Chapter 1

Introduction to Maryland's State Wildlife Action Plan

MARYLAND
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MARYLAND
DEPARTMENT OF
NATURAL RESOURCES

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Introduction

Maryland represents an extraordinary ecological crossroads and is unique in its location on the North American landscape. Latitudinally, the state lies near the southern end of northeastern ecosystems and the northern end of southeastern ecosystems. Maryland also extends east to the Atlantic seaboard and west into the central Appalachian Mountains. From the barrier islands, bald cypress swamps, and vast tidal marshes of the Eastern Shore to the ancient mountain ridges, caves, and rich forests of western Maryland, the state contains a remarkable diversity of ecosystems, habitats, and plant and animal communities.

More than 15,000 animal and plant species call our state home. Nearly 1,200 of these species are rare, uncommon, or declining. Many species within our state's borders, particularly in the invertebrate world, remain undiscovered: some are still undescribed and unknown to science. Maryland harbors some of our country's most imperiled and endangered species such as the dwarf wedgemussel, piping plover, and bog turtle. A number of species are found only in Maryland or the mid-Atlantic region. Consider, for example, a small butterfly known as Chermock's mulberry wing, the Coastal Plain swamp sparrow, and the Delmarva fox squirrel, each occurring only, or nearly so, in the Chesapeake Bay region. Some species, such as several subterranean and cave-dwelling crustaceans, occur nowhere else in the world. Also found here are rare beach-loving beetles and rare plants, such as the threatened Kate's Mountain clover (*Trifolium virginicum)*, which survives in rocky shale barren habitats. (Scientific names for animal Species of Greatest Conservation Need are included in Appendices 1a and 1b; scientific names for other species are included in the text of the chapter.)

Olympia marble (Steve Collins)

Nationwide, State Wildlife Action Plans (SWAPs) are an important tool for successful wildlife conservation. SWAPs outline strategic conservation approaches for wildlife and wildlife habitats in each of the fifty states, the District of Columbia, and the five U.S. territories. "Wildlife" in the context of SWAPs includes fishes, birds, mammals, reptiles, amphibians, insects, and other invertebrates including freshwater mussels. The Maryland Department of Natural Resources (MD DNR) led the 10-year revision of this statewide guidance document. The Maryland SWAP (Plan) represents a shared vision and a strategy that has been developed by working with state, federal, and local organizations that partner with MD DNR for wildlife conservation. The **overall goal** of Maryland's SWAP is to keep common species common or keep wildlife species from becoming listed as rare, threatened, or endangered, and work to recover species so that they no longer require legal protection.

This introductory chapter discusses the importance of Maryland's biodiversity conservation and the need and purpose for a state comprehensive plan and guidance document. An overview of wildlife conservation in Maryland, including MD DNR's role

and background information on funding for nongame wildlife species, is also presented here. This chapter explains and lists the elements required by Congress for every SWAP and the need for regional conservation. This chapter also introduces changes to the 2005 Maryland Wildlife Diversity Conservation Plan (MD DNR 2005), Maryland's first State Wildlife Action Plan.

Importance of Maryland's Plant and Wildlife Diversity

Maryland's landscape stretches for hundreds of miles from the mountains to the sea, supporting a rich diversity of habitats and wildlife resources. Over 7,000 miles of coastline occur along Maryland's portion of the Chesapeake Bay, the Coastal Bays, and the Atlantic Ocean (Burke et al. 2004; Maryland Department of the Environment 2012). Nearly 9,203 miles of rivers and streams drain the state's landscape (Versar Inc. 2011). More than 21,000 acres of lakes and ponds and 475,800 acres of wetlands provide a wide range of aquatic habitats throughout the state. By any measure, Maryland is an ecologically diverse state with a rich natural heritage. It is especially impressive in its ability to support a tremendous variety of plant and wildlife species.

The importance of Maryland's unique natural setting and its corresponding diversity of plants and wildlife overall can be measured in many ways. Most directly, it is the value of healthy ecosystems providing us with clean air, clean water, and fertile soil, often termed "ecological services." What cannot be so easily measured is the intrinsic value of Maryland's plant and wildlife diversity, perhaps the most significant thing to consider above and beyond the economic benefits associated with traditional ecological services (Costanza et al. 1997). Intrinsic value refers to the priceless value of a quality of life that is made available to the citizens of Maryland as a result of healthy, functional natural communities with a diversity of organisms. It has been long understood that the more diverse an ecosystem, the more resilient it will be, which is an important necessity, given the pressures and challenges we face today as a modern society.

Some of Maryland's diverse habitats (from left to right): *Cove Forest in western Maryland* (Edward Thompson, MD DNR), *swamp in Maryland's Coastal Plain region* (Scott Smith, MD DNR), *and Maritime Shrubland on Assateague Island* (Jason Harrison, MD DNR)

Economic Importance of Maryland's Wildlife

There is remarkable economic importance associated with Maryland's diverse wildlife as well. From the Appalachian Mountains to the waters of the Chesapeake Bay and the Atlantic Ocean, wildlife-associated recreation generated over $1 billion in revenue in 2011 (U.S. Department of Interior, U.S. Fish and Wildlife Service, and U.S. Department of Commerce 2011). Over 400,000 fishermen and 88,000 hunters contributed nearly half

that total, while the remainder of the revenue came from over 1.4 million participants in wildlife watching activities in Maryland. The U.S. Department of Interior, U.S. Fish and Wildlife Service and U.S. Department of Commerce (2011) reported that 31% of Marylanders participated in wildlife-associated recreation in 2011. An estimated 27% of Maryland residents are wildlife watchers, and over 900,000 residents and non-residents enjoy birding in the state (U.S. Department of Interior, U.S. Fish and Wildlife Service, and U.S. Department of Commerce 2011). A recent survey found that members of 82% of Maryland households participate in some form of outdoor activity. Of these, 39% hiked, 33% camped, and 27% paddled a canoe, kayak, or paddleboard (MD DNR 2014).

While Marylanders generated $483 million from wildlife-watching activities in 2011 (U.S. Department of Interior, U.S. Fish and Wildlife Service, and U.S. Department of Commerce 2011), the Total Industrial Output (TIO), which includes direct, indirect, and induced effects, totaled over $909 million (Caudill 2011). The ratio of the TIO to direct expenditures in Maryland was 1.88, which means that for every $1.00 of direct spending associated with wildlife-watching, an additional $0.88 of economic activity was generated. The TIO of over $909 million produced 10,807 full- and part-time jobs, and generated $88.4 million in state and local tax revenue (Caudill 2011). Another measure of the net economic value of wildlife can be measured by participants' willingness to pay for wildlife-related recreation over and above what they actually spend to participate. This value increased from $40/day in 1985 to $66/day in 2001 (adjusted to 2001 dollars for comparison) for wildlife-watching activities by Maryland residents.

A group of birders searches for sparrows (Bonnie Ott)

Not to be overlooked from an economic perspective is the Chesapeake Bay itself. It is the largest estuary in North America and is known to host over 3,600 species of plants and animals. Maryland shares the Bay with Virginia, and another four states contribute to its watershed (Delaware, New York, Pennsylvania, and West Virginia). Finfish and shellfish harvests in Maryland and Virginia combined were valued at $245 million in 2012 (U.S. Department of Commerce 2012). An increasing number of people are boating on the state's waters, with nearly half a million pleasure boats and crafts registered in Maryland and Virginia in 2014 (U.S. Coast Guard 2014). Commercial and recreational fisheries in the state's estuaries and marine waters provide tourism and recreation, which adds significantly to the state's economy. Commercial fisheries landings in Maryland in 2013 totaled nearly $80 million in 2013 (National Oceanic and Atmospheric Administration Fisheries 2013). The Chesapeake Bay also supports increasingly prosperous tourism and real estate economies.

Maryland's Coastal Bays and ocean coast attract over 12 million people every year, creating a $2 billion tourism industry (MD DNR 2004). The natural resources of the

Coastal Bays provide over $500 million in annual value to the state's economy (Greeley-Polhemus Group 2001). Nearly one million visitors to the Coastal Bay enjoyed wildlife observation, an activity contributing over $45 million/year. Hunting, fishing, and crabbing in the Coastal Bays added an additional $3.5 million annually to the local economy. Overall, it has been estimated that 5,680 full-time jobs have been supported by the fish and wildlife resources located within the Coastal Bays in recent years (Greeley-Polhemus Group 2001).

Tourism continues to grow in western Maryland, where outdoor recreational areas such as Deep Creek Lake and ski resorts drive much of the area's tourism industry. In 2013, Garrett County tourism generated $319 million, Washington County tourism generated $263 million, and Allegany County tourism generated $149 million. Tourism revenue makes up over 21% of Garrett County's annual labor income, and tourism provides 22% of the jobs in Maryland's westernmost county (Tourism Economics 2013).

Increases in population and development coincide with the recreational and commercial opportunities offered by Maryland's natural resources. The rich bounty we are fortunate to have that stems from our natural heritage not only functions as an economic engine, it provides us all with benefits related to quality of life issues. Maryland's diverse plant and wildlife resources deserve to be understood, respected, and protected so that future citizens have the same opportunities to enjoy and benefit from these resources.

Need for a Comprehensive Plan

Maryland's plant, fish, and wildlife resources face a number of serious threats. Urban sprawl, overdevelopment, point and non-point source pollution, invasive species, rising sea levels, climate change, habitat loss and fragmentation, and other changes to the landscape can all have a negative impact on the state's plants, fish, and wildlife and their habitats. Many of the places where these species thrive are the same as those valued for recreation and other human activities. Where human activities coincide with wildlife and their habitats, it is usually to the detriment of those habitats and already vanishing plant and wildlife populations. Currently, more than 600 species and subspecies of plants and animals are listed in state regulations as Endangered, Threatened, In Need of Conservation, or Endangered Extirpated in Maryland (Maryland Division of State Documents 2015a,b). These lists can be found in the online Code of Maryland Regulations (COMAR) in sections 08.03.08.04 – 08.03.08.09. Most of the state-listed Endangered species are plants (263), and 96 are animals. An additional 70 plants and 20 animals are listed as Threatened in the state; 35 animals are listed as In Need of Conservation. The 86 plants and 32 animals listed as Endangered Extirpated species are thought to be no longer present in the state. Maryland DNR's Fisheries Service also maintains an official list of more than 100 game and commercial fish species that are designated as In Need of Conservation. This list also can be found online (COMAR 08.02.12.03). A small number of Maryland's plant and animal species (33) are also federally listed as Endangered or Threatened (See Table 3.1).

Many programs across the state and the region collectively address the need to conserve the full array of our plants and wildlife. Numerous conservation plans to address the

needs of regional habitats, individual species, or general threats have been developed. None of them, however, take a broad, statewide perspective that includes all of Maryland's wildlife diversity and habitats in a comprehensive approach to long-term conservation. To better understand the impact of these and other activities, MD DNR has compiled information on species in need of conservation in a statewide conservation plan known as the State Wildlife Action Plan (SWAP).

The SWAP represents an opportunity to reverse declining population trends for numerous species identified within the Plan as Species of Greatest Conservation Need. The development of the SWAP at the state level represents a critical first step in defining the capabilities and needs of MD DNR and its partners to accomplish wildlife and habitat conservation goals. For example, Butcher (2004) identified state conservation plans as one of the means to address declining bird population trends, and Partners in Flight recommended population goals specifically for Maryland's first SWAP, which was completed in 2005 (Rosenberg 2004). By incorporating new and existing population assessments, monitoring programs, and conservation plans into the Maryland State Wildlife Action Plan, MD DNR and its conservation partners have the opportunity to implement conservation actions that will positively affect wildlife population levels now and throughout the next decade.

Purpose of the Plan

The Maryland SWAP is a strategy to guide the conservation of the state's wide range of fish, wildlife, and habitats, providing the framework and overall direction for wildlife and broader biodiversity conservation efforts in Maryland for the next decade and beyond. This Plan is a revised version of the Wildlife Diversity Conservation Plan (WDCP), which was completed in 2005 (MD DNR 2005). Each of the 50 states, the District of Columbia, and the five U.S. territories has been directed to develop and revise these statewide wildlife conservation strategies. Such plans are a condition to receive financial support (i.e., State Wildlife Grants) from the U.S. Department of the Interior, which funds wildlife management at the state level. Although MD DNR has taken the lead within Maryland, the Plan will serve as a statewide guidance document for use by all conservation agencies and organizations, laying out recommendations for projects and actions for the conservation of wildlife and their habitats.

The overall goals of the SWAP are to assess the health of Maryland's wildlife species and habitats, identify threats to species' survival, outline necessary conservation actions and, in turn, keep common species common. Focused and well-planned efforts can lead to healthy animal populations and a healthier environment. Towards this end, this Plan will guide the next 10 years of Maryland's state-level wildlife conservation. It will leverage successes that came from the first Plan, such as the Maryland Amphibian and Reptile Atlas project and the creation of the BioNet map. The SWAP revision process provides an opportunity for MD DNR to offer effective and visionary leadership in biodiversity conservation. Strategic implementation, periodic review, and resulting adaptive management make this document a long-term tool for wildlife conservation in Maryland.

Congressional Requirements

As prescribed by Congressional requirement, each SWAP must address the same eight elements (Table 1.1). The organization of Maryland's SWAP document reflects these elements. For detailed information about where each of the eight required elements is addressed in the Plan, please reference 'Maryland's State Wildlife Action Plan Element Guide' supplementary document.

Table 1.1 Eight required elements identified by Congress

Element 1: Species of Greatest Conservation Need	Information on the distribution and abundance of species of wildlife, including low and declining populations as the State fish and wildlife agency deems appropriate, that are indicative of the diversity and health of the State's wildlife.
Element 2: Key Wildlife Habitats	Descriptions of locations and relative condition of key habitats and community types essential to conservation of species identified in the 1st element.
Element 3: Threats	Descriptions of problems which may adversely affect species identified in the 1st element or their habitats, and priority research and survey efforts needed to identify factors which may assist in restoration and improved conservation of these species and habitats.
Element 4: Conservation Actions	Descriptions of conservation actions determined to be necessary to conserve the identified species and habitats and priorities for implementing such actions.
Element 5: Monitoring	Descriptions of the proposed plans for monitoring species identified in the 1st element and their habitats, for monitoring the effectiveness of the conservation actions proposed in the 4th element, and for adapting these conservation actions to respond appropriately to new information or changing conditions.
Element 6: Plan for Review and Revision	Descriptions of procedures to review the Strategy at intervals not to exceed 10 years.
Element 7: Partner Coordination	Descriptions of the plans for coordinating, to the extent feasible, the development, implementation, review, and revision of the Strategy with Federal, State, and local agencies and Indian tribes that manage significant land and water areas within the state or administer programs that significantly affect the conservation of identified species and habitats.
Element 8: Public Involvement	Descriptions of the necessary public participation in the development, revision, and implementation of the Plan.

Background on State Wildlife Funding

Modern funding of wildlife and fisheries management in this country has evolved over the last 100 years. Historically, management programs were focused on game species. This is clearly illustrated by a snapshot of wildlife legislation in the twentieth century. The Pittman-Robertson Act of 1937 (Federal Aid in Wildlife Restoration Act) was designed to support selection, restoration, rehabilitation, and improvement of habitat, in addition to research and information distribution for birds and mammals, with an emphasis on game species. A 1970 amendment added hunter training programs, and maintenance and support of public target ranges. Because the funding is derived from excise taxes on the sale of sporting arms, hand guns, ammunition, and archery equipment, the focus on game species seemed logical. MD DNR is the lead entity on the decision for use of these funds for work on nongame birds and mammals but works closely with its conservation partners to make decisions and distribute funds for the implementation of conservation actions.

The Dingell-Johnson Act of 1950 (Federal Aid in Sport Fish Restoration Act) intended a similar program to Pittman-Robertson for the management, conservation, and restoration of fishery resources. Similarly, funding is derived from the sale of fishing gear. An amendment adopted in 1990 to conserve wetlands reflected a recent shift in the understanding of the needs of habitat and nongame species protection.

Species not covered by the Pittman-Robertson and Dingell-Johnson Acts, and not listed in law as Threatened or Endangered, are addressed somewhat by the Forsythe-Chaffee Act (Fish and Wildlife Conservation Act). This Act, passed in 1980, called for comprehensive wildlife management plans for both game and nongame species. This enactment was a step in the right direction as it supported integrating efforts to keep common species common, in addition to managing game species and conserving rare species. Although the legislation was passed over 30 years ago, funding has not been forthcoming.

To address this continued gap in funding for nongame species, in the 1990's, a coalition of state management agencies, private commercial ventures, and individuals (known as Teaming with Wildlife) amassed bipartisan support for the Conservation and Reinvestment Act (CARA). This act would have guaranteed a long-term funding source (15 years) to support efforts in state, federal, and local conservation programs. The goals of Title III of this Act were threefold: 1) to prevent species from becoming endangered, 2) to enhance outdoor recreation experiences, and 3) to foster a responsible stewardship ethic through conservation education. Although CARA passed a House vote in 2000 and 2001, it never made it to the Senate floor.

Instead, the Commerce, Justice, Science, and Related Agencies Appropriations Act provided a smaller, temporary funding source in 2000, called the Wildlife Conservation and Restoration Program (WCRP). These monies were transferred to the Department of the Interior, intending to enhance fish and wildlife conservation and restoration efforts, including wildlife-related education and recreation projects.

State Wildlife Grants Program

Maryland's current SWAP is funded by federal monies known as the State Wildlife Grants Program or SWG. SWG funds are presently the major funding source for wildlife conservation from the U.S. Fish and Wildlife Service to states and tribes. These monies, derived from the Land and Water Conservation Fund, were first appropriated for the 2002 fiscal year in the Department of the Interior's appropriations budget. These funds have been continued annually, although funding for states has dropped more than 35% compared to 2002 levels.

The SWG program aims to fill the gaps remaining with regards to previous legislation, with the goal being not only to protect and restore rare and endangered wildlife species, but also to keep declining common species from becoming endangered. These funds are designed to address development and implementation of programs that benefit wildlife and their habitats, including species not hunted or fished, and especially those species identified as Species of Greatest Conservation Need (SGCN). The development of a state-specific Wildlife Action Plan is a requirement for the receipt of SWG funds. Until recent years, limited funding and limited programs have hindered attempts to plan and prioritize comprehensively for all wildlife. The creation of the State Wildlife Action Plan allows Maryland state agencies and their partners to do this in an effective manner.

SWG funds are distributed to the fish and wildlife agencies of states, commonwealths, and U.S. territories through the U.S. Fish and Wildlife Service. Funding is also provided to tribal governments. For states, funds are apportioned using a formula based on a state's land area and population. Grant funds must be used to address conservation needs including research, surveys, species and habitat management, and monitoring, all of which are identified within the SWAP (Department of the Interior and Related Agencies 2001).

The coalition of state agencies and private and commercial partners that spearheaded the effort to obtain stable, long-term funding deserves many thanks for making tremendous strides toward that goal. In addition to the SWAPs, Congress can rely on this information to set reasonable funding thresholds to meet long-term wildlife conservation objectives.

10 Years of SWG: Maryland's State Wildlife Grant Projects

State Wildlife Grants allow for the continuation and improvement of protection and management efforts for SGCN and their habitats. Ten years have passed since MD DNR and its partners developed the first SWAP, known as the Maryland Wildlife Diversity Conservation Plan. Over the past decade, many projects supporting the conservation, protection, and research needs for SGCN and their key habitats have been conducted using SWG funding. These projects include achievements supporting the following topics: conservation planning; technical assistance; inventory, monitoring and research; database development and maintenance; and restoration and protection. Some examples of these projects are listed below in Table 1.2. Important management and research actions and outcomes that have resulted from these projects can be found in Chapter 10.

Table 1.2 SWAP-related SWG projects funded by MD DNR since 2005.

Conservation Planning
▪ Develop a performance measures framework for conservation activities
▪ Identify Maryland's "Biodiversity Conservation Network" (BioNet)
▪ Important Bird Areas Project
▪ Develop statewide management plan for the endangered eastern tiger salamander
▪ Develop statewide conservation strategies for priority reptile and amphibian (herpetofauna) conservation issues
▪ Assess rare freshwater fish conservation needs
▪ Management and conservation of the blackbanded sunfish on the Delmarva Peninsula
▪ Develop recovery strategies for state endangered species
▪ Develop conservation strategies for BioNet Tier 1 and 2 sites
▪ Vulnerability assessment of Maryland rare, Threatened, Endangered, and Greatest Conservation Need species and habitats to climate change
Technical Assistance
▪ Bog turtle technical assistance and monitoring
▪ Environmental review
▪ Develop best management practices for rare species and habitats
▪ Appalachian region bird conservation cooperative
▪ Develop State Natural Areas Program
▪ Provide technical assistance for land use planning and management, such as Forest Management Plans
▪ Natural Areas Inventory
Inventory, Monitoring, and Research
Mammals
▪ Comprehensive rare bat surveys in western Maryland
▪ Status assessment of Maryland's boreal small mammals
▪ Identify Indiana bat maternity colonies
Birds
▪ Statewide breeding distribution of rails and other marshbirds
▪ Breeding status of black rail
▪ Statewide breeding bird status assessment
▪ Avian salt marsh habitat study
▪ Co-coordinate the second Breeding Bird Atlas project
▪ Identify critical stopover habitat for songbirds
▪ Evaluate use of CREP buffers by birds
Reptiles & Amphibians
▪ Investigate experimental reintroduction of northern pinesnake on the Eastern Shore
▪ Genetic variation and road mortality of central Maryland box turtles
▪ Assess population structure and condition of wood turtles
▪ Inventory of rare reptiles and amphibians
▪ Distribution, abundance, and habitat associations of eastern narrow-mouthed toad
▪ Factors affecting anuran community structure within Delmarva Bays
▪ Common map turtle distribution and habitat use in the lower Susquehanna River
▪ Diamond-backed terrapin population assessment and monitoring
▪ Update the status of the green salamander
▪ Coordinate the Maryland Amphibian and Reptile Atlas (MARA) project
▪ Evaluation of diamond-backed terrapin head-starting at Poplar Island
▪ Assess hellbender population status

Invertebrates
▪ Statewide status assessment of Maryland's dragonflies and damselflies ▪ Survey of groundwater invertebrates ▪ Status and distribution of Maryland's moth fauna ▪ Status review of Maryland's rare, Threatened and Endangered butterflies ▪ Patterns of invertebrate species richness on inland sand dunes on the Delmarva ▪ Scientific descriptions of new species of globally rare subterranean invertebrates
Multiple Taxa Groups
▪ Morbidity/mortality investigations for wildlife species of special concern ▪ Bird and bat migration over Appalachian ridges in the Mid-Atlantic Region ▪ Biodiversity assessment on Public Lands ▪ Biodiversity conservation assessment for SGCN ▪ Monitor SGCN and key wildlife habitats in central Maryland ▪ Review and update of the state's Rare, Threatened and Endangered Animal Species List ▪ Develop monitoring plans for the conservation of rare species and communities
Aquatic species
▪ Survey of priority aquatic SGCN by Maryland Biological Stream Survey ▪ Species-level inventory of Maryland's freshwater benthic macroinvertebrates ▪ Collect crayfish and mussel data as part of the statewide Maryland Biological Stream Survey ▪ Population status of freshwater mussels ▪ Sentinel site sampling by the Maryland Biological Stream Survey ▪ Unionid mussel propagation and reintroduction ▪ Protection guidelines and baseline monitoring for the state's highest priority watersheds ▪ Estimating space requirements and extinction risk for Maryland brook trout ▪ Re-inventory of targeted brook trout populations in western Maryland ▪ Development of a captive broodstock program for Atlantic sturgeon restoration
Key Wildlife Habitats
▪ Natural community classification ▪ Assess wildlife value of old growth forest ▪ Monitor rare plant communities and associated key wildlife habitats in Southern Maryland ▪ Community-level inventory of Upper Coastal Plain seepage and headwater wetlands ▪ Classification and assessment of bog and fen wetland complexes
Database Development and Maintenance
▪ Natural Heritage Program database management ▪ Develop new GIS data products and update GIS applications
Restoration and Protection
▪ Repair and maintain bat gates ▪ Restore habitat for amphibians in Carolina Bays ▪ Hellbender habitat, monitoring, and propagation ▪ Eastern tiger salamander habitat management on the Eastern Shore ▪ Restore endangered beetle habitat at Sharptown Dunes ▪ Restore and manage habitat for the globally critically imperiled Eastern sedge barrens leafhopper ▪ Shale barrens habitat restoration ▪ Restoration of BioNet Tier 1 Sites

MD DNR's Role in Fish and Wildlife Conservation

Maryland has one of the nation's oldest natural resource conservation programs. Conservation of the state's fish and wildlife resources began with the establishment of the State Oyster Police in 1868, a group whose role expanded many times during the following century and which is now known as the Natural Resources Police.

Conservation of Maryland's oysters began in 1830 in response to harvesting pressure. In 1874, a Commission of Fisheries was created to study and submit a report on the status of Maryland's fisheries resources. The State Oyster Police Force was brought under the jurisdiction of the new Commission and renamed the State Fishery Force.

In 1890, formal conservation of Maryland's natural resources began when the first laws for uniformity in the protection of game birds and game animals were placed on the statute books by the General Assembly. Prior to 1890, an inconsistent assortment of county game and fish legislation made protection of natural resources difficult. Pressure on the legislature brought about the Act of 1896, which created the Office of the State Game Warden. In 1916, the Conservation Commission was created by combining the State Fishery Force and the Office of the State Game Warden. In 1918, the first statewide hunting license law was enacted. State officials anticipated that the licensing requirements would generate approximately $35,000 the first year, but it actually produced revenue of $61,770. Nine years later, in 1927, the legislature enacted the resident and nonresident angler's license, which was required by all persons over the age of 14 desiring to fish the non-tidal waters of the state.

In 1922, a one-man commission called the State Conservation Department was created. Two years later the Governor appointed a second commissioner, the person who had completed the first survey of the oyster bars of Maryland in 1907 and who drew up the Potomac River Compact of 1912. The reorganization and change of direction in Maryland's conservation program incorporated the State Fishery Force into its overall activity and renamed it the Maryland Patrol and Inspection Fleet.

Another title change occurred in 1935, when the Conservation Department became the Conservation Commission. In 1937, the patrol vessels of the State Fishery Force were armed with 30-caliber machine guns for the purpose of maintaining order on Maryland oyster grounds. The Conservation Commission was later divided to form the Game and Inland Fish Commission, and the Tidewater Fisheries Commission. The Board of Natural Resources was created in 1941 as an umbrella organization for all state conservation agencies. This Board consolidated the state's conservation programs within one organization, later to become known as the Department of Natural Resources (Vaughn 2003).

The first state legislation designed to protect endangered species was the Maryland Endangered Species Act of 1971 and the first full-time staff position devoted to nongame and endangered species was authorized by the Maryland General Assembly in 1973 (Taylor 1984). The Act was significantly strengthened in 1975 by the passage of the

Nongame and Endangered Species Conservation Act (Annotated Code of Maryland, Natural Resources Article, Section 10-2A-01). One of the cornerstones of biodiversity conservation in Maryland, this law authorizes the state to establish a list of Threatened and Endangered species and to develop conservation programs for these species (Therres 1998). By 1979, MD DNR's Nongame and Endangered Species Program had increased to three full-time staff (Taylor 1984).

The year 1979 also saw the establishment of the Maryland Natural Heritage Program (NHP, the Program), one of the earliest programs developed in the international network of Natural Heritage Programs and Conservation Data Centers. In 1984, NHP published symposium proceedings on the plants and animals listed as Threatened and Endangered in Maryland; it was the first of its kind that focused on species in need of conservation (Norden et al. 1984). NHP assumed the lead role for coordinating endangered species conservation in Maryland in 1987. Throughout the 1980s and into the mid-1990s, however, MD DNR had two programs sharing responsibilities for nongame and endangered species conservation (Therres 1998).

In 1996, the two programs were combined within NHP, which is currently MD DNR's lead program responsible for the identification, ranking, protection and management of nongame, rare and endangered species and natural communities in Maryland. As part of the Wildlife and Heritage Service (WHS), NHP seeks to sustain populations of rare plants and animals through the maintenance of healthy natural ecosystems. This is accomplished through a number of conservation actions, including field surveys, research on natural history requirements, restoration of degraded habitats, technical assistance and data distribution to conservation partners and landowners, and public education. Because of its responsibility for nongame and rare species, it is fitting that NHP would be the lead program within WHS on the SWAP. The Program also works with other units within the MD DNR and with private organizations for the purchase of properties and easements with habitats that support rare species and natural communities. Today, the MD DNR owns over 480,000 acres of public land and protected open space, with the Forest Service, Wildlife and Heritage Service, Fisheries Service, and Park Service managing these lands for natural, historical, cultural, and recreational resources (MD DNR 2014). This is approximately 54% of all the land owned by public agencies and private organizations that is managed, at least in part, for biodiversity conservation in Maryland. For a map of land protected by all entities in Maryland, please see Chapter 7. Additional properties are protected through various conservation easement programs (Figure 1.1).

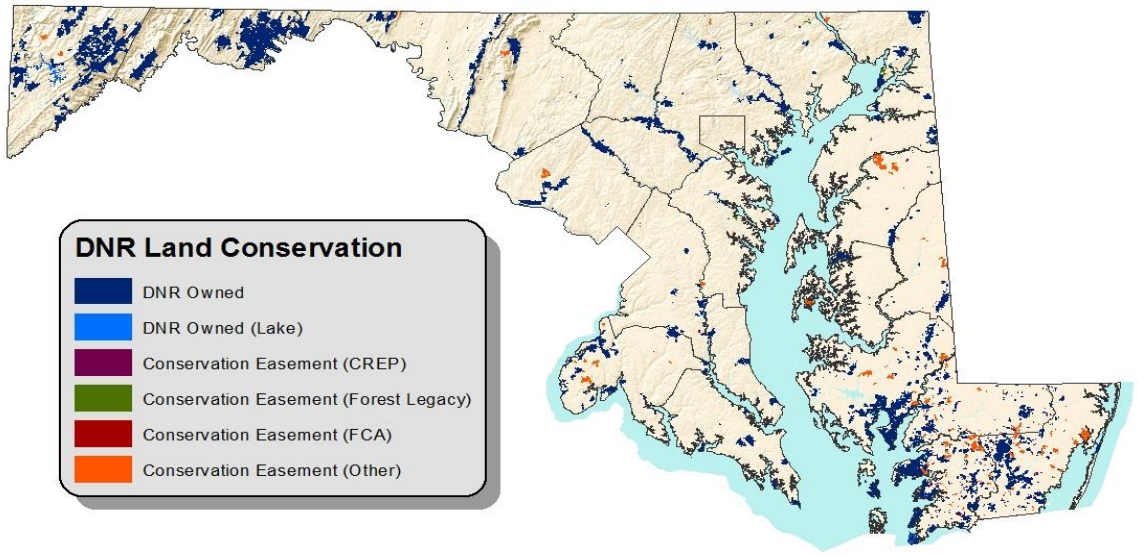

Figure 1.1 Land conserved by MD DNR. Source: MD DNR

In addition to managing state-owned lands, units of MD DNR contribute to resource conservation in other ways. For example, the MD DNR's regional foresters provide technical assistance and incentive programs to urban communities and private landowners to better manage forest habitats. Through its role in the Chesapeake Bay Program, a regional partnership that directs restoration and protection of the Chesapeake Bay, MD DNR monitors and works to restore the Bay's water quality, habitats, and ecological health. MD DNR's Maryland Biological Stream Survey program provides information to ensure the protection and restoration of Maryland's stream ecological resources. The Fisheries Service manages the state's fisheries and shellfish, including the use of fish hatcheries to stock many of the state's streams and lakes. WHS manages the health and recreational enjoyment of the state's wildlife, including the conservation of rare plants and animals under the coordination of the NHP, and the management of game species. WHS also oversees the management of 61 Wildlife Management Areas. In addition to conservation of wildlife habitat through land ownership, MD DNR conserves land and wildlife habitat through a number of easement programs, such as the Conservation Reserve Enhancement Program, Rural Legacy Program, and Forest Legacy Program, and by working directly with landowners to provide technical guidance on managing fish and wildlife habitats. Maryland's Chesapeake and Atlantic Coastal Bays Trust Fund, overseen by MD DNR's Chesapeake and Coastal Services Program, funds nonpoint nutrient and sediment reduction projects and restoration projects that improve the health of the Chesapeake Bay and Coastal Bays. The Trust Fund collects proposals for cost-effective and efficient projects and leverages funds and resources from local, state, and federal programs to aid selected projects. The Trust Fund made $16 million available for project grants in fiscal year 2016. For more information on these and other conservation programs, see Chapter 7.

The multiple programs and services within MD DNR cooperate on conservation projects, sharing their areas of expertise to apply the best available information and resources to

the state's conservation needs. Through the MD DNR web site all of the programs and services within MD DNR contribute to ongoing public education and involvement to promote citizens' awareness of and participation in natural resource conservation.

Maryland's Approach to the First SWAP Revision

Maryland's SWAP revision represents the results of a broad and inclusive approach to compile and present the best available current information on the status of wildlife conservation in the state, while involving the diversity of Maryland's public and private stakeholders. The SWAP revision required planning and research followed by iterative internal and external stakeholder input. Further information on the process of developing each element, and on partner collaboration, can be found throughout the Plan and in detail in Chapter 9.

With this revision, Maryland presents updates and improvements to the 2005 Wildlife Diversity Conservation Plan for each of the eight elements. MD DNR's WHS led the effort to collect the best available information and research from the many existing conservation plans, programs, and priorities to reevaluate the 2005 list of SGCN. WHS then coordinated with local, state, and federal agencies; NGO conservation partners; and academic experts for input and collaboration to refine and finalize the updated SGCN list. A more substantial emphasis on invertebrates and a list of priority plant species of concern is also included in this SWAP. Key wildlife habitats are listed and described using a new classification system that follows regional guidelines.

The 2015 SWAP also takes into account new information on climate change and its impact on Maryland's wildlife and their habitats. It incorporates new information on mapping resources, threats, and conservation needs, while it applies the Association of Fish & Wildlife Agencies (AFWA) Best Practices and U.S. Fish & Wildlife Service guidance (AFWA 2012). WHS reviewed and compiled the best available information, which was then presented to public and private stakeholders for refinement, review, and finalization.

Another addition to the 2015 SWAP is the way this new information is organized and presented. The conservation actions in the revision are organized by specific threat category (see Chapter 5, Appendix 5a). This benefits conservation partners, who will be able to address specific threats strategically by directing actions to them as outlined in the Plan for both species taxa groups and habitats.

As this is the first revision of the SWAP, it allows us the opportunity not only to assess SGCN and habitats, but to look at the effectiveness and success of past conservation actions and strategies. Chapter 10 describes outcomes and results from SWG-funded projects concerning species and habitats from the past decade. Some of these projects are broader in terms of successes for wildlife in that they are focused on priority land conservation, such as utilizing acquisition and easement programs to conserve high quality key wildlife habitat (e.g., Targeted Ecological Areas, BioNet). Other projects are concerned with implementing invasive species management programs to reduce or prevent impacts to threatened species and their habitats. MD DNR has had successes in

these and other project areas, but, as new threats emerge and existing threats continue to increase, it is apparent there is still much work to be done.

The Importance of Regional Conservation

Another major change to the SWAP is the fact that it reflects a collaborative effort by states within the entire Northeast region, which ranges from Maine to Virginia. A stronger regional effort reflects the facts that wildlife species know no state boundaries and many conservation issues are broader than any one state or jurisdiction. The Northeast region of the United States encompasses approximately 263,000 square miles and a wide diversity of jurisdictions, including 13 states and the District of Columbia, 17 federally recognized tribes, and 398 counties. This region is home to a remarkable diversity of fish and wildlife, from whales and saltwater fishes to alpine butterflies and moths, from vernal pool salamanders to cave beetles, from anadromous shad, catadromous eels and coldwater trout to an extraordinary array of forest, shrub, and grassland birds.

The Northeast region is geographically and ecologically diverse, with 143 terrestrial and 259 aquatic ecological communities (Terwilliger Consulting, Inc. & Northeast Fish and Wildlife Diversity Technical Committee 2013). These communities include a broad spectrum of coastal, inland, and freshwater aquatic ecosystems, ranging in elevation from ocean beaches and low-lying Coastal Plain to mountains reaching 6,000 feet above sea level in the Appalachians. Given the region's size, its north-south orientation, and its varied topography, the Northeast supports a high diversity of major plant community types and ecological habitats (Figure 1.2). These community types range from treeless arctic-alpine tundra at the highest elevations to various deciduous forest types at lower elevations, freshwater wetlands, and coastal habitats including intertidal beaches and marshes. For more information on these habitats, see The Northeast Habitat Guides: A Companion to the Terrestrial and Aquatic Habitat Maps.

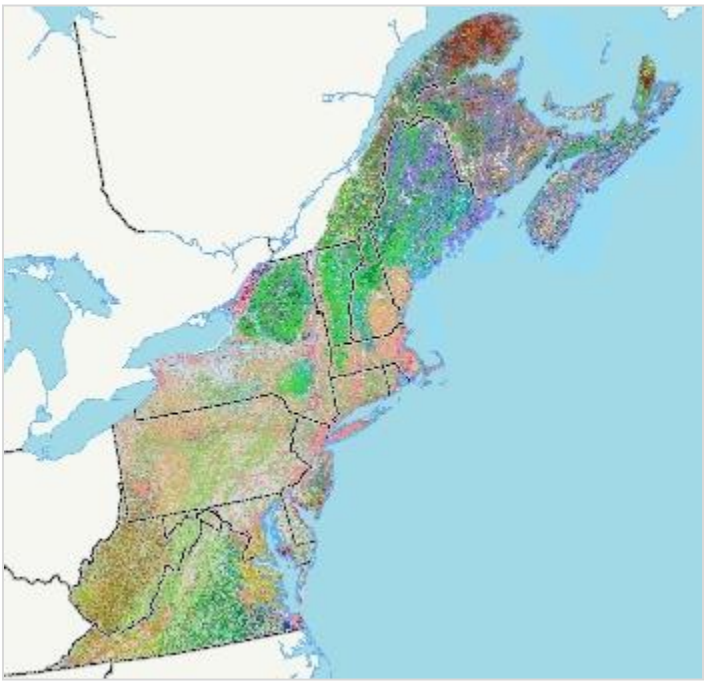

Figure 1.2 The first cross-border map of terrestrial habitats made for the northeastern U.S. and Atlantic Canada, mapping the distribution of 140 types of forests, wetlands, unique communities, and tidal systems. Source: TNC Eastern Division.

To conserve this rich biological heritage, conservation agencies in the Northeast have established a broad range of partnerships for fish, wildlife, and habitat conservation,

including Partners in Flight (birds), the Northeast Partners for Amphibian and Reptile Conservation (herpetofauna), Migratory Bird Joint Ventures (migratory birds), Atlantic Coast Fish Habitat Partnership (fish conservation), and, most recently, the Department of the Interior's Landscape Conservation Cooperatives (LCCs), which address priority plant and animal species on a regional scale. A driving force behind these and other wildlife conservation initiatives has been regional coordinating bodies such as the Northeast Association of Fish and Wildlife Agencies (NEAFWA) and its Fish and Wildlife Diversity Technical Committee (NEFWDTC), which operate on a separate and broader level than the individual partnerships. Wildlife management agencies from the states of Connecticut, Delaware, Maine, Maryland, Massachusetts, New Hampshire, New Jersey, New York, Pennsylvania, Rhode Island, Vermont, Virginia, and West Virginia, as well as the District of Columbia, participate in NEAFWA. NEAFWA (one of four regional affiliates of the Association of Fish and Wildlife Agencies) is tasked with promoting and coordinating conservation activities across the Northeast United States. NEFWDTC has led wildlife diversity conservation projects for NEAFWA and is comprised of the Wildlife Diversity Program representatives from each Northeast state and the District of Columbia.

Humans are also an important part of the Northeast landscape, where 72.4 million people (23.5% of the nation's population) live on less than 7% of the nation's land base. Much of the developed human footprint is focused along the eastern coastline between Boston and Washington, DC, but suburban and exurban areas are also expanding rapidly throughout much of the region. According to the most recent assessment by The Nature Conservancy (Anderson & Olivero Sheldon 2011), 28% of the land base in the Northeast states has already been modified significantly by humans.

Although portions of the Northeast are heavily urbanized, the Northeast also includes many rural lands and relatively undeveloped areas, especially along the Appalachian Mountains. Remarkably, some portions of the Northeast remain relatively wild, with 73 federally designated wilderness areas, 70 National Wildlife Refuges, and six National Forests. In fact, 16% of the land area in the Northeast states—over 24 million acres—has already been placed in some form of protective conservation ownership (Anderson & Olivero Sheldon 2011).

Subdivision encroaching on a forest (Chesapeake Bay Program)

As human impacts on the Northeast landscape continue to grow, the scale, pace, and complexity of threats to biodiversity in the Northeast states increase at an alarming rate.

Climate change imposes tremendous challenges for wildlife conservation and exacerbates all threats including residential and commercial development, invasive species, and wildlife diseases. Human health will also be globally affected by climate change both directly and indirectly. Climatic drivers of human health will include more intense and longer-lasting heat, which increases incidences of drought, wildfire, and air pollution; more frequent and extreme precipitation, including intensifying storms; and rising sea levels that will cause increased coastal flooding. The shifting climate will change the ranges of disease vectors such as mosquitos and ticks, introducing new pathogens to potentially vulnerable areas. Stressors arising from more frequent extreme weather events, higher temperatures, and increased pressure from invasive, non-native plants and animals will influence availability of food in many areas. Vulnerable human populations include those of lower socioeconomic status and those in more highly affected geographical areas such as coastal regions (U.S. Global Change Research Program 2014).

To address these formidable issues comprehensively, the Northeast states have joined together in several innovative, collaborative partnerships through NEAFWA and its Fish and Wildlife Diversity Technical Committee. This unprecedented collaboration of state, federal, and private organizations and academic partners improves efficiency of limited conservation dollars and uses the best available science and expertise to identify the highest priority species and habitats in need of conservation.

Due to the importance of regional conservation, MD DNR, along with the other agencies in states in the Northeast region, has agreed to use a consistent regional conservation planning framework with its SWAP. This includes a lexicon of terminology that each state has followed which includes factors involving each element of the Plan. This framework has enabled the systematic development of common terrestrial habitat classifications, identification of Regional Species of Greatest Conservation Need, development of an integrated monitoring framework for species and their habitats, and regional assessments of species and habitat condition. Recent conservation efforts for Regional Species of Greatest Conservation Need highlight how the states are applying this conservation planning framework across state lines to preempt federal listing by implementing on-the-ground conservation.

The Northeast Association of Fish & Wildlife Agencies' Fish and Wildlife Diversity Technical Committee created a Regional Conservation Needs (RCN) Grant Program, which addresses key landscape-scale wildlife conservation needs of the Northeast region as prioritized by the states and their partners. The Regional Conservation Needs Grant Program continues to provide states with the tools they need to meet their wildlife and habitat conservation goals in the context of a regional planning framework. Through the RCN grants program, more than 30 reports, resource documents, and tools are now available to help guide regional conservation. Examples and descriptions of some of these reports can be found throughout the Plan, especially in Chapters 5 – 8. More recently, regional Landscape Conservation Cooperatives (North Atlantic and Appalachian) have built upon the work of the RCN Grant Program to develop additional landscape conservation information and tools with almost 20 new projects guided by the Northeast regional conservation framework developed collaboratively with the states.

These projects address the landscape-scale wildlife conservation needs of the Northeast, as prioritized by the states in coordination with partners (Terwilliger Consulting, Inc. & Northeast Fish and Wildlife Diversity Technical Committee 2013).

This chapter has laid the foundation for the following State Wildlife Action Plan 2015 revision, providing an overview of the history of and great diversity found within the state of Maryland, the role of MD DNR in wildlife and habitat conservation, and the importance of conservation planning for Maryland's future. The next chapter will provide information regarding Maryland's physical landscape and aquatic resources, laying the groundwork for identifying the SGCN and key wildlife habitats that are the focus of the SWAP.

Citations and Sources

AFWA. 2012. Best practices for State Wildlife Action Plans: Voluntary guidance to States for revision and implementation. Teaming With Wildlife Committee's State Wildlife Action Plan (SWAP) Best Practices Working Group. November 2012. Available online from http://www.fishwildlife.org/files/SWAPBestPractices.pdf (accessed October 2015).

Anderson, M.G., and A. Olivero Sheldon. 2011. Conservation status of fish, wildlife, and natural habitats in the Northeast landscape: Implementation of the Northeast monitoring framework. Submitted to the Regional Conservation Needs Grants Program of the Northeast Association of Fish and Wildlife Agencies. The Nature Conservancy, Eastern Conservation Science. Available from http://216.92.98.160/assets/state-of-nature-report_2011copy.pdf (accessed July 2015).

Burke, D., K. Kehoe, M. Herrmann, L. Davidson, and C. Towle. 2004. Maryland coastal and estuarine land conservation plan. Maryland Department of Natural Resources, Watershed Services Unit, Annapolis, Maryland.

Caudill, J. 2011. National and state economic impacts on wildlife watching: addendum to the 2011 national survey of fishing, hunting, and wildlife associated recreation. US Fish and Wildlife Service, Arlington, Virginia.

Costanza, R., R. d'Arge. R. De Groot, S. Farber, M. Grosso, B. Hannon, K. Limburg, S. Naeem, R. O'Neil, J. Parnelo, R. G. Raskin, P. Sulton, and M. Van Den Belt. 1997. The value of the world's ecosystem services and natural capital. Nature 387:253-260.

Department of the Interior and Related Agencies Appropriations Act of 2001. PL 106-291, Oct. 11, 2000. United States Statutes at Large, 114 STAT. 1025.

Greeley-Polhemus Group. 2001. An assessment of the economic value of the Coastal Bays' natural resources to the economy of Worcester County, Maryland. Maryland Department of Natural Resources, Annapolis, Maryland.

Maryland Department of the Environment. 2012. Integrated report of surface water quality. Baltimore, Maryland.

Maryland Department of Natural Resources. 2004. Fact sheet: Atlantic coastal bays. Maryland Coastal Program, Watershed Services, Annapolis, Maryland.

Maryland Department of Natural Resources. 2005. Maryland Wildlife Diversity Conservation Plan. Wildlife and Heritage Service, Annapolis, Maryland.

Maryland Department of Natural Resources. 2014. Maryland Land Preservation and Recreation Plan 2014-2018. Annapolis, Maryland.

National Oceanic and Atmospheric Administration Fisheries. 2013. Fisheries of the United States. Fisheries Statistics Division, National Marine Fisheries Service, Silver Spring, Maryland.

Norden, A. W., D. C. Forester, and G. H. Fenwick, editors. 1984. Threatened and Endangered plants and animals of Maryland. Proceedings of a Symposium, Towson State University, Towson, Maryland.

Taylor, G. J. 1984. The Maryland Endangered Species Program. Pages 43-50 in A. W. Norden, D. C. Forester, and G. H. Fenwick, editors. Threatened and endangered plants and animals of Maryland, Maryland Natural Heritage Program, Annapolis, Maryland. Special Publication 84-1.

Terwilliger Consulting, Inc. and the Northeast Fish and Wildlife Diversity Technical Committee. 2013. Taking action together: Northeast regional synthesis for State Wildlife Action Plans. A report submitted to the Northeast Fish and Wildlife Diversity Committee, Locustville, Virginia.

Therres, G. D. 1998. Maryland's endangered species law as a tool for biodiversity conservation. Pages 133-137 in G. D. Therres, editor. Conservation of biological diversity: a key to the restoration of the Chesapeake Bay ecosystem and beyond. Maryland Department of Natural Resources, Annapolis, Maryland.

Tourism Economics. 2013. The economic impact of tourism in Maryland. Philadelphia, Pennsylvania.

U.S. Coast Guard. 2014. Recreational boating statistics. U.S. Department of Homeland Security, Washington, District of Columbia.

U.S. Department of Commerce. 2012. Fisheries economics of the United States. Economics and Social Analysis Division, Office of Science and Technology, National Marine Fisheries Service, Silver Spring, Maryland.

U.S. Department of the Interior, U.S. Fish and Wildlife Service, and U.S. Department of Commerce, U.S. Census Bureau. 2011. National survey of fishing, hunting and wildlife-associated recreation: Maryland. Washington, District of Columbia.

U.S. Global Change Research Program. 2014. National climate assessment. Washington, District of Columbia.

Vaughn, S. 2003. 135th anniversary of the Maryland natural resources police. The Natural Resources Magazine: Summer 2003, Annapolis, Maryland.

Versar, Inc. 2011. Results from Round 3 of the Maryland Biological Stream Survey (2007-2009). Final Report. Prepared by Versar, Inc., Columbia, Maryland, for Maryland Department of Natural Resources, Resource Assessment Service. Annapolis, Maryland.