Scope of Work for Data Needs Assessment, to Support Conservation Planning for the Appalachian LCC

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Background:

Systematic conservation planning is a rapidly maturing field in applied ecology. Numerous methods and data sources have been developed, serving multiple scales and conservation planning goals. There is an extensive academic literature, web presence, and track record of practical application to draw upon in order to conduct conservation planning for the Appalachian LCC.

We propose to review conservation planning tools, data needs, and integrative processes for the Appalachian LCC and provide packages of available data, as well as interpretive text. We will review ISC conservation planning goals and based on those, prioritize and justify gaps that need to be filled (e.g., through RFAs). We will apply conservation planning tools, using available data, to the AppLCC area and provide data products that result from those applications.

We define “tools” as software designed to support conservation planning (e.g., Marxan, Circuitscape), “data” as spatial (i.e., “GIS”) data as well as tabular or even text data that can assist in parameterizing an interpreting models (e.g., Table 1), and “processes” as decision making systems that evaluate, select, and integrate tools and data to address LCC-specific conservation planning goals (e.g., North Atlantic LCC “Designing Sustainable Landscapes”) (Figure 1).

We propose to rapidly produce an analysis of tools, data, and processes and deliver usable, open-source data products and identify critical new data needs, in a short time frame (i.e., early 2013). Extended time frame includes manipulating and producing new versions of critical datasets customized for the App LCC. We will also develop an AppLCC specific conservation planning process and execute portions of that process that are possible with available data. Lastly, as these become available, we will integrate Deliverables achieved through science needs projects funded by the AppLCC and currently underway.

Tasks, Deliverables, and Time Line

I. Initiation of in-kind support to the AppLCC staff doing analysis of existing ‘Processes’ of conservation planning frameworks (e.g., Designing Sustainable Landscapes (NALCC), Blueprint (SALCC), SE CAS (FWS Southeast Conservation Adaptation Strategy) [prior to this SOW].

II. Assessment of “Data” and” Tools” [SOW]

1. Task: Evaluate the 31 datasets listed in Table 1 for the following criteria A) coverage of Appalachian LCC spatial extent, and B) grain size (resolution) relevant to App LCC conservation planning (e.g., grain size > 10km may not be relevant for local-scale planning), C) quality of data (age, evidence of accuracy, completeness), D) quality of documentation (completeness of metadata), and E) rank as to overall relevance for AppLCC conservation planning goals, based on the previous 4 criteria. Deliverable: Document describing process, data, data sources (e.g., Table 1), and how each of the datasets met each of the 5 criteria. Timeline: 3 months after initiation of contract.
2. Task: Assemble GIS data (shapefiles, rasters) resulting from (1E) and compile a geodatabase of the top-ranked datasets and metadata. Deliverable: Data will be packaged and delivered to AppLCC GIS staff in two formats A) individual shapefiles and rasters and B) compiled geodatabase. Timeline: 4 months after initiation of contract.
3. Task: Based on (Task #2) define what conservation planning purposes can be met with available, quality data, using available conservation planning software tools (Table 2). Deliverable: A document containing an annotated list of conservation planning tools, their functions, and relevance to AppLCC conservation planning goals. Timeline: 6 months after initiation of contract.
4. Task: Identify what conservation planning problems could be addressed with available software if data gaps were filled and what those data gaps are. Deliverable: A document describing A) how conservation planning in the App LCC could be improved, by development of specific datasets, B) estimate of cost, sources for each dataset C) one or two paragraph descriptions of new App LCC RFAs, that would meet those needs. Timeline: 7 months after contract initiation.
5. Task: Interpret uses of data and conservation planning tools by developing interpretive text and graphics for AppLCC web portal. Deliverable: A) Document containing text that describes data and tools and that can be posted to AppLCC webportal by AppLCC staff B) map images of data that can be posted to AppLCC webportal by AppLCC staff. Timeline: 8 months after contract initiation.
6. Task: Perform an analysis of existing or ongoing planning efforts being conducted by cooperators (SWAP and AFWA BMPs, JV, and/or other state and local partner conservation initiatives to be identified through communication with App LCC staff) to document them in a systematic framework that includes extent and grain size of effort, species and ecosystem goals, and landscape-level context, and to identify opportunities to integrate state and local-scale efforts into a regional conservation framework. Deliverable: A document that A) characterizes cooperating projects as to their extent, grain size, species and ecosystem goals, and landscape context, B) identifies opportunities to integrate cooperator projects to meet regional priorities, and C) identifies how the results of 1-5 may help support cooperator projects. Timeline: 12 months after contract initiation

(To help illustrate the contributions of this analysis to the broader goals of the Appalachian LCC, please see Appendix 1. which illustrates how this SOW will contribute to the data needs-related Tasks and Objectives as identified in the Appalachian LCC 5-Year Work Plan.)

Table 1. Preliminary assessment of available conservation planning data. Additionally, we found at least 21 pieces of software (“tools”), and numerous region-scale decision making processes. We will begin by addressing the aforementioned datasets while detailing their use in conservation planning software. We will expand our analysis to include additional datasets as necessary to address LCC goals.

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| **Data Theme** | **Purpose** | **Data name** | **File Type** | **Extent** | **Resolu-tion** | **Most recent version** | **Originator** | **Website for further information** |
| **Ecological Systems** | **Landuse / Landcover / Habitat** | National Land Cover Dataset (NLCD) | Raster | United States | 30m | 2006 | USGS | [http://landcover.usgs.gov/landcoverdata. php#regional http://www.mrlc.gov/](http://landcover.usgs.gov/landcoverdata.php#regional) |
| Terrestrial Ecological Systems (Habitat Proxy) | Raster | Unisted States | 30m | 2003 | NatureServe | <http://www.natureserve.org/getData/USecologyData.jsp> |
| Terrestrial Habitat Maps | Raster | Northeastern United States | 30m | 2010 | TNC | <http://conserveonline.org/workspaces/ecs/documents/ne-terrestrial-habitat-mapping-project> |
| Phenology (NDVI) | Raster | United States | 250m | 2010 | USGS (EROS) | <http://phenology.cr.usgs.gov/get_data_250e.php> |
| **Elevation** | Digital Elevation Models (DEM) | Raster | United States | 10-30m |  | USGS | <http://seamless.usgs.gov/ned19.php> |
| Aster Satellite (DEM) | Raster | World | 30m | 2011 | NASA | <http://asterweb.jpl.nasa.gov/gdem.asp> |
| App LCC States w/ High- Resolution LiDAR effort | Raster | NC, PN, SC, IL,MD,NJ, OH | 1m-10m | 2012 | States / (USGS, NASA, AASG) | [http://www.dcnr.state.pa.us/topogeo/pamap/elevation.aspx http://www.ncdot.gov/it/gis/DataDistribution/ContourElevationData/ http://ogrip.oit.ohio.gov/ProjectsInitiatives/StatewideImagery.aspx http://dnrweb.dnr.state.md.us/gis/data/lidar/](http://www.dcnr.state.pa.us/topogeo/pamap/elevation.aspx) |
| **Species Distribution data** | Nature Serve | Location information | Global | N/A |  | NatureServe | [http://natureserve.org/getData/index.jsp http://www.natureserve.org/explorer/](http://natureserve.org/getData/index.jsp) |
| USGS GAP | Raster/Vector | N/A | N/A | 2010 | USGS | [http://gapanalysis.usgs.gov/data/species- data/](http://gapanalysis.usgs.gov/data/species-data/) |
| GBIF | Location information | Global | N/A |  |  | [http://data.gbif.org/portal/welcome.htm;j sessionid=58D32BA18D01BDC7FA256AA7 C46E832F](http://data.gbif.org/portal/welcome.htm%3Bjsessionid%3D58D32BA18D01BDC7FA256AA7C46E832F) |
| **Hydrology / Hydrography** | Hydrologic Units | Vector | United States |  |  |  | <http://water.usgs.gov/GIS/huc.html> |
| National Hydrography Dataset (e.g., Lakes, Rivers, Streams) | Vector | United States |  |  | USGS | <http://nhd.usgs.gov/> |
| **Portfolio Ecosystems** | National Wetland Inventory (NWI) | Vector | United States | Varies | 2010 | USFWS | [http://www.fws.gov/wetlands/Data/Map per.html](http://www.fws.gov/wetlands/Data/Mapper.html) |
|  | Floodplains | Vector | United States |  | Varies | FEMA | <http://msc.fema.gov/> |
| **Human Threats** | **Habitat Condition Indices** | Index of Naturalness | Raster | United States | 30m | 2010 | D. Theobald |  |
| Human Footprint/Last of the Wild | Raster | Global | 1 km | V2 – data through 2000 | NASA-SEDAC- Wildlife Conservation Society | [http://sedac.ciesin.columbia.edu/wildarea s/](http://sedac.ciesin.columbia.edu/wildareas/) |
| Impervious Surface (Current & Projected) | Raster | United States | 30m | 2006 / 2011 | Current: USGS / Projected: Dave Theobald | <http://seamless.usgs.gov/imperv.php> |
| Housing Density (Current & Projected) | Raster | United States | 1ha | 2000 / 2030 | Dave Theobald | <http://www.landscope.org/map_descriptions/threats/housing_density_2000/18361/> |
| **Energy Development** | Existing Oil & Gas | Vector | United States | Varies | 2010 | Energy Information Administration | <http://www.eia.gov/pub/oil_gas/natural_gas/analysis_publications/maps/maps.htm#field> |
| **Non - Human Threats** | **Ambient Change** | Climate Wizard | Raster | N/A | Varies | 2006 | TNC/U WA | <http://www.climatewizard.org/> |
| National Climatic Data Center | Varies | United States | Varies | Current | NOAA | <http://www.ncdc.noaa.gov/oa/ncdc.html> |
| Climate Vulnerability Index | Excel | United States |  | Current | NatureServe | http://www.natureserve.org/prodServices/climatechange/ccvi.jsp |
| Northeast Climate Impacts Assessment | Varies | Northeastern United States | Varies | 2008 | UCS/USFS | http://www.northeastclimatedata.org/ |
| Natural Disasters (Multi-Hazard) | Raster / Vector | Global | Varies | Current | Columbia University | <http://www.ldeo.columbia.edu/chrr/research/hotspots/coredata.html> |
| **Fire** | Landfire | Raster | Region- national (US) | 30m | Varies | USDA-USDI | <http://www.landfire.gov/> |
| **Existing Assets** | **Protected Areas** | Protected Areas Database of the United States | Vector | United States | Polygons | 2011 | USGS/Conservation Biology Institude | [http://www.protectedlands.net/padus/ http://databasin.org/protected- center/features/PAD-US-CBI](http://www.protectedlands.net/padus/) |
| World Database on Protected Areas | Vector | Global | Polygons | 2011 | IUCN/WDPA | <http://www.wdpa.org/> |
| **Ecoregional conservation** | TNC Ecoregional Conservation Planning data | Vector | Selected ecoregions | Polygons | 2006 | The Nature Conservancy | [http://conserveonline.org/workspaces/ec s/napaj/nap/](http://conserveonline.org/workspaces/ecs/napaj/nap/) |
| Two Countries, One Forest ecoregional planning data | Raster, vector | Northern Appalachian ecoregion | Polygons, 90m raster | 2008 | Two Countries, One Forest | <http://www.2c1forest.org/> |
| **Conservation Easements** | National Conservation Easement Database | Vector | United States | Polygons | 2011 | Conservation Biology Institute | [http://conservationeasement.us/ http://consbio.org/products/projects/nati onal-conservation-easement-database](http://conservationeasement.us/) |
| **Demographic / Socioeconomic** | US Census | Vector, tablular | United States | N/A | 2010 | United States Dept. of Commerce | <http://www.census.gov/geo/www/tiger/tgrshp2010/tgrshp2010.html> |

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| **Software purpose** | **Software name** | **Computing environment** | **Programming language** | **Difficulty (1 = easy, 5 = lots of time investment)** | **Data requirements (1 = standard inputs, 5 = specialized)** | **Quality and availability of documentation (1 = very accessible, 5 = technical language only)** | **Website for further information** |
| Reserve selection | Marxan | Zonae Cogito |  | 5 | 2 | 3 | <http://www.uq.edu.au/marxan/> |
|  | Marxan with zones | Zonae Cogito |  | 5 | 3 | 3 | <http://www.uq.edu.au/marxan/> |
|  | Sites | ArcView |  | 5 |  |  | <http://www.biogeog.ucsb.edu/projects/tnc/toolbox.html> |
|  | Zonation | Stand alone | Compiled | 5 |  |  | <http://www.helsinki.fi/bioscience/consplan/software/Zonation/index.html> |
| Habitat connectivity | Corridor  Designer | ArcGIS 10 | Python | 4 | 2 | 2 | <http://corridordesign.org/> |
|  | Circuitscape | ArcGIS | Python | 5 | 2 | 4 | <http://www.circuitscape.org/Circuitscape/Welcome.html> |
|  | Linkage mapper | ArcGIS | Python | 5 |  | 5 | <http://code.google.com/p/linkage-mapper/> |
|  | Unicor | ArcGIS | Python | 5 |  | 5 | None found |
|  | FunConn | ArcGIS 9.1 | Python | 4 | 2 | 5 | <http://www.nrel.colostate.edu/projects/starmap/funconn_index.htm> |
|  | Wild Lifelines | ArcGIS 10 |  | 3 | 1 | 3 | <http://www.twp.org/what-we-do/scientific-approach/wild-lifelines> |
| Species Distribution Modeling and Viability | Expert Opinion | ArcGIS 10 | N/A | 5 | 1 | 1 |  |
|  | Maxent |  | JAVA | 3 | 3 | 4 | <http://www.cs.princeton.edu/~schapire/maxent/> |
|  | Presence |  |  | 5 | 3 | 4 | <http://www.mbr-pwrc.usgs.gov/software/presence.html> |
|  | RAMAS GIS | Stand alone | Compiled | 5 | 5 | 3 | <http://www.ramas.com/index.php?option=com_k2&view=itemlist&layout=category&task=category&id=41&Itemid=80&lang=en#gis> |
| Planning process integration | Natureserve Vista | ArcGIS 10 | Python | 2 | 2 | 2 | <http://www.natureserve.org/prodServices/vista/overview.jsp> |
|  | Miradi | Stand alone | Compiled | 2 |  |  | <https://miradi.org/> |
| Threats | Community Viz (Local Buildout) | ArcGIS 10 |  | 3 |  | 2 | <http://placeways.com/communityviz/> |
|  | Global Human Footprint | Raster dataset for ArcGIS, web interface | NA | 3 | 1 | 3 | <http://sedac.ciesin.columbia.edu/wildareas/> |
|  | Future Human Footprint scenarios | Raster dataset for ArcGIS, web interface | NA | 3 | 1 | 3 | <http://www.2c1forest.org/> |
|  | Future housing and impervious surface scenarios | Raster dataset for ArcGIS | NA | 5 | 1 | 5 | <http://www.pnas.org/content/107/49/20887.full> |
| Climate | Climate forecasts, historical data | Raster datasets, web interface | NA | 3 | 1 | 3 | <http://www.climatewizard.org/> |

Figure 1. Data needs assessment definitions of tools, data, and processes.



Appendix 1.

Under the Scope of Work outlined in this proposal, the following objectives and tasks will be specifically addressed as identified with the Appalachian LCC 5-Year Work Plan.

**Work Plan (WP) Goal 1:** Create and deliver a landscape-level data sharing strategy and scalable toolset

*WP Objective 1.1:* Conduct AppLCC data needs assessment.

* WP: 1.1.3 Access the scope of data needs assessment project (internal vs. contract) and make recommendation to Steering Committee.
* WP:1.1.5 Identify and analyze available data sets, methodologies and approaches relative to AppLCC landscape conservation planning.
* WP: 1.1.6 Create a "crosswalk’" report to and validate identified science and data needs with member organizational priorities and AppLCC science needs portfolio.
* WP: 1.1.7 Develop scope of work needed to address or complete a data needs assessment and initiate/fund needed work.

*WP Objective 1.3:* Provide science information, tools, and data support to the existing habitat partnerships and joint ventures.

* WP: 1.3.2 Deliver findings and products (see 1.3.1) to the conservation and land use community.

*WP Objective 1.4*: Synthesize regional information to support State Wildlife Action Plans (SWAPs) and other partner action plans.

* WP: 1.4.1 Create inventory, summarize, and maintain key information from all relevant SWAPs, AppLCC Regional initiatives, resource management plans, and partnership efforts.
* WP: 1.4.2 Report as a “cross-walk” analysis that identifies opportunities to better integrate Regional perspectives, the regional ranking/priorities within each State, and connect to AppLCC Region-wide ranking to help inform planning efforts. (Ranking is based on spatial and temporal land-use and climate change factors.)

*WP Objective 1.7:* Develop and deliver landscape-level, scalable planning tools.

* WP: 1.7.1 Assemble common set of spatially explicit data layers based on LCC-consistent standards and definitions.

**Work Plan Goal 2:** Deliver landscape-level conservation plans for regional use

*WP Objective 2.7:* Utilizing the surrogate species approach to inform landscape-level planning, identify and establish data needs and monitoring design that reflect management objectives and conservation targets

* WP: 2.7.2 Define sub-zones within AppLCC.
* WP: 2.8.1 Consult with end-users/resource managers to determine what predictive tools are needed to support their work.

In addition, Principal Investigator will serve as technical advisor to LCC staff charged with executing the following Work Plan tasks:

*WP Objective 1.2:*  Identify and “craft a way forward” to overcome concerns about data sharing

* WP: 1.2.2 Assemble each ISC member organizations’ existing data protocols, data sharing contracts/agreements, and data sensitivity issues (see 1.2.4).
* WP: 1.2.3 Develop model agreements for data sharing.

*WP Objective 2.8:* Project future landscape conditions, cumulatively/over time, based on best available science/scenarios, indicating probable patterns and changes

* WP: 2.8.1 Consult with end-users/resource managers to determine what

predictive tools are needed to support their work.