Distribution Date: 12/20/13
Purpose: Deep Creek Lake Watershed Characterization
Resource: Wildlife and Rare Species Habitats

This information has been compiled by MDNR subject matter experts using the best available information and Departmental monitoring data for the purpose of describing the condition of Deep Creek Lake watershed natural resources and environmental features. Recommendations have been provided for the Steering Committee and Subcommittees to review and consider in the development of the Deep Creek Lake Watershed Management Plan.

DRAFT TEXT FROM WHS as of 8/15/2013

Deep Creek Lake Watershed Management Plan

OVERVIEW OF WILDLIFE AND RARE SPECIES HABITATS

In 2011, information on Maryland's wildlife and rare species habitats were synthesized and prioritized in a new targeting system called the Biodiversity Conservation Network or BioNet. The ultimate goal of this new system is to maintain the full complement of Maryland's native plants, animals, and habitats within Maryland's natural landscape. In this system, numerous separate geographic information system (GIS) data layers were compiled based on criteria that weight their relative value to biodiversity conservation in Maryland. The criteria used within BioNet primarily have a dual focus on both the most irreplaceable species and habitats, as well as on the habitats that concentrate larger numbers of species. In addition to focusing on vanishing species and habitats, and on high quality common habitats, the criteria also were designed to incorporate the larger landscapes required for migratory animals, population dispersal, and habitat shifts resulting from climate change.

BioNet specifically includes and prioritizes:

- Only known occurrences of species and habitats in Maryland
- Globally rare species and habitats
- State rare species and habitats
- Concentrations (aka "hotspots") of rare species and habitats
- Animals of Greatest Conservation Need
- Watch List plants and indicators of high quality habitats
- Animal assemblages (e.g., colonial nesting waterbirds, forest interior species)

- Wildlife corridors and concentration areas

In a nutshell, the rarest species and habitats, as well as concentrations of rare and vanishing species and the highest quality remaining habitats, are given the highest conservation value. The end result is one GIS data layer that assigns a relative priority to many undeveloped areas of the State. These areas are prioritized into a five-tiered system:

Tier 1 – Critically Significant for Biodiversity Conservation
Tier 2 – Extremely Significant for Biodiversity Conservation
Tier 3 – Highly Significant for Biodiversity Conservation
Tier 4 – Moderately Significant for Biodiversity Conservation
Tier 5 – Significant for Biodiversity Conservation

This five-tiered system was designed to capture and support the full array of biological diversity within Maryland – not just those places that are one-of-a-kind, but also the places that are needed to maintain viable populations of more common species. Keeping common species common is a goal that will provide enormous benefits to both our quality of life and our economy. We simply cannot afford to wait until herculean efforts are necessary to save species from the brink of extinction. The costs of these efforts are staggering. Therefore, even Tier 5 BioNet Areas are still significant to conserve, both for the species they directly support, as well as for maintenance of the larger fabric of our natural landscape.

The BioNet GIS data layer is somewhat dynamic because the data used to build it are continuously being updated as new information is gathered and processed into the various baseline data layers. These various baseline GIS layers are discussed separately below. Section 2 of this report provides a summary of the BioNet areas within the Deep Creek Lake Watershed and statistics on acreages of the various Tiered areas is reported in Table 1.

1. Ecologically Significant Areas (ESAs)

The Deep Creek Lake Watershed is home to nearly 40 plants and animals considered rare, threatened, or endangered in Maryland by the Department of Natural Resources. A subset of these species are legally regulated and listed in COMAR as In Need of Conservation, Threatened, or Endangered. A list of these rare species is included in Table 2 below.

The locations where rare species and significant natural communities occur are grouped into places called Ecologically Significant Areas (ESAs). ESAs contain one or more rare plant, animal, or ecological community occurrences. The size and configuration of the ESAs are based upon proximity of the occurrences, life history needs of the species, and the type and extent of the supporting habitats. Many rare species occur within declining or limited habitats, such as bogs or seepage swamps. Others live in high-quality patches of more common habitats. ESAs are designed to contain not only the rare resource itself, but also their habitats and appropriate buffers (i.e., adjacent lands needed to conserve the species and habitats). Thus, they are intended to be used as conservation boundaries for

the resources within them. ESAs are then assigned to prioritized BioNet Tiers based on the rarity, potential viability, and number of resources they contain. Section 2 provides details on the number of ESAs within the Deep Creek Lake Watershed and the resources contained within them. A summary description of each ESA is provided in Appendix B.

The Ecologically Significant Area boundaries should be considered as guidance maps rather than "hard" or unchanging boundaries. In fact, these boundaries are updated regularly as additional information is learned about the locations of rare species in areas that perhaps had not been surveyed previously. Also, the prioritized BioNet Tier rankings will change as new information becomes available on the resources and the viability of the resources within each area.

2. Species of Greatest Conservation Need (GCN) and Key Wildlife Habitats

In addition to the rare species discussed above, the Department of Natural Resources also keeps track of species that are uncommon and declining, as these are likely to become rare and in need of conservation efforts in the foreseeable future. In 2005, the Maryland Department of Natural Resources and numerous conservation partners developed a comprehensive Wildlife Diversity Conservation Plan. This Plan summarizes the types of habitats important for wildlife in Maryland and condenses them into 35 different habitat groups called Key Wildlife Habitats. Chapter 4 of the Plan provides details for each of these Key Wildlife Habitats, including lists of animals of Greatest Conservation Need (GCN) that are found within them. The Wildlife Diversity Conservation Plan can be found online at:
http://www.dnr.maryland.gov/wildlife/Plants_Wildlife/WLDP/divplan_final.asp.

Of the approximately 500 GCN animals listed in the plan, 300 were already considered rare, threatened, or endangered, and therefore were already being conserved by DNR through various efforts. Some of the remaining 200 GCN species already were afforded some conservation attention as a group because of their similar habitat needs. These are known as Forest Interior Dwelling Species (FIDS), and conservation of their habitat is regulated in portions of Maryland.

Forest Interior Dwelling Species (FIDS) Habitat

Some of the birds that breed in forests require large, unbroken tracts of forest for optimal breeding success. These birds are called Forest Interior Dwelling Species (FIDS). These species are considered a surrogate or "poster child" for many other species of wildlife that are known or likely to use the interior of forests as their optimal habitat. The protection of forested areas used by FIDS was mandated within the 1000-ft Chesapeake Bay Critical Area during the mid-1980's by passage of the Critical Area Law and Criteria. However, much of Maryland's forests are fragmented into smaller pieces than FIDS can successfully utilize. Therefore, the protection of this habitat outside of the Critical Area is strongly recommended by DNR. Section 2 provides details on the FIDS habitat that is found within the Deep Creek Lake Watershed in Garrett County.

3. Impacts of Resident Canada Geese on Deep Creek Lake

General Biology - Canada geese are a valuable natural resource and a source of recreation to the general public, bird watchers, and hunters. Of all the waterfowl, geese are particularly opportunistic and can easily become accustomed to people. In many areas of the United States, resident Canada goose populations have increased dramatically since the 1960's. In certain areas, Canada geese have responded to landscape features that provide expanses of short grass for food, lack of natural predators, absence of hunting, and hand feeding by some people.

Although most people find a few geese acceptable, problems develop as local flocks grow and their droppings become excessive (a goose produces a pound of droppings per day). Problems include over-grazed lawns, accumulations of droppings and feathers, nutrient loading in ponds, public health concerns at beaches and drinking water supplies, aggressive behavior by nesting birds, and safety hazards near roads and airports. Geese can also damage agricultural crops by excessive grazing.

Resident geese, as their name implies, spend most of their lives in one area, although some travel hundreds of miles to wintering areas. Resident geese are distinct from migratory populations that nests in northern Canada. Banding studies have shown that resident geese are not simply migrant geese that stopped flying north to breed. In fact, Canada geese have a strong tendency to return to where they were born and use the same nesting and feeding sites year after year. This makes it hard to eliminate geese once they become settled in a local area.

Because of their short migrations and their association with non-hunted locales, resident Canada geese have low exposure to hunting in the fall and winter and have high survival compared to migrant geese. The result is that they live longer; 15-25-year old resident geese are common. They also tend to breed earlier in life and lay larger clutches of eggs and nest in a more hospitable environment than migrant geese.

Most resident geese begin breeding when they are 2-3 years old and they nest every year for the rest of their lives. They mate for life, but if one member dies, the other will mate again. Canada geese lay an average of 5 eggs per nest, and about half will hatch and become free-flying birds in the fall. A female goose may produce more than 50 young over her lifetime.

The annual life cycle for geese begins in late winter when adult pairs return to nesting areas in late February or March. Egg laying and incubation generally extend through April, with the peak of hatching in late April or early May, depending on location in the State. Geese will aggressively defend their nests, and may attack if approached. Non-breeding geese often remain nearby in feeding flocks during the nesting season. After hatching, goose families may move considerable distances from nesting area to brood-rearing area, appearing suddenly "out of nowhere" at ponds or lakes bordered by lawns.

After nesting, geese undergo an annual feather molt, a 4-5 week flightless period when they shed and re-grow their outer wing feathers. Molting occurs between mid-June and

early July, and the birds resume flight in August. During the molt, geese congregate on ponds or lakes that provide a safe place to rest, feed, and escape danger. Severe problems often occur at this time of year because the geese concentrate on lawns next to water. Some geese without young travel hundreds of miles northward to remote molting areas. These "molt migrations" account for the disappearance of some local goose flocks in early June.

After the molt and through the fall, geese generally increase the distance of their feeding flights and are more likely to be found away from water. Large resident flocks, sometimes joined by migrant geese in the fall, may feed on athletic fields and other large lawns during the day, and return to larger lakes and ponds to roost at night. This continues until ice or snow eliminates feeding areas and forces birds to other open water areas nearby or to the south, where they remain until milder weather returns and nesting areas open up.

Damage Prevention: A Community Effort - Reducing damage caused by Canada geese takes the cooperation of the entire community. The Maryland DNR website (http://www.dnr.maryland.gov/wildlife/Hunt_Trap/waterfowl/geese/ResGeeseProblem.asp) contains an exhaustive list of deterrents and management options such as exclusions (fencing & Mylar tape); harassment (flagging, balloons, and lawn sprinklers); chemical repellants; and lethal control that, due to current regulations, are prohibited in the Deep Creek Lake buffer strip.
Currently the most practical legal management options are:

- **Limited Habitat modification** – allowing grass to grow
- **Control of nest production** – oiling eggs
- **Limited Lethal Control** – hunting outside of the buffer strip

Limited Habitat Modification - Canada geese require upland and aquatic habitats for resting, feeding, and breeding. Habitat modification involves physically altering property to make it less attractive to geese. Modifications made to the property should focus on eliminating or reducing nesting sites and food sources, as well as the access between these items and to the pond or lake. Habitat modifications make a property less suitable to geese and limit the number that can exist on the property or area.
Because of the sensitive nature of the buffer strip around Deep Creek Lake, limited habitat modifications are permissible. The means to make the habitat less hospitable to geese are:

- **Discontinue Supplemental Feeding by People -** Feeding may cause large numbers of geese to congregate in unnatural concentrations. Feeding usually occurs in the most accessible areas, making a mess of heavily used lawns, walkways, roads, parking areas, and boat docks. Feeding of all waterfowl on both public and private property should be prohibited as an important step in controlling Canada goose problems.

- **Manage Grass and Plants by Limiting Mowing -** Geese feed on grass. Grass that is frequently mowed and is fertilized is an excellent food (proteins and

carbohydrates) for geese. Mowed lawns also provide loafing areas where predators can be seen from a distance. By eliminating mowing at least 20 feet from shorelines or in even larger tracks of land, geese will be encouraged to shy away from these areas and look for safer spots with better food sources. Tall, poorly-fertilized grass is a poor food for geese and much less attractive. Canada geese are reluctant to walk through high vegetation; tall grass management limits the number of geese that can use an area. To make grass areas less attractive to geese: (1) limit lawn sizes; let grass grow 10 inches to 14 inches tall, (2) especially along shorelines; and (3) limit the application of fertilizer on grass areas to reduce the nutritional value of grass to the birds.

Control of Nest Production - Geese usually return in spring to the area where they hatched or where they nested previously. Over time, this results in increasing number of geese in areas that once had just a few birds. Local population growth may be controlled by preventing geese from nesting successfully. Egg addling or oiling of eggs prevents the embryo from developing and prevents hatching. This can be done by shaking, freezing, or applying 100% food grade corn oil to all of the eggs in a nest. The female goose will continue incubating the eggs until the nesting season is over. If the nest is simply destroyed, or the eggs removed, the female may re-nest and lay new eggs.

If you are a landowner, public land manager, or local government in Maryland,, you may obtain legal authorization to destroy Canada goose nests and eggs on your property between March 1 and June 30 to resolve conflicts with geese and to prevent injury to people, property, agricultural crops, or other interests.

Before any goose nests or eggs may be destroyed, landowners must go on-line at https://epermits.fws.gov/eRCGR/geSI.aspx to register with the U.S. Fish and Wildlife Service. Landowners must register employees or agents that may act on their behalf. Registration is free and is valid for one nesting season and must be renewed each year before nests and eggs may be destroyed. No State permit is required to destroy nests or eggs in Maryland.

Limited Lethal Control - Wherever possible, hunting should be encouraged during established hunting seasons in accordance with Federal, State, and local laws and regulations. Hunting is considered to be the most important management tool for controlling local Canada goose populations. Hunting should be strongly encouraged outside of the buffer strip area of Deep Creek Lake. Canada goose hunting that targets local flocks is permitted in Maryland during September, prior to the fall arrival of migratory Canada geese from Canada. An 80-day regular Canada goose season is also held in the fall and winter in central and western Maryland to target resident Canada geese. DNR's Website lists the licenses, stamps, and nontoxic shot ammunition requirements at: http://www.dnr.maryland.gov/huntersguide/index.asp.

Agricultural producers actively engaged in commercial agriculture may also kill Canada geese on lands that they personally control and where geese are damaging agricultural crops with proper authorization. While State authorization is required to conduct this

control, a federal permit is not required. Goose nests and eggs may only be destroyed between March 1 and June 30, and geese may only be killed between May 1 and August 31. All management actions must occur on the premises of the depredation area. Geese may not be taken in a hunting manner, e.g., decoys and calls may not be used. For agricultural producers to obtain a free State permit, they may apply in person or by telephone to the USDA Wildlife Services, 1568 Whitehall Road, Annapolis, MD 21409, Tel. 1-877-463-6497.

Protection Recommendations

- Utilize Maryland's Biodiversity Conservation Network, BioNet, to prioritize Deep Creek Lake Watershed locations for terrestrial and freshwater biodiversity conservation activities and as a tool for targeting acquisitions and easements, locating appropriate areas for project mitigation or habitat restoration, and planning for areas that require special considerations to sustain declining species and habitats.

- Target overall protection efforts within the Deep Creek Lake Watershed on the BioNet tiered sites because of the ecological services they provide and the rare species and habitats they support.

- Work with Maryland DNR to institute measures to protect the 16 Ecologically Significant Areas (ESA's) that are either contained within or that overlap the Deep Creek Lake Watershed.

- Reduce forest loss and fragmentation to conserve and protect habitat for Forest Interior Dwelling Species (FIDS). Also, maintaining forest cover is one of the best ways to protect water quality within the watershed. Follow the specific protection measures and guidelines included in Appendix C.

- Protecting headwater wetlands and intermittent and perennial tributaries is vital to maintaining the hydrology and water quality of the rare species' aquatic and wetland habitats downstream. Headwater wetlands and their upland buffers regulate stream flow and maintain the hydrology and water quality of downstream wetlands and aquatic habitats, including Deep Creek Lake itself. Headwater wetlands and their upland buffers are also vital to the aquatic food chain. Specific measures pertaining to hydrological and water quality protections can be found in Appendix C.

- Protect known Wetlands of Special State Concern (WSSC) and any which are considered potential WSSC's. These wetlands are regulated by the Maryland Department of the Environment under the authority of COMAR.

- Prevent and eliminate the spread of invasive plant and animal species. Because these organisms can displace native species and reduce overall biodiversity, they

present an on-going management challenge. Specific recommendations to combat these serious ecological threats can be found in Appendix C.

Section 2: Assessment of the Watershed ecosystem's characteristics and attributes

WILDLIFE AND RARE SPECIES HABITATS

The most significant wetlands and other habitats for wildlife and rare species within Deep Creek Lake Watershed are found primarily in the northeastern portions of the area. Another significant wetland, Hammel Glade, occurs in the southwestern section of the watershed. According to Table 1, below, about15 percent of the Deep Creek Lake Watershed provides significant habitat for Maryland's native plants, animals and natural communities. While portions of this watershed have been developed, much of the watershed still retains areas that are crucial for conserving the native flora and fauna of Garrett County.

Table 1. Summary of BioNet priority areas for the Deep Creek Lake Watershed.

BioNet Tier (Definition)	Acres	Percent of Watershed
Tier 1 (Critically Significant)	3,096	7.6 %
Tier 2 (Extremely Significant)	1,332	3.3 %
Tier 3 (Highly Significant)	1,286	3.1 %
Tier 4 (Moderately Significant)	144	0.4 %
Tier 5 (Significant)	73	0.2 %
TOTAL	**5,931**	**14.5 %**

The various natural resources that BioNet contains are detailed below. The acreages described in each section are not additive because many fall within the same areas. For example, many of the Ecologically Significant Areas for the protection of rare species are forested habitats and, therefore, are often also identified as potential forest interior dwelling species habitat. The map of BioNet areas (see Appendix E) displays them hierarchically, so that the most significant areas are overlain on top of areas with lesser significance for biodiversity conservation.

1. Ecologically Significant Areas (ESAs)

Ecologically Significant Areas are places where one or more rare species or habitat occurs that have been identified for some level of conservation attention. The Deep Creek Lake Watershed is home to 37 species of plants and animals considered rare,

threatened, or endangered in Maryland by the Wildlife and Heritage Service: 16 plants, 5 dragonflies, 3 butterflies, 3 other invertebrates, 1 reptile, 6 birds, and 3 mammals. Twenty-two of these 38 species are legally regulated by the State of Maryland: 9 are listed as Endangered (E), 9 are listed as Threatened (T), and 4 are listed as In Need of Conservation (I). None are federally-listed as threatened or endangered. The list of species is included in Table 2, below. An explanation of the rank and status codes used in this table is provided in the Appendix A.

Table 2. Rare, Threatened, and Endangered (RTE) Species with current or recent populations in the Deep Creek Lake Watershed.

Scientific Name	Common Name	Global Rank*	State Rank*	State Status*
	PLANTS			
Aralia hispida	Bristly sarsaparilla	G5	S1	E
Carex buxbaumii	Buxbaum's sedge	G5	S2	T
Clintonia borealis	Yellow clintonia	G5	S2	T
Coptis trifolia	Goldthread	G5	S1	E
Geum aleppicum	Yellow avens	G5	S1	E
Lycopodiella inundata	Bog clubmoss	G5	S2	
Menyanthes trifoliata	Buckbean	G5	S1	E
Polemonium vanbruntiae	Jacob's-ladder	G3G4	S2	T
Sarracenia purpurea	Northern pitcher-plant	G5	S2	T
Scutellaria galericulata	Common skullcap	G5	S1	
Spiranthes lucida	Wide-leaved ladys' tresses	G5	S1	E
Taxus canadensis	American yew	G5	S2	T
Thelypteris simulata	Bog fern	G4G5	S2	T
Torreyochloa pallida var. fernaldii	Fernald's mannagrass	G5T4Q	S1	
Vaccinium oxycoccos	Small cranberry	G5	S2	T
Viola appalachiensis	Appalachian blue violet	G3	S2	
	ANIMALS			
Aeshna canadensis	Canada darner	G5	S2	
Ammodramus henslowii	Henslow's sparrow	G4	S1S2B	T
Caecidotea sp. 6	An Isopod	GNR	S2	
Chlosyne harrisii	Harris's checkerspot	G4	S2	T
Circus cyaneus	Northern harrier	G5	S2B	
Dactylocythere scotos	An Entocytherid ostracod	GNR	S1	
Empidonax alnorum	Alder flycatcher	G5	S2B	I
Gomphus rogersi	Sable clubtail	G4	S2	I
Leucorrhinia glacialis	Crimson-ringed whiteface	G5	S1	
Lycaena epixanthe	Bog copper	G4G5	S1	E
Lynx rufus	Bobcat	G5	S3	I
Nymphalis vaualbum	Compton tortoiseshell	G5	S1	E
Planaria dactyligera	A Planarian	GNR	S2	

Regulus satrapa	Golden-crowned kinglet	G5	S2B	
Sitta canadensis	Red-breasted nuthatch	G5	S1B	
Somatochlora elongata	Ski-tailed emerald	G5	S2	
Sorex dispar	Long-tailed shrew	G4	S2	I
Sorex palustris punctulatus	Southern water shrew	G5T3	S1	E
Stylurus scudderi	Zebra clubtail	G4	S1	
Troglodytes troglodytes	Winter wren	G5	S2B	
Virginia valeriae pulchra	Mountain earthsnake	G5T3T4	S1S2	E

* See Appendix A for an explanation of the Rank and Status codes.

The locations of these 34 species are grouped into 16 Ecologically Significant Areas that are either contained within or that overlap the Deep Creek Lake Watershed.

Of the 16 Ecologically Significant Areas, seven are wetland areas linked by drainages and stream valley corridors along the floodplain of Cherry Creek. Another two ESAs are located along Meadow Mountain Run, and two more are found along the edges of Deep Creek Lake.

Table 3, below, summarizes these 16 ESAs and provides information on their sizes and regulatory significance. Five of these areas are within the Deep Creek Lake NRMA or within waters of Deep Creek Lake and are afforded protection by the Department of Natural Resources. Additionally, 12 of these areas are currently regulated by the Maryland Department of the Environment as Wetlands of Special State Concern (WSSC). Finally, the "BioNet Tier" column provides the priority or relative conservation value of each area, ranging from Tier 1 as critically significant for biodiversity conservation through Tier 5 as significant for biodiversity conservation. More specific information on what is known about each of these ESAs, including why each is significant, have been compiled and provided in Appendix B. A map that shows the location of the ESAs within the watershed is provided in Appendix E.

Table 3. Ecologically Significant Areas of the Deep Creek Lake Watershed.

ID Number	ESA Name	BioNet Tier	Wetland of Special State Concern	Acres
1	Negro Mountain Powerline Bog	Tier 5	Yes	73
2	North Cherry Creek Bog	Tier 2	Yes	711
3	Anvil Bog	Tier 2	Yes	364
4	Rock House Bog	Tier 2	Yes	191
5	South Cherry Creek Complex	Tier 1	Yes	949
6	Meadow Mountain Bog North	Tier 3	Yes	327
7	Highest Bog	Tier 3	Yes	259
8	Meadow Mountain Run Swamp	Tier 3	Yes	604
9	Rhodes Fields	Tier 4		77
10	Warren's Beech Grove	Tier 4		61
11	Potato Farm Coves	Tier 2	Yes	66
12	Deep Creek Spillway	Tier 3		39
13	Lower Deep Creek Complex*	Tier 1	Yes	613
14	Hammel Glade	Tier 1	Yes	1,534
15	Keystone Swamp	Tier 3	Yes	57
16	McHenry Wetland South	Tier 4		6

* only a small portion of this area is within the Watershed boundary.

2. Species of Greatest Conservation Need (GCN) and Key Wildlife Habitats

The Deep Creek Lake Watershed contains a number of Key Wildlife Habitats, as described within DNR's Wildlife Diversity Conservation Plan (2005). Many of these habitats are relatively widespread within Maryland, such as Floodplain Forests, Mesic Deciduous Forests, and Forested Seepage Wetlands. However, a few are relatively restricted in the State or have their highest quality occurrences within Garrett County. Two Key Wildlife Habitats such as these are Bog and Fen Wetland Complexes and Northern Conifer – Hardwood Forests. The Deep Creek Lake Watershed contains a dense concentration of the former, also known as Mountain Peatlands. Descriptions of

these two Key Wildlife Habitats, extracted from the Wildlife Diversity Conservation Plan, have been included in Appendix D.

In addition to those rare species that were listed in Table 2, above, a number of animal species of Greatest Conservation Need are known as residents or breeding species of the Deep Creek Lake Watershed. Some of these nearly 60 animals are birds regulated in Maryland as Forest Interior Dwelling Species (FIDS). Conservation of their forested habitat is required within the Chesapeake Bay Critical Area and strongly recommended and encouraged beyond the Critical Area. Conservation of the habitat for FIDS also helps to conserve numerous other forest species that are declining due to habitat fragmentation and loss. Most animals need large forests and forest patches connected by forested corridors because they need to move during some part of their lives, whether to find mates or better food sources or young dispersing to find their own territories. Providing sufficient habitat to support animal movement is a significant challenge that must be met if we are to stabilize populations and reverse the declines of these disappearing wildlife species.

ADDITIONAL GCN ANIMALS

Common Name	**Scientific Name**
Acadian flycatcher	*Empidonax virescens*
Allegheny Mountain dusky salamander	*Desmognathus ochrophaeus*
American emerald	*Cordulia shurtleffi*
American redstart	*Setophaga ruticilla*
American woodcock	*Scolopax minor*
Appalachian blue	*Celastrina neglectamajor*
Aurora damsel	*Chromagrion conditum*
Band-winged meadowhawk	*Sympetrum semicinctum*
Barred owl	*Strix varia*
Beaverpond baskettail	*Epitheca canis*
Black-and-white warbler	*Mniotilta varia*
Black-throated blue warbler	*Dendroica caerulescens*
Black-throated green warbler	*Dendroica virens*
Blackburnian warbler	*Dendroica fusca*
Blue-headed vireo	*Vireo solitarius*
Bobolink	*Dolichonyx oryzivorus*
Broad-winged hawk	*Buteo platypterus*
Brown creeper	*Certhia americana*
Brown thrasher	*Toxostoma rufum*
Canada warbler	*Wilsonia canadensis*
Chalk-fronted skimmer	*Libellula julia*
Chestnut-sided warbler	*Dendroica pensylvanica*
Dot-tailed whiteface	*Leucorrhinia intacta*
Eastern box turtle	*Terrapene carolina*
Eastern hog-nosed snake	*Heterodon platirhinos*

Eastern meadowlark	*Sturnella magna*
Eastern red damsel	*Amphiagrion saucium*
Eastern towhee	*Pipilo erythrophthalmus*
Field sparrow	*Spizella pusilla*
Grasshopper sparrow	*Ammodramus savannarum*
Golden-winged warbler	*Vermivora chrysoptera*
Gray comma	*Polygonia progne*
Hairy woodpecker	*Picoides villosus*
Hermit thrush	*Catharus guttatus*
Hooded warbler	*Wilsonia citrina*
Indian Skipper	*Hesperia sassacus*
Kentucky warbler	*Oporornis formosus*
Least flycatcher	*Empidonax minimus*
Long-tailed salamander	*Eurycea longicauda*
Louisiana waterthrush	*Seiurus motacilla*
Magnolia warbler	*Dendroica magnolia*
Mottled sculpin	*Cottus bairdi*
Northern parula	*Parula americana*
Northern red salamander	*Pseudotriton ruber*
Ovenbird	*Seiurus aurocapillus*
Pileated woodpecker	*Dryocopus pileatus*
Red-eyed vireo	*Vireo olivaceus*
Red-shouldered hawk	*Melanerpes erythrocephalus*
Savannah sparrow	*Passerculus sandwichensis*
Scarlet tanager	*Piranga olivacea*
Seal salamander	*Desmognathus monticola*
Sedge sprite	*Nehalennia irene*
Timber rattlesnake	*Crotalus horridus*
Veery	*Catharus fuscescens*
Vesper sparrow	*Pooectes gramineus*
White-faced meadowhawk	*Sympetrum obtrusum*
Willow flycatcher	*Empidonax traillii*
Wood thrush	*Hylocichla mustelina*
Worm-eating warbler	*Helmitheros vermivorus*

This list was compiled from the recent breeding bird atlas project, the current amphibian and reptile atlas project, and from field data and experience of DNR's biologists. As more surveys are conducted in the future, additional GCN species are likely to be found within this Watershed.

B. Potential Forest Interior Dwelling Species (FIDS) Habitat

Much of the Deep Creek Lake Watershed is forested, and over 60% of the entire Watershed is potential FIDS habitat. Also, about 65% of the potential FIDS habitat within the watershed still exists as "core habitat" or the largest and highest quality blocks

of unfragmented forests containing at least 500 acres of interior forest. The amount and potential quality of FIDS habitat in the Deep Creek Lake Watershed can be found in Table 4, below.

Within the Chesapeake Bay Critical Area, habitat protection for forest interior dwelling birds was mandated through regulations authorized by the Chesapeake Bay Critical Area Law (Natural Resources Article 8-1808, Annotated Code of Maryland). The regulations require that management programs be developed to protect and conserve riparian and upland forests used for breeding by FIDS within the Critical Area. DNR strongly encourages that protection programs for FIDS be extended beyond the Critical Area. Guidelines for determining FIDS habitat and conserving these areas are referenced in Appendix C. A map that shows the extent and quality of FIDS habitat within the watershed is provided in Appendix E.

Table 4. Amount of Potential Forest Interior Dwelling Species (FIDS) Habitat within the Deep Creek Lake Watershed.

Category (Defn.)	Acres	Hectares	Percent of Total
Class 1 (Core FIDS habitat)	18,617	7,534	66 %
Class 2 (High Quality habitat)	9,040	3,658	32 %
Class 3 (other FIDS habitat)	445	180	2 %
TOTAL	**28,102**	**11,372**	

APPENDIX A

Explanation of Species Rank and Status Codes

The global and state ranking system is used by all 50 state Natural Heritage Programs and numerous Conservation Data Centers in other countries in this hemisphere. Because they are assigned based upon standard criteria, the ranks can be used to assess the range-wide status of a species as well as the status within portions of the species' range. The primary criterion used to define these ranks is the number of known distinct occurrences, with consideration given to the total number of individuals at each locality. Additional factors considered include the current level of protection, the types and degree of threats, ecological vulnerability, and population trends. Global and state ranks are used in combination to set inventory, protection, and management priorities for species at the state, regional, and national levels.

GLOBAL RANK

G1 Highly globally rare. Critically imperiled globally because of extreme rarity (typically 5 or fewer estimated occurrences or very few remaining individuals or acres) or because of some factor(s) making it especially vulnerable to extinction.

G2 Globally rare. Imperiled globally because of rarity (typically 6 to 20 estimated occurrences or few remaining individuals or acres) or because of some factor(s) making it very vulnerable to extinction throughout its range.

G3 Either very rare and local throughout its range or distributed locally (even abundantly at some of its locations) in a restricted range (e.g., a single western state, a physiographic region in the East) or because of other factors making it vulnerable to extinction throughout its range; typically with 21 to 100 estimated occurrences.

G4 Apparently secure globally, although it may be quite rare in parts of its range, especially at the periphery.

G5 Demonstrably secure globally, although it may be quite rare in parts of its range, especially at the periphery.

GH No known extant occurrences (i.e., formerly part of the established biota, with the expectation that it may be rediscovered).

GU Possibly in peril range-wide, but its status is uncertain; more information is needed.

GX Believed to be extinct throughout its range (e.g., passenger pigeon) with virtually no likelihood that it will be rediscovered.

G? The species has not yet been ranked.

_Q Species containing a "Q" in the rank indicates that the taxon is of questionable or uncertain taxonomic standing (i.e., some taxonomists regard it as a full species, while others treat it at an infraspecific level).

_T Ranks containing a "T" indicate that the infraspecific taxon is being ranked differently than the full species.

STATE RANK

S1 Highly State rare. Critically imperiled in Maryland because of extreme rarity (typically 5 or fewer estimated occurrences or very few remaining individuals or acres in the State) or because of some factor(s) making it especially vulnerable to extirpation. Species with this rank are actively tracked by the Natural Heritage Program.

S2 State rare. Imperiled in Maryland because of rarity (typically 6 to 20 estimated occurrences or few remaining individuals or acres in the State) or because of some factor(s) making it vulnerable to becoming extirpated. Species with this rank are actively tracked by the Natural Heritage Program.

S3 Watch List. Rare to uncommon with the number of occurrences typically in the range of 21 to 100 in Maryland. It may have fewer occurrences but with a large number of individuals in some populations, and it may be susceptible to large-scale disturbances. Species with this rank are not actively tracked by the Natural Heritage Program.

S3.1 A species that is actively tracked by the Natural Heritage Program because of the global significance of Maryland occurrences. For instance, a G3 S3 species is globally rare to uncommon, and although it may not be currently threatened with extirpation in Maryland, its occurrences in Maryland may be critical to the long term security of the species. Therefore, its status in the State is being monitored.

S4 Apparently secure in Maryland with typically more than 100 occurrences in the State or may have fewer occurrences if they contain large numbers of individuals. It is apparently secure under present conditions, although it may be restricted to only a portion of the State.

S5 Demonstrably secure in Maryland under present conditions.

SA Accidental or considered to be a vagrant in Maryland.

SE Established, but not native to Maryland; it may be native elsewhere in North America.

SH Historically known from Maryland, but not verified for an extended period (usually 20 or more years), with the expectation that it may be rediscovered.

SP Potentially occurring in Maryland or likely to have occurred in Maryland (but without persuasive documentation).

SR Reported from Maryland, but without persuasive documentation that would provide a basis for either accepting or rejecting the report (e.g., no voucher specimen exists).

SRF Reported falsely (in error) from Maryland, and the error may persist in the literature.

SU Possibly rare in Maryland, but of uncertain status for reasons including lack of historical records, low search effort, cryptic nature of the species, or concerns that the species may not be native to the State. Uncertainty spans a range of 4 or 5 ranks as defined above.

SX Believed to be extirpated in Maryland with virtually no chance of rediscovery.

SYN Currently considered synonymous with another taxon and, therefore, not a valid entity.

SZ A migratory species which does not inhabit specific locations for long periods of time.

S? The species has not yet been ranked.

-B This species is migratory and the rank refers only to the breeding status of the species. Such a migrant may have a different rarity rank for non-breeding populations.

-N This species is migratory and the rank refers only to the non-breeding status of the species. Such a migrant may have a different rarity rank for breeding populations.

Ranks that are depicted as ranges (e.g., S1S2) are generally rounded up to the first rank for discussion and analysis purposes.

STATE STATUS

This is the status of a species as determined by the Maryland Department of Natural Resources, in accordance with the Nongame and Endangered Species Conservation Act. Definitions for the following categories have been taken from Code of Maryland Regulations (COMAR) 08.03.08.

E Endangered; a species whose continued existence as a viable component of the State's flora or fauna is determined to be in jeopardy.

I In Need of Conservation; an animal species whose population is limited or declining in the State such that it may become threatened in the foreseeable future if current trends or conditions persist.

T Threatened; a species of flora or fauna which appears likely, within the foreseeable future, to become endangered in the State.

X Endangered Extirpated; a species that was once a viable component of the flora or fauna of the State, but for which no naturally occurring populations are known to exist in the State.

* A qualifier denoting the species is listed in a limited geographic area only.

PE Proposed Endangered; a change is COMAR is pending that would list the species as Endangered (see definition above).

PT Proposed Threatened; a change is COMAR is pending that would list the species as Threatened (see definition above).

PX Proposed Endangered Extirpated; a change is COMAR is pending that would list the species as Endangered Extirpated (see definition above).

PD Proposed to be deleted or removed from the State Threatened & Endangered Species list within COMAR.

FEDERAL STATUS

This is the status of a species as determined by the U.S. Fish and Wildlife Service's Office of Endangered Species, in accordance with the Endangered Species Act. Definitions for the following categories have been modified from 50 CRF 17.

LE Taxa listed as endangered; in danger of extinction throughout all or a significant portion of their range.

LT Taxa listed as threatened; likely to become endangered within the foreseeable future throughout all or a significant portion of their range.

PE Taxa proposed to be listed as endangered.

PT Taxa proposed to be listed as threatened.

C Candidate taxa for listing for which the Service has on file enough substantial information on biological vulnerability and threat(s) to support proposals to list them as endangered or threatened.

APPENDIX B

Ecologically Significant Area Summaries

Included in this Appendix is a summary description of each of the 16 Ecologically Significant Areas (ESAs) within the Deep Creek Lake Watershed in Garrett County. Each summary provides information on the ecological significance of the area, a list of the Key Wildlife Habitats and other Key Elements, and a description of the ecological significance of the area.

Ecologically Significant Areas contain the locations of rare species and significant natural communities. ESAs may harbor one or more rare plant, animal, or ecological community occurrences. The size and configuration of the ESA are based upon proximity of the occurrences, life history needs of the species, and the type and extent of the supporting habitats. Many rare species occur within declining or limited habitats, such as bogs or seepage swamps. Others live in high-quality remnants of more common habitats. ESAs are designed to contain not only the rare resource itself, but also their habitats and appropriate buffers (i.e., adjacent lands needed to conserve the species and habitats). Thus, they are intended to be used as conservation boundary guidelines for the resources within them. ESAs are then assigned to BioNet Priority Tiers based on the rarity and viability of the species and habitats, as well as the number of these resources within them.

The Ecologically Significant Area boundaries should be considered as guidance maps rather than "hard" or unchanging boundaries. In fact, these boundaries are updated regularly as additional information is learned about the locations of rare species in areas that perhaps had not been surveyed previously. Also, the prioritized BioNet Tier rankings will change as new information becomes available on the resources and the viability of the resources within each area.

The following Ecologically Significant Areas are described in this Appendix:

1. Negro Mountain Powerline Bog
2. North Cherry Creek Bog
3. Anvil Bog
4. Rock House Bog
5. South Cherry Creek Complex
6. Meadow Mountain Bog North
7. Highest Bog
8. Meadow Mountain Run Swamp
9. Rhodes Fields
10. Warren's Beech Grove
11. Potato Farm Coves
12. Deep Creek Spillway
13. Lower Deep Creek Complex
14. Hammel Glade

15. Keystone Swamp
16. McHenry Wetland South

1. Negro Mountain Powerline Bog BioNet Tier: 5 Size: 73 ac

Key Wildlife Habitats and other Key Elements

- Bog and Fen Wetland Complex
- Forested Seepage Wetlands
- Tawny Cottongrass and other uncommon plants
- Core habitat for Forest Interior Dwelling Species (FIDS)

Ecological Significance

Forming the headwaters of Cherry Creek, which is one of the tributaries feeding Deep Creek Lake, this small wetland is primarily a forested wetland. The dominant tree species found in the canopy are red maple, black gum, and eastern hemlock. This wetland also has a dense shrub layer of great laurel. However, the forest is broken by a powerline right-of-way that crosses the wetland, and it is in this narrow open-canopy area that the typical herbaceous bog plants grow, such as tawny cottongrass (*Eriophorum virginicum*, watchlist). Small numbers of red spruce (*Picea rubens*, watchlist) and American mountain-ash (*Sorbus americana*, watchlist) can also be found at Negro Mountain Powerline Bog.

The upland slopes surrounding this wetland complex are mostly forested. These plant communities are important for maintaining the water quantity and quality of the bog. They filter nutrients and chemicals and trap excess sediments that could damage bog vegetation in erosive runoff events.

The forests buffering Negro Mountain Powerline Bog are embedded within a larger contiguous block of forest that was identified as meeting the criteria for core habitat (or highest quality habitat) for Forest Interior Dwelling Species (FIDS) based on the size and configuration of the forest. Species of Greatest Conservation Need (GCN), such as Acadian flycatcher, wood thrush, and scarlet tanager are likely to nest within these forests.

The forested slopes of Negro Mountain also provide habitat for countless wildlife species that are dispersing from breeding grounds or migrating to new areas. Movement corridors from lower elevations to higher elevations and from southern latitudes to northern latitudes will enable species to better adapt to shifting environmental conditions that are occurring as part of climate change.

2. North Cherry Creek Bog BioNet Tier: 2 Size: 711 ac

Key Wildlife Habitats and other Key Elements

- Bog and Fen Wetland Complex
- Forested Seepage Wetlands
- Bog Fern, Small Cranberry, and other rare plants
- Alder Flycatcher, Southern Water Shrew, and other rare animals

Ecological Significance
Located at the headwaters of Cherry Creek, one of the tributaries feeding Deep Creek Lake, North Cherry Creek Bog is one of Maryland's significant mountain peatland complexes. Despite nearby disturbances, the large central portion of this area remains a high quality wetland with very significant ecological attributes, such as a high diversity of plant communities and areas with a high degree of ecological integrity. Because of these attributes, North Cherry Creek Bog supports a greater diversity of plants and animals than many Garrett County wetlands, including numerous rare or uncommon species.

Beavers are active along the main stem of Cherry Creek and an unnamed side tributary. Some open areas are dominated by Sphagnum mosses. Meadows of sedges and other herbaceous plants give way to low shrub swamp areas of glade St. John's-wort, scattered patches of taller shrubs, such as mountain holly, and thickets of speckled alder. Forested wetlands contain eastern hemlock and red spruce or hardwoods such as red maple. Under these shaded canopies grows bog fern (*Thelypteris simulata*, Threatened). The shrubby areas provide habitat for rare breeding birds, such as alder flycatcher (*Empidonax alnorum*, In Need of Conservation). Because of the large size of this wetland and its close proximity to other large wetlands such as South Cherry Creek Complex, it provides habitat for area-sensitive species and wide-ranging animals, such as bobcat (*Lynx rufus*, In Need of Conservation). Southern water shrews (*Sorex palustris punctulatus*, Endangered) find good habitat along steep-banked streams passing through thickets of great laurel. These tiny mammals are among the most aquatic of their kind, having fur that traps air bubbles to help them change buoyancy while swimming. Also, a fringe of stiff hairs on the hind feet traps bubbles that allow this animal to run on top of the water.

3. Anvil Bog **BioNet Tier: 2 Size: 364 ac**

Key Wildlife Habitats and other Key Elements
- Northern Conifer – Hardwood Forest
- Mesic Deciduous Forest
- Floodplain Forest
- Bog and Fen Wetland Complex
- Forested Seepage Wetlands
- Rose Pogonia, Small Cranberry, and other rare plants
- Ski-tailed Emerald, Henslow's Sparrow and other rare animals

Ecological Significance

Located between North Cherry Creek Bog and South Cherry Creek Complex, Anvil Bog is part of the extensive wetland complex along Cherry Creek, which drains eventually into Deep Creek Lake. Despite nearby degraded lands from past mining activities, much of this area remains a high-quality wetland with significant ecological attributes, such as a high diversity of plant communities, some being rare or locally significant. Because of this diversity, Anvil Bog supports a number of rare and uncommon plant and animal species.

Cherry Creek meanders through the middle of this rather open wetland, and it has occasional pools created by downstream beaver dams, as well as associated large sedge meadows. On the west side of the stream are some high quality streamside and spring fed fens and peatlands, with large mats of sphagnum moss, tall sedges, small cranberry (*Vaccinium oxycoccos*, Threatened), and large cranberry (*V. macrocarpon*, watchlist). Bog clubmoss (*Lycopodiella inundata*, rare), a low, moss-like plant, thrives in several areas. This species is adapted to acidic wetlands and is found at high elevations in Maryland. Rose pogonia (*Pogonia ophioglossoides*, watchlist) is more frequently found on Maryland's Coastal Plain, but it is a rare associate in high elevation plateau wetlands.

The open waters and meadows also provide habitat for rare dragonflies, such as ski-tailed emerald (*Somatochlora elongata*, rare) and Canada darner (*Aeshna canadensis*, rare). Once found throughout the State, Henslow's sparrow (*Ammodramus henslowii*, Threatened) is a grassland specialist and is now found breeding only in the old fields and reclaimed stripmines in Western Maryland.

Along the edges and scattered within the open meadows are shrubby thickets of speckled alder. Patches of eastern hemlock and a few red spruce (*Picea rubens*, watchlist) trees are among the species found in forested sections. Future surveys of this wetland are likely to find additional rare species, such as alder flycatcher (*Empidonax alnorum*, In Need of Conservation) and Nashville warbler (*Vermivora ruficapilla*, In Need of Conservation).

4. Rock House Bog — BioNet Tier: 2 — Size: 191 ac

Key Wildlife Habitats and other Key Elements

- Bog and Fen Wetland Complex
- Northern Conifer – Hardwood Forest
- Floodplain Forest
- Mesic Deciduous Forest
- Bog Fern
- Tawny Cottongrass

Ecological Significance

Draining into Cherry Creek about a mile upstream from Deep Creek Lake, Rock House Bog is bisected by Rock Lodge Road. A variety of the acidic wetland communities characteristic of Garrett County are found here. Some of these habitat types include open

wet sedge and grass fens fed by mineral-rich surface water or groundwater, peatlands dominated by Sphagnum moss, other mosses, and other bog plants including the purple pitcher plant (*Sarracenia purpurea*, Threatened), and scattered shrubby areas primarily covered by glade St. John's-wort and speckled alder. Rock House Bog is also home to small areas of high-quality swamp forest dominated by eastern hemlock and red spruce (*Picea rubens*, watchlist). This conifer forest provides habitat for other rare species such as bog fern (*Thelypteris simulata*, Threatened).

The area offers potential habitat for several other types of rare wildlife, in addition to providing excellent habitat for a variety of more common wetland species. Due to the high quality, diversity of wetland communities, and the corresponding number of rare and endangered species present, this wetland is considered a high protection priority.

Rock House Bog is part of a forest block that was identified as meeting the criteria for core habitat for Forest Interior Dwelling Species (FIDS) based on the size and configuration of the forest.

5. South Cherry Creek Complex BioNet Tier: 1 Size: 949 ac

Key Wildlife Habitats and other Key Elements

- Bog and Fen Wetland Complex
- Forested Seepage Wetlands
- American Yew, Bog Clubmoss and other rare plants
- Bobcat, Zebra Clubtail and other rare animals

Ecological Significance

South Cherry Creek Complex is one of the largest and most diverse high-altitude wetlands in Maryland. Most, if not all, of the acidic wetland communities characteristic of Garrett County are represented somewhere within this large wetland matrix and many of these are considered highly significant globally and locally. Some of these types include open wet sedge and grass dominated fens fed by mineral-rich surface water or groundwater, peatlands dominated by Sphagnum moss, and other "bog" plants, shrub-dominated wetlands primarily covered by glade St. John's-wort and speckled alder, and forested seepage wetlands with trees such as eastern hemlock, red spruce and pitch pine. A small population of American yew (*Taxus canadensis*, Threatened) occurs along an upland edge. Bog clubmoss (*Lycopodiella inundata*, rare), a low, moss-like plant, thrives in several areas. This species is adapted to acidic wetlands and is found at high elevations in Maryland.

Because of the large size of this wetland and its close proximity to other large wetlands just to the north, it provides habitat for area-sensitive species and wide-ranging animals, such as bobcat (*Lynx rufus*, In Need of Conservation). The coldwater streams running through some wetland areas provide habitat for the highly rare dragonfly, zebra clubtail (*Stylurus scudderi*). Future surveys of this extensive wetland are likely to find numerous

additional rare species, such as alder flycatcher (*Empidonax alnorum*, In Need of Conservation) and Nashville warbler (*Vermivora ruficapilla*, In Need of Conservation).

The northern end of South Cherry Creek Complex is owned and protected by The Nature Conservancy. Parts of the Complex have been impacted by road building associated with timbering operations and coal mining. Toxic seeps from nearby mines have severely affected sections of the wetland. However, this area's large size and topographic position in addition to a few management measures have helped to neutralize much of the past disturbances.

6. Meadow Mountain Bog North BioNet Tier: 3 Size: 327 ac

Key Wildlife Habitats and other Key Elements

- Northern Conifer – Hardwood Forest
- Mesic Deciduous Forest
- Floodplain Forest
- Bog and Fen Wetland Complex
- Forested Seepage Wetlands
- Bog Clubmoss and other rare plants
- Crimson-ringed Whiteface and other rare animals
- Core habitat for Forest Interior Dwelling Species (FIDS)

Ecological Significance

Located on the north side of Meadow Mountain, east of Deep Creek Lake, Meadow Mountain Bog North is a diverse high-elevation wetland system. This wetland is found in the headwaters of the South Cherry Creek Complex and contains numerous springs and seeps scattered within upland forest. This area supports several high quality significant or rare plant communities and thriving populations of several plant species characteristic of northern bog habitats. The Cottongrass Fen (globally rare) and Pitch Pine Peat Swamp (highly globally rare) communities are just two examples of the many that have been described for this location. The matrix of diverse habitats includes great laurel thickets and forests of pitch pine, oak, northern hardwoods, eastern hemlock, and white pine. Scattered red spruce and other conifers are remnants of an earlier conifer swamp forest. Openings in wetter areas dominated by Sphagnum moss and sedges are interspersed with shrubby areas in old beaver meadows undergoing different stages of succession. Beaver activity also provides a series of open water ponds along small streams. These areas support breeding populations of damselflies and dragonflies, including crimson-ringed whiteface (*Leucorrhinia glacialis*, highly rare) and Canada darner (*Aeshna canadensis*, rare).

The upland slopes north of this wetland complex are almost entirely forested. These plant communities are important for maintaining the water quantity and quality of the adjacent wetland. They filter nutrients and chemicals and trap excess sediments that could damage the plant life in erosive runoff events.

The forests buffering Meadow Mountain North Bog are embedded within a larger contiguous block of forest that was identified as meeting the criteria for core habitat (or highest quality habitat) for Forest Interior Dwelling Species (FIDS) based on the size and configuration of the forest. In fact, it is among the largest contiguous blocks of forest in the State. Species of Greatest Conservation Need (GCN), such as acadian flycatcher, wood thrush, and scarlet tanager are likely to nest within these forests.

The forested slopes of Meadow Mountain also provide habitat for countless wildlife species that are dispersing from breeding grounds or migrating to new areas. Movement corridors from lower elevations to higher elevations and from southern latitudes to northern latitudes will enable species to better adapt to shifting environmental conditions that are occurring as part of climate change.

7. Highest Bog — BioNet Tier: 3 — Size: 259 ac

Key Wildlife Habitats and other Key Elements

- Northern Conifer – Hardwood Forest
- Mesic Deciduous Forest
- Floodplain Forest
- Bog and Fen Wetland Complex
- Forested Seepage Wetlands
- Bog Clubmoss and other rare plants
- Ski-tailed Emerald and other rare animals
- Core habitat for Forest Interior Dwelling Species (FIDS)

Ecological Significance

Forming the headwaters of a main tributary of Cherry Creek, flowing into Deep Creek Lake, the wetland complex of Highest Bog is compact but still ecologically significant. Although not as large as other nearby mountain peatlands at The Glades or South Cherry Creek Complex, Highest Bog is relatively secluded, undisturbed, and has excellent ecological integrity. Like nearby acidic peatland communities, this site contains an expansive mosaic of open sedge or grass dominated peatlands, and dwarf to tall shrublands; many being state or globally rare. These habitats in turn support a number of vulnerable species. In the emergent wetlands adjacent to the beaver-made ponds, bog clubmoss (*Lycopodiella inundata*, rare) is found in among the peat moss. The scattered alder dominated shrublands support species such as alder flycatcher (*Empidonax alnorum*, In Need of Conservation). And the small forested stream flowing from the western-most beaver pond provides habitat for a dragonfly called ski-tailed emerald (*Somatochlora elongata*, rare).

The upland slopes north and south of this bog are almost entirely forested. These plant communities are important for maintaining the water quantity and quality of the bog. They filter nutrients and chemicals and trap excess sediments that could damage bog vegetation in erosive runoff events.

The forests buffering Highest Bog are embedded within a larger contiguous block of forest that was identified as meeting the criteria for core habitat (or highest quality habitat) for Forest Interior Dwelling Species (FIDS) based on the size and configuration of the forest. In fact, it is among the largest contiguous blocks of forest in the State. Species of Greatest Conservation Need (GCN), such as acadian flycatcher, wood thrush, and scarlet tanager are likely to nest within these wooded slopes.

The forested slopes of Meadow Mountain also provides habitat for countless wildlife species that are dispersing from breeding grounds or migrating to new areas. Movement corridors from lower elevations to higher elevations and from southern latitudes to northern latitudes will enable species to better adapt to shifting environmental conditions that are occurring as part of climate change.

8. Meadow Mountain Run Swamp BioNet Tier: 3 Size: 604 ac

Key Wildlife Habitats and other Key Elements

- Bog and Fen Wetland Complex
- Nontidal Shrub Wetlands
- Alder Flycatcher and other rare animals
- Buxbaum's Sedge and other rare plants
- Core habitat for Forest Interior Dwelling Species (FIDS)

Ecological Significance

Meadow Mountain Run is an eastern tributary of Deep Creek Lake, and Meadow Mountain Run Swamp has formed near its headwaters. This somewhat linear wetland is a large, stream-fed, sedge and grass fen with both acidic and near neutral water influences. The wetland mosaic includes an open, emergent meadow dominated by tussock sedge, blue-joint reedgrass, and reed canarygrass. Buxbaum's sedge (*Carex buxbaumii*, Threatened) lives near the stream running through the middle of the meadow. Other areas are shrubby, especially along the wetland border. Perhaps the most unique attribute of this wetland is large areas of meadowsweet (or pipestem, *Spirea alba*), along with glade St. John's-wort and speckled alder. These shrub thickets are home to alder flycatchers (*Empidonax alnorum*, In Need of Conservation), which sing from the tops of the shrubs to attract mates and defend their territories. The mucky, wet areas around seeps harbor an abundance of Sphagnum moss.

Large snags of white pine in areas of standing water provide additional structure and wildlife habitat. The surrounding uplands include extensive white pine plantations, apparently from the Civilian Conservation Corps era, probably planted on old fields. Upland openings have cherries, hawthorns, and old apple trees among goldenrods and other wildflowers. There is a rather abrupt transition from conifer plantation to wetland around most of the edge.

The upland slopes north and east of this wetland complex are mostly forested. These plant communities are important for maintaining the water quantity and quality of the bog. They filter nutrients and chemicals and trap excess sediments that could damage bog vegetation in erosive runoff events.

The forests buffering Meadow Mountain Run Swamp are embedded within a larger contiguous block of forest that was identified as meeting the criteria for core habitat (or highest quality habitat) for Forest Interior Dwelling Species (FIDS) based on the size and configuration of the forest. In fact, it is among the largest contiguous blocks of forest in the State. Species of Greatest Conservation Need (GCN), such as acadian flycatcher, wood thrush, and scarlet tanager are likely to nest within these forests.

The forested slopes of Meadow Mountain also provide habitat for countless wildlife species that are dispersing from breeding grounds or migrating to new areas. Movement corridors from lower elevations to higher elevations and from southern latitudes to northern latitudes will enable species to better adapt to shifting environmental conditions that are occurring as part of climate change.

9. Rhodes Fields **BioNet Tier: 4 Size: 77 ac**

Key Wildlife Habitats and other Key Elements

- Grasslands
- Northern Harrier

Ecological Significance

Rhodes Fields is at the headwaters of an unnamed tributary to North Glade Run, which flows into Deep Creek Lake. This area consists of large, flat open expanse of hayfields adjacent to a ditched, marshy emergent and shrubby wetland along the unnamed tributary. These meadows provided habitat during the breeding season for northern harrier (*Circus cyaneus,* rare). This area also provides potential habitat for a suite of nearly ten species of grassland breeding birds that are considered Species of Greatest Conservation Need in Maryland. Many of these grassland breeding specialists are considered "area sensitive" in that they require large, contiguous grasslands and other open habitats for successful breeding. The male northern harrier defends an average breeding territory of 1 sq. mile (or 2.6 sq. km).

10. Warren's Beech Grove **BioNet Tier: 4 Size: 61 ac**

Key Wildlife Habitats and other Key Elements

- Mesic Deciduous Forest
- Floodplain Forest
- Core habitat for Forest Interior Dwelling Species (FIDS)

Ecological Significance
Located along Meadow Mountain Run, this small patch of forest represents a forest type not typically seen on Savage River State Forest. It harbors a stand of very old beech trees. This site was suggested as a special area by the former State Forest manager for Savage River, Warren Groves.

Warren's Beech Grove is embedded within a large forested area that was identified as meeting the criteria for core habitat (or highest quality habitat) for Forest Interior Dwelling Species (FIDS) based on the size and configuration of the forest. In fact, it is among the largest contiguous blocks of forest in the State.

The forested corridor along Meadow Mountain also provides habitat for countless wildlife species that are dispersing from breeding grounds or migrating to new areas. Movement corridors from lower elevations to higher elevations and from southern latitudes to northern latitudes will enable species to better adapt to shifting environmental conditions that are occurring as part of climate change.

The forests along Meadow Mountain Run also are important for maintaining water quality in Deep Creek Lake downstream. These plant communities filter nutrients and chemicals and trap excess sediments that could otherwise cloud the water in erosive runoff events. Forested corridors along rivers also mediate the destructive impact of floods and storm surges.

11. Potato Farm Coves **BioNet Tier: 2** **Size: 66 ac**

Key Wildlife Habitats and other Key Elements
- Nontidal Emergent Wetlands
- Jacob's-ladder and other rare species

Ecological Significance
Nestled on the western side of Deep Creek Lake are two adjacent coves that comprise Potato Farm Coves. These coves have seasonally wet meadows that catch the drainage from relatively flat lands nearby. The open, herbaceous portion of this area is floristically diverse with flat-topped white aster and a variety of grasses and sedges, along with some scattered shrubs. Rare species living here include Jacob's-ladder (*Polemonium vanbruntiae*, Endangered) and linear-leaved willowherb (*Epilobium leptophyllum*, rare). The presence of Jacob's-ladder indicates that the water within these wetlands has a near-neutral pH, unlike the more acidic bogs and other wetlands commonly found in Garrett County. This alkalinity is caused by the Greenbrier formation, which is bedrock underlying the wet meadow and the cove that includes a band of limestone. Jacob's-ladder is important as an indicator of environmental health; its presence indicates that despite nearby roads and other landscape impacts, these disturbances are not so great as to eliminate the habitat for this Endangered plant.

These wet meadows not only provide habitat for rare plants, butterflies, and other wildlife, but they provide critical ecosystem functions, such as filtering pollutants, catching sediments from disturbed areas, and slowing surface water flows to increase groundwater infiltration. Thus the water quality within Deep Creek Lake is being protected by natural vegetated areas like Potato Farm Coves.

12. Deep Creek Spillway BioNet Tier: 3 Size: 39 ac

Key Wildlife Habitats and other Key Elements

- Highland Streams
- A Flatworm

Ecological Significance

Just north of the Deep Creek Lake spillway, near the edge of Deep Creek Lake, are two small streams. These first-order streams have a slow flow of clear water running over sand, gravel, pebbles, and cobbles. Rhododendrons grow along the stream banks. These streams are home to a very tiny animal called a flatworm (*Planaria dactyligera*, rare). One of the most primitive forms of animal life, this flatworm lives beneath rocks and woody debris.

13. Lower Deep Creek Complex BioNet Tier: 1 Size: 613 ac

Key Wildlife Habitats and other Key Elements

- Cliffs and Rock Outcrops
- Northern Conifer – Hardwood Forest
- Mesic Deciduous Forest
- Floodplain Forest
- Numerous rare plants and animals
- Core habitat for Forest Interior Dwelling Species (FIDS)

Ecological Significance

Lower Deep Creek Complex features a highly scenic and pristine section of lower Deep Creek that begins about a mile below the outflow of Deep Creek Lake and includes the area surrounding its confluence with the Youghiogheny River. Deep Creek is a high-quality trout stream situated in a moist sandstone ravine lined with large boulders, cliffs, and outcrops. The forests are dominated by mature eastern hemlock and yellow birch with dense thickets of rhododendron. Of particular significance is the presence of two rare small mammals, the southern water shrew (*Sorex palustris punctulatus*, Endangered), which is a globally vulnerable subspecies, and long-tailed shrew (*Sorex dispar*, In Need of Conservation). Additionally, within a spring seepage along Deep

Creek lives a tiny crustacean called Allegheny isopod (*Caecidotea alleghenyensis*, globally imperiled), a newly described species.

An equally important feature of the Lower Deep Creek Complex is the two-mile long section of the Youghiogheny River. This remote river corridor includes extensive sandstone rock outcrops along the confluence of Deep Creek. This outcrop area contains an exceptionally large turkey vulture roost and evidence of what appears to have been one of the largest Allegheny woodrat (*Neotoma magister*, Endangered) colonies known in Maryland. Upstream from the confluence with Deer Creek is the stand of towering old trees at Swallow Falls State Park. Hugging the Youghiogheny River is Maryland's oldest grove of eastern hemlock and white pine, some of which are reported to be at least 360 years old. Wehrle's Salamander (*Plethodon wehrlei*, In Need of Conservation) and four rare birds find breeding habitat along the Youghiogheny: winter wren (*Troglodytes troglodytes*, rare), red-breasted nuthatch (*Sitta canadensis*, highly rare), golden-crowned kinglet (*Regulus satrapa*, rare) and Blackburnian warbler (*Dendroica fusca*, Threatened). The rare invertebrates documented from this significant natural area include Spruce Knob threetooth (*Triodopsis picea*, highly rare), a globally vulnerable land snail, and ocellated darner (*Boyeria grafiana*, highly rare), one of many dragonflies that patrol the Youghiogheny River in their constant search for prey and suitable breeding habitat.

The extensive area of undisturbed forest and proximity to other natural areas, especially along the Youghiogheny River, provides suitable habitat and a dispersal corridor for far-ranging, area-sensitive animals like black bear and bobcat (*Lynx rufus*, In Need of Conservation), and a variety of other forest dwelling wildlife and plants. The extensive forest in which Lower Deep Creek Complex lies was identified as meeting the criteria for core habitat for Forest Interior Dwelling Species (FIDS) based on the size and configuration of the forest. In fact, it is among the largest contiguous blocks of forest in the State.

The forested stream corridor also provides habitat for countless species that are dispersing from breeding grounds or migrating to new areas. Movement corridors from lower elevations to higher elevations and from southern latitudes to northern latitudes will enable species to better adapt to shifting environmental conditions that are occurring due to climate change.

14. Hammel Glade — BioNet Tier: 1 — Size: 1,534 ac

Key Wildlife Habitats and other Key Elements

- Northern Conifer – Hardwood Forest
- Mesic Deciduous Forest
- Floodplain Forest
- Bog and Fen Wetland Complex
- Forested Seepage Wetlands
- Southern Water Shrew, Alder Flycatcher, and other rare animals

- Buckbean, Yellow Avens, and other rare plants

Ecological Significance
One of the most significant wetlands in western Maryland, Hammel Glade forms the headwaters of Red Run, which flows into Deep Creek Lake. This large wetland occupies a triangular valley between Roman Nose Mountain and Hoop Pole Hill. Hammel Glade sits in a low-lying hollow, or frost pocket, that harbors more cold-adapted species than most other areas; it supports a pocket of boreal life, a relic from the last Ice Age 15,000 years ago.

Hammel Glade has a number of high-quality significant and rare wetland habitat types, including a variety of open sedge-dominated glades, shrub swamps, and forested swamps. A Red Spruce – Eastern Hemlock – Great Laurel peatland swamp (globally rare) borders the shrub swamp and open beaver meadows, of varying stages of succession, in the center of the wetland. Much of the open meadow is comprised of dense blue-joint reedgrass (*Calamagrostis canadensis*) with a patchwork mosaic of other habitat types that dot the landscape. Found along streamsides or in low-lying margins, the Lake sedge fen (*Carex lacustris* State Rare) is an indicator of underlying calcium rich substrate.

Hammel Glade is one of the most botanically diverse mountain peatland in Western Maryland, because of underlying Greenbrier formation geology that is rich in argillaceous limestone. While much of this wetland is acidic, springs originating from within the site do appear to increase the pH significantly in areas, as evidenced by the types of plants growing in patches in specific areas throughout. At least eleven rare plants have been documented here, including seven that are listed as Endangered or Threatened. Among the numerous rare plants that live here are Jacob's-ladder (*Polemonium van-bruntiae*, Endangered), yellow avens (*Geum aleppicum*, Endangered), and buckbean (*Menyanthes trifoliata*, Endangered).

Much of the central and southern portions of Hammel Glade are protected by The Nature Conservancy. However, human disturbances within the wetland and its drainage include livestock grazing, widespread timbering, commercial development along the US 219 corridor, and residential development along the other two sides, especially along Foster Road.

15. Keystone Swamp BioNet Tier: 3 Size: 57 ac

Key Wildlife Habitats and other Key Elements
- Bog and Fen Wetland Complex
- Alder Flycatcher and Small Cranberry

Ecological Significance
Keystone Swamp is at the headwaters of a small drainage into Deep Creek Lake just west of Thayerville. This wetland is a small but diverse shrubby, minerotrophic acidic fen. Dense stands of speckled alder and skunk cabbage cover the majority of the wetland.

The dense alder stands provide breeding habitat for alder flycatcher (*Empidonax alnorum*, In Need of Conservation). One open area with sedges and sphagnum moss occurs at the northern edge of the wetland. Other rare species live here, including thick mats of large cranberry (*Vaccinium macrocarpon*, watchlist) and some small cranberry (*V. oxycoccos*, Threatened). Acidic seepage springs keep the entire wetland permanently wet in most places. A few red spruce persist and the wetland edge. Although this wetland is relatively undisturbed, silt has entered the stream from human activities, such as limestone crushing and development, on the adjacent upland slopes.

16. McHenry Wetland South **BioNet Tier: 4** **Size: 6 ac**

Key Wildlife Habitats and other Key Elements

- Highland Stream
- A Flatworm

Ecological Significance

South of the town of McHenry, near the edge of Deep Creek Lake, is a small stream. This very small stream has a slow flow of clear water running over pebbles, cobbles, and pieces of wood. A few willow trees grow along its banks. This stream is home to a very tiny animal called a flatworm (*Planaria dactyligera*, rare). One of the most primitive forms of animal life, this flatworm lives beneath rocks and woody debris.

APPENDIX C

Specific Protection Measures for Wildlife and Rare Species Habitats

Water Quality and Hydrological Protection Measures

Many of the Ecologically Significant Areas harbor rare species and habitats that are directly dependent on wetlands or aquatic systems. The following recommendations pertain to maintaining the hydrology and water quality of the rare species' habitats found throughout the watershed. Pursuing these measures regarding stormwater management, the extent and location of impervious surfaces, forest retention and sediment/erosion control is very important to the conservation of the rare species' wetland and aquatic habitats.

1. Pursue environmentally sensitive design to address stormwater runoff by promoting the use of nonstructural best management practices to the maximum extent. The goal is to mimic natural infiltration patterns across the site in order to maintain natural hydrology.
    a. Methods to pursue include the use of sheet flow to buffers, vegetated channels to convey road runoff (i.e. roadside swales), disconnection of roof and non-roof runoff, methods of bioretention such as rain gardens.
    b. Reduce impervious cover as outlined in the MDE stormwater management manual section 5.1.3.1, which is available online at their website: (http://www.mde.state.md.us/programs/Water/StormwaterManagementProgram/MarylandStormwaterDesignManual/Documents/www.mde.state.md.us/assets/document/Design%20Manual%20Chapter%205%2003%2024%202009.pdf). In addition to these methods, options to pursue include the use of shared parking/driveways and pervious materials wherever possible.
    c. Locate impervious surfaces as far as possible from permanent and intermittent streams and their floodplains.
2. In order to minimize risk of sedimentation in the aquatic and wetland habitats and to minimize changes to the hydrology of these habitats:
    a. Minimize clearing and retain forest - The limits of disturbance should be the minimum needed to build homes, allow access and provide fire protection. Conduct clearing and construction in phases in order to avoid having large areas cleared at one time. Pursue clustered development in order to allow retention of large blocks of contiguous upland forest along streams and wetlands.
    b. Stabilize soil - Stabilization should occur immediately (within 24 hours). Special effort should be made to retain fine particle silt, sand and clay sediments including the incorporation of

redundant/additional control measures in the sediment and erosion control plan to ensure maximum filtration of any sediment-laden runoff (e.g., accelerated stabilization, super silt fence instead of silt fence, etc.).

c. Inspect frequently - All measures should be inspected daily to ensure that they are functional from the very initial stages through final construction, and any problems should be corrected immediately.
d. Provide a minimum 100 ft undisturbed forested upland buffer to permanent and intermittent streams and nontidal wetlands.
e. Avoid disturbing steep slopes (15% slope or greater) and areas of highly erodible soils.

3. Where instream work is unavoidable, provide adequate passage for fish, reptiles and amphibians. Further consultation with the Natural Heritage Program should be sought in order to minimize impacts from instream work in or upstream from rare species' aquatic and wetland habitats.

Potential Forest Interior Dwelling Species (FIDS) Habitat

Within the Chesapeake Bay Critical Area, habitat protection for forest interior dwelling birds is mandated through regulations authorized by the Chesapeake Bay Critical Area Law (Natural Resources Article 8-1808, Annotated Code of Maryland). The regulations require that management programs be developed to protect and conserve riparian and upland forests used for breeding by FIDS within the Critical Area. DNR strongly encourages that protection programs for FIDS be extended beyond the Critical Area. Guidelines for determining FIDS habitat and conserving these areas are found in two publications:

Bushman, E. S., and G. D. Therres. 1988. Habitat management guidelines for forest interior breeding birds of coastal Maryland. Maryland Department of Natural Resources, Wildlife Technical Publication 88-1. 50pp.

Jones, C., J. McCann, and S. McConville. 2000. A guide to the conservation of forest interior dwelling birds in the Chesapeake Bay Critical Area. Chesapeake Bay Critical Area Commission, Annapolis, Md. 58pp.

In addition, the following specific protection measures should also be considered when development projects are being evaluated for potential ecological impacts to FIDS habitat:

1. Restrict development to nonforested areas.
2. If forest loss or disturbance is unavoidable, concentrate or restrict development to the following areas:
   a. the perimeter of the forest (i.e., within 300 feet of existing forest edge)

b. thin strips of upland forest less than 300 feet wide
c. small, isolated forests less than 50 acres in size
d. portions of the forest with low quality FIDS habitat, (i.e., areas that are already heavily fragmented, relatively young, exhibit low structural diversity, etc.)

3. Maximize the amount if forest "interior" (forest area >300 feet from the forest edge) within each forest tract (i.e., minimize the forest edge:area ratio). Circular forest tracts are ideal and square tracts are better than rectangular or long, linear forests.
4. Minimize forest isolation. Generally, forests that are adjacent, close to, or connected to other forests provide higher quality FIDS habitat than more isolated forests.
5. Limit forest removal to the "footprint" of houses and to that which is necessary for the placement of roads and driveways.
6. Minimize the number and length of driveways and roads.
7. Roads and driveways should be as narrow and as short as possible; preferably less than 25 and 15 feet, respectively
8. Maintain forest canopy closure over roads and driveways.
9. Maintain forest habitat up to the edges of roads and driveways; do not create or maintain mowed grassy berms.
10. Maintain or create wildlife corridors.
11. Do not remove or disturb forest habitat during April-August, the breeding season for most FIDS. This seasonal restriction may be expanded to February-August if certain early nesting FIDS (e.g., Barred Owl) are present.
12. Landscape homes with native trees, shrubs and other plants and/or encourage homeowners to do so.
13. Encourage homeowners to keep pet cats indoors or, if taken outside, kept on a leash or inside a fenced area.
14. In forested areas reserved from development, promote the development of a diverse forest understory by removing livestock from forested areas and controlling white-tailed deer populations. Do not mow the forest understory or remove woody debris and snags.
15. Afforestation efforts should target a) riparian or streamside areas that lack woody vegetative buffers, b) forested riparian areas less than 300 feet wide, and c) gaps or peninsulas of nonforested habitat within or adjacent to existing FIDS habitat.

Invasive Species

Invasive species are non-native species that cause economic and environmental problems. Invasive species have been ranked as the second greatest threat to biodiversity because many invasives can displace native species. In the United States, it is estimated that the current 50,000 non-native species cause economic losses totaling $120 billion per year. Furthermore, it has been estimated that 57% of all imperiled plant species are affected by invasive species. Common invasive species in southern MD include common reed grass (*Phragmites australis*) and virile crayfish (*Orconectes virilis*). Many times, managing

established invasives is costly and time consuming. Therefore, the best way to control invasive species is by preventing invasion and through early detection and response.

Prevention BMP's

If construction or logging equipment is to be used within 500 ft of a seepage wetland, then thorough washing of equipment offsite is recommended. Only non-weedy, native species and weed-free mulch and soils should be used for landscaping and gardening and for soil stabilization. Time logging and other land disturbance to avoid the fruiting/dispersal period of any highly invasive species that are common in the immediate area in order to reduce the spread of these species. Where possible, pursue control measures for highly invasive species that occur on site during the year prior to logging or clearing in order to further minimize spread. After logging or construction, it is recommended that bare soils are revegetated with non-weedy, native species. Survey lands occasionally to see if any invasive species have colonized, and attempt to eradicate any new populations to prevent further invasion.

1. When hiking to a new area, try to clean boots and bags to get rid of hitchhiking seeds and pests.

2. Don't move firewood into new areas as it can harbor invasive wood-boring insects such as the emerald ash borer.

3. Fishermen are advised to never release live, unused bait or to transport live fish or crayfish from one body of water to another. Similarly, never dispose of aquarium plants or fish or other pets into the wild.

Management BMP's

Species-specific control measures should be implemented to manage established invasive species. Herbicide applications should be limited and only chemicals approved for wetland use should be used. Through the use of wipers and droppers, managers can apply targeted chemical applications. After invasive plants have been removed, non-weedy native vegetation should be planted in any areas with exposed soil.

Useful Links:

- ***Recommended native species to plant; MD Native Plant Society***
  http://www.mdflora.org/publications/natives2plant_lists.html
- ***Maryland Invasive Species Council (MISC)***
  http://www.mdinvasivesp.org/
- ***Plant Invaders of Mid-Atlantic Natural Areas***
  http://www.nps.gov/plants/alien/pubs/midatlantic/

- ***Rusty crayfish brochure***
  http://www.dnr.state.md.us/invasives/RustyCrayfishBrochure.pdf
- ***Virile crayfish brochure***
  http://www.dnr.state.md.us/invasives/virilecrayfish.pdf

- ***Emerald Ash Borer ID sheet***
  http://www.goodcamper.info/files/E2944.pdf
- ***Landowner's Guide to Phragmites control***
  http://www.michigan.gov/documents/deq/deq-ogl-Guide-Phragmites_204659_7.pdf
- ***Best Management Practices for Canary Reed Grass (Phalaris arundinacea* L.)**
  http://www.fws.gov/shorebirdplan/downloads/ReedCanaryGrassReport2004.pdf

Appendix D

Important Key Wildlife Habitats of Deep Creek Lake Watershed

A. Bog and Fen Wetland Complexes

Description:

Bogs and fens are open seepage wetlands supporting a patchwork of saturated shrub and herbaceous vegetation. The term "bog" is actually a technical misnomer, and in strict usage applies only to peatlands that are fed by rainwater (ombrotrophic). We have adopted it here for consistency since this term is so widely used throughout much of the region to describe open, acidic seepage wetlands. In Maryland, bogs and fens are groundwater-fed (minerotrophic) and best developed on seepage slopes, along headwater streams, oxbows of streams, and margins of beaver ponds, established millponds, and sandpits. Bog soils vary from mineral to deep peat, are extremely acidic, nutrient-poor, and often support a variety of sphagnum mosses. Bogs on the Appalachian Plateau are uncommon habitats, often occurring in openings on seepage slopes and along streams bordered by forests of red spruce, eastern hemlock, white pine, larch, red maple, and black gum. Shrubs common to these habitats include speckled alder, narrow-leaved meadowsweet, mountain holly, and black chokeberry. Small openings interspersed amongst the shrub growth support dense mats of sphagnum and haircap mosses and herbaceous species such as Virginia cotton-grass, rose pogonia, round-leaved sundew, and a variety of ferns, rushes, and sedges.

Current Condition:

A significant portion of Maryland's bogs and fens have been destroyed or seriously impacted by strip mining, agricultural conversion, lake and pond construction, and development. Although the ecological dynamics of these habitats are not fully understood, many have suffered from shrub and tree succession. Factors that may have been responsible for creating and maintaining these habitats include fire, grazing, beavers, and deep deposition of unstable soils. Bog and fen habitats are most numerous in Garrett County where some of the best remaining examples are found on property owned and managed by the Nature Conservancy.

Threats and Stressors:

a. Conversion to agriculture that results in loss of habitat
b. Development and land use, including roadways, that result in fragmentation and isolation
c. Incompatible agricultural practices, such as ditching, channelization, pond construction, livestock grazing, and inadequate buffers, that result in habitat degradation
d. Hydrologic changes from residential development, agricultural practices, mining, and other impacts such as ditching, water withdrawal, and pond construction
e. Reduced water quality through chemical contamination, siltation, and pollution
f. Invasive species that result in degradation of habitat

g. Pesticide use and contamination that directly or indirectly affects plants and animals
h. Acid mine drainage
i. Incompatible silviculture practices that results in habitat degradation
j. Timber harvesting that results in loss of northern conifers (red spruce, eastern white pine, balsam fir, eastern hemlock)
k. Hemlock wooly adelgid that causes loss of eastern hemlock component
l. High deer densities resulting in overbrowsing and loss of understory plants
m. Habitat degradation by ORV's and other human disturbances
n. Altered natural disturbance patterns or lack of certain management practices
o. Acid precipitation that results in habitat degradation
p. Nontarget impacts of gypsy moth control
q. Increase in nutrients as a result of septic and stormwater runoff
r. Lack of adequate buffers in development areas

Conservation Actions:

a. Establish and maintain protected networks of bog-fen wetlands and provide sufficient landscape connectivity within an extensive forest matrix
b. Avoid or minimize timber harvesting impacts in wetland areas and surrounding forest matrix
c. Protect wetlands through acquisitions and easements
d. Incorporate wetland conservation actions into land planning efforts and public land management plans
e. Protect wetlands from drainage, ditching, filling, water withdrawal, and other damaging practices that alter hydrology
f. Work with farming community to restore and protect wetlands
g. Develop and implement protocols to control invasive species and prevent their establishment
h. Enforce and improve, as needed, nontidal wetland protection regulations, especially as it relates to Nontidal Wetlands of Special State Concern
i. Restore northern conifer component of bog wetlands
j. Prohibit ORV's in and around wetland sites
k. Limit development impacts within wetland areas and surrounding watershed
l. Minimize runoff from roads, including silt, salt and contaminants
m. Minimize and reduce habitat fragmentation
n. Manage or control livestock grazing within the wetlands
o. Strictly enforce existing federal and state wetland protection laws
p. Restore wetlands affected by acid mine drainage
q. Educate the public to reduce impacts and disturbances to wetlands
r. Implement nitrogen and phosphorus reduction strategies for septic and stormwater runoff
s. Develop and implement protocols to control deer populations to reduce browsing levels
t. Work with watershed groups, watershed-based initiatives, landowners, and federal programs to expand and coordinate wetland conservation efforts

u. Restore wetlands where appropriate
v. Implement controlled burn programs as appropriate
w. Avoid gypsy moth control in wetland areas and the surrounding forest buffer
x. Work with landowners and farming community to develop and encourage BMPs for agricultural practices
y. Work with Maryland DOT to minimize wetland impacts and explore offsite mitigation for wetland complexes

B. Northern Conifer - Hardwood Forests

Description:

This habitat comprises two sub-boreal forest types, northern conifers and northern hardwoods. In Maryland, northern conifer-hardwood forests grow primarily on the Allegheny Plateau, typically on mesic sites above 600 m, as forest ecotones bordering high elevation wetlands, along stream bottoms and north-facing slopes, and in deep ravines. In northern conifer forests, eastern hemlock, red spruce, and/or white pine is co-dominant or dominant, and often mixed with northern hardwoods. Northern hardwood forests are dominated by sugar maple, yellow birch, and black cherry. Associates include basswood, white ash, northern red oak, red maple, American beech, and northern conifers. In both forest types, common midstory and understory species include striped maple, witch hazel, maple-leaf viburnum, and frequently dense patches of great laurel and mountain laurel. The herb layer is often quite diverse, especially in less acidic soils.

Current Condition:

Most of the state's remaining northern conifer-hardwood forests occur on the Allegheny Plateau. The overall extent and quality of this habitat has been greatly diminished by logging, conversion to agriculture, strip mining and residential development. During the late 19th and early 20th centuries, logging all but eliminated most remaining tracts of old growth condition of this forest. On the Allegheny Plateau, red spruce was nearly logged out. Most of the few remaining forests containing red spruce are now confined to high elevation bog wetland systems. The extent and dominance of white pine, a highly sought after and formerly much more common tree species, has also been greatly reduced. In recent years, eastern hemlock has been impacted by infestations of hemlock wooly adelgid an accidentally introduced insect pest. Widespread declines in hemlock could have severe ripple effects on other flora and fauna dependant on hemlock-dominated forests.

Threats and Stressors:

a. Conversion to other land uses or forest types that results in loss of habitat
b. Pesticide use and contamination that directly or indirectly affects plants and animals
c. Incompatible silviculture practices that result in degradation of habitat
d. Development and land use, including roadways and trails that results in forest fragmentation and isolation

e. Deer overbrowsing or other causes that result in loss of forest structural diversity
f. Forest pest species that may have landscape level effects
g. Invasive/exotic species that result in degradation of habitat
h. Forest pests that cause loss of spruce component of forests
i. Hemlock wooly adelgid and other forest pests that cause loss of hemlock component of forests
j. Deer overbrowsing or other causes that result in loss of forest structural diversity
k. Acid precipitation that results in habitat degradation
l. Development (e.g., wind farms) on ridgetops that result in loss of habitat

Conservation Actions:

a. Maintain conifer component of forest or restore such where appropriate
b. Conserve large blocks of contiguous forest where appropriate
c. Minimize fragmentation of large, unbroken forest blocks
d. Establish and maintain landscape-scale protected habitat and movement corridors
e. Develop and implement protocols to control invasive species in a manner compatible with GCN species
f. Work through the Public Service Commission to reduce impacts of wind farms on this habitat and associated GCN species
g. Incorporate forest conservation actions into land use and land planning efforts by local, state, and federal agencies
h. Develop habitat management guidelines for use by foresters and land managers and work with them to implement such
i. Develop and implement protocols to control deer populations to reduce browsing levels
j. Implement appropriate Integrated Pest Management (IPM) practices to minimize the damage of serious forest pest species and the effects of pesticides on non-target species
k. Restore degraded habitats through appropriate techniques
l. Work with Maryland DOT to improve transportation planning for new roads to minimize fragmentation of habitat

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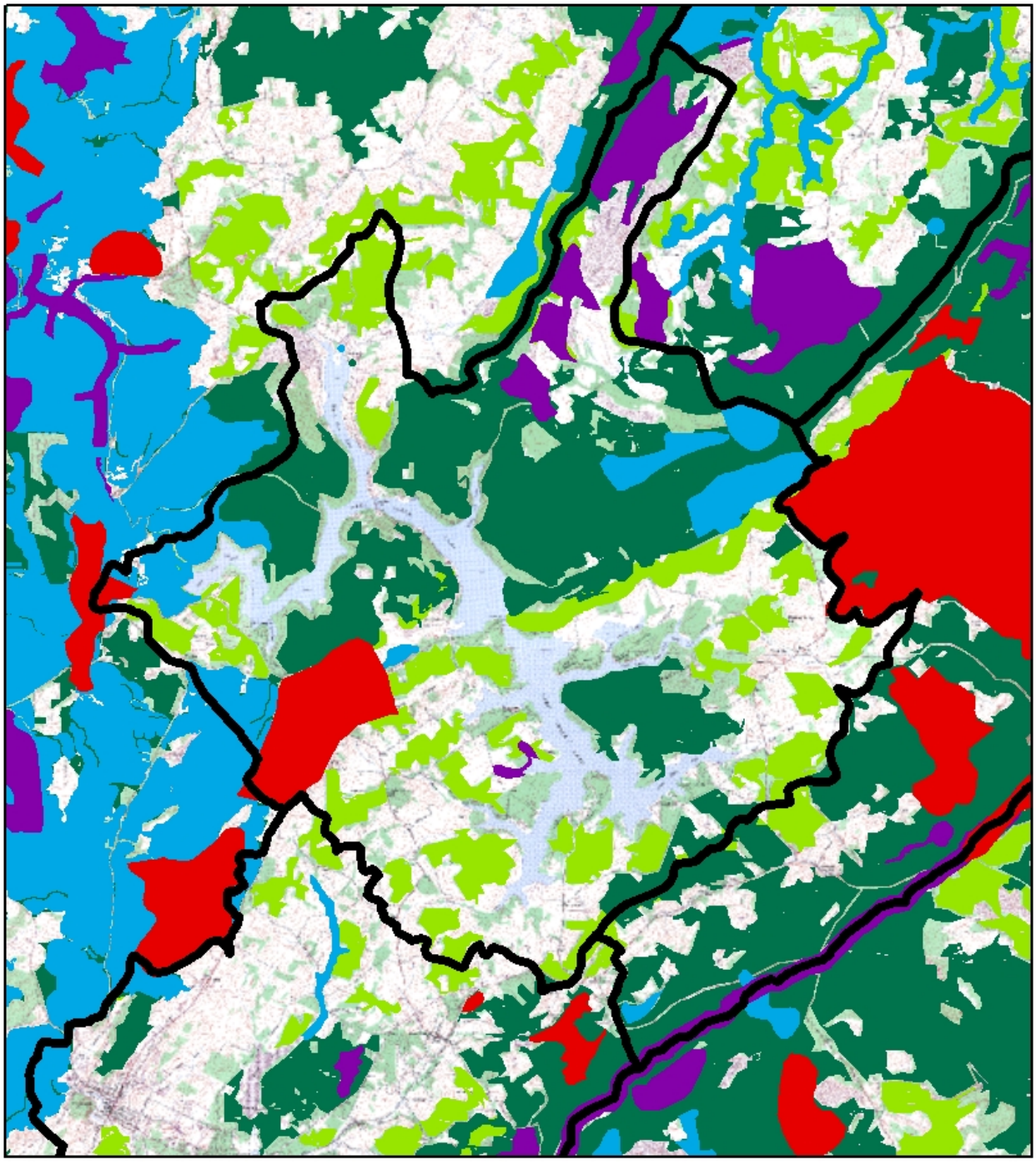
Appendix E – 1. Biodiversity Conservation Network (BioNet) of Deep Creek Lake Watershed, Garrett County, Maryland



Legend

BioNet Tiers

- Tier 1
- Tier 2
- Tier 3
- Tier 4
- Tier 5

N

0 0.5 1 2 3 4 Miles

Martin O'Malley
Governor

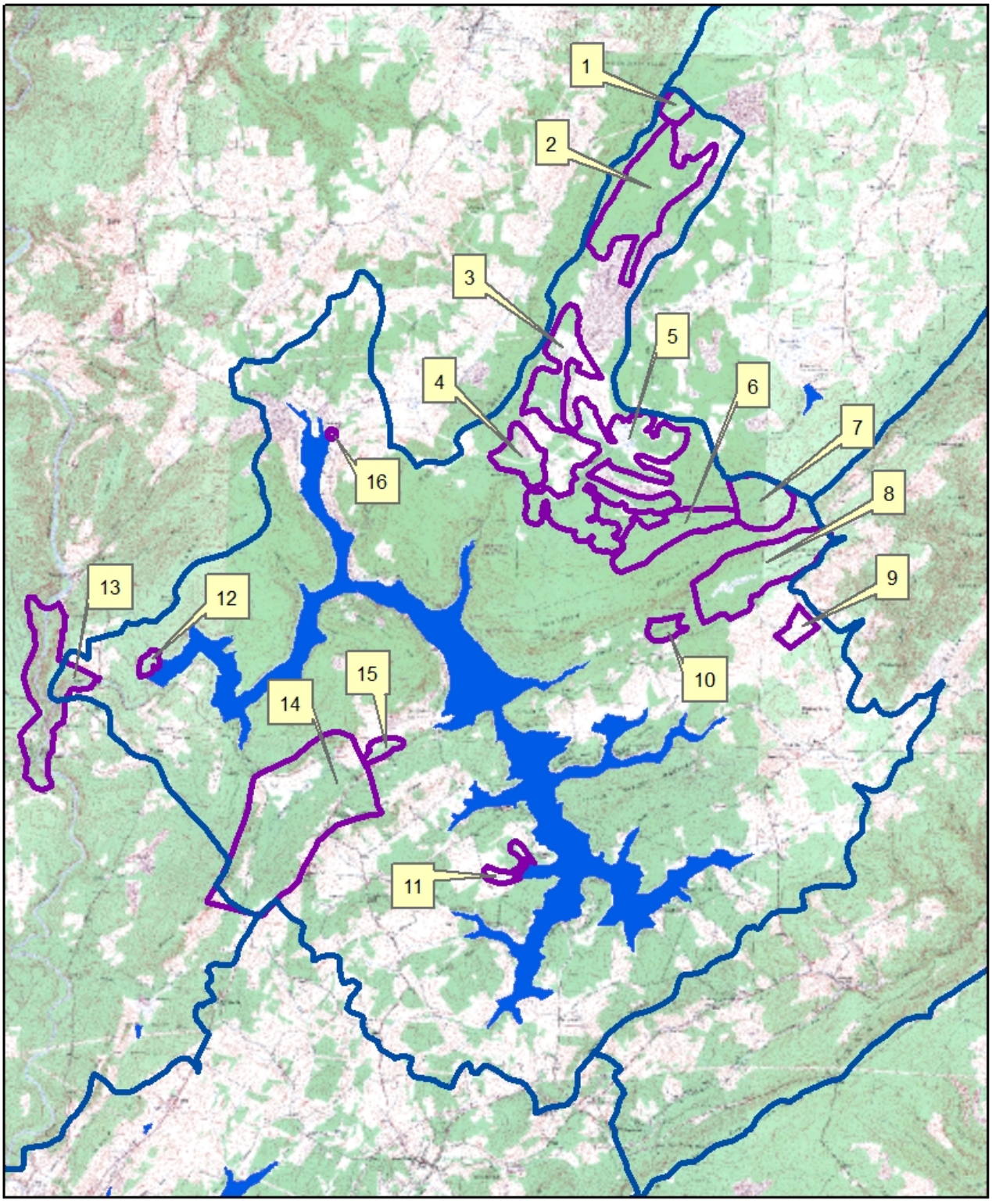
Anthony G. Brown
Lt. Governor

Joseph P. Gill
Secretary

MARYLAND DEPARTMENT OF NATURAL RESOURCES

DRAFT

Appendix E – 2. Ecologically Significant Areas of Deep Creek Lake Watershed, Garrett County, MD



N

0 0.5 1 2 3 4 Miles

MARYLAND DEPARTMENT OF NATURAL RESOURCES

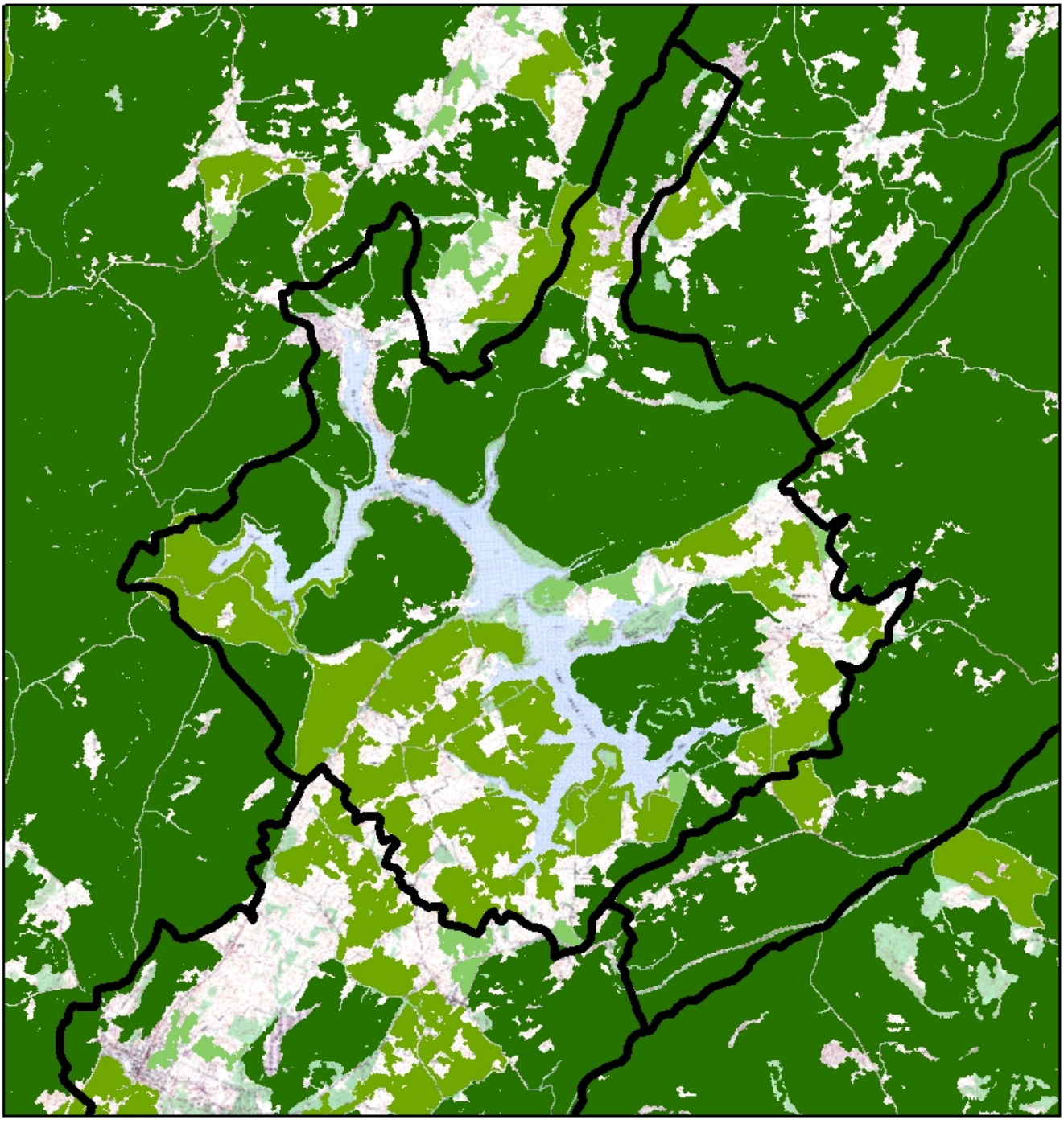
Martin O'Malley
Governor

Anthony G. Brown
Lt. Governor

Joseph P. Gill
Secretary

DRAFT

Appendix E – 3. Potential Forest Interior Dwelling Species (FIDS) Habitat of Deep Creek Lake Watershed, Garrett County, Maryland



Legend

FIDS Class

- Class 1
- Class 2
- Class 3

N

0 0.5 1 2 3 4 Miles