

Data Sources for Ecosystem Indicators



Associated Data Sources for Ecosystem Indicators

The data sources for Ecosystem indicators are drawn from federal, state, and nongovernmental sources. Data sources presented here are:

- U.S. Fish and Wildlife Service, Endangered Species Inventory;
- U.S. Fish and Wildlife Service, National Wetlands Inventory;
- North American Breeding Bird Survey; and,
- Natural Heritage Network.

Information includes:

- who to contact,
- description of the database,
- possible limitations of the data,
- where the data come from,
- how the data are shown, and,
- how can the data be used.

An additional source of data concerning wetlands is the *National Resources Inventory* of the Natural Resources Conservation Service. This report is covered in section M of this Catalog.

Summary Evaluation of the Databases

U.S. Fish and Wildlife Service, Endangered Species Inventory

This database has information on federally listed endangered species for indicator support and development. The data are supplied through cooperative efforts between U.S. Forest Service Stations, state offices, and nongovernmental organizations. The methods that were used to retrieve and estimate the data are included. The data are presented and available on a state and regional level and are helpful in gauging whether a species has improved, declined, or remained the same since the last report, whether a particular area or region is improving in protection efforts, and what the overall effectiveness of species protection programs are. A category of *fieldnotes*, such as known numbers, sightings, or nests would also be beneficial if included in a column with the *Species Status Summary* of the reports. Access to and assistance in using the data is available by mail and by phone at either no charge or minimal cost.

U.S. Fish and Wildlife Service, National Wetlands Inventory (NWI)

This database contains information on wetlands in all states and by region for indicator support and development. The data are supplied through cooperation efforts between U.S. Forest Service Stations, other organizations, and state offices. A bibliography of information sources and the methods that were used to retrieve, estimate, and calculate the data are included in the written reports. The data are presented and available on a number of scales, including state and regional. Unfortunately, NWI coverage is incomplete and uneven across the country. The written reports have data

by state and a historical trend of wetland losses, yet limited wetland quality information. Access to and assistance in using the data is available by mail, Internet, and by phone at either no charge or minimal cost.

North American Breeding Bird Survey

This database has information on breeding bird numbers for all states. The data are supplied from an annual survey conducted along 3,700 active routes by volunteer birders and professional biologists. The methods that were used to retrieve, estimate, and calculate the data are included with requested data. The data are presented and available on a number of scales, including state and regional. In some cases, trends are given. Access to and assistance in using the data is available by mail and by phone at either no charge or minimal cost.

Natural Heritage Network

This database has information on endangered plant and animal species for indicator support and development. The data are supplied from numerous sources including Heritage scientists conducting field inventories. The methods that were used to retrieve, estimate, and calculate the data are included in the individual state reports but vary from state to state. The individual state reports differ in size and format, yet in most cases include the common and scientific name, the global and state rank, and the federal and state status of a specie. The database is managed in a common manner in all states. Access to and assistance in using the data is available by mail, by phone, and by Internet at either no charge or minimal cost.

Ecosystems Data Source One: **U.S. Fish and Wildlife Service, Endangered Species Inventory**

How to Get the Report

The Division of Endangered Species can be contacted by:

Telephone: (703) 358-2171

Internet address: R9FWE_DES.BIM@mail.fws.gov

WWW address: <http://www.fws.gov/~r9endspp/endspp.html>

Questions concerning the 1992 and 1994 *Endangered and Threatened Species Recovery Program* reports can be directed to:

William Kramer
U.S. Fish and Wildlife Service
Division of Endangered Species
Mail Stop ARLSQ452
Washington, DC 20240

Telephone: (703) 358-2106

Fax: (703) 358-1735

Description of the Data

The U.S. Fish and Wildlife maintains a database of endangered and threatened species in the United States. Endangered species from each state are listed in compliance with the Federal Endangered Species Act [16 U.S.C. 1531 et.seq.], passed in 1973. The purpose of the Act is to prevent the destruction of natural diversity and conserve species at risk to extinction. Major goals of the Act are to avert species extinctions and declines, stabilize existing populations, prevent habitat destruction, and restore habitat necessary for species survival. The Act was amended in 1988 to make the requirements of the Department of the Interior and Department of Commerce Secretaries more specific in developing and implementing recovery plans for all listed species.

All listings of species are based on the best biological and commercial (trade) information available as well as new information at the time it becomes available. Each species is identified as either:

- Improving (I) - those species known to be increasing in numbers and/or whose threats to their continued existence are lessening in the wild.
- Stable (S) - those species known to have stable numbers over the recent past and whose threats have remained relatively constant or diminished in the wild.
- Declining (D) - those species known to be decreasing in numbers and/or whose threats to their continued existence are increasing in the wild.

- Unknown (U) - those species where additional survey work is required to determine their current status.
- Extinct (E) - those species that are believed to be extinct in the wild.

Where Do the Data Come From

Data are derived from cooperation between private, federal, and state entities that collect biological and habitat information on species. The U.S. Fish and Wildlife Service works closely with state government environmental agencies, and nonprofit organizations such as the Nature Conservancy's Natural Heritage programs. The U.S. Fish and Wildlife Service has published the current listing of endangered species in their *Report to Congress, Recovery Program, Endangered and Threatened Species, 1994*.¹

How the Data Are Shown in the Report

The data presented for each species includes:

- the species' listed status,
- lead Region,
- population status,
- whether or not the species has an approved recovery plan and, if not, whether one will be prepared,
- the stage of the recovery plan, and
- the percentage of the species' recovery objectives that have been met.

In addition, a map showing the number of listed species by state is provided. The 1992 *Report to Congress, Endangered and Threatened Species Recovery Program*, provides the same types of data as the more current report. The most noticeable change is that species in the 1994 report are listed by lead region, whereas the 1992 report included listings for each state.

How Can States Use the Data

States can use the data to find the status of species within their states, to establish a trend of progress for threatened and endangered species, to locate and protect crucial habitat supporting more than one endangered species, to discover which species need immediate action, and to gauge the success or failure of state regulations and growth management. States should use this data along with Natural Heritage data to get a more conclusive account of current conditions.

¹ This is the most current report available, having been published in Winter 1995. The description here is based both on the 1992 and 1994 reports.

Ecosystems Data Source Two: **U.S. Fish and Wildlife Service, National Wetlands Inventory**

In accordance with the Emergency Wetlands Resources Act of 1986 {16 U.S.C. 3931(a)}, the U.S. Fish and Wildlife Service prepares status and trends reports on wetlands every ten years. The National Wetlands Inventory directs the gathering and evaluation of information relating to the location, quantity, and ecological importance of the Nation's wetlands. National, regional, and state-level reports are available, such as the *Southeast Wetlands: Status and Trends, Mid-1970's to Mid-1980's*²; *Florida Wetlands: Status and Trends 1970's to 1980's*³; and, *Wetlands Losses in the United States (1780's to 1980's)*.⁴

How to Get the Data

Publications may be requested by writing:

U.S. Fish and Wildlife Service
Publications Unit
Mail Stop: 130 Webb Building
4401 North Fairfax Drive
Arlington, VA 22203

Telephone: (703) 358-1711
Fax: (703) 358-2283

The National Wetlands Inventory has a Website at: <http://www.nwi.fws.gov/>
There are six sections at the Homepage site, including: Data, Ecology, General Information, Status, Educators, and GIS. The Website will give the user access to digital wetlands data and national and regional plant lists that occur in wetlands.

For technical assistance concerning Website information, contact Andrew Cruz at:

andrew@wetlands.nwi.fws.gov
Telephone: (813) 570-5419
Fax: (813) 570-5409

For further inquiries into reports and data, contact:

John Hefner

² Hefner, J.M., B.O. Wilen, T.E. Dahl and W.E. Frayer. 1994. *Southeast Wetlands; Status and Trends, Mid-1970's to Mid-1980's*. U.S. Department of the Interior, Fish and Wildlife Service, Atlanta, Georgia. 32 pages.

³ Frayer, W.E. and Hefner, J.M. 1991. *Florida Wetlands, Status and Trends, 1970's to 1980's*, U.S. Fish and Wildlife Service, Southeast Region, Atlanta, Georgia. 32 pages.

⁴ Dahl, T.E. 1990. *Wetlands Losses in the United States 1780's to 1980's*. U.S. Department of the Interior, Fish and Wildlife Service, Washington, D.C. 13 pp.

Regional Wetlands Inventory Coordinator
U.S. Fish and Wildlife Service
1875 Century Boulevard
Atlanta, GA 30345

Description of the Data

Estimated historical data going back to colonial times was derived from a variety of sources, including narrative description of landscapes, land use records tracing conversion of lands by use categories, drainage statistics, information on the extent of hydric soils (drained and undrained), and historical wetland acreage data that was available. Current wetland acreage was derived from new National Wetland Inventory work and regional and national data sets.

The first report issued on the status of wetland resources in the United States, *Wetlands Losses in the United States, 1780's to 1980's*, was published in 1990. Historical acreage estimates were based only partially on state historical records. Land use records were also used to trace conversion of lands by use categories, drainage statistics, and information on the extent of hydric soils (drained and undrained). Data on existing (1980's) wetland acreage are also derived from similar state data sources. The *Wetlands Losses in the United States, 1780's to 1980's* report should not be used to develop indicators, but is appropriate to set the overall wetlands context.

For some states, the wetlands have been mapped for the entire state by the National Wetlands Inventory, and acreage summary reports are available detailing the extent of wetlands. However, for those states where wetlands are not completely mapped or where acreage summaries are not yet compiled, an accurate accounting of wetland acreage is not always available. For some states, there are conflicting data sets reflecting inconsistencies in inventory terminologies or techniques, inadequate inventory data, or simply outdated information. In several cases, published documentation on the extent of wetlands amounts to little more than speculation. In these instances, an effort was made to assess the validity of the information and reconcile acreage statistics with the best national or regional data sets available to determine statewide totals.⁵

Where Do the Data Come From

Viable wetland acreage information was first derived in 1954 when Roe and Ayres conducted an analysis of land already drained and potential land drainage needed to put the maximum area into agricultural production. Hydric soils data from the *Soil Conservation Service*⁶ have also been used in some instances to approximate wetland acreage. Hydric soils are those soils that are saturated, flooded, or ponded long enough during the growing season to develop anaerobic conditions in the upper part. Under normal circumstances, these soils support wetland vegetation and can be used as an indicator of wetlands. Additionally, the *National Technical Committee for Hydric Soils* has developed criteria to identify hydric soil series and has produced a list of soils within the United States that are hydric.

⁵ Dahl, T.E. 1990, 4.

⁶ Now known as the Natural Resources Conservation Service.

The statistical design used in the national trend study is also used with intensified sampling to obtain reliable estimates for individual states or other selected geographical areas such as the *Florida Wetlands* report and the *Southeast Wetlands* report. The *Florida* report represents wetland trends in Florida for the 10-year period from 1974 to 1984. The definitions, classifications and categories of wetlands and deepwater habitats used are those described by Cowardin et al. (1979).⁷ Wetlands must have one or more of the following three attributes: 1) at least periodically, the land supports predominantly hydrophytes; 2) the substrate is predominantly undrained hydric soil; and 3) the substrate is nonsoil and is saturated with water or covered by shallow water at some time during the growing season of each year

In the classification structure used, wetlands and deepwater habitats are grouped according to systems. A system consists of environments of similar hydrological, geomorphological, chemical, and biological influences. Each system is further divided by the driving ecological force, such as ebb and flow of tide, and by substrate material and flooding regimes, or on vegetative life form. Groupings of categories were made to accommodate special interests of the study and the detail to which aerial photography could be interpreted.

A stratified random sampling design was used with strata being formed by physical subdivisions. For example, in the *Florida* report, the strata were the *coastal* stratum, *Gulf-Atlantic Rolling Plains*, and the *Gulf-Atlantic Coastal Flats*. The total number of sample units used was 644. Each sample unit is a four-square mile area with two miles on each side. Aerial photography and color infrared photography were used.

In the *Southeast Wetlands* study, a stratified random sample of 2,204 plots was used. Each plot was four square miles, or 2,560 acres, and was permanently established for periodic reevaluation. Aerial photography was also the basic information source. Two sets of photographs were analyzed for each study plot. The mean years of the aerial photography were 1974 and 1983. Aerial photographs were interpreted and cover types delineated according to procedures developed by the National Wetlands Inventory.

Wetlands, deepwater habitats and uplands identified on the photographs for the reports were assigned to one of the following categories:

Saltwater habitats

- Marine Intertidal (ocean beaches, bars, and flats)
- Estuarine Subtidal (Open water of bays and sounds)
- Estuarine Intertidal Emergents (Salt marshes)
- Estuarine Intertidal Forest/Shrub (Mangroves & other estuarine shrubs)
- Estuarine Intertidal Unconsolidated Shore (Beaches, bars and flats)

Upland Land Use

- Agriculture (croplands and pastures)
- Urban (Cities, towns and other built-up areas)

⁷ Cowardin, L.M., V. Carter, F. Golet, and E. LaRoe. 1979. Classification of wetlands and deepwater habitats of the United States. U.S. Fish and Wildlife Service. 103 pp.

- Other Uplands (Forest, range land and barren land)

Freshwater or Deepwater Habitats

- Palustrine Forested (Swamps, bottomland hardwoods, etc.)
- Palustrine Scrub/Shrub (Shrub wetlands)
- Palustrine Emergents (Fresh marshes, wet meadows, etc.)
- Palustrine Unconsolidated Shore (Beaches, bars, and flats)
- Palustrine Unconsolidated Bottom (Open water ponds)
- Palustrine Aquatic Beds (Floating or submerged vegetation)
- Riverine (Open water within river channels)
- Lacustrine (Lakes and reservoirs)

Delineations on the interpreted aerial photographs were transferred to overlays on 1:24,000-scale U.S. Geological Survey topographic maps. Measurements of the various categories were made and acreages recorded for analysis.

How the Data Are Shown in the Reports

In the report, *Wetlands Losses in the United States, 1780's to 1980's*, the report includes:

- an assessment of the estimated total number of acres of wetland habitat as of the 1780's in the areas that now comprise each state; and
- an assessment of the estimated total number of acres of wetlands in each state as of the 1980's, and the percentage of loss of wetlands in each state between 1780's and the 1980's.

Data given for each state includes:

- Land in acres;
- Water in acres;
- Total land area;
- Estimates of Original Wetlands Circa 1780's, Source of the Data, and Percentage of Surface Area;
- Estimates of Existing Wetlands Circa 1980's, Source of the Data, and Percentage of Surface Area; and,
- Percentage of Wetlands Lost.

A bibliography of 81 references concerning the state, regional, and national wetlands data is also included.

In the *Florida* report data is shown by:

- Area, in thousands of acres, by surface area classification; and,
- Area, in thousands of acres, by selected surface area groups.

In the *Southeast Wetlands* report data includes:

- Distribution of sample plots and mean dates of aerial photographic coverage, by state;
- Distribution of sample plots within physical subdivisions (Hammond 1970);
- Wetlands of the Southeast (acres);

- Estuarine Wetlands of the Southeast (acres);
- Palustrine Wetlands of the Southeast (acres);
- Wetlands, Deepwater Habitats and Uplands of the Southeast (acres);
- Palustrine Wetland Gains and Losses in the Southeast; Fate of Palustrine Forested Wetlands: Losses and Conversions; States with Large Conversions from Palustrine Forested to Palustrine Emergent Wetlands;
- Wetland Trends for the Southeast States, mid-1970's to mid-1980's (with standard error percent);
- Wetland Acreages, Percentage of State Landscapes and Net Losses, by State, Mid-1970's to Mid-1980's;
- Wetlands of the Conterminous United States (acres);
- Estuarine Wetlands of the Conterminous United States (acres);
- Wetland Losses in the Conterminous United States (acres);
- Estuarine Vegetated Wetland Losses in the Conterminous United States (acres);
- Palustrine Forested Wetland Losses and Conversions in the Conterminous United States (acres);
- Wetland Losses in the Gulf-Atlantic Coastal Flats Compared to the Rest of the United States (acres);
- All Wetlands in the Southeast: Average Annual Loss (acres per year);
- Palustrine Forested Wetlands in the Southeast: Average Annual Loss/Conversion (acres per year);
- Palustrine Forested Wetland Losses and Conversions in the Southeast (urban, agriculture, deepwater, other);
- Area, in thousands of acres, by Surface Area Classification (Marine Intertidal, Estuarine Intertidal, Palustrine, Deepwater Habitats, Other); and,
- Area, in thousands of acres, by Selected Surface Area Groups (Marine Intertidal, Estuarine Intertidal, Palustrine, Deepwater Habitats, Other).

How Can States Use the Data

States can use National Wetlands Inventory data and the corresponding reports to track remaining wetlands, track the rate at which wetlands are being converted to other land uses, the location of wetlands and the rate of conversion at a particular location, and the type of wetland being converted.

Ecosystems Data Source Three: **North American Breeding Bird Survey**

How to Get the Data

For information on the survey, contact:
Bruce Peterjohn
Breeding Bird Survey
Patuxent Environmental Science Center
12100 Beech Forest Rd.
Laurel, MD 20708

Telephone: (301) 497-5841
Fax: (301) 497-5784
E-mail address is: Bruce_Peterjohn@nbs.gov
Home page address is: <http://www.mbr.nbs.gov/>

Description of the Database

The breeding bird survey is conducted along 3,700 active bird routes across the continental U.S., Canada, and northern Mexico. The survey has become an important source for long-term population data on all bird species at continental, regional, and local scales.

Limitations of the Data

Routes in some regions may miss both habitats and bird species; therefore, data may not reflect true abundance. Additionally, the skill of the observer may result in greater or lesser counts of certain bird species.

Where Do the Data Come From

The survey is conducted annually using a detailed methodology. In 1994, there were approximately 3,700 active survey routes across the continental U.S. and Canada, of which more than 2,750 are surveyed annually. In 1995, the number of active survey routes remained fairly constant but the number of routes surveyed annually increased to approximately 3,000. The starting points and directions of survey routes are chosen at random to reduce habitat biases. A route is 24.5 miles long, makes 50 stops at 0.5-mile intervals, and generally takes place along secondary roads to reduce the impact of traffic noise. The methodology includes:

- The survey begins one-half hour before local sunrise.
- The same stop locations should be used from year to year to ensure comparability of the data.
- A three-minute point count is conducted at each stop, with the observer counting all birds heard or seen within a 0.25-mile radius of the stop.
- Only a single observer collects the data, although other individuals may serve as data recorders or drivers. Observers should be able to identify all birds breeding in their area by sight and sound.
- "Spishing", tape playbacks, or other methods of coaxing responses from birds are not allowed.

- Each survey is conducted once annually during the peak of the breeding season; most surveys are conducted during June, although surveys in desert areas and some southern states are conducted during May. Observers should try to conduct the surveys as near as possible to previous survey dates.
- Each survey is normally completed in 4-4.5 hours (not including driving time to and from the route).
- Surveys are conducted only during suitable weather conditions; precipitation and high winds should be avoided because these conditions reduce the numbers of species and individuals counted along the routes.⁸

Thousands of volunteer birders and professional biologists collect the data.

How the Data Are Shown

States can request a listing of species and analysis from Bruce Peterjohn. The analysis will include:

- the name of the species;
- trend estimates for the time periods 1966-1994, 1966-1979, and 1989-1994 expressed as average percent annual change;
- statistical significance of the trend;
- the number of routes used in the analysis;
- the 95 percent confidence interval for 1966-1994; and,
- the average number of individuals recorded on routes used in the analysis period.

States may also obtain raw data as a printout or as ASCII files. The raw data consists of counts of individuals for each species on each route during each year.

How States Can Use the Data

Survey results can be used to track trends in specific or overall bird species. Route-specific trends can also be identified, allowing for analysis of areas of increase and decline. Researchers can undertake studies in these areas to identify the factors responsible for the population trends, such as a decrease in habitat.

⁸ Breeding Bird Survey, Methodology, in *Birding*, December 1994, p. 387.

Ecosystems Data Source Four: **Natural Heritage Network**

How to Get the Data

The Natural Heritage Network does not have a central office. For help in contacting state offices, persons can address questions to either The Nature Conservancy, state Natural Heritage Network offices, or access the Website listed on the following page.

Address:

The Nature Conservancy
1815 North Lynn Street
Arlington, VA 22209

Toll-free: (800) 628-6860

The Nature Conservancy Conservation Science Unit
(703) 841-5354

Central Natural Heritage and Conservation Data Center Network Homepage
WWW address: <http://www.abi.org/>

For technical assistance with the Website, contact Bruce Cheng at (703) 841-2726
For content and data assistance with the Website, contact Dave Meyer at (703) 841-8749

The Website address can provide users access to Association for Biodiversity Information, The Nature Conservancy, U.S. National Biological Service (NBS), and further information on the Natural Heritage Network. **Users can also access a list of the different State Natural Heritage Programs and who to contact in those offices.**

Under the guidance of The Nature Conservancy, the Natural Heritage Network has been developing for twenty years as a unified community of public and non-governmental programs engaged in a standardized approach to biodiversity information management.

The Nature Conservancy began in 1950 and the Heritage Network was started in 1974. The Conservancy supports the Heritage Network programs by providing training and technical support, computer software and technology transfer, standard methodologies, compatible ecological classifications, and mapping technologies. The Network represents a public/private partnership with state and federal governments. There are currently 86 Heritage units, covering all 50 U.S. states. Most are affiliated with state government agencies, others are in universities, or in Nature Conservancy offices. Eighty-four percent are housed in government agencies with natural resource mandates, 12 percent are hosted by public universities, and 4 percent are housed and operated directly by the Nature Conservancy. Finally, the Heritage Programs and Conservation Data Centers (from Canada, Latin America, and Caribbean countries)

have recently created the Association of Biodiversity Information to represent themselves as a cohesive network.

Description of the Database

The Heritage Program responds to 70,000 information requests annually, serving as a comprehensive source of information on biodiversity. The Network maintains a continually updated computerized database of information on rare and threatened species and natural communities and also tracks the locations of these species and communities.

The Network databases identify species, natural communities, and ecosystems in need of protection at the local, regional, national, and global levels. For species, the network tracks the scientific name, distribution and population trends, habitat requirements, and ecological relationships. For natural communities, databases contain information on vegetation structure and composition, succession patterns, natural disturbances, and the distribution and rarity of specific community types throughout their geographic range. In addition, the network tracks the quality and condition of each occurrence of a community and can also develop statewide distribution patterns and the actual areas on that landscape that are conservation significant because they are inhabited by these species.

The Heritage Network assigns status ranks to species and natural communities based on their relative rarity. Once a species has been given a global, national, and subnational rank of one to five (with one being the most rare), the Heritage Programs create lists, or scorecards, of species in their region, with the rarest at the top of the list for protection. In effect, these scorecards enable conservation organizations to select the best sites for protecting the rarest species. Several state Heritage Programs can pool information on a region or an ecosystem level that encompasses several program's jurisdictions.

Where Do the Data Come From

Information on both species and communities is compiled from existing sources, including scientific literature, field guides, books, maps, and museum collections, as well as from direct contact with experts. In addition, Heritage scientists conduct field inventories to verify the presence of these species, supplementing the preliminary data with information about the status and locations of each element of conservation interest.

Each data center uses the Biological and Conservation (BCD) Database as the basis for its operation. The BCD is the sixth generation database management application developed by The Nature Conservancy for use by the Natural Heritage Network. At each data center the BCD software organizes biodiversity information into a set of 48 interrelated database tables, and the data management operation is supported by an extensive map collection, structured manual files, and a library. A trained staff of biologists, natural resource specialists, and data managers interprets the data for use in local conservation and development planning, natural resource management, and environmental review.

How the Data Are Shown: North Carolina Natural Heritage Program Report

As an example of one of the state Natural Heritage Programs, users can obtain the 1995 *North Carolina Natural Heritage Program List of the Rare Animals of North Carolina*⁹ by contacting:

North Carolina Natural Heritage Program
Division of Parks and Recreation
Department of Environment, Health, and Natural Resources
P.O. Box 27687
Raleigh, NC 27611-7687

or the:

Nongame and Endangered Wildlife Program
North Carolina Wildlife Resources Commission
512 North Salisbury Street
Raleigh, NC 27611

The list of species is revised every one or two years and represents species that are endangered, threatened, or otherwise occur in small or unknown numbers in the state. The list is compiled by Natural Heritage staff, the State Wildlife Resources Commission (WRC), and scientific councils. The list format is as follows:

- Scientific and Common Name of the animal;
- Province in which the animal is known to occur, such as mountains, piedmont, coastal plain, or tidewater;
- State Status such as Endangered or Special Concern which indicates the degree of protection (if any), based on rarity, of a species;
- Federal Status in which species listed as Endangered and Threatened are protected by the Endangered Species Act;
- State Rank which is based on the Natural Heritage Program Network of measuring rarity and threat status. It includes the number of extant populations when possible; and
- Global Rank which are assigned by a consensus of scientific experts, the individual natural heritage programs, and the Natural Heritage Network. Global ranks apply to the status of a species throughout its range, and are based on data on the species' status rangewide.

How Can States Use the Data

States can use the data for natural resource and development planning, land use and management decisions, and to support endangered species and habitat protection. States should contact the Natural Heritage Network office within their respective state for assistance.

⁹ Compiled by Harry E. LeGrand Jr., Vertebrate Zoologist and Stephen P. Hall, Invertebrate Zoologist. North Carolina Natural Heritage Program, Division of Parks and Recreation, N.C. Department of Environment, Health and Natural Resources, 1995.