MARILANDICA

Journal of the Maryland Native Plant Society

Vol. 10, No. 1 Winter/Spring 2002

Marilandica
Journal of the Maryland Native Plant Society
Volume 10, Number 1 Winter/Spring 2002

Table of Contents

Submissions for articles in *Marilandica* are welcomed. Electronic text is preferred but not necessary. If you wish to contribute articles or other material, or have questions or comments, please contact the e-mail address listed on page 19 or send to Meghan Tice at P.O. Box 25, Bowie, MD 20719. Thank you.

The Maryland Native Plant Society

(MNPS) is a nonprofit organization that uses education, research, and community service to increase the awareness and appreciation of native plants and their habitats, leading to their conservation and restoration. Membership is open to all who are interested in Maryland's native plants and their habitats, preserving Maryland's natural heritage, increasing their knowledge of native plants, and helping to further the Society's mission.

MNPS sponsors monthly meetings, workshops, field trips, and an annual fall conference.

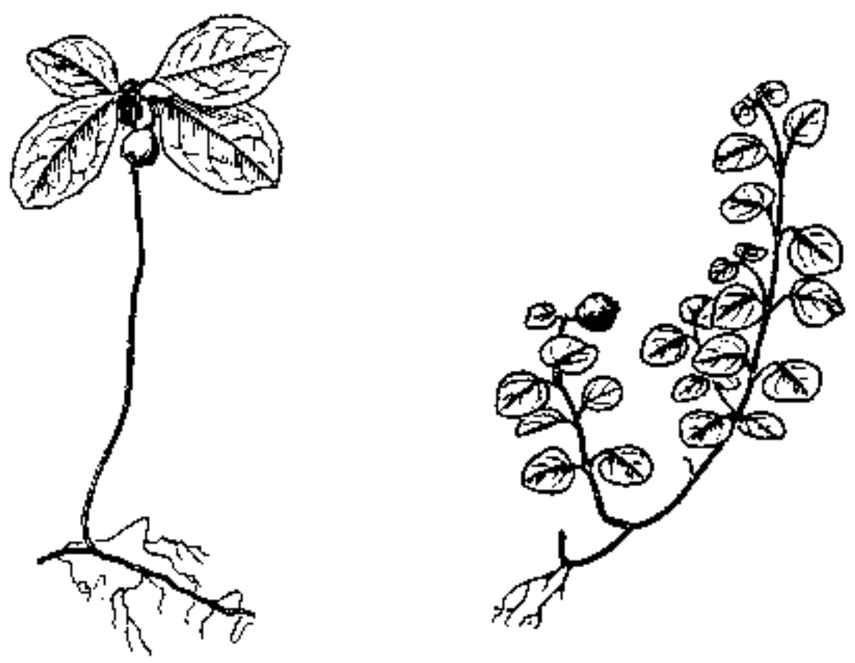
Maryland Native Plant Society
P.O. Box 4877
Silver Spring, MD 20914
www.mdflora.org

Winter Botanizing in Maryland

By Meghan D. Tice

There are many interesting plants to observe even on the coldest winter days. In fact, a good way to learn to distinguish some native plants is to study the ones that persist throughout the winter months. Besides the well-known evergreens such as American holly, pines, hemlock, cedars, and spruces, there are several shrubs that keep their green in the winter. One is the commonly occurring mountain laurel (*Kalmia latifolia*), which can be seen throughout Maryland. Mountain laurel is a member of the Heath Family (*Ericaceae*), which contains several evergreen species. The sheep laurel or lambkill (*Kalmia angustifolia*) is a rare, watch list species in Maryland. It tends to grow near bogs in acid soil and is a much smaller shrub than the mountain laurel. Another evergreen shrub of the Heath Family is rosebay or giant laurel (*Rhododendron maximum*) that occurs in the mountain zone and upper piedmont of Maryland. Their large, glossy leaves droop under the weight of ice and snow. One of the rarest plants in Maryland, the box huckleberry (*Gaylussacia brachycera*), is listed as endangered but may now be extirpated. The last known site for this small shrub was in Anne Arundel County. Box huckleberry is the only evergreen huckleberry that existed in Maryland as a glacial remnant. Anne Arundel County also contains some examples of the natural community known as the northern or quaking bog. Within these bogs grows another ericaceous evergreen, the large cranberry (*Vaccinium macrocarpon*), a rare, watch list species that is also found in bogs in Garrett County. Garrett County is also home to the state-threatened small cranberry (*Vaccinium oxycoccos*). The Heath Family also contains some smaller evergreens. One is the well-known wintergreen, teaberry, or checkerberry (*Gaultheria procumbens*), which can be seen in acid woods throughout Maryland. Another member of the genus, the creeping snowberry (*Gaultheria hispidula*), is a state-endangered species that only occurs in Garrett County. One last, small evergreen member of the Heath Family is trailing arbutus or mayflower (*Epigaea repens*), found uncommonly throughout the state in dry, acid woodlands, often on slopes.

Not to be confused with the previously mentioned wintergreen is the spotted wintergreen (*Chimaphila maculata*), which is a member of the Wintergreen Family (*Pyrolaceae*). Spotted wintergreen is a common, small evergreen that can be seen in woodlands throughout Maryland. A highly state-rare member of the genus is pipsissewa or prince's pine (*Chimaphila umbellata*). Pipsissewa lacks a pale stripe on the leaves and has leaves that occur in whorls. Round-leaved pyrola (*Pyrola rotundifolia*) and other *Pyrola* species are uncommon members of the Wintergreen Family that have round, glossy evergreen leaves that grow from basal rosettes.



Wintergreen and Partridgeberry

Partridgeberry (*Mitchella repens*) is a low, creeping evergreen that is common throughout the state. It forms small mats of tiny, opposite, dark green, glossy leaves that have pale midribs, and has bright red berries. Partridgeberry is in the Madder Family (*Rubiaceae*).

Mistletoe is a popular holiday tradition, but it might surprise some to learn that there is mistletoe native to Maryland. American mistletoe (*Phoradendron flavescens*) can be found throughout southern Maryland and on the eastern shore. Mistletoe is parasitic on several species of deciduous trees, especially oaks. Some call the species oak mistletoe, though it can also be found in maples, gums, and elms. The popularity of mistletoe stems from the Druids who believed that the spirit and power of the oak resided in the mistletoe during the winter months. It has been thought of as a symbol of fertility: hence the kiss.

Several species of ferns can be seen throughout the winter, which is helpful in learning to identify them. Perhaps the most frequently seen, and familiar, is the aptly named Christmas fern

(*Polystichum acrostichoides*). Others to be noted in winter are wood ferns such as the spinulose wood fern (*Dryopteris spinulosa*), commonly seen in the mountain zone, intermediate wood fern (*Dryopteris intermedia*), found in the mountain and midland zones, and the marginal wood fern (*Dryopteris marginalis*), which can also be seen in the mountains and midlands. Marginal wood fern is named so because the sori, or fruit dots, occur near the margin, or edge, of the leaflets. Spinulose and intermediate wood ferns have more serrated leaflets and sori that occur close to the midrib. Intermediate wood fern has sori with stalked glands that can be seen with a hand lens. Log fern (*Dryopteris celsa*) is a watch list species that is tracked by the Maryland Natural Heritage Division. Common polypody (*Polypodium virginianum*) is found throughout Maryland growing on rock outcrops, rocky soil, or the trunks of trees. Walking fern (*Asplenium rhizophyllum*) is an interesting fern that grows on rock outcrops in the piedmont, though not commonly. The walking fern spreads by rooting at the tip of its leaves. Ebony spleenwort (*Asplenium platyneuron*) is an evergreen fern that can be found throughout the state in well-drained, sandy or rocky soils. Its leaves are narrow, fairly short, and have a shiny black stipe. Mountain (*A. montanum*) and maidenhair (*A. trichomanes*) spleenworts occur infrequently in western Maryland, growing on rock outcrops. There are several other species of evergreen ferns that can be found in the state, including two spleenworts that are currently listed as endangered.

Common Polypody

A very attractive family of plants, especially during winter, is the Clubmoss Family (*Lycopodiaceae*). *Lyco~* means wolf, *~podium* means foot, and some common names given to the lycopods are ground pine, running pine, ground or running cedar, wolf's claw, bear's claw, and crow's foot. Over the years, clubmosses and partridgeberry have been collected for holiday decorations and good luck charms, but this should not be done because they are very slow-growing plants and can be easily decimated by such practices. Some fairly common species in Maryland are tree clubmoss or ground pine (*Lycopodium obscurum*), ground cedar (*L. digitatum*), and shining clubmoss (*L. lucidulum*).

Orchids (*Orchidaceae*) are a family of plants that many wouldn't expect to see on a winter day. However, there are some species that produce their leaves in the fall instead of the spring. These leaves persist throughout the winter and then wither before the plants bloom in the spring or summer. Light is made available to such plants because of the open canopy of leafless trees. One species, the cranefly orchid (*Tipularia discolor*), has a beautiful leaf that is green on the top with occasional purple spots, and bright purple underneath. Another orchid of winter is the puttyroot (*Aplectrum hymale*), with its long, oval, striped leaf. Perhaps the loveliest of orchid leaves are those of the downy rattlesnake-plantain (*Goodyera pubescens*), which are dark green with a network of white nerves and veins, grow in a basal cluster, and can be seen during the winter and throughout the rest of the year.

As early as February (or even in December this winter), skunk cabbage (*Symplocarpus foetidus*) flowers can be seen blooming in wet woodland depressions. Skunk cabbage is in the Arum Family (*Araceae*) and its members have dense flowers on a spike, or spadix, and in some species (such as skunk cabbage) the spadix is surrounded by a hood, or spathe. The large, cabbage-like leaves emerge after the plant blooms.

The days may be short during winter months, but when the leaves and the snows fall, the earth seems to be a brighter place. There are many beautiful things to take notice of during winter, such as the sparkle in an icicle, or the many sparkles on the surface of a snowfall, or even in the frost we have to scrape off of our cars. If you look at them carefully as the sunlight strikes them, you can see all the colors of the spectrum. Things that you may overlook during the other seasons will start to stand out, like the greens of mosses, the reds of berries, the many kinds of pods and nuts that autumn left behind, the openness and colors of the sky that are less visible during greener months, or the stars on a cloudless night. Enjoy the season.

Restoration of Forests: A Recommended Land Use for Disturbed Areas

By W.R. Carter, III

Introduction

Much of the eastern part of the United States was covered by forest prior to the European contact. The forests probably developed from southern refugia and expanded northward over some 10,000 years since the retreat of the Wisconsin glacier. Numerous varied microclimates and soil types were exploited and moderated by many species, including some 315 species of trees (exclusive of ca. 100 tropical species confined to southern Florida) (Little 1980:18). Abiotically superimposed random events created complex assemblages of uneven-aged vegetational communities and ecotones with diverse microhabitats, and thereby supported highly biodiverse communities of organisms. These, evolving so as to utilize available solar energy and recycle mineral resources wherever climatic conditions permitted, constituted the maximally possible efficient mechanisms for conservation of nutrients and fixed energy. This circumstance minimized downdrainage export and eutrophication of receiving waters.

Relatively few people today understand the attributes of this biome, its current relative scarcity and continuing negative trends in abundance, or the increasing societal and natural resources management problems attendant on its decline. Appreciation of the benefits of forests and concern for the future urge forest restoration on disturbed lands wherever they are available. Explication of the reasons for this posture is the purpose of this paper.

Conservation Issues Bearing on Forest Development on Disturbed Lands

Over 20 years ago, the Global 2000 Report to the President (Barney 1980, p. 326) noted: "The projected growth in human population and economic activity can be expected to create enormous economic and political pressure to convert the planet's remaining wildlands to other uses. As a consequence, the extinction rate will accelerate considerably." This has, in fact, occurred.

In 1980, world population was estimated at 4.456 billion (U.S. Bureau of the Census 2001a). United States population was ca. 227.2 million (U.S. Bureau of the Census 2001b). Maryland population was 4.216 million (Maryland Office of Planning 1993).

In 2000, world population was estimated as 6.080 billion, (U.S. Bureau of the Census 2001a), U.S. population was 281.421 million (U.S. Bureau of the Census 2000a), and Maryland population was 5.296 million (U.S. Bureau of the Census 2000a). Population projections for the world, the United States, and Maryland are as follows:

Year	World	United States	Maryland
2020	7.518 billion	324.93 million	6.014 million
2025	7.841 billion	337.815 million	6.274 million
2050	9.104 billion	403.687 million	not available

(Sources: World: Census Bureau 2001a; United States: U.S. Bureau of the Census 2000b; Maryland: Maryland Office of Planning 1999.)

In a more ecologically oriented context, the population of the Chesapeake Bay drainage basin in 2000 was approximately 15,594,241. In 2020, it is projected to be 17,766,630 (EPA, CBP 1999).

In addition to the absolute increases of population for the Chesapeake watershed and Maryland, land utilization patterns have shifted in recent decades such that each resident tends to consume more land. The rate of land consumption per capita in the Chesapeake region increased from 0.18 acres in 1950 to 0.65 acres per capita in 1980. In 1988, it was projected that, depending on how residential development patterns are managed, additional housing and roads will absorb between 63,827 acres and 205,597 acres in 2020, increasing the developed fraction of the State from 19% to about 33% (2020 Report). Since current population projections for 2020 are greater than those made in 1988, it is predictable that land consumption will also be greater than these figures. Population demand for housing will absorb additional acreage, making preservation and re-forestation more and more difficult.

Suzuki (2001) cites World Resources Institute (WRI) to the effect that extinction rates are 100 to 1000 times that which would occur naturally. Tickell

(1998) reports 8,758 tree species, ca. one-tenth the known species, are at risk of extinction. WRI currently reports 25,971 species of higher plants (ferns, fern allies, conifers, cycads, and flowering plants) out of a world total of ca. 270,000 (9.6%) as threatened (WRI 2000, Table B.I.3).

WRI utilizes FAO data in tabulating that world total forest area has continued to decline, dropping from 3.51 billion hectares (=ca. 13.55 million square miles) in 1990 (FAO, Rome 1995) to 3.45 billion hectares (= ca. 13.32 million square miles) in 1995 (FAO, Rome 1999). Deneen and Rembert (1999) utilize International Union for the Conservation of Nature (IUCN) data in reporting that 29% of the United States' ca. 16,000 species of plants are at risk of extinction. WRI (2000-2001, Table B.I.3) tabulates that 2,449 out of 4,036 (60.6%) species of higher plants endemic to the United States are threatened. "Threatened" means "all full species categorized at the global level as endangered, vulnerable, rare, or indeterminate."

The IUCN Red List of threatened species for 2000 shows increases in numbers of threatened animal species (IUCN 2000). The 1996 mammals list indicated 169 species as critically endangered and 315 as endangered. The 2000 list enumerates 180 critically endangered species and 340 as endangered. Birds listed as above were, for 1996 and 2000, respectively, critically endangered: 168 and 182, endangered: 235 and 321. Among other vertebrate taxa, approximately 25% of reptiles, 20% of amphibians, and 30% of fishes (mainly freshwater) so far assessed are listed as threatened.

On a more regional scale, the Chesapeake Bay watershed was estimated as being more than 95% forested at the time of the European contact (EPA/Chesapeake Bay Program 1995). McAvoy (2001:8) states that, "Prior to the European settlement, virtually all of Delaware's land area was forested." The watershed of Chesapeake Bay is currently about 58% forested (EPA/Chesapeake Bay Program 1995).

More locally still, Maryland, too, has been estimated as having been ca. 95% forested prior to the European contact, with the balance of the land being occupied by tidal marshes. Presently, Maryland is estimated as being about 45% forested, with its forested area being very unequally distributed among the counties (range: 76% forested in Allegany Co. to 21% forested in Montgomery Co.) and among the watersheds (Range: 76% in North

Ancient American chestnut trees c. 1910 at Joyce Kilmer Memorial Forest, North Carolina, a remnant of an original Appalachian forest wilderness.

Branch Potomac to 25% in Washington Metropolitan-Potomac (Lade 1993).

In Maryland, 271 species of plants are listed as endangered, 154 species are listed as having been extirpated in the state or region, and 71 species are listed as threatened. Seventy-two species of animals are listed as endangered, 23 species of animals are listed as extirpated, and 16 species are listed as threatened (COMAR 08.03.08).

The thrust of this recitation, relative to forests, is that, on a broad scale, forests are habitat for about two-thirds of known terrestrial species, and typically have high species diversity and endemism. In the tropics, if current rates of deforestation continue, the number of all forest-dwelling species could be reduced by 4-8% (WRI 2000.k).

A number of arguments urging development of forests on disturbed lands derive from the pressures exerted by population growth and increasing societal demands, both purposeful and unintended, upon ecosystems and natural resources. Important among these are the following:

1. Maintenance of biodiversity. Problems are posed by:
   a. Habitat fragmentation, aggravated by
      i. Loss/constriction of mature forest habitat caused by converting large areas back into an earlier, younger, less suitable successional state. A subset of this problem is
         (1) Barriers to population/genetic interaction posed by inhospitable, man-altered areas, including agricultural and urban/suburban situations;
      ii. Constriction of range, caused by climatic change;
   b. Small, isolated populations vulnerable to local extirpation;

2. Maintenance of ecosystem functions and services, such as:
   a. Regulation of atmospheric and water chemistry of both regions and the entire planet;
   b. "Cycling", including
      i. Production: the collection, conversion, and sequestration of mineral elements and compounds, and the collection/conversion of solar energy into chemical energy via incorporation in plant material;
      ii. Consumption: conversion of plant material into animal tissue;
      iii. Decomposition: breakdown of organic wastes and dead tissue into organic and inorganic compounds available for re-integration into living material.
      iv. A most important aspect of cycling is the retention of mineral elements and compounds and biotically produced compounds in updrainage locations and in conditions readily available for human use.
   c. Protection processes: control of soil erosion, maintenance of soil fertility;
   d. Regulation of the hydrologic cycle (control of the rates of evaporation, evapotranspiration, surface runoff, and groundwater recharge);
   e. Maintenance of a "genetic library";
   f. Maintenance of "dynamic stability", the capacity to reverse trends, e.g., the negative feedback phenomena that control pest outbreaks (OTA 1987). Often over-simplistically referred to as "the balance of nature."
   g. Moderation climatic conditions, e.g., temperature, humidity.

3. Development of improved water quality.

Scientific/Educational Issues Bearing on Reforestation of Disturbed Lands

The need to learn more about the habitat and other life requirements of rare, threatened, or endangered species, or those in need of conservation, in order to be able to maintain them (onsite or offsite) or restore them, if previously extirpated, by re-creating suitable conditions. The point becomes more important in the face of the likely impending climatic changes. Species habitats/ranges are likely to contract vertically and move upward, and become displaced northward (possible approximate 1,000-1,200 feet upward and ca. 185 miles northward: Peters 1989).

Reasons for Allowing Disturbed Lands to Re-succeed into Forested Conditions, in General

The above sections noted several issues that bear upon development of forests. This section discusses those issues and provides explanation as to how addressing those issues argues in favor of allowing disturbed lands to develop into forests.

A. Conservation issues: maintenance of biodiversity and ecosystem function and services.

These two aspects of conservation issues are closely interlinked.

1. Maintaining biological diversity, i.e., the numerical richness, abundance, and distribution of species is dependent upon conditions continuing to be within the range of the organisms' adaptive capabilities. Definition of those ranges is established over long periods of relatively constant conditions within each habitat, during which genetic mutation allows species to adapt to those conditions. If rates of change or physical conditions are too great in either space or time - that is, conditions change too much either in a local area or too frequently in a given time frame, the species will cease to exist under those conditions. Too much change can and should be considered as pollution from the point of view of the affected organisms.

MacArthur and Wilson published *The Theory of Island Biogeography* in 1967. This work explicated the concept that on islands - pieces of terrestrial habitat isolated from other land by oceans (inhospitable habitat for land-dwelling life forms) - there are fewer species of life than on larger landmasses. This is because of the difficulty experienced by terrestrial life in reaching the islands and because of the relative scarcity of habitat diversity (necessary to support different life forms) on small landmasses. Species tend to suffer local extinction from a variety of causes. Replacement by immigrants and/or the enrichment of still-surviving species' genetic pools (necessary for the maintenance of species' ability to adapt) by immigrants is hampered by inhospitable oceanic barriers to reaching the islands.

The concept has since been extended to include numerous forms of habitat "islands" in circumstances where a given habitat type (e.g., a forest) occurs in a location that is surrounded and isolated by a different habitat type (e.g., agricultural or suburban landscapes). This phenomenon is referred to as "fragmentation." Fragmentation occurs when a large, contiguous amount of habitat is transformed into a number of smaller patches of smaller total area, isolated from each other by a matrix of habitats unlike the original (Wilcove, McLelland, and Dobson 1986). Wilcove et al. note that fragmentation has two components that cause local populations of organisms (both plant and animal) to become locally extinct. These are (1) reduction in total habitat area, and (2) difficulty of dispersal of organisms from one habitat fragment to the next.

Minckler (1976) noted that, "Eastern hardwood forests are among the most complex in the world. At present, they are overwhelmingly immature..." If these forests are indeed overwhelmingly immature, it must also be true that habitat conditions typical of older, more mature seral successional stages are largely missing. It would seem to logically follow that it would behoove society to allow at least some remnant areas to continue aging in order to re-establish some of the natural complexity and diversity ("alpha" diversity, i.e., "within-habitat" diversity) of uneven-aged forest communities. In view of the current relative scarcity of forests compared to their previous extent, particularly in the East, it would similarly behoove us to re-establish forests - of any age - where most of the land is in other uses.

Norse et al. (1986) support the idea that reduced occurrence of later successional stage communities causes a reduction of diversity, and carry the argument to the point of relating the loss of ecosystem function and service to lost diversity (see also Lull and Sopper 1969 and Likens, Bormann, et al. 1977 below): "...very frequent harvests, on the order of every 20 to 70 years (depending on the forest), can remove nutrients from the ecosystem faster than natural biogeochemical processes can replace them. Furthermore, frequent harvests diminish species diversity by depriving the forest of colonizing life history stages of plants and animals that require late successional forest."

Solheim, Alverson, and Waller (1987a) argue that island biogeography theory is most relevant to forests as it applies to those species adapted to old-growth conditions. They recommend that the U.S. Forest Service utilize the theory to predict the response of such species to the Service's management plans. In contributing to the Wisconsin Conservation Task Force stance on management of the Chequamegon and Nicolet National Forests, they recommend that all of the planned logging be carried out on approximately 80% of the forest area. This reserves 17% and 24% of the two forests, respectively, to "diversity maintenance zones" to be held in contiguous blocks of at least 50,000 acres.

Peter Raven, Director of the Missouri Botanical Garden, concurs with Minckler's assessment and supports the Solheim et al. diversity protection proposals "...old-growth of the sort that was present before European settlement [in Wisconsin] has largely been destroyed, and it is in the interest...of all Americans, that the opportunity be given for the restoration of this vegetation type...old-growth vegetation is necessary for the breeding and survival

of many kinds of plants and animals. The kinds of second-growth situations that are characteristic of many of our natural forests and, even more so, of altered or exploited lands are simply not adequate to protect populations of these organisms adequately." He further notes that "...the opportunity [for recovery of biological diversity]...can be taken now, ..." and "...the chance to set up such blocks while this can still be done should not be missed." (Letter to H. H. Iltis 8/4/86)

Similarly, Prof. B. A. Wilcox, Executive Director of the Center for Conservation Biology (Stanford University), notes: "The need for large, undisturbed tracts of forest in order to maintain their natural integrity and diversity is fundamental ...contiguous tracts on the order of tens of thousands of acres are clearly called for in many instances. The overwhelming scientific evidence that the reduction in size and fragmentation of habitat is the major single threat to diversity in natural ecosystems very clearly compels land management agencies to consider the maintenance of intact forest first priority." (Letter to Alverson, Solheim, and Waller 11/18/86)

Parenthetically, it is necessary to clarify that the diversity spoken of above is not strictly the same as that fostered by creating extensive amounts of edge habitat and early seral stages as is commonly done in timber harvest and game management activities. Human manipulation of vegetation has the ready ability to create early seral successional stages, thereby favoring edge-adapted species as opposed to the long time spans necessary to create mesic, forest interior conditions. Where the latter are comparatively scarce (Cf. Minckler 1976, op. cit.), management priority should be given to those situations and species more difficult and time-consuming to create.

The Wilcox letter cited above notes, in part: "...the manipulation of habitat in terms of the variety of, say, seral stages, is not a legitimate approach to the problem of maintaining natural diversity in forest ecosystems..." Similarly, Norse et al. (1986, op. cit.) note, regarding the creation of edge habitat for game (p. 36): "To avoid the loss of non-game species of the forest interior, sufficient blocks are needed where these techniques are not used." With regard to forest interior breeding birds, Bushman and Therres (1988) reviewed the literature on preferred habitat conditions. They reported that although some species utilize altered habitats, 15 of 17 reached their greatest abundance in the oldest of three timber stand size/age classes (i.e., sawlog mature, as opposed to seedling/sapling or pole middle). They also noted, however, that when canopy closure is maintained fairly completely (e.g., about 70%), thinning can enhance shrub and understory growth and favor birds using those strata in the forest. (See also Minckler 1989; Fritz 1988 below, re: selection management and gap space size.)

2. The second aspect of the conservation issue - that of maintaining ecosystem functions and services is linked to the first. This is by virtue of the fact that it is the living and dead biotic materials (i.e., animals, plants, and their wastes and dead bodies), which principally control the cycling rates and retention and conservation of mineral nutrient elements/ compounds and biologically synthesized materials. Also, it is only living, green plants which can capture and sequester solar energy and make it available for use by other trophic levels and all other species.

The linkage is made clear by considering that the process of evolution selects those species for survival which are most competitively efficient at extracting nutrients and collecting energy. This implies that if a certain species is most efficient at so doing under some given habitat circumstance, loss of that species implies a loss of efficiency of mineral nutrient retention and energy collection and transmission. This is especially true of the species characteristic of late successional stage communities.

O'Neill and Reichle (1979) stated that large biomass and large storage capability (for mineral elements and energy) is essential for slow turnover/efficient recycling of nutrients. These are the characteristics of mature forests, i.e., communities of large, slow-growing, long-lived species. Odum (1969) stated that slow cycling/ turnover of nutrients maximizes the probability that mineral elements will be retained within the system. Woodwell (1970) showed that excessive stress/ disturbance on forests resulted in the losses, first, of the more complex, long-lived, larger species and later, depending on the intensity of the stresses, of progressively smaller, shorter-lived, less complex species. Odum (1969 op. cit.) pointed out that the simpler, smaller, shorter-lived species - representative of earlier successional stage communities - are more "leaky" as ecosystem components with regard to the recycling of mineral elements/nutrients: they do not retain them as

efficiently, and a greater fraction are exported downdrainage. It is this phenomenon that aggravates the eutrophication of downdrainage waterbodies. The same is true of their abilities to capture and sequester energy.

The function of control of the hydrologic cycle requires specific mention and explanation, because of its particular and extreme importance in relating human activity in the Chesapeake watersheds to the condition of the Bay and its tributaries. Gravity and down-gradient flow of water are the principal means by which solid and liquid substances, whether dissolved or suspended, are transported by natural processes. Infiltration, evaporation, evapotranspiration, and the physical slowing down of surface runoff are the major physical mechanisms by which natural systems (primarily the living and dead organic components, but also the non-living micro-topographic physiographic aspects) control the quantity and quality of water volume, which passes through them to be exported down drainage. Control of the quality and quantity of water controls the passage and export of nutrients, sediments, fixed energy, and pollutants.

The old-growth Belt Woods,
Prince Georges County, Maryland

Lull and Sopper (1969) report that evapotranspiration from forest vegetation ranges from about 29 inches per year in mountainous areas (of the Northeast) to about 23 inches per year in the Maryland-Delaware Coastal plain, out of an annual rainfall of 40-50 inches. They note that high infiltration rates result from the soft, un-compacted forest floors and forest litter. Similarly, Likens, Bormann, Pierce, Eaton, and Johnson (1977) report that for the Hubbard Brook experimental forest "Most precipitation infiltrates into the soil at all times and there is very little overland flow. This is because the soil is very porous, the surface topography is very rough (pit and mound micro-topography, mostly from wind-thrown trees)..." They note that in humid regions, chemical flux and cycling are intimately linked to the hydrologic cycle (p. 4) and emphasize the "...powerful regulating role that the living ecosystem plays in the hydrologic cycle:" (p. 22).

It cannot be pointed out too strongly how important the living components of ecosystems are to proper functioning of the cycling of major minerals that sustain life: those species which are adapted through evolution to given conditions are the principal means whereby mineral nutrients are conserved and made available to other forms of life, including humans. Alteration of the extent, location, and composition of the living components of the ecosystem, through reduction/fragmentation of the native forest stands, can be expected to, and has, seriously affected their functional capability to control the hydrology of an area.

In addition to regulation of export of water-borne compounds, it is estimated that forest communities can store substantial quantities of carbon. Houghton et al. (1983) cite Whittaker and Likens' (1973) figures of 135 metric tons (i.e., 135 million grams) per hectare (=2.471 acres) stored in the vegetation of undisturbed temperate deciduous forest. This compares favorably with an estimate of 100 metric tons per hectare for secondary growth temperate deciduous forest. Similarly, Harmon, Ferrell, and Franklin (1990) cited estimates that a 450 year-old Douglas fir/hemlock forest (Pacific Northwest) stored 611-612 megagrams (=metric tons) per hectare, compared with 259-274 megagrams/hectare for a 60 year-old Douglas fir forest. They estimated that for managed, even-aged stand forests, rotation at 50, 75, and 100 years age would achieve carbon storages of 38%, 44%, and

51%, respectively, of the storage in the old-growth condition.

It is probably impractical to contemplate development of enough area in Maryland forests to make any significant difference to large-scale atmospheric carbon balances. However, it is interesting to note that development of such stands could mature to older successional stages, and would increase carbon storage. This would be a positive step. As a result of harvest and conversion of 5 million hectares of old-growth Pacific Northwest Douglas fir/hemlock forests over the last 100 years, Harmon et al. (1990) estimate an addition of about 3.0 to 3.6 metric tones of carbon (= 11.0 - 13.2 metric tons carbon dioxide: Flavin 1990) per hectare per year to the atmosphere. Houghton et al. (1983) estimated that since 1958 (globally) forest harvest (harvest alone; not counting clearing for agriculture) adds about 0.5 billion metric tons per year of carbon to the atmosphere. Woodwell (1988) suggested that (globally) total deforestation (for all reasons) adds about 1-3 billion metric tons of carbon annually.

B. Development of improved water quality.

Development of improved water quality through the normal functioning of an aquatic ecosystem is a function of several interacting aspects.

As takes place within terrestrial ecosystems, control of nutrients and contaminants occurs through the biological processes of incorporation/retention and chemical re-configuration and neutralization/ immobilization of such substances into living tissue, and their recycling through various trophic levels. For this to occur, abiotic conditions must be favorable for biotic processes to occur.

There must be steady, sufficient, cool groundwater flows in adequate volume on a year round basis to moderate temperature stresses. There must be adequate, but not superabundant nutrients reaching the stream. These must be principally in the form of coarse particulate organic matter (CPOM), or allochthonous material. The stream must be large enough to support satisfactorily-sized populations of aquatic organisms. There must be a sufficient mix of the elements of physical habitat, such as large, downed timber, deep pools, undercut but stable banks, and a substrate combination of organic and inorganic material that produces invertebrate organisms. There must be percolation of cool, oxygenated water through the bottom sediment

"We all travel the milky way together, trees and men..."

-John Muir

particles to allow incubation of eggs. Influxes of fine, inorganic sediment (< 1.0 mm diameter) must be limited. There must be slow side channels and sloughs to allow nurturing of immature stages of organisms.

Essentially, all of these factors are related to the degree of development/utilization of the watershed. Groundwater flows, controlling stream volume and temperature stability derive from infiltration, which is a function of the vegetative community and the perviousness and micro-topography of the forest floor. The stability of flow patterns is particularly critical in the smaller tributaries because these constitute the spawning grounds for many adfluvial organisms. Alteration of the infiltration patterns by land management changes can reduce spawnable habitat, as can alteration of the temperature patterns through direct insolation or the reduction of groundwater flows.

The availability of large, coarse, particulate allochthonous material is dictated by the abundance of riparian vegetation throughout the lengths of the first and second order tributaries that penetrate far into the watershed. The drainage density, i.e., the stream length per unit area of watershed (miles per square mile) determines to what extent the production of the watershed is made available to the aquatic sub-ecosystem. In Maryland as a whole, there are approximately 1.7 miles of stream per square mile (R. Klein, pers. comm.). The abundance

of all allochthonous material, both large and small, is important to the creation of varied velocity patterns, the gouging out of deep holes, and retention of the leaf and twig matter that small stream invertebrates feed upon.

Many of the features critical to stable aquatic ecosystems are maximally developed in forest situations with old-growth characteristics (Sedell and Swanson 1984). They noted the abundance of large wood, a mix of deciduous and coniferous leaf and wood litter, and light gaps as contributing to habitat richness. Dean (Fisheries Division, Tidewater Admin.) noted that large (larger than second order) streams which retained these characteristics and supported viable [brook trout] populations are rare in Maryland, because so many of the larger watersheds have been disturbed by fragmentation and a variety of cumulative effects since about 1900 (Wildlands Committee task force meeting minutes 1/25/90). Sedell and Swanson (op. cit.) stated that the United States has few remaining examples of the full natural interaction of rivers with adjacent forests. Bachman (Fisheries Division, Tidewater Administration, pers. comm. 3/27/90) noted, with regard to Middle Fork (a third order stream), that its outstanding aquatic organisms [trout] population was due in large measure to the presence of the mature woodland of its watershed. The latter implies good water holding capacity, which leads to a good ground water supply, nutrient retention, available allochthonous material, minimal fine sediment inputs, and good thermal regime characteristics.

Literature Cited

Barney, G.E. (Study Director) 1980. The global 2000 report to the president vol. 2: the technical report. Council on Environmental Quality and U.S. Dept. of State. U.S. Govt. Printing Office. Wash. D.C.

Bushman, Ellen S. and Glenn D. Therres. 1988. Habitat management guidelines for forest interior breeding birds of coastal Maryland. Md. Dept. Nat. Resources: Forest Park and Wildlife Service. Wildl. Tech. Publ. 88-1.

COMAR 08.03.08: Code of Maryland Regulations Title 08, subtitle 03, Chapter 08: Threatened and Endangered Species.

Deneen, Sally and T.C. Rembert. 1999. The world plant crisis is accelerating. E-Magazine.com. July-August, 1999.

Environmental Protection Agency, Chesapeake Bay Program. 1995. The state of the Chesapeake Bay, 1995. Chesapeake Bay Program Report. CBP Office, Annapolis, Maryland.

Environmental Protection Agency, Chesapeake Bay Program. 1999. Population estimates and projections for states, counties, and modeling segments within the Chesapeake Bay watershed. Chesapeake Bay Program report. CBP Office, Annapolis, Maryland.

FAO. Rome. 1995. Data for total forest and plantation extent for 1990: Forest Resources Assessment, 1990: Global Synthesis.

FAO. Rome. 1999. Data for total and natural forest extent for 1995: State of the World's Forests 1999.

Flavin, Christopher. 1990. Slowing global warming. Pp. 17-38, in: Brown, Lester R., et al. 1990. State of the world: a worldwatch institute report on progress toward a sustainable society. W.W. Norton Co., New York. 253 pp.

Franklin, Jerry F. 1989. An ecologist's perspective on northwestern forests in 2010. Forest Watch. August, 1989: 6-9.

Fritz, Edward C. 1988. Keepers of the perpetual forest. Forest Watch. August, 1988: 10-13.

Haas, Glenn E., Eric Hermann, and Richard Walsh. 1984. Wilderness values. Natural Areas Journal 6(2): 37-43.

Harmon, Mark E., William K. Ferrell, and Jerry F. Franklin. 1990. Effects on carbon storage of conversion of old-growth forests to young forests. Science 247 (9 Feb., 1990): 699-702.

Houghton, R.A., J.E. Hobbie, J.M. Melillo, B. Moore, B.J. Peterson, G.R. Shaver, and G.M. Woodwell. 1983. Changes in the carbon content of terrestrial biota and soils between 1860 and 1980: a net release of CO_2 to the atmosphere. Ecological Monographs 53(3): 235-262.

I.U.C.N. 2000. Confirming the global extinction crisis. News release by IUCN. September 28, 2000.

Lade, K.-Peter. 1993. Comprehensive forest resource inventory for the state of Maryland 1992/1993. Maryland Dept. Natural Resources, Salisbury State University, Maryland Department of the Environment.

Likens, Gene E., F. Herbert Bormann, Robert G. Pierce, John S. Easton, and Noye M. Johnson. 1977. Biogeochemistry of a forested ecosystem. Springer-Verlag, Inc. New York. 146 pp.

Little, Elbert L. 1987. The Audubon Society field guide to North American trees: eastern region. Chanticleer Press/Alfred A. Knopf. New York. 714 pp.

Lull, H.W. and W.E. Sopper. 1969. Hydrologic effects from urbanization of forested watersheds in the northeast. U.S. Dept. Agric., Forest Service Research Paper NE-146, N.E. Forest Exper. Sta. Upper Darby, Pa.

MacArthur, Robert H. and Edward O. Wilson. 1967. The theory of island biogeography. Princeton Univ. Press.

Maryland Office of Planning. 1999. State of Maryland demographic and socio-economic outlook. Planning Data Services, revision date August, 1999.

Maryland Office of Planning. 1993. Population projections for Maryland subdivisions, Dec. 1993. MOP Planning Data Services.

Maryland Wildlands Committee. 1989. Maryland wildlands preservation act in brief. Unpublished mimeo.

Minckler, Leon S. 1976. Managing natural forests in the east. Unpublished mimeo. Presented 1/31/76, Sierra Club Southeastern Forestry Seminar, Tuscaloosa, Ala.

Norse, Elliott A., K.L. Rosenbaum, D.s. Wilcove, B.A. Wolcox, W.H. Romme, D.W. Johnston, and M.L. Stout. 1986. Conserving biological diversity in our national forests. Prep. By The Ecological Soc. Of America for The Wilderness Society. 1400 I Street. Wash. D.C. 116 pp.

O'Neill, R.V. and D.E. Reichle. 1980. Dimensions of ecosystem theory. Pp. 11-26. in: Waring, Richard H. (ed.) Forests: fresh perspectives from ecosystem analysis: proc. Of the 40th ann. Biology colloquium. Oregon State Univ. Press, Corvallis, Oregon. 199 pp.

Odum, Eugene P. 1969. The strategy of ecosystem development. Science, 164: 262-270.

Peters, Robert L. 1989. Effects of global warming on biological diversity. Forest Watch. August, 1989: 10-15.

Sedell. James R. and Frederick J. Swanson. 1984. Ecological characteristics of streams in old-growth forests of the Pacific Northwest, in: Meehan, W.R., T.R. Merrell, and T. A. Hanley, eds. 1984. Fish and Wildlife Relationships in Old-Growth Forests. Proc. Of Sympos., Juneau, Alaska, 12-15 April, 1982. Am. Inst. Fish. Research Biol.

Solheim, S.L., W.S. Alverson, and D.M. Waller. 1987a. Maintaining biological diversity in national forests: applying island biogeography concepts in forest planning. Forest Watch. April, 1987: 9-14.

Suzuki, David. 2001. Science matters: repeating history at our peril. Environmental News Network, 6/15/2001.

Tickell, Oliver. 1998. Trees on the verge of mass extinction. New Scientist, 29 August 1998. U.S. Bureau of the Census 2000a. Resident population of the 50 States, the District of Columbia and Puerto Rico: April 1, 2000 (Census 2000) and April 1, 1990 (Census 1990). Internet release date December 28, 2000.

U.S. Bureau of the Census. 2000a. Resident population of the 50 States, the District of Columbia and Puerto Rico: April 1, 2000 (Census 2000) and April 1, 1990 (Census 1990). Internet release date December 28, 2000.

U.S. Bureau of the Census. 2000b. (NP-T1) Annual projections of the total resident population as of July 1: middle, lowest, highest and zero international migration series, 1999 to 2100. Revised internet release date February 14, 2000.

U.S. Bureau of the Census. 2001a. International Database. Updated 5/10/2001.

U.S. Bureau of the Census. 2001b. Historical national population estimates: July 1, 1900 to July 1, 1999. Data from "Current Population Reports, series P-25, nos. 311, 917, 1095, and National Population Estimates web page.

Wilcove, David S., Charles H. McLellan, and Andrew P. Dobson. 1986. Habitat fragmentation in the temperate zone. Pp. 237-256, in: Soule' Michael E. (ed.) Conservation Biology. The Science of Scarcity and Diversity. Sinauer Associates, Inc. Sunderland, Mass. 584 pp.

Woodwell, G.M. 1970. Effects of pollution on the structure and physiology of ecosystems. Science, 168: 429-433.

World Resources Institute. 2000. World resources, 2000-2001.

Year 2020 Panel. 1988. "Population growth and development in the Chesapeake Bay watershed to the year 2020." The report of the Year 2020 Panel to the Chesapeake Executive Council. 52 pp. + appendices. U.S. EPA Ches. Bay Liaison Office. Annapolis, Md.

Nick Carter is a biologist and ecologist who worked for the Maryland Department of Natural Resources for 35 years in the field on reservoirs, streams, anadromous fish, tidal and non-tidal wetlands, and Chesapeake Bay fisheries management. He received the Izaak Walton League's Chesapeake Bay Conservation Award in fish and wildlife and a Governor's citation for his work. Upon retirement in 2000, he was made an "Admiral of the Chesapeake Bay." He is chairman of the Eastern Shore group of the Maryland Sierra Club and is presently active in environmental education.

Ancient pignut hickory at the old-growth Chapman Shell-Marl Ravine Forest, Charles County, Maryland

MNPS Field Botany Updates

By Rod Simmons, John Parrish, and Cris Fleming

MNPS conducts field surveys throughout Maryland each year to assess natural communities, inventory flora, study plant associations, and record information on species distribution. Besides having fun discovering new plants and places, the society performs an important role by documenting Maryland's native flora and habitats, both common and rare. Some of the survey sites are familiar parks and preserves. Others are unknown or have not been seen in a long time, and many are threatened by urbanization, pollution, and invasive exotic plants. Today, there are very few intact examples of these communities in parts of the state, especially the overdeveloped but floristically diverse Washington-Baltimore area. It is hoped that this information will bring attention to these sites as irreplaceable remnants of Maryland's natural heritage, and lead to their conservation.

These surveys also help the Maryland Natural Heritage Program track Rare, Threatened, and Endangered (R,T,&E) plants and special communities in Maryland. The location of R,T,&E species and habitats is reported to the Natural Heritage Program to be added to a database that includes all the known occurrences of state-listed R,T,&E species in Maryland. This information, and other assistance by MNPS, helps the state, counties, and land trusts prioritize lands for acquisition and develop appropriate management strategies.

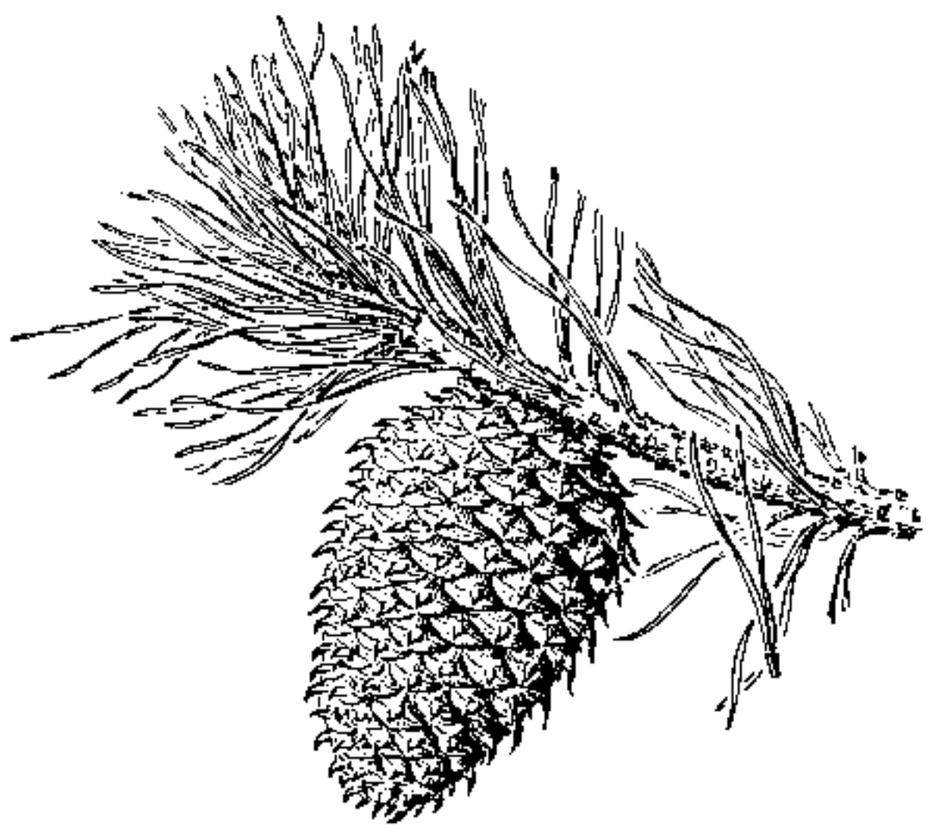


Table Mountain Pine (*Pinus pungens*)

The following is a list of some of the notable sites and flora recently surveyed by MNPS. Species actively tracked by the Maryland Natural Heritage Program (noted below) have a state rank of S1 (highly state rare) or S2 (state rare) and sometimes a state status of E (endangered) or T (threatened).

Blockhouse Point Park, Montgomery County: Two large (both 30"-36"dbh) swamp chestnut oaks (*Quercus michauxii*) were discovered on the floodplain of the Potomac River. This is probably the westernmost occurrence of *Q. michauxii* in Maryland. It was found by John Parrish a few miles downstream at Little Falls several years ago, but is not known elsewhere in the piedmont of Maryland. Lester Ward discusses *Q. michauxii* from the vicinity of Great Falls, Virginia in the *Guide to the Flora of Washington and Vicinity*, 1881.

Surveyors: John Parrish and RG Steinman

Boyds Diabase Area, Montgomery County: Table mountain pine (*Pinus pungens*) – One dead tree with numerous cones was located on the north side of White Ground Road, approximately one-half mile south of Hoyles Mill Road. Found on shallow, rocky, diabase soil. *P. pungens* is exceedingly rare in Montgomery County.

Surveyor: John Parrish

Clara Barton Parkway, Montgomery County: Surveys in several areas along the parkway revealed five new occurrences of the globally rare spring ephemeral Coville's phacelia (*Phacelia covillei*) (S1 E), formerly *P. ranunculacea*. Most of the occurrences were quite large, with one near Brookmont numbering in the tens of thousands growing on a southwest-facing slope above the parkway. Even more notable than the size of the populations is that several are located on high, upland slopes, often more than 100 feet above the river. Found in some abundance throughout the Potomac Gorge, this species is now considered to be endemic to the Potomac River watershed in our region. In addition, one new occurrence of narrow melicgrass (*Melica mutica*) (S1 T) was documented in upland woods near Glen Echo and one large Shumard's oak (*Quercus shumardii*) (S2 T) was

discovered on a low slope above the parkway near Brookmont.

Surveyor: Cris Fleming

Fort Stanton and Fort Chaplin, Washington, D.C.: Several patches of the locally-uncommon staggerbush (*Lyonia mariana*) were discovered growing amongst other heaths under a canopy of oaks and hickories in upland Terrace Gravel Forest. The gravel terraces and forests of the D.C. Civil War Fort sites are some of the oldest and largest remaining in the region.

Surveyors: Lou Aronica, Mary Pat Rowan, and MNPS field trip participants.

Little Paint Branch Bogs, Prince Georges County: A series of terraced, gravel seeps under a power line easement adjacent to Interstate 95 between Sellman Road and Powder Mill Road. These seeps or "Magnolia Bogs" are collectively called the "I-95 Bog" by the Maryland Natural Heritage Program and are remnants of the once-extensive Powder Mill Bogs. This site is listed as a "Wetland of Special State Concern."

A single, large eastern featherbells (*Stenanthium gramineum*) (S1 T) specimen was observed growing in the open, sphagnous section of the bog at the terrace summit. The largest known population of this plant in Maryland, consisting of hundreds of individuals, occurred at this site and was documented in the 1980's by Chris Ludwig, Kathy McCarthy, and other Heritage staff.

Several pink milkwort (*Polygala incarnata*) (S2S3) plants were also observed growing in dry, gravelly soil near the bog.

Surveyors: Rod Simmons; Lou Aronica, Jake Hughes, John Parrish, RG Steinman, Meghan Tice, and participants of a MNPS field trip to the site on August 25, 2001.

Northwest Branch Park, Montgomery County: Several large table mountain pines (*Pinus pungens*) were discovered growing on a slope with Virginia pines in upland Oak-Hickory Forest above Northwest Branch. John Parrish counted a total of 12 mature trees on a subsequent visit, one being large enough to qualify as the state champion! This species is disjunct from a primary range westward in the mountain province.

Surveyors: Rod Simmons; Lou Aronica, Carole Bergmann, Meghan Tice, and participants of a MNPS field trip led by Carole on November 11, 2001.

Rock Creek Park, Washington, D.C.: The following species are recent additions by John Parrish and Jake Hughes (as noted) to the *Annotated Checklist of Vascular Plants of Rock Creek Park* by Fleming and Kanal, published in the December 1995 issue of *Castanea*.

Blackjack Oak (*Quercus marilandica*) – Growing in dry forest with post oak (*Q. stellata*) on a south-facing slope at picnic area #27. One large tree was located.

Chinquapin Oak (*Quercus muehlenbergii*) – Re-discovered by Jake Hughes near the confluence of Broad Branch and Rock Creek on a rich, east-facing slope above the Rock Creek floodplain. Recorded at this location in the *Guide to the Flora of Washington and Vicinity*, by Lester Ward, 1881. Several trees were located.

Chokeberry (*Aronia* sp.) – Occurs in a skunk cabbage seepage wetland (on a floodplain near Holly Street) at the base of a steep, rocky slope on the east side of Rock Creek. One large shrub was seen.

Virginia Snakeroot (*Aristolochia serpentaria*) – Six plants were observed on rock outcrops upslope on the east side of Rock Creek, between Sherrill Drive and Riley Spring Bridge.

Blue Vervain (*Verbena hastata*) – One large, flowering plant was observed growing on moist, open ground beside Fenwick Branch along East Beach Drive at North Portal Street.

Late-flowering Thoroughwort (*Eupatorium serotinum*) – Two large, flowering plants were found growing in moist, alluvial soil along Fenwick Branch near the intersection of East Beach Drive and North Portal Street. Non-flowering plants were also observed along Rock Creek at the mouth of Fenwick Branch.

Swamp Dewberry (*Rubus hispidus*) – Several plants were noted on the north side of Piney Branch.

Fox Grape (*Vitis labrusca*) – One large vine was observed in a seepage wetland on the north side of Piney Branch.

Mud Plantain (*Alisma subcordatum*) – Many plants were observed in a floodplain wetland south of Parkside Drive.

Rice Cutgrass (*Leersia oryzoides*) – A small colony was found growing in a seepage wetland on the north side of Piney Branch.

Smooth-sheath Sedge (*Carex laevivaginata*) – Several plants were noted in a seepage wetland on the north side of Piney Branch.

White-edge Sedge (*Carex debilis*) – Two plants were noted at the edge of a seepage wetland on the north side of Piney Branch.

Large Whorled Pogonia (*Isotria verticillata*) – Observed on a slope under mountain laurel, west of Colorado Avenue and north of Pulpit Rock.

Wood Anemone (*Anemone quinquefolia*) – A small colony was observed growing in moist soil on the north side of Piney Branch.

Pinesap (*Monotropa hypopithys*) – Discovered by Jake Hughes growing on a steep bank near Holly Street.

Seedbox (*Ludwigia alternifolia*) – Two plants were seen in a floodplain wetland south of Parkside Drive.

Marsh Primrose-willow (*Ludwigia palustris*) – Several plants were found growing in mud of a floodplain wetland south of Parkside Drive.

American Pennyroyal (*Hedeoma pulegioides*) – A colony was observed at the forest edge by the equestrian ring near picnic area #25 and #26.

Elm-leaved Goldenrod (*Solidago ulmifolia*) – Several plants were seen on steep rocky ledges on the north side of Piney Branch.

Wavy-leaved Aster (*Aster undulatus*) – Two plants were observed on a bluff above Broad Branch and an old quarry south of Grant Road.

Surveyors: John Parrish and Jake Hughes

Upper Little Paint Branch, Montgomery County: Two-flowered bladderwort (*Utricularia biflora*) (S1 E) – A large floating and submerged mat of this bladderwort occurs in a ponded area of a gravel seepage wetland. Associated plants within the ponded area include watershield (*Brasenia schreberi*) and four-angled spikerush (*Eleocharis quadrangulata*). Bill Sipple, in *Days Afield*, 1999, mentions finding many *Utricularia biflora* plants in close association with *Brasenia schreberi* in the Little Patuxent Oxbow marsh area in Anne Arundel County, near Laurel, Maryland.

Southern Bayberry (*Myrica cerifera*) - One large shrub occurs around the periphery of the *Utricularia* wetland. This is believed to be the only known occurrence of Southern Bayberry in Montgomery County. It was documented at the Powder Mill Bogs (about two miles away in Prince Georges County) by W.L. McAtee in 1918.

Nodding Ladies'-tresses (*Spiranthes cernua*) – Approximately 200 plants were observed blooming in October. They grow out of sphagnum mosses around the edge of the *Utricularia* wetland. Deer browse eventually consumed all but a few dozen of the blooming plants. Nodding ladies'-tresses is a rare occurrence in Montgomery County.

Surveyor: John Parrish

Upper Paint Branch, Montgomery County at Spencerville: Eastern featherbells (*Stenanthium gramineum*) (S1 T) – A few hundred non-flowering plants and 50 flowering plants were observed (blooming early July) on high ground within a forested wetland that includes tulip tree, black gum, and red maple. This site is south of MD 198 between Good Hope Road and Thompson Drive. A large population of large whorled pogonia (*Isotria verticillata*) occurs here as well.

Surveyors: John Parrish and RG Steinman

No Place for Nature

By Bob DeGroot

Numerous species of plants and animals require mature forests of relatively large acreage to insure their survival. These species include a variety of birds that spend much of their life in the tropics, but fly to the United States or Canada during the summer months to rear their young. Included are warblers, vireos, tanagers, and flycatchers. But migrant birds are not the only species that need mature forests. Many of the less common species of lichens are found only in mature forests. Some are found only in 150 to 200 year old forests where there is a constant supply of substrate material in various stages of decomposition. The richness of herbaceous plants like ferns, especially those associated with springs or wet areas, is consistently found in greater abundance in older age forests. Large, mature forests occur infrequently in the east, and old-growth forests, usually considered to be forests over 200 years old, are the rarest type of habitat. Scientists have recommended that "diversity maintenance zones" for species adapted to old-growth conditions be preserved in contiguous blocks of at least 50,000 acres or more.

In the east, this poses problems for species adapted to old-growth forests where most forests have been subjected to frequent logging activities. Harvests, on the order of every 20 to 70 years, can remove nutrients from the forest floor faster than natural chemical processes can replace them. Frequent harvests diminish species diversity by depriving the forests of the plants and animals that require a mature forest in which to colonize. Second-growth forests, which are characteristic of most of our eastern forests, provide habitat for some species, but are not adequate to host populations of the many plants, animals, and organisms that populate mature forests. Finding contiguous blocks of forest approaching 50,000 acres is very difficult in the east, and re-creating such forests is almost impossible when forest management schemes demand continual harvests.

New-growth forests are relatively easily re-created, but it is much more difficult and time-consuming to restore old-growth forests. It also requires more forward-looking and enlightened forest managers. We have managed forests in the east for about 100 years, which is not enough time to establish true old-growth forests, but unless we manage for old-growth characteristics we will never again have any quantity of this type of forest. The very act of managing a forest usually means the primary focus is on producing wood products, which is incompatible with the idea of re-creating mature forests containing rich species diversity.

"Three centuries he grows, and three he stays,
Supreme in state, and in three more decays."

-Dryden

The largest state forest in Maryland is the Savage River State Forest. It contains about 54,000 acres, but only half of it is protected from logging. The protected forest is mostly stream buffers and steep slopes, and logging operations are scheduled throughout the other areas. Only about 10,000 acres of this forest are fully protected as "wildlands," a designation that prohibits logging activities.

Forests being managed in this fashion will never create large, "contiguous" blocks of mature forest. Instead, small pieces of mature forest will occur, but they will be fragmented by logging operations and roads. Without large tracts of mature forest, much of nature will never have a home.

Bob DeGroot is President of the Maryland Alliance for Greenway Improvement and Conservation (MAGIC), which works to preserve stream valleys, expand and connect forest preserves, and increase wildlife, forests, wetlands, and plant habitat in Maryland. MAGIC has formed a statewide alliance of more than forty environmental organizations. The web address for MAGIC is: www.magicalliance.org

On Nature and Human Nature:
One Naturalist's Thoughts on Development

By Christine Maccabee

As most of you know by now, a Wal-Mart store wants to move into our neighborhood. The parcel of land on which it wishes to reside is seen by some as a piece of real estate to be sold at the highest price, but when I walked through there the other day with a knowledgeable fellow from the Sierra Club, we saw it through different eyes.

Even on that cold winter day, the trees all bare and the earth hard beneath our feet, I could imagine the many woodland wildflowers which must grow in the area around the tiny stream in the spring, perhaps even a rare wild orchid. There were a couple rivulets of water flowing from a spring somewhere, creating a small wetland area. Our shoes sank into deep mud, made worse by some preliminary cutting and gutting being done in preparation for the final devastation. There were many signs that the young, brushy woods had also been serving as a haven for birds, as we saw many nests in the small trees. Not surprisingly, there were many deer tracks, and if I'd taken time I'm sure I would have spotted tracks of smaller animals like rabbit and raccoon, perhaps even turkey. Certainly there are turtles as well, safely asleep beneath the earth and mud, totally unaware that soon their entire world will come crashing down upon them.

Joe from the Sierra Club said that if this area was left alone for 100 years it would be a rich wonderful forest, much like it was before man timbered it. All of the invasive plants like multiflora rose, which make this area appear so ragged now, would die off for lack of sunlight. But, who has the patience or the vision to let the land heal itself in this manner? As it stands, it is doomed to destruction, never to exist again.

My feelings about development run very deep. I've seen whole mountaintops shaved off and turned upside down as a result of strip mining, and beautiful farms cut in half by an interstate highway. In a suburban setting, I watched as the last of the wild areas, bursting full of wild berries, was turned into a parking lot. Then, there was the ancient mulberry tree, filled with birds and children and me, cut down when it got in the way. Sorrowful, I left the city to live in the country only to find that there is no escaping this indifference to the natural world when the bottom line is money and human convenience. My bottom line is wealth of a different sort. My bottom line is the preservation of a beautiful world rich in natural wonders.

I know that I am not alone in my feelings as I've spoken to many people who much like myself migrated from city sprawl in order to dwell in a small town and country setting. In spite of the development thus far in upper Frederick County, there still exists that beautiful aura of country, and the tree-laden mountainsides are inspiration for all. I have to wonder to myself, in this day and age of economic priorities and convenience at any cost, if it is at all possible to preserve the quaint natures of small towns in the future. Or will we have no choice but to embrace large businesses such as Wal-Mart, and in some unknown future, perhaps a mall? Not only is the natural ecology completely destroyed, but human ecology is upset as well.

Inevitably, many small business owners will suffer business loss and maybe even go out of business. There will be many changes to be sure. I am willing to concede that not all of the changes will be bad ones, but much will be lost. The question is, how much do we really want to sacrifice?

No matter what happens in the future, I will continue striving to live according to ideas I've embraced most of my adult life, that being "small is beautiful" (the title of a brilliant book by Schumaker), and "simplicity is best." You will find me quietly planting more trees on my property and growing my wildflowers while my neighbors obliterate theirs. I will be on my knees transplanting and preserving the beautiful and important things of this earth. There are more wonders to see while on your knees than you might realize. Won't you join me?

To conclude, any time huge buildings and parking lots are placed on top of ecologically sensitive land, the natural balance is thrown off. Turtles are buried alive along with small moles and mice. Rabbits and other more mobile animals escape to neighboring woods, if there are any, and maybe even to YOUR backyard. Thus, the property that we as individuals own becomes more valuable...not in dollars and cents but valuable as vital potential habitat for wildlife. If you are lucky enough to have one acre or more, there is much you can do. However, even on 1/6 acre habitat can be created.

Continued next page

Every landowner can do something no matter how small.

When the wild kingdom comes up to your door, you are doing something right! After all, are we humans not a part of (not apart from) the natural world?

Christine Maccabee is a Certified Master Wildlife Habitat Naturalist, musician, and writer who lives in Frederick County, Maryland.

Maryland Native Plant Society Contacts

Botany.....Rod Simmons
(See below)
Conservation.....Lou Aronica
(202) 722-1081
-Charles County.....Marc Imlay
(See below)
-Montgomery County.....John Parrish
lifeonearth@juno.com
Flora of Maryland.....Joe Metzger
(410) 775-7737
jmetzger50@hotmail.com
Invasive Exotic Plants.....Marc Imlay
(301) 283-0808
ialm@erols.com
Membership.....Blaine Eckberg
(301) 438-0925
President.....Karyn Molines
kmolines@chesapeake.net
Programs:
Field Trips.....Jake Hughes
(See below)
Monthly Meetings.....Rod Simmons
(703) 256-7671
cecropia13@msn.com
Publications:
Marilandica.....Rod Simmons & Meghan Tice
cecropia13@msn.com
Native News.....Jake Hughes
(301) 490-4179
jah3r@excite.com
Web Site.....James MacDonald
jmacdon@iamdigex.net

PRAYER FOR THE NEW MILLENNIUM

May the new millennium see the birth
of an era of thanksgiving,
an age of peace,
greed's surcease,
honor to all things living.

May pride that feeds on hate soon end,
as all who love their native land
look round and see
community,
no boundary lines dividing humankind.

The love affair with greed shall yield
to stewardship of woods and field,
and seas, until Earth's wounds are healed,
Her fertile richness spared,
not bought or sold but shared.

Tread lightly as we journey forth
through this new age before us,
that tomorrow's children too may thrive,
threatened species long survive,
and songbirds still may migrate north
each spring with carefree chorus.

Let profit not determine worth
but value guide our hearts as we
unselfishly
decide the fate of Earth.