

## **Appendix H. Land Evaluation/Protection Programs in Georgia and Other States**

### **Early Ecological Assessments and Conservation Planning in Georgia**

Efforts to conduct comprehensive ecological assessments in Georgia began well before the formation of the Georgia Department of Natural Resources. Emphasis on assessments of rare species and natural communities can be seen in various programs operating in Georgia and the Southeast over the past four decades.

In 1966, concern over the deterioration of Georgia's natural environments led to the passage of the Georgia Natural Areas Act. This act created the Natural Areas Council, a group of appointed citizens whose duty it was to identify "areas within the state which are of ecological significance, and to use its influence and take whatever steps are within its power to secure the preservation of such areas in an undisturbed natural state, in order that such areas may: 1) be studied scientifically, 2) be used for educational purposes, 3) serve as examples of nature to the general public, and 4) enrich the quality of our environment for present and future generations."

The Natural Areas Council was given the responsibility of accepting or rejecting areas offered as donations to the state, advising federal agencies and scientific organizations on areas of significance, and cooperating with federal agencies, other state agencies, and local governments on the acquisition and management of natural areas. During its six-year existence the Natural Areas Council visited several hundred sites across Georgia. Many of these tracts were already well known as important natural areas; others represented newly documented sites of ecological significance. The Natural Areas Council worked with a variety of agencies and organizations to facilitate protection of these sites.

In 1969 the state legislature passed the Georgia Scenic Rivers Act, patterned on the federal Wild and Scenic Rivers Act of 1968. The Georgia Scenic Rivers Act established guidelines and criteria for the designation of state Scenic Rivers, and specified certain prohibited acts (channel modification and dam construction) within these streams. The first three streams designated Georgia Scenic Rivers were the upper Jacks and Conasauga rivers within the Cohutta Wilderness and a portion of the Chattooga River in Rabun County. The law was later amended to include a portion of Ebenezer Creek in Effingham County as the fourth designated Scenic River. The Natural Areas Council was charged with conducting a statewide evaluation of rivers for possible inclusion in the Georgia Scenic River system. A preliminary assessment of Georgia streams was completed by the Council in 1970. In 1998, evaluations of the terrestrial and aquatic wildlife resources in Georgia river corridors were completed as part of the RiverCare 2000 Program, and were reported in a document entitled "Georgia RiverCare 2000 River Assessment".

The duties of the Natural Areas Council were transferred to the newly-established Georgia Department of Natural Resources by the Executive Reorganization Act of 1972. From 1972 to 1978, the Natural Areas Unit was part of DNR's Office of Planning and Research. The Office of Planning and Research completed several significant conservation planning projects, including plans for natural river parks along the Altamaha and Flint Rivers. This office also completed a

statewide landcover mapping project utilizing LANDSAT Thematic Mapper data and state-of-the-art image processing software.

Perhaps the most significant document produced by the Office of Planning and Research was "The Natural Environments of Georgia", written by Dr. Charles H. Wharton in 1978. This book, based on a compilation of natural history information from a variety of contributors including the author, provided a classification of the major ecosystems and natural habitats found in Georgia. It also included descriptions of plant and animal communities found in these habitats, an overview of the geologic, hydrologic, and climatic factors responsible for the diversity of Georgia's biota, and discussions of the major threats facing these habitats and species. To date, this remains the only comprehensive treatment of the natural communities of Georgia.

The Heritage Trust Program signaled a new era in the protection of Georgia lands. This program was created through an Executive Order signed by Governor Jimmy Carter and given a legislative mandate by the Heritage Trust Act of 1975. The Heritage Trust Act instituted a more formal process for the evaluation of lands to be acquired by the state. It also provided for a special protective designation for state lands as "Heritage Preserves". Once designated as such by a document signed by the Governor, Heritage Preserves could be used only for those purposes specified in the designation document; changes in the management or use of Heritage Preserves required an act of the state legislature.

Several important state lands were obtained under the Heritage Trust Program; from 1974 to 1980 the state acquired over 80,000 acres, using approximately \$39 million in state and federal monies and \$4 million worth of private donations. DNR's Office of Planning and Research played an important role in the nomination and evaluation of lands under the Heritage Trust Program. Many of the sites acquired under the Heritage Trust Program had been first documented by the Natural Areas Council.

Several agencies and organizations have conducted broad-scale assessments of biological or ecological diversity. In the 1970's and early 1980's the National Park Service funded a series of evaluations of potential National Natural Landmarks throughout the United States. National Natural Landmarks represent areas which best represent the ecological and geological character of the United States. These evaluations were conducted within physiographic provinces or other general ecological regions according to a classification scheme developed by the U.S. Department of the Interior. Individuals with knowledge of the geological and ecological systems in a particular region were chosen to compile the evaluation reports. While broad in scope, these evaluations dealt with a relatively small number of sites, often with incomplete ecological or geological descriptions. Nevertheless, the National Natural Landmark Program represented an attempt to systematically identify, analyze, categorize, and rank the ecological features in a region. Today, Georgia has 12 designated National Natural Landmarks, including Big Hammock Natural Area, Ebenezer Creek Swamp, Heggies Rock Preserve, and Panola Mountain State Conservation Park.

The Wildflower Preservation Act of 1973 and the Endangered Wildlife Act of 1973 provided mandates for State involvement in the identification and protection of rare plant and animal species, respectively. The Department of Natural Resources was given the responsibility of

identifying species in need of protection, designating these as State-protected species, and enforcing restrictions on the take (harvest) and trade of these species. Having State protected species programs also made the Department eligible to receive federal funding under the Endangered Species Act of 1973. Over the years, much of this federal funding has been used to conduct statewide or rangewide assessments of rare plant or animal species, resulting in a more accurate picture of the conservation needs of nongame wildlife in Georgia.

The Nongame-Endangered Wildlife Program received additional authorization and financial support from the Nongame Wildlife Conservation Programs Act of 1985, which provided a definition of nongame wildlife, stated objectives for conservation of nongame wildlife, and established a mechanism for public support of nongame wildlife conservation through voluntary contributions by the people of Georgia. These contributions have funded a number of research projects, including field assessments of rare animal and plant populations, acquisition and processing of data on rare species and significant natural communities, and management programs intended to further recovery of listed species.

In 1986, the Department of Natural Resources entered into a cooperative relationship with The Nature Conservancy to establish and fund the Georgia Natural Heritage Inventory Program. The purpose of this program was to develop a dynamic atlas of the elements of natural diversity in Georgia, to aid conservation activities such as land acquisition, and to contribute to the body of scientific knowledge about the state's natural history. The Georgia Natural Heritage Inventory Program represented the 48th Natural Heritage Program established in the United States, the first such program having been initiated in 1973 by South Carolina and The Nature Conservancy. It is a little-known fact that Georgia's Heritage Trust Program was the prototype for the first state natural heritage program. Georgia's successful land evaluation and acquisition system served as the model used to develop South Carolina's Heritage Trust Program. Under the direction of Dr. Robert Jenkins, The Nature Conservancy's Science Division improved upon existing site evaluation criteria by emphasizing the rarer elements of biodiversity and establishing standards for compiling, verifying and mapping biological data. As other states joined the Natural Heritage Network, these data standards were improved and refined, and a computerized database management system was developed. After two years of operation under joint funding, the Georgia Natural Heritage Inventory Program was fully incorporated into state government in 1988, and was later renamed the Georgia Natural Heritage Program. In 1998, this program was combined with the Nongame-Endangered Wildlife Program to form the Nongame Wildlife & Natural Heritage Section (NWNHS).

### **Recent Ecological Assessments and Conservation Planning in Georgia**

Critical to effective conservation planning are the cooperative arrangements established with other agencies and organizations. A recent example is the ecoregional planning initiative established by The Nature Conservancy. In 1997, this organization embarked on a broad-scale conservation planning initiative emphasizing an ecoregional perspective. The goal of this effort is to develop a "portfolio" or list of high-priority conservation sites that represent key areas necessary to support the long-term survival of all viable native species and community types within each ecoregion. Ecoregions are relatively large geographic areas delineated by biotic and abiotic factors that regulate the structure and function of the region's ecosystems.

The ecoregional conservation planning process includes analyses of appropriate conservation targets (species and natural communities), sites of known ecological significance, the distribution and management of existing conservation areas, and areas of needed field research. The primary products of these analyses are a prioritized list of conservation sites within each ecoregion and a set of conservation goals for each site. Data from state natural heritage programs represents an essential component in this planning process. Information on occurrences of rare plants, rare animals, and significant natural communities is used, as well as information on important conservation lands and informally-designated sites of biological significance. Consultations with field biologists, taxonomists, ecologists, and other experts are critical for the development and refinement of each "portfolio" of sites. Special emphasis is placed on those species and natural communities that are globally imperiled or endemic to the ecoregion.

The ecoregion-based planning process represents a logical extension or outgrowth of earlier efforts by the staff of WRD and The Nature Conservancy to develop a list of high-priority conservation sites within the boundaries of Georgia. However, the important distinction is that ecoregion-based conservation planning is meant to provide a more meaningful geographical context for setting conservation goals, since it downplays the significance of political boundaries that are relatively meaningless for the biota in question. In this way, conservation objectives for plants, animals, and natural communities can be established across a broad region involving several states. WRD has collaborated with The Nature Conservancy to develop conservation plans for the Southern Blue Ridge, East Gulf Coastal Plain, South Atlantic Coastal Plain, Cumberlands/Southern Ridge & Valley, and Piedmont ecoregions in Georgia.

The USGS Biological Resources Division coordinates Gap Analysis Programs (GAP) in 50 states. The Georgia Gap Analysis program was initiated in 1998, with cooperators that include the University of Georgia Institute of Ecology and Georgia DNR. A primary goal of these programs is to identify gaps in biodiversity protection through use of two primary geographic databases, one of species richness and another of conservation lands. An overlay of two such databases can lead to the identification of gaps in the system of protected lands where areas of species richness are not included. The Georgia GAP report was completed in 2003. A regional Gap Analysis Program was recently initiated. This program will update land cover and conservation land data by ecoregion, and will provide for more consistent definition and delineation of land cover across the southeastern states.

The development of a conservation lands database for Georgia is a fairly straightforward process of assembling boundary information, management goals and landowner information for those lands providing some level of permanent species protection. Many of these lands are government owned in fee simple, with some having species protection as their primary management goal. Others may be privately owned tracts with conservation easements. Most of the lands managed by the primary federal and state land management agencies are included as conservation lands, as are lands managed by private conservation organizations in Georgia. Every land unit is classified as to its species protection status for use in analysis of species protection efforts statewide.

The development of species richness information begins with the classification of satellite imagery into landcover data used in habitat modeling for vertebrate species. The Georgia GAP

program focused primarily on terrestrial vertebrates, including species considered rare or uncommon in Georgia. With the development of habitat-based models, species richness maps can be constructed, that when compared with the distribution of protected lands, can aid in the identification of areas where conservation efforts can be focused.

The Georgia GAP project is extending this approach to freshwater systems in an effort to add to information on conservation needs for these ecosystems. The results of these analyses can be used by management agencies and conservation organizations to direct current on-the-ground activities and in planning for future protection strategies. The wide distribution of the digital land cover, species range, and conservation lands data will aid in the protection of Georgia's wildlife diversity by providing basic information that when combined with other information, such as documented occurrence records for species of special concern, can lead to better application of limited conservation resources.

The Wildlands Project is a nonprofit organization of conservation biologists and citizen conservationists from across the country devoted to helping to protect and restore the ecological richness and native biodiversity of North America through the establishment of a connected system of ecological reserves. To this end, the Wildlands Group convened a group of conservation biologists and other individuals in Georgia in 1998 to initiate large-scale conservation planning.

The group met for a one-day session where input was solicited in the form of delineations on 1:100,000-scale topographic maps of areas of conservation interest. The final product, in draft form, was distributed as a statewide map and accompanying report to provide an overall picture of Georgia's conservation needs. A continuous process of analysis, refinement, and revision would be necessary to develop specific plans for implementation of this conservation vision. Landscape-level conservation strategies utilizing core areas and corridors, as contained in the Wildlands concept, are particularly appropriate for fragmented landscapes such as those found in the Georgia Piedmont.

In 1998 the United States Geological Survey (USGS) published a 964-page, two-volume report entitled "Status and Trends of the Nation's Biological Resources". This document, edited by staff of the Biological Resources Division, represents a synthesis of information provided by a wide variety of federal and state agencies, academic research institutions, and private conservation organizations on the current status of biota of the United States. The report includes several chapters on the various natural and anthropogenic factors affecting the distribution and condition of our nation's plants, animals, and natural communities. Other sections of the document provide details on regional trends in biodiversity.

In 2000 the Association for Biodiversity Information and The Nature Conservancy jointly published an assessment of the biological diversity of the United States. Entitled "Precious Heritage", this 399-page book details the patterns of biodiversity nationwide, as well as regionally and in individual states, and emphasizes the need to protect representative natural communities as well as populations of rare species. This book is the result of several years' compilation of data from individual natural heritage programs and other information sources, and like "Status and Trends of the Nation's Biological Resources", it demonstrates the value of

multi-jurisdictional biodiversity databases in broad-scale assessments of conservation needs. An update of this document, entitled “States of the Union” was released in 2002.

All such assessments are based on the information at hand, and are thus point-in-time “snapshots” of biological diversity as we comprehend it today under current habitat conditions. To be meaningful, conservation planning must be based upon ongoing biological inventories, and a significant effort must be made to compile, analyze, and update biological data on a regular basis. In addition, new areas of emphasis in biological inventories need to be developed. To date, a relatively small group of organisms has been emphasized in field investigations, while the vast majority of the biota has been largely ignored.

Updating information on the condition of high priority conservation sites is similarly critical. While a great number of Georgia sites identified years ago remain high-priority conservation targets, others have been degraded or destroyed. At the same time, several new sites containing globally rare species and natural communities have been discovered and documented in recent years. Biological inventories and ecological site assessments can be very useful in the depiction of geographic patterns of biodiversity and documentation of loss of species and natural communities. However, these activities are most useful to wildlife conservation when they are implemented as tools to guide land acquisition and habitat management efforts.

### **Land Acquisition and Other Protection Tools**

The Georgia Department of Natural Resources has a long and successful history of securing important lands for public recreation and education as well as for conserving important wildlife habitats. Initially, land acquisition was funded primarily from special appropriations from the Georgia General Assembly or through the federal Land and Water Conservation fund. The Department’s Real Estate Unit was formed in 1974.

An attempt to provide a more regular funding source was initiated in 1988 when the Department guaranteed a series of general obligation bonds, known as Series 19 bonds, with hunting and fishing license fees. A total of 21 properties, mostly Wildlife Management Areas and Public Fishing Areas representing approximately 60,000 acres, were purchased with these funds.

Two statewide land acquisition programs, Preservation 2000 and RiverCare 2000, were initiated by Governor Zell Miller during the late 1980s and early 1990s.. Preservation 2000 was funded through the General Assembly and was designed to secure lands that provided for a variety of recreational uses, but also targeted lands with exceptionally high natural integrity. A total of 100,462 acres were secured, including approximately 1,788 acres donated to the state directly or through specific acquisition funds made available by individuals or institutions. Approximately 13,400 acres of the total were designated Natural Areas. In addition to the acreage protected, a product of the Preservation 2000 effort was the information gathered during assessments of lands proposed for acquisition, formally gathered using criteria-based rating forms by DNR staff. Such information has proven to be a valuable resource in subsequent acquisition efforts.

Immediately following Preservation 2000, Governor Miller established RiverCare 2000, a land acquisition program designed to protect habitats associated with Georgia rivers and streams. By 1999, RiverCare 2000 had acquired more than 17,000 acres statewide. Many of the lands were

purchased with the intention of transferring management responsibilities to local governments through intergovernmental agreements. Governor Roy Barnes, Miller's successor, secured another 30 million dollars for protection of lands along the Chattahoochee River near Atlanta. Site assessment data were also gathered during this effort using methods similar to those developed for Preservation 2000.

In an effort to secure a new, long-term funding source, a coalition of conservation organizations prompted the General Assembly to place on the ballot a proposed amendment to the Georgia Constitution that would fund conservation land acquisition through a nominal increase in the transfer tax for real estate. The proposal was narrowly defeated but provided impetus for seeking such funding in ways not involving tax increases.

Governor Barnes also established the Georgia GreenSpace Program. It differed significantly from the other acquisition programs in that it specifically targeted metropolitan and fast-growing counties. As with RiverCare 2000, lands purchased under the GreenSpace Program were intended to be managed by local governments. The GreenSpace Program was designed to provide for low-impact, non-consumptive recreational uses such as walking and biking by a largely metropolitan population. To date, this program has protected more than 9,400 acres.

Land acquisition efforts by WRD have been augmented by the efforts of other conservation agencies and organizations within the state. Federal land management agencies including the US Forest Service, US Fish and Wildlife Service and National Park Service actively acquire lands for conservation purposes, although most acquisitions were prior to the 1970s. The Department of Defense is required to address natural resource issues in the management of Georgia military bases.

Organizations such as The Nature Conservancy, The Conservation Fund, The Georgia Land Trust and the Trust for Public Land have staff dedicated to securing lands for protecting habitat and providing greenspace opportunities for Georgians. The Georgia chapter of The Nature Conservancy has participated in more than 65 conservation projects totaling in excess of 220,000 acres. They currently maintain 17 preserves and hold 22 conservation easements. Conservation easements have become an increasingly powerful tool for land protection. Currently within Georgia there are more than 45,352 acres in easements held by approximately 23 land trusts. The Georgia Land Trust Service Center provides support for these land trusts.

Purchasing property and establishing permanent conservation easements are not, however, the only tools available for conserving natural habitats. Landowners can protect environmentally sensitive lands through the state's Conservation Use Valuation program, which provides reductions of property taxes on lands placed under ten-year conservation agreements. Most of these reductions have come through the use of provisions for agricultural and forest lands, which are easier to implement than the provisions for environmentally sensitive lands. In order to provide greater protection for environmentally sensitive lands, DNR should develop new regulations to simplify the procedure for enrolling these lands and advertise the availability of this tax-based incentive program.

Registry programs can also be effective in providing incentives for protection of natural habitats. A state-sponsored registry program for significant natural areas was begun during the 1970s. It

was designed to provide technical assistance and commendations to landowners practicing wise stewardship of natural resources on their lands. Historically, the state has maintained as many as 23 registry sites; however, this program has been inactive for many years because of a lack of funding and staff resources. The Nature Conservancy currently recognizes approximately 24 registry sites through a similar program.

Private corporations, particularly in the forest industry, designate certain areas within their holdings for special management attention based on the presence of species and communities of concern. The federal government provides a variety of incentives to private landowners for conserving or enhancing wildlife habitat that range from cost-share payments to technical assistance. Considering that more than 90% of Georgia is owned by private entities, it is important that agencies managing natural resources work cooperatively with landowners to help protect the integrity of natural systems.

### **Land Evaluation and Protection Programs in Other States**

In the development of a wildlife conservation strategy for Georgia, much can be gained by examining similar efforts in the nation's other states. The foundation for effective conservation exists in all states in that some level of understanding of wildlife resources is evidenced in information developed by state natural heritage programs and gap analysis programs. Habitat protection comes about through various state land protection programs that have been or are currently in place. An overview of these general activities in most states will be followed by a more detailed discussion of the close relationship between information gathering and habitat protection activities in a small subset of the states. An understanding of how these states use natural resource information in evaluating options for wildlife habitat protection will be useful in our efforts.

Where range maps for wildlife species are available, the relatively simple analysis of mapping areas of maximum range overlap can provide focal areas for prioritizing habitat protection measures. Point location and area data for rare species and natural communities of interest found in state natural heritage databases can be analyzed for distribution patterns. Where clusters of data points occur, conservation targets can be developed. Thus, the potential exists in all states to focus habitat protection efforts on areas important to rare species and exemplary natural communities, often surrogates for areas of high biodiversity. More typically, this information is used in concert with other biological and geographic information in developing conservation strategies.

Two examples of information available to most states are road density and landcover databases. Geographic information systems at the state level usually include data layers for roads that can be analyzed to show areas of low road density. Habitat fragmentation can be assumed to be least in these areas. In the ecoregional planning efforts undertaken by The Nature Conservancy, low road density was a factor used in targeting conservation opportunity areas.

Satellite-based landcover mapping is available for all states through the National Land Cover Database effort coordinated by the US Geological Survey, and in many cases is complemented by landcover mapping efforts conducted individually by states. Analysis of contiguous forest

cover and the spatial extent of other landcover categories of interest based on these databases can be used to highlight areas where conservation efforts can be focused.

State gap analysis programs as coordinated by the Biological Resources Division of the US Geological Survey use vertebrate habitat modeling with landcover data in conjunction with information on the location of areas protected, at least in part, for conservation to develop species-specific maps of unprotected habitat. With the understanding that much of the area not currently under formal protection as conservation land may very well be being managed for wildlife, the use of gap analysis information in developing habitat protection options has great potential for effective conservation planning.

The challenge of integrating biological information into state habitat protection programs is being met with various levels of success by state wildlife management agencies. Even in states with no established, permanent land acquisition programs, a variety of habitat protection programs exist in various landowner assistance and acreage set-aside programs. These can be state-administered federal programs, or programs originating in the state themselves. They are sometimes targeted at individual species or communities, an example being the Bobwhite Quail Initiative in Georgia. Broad areas or regions in a state can be identified as focus areas for specific programs, and landowners in these areas are solicited for their interest in receiving program benefits which can include funds for habitat restoration and payments for set-asides.

These programs often benefit other wildlife and natural communities in addition to the target species, but in a larger context, represent piecemeal approaches that have a circumscribed place in comprehensive wildlife conservation planning. What is sometimes lacking at the state level is a strong link between the biological knowledge base and existing habitat protection programs.

A 1995 study by the Defenders of Wildlife considered the existence of a statutory program with earmarked funding designed to acquire or otherwise protect lands with high biodiversity value to be indicative of states that are effectively planning for and implementing wildlife conservation, if relevant biological data drives decision-making. Having biological data-gathering programs and land acquisition programs in place is not sufficient in itself for effective conservation if a strong interconnection is lacking. This interconnection can be achieved through administrative organization of the agencies involved and is most effective when the interaction has a statutory basis.

The states for which a description of this interaction is given below meet this criterion to some degree. A comparison of the uses of biological information in evaluating conservation options by the relevant state agencies can be useful in designing and implementing a comprehensive wildlife conservation strategy for Georgia.

### Alabama

The Alabama Department of Conservation and Natural Resources, State Lands Division, Natural Heritage Program is a cooperator with the Alabama Gap Analysis project being conducted by the Cooperative Fish and Wildlife Research Unit of Auburn University. The ongoing development

of a rare species and exemplary natural community location database by the Natural Heritage Program complements the work being done by the GAP project. The Department also administers Alabama's "Forever Wild Land Trust" program such that the possibility of coordination between development of biodiversity information and its use in evaluating proposed land acquisitions exists.

Funding for the Forever Wild program is derived from royalties on offshore natural gas leases and was established by the passing of a constitutional amendment. The Alabama Natural Heritage Program is funded through the Forever Wild program and is charged with developing a Natural Heritage Plan which suggests priorities for the protection, acquisition and management of dedicated natural area preserves.

The amendment also provides for a 15-member Forever Wild Board that reviews all nominations for purchase of tracts and establishes a priority purchase authorization. Using its own knowledge and expertise, as well as the knowledge and expertise of the scientific community and state and federal agencies, the Board adopts a priority list of properties to be considered for acquisition.

The Board has established a methodical and consistent process for tract selection. Efforts are made to select tracts of land evenly from among the northern, central and southern districts of the state and from among four targeted land uses: Nature Preserves, general outdoor recreational areas, Wildlife Management Areas and extensions of existing State Parks. Once a tract is nominated, information is compiled for each tract to assist with assessing the properties' respective attributes and is measured against a common set of criteria which helps identify the best category under which a tract may be purchased. To the extent that biodiversity information from the Natural Heritage Program is included in this process, the habitat protection effort in Alabama can be characterized as progressive relative to other states.

### California

Few states have a strategic conservation methodology as sophisticated as California's. A key concept in the California Resources Agency Legacy Project is that a scientific methodology alone cannot identify important conservation investments. As such, conservation decision-making is not simply a matter of using a computer to generate maps of conservation priorities.

The Agency draws similarities between their work as conservation investors and financial investment. As described in the agency's 2003 California Legacy Report, "conservation investors are building a conservation portfolio by providing long-term protection for valuable natural resources (capital). California's existing natural resource portfolio is evident in the form of lands already acquired for long term protection. An important investment goal is to improve that portfolio and its long-term success."

The report goes on to say that this improvement depends on investment goals that once stated, can lead to the identification of new investment options using existing data, but that data alone are usually inadequate and additional expertise and planning-support tools are needed. The Legacy Project staff's original concept of a "blueprint" for resource protection was replaced by

an evolving, adaptive approach necessary to be effective in a rapidly changing decision environment.

This approach will be used by the agency as it administers several land acquisition programs that target important wildlife habitat. Since 1947, the California Wildlife Conservation Board programs provide habitat enhancements and purchase of fee title or other rights to land. The Board encourages projects that support wildlife habitat preservation while providing multiple recreational opportunities. One of these programs is the Land Conservation Matching Grants Program that provides for the acquisition and restoration of habitat. The Natural Heritage Preservation Tax Credit Program provides income tax benefits in exchange for the donation of land to state resource departments, local governments and nonprofit organizations.

The challenge for the California Resources Agency in administering these and other programs using the revised methodology for strategic conservation investments briefly described above will be the effective integration of existing biodiversity information into a changing decision-making landscape. Most of the statewide databases currently available were not developed specifically to support conservation investment decisions and data gaps exist. The California Natural Diversity Data Base is not fully complete due to the lack of biological surveys in many locations. Their emphasis on professional expertise as a vital complement to existing databases will help offset these inadequacies. Their recognition of the need to build on the significant progress made by state agencies in developing and implementing multi-agency, multipurpose conservation plans in past years will increase their ability to effectively plan for resource protection.

### Colorado

Great Outdoors Colorado (GOCO), established by an amendment to the state constitution, is a program permanently funded by lottery money that provides funding for acquisition of lands or easements in unique open space or natural areas of statewide significance, rental of habitat, and restoration of critical areas. These activities are part of one of three core programs, the Land, Water and Wildlife Protection Program. Other core programs are the Outdoor Recreation Facilities Program and the Youth/Environmental Education/Interpretation Program.

Grants provided by GOCO span the three core programs, with the majority of funding (71.5%) going to land protection. One of the initiatives under the land protection program is the protection of Colorado's unique natural areas and wildlife habitats. To meet the objective of supporting efforts to create and strengthen local partnerships, GOCO awards grants to local governments, state agencies and nonprofit organizations to identify, develop and/or refine specific land protection strategies within important conservation areas.

To inform these habitat protection initiatives, GOCO also funded the development of the System for Conservation Planning, a GIS-based Internet mapping tool to be used by local governments and other GOCO grant recipients. The system makes use of rare species and natural community information produced by the Colorado Natural Heritage Program.

The interconnections between a permanently-funded grant program with an emphasis on habitat protection, a cooperative planning initiative involving the state resource agency and university, and the natural resource information provided by the Heritage Program and the state's Gap Analysis Program make Colorado a model for coherent conservation planning in other states. All the elements of a model system are in place, and regular canvassing of the state's citizens and conservation professionals for feedback on program administration ensure that GOCO will continue to meet resource protection goals in coming years.

### Delaware

As an amendment to the legislation that set up the Realty Transfer Tax in Delaware, a Conservation Trust Fund was established to which a portion of the realty transfer tax returns are earmarked. Purposes for the state's acquisition of interests or rights in real property include the protection and conservation of biological diversity. Funds are also set aside for the stewardship and management of lands acquired.

To advise the Department of Natural Resources and Environmental Control (DNREC) on the expenditure of funds from the Conservation Trust Fund, the Delaware Open Space Council was established in the legislation. The Council advises on all matters relating to the administration, implementation and financing of the protection program, site selection, methods of protection and interagency coordination. It is made up of state legislators and conservationists with equal representation from Delaware counties. The Council is charged with reviewing and recommending criteria for the delineation and dedication of open space in the form of a state resource area map and recommending a ranking system to establish land acquisition or permanent protection priorities.

The DNREC launched a biodiversity initiative in 1999 to engage all sectors in the state in developing a strategy to better conserve and restore Delaware's living resources. A Biodiversity Conservation Partnership was formed with the responsibility for the implementation of the goals and objectives detailed in the document "Our Natural Legacy". It describes four initiatives; science, resource management, land use planning and education and outreach, with guidance and a timeline for implementation. An objective under one of the resource management priority actions is to give greater consideration for protection to lands with high quality habitats or lands with habitat conservation plans.

Through the Biodiversity Conservation Partnership, a resource mapping project modeled on that of Massachusetts has been initiated, entitled BioLegacy, in keeping with the "Our Natural Legacy" theme. Using the Biotics GIS program designed for managing rare species data and methods developed by the Natural Heritage Network, they will focus on converting point observations of rare species into polygons that represent a greater accuracy on the ground and incorporate habitat for these species. The BioLegacy mapping has the potential through the Partnership to inform land acquisition activities undertaken by the Open Space Council.

### Florida

The 1994 Florida Fish and Wildlife Conservation Commission document, "Closing the Gaps in Florida's Wildlife Conservation System" contains, in addition to the map products of the analyses undertaken, guidance on how the information presented in the document might be used in land protection. While cautioning on directly using these remote-sensing based products in legal zoning maps due to temporal constraints, they suggest their use as a layer of information in the making of decisions concerning land acquisition, land-use planning, and development regulation. The authors point out that land acquisition and the purchase of conservation easements are perhaps the most effective and least controversial habitat conservation techniques and that at least 20 Florida counties have established local land acquisition programs. They designated private lands containing habitats critical to the continued survival of populations of inadequately protected plants and animals as Strategic Habitat Conservation Areas.

Similarly, the Florida Natural Areas Inventory used remote sensing and rare species information to develop and map Areas of Conservation Interest and, in addition, Potential Natural Areas (formerly category B and C Areas of Conservation Interest). These geographic data layers were used, with others, in a conservation needs assessment contracted by the Department of Environmental Protection. The assessment was conducted to meet the mandates of the legislation that created Florida's second 10-year, \$3-billion land and water conservation program, the Florida Forever program. The Florida Forever Conservation Needs Assessment was developed to assist the Florida Forever Advisory Council in establishing priorities and measures of progress for the Florida Forever program.

The legislation called for a better way of identifying acquisition priorities and evaluating the success of the newly created program. This emphasis sets Florida apart from most other states in that a system of evaluating the success of conservation measures was included in the enabling legislation. In the Assessment, 15 data layers including those mentioned above were used that corresponded to some of the performance measures developed by the Council. These measures were selected for the Assessment because they are resource-based criteria that can be used to set acquisition priorities. The Florida Forever enabling legislation specifically states that a competitive selection process be developed to select those projects best able to meet program goals.

The Florida Forever Advisory Council, in meeting its charge to develop the selection process, benefits from the needs assessment completed by the Florida Natural Areas Inventory described above and one completed by the Florida Fish and Wildlife Conservation Commission as a follow up to the 1994 work that delineated Strategic Habitat Conservation Areas. These needs assessments serve to inform the decision-making in the Florida Forever program and constitute a strong link between resource assessment and protection efforts.

## Hawaii

The Hawaii Natural Heritage Program conducts the Hawaii Gap Analysis project in conjunction with the nationwide USGS effort to assess the extent to which native animal and plant species are being protected in Hawaii. The fundamental concepts of GAP were exemplified by the USFWS Forest Bird Surveys on the islands in the 1980s which assessed the distribution of key

vertebrate species against the distribution of protected areas. GIS layers produced by the Hawaii GAP project will assist land managers, researchers and planners in making scientifically sound recommendations for future conservation management.

The Hawaii Conservation Alliance, established with private funding, has the specific goals of communicating conservation science to natural resource managers, increasing public awareness about the importance of biodiversity conservation in Hawaii and prioritizing and increasing support for conservation research. Its two major activities have been the annual Hawaii Conservation Conference and the Hawaii Conservation Forum, where major stakeholders gather to identify conservation priorities and develop implementation plans. A top-priority action item for the Forum is to establish a multi-agency task force to assess native ecosystem protection needs.

The agencies involved in the Forum include those responsible for land acquisition and management in Hawaii. The Department of Land and Natural Resources administers the Park Acquisition Trust Fund where private contributions are accumulated to acquire private lands for new or expanded state parks. They maintain a list of proposed lands of resource value to the State for expansion or creation of park lands.

The Department's Land Division owns and manages 1.3 million acres comprising the Public Land Trust. Use of Trust lands are guided by five purposes including the provision of lands for public use. The Division is responsible for acquiring lands for these purposes through negotiations, donations, condemnations and land exchanges and also makes decisions to keep land as open space area. The Department's membership in the Hawaii Conservation Alliance provides for the opportunity for conservation science to inform Land Division actions to some degree.

The Division of Forestry and Wildlife administers the Natural Area Reserves System which was created to preserve and protect representative samples of Hawaiian ecosystems. The System consists of 19 reserves encompassing more than 109,000 acres of the State's most unique ecosystems, ranging from marine and coastal environments to lava flows, tropical rainforests, and even an alpine desert. It serves as a yardstick by which to measure changes occurring across the rest of the State and is funded through the Natural Area Reserve Fund which receives appropriations from the general fund. Most funding is spent not on land acquisition, but on managing existing preserves, especially non-native plant and animal control and rare species protection and restoration.

The Division, through the Natural Area Reserve Fund, also provides matching funds on a 2:1 basis with private funds for the management of natural resources on private lands permanently dedicated to conservation through the Natural Area Partnership Program. This program complements the existing Natural Area Reserves System by providing long-term protection and management of unique natural resources on private lands.

Another public-private cooperative program administered by the Division is the Forest Stewardship Program, which uses a dedicated funding source maintained through a percentage of

annual Conveyance Tax revenues deposited in the Natural Areas Reserve Fund to assist private landowners to manage, protect and restore important natural forest resources on their forested and formerly-forested properties. Forest Stewardship projects are prioritized according to efficiency in use of earmarked funds, landowner involvement, improvement of forest stewardship practices, improvements to forest health, economic potential and public benefits including native wildlife habitat creation and improvement.

## Maine

The Maine Forest Biodiversity Project, undertaken between 1994 and 1999, had a mission to explore and develop strategies that help maintain viable populations of existing native species and viable representatives of existing native ecosystems in Maine. A two-volume assessment of Maine's biodiversity produced by the Project contained recommendations of biodiversity-friendly forest practices and an evaluation of the potential of an ecological reserve network.

It was the intention of this project, coordinated by the Maine Natural Areas Program, to inform the Maine State Planning Office's Land for Maine's Future Program. The Program was established in 1987 when Maine voters overwhelmingly approved a \$35 million bond for purchasing lands of statewide significance for recreation and conservation. The Commissioner of the Planning Office, four other agency commissioners and six private citizens made up the fund-managing board.

The concept behind the Land for Maine's Future Program was that certain lands rise above the rest because of the exceptional natural and recreation values they possess and they warrant permanent protection through public acquisition. Any citizen could submit a proposal for consideration that included a letter from the landowner indicating full willingness to have the land considered by the Board. All proposals were scored using a scoring system developed with public input and designed to guide the Board in selecting projects which are of state significance, capture multiple values, and benefit a wide spectrum of citizen interests and needs.

This program was succeeded by the Maine Outdoor Heritage Fund, which in 1996 began distributing revenues from the sale of wildlife lottery tickets and provides about 35% of its revenues for public land acquisition and management projects. At that time, the Governor established the Land Acquisition Priorities Advisory Committee, similar in make up to the Land for Maine's Future Board.

The Committee, to meet one of its mandates, asked the State Planning Office to develop an inventory of public land ownership, characterizing each parcel by twenty different categories of use. They were able to use the inventory to develop a number of its recommendations, including placing a high priority on southern Maine conservation lands, where the US Fish and Wildlife Service's Gap Analysis project shows the greatest diversity of Maine's biological resources and where development poses a significant threat.

The Committee identified a limited number of Land Acquisition Priorities that would receive special focus during the first years of the program, without being so rigid as to ignore other

priorities. Some of these Focus Areas could be pursued through federal programs and non-state funding sources as well. One of the five focus areas was an ecological reserve system. In order to establish an ecological reserve system that protects all of the natural communities and species found in the State, they recommended that special attention be given to those areas that include rare species as well as unique or exemplary natural communities. Input from the Maine Forest Biodiversity Project has the potential of assisting the Committee in addressing this priority and in maximizing the benefits of expenditures from Maine's Outdoor Heritage Trust Fund.

### Massachusetts

The Natural Heritage and Endangered Species Program of the Massachusetts Division of Fisheries and Wildlife completed, in 2001, a project intended to guide land conservation for biodiversity titled "BioMap". Introductory comments in the publication mention targeting lands with greatest ecological value in meeting their Governor's aggressive goal of protecting 200,000 acres of open space by the year 2010. Without providing more reference to land acquisition programs in the state, this document describes in detail the map-based approach to habitat protection developed by the Program.

The goal of the BioMap project is to promote strategic land protection by producing a map showing areas that, if protected, would provide suitable habitat over the long term for the maximum number of Massachusetts' terrestrial and wetland plant and animal species and natural communities. This promotion is accomplished in part by the distribution of the document to towns, state agencies, regional planners and conservation organizations.

The BioMap was created through a systematic evaluation of over 7,000 site-specific records of rare plants, rare animals, and natural communities collected over the past 23 years in the Natural Heritage database. Staff used the database to identify and map the most viable rare species habitats and natural communities, collectively termed "core habitat" areas. The BioMap also includes large, minimally fragmented "Supporting Natural Landscape" areas that safeguard the Core Habitat while also including habitat for the common species of Massachusetts. By overlaying information on currently protected areas, the location of areas of unprotected biodiversity are highlighted. This information is presented for the state as a whole, and subdivided by ecoregion as well, in the form of maps and summary area statistics.

In the implementation of the state's Wetlands Protection Act and the Massachusetts Endangered Species Act, a Natural Heritage Atlas has been created as the sole source of Estimated Habitat maps and Priority Habitat maps used for the Acts, respectively. The BioMap, although not used for regulatory purposes, complements the Atlas as a planning tool to be used proactively. In protection efforts, Core Habitat should be given highest priority for protection. Within the Supporting Natural Landscape areas, areas should be higher priorities for land protection if they buffer Core Habitat areas, connect Core Habitat areas, connect other areas of Supporting Natural Landscape or connect areas of protected open space.

The distribution of this document to state agencies should help in the administration of the state's existing land acquisition programs. Within the Inland Fisheries and Game Fund, a Wildland

Acquisition Account and a Natural Heritage and Endangered Species Fund have been established. Monies received from license fees, permit fees, authorized sales and from federal government grants-in-aid or other receipts from activities of the Division go to the Inland Fisheries and Game Fund, except for funds received for natural heritage and endangered species programs. In 1987, an Open Space Bond allocated \$7 million to the Natural Heritage and Endangered Species Fund. One dollar from the sale of each sporting license is credited to the Wildlands Acquisition Account. Use of the fund is limited to eleven purposes, one of which is the acquisition and maintenance of wildlife sanctuaries and fish and wildlife management areas. Information in the BioMap should be of use in the spending of funds for this purpose.

## Missouri

The Missouri Resource Assessment Partnership (MORAP) is an interagency partnership at the University of Missouri that provides expertise in geographic information systems, remote sensing, and natural resource management. The Missouri Department of Conservation is a partner organization. MORAP was established to meet the need for digital data development, analysis, and delivery, with the recognition that a coordinated approach in which funds are pooled saves money.

Landcover and elevation data were used to model conservation Opportunity Areas for Missouri and surrounding states in an ongoing MORAP project. Finer-resolution information on conservation targets and threats is being added as a refinement to the model. This characterization of Opportunity Areas will allow for ranking according to an area's ability to achieve conservation goals outlined in the 1992 report of the Missouri Biodiversity Task Force.

Because of the Department of Conservation's involvement in MORAP, the potential for the use of the information developed by the project in land acquisition decision-making is great. The Department formed a Land Acquisition Unit in 1977 under the "Design for Conservation" program resulting from the passage of a conservation sales tax. This program is funded by a constitutionally-mandated state sales tax of 1/8 of one percent, providing approximately \$64 million per year.

Purchases under this program benefit both game and non-game species, with acquisition efforts guided by conservation and outdoor recreation considerations. A payment in lieu of taxes program has been established to compensate local governments for tax base losses. Priorities under the Design for Conservation program include land acquisitions favoring upland wildlife, natural areas and rare and endangered species, stream access and wetland wildlife.

The Department has applied for federal funds under the State Wildlife Grant program to develop a Comprehensive State Wildlife Conservation Plan. The application seeks funds to initiate a plan which will update GIS databases needed for planning, integrate into the comprehensive plan a plan for the Missouri Natural Areas System and establish procedures for monitoring plan implementation. Land acquisition related to the expansion of the Natural Areas System will be supported by upgrades in the Missouri Fish and Wildlife Information System and the Natural Heritage Database.

## New Jersey

Within New Jersey's Department of Environmental Protection are two programs that contribute to effective wildlife resource protection in the state. The Green Acres Program serves as the real estate agent for the Department and the Division of Fish and Wildlife's Endangered and Nongame Species Program, through the New Jersey Landscape Project, serves as the source of information to be used in prioritizing land acquisitions.

The Green Acres Program, from 1961 to 1995, benefited from nine voter-approved bond issues that earmarked over \$1.4 billion for land acquisition. In 1998, voters approved a referendum which created a stable source of funding for open space through the Garden State Preservation Trust Act, with a goal of preserving 1 million acres over the following ten years. The Program's primary focus is acquiring land that creates linkages between existing protected lands to form open space corridors. The Program gathers other public and private partners together to assist in buying and managing open space.

In addition, the New Jersey Natural Lands Trust was created in 1968 with a mission to preserve land in its natural state to protect natural diversity through the acquisition of open space. The Trust preserves land primarily by donation and manages the properties to conserve endangered species habitat. The Trust operates within the Division of Parks and Forestry with staff from the Office of Natural Lands Management implementing the policy set by the Board of Trustees.

To meet information needs of these land acquisition programs, the Landscape Project has been designed to provide users with peer reviewed, scientifically sound information that is easily accessible and can be integrated with planning, protection and land management programs at every level of government as well as nongovernmental organizations and private landowners. The critical area maps that are the products of the Project can be used to prioritize land parcels for purchase through the Green Acres Program.

The Project focuses on large areas called landscape regions that are ecologically similar with regard to their plant and animal communities. The Project's protection strategy begins with already conserved areas such as publicly owned areas and regulated wetlands. By identifying habitats adjacent to these areas, large, contiguous blocks of habitat can be protected. This concept fits in well with the primary focus of the Green Acres Program noted above.

Within landscape regions, landcover information is analyzed using boundaries between habitat types and major roads to delineate contiguous patches for each habitat type. Depending on habitat type, buffers of different widths are placed around habitat patches. Endangered and threatened species location data are then intersected with these habitat patches. Patches are classified based on the conservation status of species present. Habitat patches with federally endangered or threatened wildlife are given the highest ranking, followed by state endangered, state threatened and non-listed state priority species. This classification scheme can be used to prioritize conservation acquisitions as well as to guide planners and regulators and to enhance stewardship of already-conserved lands.

## New York

Within the 2002 New York State Open Space Conservation Plan, to be described later in this section, are some provisions for integrating rare species and natural community information into land acquisition decision making. Sources for this information include the state's Natural Heritage database and natural community information developed by the New York Gap Analysis Project. One of the goals of the Project is to facilitate cooperative development and use of information for more effective stewardship of the state's biological resources. Information from the GAP database about landcover types and predicted occurrences of terrestrial vertebrates can be useful in open space designation, planning and management.

The Biodiversity Research Institute, housed in the New York State Museum, was established by statute in 1993 to coordinate state and private efforts to identify and understand the state's plants, animals and environments. The New York State Biodiversity Project is a collaborative effort of the Institute and other conservation entities in the state that seeks to assess and collect current information on the state's biodiversity and to prioritize future conservation actions. A needs assessment conducted in 2001 revealed the need for a clearinghouse for state biodiversity information, among other needs. A method for providing this information to state agencies is necessary for the implementation of New York's Open Space Conservation Plan.

The State Environmental Protection Fund, created by the legislature in 1993, provides funds for the acquisition of priority projects identified in the Plan and is funded at \$125 million annually. A State Land Acquisition Advisory Council advises the Department of Environmental Conservation Commissioner on state open space conservation and makes recommendations ensuring a balance of statewide and regional interests. A unified system for evaluation of land conservation projects is provided in the Plan for use by the Council in guiding expenditures from the Fund.

Project proposals originating from citizens, organizations or governmental bodies are organized at the regional level into a comprehensive project inventory and assigned to regional offices. After completing a project review, the regional office submits the results and its recommendation to the central office. Here, projects are screened for vulnerability, criticalness, alternative protection strategies, and resource value before proceeding to executive review. If approved, a project recommendation is forwarded to the Commissioner in whom the decision regarding purchase is vested.

Within the resource value screening that proposals are subject to is the assigning of numeric ratings for species value (endangered and threatened species habitat presence), habitat rarity and habitat quality. A similar rating scheme for the biodiversity potential of a proposed project is also used in evaluating proposals. It is within this well-defined resource value portion of the project evaluation process that information from the Biodiversity Project is used, representing a close integration between the resource information development and habitat protection functions of the Department.

## Pennsylvania

The Pennsylvania Biodiversity Partnership is completing the second phase of development of the Pennsylvania Biodiversity Conservation Plan. It builds on work done in the first phase to summarize the status of the state's biodiversity by pinpointing gaps in knowledge, identifying methods to initiate processes to fill those gaps, formulating and consolidating recommendations and providing a blueprint for achieving the goals of the final plan. The Partnership was formed to conserve biodiversity statewide by promoting communication and cooperation among a broad spectrum of stakeholders and the Plan is an effort to achieve these goals.

One of the partners is the Pennsylvania Natural Diversity Inventory, itself a partnership between the Pennsylvania Bureau of Forestry and The Nature Conservancy. Using the methodology of the Natural Heritage Network, the Inventory collects data to identify and describe the state's rarest and most significant ecological features. Species tracked within the Inventory's information system are those classified as endangered, threatened or rare as listed by the Department of Conservation and Natural Resources. The Inventory assists conservation organizations by providing information so that funds directed towards land acquisition can be more effectively used to protect significant ecological resources. It is partially funded by contributions to the Wild Resources Conservation Fund.

The Fund awards resource conservation grants toward projects that protect or study wildlife species and is partially supported by the sale of wildlife license plates and funds from Pennsylvania's Growing Greener program. The Department of Conservation and Natural Resources uses funds from the Growing Greener program to locate and protect remaining locations of endangered and threatened species using information developed by the Inventory. The Fund is the mechanism for channeling Growing Greener monies to resource protection activities focused on nongame wildlife and native plants.

The Growing Greener program is the state's largest investment ever in environmental protection, a \$650 million dollar spending plan that receives money from the state's general fund and other sources. About \$27 million is used for matching grants to acquire land for protection of open space and critical natural habitat. The Keystone Recreation, Park and Conservation Fund is another source that is permanently funded with revenues from realty transfer taxes used in part to acquire lands. One program benefiting from Keystone funds is the Land Trust Grants Program that provides funds to nonprofit land trusts and conservancies to protect natural areas. The Department's Bureau of Recreation and Conservation administers the Community Conservation Partnership Program, funded from both the Growing Greener and Keystone funds. This program provides technical assistance and grant funding to communities and nonprofit organization for a variety of purposes including protecting critical natural areas and open space.

These well-funded habitat protection efforts benefit from the coordination provided under the Pennsylvania Biodiversity Partnership's guidance. Having the land acquisition funding programs working in concert with the programs providing biodiversity information under the Partnership increases the likelihood that expenditures will be made in ways that provide maximum benefit to the resource.