

1. **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

How to use this document: The tables in this document refer to the attached excel sheet. Most were too extensive to fit into the main body of the document. They may provide better data access as spreadsheets. Where highlighted in yellow, the table appears only in the spreadsheet. Some of the spreadsheet tables were small enough to present in the document. Appendix 1 is a compilation of key observations from the SWAPs.

# **AN ANALYSIS OF STATE WILDLIFE ACTION PLANS IN THE APPALACHIAN LANDSCAPE CONSERVATION COOPERATIVE**

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## **BACKGROUND**

This is the final task of the data needs assessment project. In our previous tasks, we did the following:

1. Evaluated existing spatial data for coverage, conservation planning relevance, and quality
2. Assembled public data in geodatabase
3. Defined conservation planning tasks that can be accomplished with available, quality data, using some of the available software tools
4. Identified what other problems could be addressed if data gaps were filled, and
5. Interpreted uses of data and tools for website

During the Data Needs Assessment we came to the conclusion that there are two essential issues facing the App LCC. First, there is the problem of selecting a conservation planning methodology. Second, is the problem of bridging a fine-filter data gap so conservation planning can help with more local decisions. There are a number of conservation planning frameworks that are science-based. We strongly recommend the App LCC select for testing 2-3 well-reviewed methodologies. Examples include combining a reserve selection algorithm that integrates data from multiple scales, with a habitat connectivity algorithm. Three methods that could be tested include 1) Marxan, Marxan with Zones combined with a gene flow model for connectivity and resistant kernels, 2) Resistant Landscape approach (TNC), and 3) NALCC conservation planning method, LCAD. Each of these approaches has philosophical and methodological similarities as well as differences. This will allow the AppLCC to test and select the most appropriate method for its circumstances. We caution that the entire LCC system should, if it is to follow the underlying principles of science-based conservation planning, attempt as much as possible within biomes to adopt methods and datasets that are homogenous across LCC boundaries.

Part of understanding the needs of a region is knowing what has come before. The purpose of a regional approach to conservation is to transcend localities and make decisions to insure optimal conditions for biodiversity across multiple jurisdictional and political boundaries. Ecoregional approaches to conservation planning, of which the LCC system is a recent, agency-driven iteration, are well documented and extend back to the 1980s. The recognition that ecosystems do not observe political boundaries has rich coverage in the literature, well back to the early 20<sup>th</sup> century. At the same time, state governments in the United States bear the greatest responsibility for managing populations of wildlife. States have developed plans for wildlife conservation, and those plans must be considered in the context of regional conservation.

In this synthesis, we describe how the information contained in the individual State Wildlife Action Plans and conservation plans by other agencies can be linked together towards identifying opportunities to integrate state and local scale efforts into regional conservation framework for the AppLCC. Specifically, our aim was to quantify the objectivity and efforts across the 15 partner states. We are particularly interested in the commonalities of methodology and results across plans. Throughout the document, we integrate our previous efforts in this data needs assessment to figure out ways that state efforts can be upscaled to meet regional planning goals.

This review of the State Wildlife Action Plans (SWAPs) and other conservation planning efforts in the region is a timely and important effort toward synthesizing the extent and resolution of effort, species and ecosystem goals, and landscape-level context, in order to identify opportunities to integrate state and local-scale efforts into a regional conservation framework.

#### **JVs, AFWA BMPs and SWAPs:**

Joint Ventures and SWAPs operate at different spatial scales. SWAPs are restricted to state boundaries. JVs are regional partnerships involving federal, state, and local government agencies, corporations, tribes, individuals, and a wide range of non-governmental organizations which advance conservation efforts and help identify local land use priorities. JVs provide coordination for conservation planning and implementation that benefit specific species (Eastern Brook Trout Joint Venture), or certain taxonomic groups across an ecoregion (such as Appalachian Mountains Joint Venture, Central Hardwoods Joint Venture). JVs develop science-based goals and strategies, and a non-regulatory approach for achieving conservation. While the extent of certain JV may overlap with LCCs, the focus of the two efforts are different ([Table 1](#)). JV tend to focus on one or a few species (usually vertebrates, especially birds), whereas LCCs and State Wildlife Action Plans cover a much wider taxonomic strata. Given the restrictions of time, we decide to focus our analysis on the fifteen SWAPs in the AppLCC.

#### **Approach to analyzing SWAPs**

In order conduct this study, we read and analyzed the State Wildlife Action Plans from all 15 AppLCC partner states. We extracted information from the plans in a way that would enable us to analyze and synthesize the data dependency and objectivity across the SWAPs. We extracted key information of the plans, so that they can be presented here in a consolidated, organized and systematic manner. We also contacted all SWAP coordinators in all 15 partner states, with whom we had one on one email conversations regarding the upcoming SWAP revision. All states responded at-least once to my emails. In the emails, I asked questions on proposed changes in SWAP revisions, datasets in progress and conservation planning efforts in the different states. I also shared a consolidated summary document with each state, and gave them an opportunity to review and comment on it Appendix 1 contains all the state summaries. Some of our surveys are still out, and we will update the revised summaries as soon as we hear back from them.

While there are major differences in the methods and efforts across the states, putting them in one systematic framework allows a comprehensive picture of the conservation planning efforts conducted in the 2005 SWAP and the self-reported changes in the upcoming SWAP revision.

## State Composition of LCCs

As a first step towards understanding the geography of the AppLCC, we did some basic analysis to understand the composition of all 22 LCCs that have been designated by the USFW. AppLCC spans over has fifteen state partners across the Northern, Mid-West, Eastern and Southern states. Our analysis shows that the AppLCC has the largest number of state partners across all the LCCs across the US and US territories (Table 2: Snapshot of the composition of LCCs with respect to the number of state partnersTable2). This multi-state partner membership in the AppLCC probably creates greater challenges in coordination efforts. The North Atlantic LCC (NALCC) and Gulf Coastal Plains and Ozarks LCC have the next highest number of partner states (13 each).

Table 2: Snapshot of the composition of LCCs with respect to the number of state partners

LCC Nos (Assigned by USFW)	Names of LCC	No states
1	Appalachian	15
9	Gulf Coastal Plains and Ozarks	13
10	North Atlantic	13
4	Eastern Tallgrass Prairie and Big Rivers	12
16	Upper Midwest and Great Lakes	10
7	Great Plains	8
6	Great Northern	7
13	Plains and Prairie Potholes	7
15	Southern Rockies	7
3	Desert	6
5	Great Basin	6
8	Gulf Coast Prairie	6
14	South Atlantic	6
11	North Pacific	4
22	Caribbean	3
2	California	1
12	Peninsular Florida	1
17	Aleutian and Bering Sea Islands	1
18	Arctic	1
19	Northwest Boreal	1
20	Western Alaska	1
21	Pacific Islands	1

We then tried to assess how many LCCs each state within the AppLCC was a member of. Within the partner states of the AppLCC, most states have partnerships in other neighboring LCCs (Table 2). Eight out of the 15 states have LCC partnerships in more than 3 LCCs, six states are members of 2 LCCs, and West Virginia is the only state within the region that is completely and exclusively within the AppLCC. Alabama and Illinois have four LCCs intersecting their

state. Just as it is difficult for the LCC to coordinate across so many state partners, a state that has members in different LCCs probably puts some strain on the logistical and coordination efforts at the state level.

Table 3: Partner states within the AppLCC and other neighboring LCCs (not arranged in any specific order)

S. No	State	No. LCCs	LCC 1	LCC 2	LCC 3	LCC 4
1	AL	4	Appalachian	Gulf Coastal Plains and Ozarks	Gulf Coast Prairie	South Atlantic
2	IL	4	Appalachian	Gulf Coastal Plains and Ozarks	Upper Midwest and Great Lakes	Eastern Tallgrass Prairie and Big Rivers
3	GA	3	Appalachian	Gulf Coastal Plains and Ozarks	South Atlantic	
4	IN	3	Appalachian	Eastern Tallgrass Prairie and Big Rivers	Upper Midwest and Great Lakes	
5	NY	3	Appalachian	North Atlantic	Upper Midwest and Great Lakes	
6	OH	3	Appalachian	Eastern Tallgrass Prairie and Big Rivers	Upper Midwest and Great Lakes	
7	PA	3	Appalachian	North Atlantic	Upper Midwest and Great Lakes	
8	VA	3	Appalachian	North Atlantic	South Atlantic	
9	KY	2	Appalachian	Gulf Coastal Plains and Ozarks		
10	MD	2	Appalachian	North Atlantic		
11	NC	2	Appalachian	South Atlantic		
12	NJ	2	Appalachian	North Atlantic		
13	SC	2	Appalachian	South Atlantic		
14	TN	2	Appalachian	Gulf Coastal Plains and Ozarks		
15	WV	1	Appalachian			

This analysis reckons some of the top-down (Table 1) and bottom up (Table 2) problems that are involved in multi-stakeholder, multiple partnership driven conservation initiatives face. Given such a diverse portfolio of the AppLCC, having the highest number of state partners most certainly presents unique challenges in coordinating and obtaining outcomes in a timely manner. However, such endeavors have been undertaken, and very successfully so, by neighboring LCCs such as the South Atlantic and North Atlantic LCCs. NALCC has 13 states (although several

states belong entirely to the NALCC) has been very successful at ecoregional conservation planning projects, such as the LCAD effort. On the other end, being a member of several different LCCs can also pose unique challenges for each state, such as coordination, and dedicating enough time and resources to the LCC. Being a member of a fewer number of regional conservation efforts may be more efficient, because then states can devote their complete attention toward one regional planning effort.

Obtaining conservation planning at the regional scale is also challenging when there is heterogeneity in data and conservation planning efforts at the state level. Thus, a comprehensive synthesis of the state wildlife action plans seems very critical in the AppLCC, as it could serve as a way to understanding the level of variation in state conservation goals, efforts, approaches, and outcomes, and integrate efforts to produce rational decision making and conservation planning at the ecoregional level.

### **State Wildlife Action Plans**

In the United States, wildlife conservation historically has been carried out through hunting and fishing regulations focused on game species, through establishment of public wildlife refuges and conservation lands, and through endangered species protection laws. These approaches have left a large portion of wildlife and habitat unaddressed by laws and policies, especially for non-game species and habitat types. In order to fill this gap, Congress created the State Wildlife Grants (SWG) in 2000. SWG provides states with funds to protect and prevent species from becoming imperiled. This theme is commonly known as “Keep common species common”. In order to be eligible for the SWG funding, each state had to develop a comprehensive state wildlife action plan by 2005. States were allowed to take any approach they wished to, as long as it fulfilled the eight basic elements that were issues as guidelines. These are:

1. Identify the distribution and abundance of species of greatest conservation need (SGCN).
2. Describe the location and condition of key habitats essential to the SGCN.
3. Describe the threats to and research needs for SGCN and their habitats.
4. Describe the conservation actions required to conserve the identified species and their habitats.
5. Identify monitoring plans for SGCN, their habitats, and the proposed conservation actions.
6. Describe the review process of the WAP at intervals not to exceed ten years.
7. Coordinate the WAP with other federal, state, and local agencies' wildlife and land management plans.
8. Include a public involvement process in the development and implementation of the WAP.

We chose to focus our synthesis on the first two elements (SGCN and habitat). This is the baseline information on which recovery plans, monitoring and adaptive management are based on. The monitoring, review, coordination with agencies and public involvement are more logistical in their intent. In the following sections, we present details of our synthesis on these four elements. Along the way, we cross walk our synthesis of SWAPs with the previous tasks in this project.

## SPECIES

The initial mandate for the development of wildlife action plans was to “Keep common species common”. Identifying the species of greatest conservation need is a critical exercise, which sets the stage for all downstream conservation planning efforts. One of the main purpose of selecting focal species in planning is to provide focus and context to the development of specific conservation actions. These prioritized species may then become candidates for setting conservation targets in the long or short term. Thus, investing time, resources and effort in defining the species are of critical importance in downstream planning efforts. Using a standardized/objective approach for identification of SGCN helps in objective re-iterations of the process, and may provide ways of replicating the process outside the states.

The fifteen states used a variety of approaches in determining the Species of Greatest Conservation Need (SGCN), and organized the SGCN lists in different ways. Nine states prepared lists of SGCN, whereas the other six states categorized their SGCN lists into two or more tiers, based on various criteria. In the way that states defined taxonomic groups, there was clear definition of vertebrates (mammals, birds, amphibians, reptiles, and fishes), and to a large extent, crayfish and mussels. The invertebrate taxonomic group was variously presented in the different states (Table 4). For example, WV categorized invertebrates very extensively into butterflies, cave invertebrates, land snails, moths, spiders, stoneflies, tiger beetles, and dragonflies and damselflies. Several of the states expressed the need to include plants, but could not proceed because it was not in the mandate of the USFW directive, or there was not enough data and/or expertise at hand.

States followed a variety of criteria and undertook a sleuth of approaches in deciding their SGCN lists. Species selection for inclusion in the SGCN lists was primarily driven by expert opinion based on available literature. States sometimes supplemented the expert opinion process by self-devised ranking of species in various categories (Eg. VA, NC, etc) or following published approaches. The most common approach in identifying SGCN was to start with the compilation of multiple lists (Federal/ Natureserve Global and State ranks; and taxa specific lists such as Partners in Flight, Waterbird conservation plans, etc), work through the lists with experts by means of workshops, Taxon Advisory Committees, online surveys, or a combination of any of these means. Two states (NJ and IL) incorporated a measure of confidence in their species assessments and rankings. NJ devised a species selection procedure based on the Delphi Status Review, which is an iterative, consensus building exercise (Clark et al. 2006). Another available method is the Millsap et al (1990) approach that some states have alluded to using in the upcoming revision. In order to capture this underlying factor, we tabulated the criteria of SGCN selection across the states (Table 5). On tabulating the criteria of SGCN selection, we found certain characteristics such as state and federally listed species, species distribution, population trend, and endemism to be the most commonly used criteria for SGCN identification. Several other criteria were used to prioritize the lists.

As one step further in this process, we tabulated the mammalian species that states had listed in their SGCN or in the top two tiers of tiered lists (Table 6). We used mammal lists as an example, to illustrate that certain species that may be contiguous across different states may often be prioritized differently, depending on the criteria that were used. This list can also serve as a starting template to be used for AppLCC indicator/surrogate species determination. Currently the AppLCC does not have a defined list/suite of focal species. Focal species are often used in conservation planning, if their habitat needs represent those of larger groups of organisms and/or if they are of particular conservation interest. We have previously recommended identifying a suite of species that is representative of the habitat and/or management needs of larger groups of species and to AppLCC's conservation plans.

## HABITAT

Different states identified habitats in a variety of ways, leading to a no. of different terrestrial and aquatic habitat categories (details in Appendix I). Several states used their GAP analysis to develop habitat classifications, while others conducted and explained new habitat classification methods in their SWAPs. For example, Indiana identified a total of ~ 80 habitats clubbed into eight broad categories, which they used to write the State CWS (Agriculture, Aquatic Systems, Barren Lands, Developed Lands, Forested Lands, Grasslands, Subterranean systems, and Wetlands). Tennessee used a five level hierarchical approach to defining habitat. The Landscape project in NJ highlights an effort to use data-dependent objective and scientific approach towards habitat conservation, prioritization, and planning. Some states developed habitat classifications, and explained the process in details in their SWAP. Other states were more descriptive of the habitats. I broadly categorized terrestrial habitats into forest, grassland, rocky outcrops, wetlands, and anthropogenic habitat (although there may be some overlap between these categories), and cross tabulated the different habitats across all 15 states (Table 7).

A cursory glance through this matrix shows that different states have described habitats in a variety of ways. This is just a tabulation, and I have not attempted any cross walk between definitions of habitats across states, thus there is definitely some redundancy in this matrix. However, it is not difficult to see that there exists a variety of habitat descriptions and delineations across the states. For example, there are a total of 34 different categories of rocky habitats overall. PA had just one designation for this kind of habitat, which involved caves, rock outcrops, mines, and talus slopes. On the other hand, IL had a much more detailed classification of rock habitats. They identified a total of five rock habitats: Glade, Bluff & Cliff, Lakeshore, aquatic caves, and terrestrial caves. Nine states had a category for anthropogenic lands, and had various levels of classification within it (1-7 categories per state). At the same time, MD, NC, GA, OH, SC and NJ did not have a single category for anthropogenic habitats.

While some heterogeneity can be dealt with for ecoregional conservation planning, some common way to identify habitats at a finer scale than currently available would be extremely useful to the AppLCC. The Northeast Terrestrial Habitat Mapping Project (NETHM) overcomes this by creating a classification system based on the ecological systems classification created by

NatureServe, with additional systems for altered habitats and land-use types. These Habitat Systems are intended to be applicable at medium and large scales, and to supplement the finer-scale approaches used within states for specific projects and needs. They include types that are extensive and cover large areas, as well as small, specific-environment types that may cover only a hectare or two. Several Northern states are planning to use this in their revisions, and it may be worth extending the classification to cover the other AppLCC states as well.

We then developed a ranking system during our meta-analysis of the SWAPs. We recorded the number of conservation planning efforts taken by the states, and calculated a cumulative score (Table 8). We decided to do this as a way to measure objectivity/complexity and data-drivenness in the SWAPs. We also gave states a chance to comment on a previous version of this table, and will incorporate any changes if they come through to us soon. As far this ranking system goes, VA and TN score very high, because of the number of processes they have completed in their SWAPs. They rank the highest, followed by several states that score similarly in different blocks. Most states that had a higher score did 5 out of the 13 tasks. The most frequently completed exercise across the states was identifying areas of conservation priority. Several of the states used mapping and overlaying species richness maps of various taxa to identify terrestrial and aquatic areas of conservation priority (Eg: KY, VA). The only state that did not score in these categories was SC. It will be very interesting to use this (or a modification of this) rubric to measure change in scores after the SWAP revision is completed.

## REVISIONS TO SWAPS

During our communication with the states, I asked them about the changes they will be undertaking in the 2015 revisions of the plans. The states are in different stages (from early stages in TN, AL to more advanced stages where SGCN lists have been revised in NC). Most plans that I used were 2005, or 2008 revisions (eg PA), except for KY, which has already completed its revision in 2013.

Some key relevant mentions of AppLCC in my communication:

GA “Participation in the Landscape Conservation Cooperatives will be instrumental in shaping these regional conservation strategies. We hope to be able to use data being developed or compiled by the LCCs to assess broad-scale and long-term conservation needs.”

NC “I don't get much correspondence from the AppLCC, so that would be the first improvement that would facilitate participation. I know there is a web page but I don't have time to visit sites randomly to see if there's new information posted yet or not.”

Given this disparity in the stages of revisions, we present a very brief summary in two tables (Table 9) highlighting some of the most important changes that states have mentioned as being important in their revisions. Climate change and wildlife disease are important across the border additions in the revisions. Improving partnership involvement, electronic means of disseminating information are other big issues states are trying to improve upon. Several northern states are planning to use North East Terrestrial and Aquatic Habitat Classifications for their revisions, and several states are planning to adopt AFWA voluntary best practices for SWAP revisions (Table 9).

Please note that we are still in communication with states, and are waiting to hear back from several of them. We anticipate that there will be newer information in the revision section will be significantly updated once we hear from them, and maybe some minor changes to the other sections. For more details on each state, please refer to the appendices.

We also asked states to share any information on data that is being currently developed. This information is summarized in Table 10. This table can be helpful in developing AppLCC wide datasets for conservation planning efforts in the near future.

## CAVEATS

With this intensive analysis of the SWAPs, we hope that we have presented the heterogeneity of the efforts undertaken by the states within the AppLCC ecoregion in a systematic, meaningful manner. Several states communicated with us that they are moving towards a more standardized/objective approach towards writing their plans in the upcoming revisions. While the information here is to the best of our (and also the state's) knowledge, we suggest that the revision section be taken as tentative, given that things may change during the process.

We are still in communication with states, and hoping to hear back from several of them. We anticipate that the revision section will be significantly updated once we hear from them, and maybe some minor changes to the other sections. One thing to note here is that KY has already revised its plan in 2013. I used the 2013 plan to do this analysis, while most other state.

## CONCLUSIONS

When examining the SWAPs as a whole, their primary feature is heterogeneity. While the SWAPs in many cases are well calibrated to the needs of the individual state, and in some cases effort has been made to homogenize across state boundaries, their role in the App LCC remains unclear. If the App LCC were to adopt a regional conservation planning strategy that is science-based, the information in the SWAPs, as documented in this report, could be drawn upon to select focal species and ecosystems, parameterize models, and bridge coarse-fine-filter gaps. On the other hand, lack of uniform methodology across SWAPs could impede regional study.

The range of data dependencies varies by states to a large degree. From the complexity or objectivity in SGCN determination, habitat delineation and conservation planning exercises, there is a wide range of methods, data usage, complexity and objectivity. From our correspondence with states, we found that they are in different stages of the revision, and we hope that the information in this report will be helpful for them as they proceed in their revision work.

Scaling up to a certain degree, following standardized and replicable approaches in all steps will help planning at the LCC level. The LCAD approach in the NALCC is a fine example of what ecoregional conservation planning can be achieved, even when multiple state agencies are involved. The AppLCC can use the information collected in this study to collect some finer scaled data from states, expand some of the work done at individual state levels to the LCC and also deliver data in a format that is useful for the states.

## **REFERENCES CITED**

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