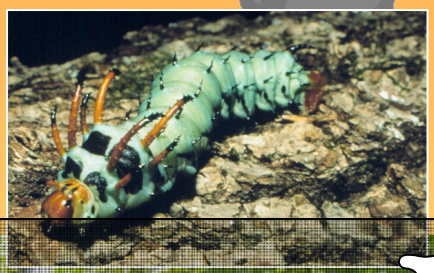
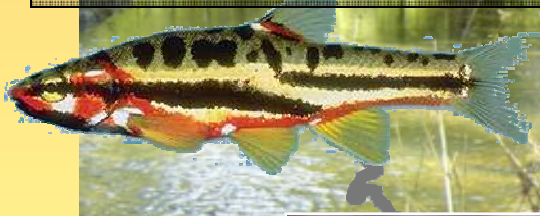
Albemarle County Biodiversity

A Report on its History, Current Conditions, and Threats, with Strategies for Future Protection



Summary Report



Prepared by the Albemarle County Biodiversity Work Group

Albemarle County Biodiversity:
A Report on its History, Current Conditions, and Threats, with Strategies for Future Protection

Summary Report

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October 2004

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PREFACE

This report focuses on one of the mandates of Albemarle County's Comprehensive Plan: to preserve and restore the County's biological diversity (hereafter, "biodiversity"). To that end, we first define biodiversity concepts, outline the guidelines for protection, and review the history of and threats to biodiversity in the County. We then provide a road-map for achieving biodiversity protection, by identifying key areas, services, and species/community groups to preserve. We emphasize a need for education at all levels about the importance of biodiversity. Lastly, we make recommendations to the Board of Supervisors concerning the establishment of the standing Biodiversity Committee called for by the Comprehensive Plan, and to that committee about strategic steps to take in order to study, monitory, preserve, and restore the County's rich biodiversity.

Biodiversity is the variety of life in all forms and at many levels, from genes and species to entire ecosystems. Biodiversity is essential for the functioning and health of ecosystems and for provision of the ecological services on which all living organisms, including humans, depend. The wellbeing (a term encompassing the economic, ecological, and aesthetic/spiritual condition) of Albemarle's citizens is directly related to the diversity and health of Albemarle's environment. And, while biodiversity has aesthetic and economic values, its protection is also an ethical responsibility.

Combining knowledge of the history and current state of biodiversity with an understanding of current and potential threats can help us develop biodiversity conservation and restoration strategies for the future. Albemarle's Comprehensive Plan identifies the documentation and protection of the County's biodiversity as an important goal for the Community. The Biodiversity Assessment begun by the Work Group, and the recommendations contained in their report (which this document summarizes), are presented as a first step toward achieving that goal. The next step will be the creation of the standing biodiversity committee.

GUIDELINES FOR BIODIVERSITY CONSERVATION

Aldo Leopold stated in his classic *Sand County Almanac* what has become the guiding principle for modern conservation: "To change ideas about what land is for is to change ideas about what anything is for... To keep every cog and wheel is the first precaution of intelligent tinkering." The following guidelines are intended to express the implications of Leopold's words through the lessons from ecology and population biology and to derive conclusions regarding sound biodiversity conservation strategies. Section Two of the full report contains more information on these guidelines.

Protect and restore large blocks of contiguous terrestrial ecosystems (especially forests) and extensive aquatic ecosystems. Large habitat areas provide for larger (and more resilient) populations, maintain gene flow, provide interior habitat for area-sensitive terrestrial species, improve the viability of mobile aquatic species, allow ecosystem processes to occur across connected areas of varied habitat types, and provide the space necessary for a natural mosaic pattern of terrestrial habitat types and successional stages. Planning for large areas that can assure maintenance of the health of ecosystems and their ecological processes requires a landscape- or watershed-level approach to setting land and water policies. Planning for individual elements (e.g., endangered or depleted species, unique habitats, etc.) will require a parallel site-specific approach—see below. A central management goal is to prevent, minimize, or reverse current trends towards fragmentation and simplification of ecosystems and their habitats.

Protect and restore the connectivity of terrestrial and aquatic habitats. Connectivity is the key to genetic exchanges for healthy populations, allows for movement among habitats and regeneration of reduced or extirpated populations, and provides for ecosystem and community resilience in the face of ecological change (from local site disturbances to global changes).

Maintain and reestablish multiple representative examples of native ecological community types and sites with the physical elements necessary for those communities to exist. Maintaining representative environments ensures that the area's full native biodiversity will be maintained in the area, and redundancy (having multiple examples) ensures that impacts to any single population or community will not remove that element from the landscape. The multiple examples should be distributed across the area (for example, in multiple watersheds), rather than concentrated where a single disturbance could affect them all. In cases where native community types no longer occur, protecting sites with the physical factors (geology, soils, etc.) that would foster those types can increase prospects for future restoration of biodiversity.

Protect and buffer ecologically valuable areas and important sites. Critical areas (e.g., wetlands, riparian corridors, etc.,--see the Recommendations for a proposed list) are those landscape and aquatic elements that are particularly important to healthy ecosystems and their services. Known occurrences of rare species and community types (see Section IV for a preliminary list of these Important Sites) are often the last refuges of those elements of the area's biodiversity. Protecting and buffering both types of sites, in concert with protecting larger-scale habitats and connectivity, provides a foundation for protecting and enhancing the area's biodiversity.

Recognize and convey the importance of biodiversity and ecosystem services. Biodiversity is directly affected by human policies and actions. Acknowledgment of the human role in ecosystem health is the first step toward protection and restoration. Citizens and decision-makers must be aware of biodiversity, ecosystem services, land-protection mechanisms, and appropriate management practices, and reflect that awareness in public policy decisions that affect biodiversity and ecosystem services. Even within suburban and farm landscapes, there are opportunities for landowners to promote biodiversity

Maintain active protection, monitoring, management, and restoration programs. This requires protection of existing intact habitats and populations; active management of protected areas (versus passive management or neglect, which leads to degradation); action to quickly and effectively take advantage of conservation opportunities and respond to threats; and restoration of habitats damaged by past actions. Adaptive management encompasses monitoring, research, and management using a “learning-by-doing” approach.

HISTORIC IMPACTS AND MODERN THREATS

Virginia, including Albemarle County, has one of the longest histories of European settlement in the United States. Since European colonization, the landscape has been altered significantly again and again, resulting in major changes to the biological communities of the county. Even before Europeans arrived, Native Americans were altering the landscape in more modest ways. Because waterways flow from and through the landscape, changes in the land dramatically altered waterways and aquatic life too. Waterways have been altered through direct manipulation as well. The landscapes, waterways, and natural communities seen today are distant, highly-modified “descendants” of those seen by the Native Americans.

Human activity is also the source of most of the threats that wildlife species and natural communities confront today. Land use changes-- especially the conversion of rural or undeveloped land to developed sites--directly impact biodiversity. Suburbanization and other forms of development not only reduce the amount of land in natural or semi-natural conditions, but also create a fragmented landscape. Habitat fragmentation creates a host of threats and stresses to natural systems.

A less well known, but critical historic impact and modern threat is that of exotic, invasive organisms. These species are second only to destruction of physical habitat as a threat to native species and ecosystems the world over. Albemarle County, along with most other areas in the U.S. and the world, suffers from the effects of invasive exotic organisms, both in natural and agricultural settings.

Some of the forces that stress and therefore threaten biodiversity originate at locations far removed from Albemarle County. Local activities may contribute to the source of the problem, but much broader efforts will be needed to reduce the threats. Examples of two threats to local biodiversity that originate at geographic levels far beyond Albemarle County are airborne pollution and climate change.

With a history of massive impacts to the landscape, an abundance of invasive species, environmental changes occurring at national and global scales, and uncertainty about what the future may hold, one might be tempted to despair. However, that conclusion ignores the biodiversity that remains and the potential for its protection and restoration.

The lessons of the impact of land use changes initiated hundreds of years ago serve as poignant reminders that today's land use will be the legacy for tomorrow's Albemarle County. Our remaining biodiversity will either be conserved and enhanced or it will become distant memory for those who follow.

ALBEMARLE'S BIODIVERSITY TODAY

The County's landscape hosts highly variable forest and plant communities. There are two main causes of the landscape conditions we see today. The first is the natural variation in physical site factors--geology, topography, elevation, soils, etc.--that affect plant growth. The many combinations of these factors are reflected in the different kinds of forests and plant communities that occur.

The second cause is the extensive alteration of original plant communities that started when the county was first settled by Europeans and that continues up to the present day. The human disturbance history of the county has completely altered the original, natural forests and plant communities that occurred here. There are no intact old-growth forests remaining.

The dominant aquatic feature of Albemarle County is the network of streams and rivers. Albemarle County's moving-water systems range from the smallest spring seeps and ephemeral swales to the James River. Wetlands are important elements of the aquatic system. There are no natural "lake" environments in Albemarle County, but there are many ponds and reservoirs that have been established by the impoundment of moving waters. Floodplains and riparian zones are critical to the aquatic systems and provide a transition to the terrestrial landscape. All of these systems are impacted by the same human activities that affect terrestrial ecosystems.

Throughout Albemarle, there are sites known by naturalists to be exceptional examples of the County's habitats and ecosystems. (See Appendix A for an initial list.) They include the habitats of rare plants, sites with relatively intact natural communities, migration routes for animals, forested areas with large unfragmented habitats, etc. The majority of these sites have no current protection for their biodiversity values.

Thousands of animal species occur in the County. About 60 species of mammals (Appendix B), from shrews to bears, can be found, although three species—Elk, Gray Wolf, and American Bison—are known to have extirpated from the County since the colonial era. There are 283 species of birds (Appendix C) that occur in the County. At least two others (Bewick's Wren and Henslow's Sparrow) occurred in the past but are no longer found here, while some that occur now (e.g., European Starling and House Sparrow) are non-native introduced species that compete with native species. Bald Eagle, which has been recorded breeding in the County, is a federally-listed Threatened species, and seven species (Northern Goshawk, Black Rail, Loggerhead Shrike, Bewick's Wren, Cerulean Warbler, Bachman's Sparrow, and Henslow's Sparrow) are federal Species of Concern.

Fifty-nine species of fish (Appendix D) are known to occur in Albemarle, and another 12 are thought likely to occur. This is a moderately diverse fish community for our geographic region. Seventeen of these species are non-natives introduced by humans. One of the native species, the Appalachia Darter, is a federal

Species of Concern. It is not known how many species of fish that formerly occurred in the County are extinct or have been extirpated. Twenty-nine species of amphibians (salamanders, toads, and frogs) and 37 of reptiles (turtles, lizards, and snakes) are found here.

Our knowledge about these species varies widely. For example, birds are easily observed and are fairly well known, as are fish, while reptiles and amphibians are difficult to find and consequently are not well known.

This lack of knowledge is especially the case with invertebrates. While they are critical to the healthy functioning of ecosystems and occur in a fascinating variety, invertebrates are only beginning to be carefully studied in the County (e.g., native bees), and we have much to learn about them. The best-known invertebrate group is the freshwater mussel community. Sixteen species of freshwater mussels or clams are known or believed to live in Albemarle's waters. One, the James Spinymussel, is federally Endangered. Another, the Green Floater, is a federal Species of Concern. The Atlantic Pigtoe is threatened in the state.

Albemarle County currently has a considerable diversity of plants--about 1336 species as of 2003. Of these, some 1,066 are natives that were probably present before the arrival of European settlers in the County. There is no information available to tell us how many of the species present in the pre-colonial era have now been extirpated by the destruction of habitat through human activities. Meanwhile settlers brought with them many aliens, some intentionally and others unintentionally, and more continue to arrive or are discovered each year. About 100 of the vascular plants of Albemarle County are classified as Rare or Very Scarce; see Table I-1 in Appendix I. Most of these rarities are found either on steep bluffs along rivers or creeks, or in wet areas where lumbering and farming has not been feasible.

Adding to this knowledge base about ecosystems, important sites, and habitats will be a key task for the County's ongoing Biodiversity Assessment. The ongoing input of local naturalists (whose observations are being recorded and mapped as part of the Work Group process) and other experts will be critical for policy decisions.

ECOSYSTEMS

In the abstract, "biodiversity" can include all the natural diversity of an area, whether or not the genes, organisms, or habitats are native to that place or representative of healthy natural systems. In this report, our focus is on biodiversity that is natural for its location. Protecting biodiversity in this manner requires a landscape context built on healthily functioning native ecosystems. This makes it important to understand what ecosystems are and how they function.

Ecosystems--short for "ecological systems"--are fundamental units of nature. They range in size from small wetlands, meadows, or forest patches to watersheds and entire ecological regions. But ecosystems of any size share defining factors--they occupy a defined place, they continue through time, they take in materials and energy and let out heat and wastes, and they include habitats and interacting organisms. It is the way in which the related parts function that forms the system. Ecosystems are highly complex because of the dizzying array of biodiversity, physical parts, and processes they contain. It is precisely because of this complexity that keeping all the "cogs and wheels" is essential for any attempt to achieve sustainability. For any system, it is essential to understand what parts may be removed or changed before the system is unable to function. However, we seldom have this information; therefore, wise stewardship equates to keeping all the pieces.

The scientific literature is now replete with descriptions of how healthy ecosystems provide welfare to human societies. Daily (1997) lists the following "conditions and processes through which natural ecosystems, and the species that make them up, sustain and fulfill human life":

- purification of air and water
- mitigation of floods and droughts

- detoxification and decomposition of wastes
- generation and renewal of soil and fertility
- pollination of crops and natural vegetation
- control of the vast majority of potential agricultural pests
- dispersal of seeds and translocation of nutrients
- sources of crop varieties, medicines, and industrial enterprise
- protection from the sun's harmful ultraviolet rays
- partial stabilization of climate
- moderation of temperature extremes and the force of winds and waves
- support of diverse human cultures
- provision of aesthetic beauty and intellectual stimulation that lift the human spirit.

ASSESSING AND MONITORING BIODIVERSITY

Documenting the diversity of the flora and fauna of a region the size of Albemarle County, Virginia--approximately 726 square miles--is a daunting task. Therefore, it is necessary to select assessment methods that will provide the most accurate information that can be reasonably obtained. These methods include expert systems (compiling the knowledge of experienced naturalists), "gap analysis" (using geographic information systems to identify areas in need of protection), field assessments (as carried out by Virginia's Natural Heritage Program), use of physical proxies (using landscape features to predict locations of important areas), and the "focal species" approach (plans for protecting highly-valued species). The Work Group's recommendations include guidance on how to adapt each of these methods to meet the County's information needs.

Ecological monitoring is an essential ingredient for any attempt at biodiversity protection or environmental management, as information must be kept up to date for ecosystems to be protected. Measures of ecosystem status, known as "indicators," can be used to keep tabs on the health of ecosystems over time.

Hand in hand with this monitoring process, ecosystems and communities need to be classified, and their current states need to be assessed. (Much of this classification and assessment work has been begun by the Work Group.) This makes it possible for the County to track ecosystem changes and decide which protection and restoration programs are necessary and appropriate.

BIODIVERSITY EDUCATION

The citizens of Albemarle County value the natural landscape and the plants and animals living therein, and have demonstrated that they support the goal of protecting biodiversity. The County has formalized this shared value in the Comprehensive Plan and citizens have confirmed it in public surveys. However, evidence suggests (from various forums, comprehensive plan documents, surveys, etc.) that public support for the general goal of protecting biodiversity is ahead of people's understanding of the steps required to achieve that goal. Those steps include both individual actions on private land and changes in County policies. Thus, there is a need for a public education program that contributes to both understanding and positive action in support of biodiversity.

There are several existing and successful education efforts that address biodiversity to varying degrees. However, there is no overall framework for biodiversity education. There are also many needs in biodiversity education that are not served adequately.

Public biodiversity education should be based upon an overall plan to provide citizens with opportunities to educate themselves on biodiversity issues, with a focus on both understanding issues and taking action to support biodiversity. A key step is framing an overall approach; an initial framework is included as the table in Appendix J of the full report. Achieving the goal of long-term preservation of Albemarle's

biological resources requires a commitment to landscape states that support biodiversity. This fact should drive the creation, conduct, and evaluation of education programs. A Biodiversity Education Subcommittee or advisory group to the Biodiversity Committee can build on the table in Appendix J and, in partnership with representatives of organizations currently offering such educational opportunities, develop a broad framework of biodiversity concepts important for public understanding of biodiversity issues and actions.

The Biodiversity Committee and its education subcommittee/advisory group can document and create targeted education programs that support the completion of specific tasks. For example, the task of managing one's backyard is very different from participating in the development and execution of public policy, but both tasks can be informed by an educational effort. In addition, biodiversity-related studies already underway in county schools can be documented and enhanced through a direct link to the work of the Committee, and the Committee can work with these initiatives to identify additional needs and opportunities for the school curriculum to address community biodiversity initiatives. The result will be a complete educational structure that addresses every component of our community's effort to preserve and enhance our biological resources.

RECOMMENDATIONS

In this section, the Work Group makes recommendations to the Board of Supervisors and to the permanent Biodiversity Committee.

Biodiversity Planning Goal

The Work Group recommends that the County adopt the following overall goal to guide development and implementation of the County's biodiversity policies:

> **GOAL: The County should develop a biodiversity action plan and subsequent implementation measures that provide means for sustaining the landscape states and ecological integrity required for important ecological services and healthy populations of native plants and animals.**

The strategies recommended below in the section on the Biodiversity Action Plan are intended to help the Biodiversity Committee determine those necessary landscape states and set policies for achieving them.

Recommendations to the Board of Supervisors

The Standing Biodiversity Committee

The Work Group recommends that the following items be the responsibility of the standing committee:

- Development of policy recommendations to the Board in response to biodiversity issues and information gathered from the Biodiversity Assessment. The Committee should be consulted on programs, regulations, and Comprehensive Plan changes that may affect biodiversity protection.
- Review of the biodiversity impacts of selected development projects that are expected to have such impacts, and comment to the Planning Commission and Board regarding the impacts and potential mitigation measures or alternative approaches.
- Development of educational materials and programs on biodiversity.
- Input on and oversight of the maintenance, expansion, updating, and evaluation of the ongoing Biodiversity Assessment begun by the Biodiversity Work Group, and development of a protocol for assessing changes in the state of biodiversity (with reference to planning goals).

- Assistance in staff development of an action plan that specifies detailed steps for achieving protection of biodiversity as outlined in the Comprehensive Plan; and
- Provision of periodic reports to the Board of Supervisors on the state of biodiversity in the County.
- Provision of a brief list of actions required to secure protection from immediate threats

The Work Group has made the following recommendations regarding the makeup of the standing Committee:

1. The process of establishing the standing Biodiversity Committee should begin upon completion of the Biodiversity Work Group's work and acceptance of this report by the Board of Supervisors.
2. The Biodiversity Committee should consist of 8 to 12 members; the Work Group feels that this is a good compromise between the wide experience base of a larger committee and the more efficient interaction and decision-making of a smaller group. The group agrees that a larger group would be cumbersome and slow to act. When additional expertise is needed, the Committee should invite experts to attend meetings and provide input that the Committee needs.
3. The Committee needs to include a range of expertise in fields applicable to its tasks (see below). As with the Biodiversity Work Group, membership should include individuals with experience in: natural history (including those with detailed knowledge of local wildlife, plants, and other resources); population biology; community and landscape ecology; biological conservation and conservation planning, including GIS; forestry; geology and soils; and science education (adult and youth).
4. The group should also include local landowners and citizens with interests in biodiversity conservation, farming and forestry, and conservation-oriented rural and urban development.
5. All members of the Committee, no matter what their background or area of expertise, should be supportive of the biodiversity-protection goals that the County has adopted into its Comprehensive Plan. The Work Group feels strongly that the Committee's role should be to support, expand on, and implement that policy. As part of the application process for the Committee, potential members should be asked to confirm their support for biodiversity protection in the County, and their answers should be considered in the Board's selection of the most suitable candidates.
6. The membership of the Committee should reflect the diversity of the community. The Work Group recommends that the process of announcing the Committee's formation and accepting applications be expanded to ensure that persons of both genders and any ethnic, racial, and/or socioeconomic group are well aware of the opportunity and have an equal opportunity to be involved.
7. The Committee should be known as the "Natural Heritage Committee."

Immediate Measures Needed to Protect Biodiversity

While the County will need to carefully select its biodiversity policies, much can be lost during the time needed for committee creation and later deliberation, policy and program development, regulation amendment, etc. Valuable habitat sites, especially those under threat from construction, clearing, pressures from adjacent land uses, or invasive species should be protected as soon as possible. Riparian (river) corridors and wetlands deserve special attention. Others should be protected as a precautionary measure. The sites that are selected as Important Sites, and valuable examples of various ecosystem types, for example, should be protected wherever possible. Protection methods might include conservation easements (donated or purchased), land purchase (and subsequent management by the County for conservation purposes), donation of land to non-profit organizations, or management agreements. Action to protect important sites should not be limited by the incomplete or changing nature of the Biodiversity Assessment. Opportunities for effective conservation must be acted upon even when information is incomplete, to ensure that the opportunities are not missed. Expert assistance is available to make the best judgments possible in the time available.

Recommendations to the Standing Committee

Data Collection, Analysis and Application

Strategy: Continually add to, improve, and update the Biodiversity Assessment begun by the Biodiversity Work Group.

The Biodiversity Working Group recommends the following approaches to the permanent Biodiversity Committee in Albemarle County:

1. Use a combination of the methods listed in section IV under "Biodiversity Assessment Methods," as each has certain strengths and limitations. We suggest that both a habitat/landscape approach be used in conjunction with inventories of specific taxa of interest. The annual variation in funding support that the County experiences may allow more intensive inventory work in some years, and less in others.
2. Use, as a starting point, protection of the known Important Sites and occurrences of rare, unusual, or sensitive species of plants or animals (the BWG GIS files), with a commitment to expand the sampling to other parts of the County to try to supplement the current GIS coverage. In concert with this effort needs to be a landowner educational program to inform the pertinent landowners of the natural resources on their lands, their values, and some tips on stewardship to sustain these resources.
3. Use a modified GAP approach to identify larger-scale landscape features that are currently intact and of high biodiversity value for protection, such as wetlands (all sizes), stream corridors, large intact forest tracts (especially those > 500 acres), abandoned farmland or pasturage, cliffsides.
4. Carefully determine which taxa are of sufficient interest and importance to consider for the County, and to pursue opportunities to scientifically inventory these using best contemporary methods. In many other areas, volunteer networks have taken the responsibility of data collection while the overall coordination, data management, analysis and report writing is handled by a public agency (e.g. the national Breeding Bird Survey operated by the U.S. Geological Survey's Biological Resources Discipline) or a non-governmental organization.
5. Investigate feasibility and establishment of an early detection system for invasive species, as well as an inventory and management system for invasives.

Strategy: Increase the County's capacity for effectively using information on biodiversity in its decision-making processes.

Possible Implementation Measures Include:

- Provide training in conservation principles, County biodiversity policies, and the character of local biodiversity for staff involved in planning, policy development, and development review. Ensure that review processes provide effective biodiversity protection.
- Hire staff with conservation biology experience, and/or contract with consulting conservation scientists to address data analysis and appropriate decision-making
- Provide GIS and database tools as necessary to provide staff and the public with necessary information for effective biodiversity protection.

Strategy: Use information gathered in the Biodiversity Assessment to set directions for land-use policy development.

Strategy: Work to connect biodiversity policy development to Rural Area and Development Area land-use policies.

Possible Implementation Measures Include:

- Present maps recognizing important sites, examples of ecological community types, and large-scale landscape structures to the Board for adoption into the Comprehensive Plan with the intention that they guide policy decisions and project-review processes. (Focus on large blocks/fragmentation, connectivity)
- Adopt a list of priority site and landscape-feature types into the Comprehensive Plan, for the purpose of identifying important resources to be protected. This list, which should be amended as necessary based on results of the ongoing Biodiversity Assessment, should initially include:

Table N: Critical Site & Landscape Feature Types for Comprehensive Plan Recognition
1) **Wetlands**. All non-impoundment wetlands should be considered high-priority areas. However, as stated in section IV, many of Albemarle County's wetlands are small sites that aren't catalogued in large-scale wetland surveys, and therefore need further assessment.
2) **Large areas of unfragmented forests** (with breaks of 200 meters or more considered to be boundaries), and contiguous areas where reforestation efforts can reconnect forest areas and re-create larger blocks.
3) **Steep bluffs** (native vegetation hotspots)
4) **Lengthy, connected stream/river ecosystems,** representing all the native ecosystem types.
5) **Riparian corridors** including all vegetation (both existing forests and potential reforestation sites) and steep slopes, out to 100 ft from the stream edge or the limit of adjacent slopes.
6) **Known breeding and roosting areas** (for example, the eagle nest and heron rookery listed in Table A-1 in Appendix A.)
7) **Migration/movement routes,** including corridors connecting habitats and local routes for seasonal amphibian movements, etc. Forested ridgetops (without antenna towers and other collision-death threats) in this region are critical migration routes for birds migrating on regional to intercontinental scales.
8) **Rock outcrops and barrens** with characteristic flora
9) Sites with **known occurrences of rare/out-of-range species**, and good examples of **intact native community types**
10) **Potential native grassland restoration areas** of 25 acres or more. Many grassland species have declined dramatically.

- Tie biodiversity policies to Rural Area and Development Area land-use policies by participating in a comprehensive landscape-futures scenario process that establishes a vision for achieving biodiversity protection, rural preservation, and other land-use goals on a shared landscape. Use the outcomes of this process to guide policy and regulation changes.
- Adopt a set of indicators to measure progress toward explicit biodiversity planning goals and to evaluate the success of biodiversity protection efforts.
- Engage adjoining localities in a regional biodiversity planning process that recognizes the role of multiple jurisdictions in protecting the habitat values of large-scale landscape structures.

Structure of the Biodiversity Action Plan

Building on the outline proposed in the Natural Resources and Cultural Assets Plan and the Work Group's "Strategic Guidelines for Biodiversity Protection," the Work Group proposes the following structure and strategies for the Action Plan. The strategies included in this outline are intended to focus directly on on-the-ground physical goals for biodiversity protection and restoration. They should be used to direct policies and programs for both the Rural Areas and the Development Areas.

Summary Table: Biodiversity Action Plan Strategies
Protect, restore, and manage large blocks of contiguous terrestrial ecosystems (especially forests) and extensive aquatic ecosystems.
Protect and restore the connectivity of terrestrial and aquatic habitats.
Maintain and reestablish multiple representative examples of native ecological community types and sites with the physical characteristics necessary for those communities to exist, with appropriate management.
Protect and buffer ecologically valuable areas and known occurrences of rare species and community types, with appropriate management.
Recognize and convey the importance of biodiversity and ecosystem services. Provide community education and foster awareness of biodiversity and understanding of its importance.
Identify opportunities and act on them, or facilitate action by others.
Anticipate and address current and potential threats in the County and in cooperation with neighboring jurisdictions.