restoration to Promote Climate Change Resilience* tool works by identifying vulnerable streams and riverbanks in coldwater stream habitats that lack tree cover and shade.
[*AppLCC Funded Project*: Nislow, USFS. "Web-based tool for riparian restoration prioritization to promote climate change resilience (RPCCR) in eastern US streams"]

Project Description: There is a great need for the development of region-wide flow policies to protect stream ecosystems and enhance long-term management of aquatic resources in the

face of energy development such as natural gas drilling. This research is developing models that predict ecological responses to flow alteration within the Marcellus Shale region of the Appalachian LCC.
[*AppLCC Funded Project*: Fisher & Walter, Cornell University. "Development of a hydrologic foundation and flow –ecology relationships for monitoring riverine resources in the Marcellus Shale region"]

[2] **Cave/Karst & Minelands**: Conserve and manage cave/karst and restored mine lands communities across jurisdictions. Objectives – to inventory significant regional subterranean cave/karst systems and communities, evaluate their condition and importance, and identify regional threats so that LCC partners and stakeholders can develop and implement cohesive regional strategies to protect and manage these resources across jurisdictions.

Project Description: Develop a classification system and an Appalachian-wide map depicting where cave and karst habitats and resources occur across the landscape.
[*AppLCC Funded Project*: Culver, American University. "Classification and Georeferencing Cave/Karst Resources across the Appalachian LCC"]

[3] **Wetlands**: Inventory significant regional wetland habitats, evaluate the condition and importance of these habitats, and identify regional threats impacting those resources so that LCC partners and stakeholders can develop and implement cohesive regional management strategies to protect and manage wetlands across jurisdictions.
[No AppLCC funded projects currently]

[4] **Forests**: Identify and prioritize regional forest habitats and natural communities to foster resiliency in the face of current and future threats while supporting a larger multijurisdictional framework for planning and management. Objective - Inventory significant regional forest habitats while evaluating present and future conditions including threats, importance and connectivity of these habitats so that LCC partners and stakeholders can develop and implement cohesive regional management strategies to protect and manage forest resources across jurisdictions.

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 these systems.
[*AppLCC Funded Project*: Baldwin, Clemson University. "Data needs assessment to support conservation planning for the Appalachian LCC"]

[5] **Openlands/Grasslands (meadows, balds, shale barrens)**: Maintain native habitats and native species in their current locations or support these as they migrate in response to land use and climate changes in the future. Objective - Inventory significant regional grassland/open land communities, evaluate the condition and importance of these habitats, and identify regional threats impacting those resources so that LCC partners and stakeholders can develop

and implement comprehensive regional strategies to conserve and manage natural and non-natural (e.g., restored mine lands) grassland/open land communities across landscape jurisdictions.
[No AppLCC funded projects currently]

[6] **Working Lands** (**human dominated/economic lands, e.g., urbanized, agricultural, industrial, and energy development)**: Improve planning and integration of working lands and conservation interests. Objective – develop a better understanding of how potential land use changes will affect conservation goals and how these effects can be avoided or mitigated to reduce economic impacts and pressures on the natural resources of the Appalachian region so that LCC partners and stakeholders can collaboratively meet economic development and conservation management goals through improved decision making and resource management.

Project Description: Forecast energy development by combining data on trends to give a more comprehensive picture of what potential energy development could look like in the Appalachians and identify where these may intersect with valued natural resources. Information and mapping tool to inform discussions among conservation organizations, policy makers, regulators, industry, and the public on where to protect essential natural resources while realizing the benefits of increased domestic energy production
[*AppLCC Funded Project*: Kiesecker, The Nature Conservancy. "Forecast resource extraction: energy development for shale, wind and coal for a 20-year timeframe and produce geospatial displays"]

Project Description: Provide guidance for water withdrawals for natural gas, abandoned mine lands and other energy uses.
[*AppLCC Funded Project*: Fisher & Walter, Cornell University. "Development of a hydrologic foundation and flow –ecology relationships for monitoring riverine resources in the Marcellus Shale region"]

Project Description: Establish a stream classification system and subsequent geospatial data to quantify the amount and types of streams and rivers, allowing 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 Funded Project*: Anderson et al., The Nature Conservancy & ORNL. " A stream classification system for the Appalachian Landscape Conservation Cooperative"]

[7] **Human Dimensions:** Incorporate ecosystem services values that benefit human communities and associated social expectations into natural resource decision-making. Objective – conduct research necessary to sustain, enhance and restore ecosystem services provided by natural ecosystems and develop and implement an ecosystem services framework to inform management actions and decisions in the Appalachian region.

Project Description: Inventory of existing ecosystem services assessments, products, and decision-support or visualization tools conducted within the Appalachian LCC boundary. Research will also involve a regional survey and workshops within our boundary to assemble a list of high priority economic goods and services and non-monetized values and benefits that are dependent on Appalachia's natural assets while identifying the associated resource that support these services and benefits (such as intact forests, clean rivers, etc.). Finally a geo-referenced assessment of the location of key ecosystem services that are linked to specific priority economic products or uses will be developed.
[*AppLCC Funded Project*: Lee, USFS. "Assessment and Inventory of Ecosystem Services and Environmental Threats"]

[8] **Climate Change**: Create an effective adaptation strategy for climate change based on the best available science. Objective – provide the best available predictions of how the regional climate might change, and estimate the impacts these changes might have on the region's natural and cultural resources so that LCC partners and stakeholders can determine adaptation and mitigation strategies that can be implemented and coordinated at a regional scale.

Project Description: Support a multi-scale vulnerability assessment to identify species and habitats that would be most vulnerable to climate change in the Appalachian region. Also include information on human populations that are impacted by these climate changes.
[*AppLCC Funded Project*: Young et al., NatureServe. "Understanding land use and climate change in the Appalachian landscape"]

Project Description: Index technology and availability of ecological scalable habitat-type focused imagery data for application in species/habitat range and habitat modeling/shifts. Additionally, we reviewed and analyzed State Wildlife Action Plans (SWAP) from 15 states that intersect with the LCC.
[*AppLCC Funded Project*: Baldwin, Clemson University. "Data needs assessment to support conservation planning for the Appalachian LCC"]

Project Description: Develop a draft regional conservation plan for the Appalachian LCC using an interactive and iterative planning approach.
[*AppLCC Funded Project*: Baldwin, Clemson University. "Interactive conservation planning for the Appalachian LCC"]