

APPALACHIAN

LANDSCAPE CONSERVATION COOPERATIVE



Build
CAPACITY

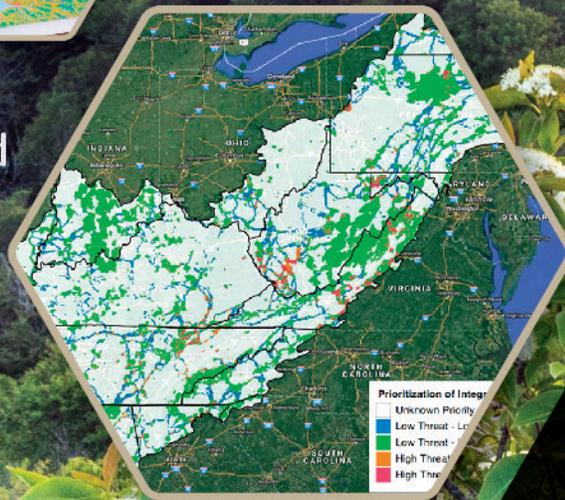


Support
NETWORKS



Deliver
SCIENCE

Integrated
DESIGN



APPALACHIAN
LEGACY
REPORT

2016-17

A Strong Jumping-Off Point ... In Re-Imagining the Partnership

The members of the Appalachian Landscape Conservation Cooperative (AppLCC) initiated a programmatic review of our work as the focus of our annual meeting in the summer of 2016. We celebrated our successes and progress in completing our previous 5-year work plan. In the process we identified challenges faced in the previous years, along with new opportunities that have arisen since the first 5-year plan was developed, as well as future conservation priorities. The meeting was a benchmark, of the growth of the partnership, and the evolution of this new approach to conservation – large-scale collaborative partnership.

The partners left the 2016 review energized by our successes; advances in the science of conservation planning, development of networks and partnerships, and delivery of tools to conservation planning in focal areas to inform conservation outcomes. We agreed to continue the work of defining the next phase of the conservation partnership. 2017 was the start of the next phase of our organizational evolution, which began, as we had previously by drafting new goals and objectives to provide the direction of our next 5-year Work Plan. The year 2017 was a critical year in our partnership as it signaled a major year of transformation. Thus, we took up the challenge from a position of strength – a strong ‘jumping off point’.

Our self-evaluation began in advance of a similar national level efforts under the new federal administration. The goal: to review programmatic direction and commitment of large geographic conservation partnerships. Although there is uncertainty in what precisely the path forward will

look like, Appalachian conservation partners are fortunate, and perhaps uniquely positioned, to help contribute to this broader dialogue. Thus, we have combined our reporting on both 2016 and 2017 in this “Appalachian 2016-17 Legacy Report”

To our national colleagues: we hope this report aims to provide guidance to the conservation community as we consider the path forward, reflecting on the successes of the partnership and the LCC model of collaborative landscape conservation.

To our regional partners: we can remind ourselves of the partnership vision – reflecting the motivation of the partnership formation originally, remains solid. Our ability to realize the vision is closer than ever before thanks to the dedication and investment of time and resources. We are positioned to take the next steps to mobilize our expertise, direct resources, and apply the science to work together towards our common goals. This partnership can make a difference for the Appalachian region.

Thanks to out-going Leadership:



Dr. Gwen Brewer, Appalachian LCC Chair,
Maryland Department of Natural Resources

Clyde Thompson, U.S. Forest Service
Monongahela National Forest, West Virginia



Overview

This report is organized along the major elements of our work:

- SECTION **1** Advancing *Landscape Conservation Design*
- SECTION **2** *Networking Focal Area Partners* across the geography
- SECTION **3** *Delivering the Tools* including the creation of online training courses and in-person workshops, and
- SECTION **4** Integrating *Social-Cultural Priorities* influencing land-use decision and connectivity of natural areas.

In 2016 the AppLCC Partners also began to draft their next (the 2nd) 5-Year Work Plan to capture what they saw as the “*Next Phase*” of the partnership (i.e., to focus on conservation delivery that would build on the previous achievements of the AppLCC) see “*Our Legacy*” insert (page 12). Based on partner interviews, staff attempted to review the successes and challenges of the partnership over the past 5-years as a “*Lessons Learned*” see Appendix (page 30). Combined, these sections may suggest a path forward, and help to define the organizational structure and next iteration of a large-landscape collaborative conservation partnership in the Appalachian region.



Left to Right: Lars Pomara (USFS SRS), Ken Elowe (USFWS), Matthew Cimitile, (AppLCC), Clyde Thompson (USFS), Bill Reeves (TN WRA), Thomas Minny (TNC), Todd Fearer, (AMJV), Susan Spielberger (EPA), Danny Lee (USFW SRS), Dave Hartos (OSMRE), David Whitehurst (VA DGIF), Jean Brennan (AppLCC), Pat Ruble (WMI), Dick Cole (ACE), Paul Kyzak (MD DNR), Evan Crews (TVA), Dan Odess (NPS), Bill Jenkins (EPA), Ginny Kreitler (Audubon), Gwen Brewer (MD DNR), Paul Johansen (WV DNR), Perry Wheelock (NPS), Mark Thurman (TN WRA), Rachel Muir (USGS), Kendrick Weeks (NC WRC), Mike Piccirilli (USFWS), Rob Baldwin (Clemson), Lori Pelch (NALCC).

The Partnership

Maryland Department of Natural Resources
 U.S. Forest Service - Monongahela National Forest, West Virginia
 Tennessee Valley Authority
 Environmental Protection Agency, Region III
 National Park Service, National Capital Region
 West Virginia Division of Natural Resources
 Virginia Department of Game and Inland Fisheries

National Park Service, Southeast
 Georgia Department of Natural Resources
 U.S. Army Corps of Engineers
 Natural Resources Conservation Service
 Pennsylvania Fish & Boat Commission
 Environmental Protection Agency, Region IV
 U.S. Fish and Wildlife Service, Northeast Region

U.S. Fish and Wildlife Service, Southeast Region
 Wildlife Management Institute
 Eastern Brook Trout Joint Venture
 Pennsylvania Game Commission
 Eastern Band of Cherokee Indians
 U.S. Forest Service, Southern Research Station
 National Oceanic and Atmospheric Administration

The Nature Conservancy
 U.S. Geological Survey
 Bureau of Indian Affairs
 Tennessee Wildlife Resources Agency
 National Wildlife Federation
 Office of Surface Mining Reclamation and Enforcement
 North Carolina Wildlife Resources Commission
 USFS Southern Research Station

The Vision

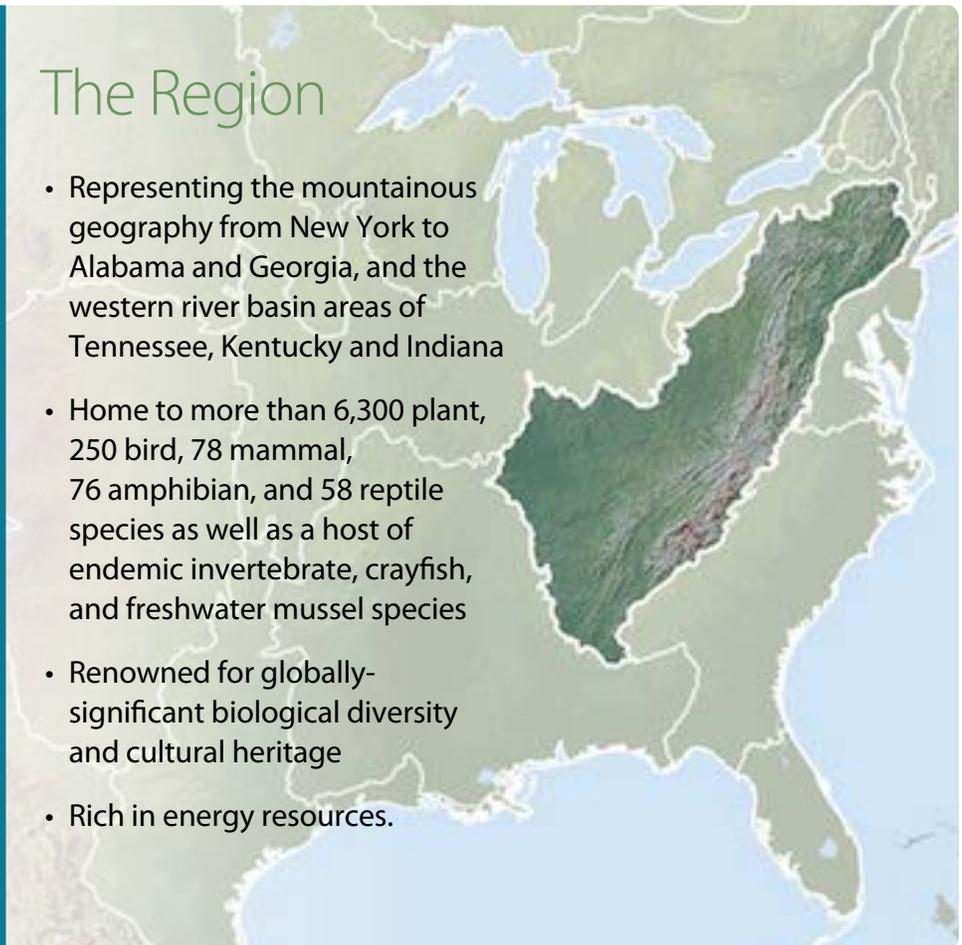
*Ecological Integrity.
 Environmental Benefits.
 Sustainable Wildlife Populations.*

& Mission

Achieve sustainable landscape-level conservation in Appalachia through partnerships, shared resources, enhanced science-based management capacity, landscape-level planning, and support for conservation actions and research.

The Region

- Representing the mountainous geography from New York to Alabama and Georgia, and the western river basin areas of Tennessee, Kentucky and Indiana
- Home to more than 6,300 plant, 250 bird, 78 mammal, 76 amphibian, and 58 reptile species as well as a host of endemic invertebrate, crayfish, and freshwater mussel species
- Renowned for globally-significant biological diversity and cultural heritage
- Rich in energy resources.



2016-17 Highlights



1 ADVANCING LANDSCAPE CONSERVATION:
Delivered the 2nd Landscape Conservation Design – an integration of optimization modeling with enhanced aquatic conditions. Combined design map with underlying data summary tools and aquatic condition visualization presented as **“NatureScape”** - a tool suite, based on state-of-the-art science.

2 NETWORKING FOCAL AREA PARTNERS:
Supported Sub-Regional Networks – Tennessee River Basin Network, Enhancing Partner Synergy and Improving Outcomes in an Aquatic Biodiversity Hotspot.

3 DELIVERING THE TOOLS:
On-line training courses including self-paced tutorials, classes on the uses of decision-support tools and other products, step-by-step demonstration of applying tools to natural resource issues.

4 INTEGRATING SOCIO-CULTURE PRIORITIES:
Melded cultural and natural resources – integrating thought, research design, and prioritized decision-making.

Research Completed and Delivered in 2016-17

The 2016-17 highlights the studies completing our foundational investment...

NatureScape – an optimal, collaborative design for the future;

Tennessee River Basin Report Card – of current status;

LanDAT – past landscape change and current ecological trends;

Stream Impacts – in the Marcellus Shale Region

... to inform decisions, signal potential damages and expanding threats due to water withdrawals, and to help balance the demands if we are to sustain the benefits of nature for society.

Each year our investments have been showcased in the annual reports as they came to completion. A quick ‘snap-shot’ of these are presented in the insert labeled “Our Legacy” of this report. Much of this funded research has been integrate into a user-friendly tool suite that delivers a state-of-the-art Landscape Conservation Design. As noted in the National Academy of Science’s review of LCCs these landscape conservation designs are the *“signature product”* of LCCs as they represent a unique contribution to existing conservation efforts. We have named our design **“NatureScape”**.

Advance the Science of Conservation for the Next 100 Years

Landscape-level Cooperatives were first proposed in response to the conservation challenges of the 21st Century. The cooperatives pushed the limits of century-old approaches to wildlife and resource management to manage at an appropriate, landscape-level scale. This approach was necessary to address the scale of the threats that extend beyond the capability of any single state, agency, or partner—challenges that are occurring at such fast rates of change that they require forward-thinking and proactive planning. This new, more adaptive approach necessitated a strong initial investment to create a science-based foundation. This foundation can be used to conduct large-scale and long-term planning and collaborative decision-making to help design supporting conservation actions.

Our Cooperative has built an impressive partnership and an engine for regional conservation. The cooperative leads the effort to create and assemble the tools and information needed for a solid scientific foundation. The cooperative is well placed to serve as an engine to facilitate regional

conservation action and delivery.

The LCC partnership has taken a two-prong approach. **First** in the investment in new and emerging science while simultaneously building the scientific foundation and delivering the information, tools, and conservation design needed to help inform management decisions. Second in the investment in the partnership itself, to network, facilitate, and help inform conservation planning.

- **Conservation Planning** is a process that identifies and prioritizes lands that encompass important natural and cultural resources across the landscape and develops protection and management strategies for these lands. Where planning is the process.
- **Conservation Design** is the product. It can be a series of maps or data layers that illustrate the location of focal areas and priority resources. This information can be combined into a decision-support tool to inform managers about the quality, quantity, and location of habitats needed to protect biodiversity.

A Suite of decision-support tools



NatureScape, TRB Report Card, and LanDAT are a suite of tools now available to help conservationists, land managers, stewards of natural and cultural importance. The goal: to identify and invest in, areas rich in resources or serving as critical in connecting and creating an integrated and connected landscape. Investment represents both financial as well as action. For those in the Appalachians, LanDAT was a jointly funded effort that compliments the other science investments.

NatureScape offers a possible **future** design – one that balances the competing interests and demands due to human land-use that represent major stressors to sustainable investments such as urbanization, energy development, and change in climate. It helps direct the conversation to engage local stakeholder and potential partners to safeguard resources and ensure healthy ecosystems, given competing needs to meet future human demands.

Report Card captures **present** status, but represents not only the natural terrestrial and aquatic habitats, but also represents the sort of things people value such as access to clean water, natural scenic area, and recreational opportunities and associated economic benefits. But moving forward to apply the science will require a focal area approach. To refrain the adage, as in politics, all decisions are local. Thus, the Appalachian partners chose to invest in developing a local Report Card for the Tennessee River Basin. The question LanDAT can support is: Given targeted investment, is an area or system stable or on a recovery trajectory, or is it likely to decline over time given the stressors and frequency of insults? In essence, is it a wise investment?

LanDAT helps to identify **past** disturbance and change events and the response trends (i.e., is the recovery, decline, or stable) as one indicator of health and resilience of natural forested systems across the region. More than 62% of the Appalachian geography is forested. In fact, the design of this tool by Forest Service researchers has been part of a National-level assessment, thus offering an even broader predictor.

1. NatureScope – to Guide Current Decisions to Achieve Desired Future Outcomes

Over the last year, Clemson University researchers and Appalachian LCC staff coordinated a series of consultations with experts across the region to ensure priority aquatic species, habitats, and ecosystems are included in NatureScope. These experts helped the LCC identify appropriate frameworks for assessing aquatic integrity, key conservation targets and threats to aquatic ecosystems, and delve further into representative databases of the region.

In 2015, the Appalachian LCC rolled out the initial version of its conservation design. In that initial effort, the researchers identified what they called five conservation elements, which covered ecologically significant habitats and processes across the Appalachians. These elements included regional interconnected cores (broad areas of regional significance having high landscape connectivity), as well as broad corridors that connect these cores. Small areas, that are likely to contain larger ecological significance than their size would suggest, or act as buffers around existing protected areas, were also mapped.

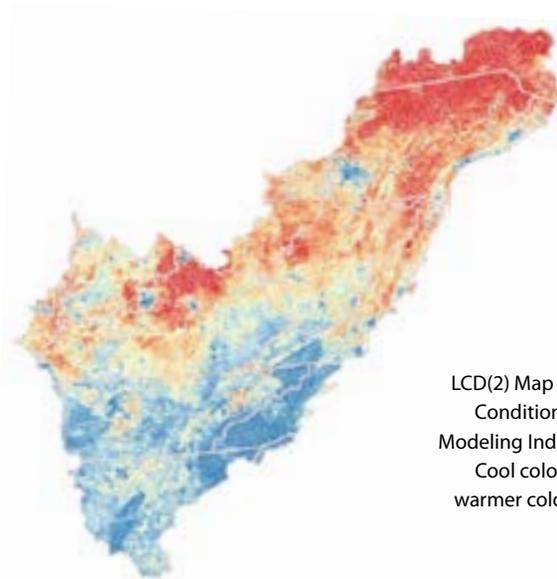
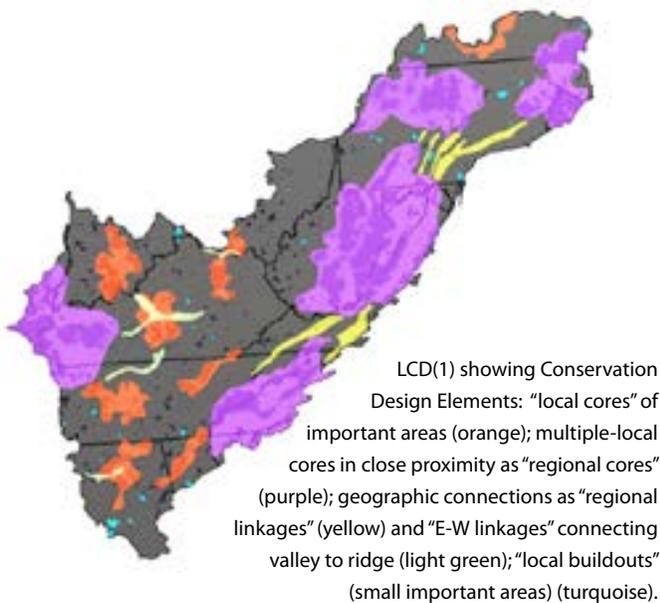
The most recent Appalachian NatureScope design was a more computationally complex system than it's 2015 predecessor. It inte-

grated a second, independent aquatic model, other newly developed data, and measures of social metrics of ecosystem services and environmental benefits information from other LCC funded research projects. The resulting series of maps greatly enhanced this second, **NatureScope** design, especially in representing high-value aquatic features and connectivity. Together the resulting design helps to capture the significant terrestrial habitats and watershed to guide conservation planning and decision-making. The final delivery, as an online tool, enables partners to ask multiple questions about the underlying data, such as why is a given area important and what priorities are within this area, to help prioritize and inform decision-making.

The process to achieve the 1st conservation design development involved:

- ▶ Working with the LCC partnership to identify eight priority resources/ecosystems as essential to preserve into the future.
- ▶ Choosing Marxan modeling software as the best tool to identify optimal areas to preserve in order to achieve biodiversity goals.
- ▶ Teasing out 20 representative species within each priority resource to inform modeling and provide evaluation metrics.
- ▶ Modeling major landscape-level threats from energy development, urbanization, and climate change.
- ▶ Generating optimal conservation areas to prioritize and preserve – generating realistic options based on inputs from threats, change over time, and financial cost.





2nd design further refined regional design: NatureScape development

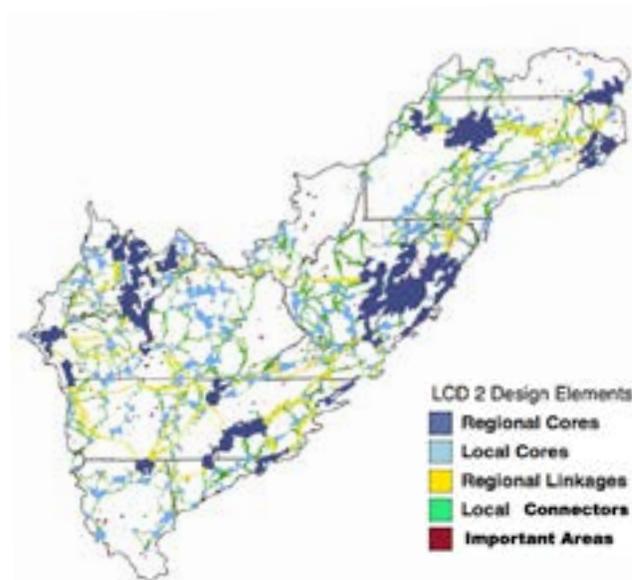
The Clemson team pioneered a new approach in computational ecology that reconciles the difference in units and captures the dynamics of aquatic systems into a primarily terrestrial conservation design.

Landscape ecologists describe the land in terms of square kilometers while aquatic ecologists deal in non-standard features as "catchments." No two catchments are the same in terms of size, shape, or the energetics that influence aquatic habitats.

The second challenge is to capture the dynamics of what's happening on both the land surrounding the catchment as well as the broader dynamics. For conservation practitioners it's critical to understand the dynamics and the interplay of land and water.

NatureScape reconciles these differences for practitioners in the final near-optimal conservation design ("near optimal" vs. perhaps "best" as it reflects a balanced approach to meet conservation targets while considering the competing needs of human land-uses.

Overall, the Appalachian NatureScape Design provides land stewards, resource managers, non-profit organizations, trusts, private landowners, and regional planners the ability to incorporate landscape data into their own local land use decisions.



Integrated Design: modeling combined LCD(2) and Aquatic Models to generate the Integrated Model ("NatureScape") Landscape Conservation

► *The final delivery, as an online tool, enables partners to ask multiple questions about the underlying data, such as why is a given area important and what priorities are within this area, to help prioritize and inform decision-making.*

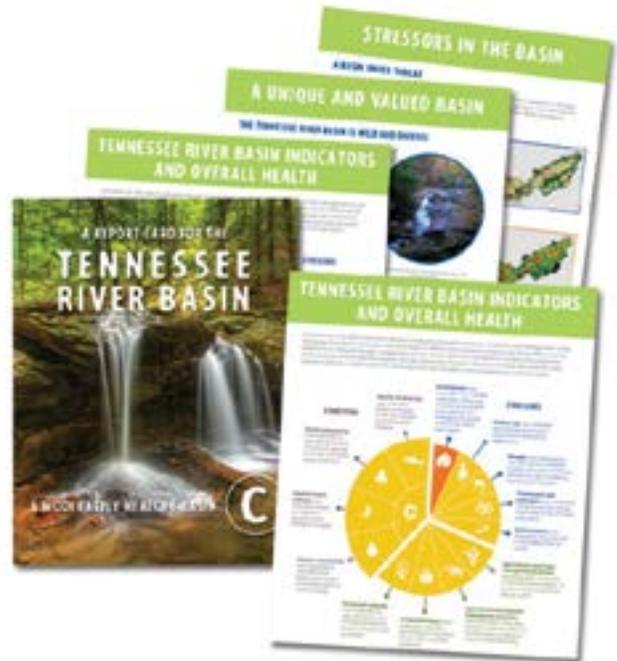
Visit NatureScape for more maps
<http://applcc.org/research/applcc-funded-projects/interactive-conservation-planning-and-design>

2. Tennessee River Basin Report Card of Current Status - to assist partners in prioritizing focal areas and conservation actions

The Appalachian LCC funded the development of an assessment of ecological health, or a “Report Card,” for the Tennessee River Basin. This product will provide a vital baseline on the current conditions of important natural resources and contain colorful illustrations, graphics, and meaningful measurements.

The Tennessee River Basin “Report Card” was built around a suite of key natural resource indicators that reflect conditions across the whole of the geography - such as water quality - and prescribe a grade (A-F) based on ecological health. This deliverable serves to highlight key findings, assess data sources and data gaps, and detail the potential implications to institutional goals and objectives of the Appalachian LCC focal area or sub-region.

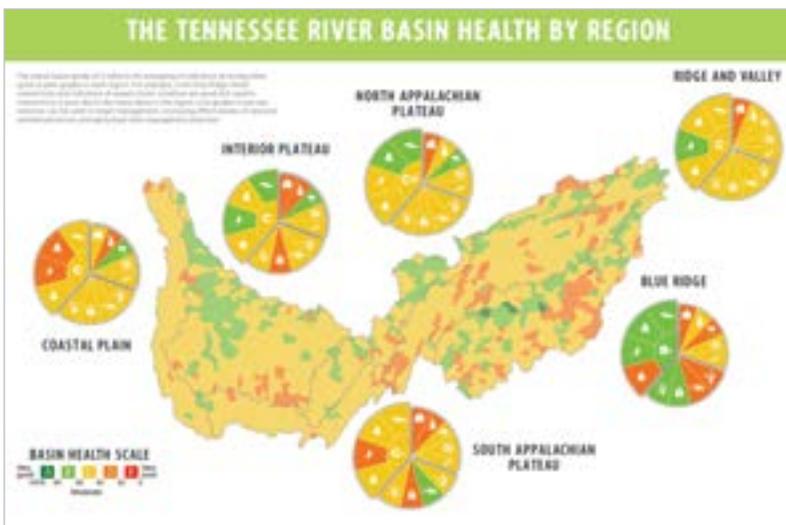
Researchers from the University of Maryland’s Integration and Application Network conducted a series of meetings and webinars with key stakeholders and technical experts to introduce the process and scope of this initiative. Participants helped identify existing relevant data sets and target key-values and major threats in the region. Researchers then propose indicators and



metrics for the report card, solicit suggestions for modifying indicators and metrics, and delivered a working draft at the TRB Network meeting to generate additional input from this focal area partner network.

The research resulted in two final products: an in-depth technical report, and the more info-graphic presentation as an 8-page Report Card. The products will be both an engaging outreach tool for partners in the

Tennessee River Basin to inform critical audiences on current ecological health, as well as a technical resource to aid conservation planning and management of natural resources. Both can be used as a companion to the Appalachian LCC NatureScope Conservation Design, with information on future analysis of major stressors from the Report Card, integrated with data on corridors and connectivity from the Conservation Design to help facilitate conservation prioritization and objectives.

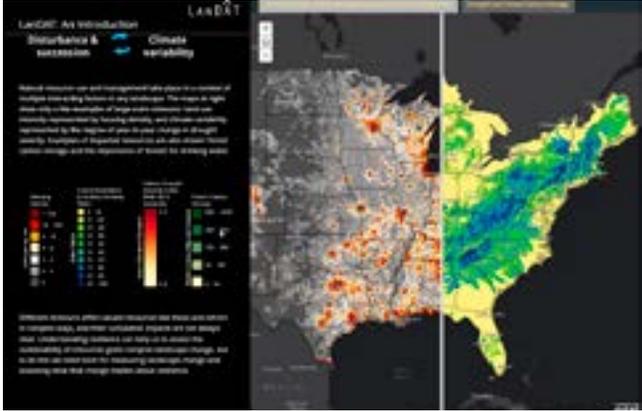


3. LanDAT Tool Suite - to examine past landscape change and assess current ecological trends to reinforce conservation action decisions

A three-year collaboration between the Appalachian LCC and the U.S. Forest Service Eastern Forest Environmental Threat Assessment Center (EFETAC) has resulted in a wealth of Appalachian ecosystem services information and a decision-support tool for assessing and interpreting landscape change. The Landscape Dynamics Assessment Tool (LanDAT) will aid natural resource managers, planners, and spatial data analysts in integrating assessments of ecosystem services in their efforts locally and regionally. This tool is accompanied by a clearinghouse – found on our Web Portal - of other essential data and information on nature’s benefits to people, risks to those benefits, social dimensions of Appalachian landscapes, and assessments on the use of natural resources. Overall, the clearinghouse provides users with the knowledge to make informed resource management decisions that sustain ecosystem services that are valued by the public.

To better introduce and engage the conservation community on these resources, the researchers organized a series of workshops throughout the Appalachians. These workshops server to:

- show how LanDAT can be used to map critical forests, river systems and other natural areas that support ecosystem services (e.g., forest carbon storage, wildlife habitat, clean water) in the Appalachians;
- demonstrate LanDAT’s application to local and regional monitoring and planning ;
- provide in-depth discussion and exploration of the LanDAT website and data products, and
- allow technical experts to evaluate the tool, design, and functionality.



LanDAT can help users monitor landscapes through more than 15 years of satellite observations, including metrics, such as the long-term trend in vegetation greenness (top), and the degree of inter-annual variability (bottom). Map layers can be used for evaluating any land unit in the continental United States.

The first workshops were conducted in Asheville, NC on May 16 and June 21. Upcoming sessions will take place at the National Conservation Training Center in Shepherdstown, West Virginia on July 26 and at the Land Between the Lakes National Recreational Area in Golden Pond, Kentucky on September 13.

Understanding the complete and diverse benefits society receives from nature as well as risks to their sustainability will allow managers, industry, and the public to adopt policies that encourage protection and investments in these critical resources.

Access all the deliverables from this research here:
<http://applcc.org/ecosystem-risks-benefits>.

The dedicated link to the LanDAT tool is:
<https://landat.org>

4. Stream Impacts from Water Withdrawals in the Marcellus Shale Region - to negotiate a balance solution

The rivers and streams of the Central Appalachians are home to more than 200 species of fish and other aquatic life. They also provide a reliable source of drinking water, recreational opportunities, and associated economic benefits to people living in large cities and surrounding communities. This study by Cornell University looks at how the region's surface freshwater supply – and the health of natural systems delivering this resource – have been impacted and may be altered in the coming years under increasing water withdrawals.

In addition to considering the cumulative impacts of water withdrawals, the researchers looked at specific impacts of large water withdrawals with hydraulic fracturing in the Marcellus Shale region. The study attempts to answer these key questions:

- **What are the observed impacts of water withdrawals on freshwater fish communities and ecosystems associated with current levels of water withdrawals?**
- **What might those impacts look like under a range of potential water withdrawal scenarios?**
- **Is it possible, using sophisticated computer modeling techniques, to identify different flow regimes that deliver a more balanced approach for regulating water withdrawals to meet human demands and sustain healthy ecosystems?**

The study is the first region-wide assessment to document “flow-ecology” relationships – showing connections between observed impacts under current water withdrawal standards (based on daily water gauge data collected over the last 15 years and fish surveys) and the decline in freshwater fish communities. Based on the assessed relationships and factors such as season, stream size, and projected expansion of natural gas in the region—scientists developed models showing how water withdrawals impact sustainability of aquatic ecosystems. Cornell researchers also applied a model to vary water withdrawal scenarios— for example from current standards to a more seasonally variable scenario—that provided critical information on how flow regimes can be modified to achieve a balance in meeting both human/energy water needs and those required to maintain healthy ecosystems and diversity.



CREDIT: GARY PEEPLES, USFWS



CREDIT: GARY PEEPLES, USFWS

Key findings and recommendations from the research include:

- ▶ Flow-ecology relationships indicate fish are sensitive not only to changes in low flows, but also to changes in a variety of flow components (season, median, and high flows). This has important implications for setting sustainable flow standards and designing monitoring campaigns.
- ▶ A considerable number of streams are at high risk of flow alteration due to withdrawals during the summer and fall seasons – especially smaller streams in the southwestern (western portions of Ohio River Basin) and northern (headwaters of the Upper Susquehanna and Hudson River Basins) sections of the region.
- ▶ Though these high-risk streams are individually small, combined they drain the majority of the study region.
- ▶ Fixed minimum aquatic flow standards that do not consider seasonal changes in flows and throughout the year may not be adequate to sustain fish populations and aquatic biodiversity.
- ▶ But a balance can be realized if flow standards, due to water withdrawal regulations, vary with stream size and season and thus provide the necessary balance between human needs and flows needed to sustain fish and aquatic ecosystems.



CREDIT: MATTHEW CIMITILE

Following release of this research, the Cooperative held a briefing with the Susquehanna River Basin Commission, Potomac Commission, and the Delaware River Basin Commission. The briefing covered the key findings and recommendations from this research, methods used in its development, and intended management and planning issues these modeling results can help address. In addition, staff from the USFWS Pennsylvania field office are using the results of this study to work with the Pennsylvania Department of Environmental Protection on potentially modifying ecological flows within the Ohio River to ensure sufficient amounts of water for endangered mussels.

The partners plan to continue close collaboration with these entities in identifying flow regimes that deliver a balanced approach for regulating water withdrawals to meet human demands and sustain healthy ecosystems. For more information, view: <http://applcc.org/research/stream-impacts-water-withdrawals>.

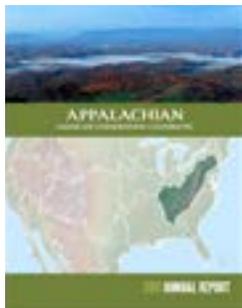


CREDIT: GARY PEEPLES, USFWS

Our Journey. Our Investments. Our Legacy



Our work and achievements in 2016 and 2017 built upon the collaborative scientific foundation established in our earlier years, while continuing towards a vision of maintaining a landscape that supports the special biological and cultural resources of the Appalachians. It's helpful to reflect on the systematic advances made by our regional partnership in terms of its actions, decisions, and our investments—both in terms of the science but also in terms of strengthening the partnership through investment in shared resources. Our past Annual Reports have highlighted major benchmarks we've achieved in our partnership's evolution, such as:

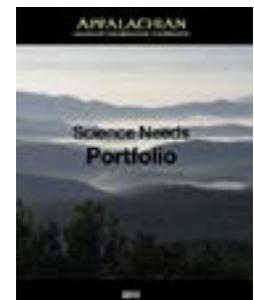


2011 THE YEAR OF

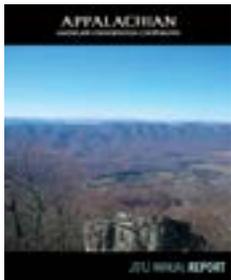
Identifying Science Needs and Forming the Partnership

Investing in the Partnership: Identified the decision-making body (Governance Structure and Membership) and defined their Vision and Mission. A portion of 2011 project funds jointly hired a Communications Specialist, who was shared with the Appalachian Mountain Joint Venture, to support the Partners in-reach and out-reach in communicating the value of conservation.

2012: Investing in the Science: A group of over 150 invited researchers and managers, representing a diverse cross-section of expertise and affiliations, were assembled to identify the science information needs of Appalachia in order to effectively address the conservation challenges and opportunities across the landscape. The 3-day Science Needs workshop developed, through expert consultation workshop, a **Science Needs Portfolio**. Leadership approved the Science Needs Portfolio as the cornerstone of the Appalachian LCC Science Program. It was organized by thematic areas (Aquatics, Human Dimensions, Forests, Climate Change, etc.). Top Ranked Science Needs generated through the workshop were identified for funding.



The Science Needs Portfolio is structured to identify the highest-level of “MISSION: SCIENCE and MANAGEMENT OBJECTIVES,” sub-divided and described by “PROGRAM” and identifies initial thinking on the type of activities or “PROJECTS” that would, in total, combine to make up the Program elements.



2012 THE YEAR OF Defining the Business Model

Investing in the Partnership: Steering Committee members define the goals, direction, and expectations envisioned for the AppLCC. Workshops helped to define and implement

a 5-year work plan for the organization while also pursuing data integration with partners and sharing, and supporting monitoring and research. Focused on aligning actions that reflected the member’s shared vision as reflected in the Goals and Objectives identified in the 5-Year Work Plan.

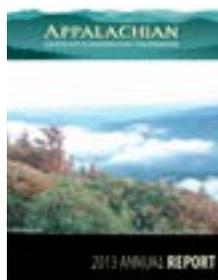
- ▶ **Goal 1.** Create a landscape level data sharing strategy and scalable toolset.
- ▶ **Goal 2.** Deliver landscape-level conservation plans for regional use.
- ▶ **Goal 3.** Create an on-going process to promote engagement and dialogue across the region.
- ▶ **Goal 4.** Assess and align conservation goals and actions that reflect the Cooperative Members’ common and shared vision.

Investing in the Science: continued to fund and oversee projects that developed the tools and research necessary to enhance landscape conservation.

PERFORMANCE:
Work Plan provides the framework to report progress. Annual “Report Card”

INITIATED RESEARCH:

- ▶ “Appalachian Energy Forecast Analysis”;
- ▶ “Riparian Restoration Prioritization to Promote Climate Change Resilience in Eastern U.S. Streams”;
- ▶ “Development of a Hydrologic Foundation and Flow-ecology Relationships for Monitoring Riverine Resources in the Marcellus Shale Region”.



2013 THE YEAR OF Building the Portal – A Networking and Planning Tool

Investing in the Partnership: Helped to catalyze the network: assembled foundational data and information; provided decision support tools and

products; supported outreach, capacity, and enhanced the visibility of conservation actors. Supported the design and programming of a web-based portal to advance networking and collaborative planning and delivery from among the many partners.

Demonstrated the collaborative nature of LCC ‘convening function’ through its support of a planning alliance of multiple Fish Habitat Partnerships called “The Whitewater to Bluewater Project”, made possible by hosting the on-line collaborative workspace of this Alliance through the applcc.org web portal.

Creating a web portal

- ▶ a unique member directory to bring together diverse range of individuals and expertise,
- ▶ dedicated group space to facilitate collaborative workflow and exchange,
- ▶ integrated a searchable Research and Project Databases to highlight conservation activities across the region,
- ▶ shared stories and resources to promote and detail how their accomplishments fit into the larger regional goals of landscape conservation.

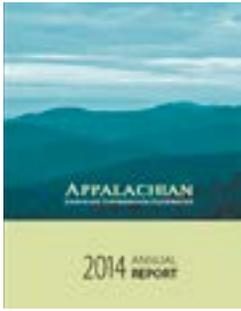
Investing in the Science: In February 2013, almost 50 experts from a wide range of technical background in both natural and social sciences, as well as geographic expertise across the entire region, volunteered to participate in the annual review of the Appalachian LCC **Science Needs Portfolio**. 2013 marked the first revision of the Portfolio.



LCC funds research that provided foundational information needed for conservation planning and modeling.

INITIATED RESEARCH:

- ▶ “Data Needs Assessment to Support Conservation Planning for the Appalachian LCC”;
- ▶ “Support for Understanding Land Use and Climate Change in the Appalachian Landscape”;
- ▶ “A Stream Classification System for the Appalachian LCC”.



2014 THE YEAR OF Beginning the Conservation Planning Process

Investing in the Partnership: Actively engaged Cooperative members through a process with university researchers to define “priority resources”

The beginning, or “seed” resources were assembled with input from LCC staff with the goal of representing key ecosystems or processes, and to begin the discussion about what to add. Researchers then evaluated these in terms of their feasibility e.g., data cost, availability, modeling practicality, alternative surrogates, missing ecosystems.

The research team facilitated a consultative process by engaging the full Steering Committee members asked to select final priority. In a rapid modeling exercise, utilizing the strength of super-computing capacity, the researchers ran over-night modeling simulations to illustrate the resulting spatial modeling approach. This further enhance the partner engagement and decision-making with the resulting draft or “straw-man” landscape-scale conservation design. Engaging the partners in this level of in-depth consultation served to both expand the discussion and agreement on partner-defined “priority resources”, identify additional priority resources to include in future iterations of the conservation design, and gain the partners approval in adopting this modeling approach and final methodology.

Investment in the Science:

Science Delivered: results from funded research delivered to the partnership as data, tools, information, and assessments from:

- **Assessing Future Energy Development across the Appalachians;**
- **Protecting Aquatic Habitats through Strategic Riparian Restoration;**
- **Data Needs Assessment Delivers a Suite of Conservation Planning Products;**
- **Providing Vital Data for Modeling, Visualization, and Decision Making.**

All the information, tools, and resources highlighted in the previous years of work are integrated into or inform the modeling component of the conservation planning and design process."

INITIATED RESEARCH:

- ▶ “Classification and Geo-referencing of Cave/Karst Resources across the Appalachian LCC”
- ▶ “Assessment and Inventory of Ecosystem Services and Environmental Threats across the Appalachians”



2015 THE YEAR OF Developing a Landscape Conservation Design (LCD)

Investing in the Partnership: The partnership reached a critical point of its evolution in the iterative process of conservation planning. Work done in

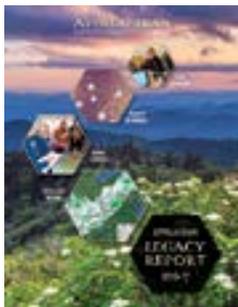
2014 with the conservation planning research team identified the ‘priority resources’ or priority ecosystems to be conserved. This grounded the planning process in defining the end-point or desired outcome of the partnership – its ultimate measure of success. 2015 began the work of building the framework necessary to achieve the ultimate outcome. By working with the conservation planning research team, the partnership approved a modeling approach that reflects this framework.

Based on the partners’ guidance, the conservation planning research team engaged organizational representatives, both managers and collaborative researchers, in an iterative year-long technical consultation to build the modeling framework. The approach adopted by the AppLCC partners reflects the complexity of large landscape-level conservation planning: the need to off-set land and resource conservation efforts in achieving ‘benefits’ or conservation targets against the likely detractors or ‘costs’ of expanding stressors or competition with societal demands. It represents an “optimal”, if not ideal solution, i.e., most likely to achieve maximum benefits at least cost. The modeling components identified surrogates or indicators to guide collaborative conservation efforts in, or measuring efforts towards achieving benchmarks, and ultimately realizing the desired outcome.

Investing in the Science: Building the science-based landscape conservation design or tool, to help decision-support by identifying optimal areas for investment or collaborative actions, required the integration of previous years’ funded research investments. Then, using super-computing technology, researchers at Clemson University identified focal landscapes and critical corridors -- key areas that most likely offer resiliency and represent ecologically significant habitats for species and natural resources of concern. The information and resources from these projects also had the net effect of informing the LCCs Landscape Conservation Design (LCD1) – a product presented as a series of maps and supporting data layers or decision support.

INITIATED RESEARCH:

- ▶ “Data Needs Assessment to Support Conservation Planning for the Appalachian LCC”;
- ▶ “Support for Understanding Land Use and Climate Change in the Appalachian Landscape”; and
- ▶ “A Stream Classification System for the Appalachian LCC”.



2016 THE YEAR OF Focal Area Networks

Investing in the Partnership:

2016 marked the end of the 1st 5-Year Work Plan developed by the Partnership in 2012 (built upon Goals 1-5). In the summer, the LCC convened a 3-day workshop to identify next steps in advancing the

partnership and drafting new goals to serve as the framework for the next 5-Year Work Plan. Steering Committee members, collaborative researchers, managers and regional partnership staff from across the Appalachian geography hosted carried on the work stated in 2016 with a series of calls in early 2017 to produce a framework document of major landscape conservation goals and key objectives we will work towards achieving in the coming years. These teams helped to polish and refine our next 5-Year Work Plan around goals focused on achieving widespread use of LCC-funded data, tools, and our Landscape Conservation Design (part of the “NatureScape” tool suite); strategically collaborate and plan to achieve landscape conservation; and enhancing the financial foundation of the LCC and capacity of its membership. The Plan was finalized and approved for adoption at the following annual Steering Committee meeting in October 2017.

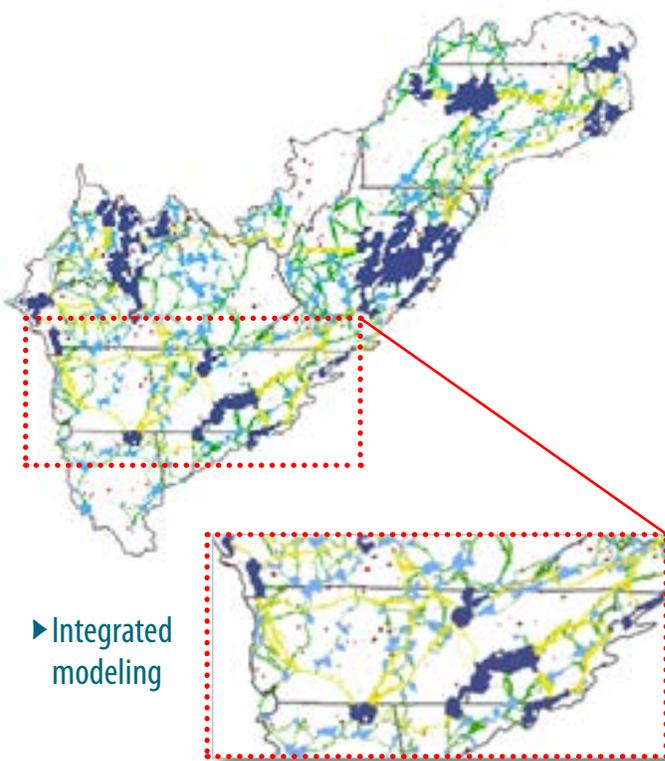
2017 THE YEAR OF Refined (NatureScape) Design

Investing in the Science: 2017 saw the delivery of NatureScape – our “2nd generation of landscape conservation design. It represents a suite of tools drawing from many individually research projects funded by the LCC over the years. But key to this enhanced product was the “integrated modeling” approach that advances the state-of-the science as pioneered by the Clemson team. It goes beyond any previous effort to capture the interplay between aquatic and terrestrial systems optimization modeling approach. First, overcoming the statistical challenges that the aquatic system must ‘marry’ the aquatic condition scores that have been assessed at unique planning units (catchments, watershed, sub-basin) to the uniform terrestrial units such as km². Second, the focal aquatic model captures the dynamics of aquatic systems – defining four key variables influencing aquatic environment at both the catchment and stream reach-level, and then further characterizing the dynamics that modify the aquatic condition based on terrestrial buffer areas influencing that unit.

2nd (5-Year) Work Plan (draft)

Strategic Goal: The Appalachian LCC supports strategic planning, investment, and coordination to deliver beneficial and effective landscape science, tools, and resources to enhance partner’s capacity and achieve local and landscape-level conservation goals.

- ▶ **Goal 5** – Build necessary capacity to achieve Appalachian LCC priority goals
- ▶ **GOAL 6** – Effectively achieve landscape conservation through strategic collaboration and planning
- ▶ **GOAL 7** – Promote and achieve widespread use of LCC science and tools across our geography to inform management and conservation planning decisions
- ▶ **GOAL 8** – Integrate social and cultural assets and services into landscape planning



▶ Integrated modeling

Networking Focal Area Partners

The partnership puts its science investment and foundational knowledge into action by developing planning tools and providing place-based information to support conservation networks such as the Tennessee River Basin Network and local land trusts. Thus, at the direction of the partners' steering committee, the AppLCC Staff have contributed staff time, talents, and research dollars to promote the Tennessee River Basin Biodiversity Network over the past several years. This collaboration supported the energy industry-led initiative under the leadership of the Tennessee Valley Authority (TVA) Natural Stewardship program. It also reflects the shared interest of the broader Cooperative mission as this focal area is a national and globally significant area of biodiversity and partners' Trust Responsibilities. —This supportive work is featured in this Legacy Report.



Enhancing Partner Synergy and Improving Outcomes in an Aquatic Biodiversity Hotspot

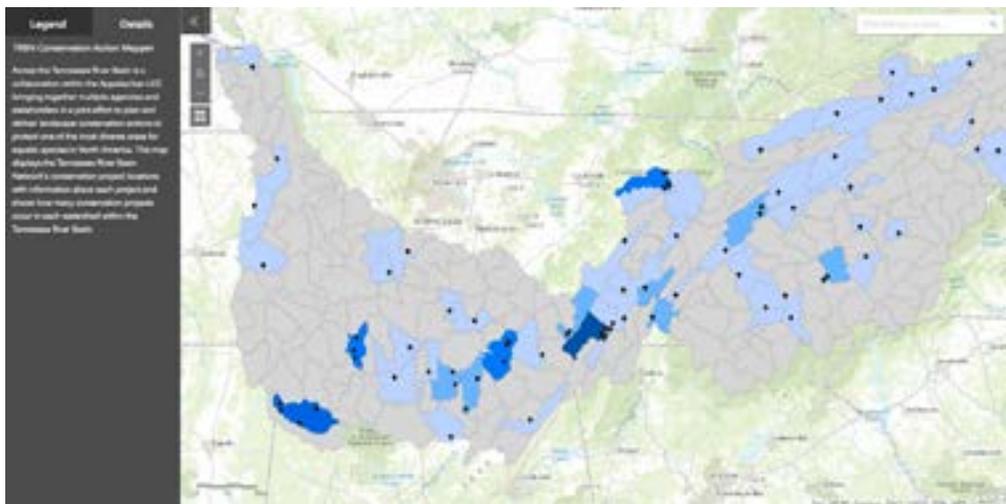
Considering that the Tennessee River Basin is one of the most biologically diverse watersheds in North America, that's a critically important objective of the TRB conservation network. Winding its way through roughly 650 miles and encompassing over 41,000 square miles, the Basin is home to 270 species of fish and over 100 species of mussels. For comparison, the state of Wisconsin, which includes portions of the Upper Mississippi River, Lake Superior, and Lake Michigan is only

home to 160 fish species. In China, there are only 60 species of mussels. In Europe, just 12.

Nearly as diverse as the wildlife within the Basin are the people and organizations working to conserve it. During the last several years, the Appalachian LCC staff and Landscape Conservation Fellow have worked with this thriving conservation community with the goal of continuing momentum in this

biological hotspot. The Tennessee River Basin Network unites nearly 40 federal, state and local organizations to identify common goals; determine actions to achieve those goals; and share resources and lessons learned along the way to protect the landscape that unites them.

“(But) we cannot be successful implementing watershed improvements on our own,” O’Quinn says. “To truly succeed, we and other part-



A Conservation Action Map showcases where conservation actions are being implemented in the Basin and who is involved in various projects.

► Learn more about the Tennessee River Basin Network: <http://applcc.org/projects/trb>

ners have to pool together and share our experience and resources.”

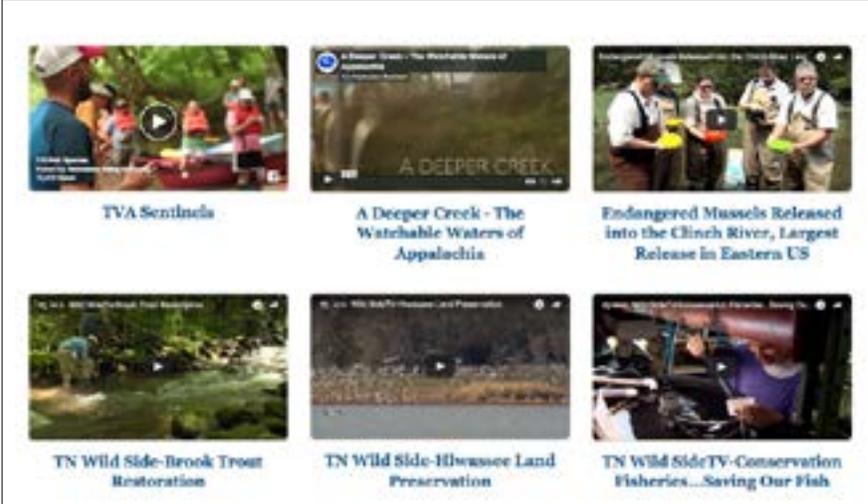
To help connect and inspire conservation organizations throughout the Basin, the AppLCC staff and Conservation Fellow have developed two tools to improve collaboration and help partners focus on shared priorities. A “Conservation Action Mapper” showcases where conservation actions are being implemented in the Basin and who is involved in various projects. More than a map, it’s a vehicle to show and tell the story of concurrent efforts in the watershed, and to enhance the efficiency of the Network’s collective action by sharing information, reducing duplication, and creating and strengthening partnerships.

The Network also assembled and curated a video resource collection showcasing the ecology, threats, conservation efforts, and sense of pride in the Tennessee River Basin. Many of the partner organizations contributed their video resources to build this collection which encompasses more than 40 videos from partners that showcase the

conservation work taking place in the region, and provides a means of engaging the broader public on the many values of nature that the River Basin provides to communities. These short videos range from projects improving conditions for Eastern brook trout and hellbenders to challenges presented by droughts and increasing demand for freshwater. Both the Conservation Action Map and Video Resource Collection are found on the Network’s website, housed within the Appalachian LCC Web Portal.

“The Network is providing an opportunity for partners and stakeholders throughout this large and diverse region to talk to one another more regularly,” O’Quinn says. “This helps build relationships and forge action that can only make all of our efforts that much stronger for protecting and improving the health of the Tennessee River.”

It takes a village to protect a hotspot of biodiversity and keep a unique place healthy for people to work, play, and live. And the more that village can work together, the greater the chances of success.



See the video collection: <http://applcc.org/projects/trb/engagement/videos-around-the-basin>



Coordinator Jean Brennan presenting on the need for landscape conservation to Tennessee Wildlife Resources Agency staff and partners.
 Photo: Gillian Bee

3rd Annual Meeting of TRB Network Forges Collaborations to Address Regional Planning

The 2016 meeting for the **Tennessee River Basin (TRB) Network** took place August 30-31st at the Tennessee Aquarium in Chattanooga. The meeting was a great success with over thirty organizations represented by nearly 80 meeting participants. This unique gathering allowed members of the Network to celebrate successes, share current conservation efforts, and discuss how the Network can maximize efficiencies for conserving and improving aquatic biodiversity in the Tennessee River Basin.

It consisted of a keynote presentation by former Appalachian LCC Chair David Whitehurst, who highlighted successes within the region and shared the importance of the Network's charge to instill value in our natural resources with a broad constituency. His speech was followed by updates on several partner initiatives within the region that spoke to high-level outcomes, relevant challenges, and how the Network could engage in these efforts. For the rest of the time, participants broke into two Communities of Practice—science/management and communications/outreach— that delved into critical barriers these communities are facing and action needed to overcome these barriers.

Out of these discussions came specific tasks that included:

- Identifying and mapping current conservation efforts within the TRB to better identify the Who, What and Where of conservation action.
- Inventorying and sharing existing data and other resources (educational materials, strategic plans) to assist needs for both science/management and communication/outreach.
- Forming work groups to focus efforts on strategic marketing and messaging to raise awareness and support for conserving biodiversity within the TRB - with a focus on developing or marketing films that can help engage and inspire key audiences.
- Continuing to focus on collective action that will strengthen the networking capability of the Network and connect people across the landscape.

A central beacon in the 2017 TRB Network meeting was the keynote presentation by Michael (Mike) Slattery, US Fish & Wildlife Service. For the past 30 years Slattery has helped to coordinate a large, complex partnership in the North East. He brought to the Tennessee River Basin a number of lessons he has learned over the years. He charged Network members to really think over these lessons learned as the partners moved forward to identify how the Network can take next steps to move forward and develop a better sense of how to operate as a collaborative Network.

Mike presented the Network with guidance based on his extensive experience working with large regional partnerships over the years that included:

- All of us create greater influence together than individually
- Put relationships first
- Each organization's goals are important and partnership goals should be inclusive of partner's goals
- Find projects you can work on together to further galvanize relationships
- Plan for long time horizons
- Decide who does what best, and use those strengths
- Develop a shared storyline each person can present when you are on your own and not with Network members
- Sustain a level of enthusiasm and inspiration. Sustaining inspiration helps to keep Networks ticking
- Think about scalability, how to connect our Work across the geographic scale.

Deliver the Tools through Partner Workshops

The Appalachians are a big place with many incredible and unique ecosystems dotted across the landscape, each one worth protecting. There is no simple solution to how to protect the landscape, especially in such a way that protected lands are connected to each other so wildlife can migrate and adjust to changing conditions. But we do know that one group cannot accomplish it alone. When neighboring organizations band together, it lightens the work-load for everyone.

WORKSHOPS: Private Sector Non-Profits and Land Trusts

Work on a regional scale can mean a number of things, but the main purpose is to create a network of people that share data and information, technology and tools, and lessons learned along the way to enhance conservation collaboration and make a greater impact on the landscape. As Rick Huffines, Executive Director of the Tennessee River Gorge Trust puts it, “It’s not just people working in silos. If someone needs something, needs assistance, we should be coming together to help each other out.” To this day, land trusts are still operated by and for the communities they serve—keeping community involvement a central theme in their efforts.

That’s where a partnership like the Appalachian Landscape Conservation Cooperative comes in. It brings together a diverse coalition of scientists and resource managers from federal, state, NGOs,



Rob Hurt of Wheeler National Wildlife Refuge leads a breakout session at the Appalachian LCC science delivery workshop. Photo: Matthew Cimitile.

universities, and tribes to harness expertise, creativity, and passion to work at a larger scale and collectively tackle long-term conservation challenges.

That vision is carried by land trusts throughout the Appalachians. Kelly Watkinson of the Land Trust Alliance and former Executive Director of the **Cacapon and Lost Rivers Land Trust in West Virginia**, shared Huffines community-driven philosophy, “Our primary focus is working with private land owners to protect important

resources in the watershed. We’re driven by the local land owners and their strong connection to the resources of the area.”

WORKING WITH THE LCC PARTNERSHIP: The territory of focus for the Cacapon and Lost Rivers Land Trust encompasses three wildlife management areas, two state parks, and cushions up against both the Washington and Jefferson national forests—all offering ample opportunities for outdoor recreation. The information gathered by land trusts



is vital, not just to the immediate territory of land trusts, but to the landscape on a larger level. As Watkinson puts it, “It’s essential to think about how our lands fits within the larger region. If we’re not seeing that, we’re not seeing the bigger picture.” The Appalachian LCC supported a grant application to work collaboratively to pioneer how LCC partnerships might best serve the individual local land trusts as well as that of the regional association network.

The **Tennessee River Gorge Trust (TRGT) near Chattanooga, Tennessee** is a perfect example of the unique role land trusts play in local conservation. The Trust was formed in 1981, not by a government mandate, but from a dinner party at a Chattanooga resident’s home where she and her guests expressed concern about the development on the mountains bordering Chattanooga. The residents decided the 27,000-acre gorge was worth protecting and from there the Trust was born to ensure the land would remain as a healthy and productive resource for the community.

For land trusts such as the TRGT, that means working with and addressing the needs of the communities they serve. “Just because we all wear tan shirts, doesn’t mean we all play in the same sand box,” said Huffines. “It’s all about conservation work, but each entity has their own mission and way of doing business.”

“While other agencies rely on, and interact with their local communities,” Huffines explains “(Land Trusts) live and die by the community.” Within five miles of the bustling city of Chattanooga, the TRGT encourages residents to take advantage of the Gorge’s immense beauty and many recreational opportunities, offering camping, kayaking, cycling, hiking, and much more. “Folks don’t have to support what we do; folks choose to support what we do” Huffines notes.

Many of these recreational opportunities can also offer a double purpose. For example, a new bird observatory at the TRGT encourages birding and keeps track of what birds’ visitors can expect to see. It also allows the Trust to monitor populations as they come

through the Gorge. Since birds are an indicator species, monitoring their populations over time can reveal vital information about the unique ecosystems within the Gorge and their health.

WORKING WITH THE LCC PARTNERSHIP: “I worked for U.S. Fish and Wildlife Service back in 2009 when we started talking about LCCs and I realized that what we hoped for back then was finally coming to fruition,” said Huffines. “I was just overwhelmed to see how far the LCC had advanced and felt there was a need to share my excitement with others.”

Recently Huffines and the Trust staff hosted a workshop with their partners and Appalachian LCC staff in the hopes of spreading this landscape conservation philosophy to neighboring organizations. The workshop familiarized participants with the Appalachian LCC; its mission, recent activities and newly developed resources available to partners to improve their conservation planning and management efforts. The workshop provided a wealth of regional information, provided a larger context to the local conservation taking place, and maybe most importantly, brought neighboring land trusts in Tennessee together in the same room to talk about the challenges and issues they are dealing with.



Staff of Tennessee River Gorge Trust, who helped to organize an Appalachian LCC science delivery workshop with its network of partners.
 Photo Tennessee River Gorge Trust

WORKSHOPS: State and Federal Agencies

In partnership with the **Tennessee Wildlife Resources Agency**, the Appalachian LCC staff conducted workshops in Ecological Services Office in Crossville, Tennessee and another at Wheeler National Wildlife Refuge in Decatur, Alabama to introduce LCC-funded research products to resource managers and scientists.

The events demonstrated the need behind working at a landscape scale to better plan and manage for the conservation of essential natural and cultural resources. More specifically, it showcased Appalachian LCC derived tools and resources that can enhance collaboration between federal, state, and local entities and aid conservation planning

efforts that transcend state lines. A total of 67 people representing 26 organizations participated in these two events.

Each event was tailored to participants based on their feedback obtained prior to the meeting. The meetings included presentations, hands on case scenarios, facilitated discussions and break-out sessions. Drs. Paul Leonard and Daniel Hanks of Clemson University were at the Crossville event to present and discuss the science behind the Appalachian LCC Landscape Conservation Design effort. Participants walked through case scenarios of how the second “Integrated Model” conservation design (NatureScape) tool set can be used in their conservation planning

.....
The events demonstrated the need behind working at a landscape scale to better plan and manage for the conservation of essential natural and cultural resources. More specifically, it showcased Appalachian LCC derived tools and resources that can enhance collaboration between federal, state, and local entities and aid conservation planning efforts that transcend state lines. A total of 67 people representing 26 organizations participated in these two events.

efforts at the local and regional level, and had a hands-on opportunity to work with the tool themselves through a set of training exercises.

Deliver the Tools as Online Resources and Training Courses

Online Resources: Big Questions & Key Science Investments Video Series

How can Appalachian LCC science investments work for you? A series of short videos highlighted key Appalachian LCC investments into science information and tool development over the last several years. These videos spotlighted the categories of regional products, tools, and data the Cooperative developed, highlighted our Conservation Planning Atlas that houses a plethora of datasets and information for the conservation community to explore, and depicted examples of how we are bringing people and expertise together to address environmental issues that transcend state lines.



The Big Questions

Why Landscape Planning and Design Approach?

Who Make up the LCC Members and the Role of LCC?

What are Landscape Conservation Designs (LCDs)?

How can the LCDs Inform Decision-making?

WATCH THE VIDEOS AT: <http://applcc.org/resources/overview-science-investments>

In addition, the series featured videos that outline the big questions around landscape conservation and the need for LCCs. Users will find an overview of the major environmental challenges of today, and the need to shift conservation towards a more comprehensive scale. The videos detail the four key roles of the LCC in addressing large-scale threats through 1) conservation planning, 2) developing natural resource management tools and information, 3) engaging diverse audiences, and 4) building capacity to leverage and share resources.

While providing capacity for this partnership looks to be more challenging than ever, we are committed to expanding the use of our tools and

.....
The AppLCC has invested in creating self-paced, independent, online learning courses to support all of the many tools and resources we have invested in developing over these last several years.

resources by partner organizations and the broader conservation community in the coming year. But it is important to acknowledge that both the need and the demand far exceed that of the limited LCC staffing capacity. In addition, partners are often constrained in terms of their time or funding and thus may not be able to participate on in-person trainings, and are therefore handicapped in being able to access tools and resources. Thus the AppLCC has invested in creating self-paced, independent, on-line learning courses to support all of the many tools and resources we have invested in developing over these several years.

ONLINE RESOURCES:

Conservation Planning Atlas (CPA) for the Appalachian LCC Community



The Appalachian LCC Conservation Planning Atlas is a platform for data discovery, sharing, and collaboration for stakeholders throughout the Appalachian LCC region. With the CPA you can search for spatial datasets, visualize LCC-supported projects, and learn more about conservation science and design in the region. We invite the Appalachian LCC community to explore our CPA and begin to:

- ▶ **Organize data & information**
- ▶ **Create custom visualizations, drawings, & analyses**
 - ▶ **Use collaborative tools in groups**
 - ▶ **Publish datasets, maps, & galleries**
- ▶ **Develop decision-support and custom tools**

Appalachian LCC Conservation Planning Atlas

<https://applcc.databasin.org>



Science Applications Online Learning Management System

► <http://www.scienceapplications.org>

Online Training Courses

The AppLCC team developed the **Science Applications Online Learning Management System** to host self-paced tutorials and classes that highlight the intended uses of LCC-funded research to aid conservation planning and delivery activities. Step-by-step demonstrations on decision-support tools and other deliverables demonstrate how to apply these resources to specific natural resource issues. Once users complete a course, they can work with LCC staff directly to discuss how to incorporate these LCC products in their own work.

Current AppLCC Online Courses Include:

■ **Riparian Restoration to Promote Climate Change Resilience** - This user-friendly tool allows managers and decision-makers to rapidly identify and prioritize areas along the banks of rivers, streams, and lakes for restoration, making these ecosystems more resilient to disturbance and future changes in climate.

■ **Energy Forecast Modeling** - Models of wind, shale gas, and coal development for the entire study area have been created to predict potential future energy development and impacts to natural resources within the Appalachians. Models and data from all development projections populate a web-based mapping tool to help inform regional landscape planning decisions.

■ **Ecosystem Benefits and Risks** - A clearinghouse for Appalachian ecosystem services knowledge and data, providing users with the tools they need to make informed resource management decisions that improve and sustain nature's benefits to people.

■ **Cave and Karst Classification and Mapping** - A summary of pre-existing efforts to collect and present karst resource information and an appropriate classification system for karst habitats within Appalachia. This project produced a series of deliverables, including data tables, geospatial information layers, and maps. The maps and other products provide a comprehensive overview of available data for examining relationships between environmental factors and biological diversity and distribution within karst areas of the Appalachian LCC.

■ **Vulnerability of Species and Habitats to Large-scale Impacts** - A two-phase project that explores understanding of climate change in the Appalachian landscape. Motivated by the need to rapidly assess the vulnerability of species to climate change, NatureServe developed a Climate Change Vulnerability Index. The Index uses a scoring system that integrates a species' predicted exposure to climate change within an area

and three sets of factors associated with climate change sensitivity. Resources will help land managers develop and prioritize strategies for climate change adaptation that lead to actions that increase the resilience of species to climate change.

■ **NatureScope (2nd Landscape Conservation Design) Conservation Planning** - A conservation planning and design process that provides the science, resources, and tools needed to promote conservation outcomes that link pristine and natural lands into an interconnected landscape for plants, animals, and humans. The project developed a suite of resources that can be widely used by conservation practitioners throughout the Appalachians to help one answer "What is the wisest, sustainable long-term investment of our conservation efforts?" The study and resources developed from this research are intended to inform conservation planning at the local and regional level.





Photo: Matthew Cimitile

Integrating Social-Cultural Priorities

The partnership has expanded our commitment to integrate socio-economic and cultural values into our conservation planning work. Our efforts have developed on two main fronts.

The **first**, is the continued support and collaboration with cultural researchers at Pennsylvania State University and the National Park Service. Their on-going studies seek to define appropriate cultural metrics to reflect cultural values and the status of culturally important resources, as an integral part of our landscape into planning and management tools (“landscape conservation design” modeling results). The **second** front is the support for a unique Cultural Resource Conservation Fellowship that allows a post-doctoral level Fellow to work directly with the landscape conservation cooperative community. In that way we hope to forge the melding of thought, research design, and value-driven decision-making into a final integrated conservation design model. Combined, these efforts serve our Cooperative and add value to partner organizations, helping them achieve their conservation and management goals in the larger context of maintaining a landscape that supports the special biological and cultural resources of the Appalachians.

Landscape Conservation Fellowship

The Appalachian LCC created a Landscape Conservation Fellowship to provide unique access to the emerging science and conservation community dedicated to forging a new conservation approach in the 21st Century. The Fellows serve as part of the professional staff of the LCC and work across many facets of applied conservation and cultural/natural resource management. The focus of our Fellows is to coordinate efforts (meetings, workshops, webinars), promote resource sharing, foster collaboration within the conservation community in key focal areas within our region, and most importantly to provide the direct bridge between landscape ecologists and conservation practitioners. The Fellows help researchers access unique data and information generated by the partners, while working with researchers to better understand the needs of resource managers and how to deliver the science as easily accessible decision-support tools.



GILLIAN BEE

.....
Conservation Fellows serve as part of the professional staff of the LCC and work across many facets of applied conservation and cultural/natural resource management. The focus of our Fellows is to coordinate efforts (meetings, workshops, webinars) and to promote resource sharing and collaboration within the conservation community in key focal areas within our region.



MADELINE BROWN

Fellows Help Lead Coordination Efforts in Key Focal Areas

In August of 2016, Gillian Bee became the first Appalachian LCC Landscape Conservation Fellow, which provided a unique opportunity for new-entry professionals to be part of the emerging and exciting field of Landscape Conservation. In this new role, Gillian is working with partners in the Tennessee River Basin (TRB) to help lead coordination efforts that continue momentum within this focal area by putting together an annual meeting, quarterly webinars, clearinghouses for key resources, and other efforts that strengthen the network and inform partners on what is taking place across the Basin. She is stationed out of Clemson University under the direction of Dr. Rob Baldwin and in the 1st year was jointly-supported with a grant by the Tennessee Valley Authority.



Conservation Fellow Gillian Bee and the staff of the ApplCC at the partner workshop for the Tennessee River Gorge Trust. (L-R) Matthew Cimitile, Gillian Bee, Rick Huffines (Executive Director, TRGT), and Marilyn Knight.

Prior to her new role, Gillian was the Stewardship Director for the Bird Conservancy of the Rockies. She focused her efforts on collaborative conservation of private working lands, which instilled a passion for building relationships that encourage proactive conservation for natural resources and rural culture. Gillian received her bachelor’s in wildlife biology from the University of Vermont and her master’s in wildlife biology from Clemson University.

Our second fellow, Dr. Madeline (“Maddie”) Brown, came on board in the summer of 2017 and is stationed at Penn State University under the direction of Dr. Tim Murtha and supported jointly with the National Park Service. Her work is focusing on geospatially-referenced social and cultural resource conservation and assisting Appalachian LCC research already underway for our “Integrating Cultural Resource Preservation at a Landscape Scale” project. Maddie conducted a structured open-interview survey to capture “LCC Partner Perspective Survey” on what has worked and what still needs improving in evaluating and advancing the path forward for landscape-level collaborative conservation partnerships.

Learn more about our Conservation Fellowship:
<http://applcc.org/cooperative/our-organization/landscape-conservation-fellowship>

Cultural Metrics to Reflect Cultural Values and Status

A collaborative research project sponsored by the Appalachian LCC, the National Park Service, Penn State University, the National Council on Preservation Education, and the Wildlife Management Institute is integrating cultural resources, such as historic bridges and Civil War Battlefields, into landscape conservation planning and design. The goal is to address the threats of land-use conversion associated with energy expansion, urbanization, sprawl, and impacts of climate change on cultural resources that society values.



An Appalachian LCC-funded research project is testing an approach for integrating cultural resources, such as historic bridges and Civil War Battlefields.

The research team is first conducting pilot studies in Pennsylvania and West Virginia. The team investigated relevant resources, data requirements, and opportunities to identify the best process for integrating cultural resources into landscape planning and scaling up local results to apply to the entire Appalachian LCC 15-state geography.

Some of the key work accomplished so far includes:

- Development of a comprehensive geospatial library relevant to cultural resources for the state of Pennsylvania.
- Review of state and local comprehensive planning documents for an analysis of policy related to cultural resource management, preservation and planning.

- Assembling available data for test modeling Pennsylvania’s pilot study and then completing around 270 million test models for identifying landscape-scale conservation priorities for Pennsylvania.
- Developing a comprehensive geo-spatial library relevant to cultural resources for the state of West Virginia.
- Comparing and analyzing data sources and resolution with particular attention paid to evaluating data quality and coverage for PA and WV.

Work to date in the pilot studies of Pennsylvania, and more recent comparisons to West Virginia, indicate that there are important topics to study to best integrate cultural resources early on in the

natural resource planning process. The team is examining twelve cultural resource themes in these pilot studies and each theme has produced fascinating results. The results of this ongoing research will be integrated into an Open Science Framework over the next several weeks, in addition to producing three manuscripts in preparation for peer review, as well as several invited presentations in the upcoming months.

Integrating cultural resource priorities is essential to our NatureScape Conservation Design, which will guide the Cooperative’s collaborative conservation actions and outreach in the Appalachians over the next several years.

News of Note

Goodbye to Appalachian Conservation Heroes

This year we say goodbye to a number of individuals who were instrumental in the development and growth of landscape conservation in the Appalachians. For decades, they have been conservation heroes that have improved terrestrial and aquatic environments in the Appalachians for many wildlife and people. We are thankful for their commitment to Appalachian conservation and indebted to them for sharing their expertise and passion with us.



DAVID HARTOS: David, the Deputy Regional Director of the Mid-Continent Region for the Office of Surface Mining Reclamation and Enforcement (OSMRE), retired after 39 years of experience with the federal government. David was a key member of our community, participating in many of our Steering Committee meetings, providing feedback on technical oversight teams that made deliverables from our funded research projects that much better, and overall gave great guidance that informed LCC decision making and trajectory. Dave had this to say about the LCC: “I thoroughly enjoyed discussions and the science. The Appalachian LCC has successfully developed several outstanding products and made considerable progress achieving many of its mission goals. I was very glad to be a part of it.”



BILL REEVES: Bill was another vital Steering Committee member for years and the Chief of Biodiversity with the Tennessee Wildlife Resources Agency (TWRA) where he administered the state wildlife grant, ESA Section 6 and wildlife diversity programs. He was instrumental in sharing the Cooperative’s science, resources, and tools to partners throughout the state of Tennessee. He helped to put on one of our first science delivery workshops with TWRA and its partners, demonstrating the need behind working at a landscape scale to better plan and manage how Appalachian LCC derived tools and resources can enhance collaboration between federal, state, and local entities and aid conservation planning efforts that transcend state lines. In his over 40 years of experience, Reeves held positions of Chief of Fisheries (TWRA), Assistant Chief of Fisheries, Community Lakes Supervisor, and District Fisheries Biologist (Alabama Game and Fish Division). Reeves is a Certified Fisheries Scientist and served as

the President of the Alabama Fisheries Association, Chairman of the Mississippi Interstate Resources Association (MICRA), co-founder and co-chair of the Southeast Aquatic Resources Partnership (SARP), and member of the core team for the National Fish Habitat Initiative.



ROBERTA HYLTON: Roberta, the Supervisory Fish and Wildlife Biologist out of the U.S. Fish and Wildlife Service Virginia Ecological Services Office, was a key voice of conservation and partnerships in the Tennessee River Basin. She helped to spearhead the Conservation Strategy for the Upper Tennessee River Basin, which is designed to help the U.S. Fish and Wildlife Service better integrate its efforts internally and with local partners in identifying aquatic species conservation objectives for 36 imperiled freshwater fish and mussel species as well as recommending a management approach for conserving and recovering prioritized species and locations across the basin. Roberta’s conservation career spanned 40 years, with 23 out of the Southwestern Virginia field offices. “I have loved this job and have appreciated the chance to work with so many other great folks in the Upper Tennessee River Basin, the Southern Appalachians, and across the nation.”



PATRICIA MORRISON: During her tenure as the wildlife biologist for the Ohio River Islands National Wildlife Refuge, Patricia Morrison worked tirelessly to secure partnerships and funding to advance the recovery of imperiled mussel species including pink mucket, clubshell, orange-foot pimpleback, spectaclecase, purple cat’s paw pearl mussel, northern riffleshell, fanshell, ring pink, white wartyback, and sheepnose. Her work led to significant conservation milestones including the establishment of new mussel populations and advances in propagation techniques such as the first ever in-vitro propagation of an orange-foot pimpleback. These efforts greatly reduced extinction likelihood by addressing population decline and population fragmentation for these species.

*Thank you for your service
to conservation efforts!*

Lessons Learned: Reflecting on Our Partnership, Our Work, Our Evolution

Facets of Partnership Strength

- The strength of the partnership is the key glue of the LCC. Having engaged and motivated partners to contribute intellectually, willing partners have developed and used science and tools. This is participating in landscape conservation - a new way of doing business.
- Deeper commitment in terms of having partners willing to contribute to capacity needs (staff time, skill sets, funds) is essential to the longer-term success of an LCC. Dependency on a single funding source has created instability and uncertainty in the partnership.
- Our LCC made in-roads with non-traditional conservation partners (in our case energy and tribes), but we and other partnerships can do a much better job of engaging diverse stakeholders that don't have a conservation focus. Forging relationships and engaging on management and planning issues that lead to win/win solutions are essential to a strong and effective approach.

What is "landscape conservation?"

- The concept of landscape conservation can be challenging to communicate. (What's a landscape? How to determine the relevant scale?)
- The concept of how more local-level conservation community members fit into landscape conservation can be challenging for many to understand, and complex to negotiate.

Advantages of Landscape Approach

- Political, geographic, agency, and organizational boundaries are super-ceded in favor of managing at the scale of the issue/challenge at hand.

- Issues and challenges that are too difficult or outside the specific mission of any one partner can be addressed by other partners and/or by the partnership collectively.
- Being able to bring together diverse expertise, organizations, and personalities to identify common challenges and working together to address them can be very rewarding, making solving large problems more manageable, and capable of inspiring outside-of-the-box thinking
- New ways of doing things slowly evolve that could not have happened while remaining in our agency/organizational silos.
- Collaboration in the landscape partnership helps individual partners see their roles and responsibilities in the context of others' and this is helpful in strengthening commitment to tasks, collaborating on shared priorities, and identifying and addressing gaps that may exist.

Difficulties of Landscape Approach

- Each partner is busy with their day-to-day jobs and responsibilities, so there is a delicate balance of how much you can ask of partners, and what they can contribute given their limited time.
- For some partners, their geography of work included more than one LCC within the National Network. This became a point of stress in terms of staffing demands and awkwardness of sewing together tools produced by different neighboring LCCs. For these partners it would be beneficial to see how the LCCs could work together to provide them with seamless datasets if desired and needed (i.e. a scaled down version of the work SECAS is doing).



Award ceremony for the AppLCC's "founding fathers" (David Whitehurst, Chair; and Paul Johnansen, Vice-Chair). Left to right: Bill Jenkins (EPA), Jean Brennan (FWS), Paul Johansen (WV DNR), David Whitehurst (VA DGIF), Gwen Brewer (MD DNR), Dan Odess (NPS), Perry Wheelock (NPS).

- A challenge the LCC program has to overcome is the short versus long-term threats to natural/cultural resources. LCCs were developed to not only deal with large-scale' long-term issues such as climate change, but to aid long-term planning among diverse stakeholders to achieve landscapes that can sustain fish and wildlife populations.
- Many partners, especially states and smaller NGOs, deal in immediate conservation challenges and conservation delivery at much smaller scales, making their day-to-day responsibilities difficult to balance with the desire to manage at larger landscape scales.

Establishing Identity/Branding

- “What is the LCC?” remained a question commonly heard in the conservation community. How do we engage a diverse audience to make our presence more known and more clearly understood? The meet and greet type of workshop that we offered helped to clarify for many the who, what and where of LCCs, but the traveling workshop format was very labor-intensive and difficult to sustain.

- A significant initial and on-going challenge is placing a new landscape conservation effort into context with existing regional efforts, local and state-based conservation – and vice-versa. How to discourage territoriality, build trust, and be relevant and value-added?
- There was also the recurring issue with some partners seeing only staff as constituting the LCC, and not realizing that they – as a collaborative group – were the LCC. It takes sustained awareness and consistent effort to work as a Cooperative with both the partnership’s Steering Committee members as well as the LCC staff forming the “Institution.”

Deployment of Science Tools

- Providing the Steering Committee with opportunities to hear updates regarding funded project can help keep them conversant on LCC resources, which in turn can help spread the word of these useful resources to broader constituents. Without these opportunities, we cannot assume the SC can speak to the science.

- A challenging issue with any new initiative/program is adoption of new science and tools. There are so many out there already, and people and organizations already have the tools they are using, so why should they learn something new? It can be a challenging barrier to overcome, often exacerbated by a lack of sufficient staff or skillsets to take advantage of the science tools made available.
- At times conservation practitioners may not have the opportunity to implement on-the-ground conservation based on AppLCC guidance based on funding restrictions. Having funding entities be an active participant in the AppLCC (Steering Committee) could help with this.
- The AppLCC made progress on the challenge of deploying science tools by approaching partners via teaching conference calls, webinar sessions, recorded webinars, posted step-by-step instructions, etc. and these approaches need to be expanded to fully utilize the tools currently developed plus those that might be developed in the future.

General Achievements of the Appalachian LCC

- From staff's perspective, the greatest conservation achievements that the LCC produced in its infancy was the Science Needs Portfolio, which set the example sustained through all work of the LCC of continuous solicitation of feedback/input and transparency in decision-making. Everything the AppLCC has achieved was a team effort!
- Subsequent science products/tools based on the early assessment of "top science needs" of the partnership resulted in a number of unique and timely science products that remain relevant to current activities of the partners, individually and collectively. A full list of these science products and tools is available at <http://applcc.org/resources/science-and-research-products-1>.
- As the AppLCC matured, the creation of a Conservation Design that can rally diverse partners around a vision for the region, and can be used to engage other sectors (energy, transportation) in conservation planning is a major achievement that will endure.



AppLCC staff, June, 2017. (L-R) Marilyn Knight, Kelly Rene, Gillian Bee, Jean Brennan, Matthew Cimitile and Rose Hessmiller.

APPALACHIAN LANDSCAPE CONSERVATION COOPERATIVE

A broader role of the LCC community is to help coordinate and plan conservation actions at a landscape level.



Deliver SCIENCE

To effectively address the conservation challenges and opportunities across the landscape, the Appalachian Landscape Conservation Cooperative (AppLCC) hosted a workshop with over 150 researchers and managers from across the geography.

The purpose: **identify the science information needs of Appalachia and build the necessary foundation to work at such large geographic scales.** The workshop resulted in a guidance document organized as a Science Needs Portfolio vs a single list of topical questions.

AppLCC science investments include:

- Appalachian Energy Forecast Analysis
- Riparian Restoration to Promote Climate Change Resilience
- Flow-ecology in the Marcellus Shale Region
- Land Use and Climate Change in the Appalachian Landscape
- Stream Classification System
- Classification & Geo-referencing Cave/Karst Resources
- Ecosystem Services and Environmental

"NatureScape" – integrated landscape conservation design (LCD). The final products of AppLCC-funded research were integrated into a suite of visualization tools designed to represent **areas of opportunity for balanced development while delivering a healthy and resilient natural landscape or "NatureScape"**.



"NatureScape" – Helps partners address key questions:
 "Why is this place important?"... "What resource priorities as defined by our partnership are within this area?" ...
 "Where do we get the most 'conservation bang for the buck'?"...
 "What are the wisest, sustainable long-term investment of our conservation efforts?"



Support NETWORKS

The AppLCC supported the Tennessee Valley Authority to formally establishment of a coordinated Network across the Tennessee River Basin. AppLCC has supported the **formation, communication, and information sharing among one focal area within the LCC geography.**

The AppLCC has supported their efforts by providing:

- Expertise Database of technical experts
- On-line "Conservation Action Mapper" that identifies "Who's working where and what are our shared conservation interests", and
- Provided Web Site for the Network partners: <http://applcc.org/projects/trb>.

On-line Training Courses: self-paced, tuition-free on-line training course have been developed by AppLCC staff and Conservation Fellows to introduce and train end users to the suite of tools and resources available.

In-person Training at partner-hosted workshops:

- **States:** Tennessee Wildlife Resource Agency,
- **Wildlife Refuges:** Wheeler (AL), Clarks River (KY) and Tennessee Refuge Complex
- **Land Trust:** Tennessee River Gorge Trust
- **FWS Ecological Services:** Pennsylvania Field Office

Integrated DESIGN



Build CAPACITY

Visit our website at www.applcc.org

