



Our Natural Legacy

DELAWARE'S BIODIVERSITY CONSERVATION PARTNERSHIP



FOREWORD

You don't often hear the term "biodiversity" used in everyday conversation, but like the air we breathe and the water we drink, it is absolutely essential to our continued existence. According to the Ecological Society of America, biodiversity is defined as follows: "Short for biological diversity, biodiversity includes all organisms, species, and populations; the genetic variation among these; and all their complex assemblages of communities and ecosystems."

Yet, as important as biodiversity is to sustaining human life, for its medical uses and applications, and for its present and potential economic values, we really know very little about the variety of plant and animal life found on Earth. What we do know is that in Delaware these living resources are facing multiple threats. These threats include habitat alteration, loss and destruction due to development and poor land-use planning, proliferation of invasive species such as phragmites and purple loosestrife that choke out native species, and pollution and contamination that impact benthic organisms and degrade our ecosystems.

Biodiversity conservation provides a unifying theme for mitigating these threats and integrating our environmental protection programs with our natural resource management efforts. In protecting these living resources, we protect ourselves — our future — by creating a more sustainable environment. The health of our ecosystems will eventually determine the health of the human species. We have a health insurance plan for the future and we need to sign up very soon.

— Nicholas A. DiPasquale
Secretary of DNREC





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About the Cover: Forests are one of our most important keys to conserving biological diversity — numerous rare plants and animals depend upon the diverse physical and ecological conditions found among the shady layers of the forest environment. Piedmont forest ecosystems, as depicted in this photo, support a rich variety of plant and animal life from the decaying leaf litter, fallen tree limbs and boulders to the tree canopy.

OUR MISSION

The Biodiversity Conservation Partnership seeks to maintain and, where possible, restore to a healthy state both the species and the processes native to the natural landscape in Delaware.



Wading birds
Thousands of egrets, herons, and ibises nest each spring in the wetland spoils of Pea Patch Island, the second largest heronry on the East Coast.

Biological diversity or biodiversity “is the variety of life and its processes. It includes the variety of living organisms, the genetic differences among them, and the communities and ecosystems in which they occur.”* Delaware’s biodiversity provides the state and its citizens with numerous ecological, economic, ethical and aesthetic benefits. Some of these benefits include the vital services of climate regulation, water purification, flood control and pest control. Economically, biodiversity provides a multitude of natural resources that are used commercially and non-commercially for food, fuel, hunting, fishing and recreation opportunities. Monies spent on biodiversity-dependent activities total over \$600 million annually in Delaware.

Today, Delaware’s biological diversity is facing multiple threats from habitat loss and degradation due to land development and poor land-use planning. From the introduction and proliferation of non-native invasive species to pollution and contamination, threats to Delaware’s natural landscape take many forms. These are apparent when we consider trends in our native species: Delaware has one of the highest percentages of plant species lost.

Recognizing these issues, a working group consisting of public agencies and private interests was formed and together they developed a framework for *Our Natural Legacy: Delaware’s Biodiversity Conservation Partnership*. This document provides a foundation upon which the partnership can build a strategy for conservation of Delaware’s biological diversity. The framework identifies urgent needs and opportunities to build on current successes through a set of priority actions. These actions are placed in four focus areas around which the partnership is organized: science, resource management, land use planning and education and outreach.

The mission of the Biodiversity Conservation Partnership is to maintain and, where possible, restore to a healthy state both the species and the processes native to the natural landscape in Delaware. Four initiatives will be undertaken to achieve this mission:

◆ The **Science Initiative** will seek to develop science-based biodiversity information products to guide decision-makers in making informed decisions about protecting and managing Delaware’s living resources.

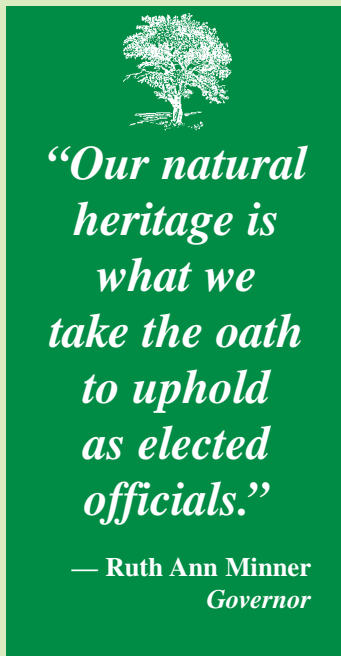
◆ The **Resource Management Initiative** will seek to ensure that state laws and policies allow, support, and encourage the protection of Delaware’s wildlife, fish and native plants while guarding against actions and circumstances that pose a threat to those resources.

◆ The **Land Use Planning Initiative** will seek to guide residential, commercial, industrial, and infrastructure development in a manner that will minimize impacts to biological diversity.

◆ The **Education and Outreach Initiative** will seek to educate natural resource and land use professionals and the public about biodiversity values; strengthen and coordinate existing biodiversity education

programs; and actively involve individuals and local communities in biodiversity conservation.

This document also identifies a structure for the Biodiversity Conservation Partnership, including the appointment of a steering committee to provide ongoing leadership and coordination and the development of implementation teams corresponding with each initiative. The executive committee will continue to provide overall leadership and to make final approvals of the actions recommended by the steering committee and the implementation teams.



* *The Keystone Center. 1991. Keystone Dialogue on Biological Diversity on Federal Lands.*



Our Natural Legacy

DELAWARE'S BIODIVERSITY CONSERVATION PARTNERSHIP

This document presents a framework upon which public agencies and private interests can build a strategy for the conservation of Delaware's biological diversity. The framework identifies urgent needs and opportunities to build on current successes. It focuses on the use of science, resource management, land use planning and education and outreach efforts to guide the identification of areas essential for conserving biodiversity in the state and the development of an action plan. This framework provides a vehicle for local groups, individuals, and state, county and federal agencies to unite their efforts. With this framework as the foundation, the strategy that is developed will place seemingly small, incremental improvements in biological diversity conservation within a broader vision for a livable Delaware.

BACKGROUND

The Delaware Department of Natural Resources and Environmental Control (DNREC) launched a Biodiversity Initiative in May 1999 to engage all sectors in the state in developing a strategy to better conserve and restore Delaware's living resources. A catalyst for this effort was the release of a report in December 1999 which reviewed the ability of existing laws, policies and institutions to conserve the state's living resources. The report, *Protecting Delaware's Natural Heritage: Tools for Biodiversity Conservation*, was prepared by the Environmental Law Institute (ELI) in collaboration with DNREC, the Delaware Nature Society (DNS) and The Nature Conservancy's Delaware Chapter (TNC). It outlines a set of

KEY TERMS

BIODIVERSITY CONSERVATION:

The maintenance of viable populations and natural distribution of native species and communities in a regional landscape.



Delmarva fox squirrel

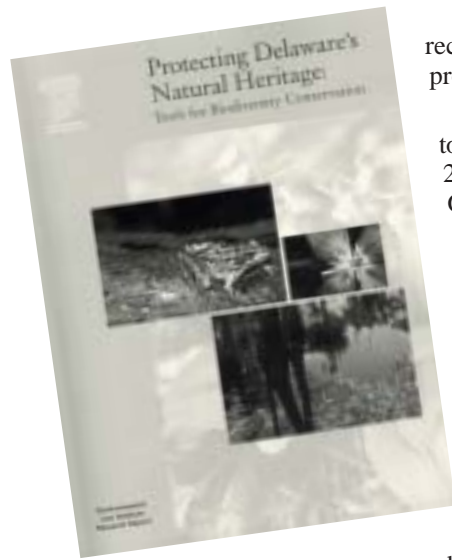
The large, silver-gray Delmarva fox squirrel disappeared from Delaware in the early 1900s due to over-hunting and logging of its habitat. Between 1984 and 1987, 30 fox squirrels were released in the Assawoman and Prime Hook Wildlife Areas.





Delaware was once a land of mature hardwood forests, coastal marshes and freshwater swamps. Its lands and waters provided rich and productive habitat for a myriad of songbirds, waterfowl, fish, reptiles, amphibians and native plants. Forested ecosystems supported wildlife and maintained the diversity of Delaware's rivers, streams and wetlands. Delaware's prosperity was built on its biological diversity. Yet, as the state's early inhabitants took advantage of the land's natural riches to build an economic future, they were simultaneously compromising the base of that diversity. If Delaware citizens hope to provide future generations with healthy populations of plants, animals and a diverse array of native ecosystems, action must be taken now to protect and restore the state's natural heritage.

— Protecting Delaware's Natural Heritage



recommendations for using or modifying existing policies, programs and laws to promote biodiversity conservation.

The recommendations in the ELI report were presented to the Cabinet Committee on State Planning Issues in May 2000. The Biodiversity Implementation Strategy Work Group was formed, consisting of key leaders in Delaware's state and county governments and environmental community. This diverse group was charged with defining goals for biodiversity conservation in the state and developing a framework for implementing these goals.

Input was solicited from a variety of sources including experts in conservation, members of the agricultural and development communities, business representatives and other interested citizens. A statewide symposium held in Dover on February 20, 2001 drew over 300 key stakeholders. This forum was used to solicit feedback on preliminary

recommendations and to discuss pressing issues and obstacles that may affect implementation of a conservation strategy for the state. As a result of the stakeholder input the following items were suggested:

- ◆ Create a vision statement with measurable goals and objectives.
- ◆ Develop long and short-term indicators of success.
- ◆ Recommend an organizational structure.
- ◆ Undertake a statewide biodiversity assessment.
- ◆ Launch an education and outreach campaign.
- ◆ Engage private-sector representatives and strengthen participation by county officials and local planners.

KEY TERMS

ECOSYSTEM:

Dynamic and interrelating complex of plant and animal communities and their associated nonliving environment.

Research and outreach efforts have resulted in this proposed framework for *Delaware's Biodiversity Conservation Partnership*. The Partnership will consist of all current agencies and organizations involved thus far, as well as stakeholder groups not currently represented, such as private sector representatives and local and county land-use planners. It will be responsible for the implementation of the goals and objectives detailed in this document.



WHAT IS BIODIVERSITY?

Biological diversity or biodiversity “is the variety of life and its processes. It includes the variety of living organisms, the genetic differences among them, and the communities and ecosystems in which they occur.” Maintaining biological diversity requires the conservation of many types of landscapes, ecosystems, habitats, native plant and animal species, and populations and the healthy and diverse genetic stocks within them.

WHY PROTECT BIODIVERSITY?

Biologically diverse communities of plants and animals are the foundation of life on earth. Delaware’s biological diversity provides the state and its citizens with numerous ecological, economic, ethical and aesthetic benefits.

Ecological Services

Diverse ecosystems sustain vital services of water purification, flood control, photosynthesis, pest control and soil formation. Healthy ecosystems have many checks and balances, and every species plays a role in maintaining this system. The loss of diversity generally weakens natural systems, making them more susceptible to natural and artificial perturbations, and increases the chance of a system-wide collapse. Thus, the air we breathe and the water we drink are linked to the maintenance of a biologically diverse ecosystem.

Economic Benefits

The total economic value of the services provided by ecosystems and associated biodiversity is immeasurable. We could not survive without them. Economists have estimated the average global value of these services to be over \$33 trillion annually, which is greater than the global Gross National Product. Biological diversity

provides us with a multitude of natural resources that are used commercially and non-commercially for food, fuel, fiber, recreation, hunting, fishing and wildlife observation opportunities. Enormous direct economic benefits from biological diversity have already been realized, and many more have yet to be discovered. Twenty-five percent of all medical prescriptions throughout the world originally came from plants or microorganisms. Delaware’s forest-based industry provides jobs to 3,700 individuals with total annual wages estimated at \$98 million. In 1999, the dockside value of commercial fish and shellfish in Delaware was almost \$6.8 million and the blue crab harvest generated over \$4.8 million. In 1996, 40,000 hunters and 196,000 anglers using Delaware lands and waters spent over \$443.6 million on fishing and hunting trip related expenses. Wildlife watching activities generated over \$63.8 million in Delaware in 1996.

Ethical Values and Aesthetic Values

Almost 80 percent of all Americans believe that our responsibility for protecting the environment stems from our responsibility to future generations. A majority of people feel humans have the social, spiritual or moral responsibility to maintain ecosystems and their associated complements of species. In addition, conservation of biological resources improves the aesthetic qualities of the lives of Delawareans and our visitors. Protected natural places promote recreation, inspiration and contribute to stronger communities and a more livable Delaware.



Osprey 4
These fish-eating raptors nest in tall trees or nesting platforms in the marshes and behind sand dunes. There are 52 active osprey nests in Delaware.



Striped bass & American shad
These anadromous fish spend their adult lives at sea, but return to spawn in freshwater rivers. Their populations were so reduced by over-fishing and damming of rivers that harvesting limits were passed in the 1980s.

PLANT & ANIMAL CONSERVATION THREATS

Today, threats affecting conservation of the state's plant and animal resources include:

- ◆ Development and poorly planned growth.
- ◆ Non-native invasive species introductions via interstate and international transportation.
- ◆ Water quality degradation caused by point and non-point source pollution, as well as water diversions for industrial, commercial and residential uses.
- ◆ Aquatic habitat degradation caused by an increase in impermeable surfaces (buildings, pavement), stormwater runoff, agricultural practices, excessive sedimentation and stream channelization.
- ◆ Ecosystem degradation from toxins introduced from historical hazardous waste, agricultural and industrial chemicals including waste handling and disposal, spills and leaking storage systems.
- ◆ Over-harvesting of commercially important fisheries.



THREATS TO BIODIVERSITY CONSERVATION IN DELAWARE

Rapid growth, especially in suburban and rural areas, has a profound effect on biological diversity. Not only does poorly planned growth lead to the direct loss of habitat, but it also fragments and degrades remaining forests and wetlands. Once fragmented and disturbed, these habitats become more susceptible to further degradation by non-native invasive species leading to further loss of our natural biological diversity.

These translate into three primary causes of biodiversity loss that must become the focus of biodiversity conservation efforts:

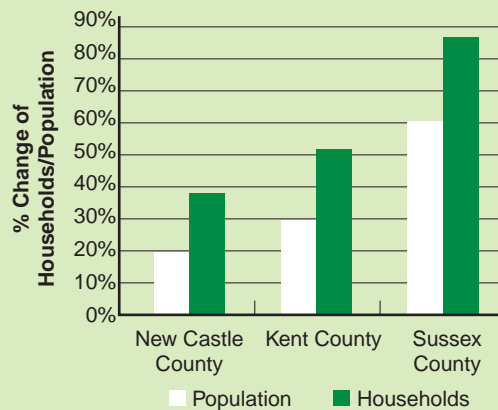
- ◆ **Habitat loss and fragmentation**
- ◆ **Proliferation of non-native invasive species**
- ◆ **Ecosystem degradation**

Habitat loss is the destruction and removal of habitat for plants and animals from various activities such as agriculture, infrastructure development, ditching and dredging of streams and commercial and residential development. Habitat fragmentation is a process whereby

large continuous areas of habitat are reduced in size and separated into discrete parcels. These fragments are often isolated from one another by a highly modified landscape. Fragmentation occurs when habitats are divided by roads, railroads, ditches, dams, power-lines, fences or other barriers to the free movement and migration of plant and animal species.

Many **non-native invasive species** have been intentionally transported by humans for use as cultivated plants and game fish or introduced inadvertently by ships and vehicles. Because non-native invasive species are transplanted to areas where natural predators

Population and Households Projections by County, 1990-2020



“Small can be beautiful, but for Delaware, being a small part of a larger regional economic and demographic system means that many trends affecting the state are driven by influences beyond its borders and control.”

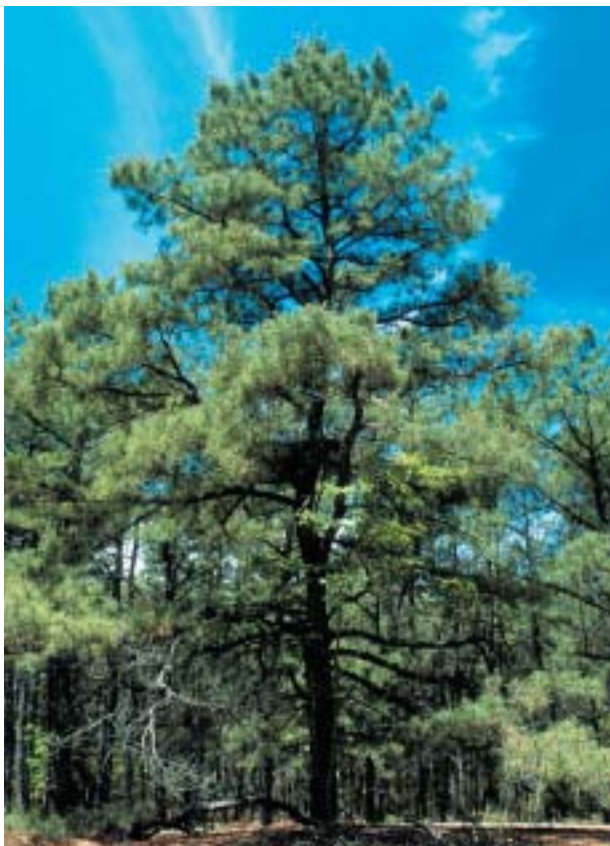
— David Ames and Robert Dean
University of Delaware
Center for Historic
Architecture and Design

From our coastal beaches and dunes to the hills of the piedmont, Delaware is rich in natural treasures that add character to our landscape. Here are just a few examples:

- ◆ The greatest reported concentration of **worm-eating warblers**, a species showing declines in portions of its range due to forest fragmentation, is found in the Great Cypress Swamp in southern Delaware.
- ◆ **Atlantic white cedar swamps** found in Delaware are “hot spots” of biological diversity — not only is this community type globally rare, but several globally rare species are found in this habitat, including two butterflies (Hessel’s hairstreak and frosted elfin) and five plants (creeping St. John’s-wort, curly-grass fern, sea-side alder, Mitchell’s sedge and federally listed swamp-pink). Numerous state-rare species are also associated with white cedar swamps.
- ◆ The only sites currently known to harbor the **Bethany firefly**, first discovered and described as a species in the 1950s near Bethany Beach, are Delaware’s Atlantic coast dune wetlands. This species was only recently rediscovered in these wetlands after nearly 50 years.
- ◆ Hundreds of **coastal plain ponds**, shallow wetland depressions that are typically flooded in the winter and spring and dry in summer and fall, are found in southwestern New Castle County and northwestern Kent County; a smaller number are concentrated in Sussex County. These ponds, and the upland forest surrounding them, are critical habitat for many of our rare plant and animals species.
- ◆ A globally rare plant called **Hirst’s panic grass** grows in only three places in the world – a population is found growing here in Delaware in a **coastal plain pond**.
- ◆ **Seabeach amaranth** and **seabeach knotweed** are globally rare plants that grow on sandy beaches and foredunes along the ocean coast. In 2000, both were discovered growing on Delaware’s beaches for the first time in 125 years and more than 60 years respectively.
- ◆ The best population of **coastal plain swamp sparrow**, a sub-species that nests only in the upper brackish tidal marshes of the Chesapeake and Delaware Bays, is found in Delaware’s marshes bordering the Delaware bay.



◆ **Steep wooded slopes** along streams and rivers in the piedmont region of northern Delaware provide habitat for many of our rare plants. These forested areas are also important for many neotropical migrant birds that nest here or migrate through the state.



STATUS	
PLANTS & ANIMALS	LOST OR AT RISK
Plants	40%
Freshwater Mussels	78%
Dragonflies & Damselflies	34%
Fish	20%
Herpetiles	31%
Birds	19%
Mammals	4%

do not exist, they may have a substantial advantage over native species. Invasives can greatly influence the composition of native species through competition for resources, direct predation and alteration of the existing habitat. Non-native species now represent 25 percent of Delaware’s known flora.

Ecosystem degradation

includes any process, input or modification of a habitat that diminishes its ability to maintain a healthy native plant and animal population. Degradation includes the direct alteration of habitat such as stream modification, ditching and diking and the input of pollutants into a habitat (point and non-point).

Harvesting and extractive activities can also produce habitat and ecosystem degradation. For example forest practices, that do not incorporate soil conservation measures impair natural habitats. Agricultural practices and commercial and residential development can also lead to excessive erosion, sediment input and nutrient enrichment of waterbodies.



KEY TERMS

ECOSYSTEM FUNCTIONS:

Refers to habitat, biological or system properties or processes of ecosystems. Examples include the storage and retention of water, retention of soil, and regulation of global temperature, precipitation and other biologically mediated climate processes.

ECOSYSTEM SERVICES:

Represents the benefits human populations derive, directly or indirectly, from **ecosystem functions**. Examples include food and raw materials production, waste assimilation and treatment, and climate regulation.



INITIATIVES

Four **Initiatives** will be undertaken to achieve the mission of the Biodiversity Conservation Partnership. These include the **Science, Resource Management, Land Use Planning and Education and Outreach Initiatives**. Each will be charged with meeting the objectives outlined below by using a variety of tools including policy and programmatic measures, legislative approaches and education and outreach.

Science Initiative

The Science Initiative will seek to develop science-based biodiversity information products to guide decision-makers in making informed decisions about protecting and managing Delaware's living resources.

OBJECTIVES

- ◆ Use existing data to identify and to map for land use decision-makers those land and water areas essential for the long-term protection of native plants, animals and natural communities by July 1, 2001.
- ◆ Conduct an inventory and assessment of existing biodiversity data and information to determine critical inventory, monitoring and research needs by July 2002.
- ◆ Apply annual or bi-annual updates to the biodiversity conservation map to ensure that the best available data is used to identify areas most critical for the conservation of native plants, animal and natural communities.
- ◆ Provide technical guidance to biodiversity partners, decision-makers and the agency designated to maintain a clearinghouse for biodiversity data, information and decision-support tools.

PRIORITY ACTIONS

1. Define "native." Develop lists of native communities and species to help guide land management decisions.

Defining "native" and listing those species and communities that are native will be critical to the success of the initiative in order to deliver a clear and consistent message about what we are targeting for protection, management and restoration. Our focus on these elements of biodiversity should not be mistaken for an attempt to eliminate non-native species that are related to, for example, agriculture or horticulture, except when these species are considered invasive.

2. Develop a statewide assessment of biodiversity by conducting workshops with public and private sector scientists to identify and evaluate existing data and information related to plant and animal populations and natural communities throughout the state, with particular emphasis on identifying data limitations, data quality deficiencies and data gaps.

The science implementation team will acquire information on plant and animal populations and natural communities to determine if and how they can be used to identify areas critical for biodiversity conservation. The assessment phase will tell us what we *know* and *don't know* about biodiversity in Delaware, from which we can begin to 1) identify critical gaps in biodiversity information, and 2) determine which components of biodiversity are in greatest need of protection (e.g., through acquisition, management, restoration, policies, legislation).

3. Using the results of the biodiversity assessment, produce maps that identify opportunities for statewide biological resource protection through targeted incentive and legislative programs, resource management, land acquisition, restoration and

education and outreach activities by December 2002. Update and create new State Resources Areas (SRA) and Natural Areas to target for protection those lands and waters critical for biodiversity conservation. Produce biodiversity conservation overlay maps that depict areas in need of restoration and opportunities for creating links among State Resource Areas and the Natural Areas Inventory through biological corridor protection and/or restoration.

State Resource Areas established in 1989, are lands targeted for protection not only because of their biological value but also for their historical significance and access to recreational opportunities. As part of this Initiative, updated and new SRAs will clearly reflect those areas critical for biodiversity conservation. Additionally, the results of the biodiversity assessment will be integrated into the Natural Areas Inventory (NAI). Overlay maps will build upon the SRA and NAI by identifying restoration opportunities including, but not limited to, reforestation and restoring wetlands on marginally productive lands, re-establishing riparian buffers, linking forested and wetland tracts, reconfiguring streams and other waterbodies to a natural geomorphic condition, restoring streams degraded by urban development to re-establish natural functions (e.g., improving fish habitat and water quality, restoring aesthetic values) and creating wetland treatment facilities for nutrients and sediments associated with streams and other waterbodies.

4. Develop and provide biodiversity information and decision-support tools in formats accessible to decision-makers. Provide associated technical assistance to governmental agencies and non-governmental organizations to help guide state decision making.

For biodiversity information to be incorporated into policy, management and planning decisions at the state and local levels, it must be in a format that decision-makers can interpret and use. Availability of data alone will not ensure use. Rather, data must be tailored to meet the needs of its potential and intended users. If existing science-based assessment programs are not providing information in an appropriate format for those whose decisions affect biodiversity, valuable data will fail to have significant on-the-ground effects. In addition, because decision-makers and/or organizations are often illinformed or ill-equipped to adequately use and interpret biodiversity information, on-going technical training and support are critical. Without adequate guidance or tools, this information may fail to be incorporated into state decision-making or may be interpreted inappropriately.

5. Identify leadership within an existing program and provide funding to support periodic re-assessments of biodiversity and create a central clearinghouse for state biodiversity information and technical assistance.

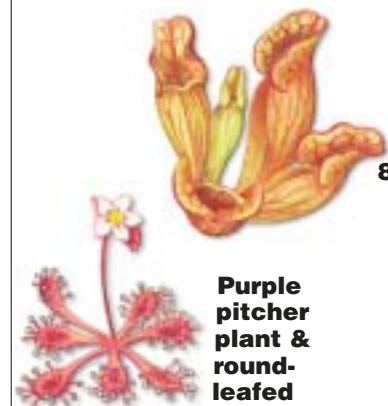
Several programs and agencies are using their own resources to develop parallel projects aimed at guiding biodiversity protection in Delaware. While parts of an assessment and plan are already being addressed independently or with limited partners, dedicated funding will be needed to ensure these efforts are coordinated. A coordinated effort would facilitate and encourage communication and make more efficient use of limited resources. Furthermore, it would be vital to have at least one full time position to help (1) develop a comprehensive biodiversity assessment and plan, and (2) determine the needs of decision makers and integrate these needs into customized tools for different uses. Dedicated staff time will be needed to complete development of tools and to ensure these tools continue to be developed, as better information becomes available.

Because our scientific knowledge base and available tools are ever-changing, the biodiversity assessment, plan and decision-support tools must evolve as more and better data becomes available. Currently no mechanism exists to ensure this will happen. A formal program would help to establish institutional memory, which will be needed for a multi-agency effort to survive. With dedicated coordination, motivated leadership and committed resources, we can keep the momentum going and develop a plan that will guide biodiversity conservation for Delaware into the 21st century.



Yellow-throated warbler

This neotropical migrant can be found nesting in pine forests of southern Delaware, and in sycamores in northern Delaware. A diversity of songbirds in our forests will consume large quantities of insect pests and attract birdwatchers who contribute to our economy.



Purple pitcher plant & round-leaved sundew

These insect-eating plants grow on sphagnum moss hummocks in Atlantic white cedar swamps. They get the nutrients they need by digesting insects lured into their pitchers or onto their sticky leaves.



Shorebirds & horseshoe crabs

Over one million shorebirds arrive each May to gorge on horseshoe crab eggs. The Delaware Bay estuary is a critical refueling stop on the birds' migration routes from Central and South America to their nesting grounds in the Arctic.



Seaside alder

Most of the world's population of this shrub grows along stream banks in the Delmarva Peninsula. It is fairly common in the Nanticoke watershed.

9



“If we are to succeed in retaining the natural values and beauty we enjoy today in Delaware, we must devise and act on a strategy for conserving our biodiversity that includes sensitively sited environmentally compatible development.”

— Michael E. Riska
Delaware Nature Society

Resource Management Initiative

The Resource Management Initiative will seek to ensure that state laws and policies allow, support and encourage the protection of Delaware's wildlife, fish and native plants while guarding against actions and circumstances that pose a threat to those resources.

OBJECTIVES

- ◆ Protect the most critical ecosystems and communities through the use of incentive programs, land use planning, resource management and habitat protection strategies.
- ◆ Prevent the introduction of and control the spread of non-native invasive species.
- ◆ Develop mechanisms to achieve the mandate of the Land Protection Act to protect appropriate natural resource lands contained within State Resource Areas.
- ◆ Keep the common native species common while providing protection for all rare, threatened and endangered plant and animal species.
- ◆ To enhance and maintain aquatic systems (tidal and non-tidal wetlands, streams, and riparian zones) and forested habitats (old-growth areas, in particular), giving the highest priority to areas that could connect hubs of biodiversity and maintain landscape interconnectivity.
- ◆ Restore and enhance degraded ecosystems to maintain and create native biodiversity.

PRIORITY ACTIONS:

The Resource Management Initiative's priority actions for achieving these objectives fall under four areas — *Incentives for Private Landowners, Land Acquisition, Public Land Management and Habitat Protection.*

INCENTIVES FOR PRIVATE LAND OWNERS

With over 80 percent of Delaware in private ownership, programs and incentives for private landowners are important for developing a strategy to protect biological diversity. State tax policies and state and federal incentive programs can have a profound effect on land use and management decisions on private lands.

Individual landowners need to be engaged in and rewarded for preserving, restoring and maintaining Delaware's biodiversity. Working closely with private landowners, the State of Delaware has the potential to help protect significant habitat on private lands.

1. Secure high-level state agency and private landowner commitments to support and implement the activities developed by the Delaware Invasive Species Council.

2. Expand private landowner incentives to promote biodiversity conservation through the following options:

- a. Establish a Habitat Conservation Act or Program to provide financial and management incentives for landowners who want to conserve and protect habitats and to manage for biodiversity. Create financial incentives such as low- or no- interest loans, cost share or tax credits to encourage landowners to protect habitat and manage for biodiversity.
- b. Amend Delaware's Farmland (and Forestland) Assessment Act to allow lands managed for conservation purposes to be assessed using the same property tax scheme as lands used for agricultural, horticultural, or forestry purposes. Suggested criteria for "conservation-land" qualification include a minimum of 10 acres managed for biodiversity conservation as validated by a habitat management plan from a qualified agency (e.g., a Conservation District).

- c. Amend the Commercial Forest Plantations Law to provide incentives for biodiversity conservation to be addressed as a component of forestry management plans.
- d. Amend the Agricultural Preservation Program policy to give priority qualification for cost share monies to agricultural lands using Best Management Practices (BMP) that promote biodiversity conservation. Set yearly goals for a percentage of available monies distributed specifically for BMPs that promote biodiversity conservation. This may require only a shift in Department of Agriculture policy, not legislative action.
- e. Simplify and coordinate landowner incentive programs to protect biodiversity offered by the Natural Resources Conservation Service, the Department of Natural Resources and Environmental Control, Delaware Department of Agriculture, and other state and local natural resource agencies.
- f. Enhance DNREC’s existing Wildlife Habitat Enhancement Program through increased funding.

LAND ACQUISITION

In order to carry out the mandate of the Land Protection Act to protect appropriate natural resource lands contained within the State Resource Areas, a consistent annual source of funding is needed. Long range planning, even for acquisition and stewardship of the highest priority lands, is difficult without knowing whether and how much money will be available on an annual basis. Over the first ten years of the Open Space Program, the funds available for acquisition averaged \$13 million annually. This budget severely limits the amount of land that can be purchased for permanent protection. The Agricultural Lands Preservation Program needs approximately \$10 million a year for the next 20 years to purchase development rights.

- 3. Identify and secure a permanent revenue stream for the Open Space Program.**
- 4. Identify and secure a permanent revenue stream for the Agricultural Land Preservation Program.**
- 5. Lands with high quality habitats or lands with habitat conservation plans should receive greater consideration for protection under the Open Space and Agricultural Lands Preservation programs.**

PUBLIC LANDS MANAGEMENT

While conservation action will necessarily be targeted to private lands, public lands may be the best hope for preservation and professional management of key species and natural communities. Continuing acquisition of fee-simple title and development rights is essential in the absence of strong land use controls. Further, specific parcels must be targeted to help land-managing agencies meet strategic objectives and to maintain the viability of the state’s agricultural economy.

- 6. Create a stewardship fund within the Department of Natural Resources and Environmental Control to ensure that lands acquired under the Open Space Program receive adequate funds for restoration and management.**

HABITAT:
The set of physical and biological features that determines where an organism or group of organisms can survive.

HABITAT FRAGMENTATION:
Process by which large continuous areas of habitat are reduced in size and separated into discrete parcels.

INVASIVE SPECIES:
A species that causes or has the potential to cause economic or environmental harm or harm to human health.



NATIVE SPECIES:

A species that occurred in Delaware prior to European settlement or has migrated into the state independent of human activity.

NATURAL COMMUNITY:

A habitat in a defined geographic area that supports a recurring assemblage of species across the landscape, and includes the entire composition of plants, animals and microorganisms, as well as their interactions with each other and with their physical environment.

NON-NATIVE SPECIES:

A species that has been introduced by humans, either intentionally or unintentionally, to a given geographic area where it would not otherwise occur naturally. In the context of biodiversity conservation, these species grow in wild habitats outside cultivation.

7. Develop management plans that consider biodiversity conservation and restoration for each of the state's protected conservation lands. Require regular updates to reflect new trends in wildlife and recreational use; include updates on exotic species; ensure that each agency's constituents are being served; and ensure that management activities reflect current scientific understanding and do not adversely affect biological diversity.

8. Establish a comprehensive biodiversity partnership among state and local agencies to achieve biodiversity management objectives for public land.

9. The Department of Natural Resources and Environmental Control should develop a native plant list and planting policy using the Division of Parks and Recreation's model. Update annually or biannually to ensure that the list of native species, list of exotics to be avoided and list of nurseries supplying native species remain current.

HABITAT PROTECTION

10. Revise the state Endangered Species Act to extend protection to include: critical ecological communities, such as critical wetland habitats (e.g. coastal plain ponds) and Delaware's plants and animals that are endangered, threatened and species of concern. Revisions to the Act should include provisions for:

- a. Public works projects, financed with state and/or local funds, should be required to conduct an alternative analysis to consider the impact of these projects on species or habitats that are likely to become endangered or threatened within the state.
- b. Extend protection to Delaware plants as well as animals, while broadening the scope of that protection to include species that are not only endangered, but also threatened, or noted as "species of concern."
- c. Trade in wild-collected, endangered, threatened or rare native Delaware plants should be regulated to promote conservation.
- d. Prohibit taking of a listed species.
- e. Update species and community lists regularly.

11. Identify existing statutory mechanisms which can protect isolated and/or critical unique wetland habitats, while furthering efforts for comprehensive protection of all non-tidal wetlands.

A recent Supreme Court decision leaves isolated non-tidal wetlands throughout the United States with no protection under section 404 of the federal Clean Water Act. Certain types of rare and unique wetland communities within Delaware exist within this isolated wetland assemblage, which may be a significant portion of the whole of Delaware's non-tidal wetlands. Immediate action is necessary in Delaware to achieve sufficient protection of these resources. This can be accomplished expediently and



efficiently through the existing statutory mechanisms. Minor changes to one or more of these statutes would afford Delaware the opportunity to protect these valuable areas.

Eventual development and enactment of a comprehensive mechanism to protect all non-tidal wetlands is a key factor for inclusion of these resources within the biodiversity strategy. Consistent and proactive wetland protection and management could be achieved with such a comprehensive effort. Additionally, existing Section 401 Water Quality concerns could be addressed, riparian zones and habitat corridors could be protected, and better ecological understanding of wetlands by experts, who

will geographically define outstanding and irreplaceable wetland resources could be achieved.



12. Enact a Forest Conservation Law that will minimize the loss of forestland within the state, particularly loss due to development projects. Consider including provisions to require mitigation for habitat loss.

Forests provide critical habitat for numerous plant species (more than 40 percent of Delaware’s native flora are forest-dependent species) and many animals, especially birds. It is estimated that Delaware’s original upland forest cover has been reduced by 75-80 percent, or nearly 800,000 acres. At present, little protection is afforded to upland forests and, in fact, certain activities (e.g., highway construction, placement of stormwater ponds, etc.) are often directed to forested areas. Creation of a forest mitigation requirement should be considered. True costs associated with forest destruction are not currently being incurred by those benefiting from the destruction. For example, services provided by forest ecosystems, such as air quality improvement, flood control and

wildlife habitat, are not factored into land value calculations.

13. Increase funding for marine restoration and marine research.

Delaware’s marine resources are rich in species, genetic and ecosystem diversity and economic value. Marine ecosystems support many valuable recreational and commercial fish species. However, the conservation of biological diversity in the Delaware Bay, particularly marine fisheries within the state’s territorial sea, are even more neglected than on land.

Management tools for decision-makers to protect the state’s marine biodiversity cost money. Such tools as biological inventories, research, monitoring, training and recruiting professionals, regulating threats to marine ecosystems and fisheries require a stable source of revenue. Possible options for generating this revenue stream include 1) replacing the freshwater fishing license with a statewide recreational fishing license; 2) transferring annually three-fifths of 1 percent (approximately \$522,000) of the total motor fuel tax revenue paid by boaters but not reclaimed to the Division of Fish and Wildlife as match to the Sportfish Restoration Program; and/or 3) increasing the General Fund Appropriation to the Division by \$500,000 annually.



Cricket frog

This small nonclimbing member of the treefrog family prefers forested wetlands that have not been recently cleared.



Bog turtle

This federally protected reptile lives a secretive life in the wet meadows along shallow brooks and streams.



“Native species are part of the state’s heritage and enhance our sense of belonging to a special place.”

— David S. Hugg III
State Planning Coordinator



“If we can get people thinking of themselves as land managers – whether they are landowners or visitors – Delawareans have the potential to contribute to a positive stewardship of our resources.”

— Rob Line
Natural Area
Program Manager

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Eastern oyster

In the 1950s and in 1990 most of the oysters in the Delaware Estuary died from a parasite called MSX.

Land Use Planning Initiative

The Land Use Planning Initiative will seek to guide residential, commercial, industrial and infrastructure development in a manner that will minimize impacts to biological diversity.

OBJECTIVES

- ◆ Achieve clear and agreed upon consistency between state and local land use and environmental plans and policies that will conserve biodiversity in both growth and non-growth areas and further, when possible, direct growth away from environmentally sensitive areas to designated growth and infill areas.
- ◆ By July 1, 2001, provide best available information and data (including maps), as well as technical assistance to land use decision makers so they can update County Comprehensive Plans in order to minimize habitat loss and fragmentation and protect critical areas and resources for biodiversity.
- ◆ Coordinate the Biodiversity Land Use Planning Initiative with the “Livable Delaware” agenda and advance the implementation of both efforts.

PRIORITY ACTIONS:

Many of the most important opportunities to conserve biological diversity involve the use of land. How habitat is lost, fragmented, degraded, or alternatively, how land is protected, is affected by the planning tools available and how they are used. Planning is critical because development decisions that affect habitat are largely irreversible. Once habitat is lost to development it becomes extremely difficult to restore.

Presently, we have a significant window of opportunity for making policy and regulatory changes, at both the state and county levels. At the state level, Governor Minner has announced an aggressive land use policy, Livable Delaware, to address land use issues as articulated in the *Shaping Delaware's Future: Managing Growth in 21st Century Delaware*. At the forefront of this initiative is how to control sprawl, which is key to minimizing the impact of land use on biodiversity. At the county level, all three counties are beginning the required process of updating their comprehensive plans. The counties will have the benefit of full state participation in this process, which includes a fully articulated land use policy via *Shaping Delaware's Future: Managing Growth in 21st Century Delaware*.

In order for the biodiversity effort to be successful, county and municipal comprehensive plans and state development priorities, as articulated in *Shaping Delaware's Future: Managing Growth in the 21st Century* and the *Livable Delaware* initiative





must be consistent. This is important because the plans are the basis for land use regulations and policies. This ties in with many of the other recommendations that advocate changing and adding regulations to be consistent with state and local plans.

1. Encourage all counties, through updates to comprehensive plans, to adopt or improve environmental design standards that protect biological diversity.

2. Require all local and county zoning maps and regulations to be consistent with their respective comprehensive plans.

3. Achieve consistency between county and municipal comprehensive plans and state development priorities.

4. Encourage use of community septic and sewer systems in growth areas.

5. Ensure wastewater systems in rural areas are consistent with Total Maximum Daily Load pollution control goals and with designated growth areas.

6. Ensure that the Land Use Planning Act (LUPA) requires review of all state capital projects for consistency with state development policies.

7. Support portions of the Livable Delaware Initiative that enhance the Biodiversity Conservation Partnership.



Bethany firefly
The Bethany firefly is the only species found solely in Delaware. It lives in low grassy swales behind sand dunes and zooms quickly about, flashing a short, infrequent green taillight.

KEY TERMS

RIPARIAN ZONE:

Narrow areas along the margins of rivers, streams and other waterbodies.

Managed properly with a diversity of vegetation, these narrow strips provide habitat for many wildlife species and play a critical role in maintaining the water quality of adjacent waterbodies.

WETLAND:

“Land that is saturated with water long enough to promote wetland or aquatic processes as indicated by poorly drained soils, hydrophytic (water-loving) vegetation, and various kinds of biological activity adapted to wet environments.” (National Wetlands Working Group, 1988).

Education and Outreach Initiative

The Education and Outreach Initiative will seek to educate natural resource and land use professionals and the public about biodiversity values; strengthen and coordinate existing biodiversity education programs; and actively involve individuals and local communities in biodiversity conservation.

OBJECTIVES

- ◆ Engage a broad spectrum of Delaware's population in biodiversity conservation through traditional education and outreach.
- ◆ Promote a coordinated statewide media strategy that provides current information on biological diversity to the citizens of Delaware.
- ◆ Coordinate and support existing public and private education efforts that offer biodiversity education opportunities. Strengthen and expand the existing network of groups and individuals that communicate with the public about biodiversity.
- ◆ Promote the use of biodiversity conservation tools such as conservation easements and incentive programs.

PRIORITY ACTIONS:

Delaware's environmental outreach network should be expanded and revitalized to educate all sectors about the importance of biodiversity conservation. Existing programs can be coordinated to send a unified message to targeted audiences about the importance of biodiversity conservation as a component of the *Livable Delaware* Initiative. Targeted audiences should include decision-makers, students, homeowners, land managers and landowners, media, natural resource and land use professionals.

1. Increase biodiversity education and outreach opportunities for the public.

- a. Incorporate biodiversity education in existing programming within agencies such as DNREC, Delaware National Estuarine Research Reserve, U.S. Fish and Wildlife Service, Delaware Nature Society and other relevant efforts.
- b. Engage citizens in hands-on research and educational efforts to promote biological diversity.

2. Create and implement a media outreach, marketing and public relations strategy to inform and educate the public as a whole on the value of Delaware's biological diversity.

- a. Ensure the best information about biodiversity is available on the DNREC web page including biodiversity-related grant applications, resources for teachers and maps of resource protection areas.
- b. Develop a strategy to inform news media on needs and accomplishments of the conservation of biodiversity effort.

3. Create and implement an education/outreach program focused on decision-makers regarding the value and importance of protecting Delaware's biological diversity.

- a. Target state and local elected officials and appointed planning board or commission officials through workshops, personal visits, seminars and field experiences.
- b. Provide educational opportunities to landowners to encourage participation in incentive and cost share programs that foster biodiversity protection. As part of this effort, incentive programs such as the Conservation Reserve Enhancement Program and the Wildlife Habitat Enhancement Program will be promoted and publicized.
- c. Increase education opportunities for landowners to learn about conservation easements and other land protection options.



Bald eagle

In 2000, biologists monitored 16 nests statewide, which produced 14 chicks. This represents a comeback from a low of three nests in 1978.



Atlantic blue crab

Harvests of two million pounds annually make the blue crab the most economically important species in the Mid-Atlantic region. A single female mates only once, producing a million eggs.

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Freshwater mussels

The most globally endangered species group, freshwater mussels can only live in clean, sediment-free streams. They help clean water by filtering out bacteria and organic matter.

Implementation

DECISION-MAKING, STRUCTURE AND PARTICIPATION

Organizational structure:

By determining how to move forward with implementation, the **Executive Committee** will structure the Delaware Biodiversity Conservation Partnership to improve coordination between the many players whose decisions affect the state's living resources.

THE EXECUTIVE COMMITTEE WILL:

- ◆ Engage state, federal and local government, universities, environmental and citizen groups, major private landowners and agricultural and business communities to implement on-the-ground actions.
- ◆ Adopt an organizational structure for implementation that fosters inter-organizational exchange and identifies clear leadership roles and responsibilities.
- ◆ Appoint a **Steering Committee** of high-ranking officials and leaders within state and local government, conservation organizations and the private sector to provide on-going coordination and leadership to the Partnership.
- ◆ Approve and adopt implementation strategies recommended by the steering committee.

EXECUTIVE COMMITTEE

Nicholas A. DiPasquale
Secretary
Delaware Department of
Natural Resources and
Environmental Control

Thomas P. Gordon
Executive Administrator
New Castle County

Nathan Hayward III
Secretary
Delaware Department
of Transportation

Constance C. Holland
State Planning Coordinator
Office of State Planning
Coordination

Roger L. Jones
State Director
The Nature Conservancy

Robert S. McLeod
Administrator
Kent County

Michael E. Riska
Executive Director
Delaware Nature Society

Michael T. Scuse
Secretary
Department of Agriculture

David W. Singleton
Secretary
Department of Finance

Robert L. Stickels
Administrator
Sussex County

Lee Ann Walling
Senior Advisor
Office of the Governor

John D. Wik
Director
Delaware Economic
Development Office

Valerie A. Woodruff
Secretary
Delaware Department
of Education



IMPLEMENTATION TIMELINE

Phase I: First six months following adoption of partnership (July 2001 – December 2001)

- ◆ Complete Phase 1 priority actions.
- ◆ Develop package for the 2002 legislative session of all proposed legislative changes.
- ◆ Communicate tangible products and on-the-ground successes to the public.

Phase II: Twelve months following adoption of partnership (July 2001 – July 2002)

- ◆ Legislative deliberation and passage.
- ◆ Complete priority actions that require more time commitment.
- ◆ By July 2002, conduct an assessment of successes and future goals.
- ◆ By September 2002, identify goals for the next legislative session.
- ◆ Communicate tangible products and on-the-ground successes to the public.

Phase III: Longer time frame

- ◆ Complete remaining priority actions and new actions identified through assessment.
- ◆ Communicate tangible products and on-the-ground successes to the public.

THE STEERING COMMITTEE WILL:

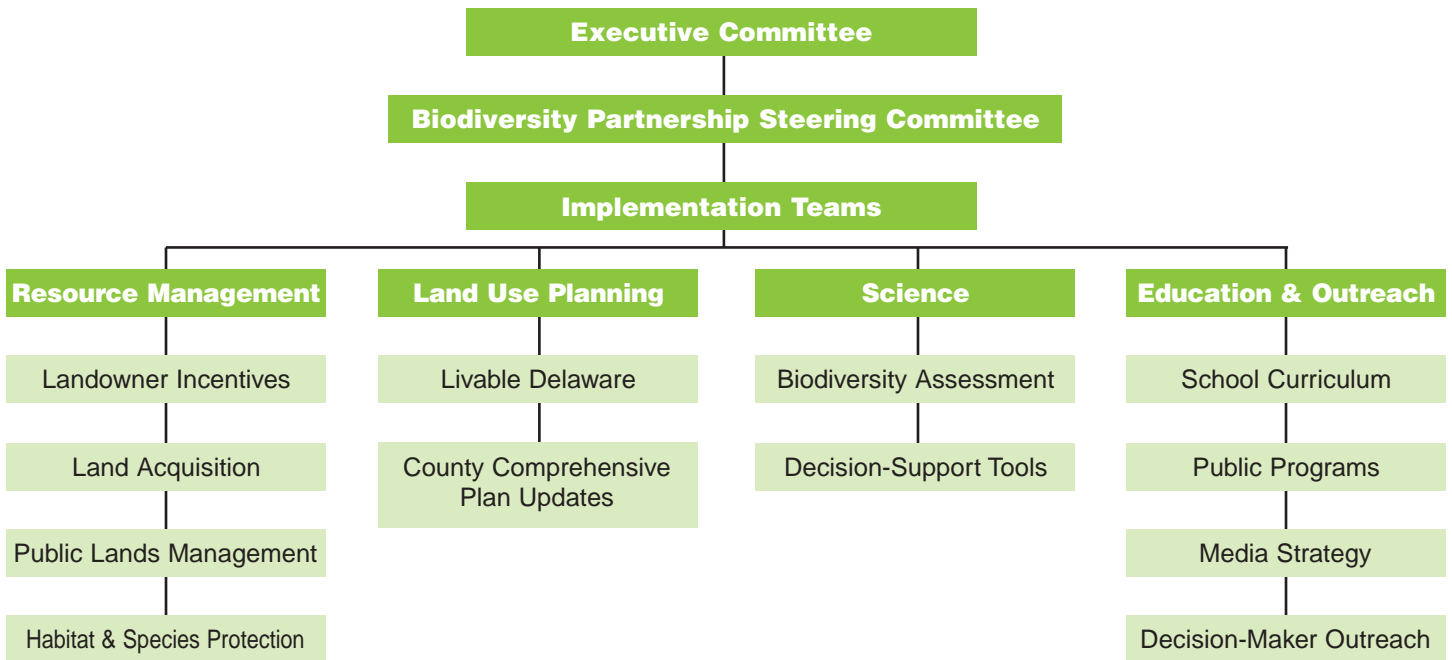
- ◆ Appoint **Implementation Teams** to carry out approved priority actions.
- ◆ Provide oversight and approval of ongoing work by implementation teams and help them to identify strategic opportunities and priorities.
- ◆ Meet on a quarterly basis to evaluate on-going progress.
- ◆ Report regularly to the Executive Committee.
- ◆ Establish short-and long-term indicators of success (scorecard) that provide relevant information to key stakeholders.
- ◆ Garner high-level support from appropriate agencies and organizations to facilitate the implementation of approved actions.
- ◆ Document tangible products and on-the-ground successes and communicate this progress to public early on and throughout the effort.
- ◆ Identify leadership within existing programs and provide funding to guide the implementation of the Biodiversity Conservation Partnership.

THE IMPLEMENTATION TEAMS WILL:

- ◆ Correspond to the Initiatives adopted by the Executive Committee: Science Team, Resource Management Team, Land-Use Planning Team and Education & Outreach Team.
- ◆ Develop and implement a plan to achieve their respective goals and objectives.
- ◆ Develop specific indicators of success and measures to track progress of each priority action.
- ◆ Report successes and progress to the Steering Committee at regularly scheduled quarterly meetings.



IMPLEMENTATION STRUCTURE



A SCORECARD FOR CONSERVATION OF DELAWARE'S BIODIVERSITY

A scorecard for biodiversity conservation must be developed to measure successes, to enhance accountability and to provide valuable feedback to citizens, legislators and managers. The Biodiversity Conservation Partnership will collect data from various organizations and transform the data into information relevant to key stakeholders for assessing performance.

Possible indicators to measure the Biodiversity Conservation Partnership's progress toward abating key threats to Delaware's biodiversity are:

- ◆ Extent of habitat loss and fragmentation, particularly for forest and wetland habitats.
- ◆ Change in populations (or decline) of indicator species.
- ◆ Change in abundance and distribution of non-native invasive species.
- ◆ Change in stream miles of impaired aquatic habitats.
- ◆ Change in amount of toxins released into aquatic and terrestrial environments.
- ◆ Increase in the amount of lands preserved or protected.





“Successful conservation must marry the needs of the people and the environment, leading to informed land use decisions, compatible economic development activities, and a conservation ethic that values a future of people living and working within healthy natural systems.”

— Roger Jones
Executive Director
The Nature Conservancy’s
Delaware Office

If your group or organization would like to participate in the Biodiversity Conservation Partnership please call 302-739-4403. Visit us on the web at www.state.de.us/dnrec2000/Admin/Biodiversity

CONCLUSION

Delaware’s public and private conservation entities have worked for decades to protect the state’s biological diversity. However, the threats posed to our native plants, animals and natural communities are



currently increasing as more land is consumed by a growing human population. To effectively protect Delaware’s biodiversity, public and private interests must form a partnership to unite and connect projects and programs, legal and decision support tools. The partnership will be the first step in identifying the priority issues and implementing actions to achieve an ever-evolving approach to protecting and restoring Delaware’s biological diversity.

This document will facilitate the partnership and provide focus for actions that can have lasting effects on our state’s natural resources. Actions outlined in the framework fall into one of four initiatives: science, resource management, land use planning and education and outreach. Through these initiatives, the partnership seeks to address shortcomings in existing programs and tools and improve coordination between public agencies and private initiatives. Though there is still much work to be done, the Biodiversity Conservation Partnership can build a strategy for conserving the plants, animals and natural communities that support a healthy, livable Delaware.

PHASE 1 — ACTION ITEMS

- ◆ Develop criteria for determining which species are native to Delaware. Using these criteria compose a list of species native to the state.
- ◆ Provide the best available information and data, including maps to land-use decision-makers so they can update the county comprehensive plans.
- ◆ Develop legislative package for the 2002 legislative session.
- ◆ Identify existing statutory mechanisms that can protect isolated and/or critical unique wetland habitats.
- ◆ Conduct assessment of private landowner incentives to promote biological diversity.
- ◆ Increase biodiversity education and outreach opportunities for the public.

BIODIVERSITY IMPLEMENTATION WORKGROUP

Department of
Natural Resources and
Environmental Control

Department of Agriculture
Economic
Development Office

Delaware Nature Society

The Nature Conservancy’s
Delaware Chapter

Department of Transportation
Office of State Planning
and Coordination

Department of Finance
New Castle County

Center for Inland Bays

U.S. Fish and
Wildlife Service

Kent County

Sussex County

USDA — NRCS

US EPA — Region III

Environmental Law
Institute

Sierra Club’s Delaware
Chapter

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Ruth Ann Minner
Governor

Nicholas A. DiPasquale
Secretary

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at 302-739-4506 for copies of this document.

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