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A guide to the natural history of the Cedarburg Bog: Part II

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A GUIDE TO THE NATURAL HISTORY OF THE CEDARBURG BOG

PART II

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USE OF THE ANNOTATED PLANT SPECIES LISTS

Part I of this guide contains a general description of the natural history of each vegetation zone along the boardwalk. Part II contains an annotated list of important vascular plants in each of the vegetation zones. Over 300 vascular plant species grow in the Bog (see complete species list) and only the more important, conspicuous and interesting species seen from the boardwalk, are included in the annotated lists. The notations include range information, flowering dates and some fruiting dates, and notes about the biology and ecology of the species. Instructors will find the notes useful for finding examples to demonstrate specific topics.

This guidebook must be used in conjunction with identification guides. The guides most useful for this area are:

Picture and Color Guides

Courtenay, B. and J. Zimmerman. 1972. Wildflowers and Weeds. Van Nostrand Reinhold, New York. 144 pp.

Peterson, R. and M. McKenny. 1968. A Field Guide to Wildflowers of Northeastern and North Central North America. Houghton Mifflin, Boston. 420 pp.

More Technical Guides

For Spring Bloomers: Fassett, N. 1976. Spring Flora of Wisconsin, 4th ed. Univ. of Wisconsin Press, Madison. 413 pp.

For Gymnosperms and Monocots: Voss, E. 1972. Michigan Flora. Part I. Gymnosperms and Monocots. Cranbrook Institute of Science, Bloomfield Hills, Michigan. 488 pp.

Fernald, M. 1970. Gray's Manual of Botany, 8th ed. D. Van Nostrand, New York. 1632 pp.

Gleason, H. and A. Cronquist. 1963. Manual of Vascular Plants of Northeastern United States and Adjacent Canada. Van Nostrand Reinhold, New York. 810 pp.

Voss, E. 1985. Michigan Flora. Part II. Dicots (Saururaceae-Cornaceae) Cranbrook Institute of Science, Bloomfield Hills, Michigan. 724 pp.

In addition to these manuals, the following works were used as information sources for the annotated lists: Argus (1964); Billington (1949, 1952); Case (1964); Fuller (1933); Gleason (1968); Klimas and Cunningham (1974); Preston (1961); Rosendahl (1955); Smith (1966). Other sources are referenced in the lists.

Common names are given first, however, the lists are organized first by growth form and secondarily in taxonomic order. Nomenclature largely follows Fernald (1970). Trees, shrubs and herbaceous plants are listed separately. Within these categories, plants are listed in standard taxonomic (Englerian) order, the same order used in herbaria. Monocotyledons (i.e. grasses, sedges, lilies, orchids, etc.) are listed first, followed by Dicotyledons culminating with the Composite family (Asteraceae).

Scientific names are followed by the generalized range of the species (Fig. 1). As soon as I "meet" a new plant species, one of my first questions is invariably: Where does it grow? But it is difficult to understand distribution patterns and their relationships using only standard written range descriptions. In order that the reader may better understand the geographical relationships of the plants in Cedarburg Bog, I have attempted to define some generalized distribution patterns for our species. The ranges given in Fernald (1970) and Gleason (1968) were sketched onto maps of North America and five general range patterns that included the vast majority of species growing in the Bog were found (Fig. 1). Some plants having ranges 1 and 2 also grow in the southwestern United States. An "A" is appended to the range designation of those plants which are found in the southwest (e.g., 1-A, 2-A) (Fig. 1). The exact location of the range boundaries must not be interpreted precisely for individual species.

Some generalizations concerning the biogeographic relations of the plants of the Bog are suggested in Figure 1: 1) The Bog (X) is located near the southern edge of all of the basically northern ranges, but not as close to the northern edge of the two southern ranges, therefore, we have many more locally uncommon

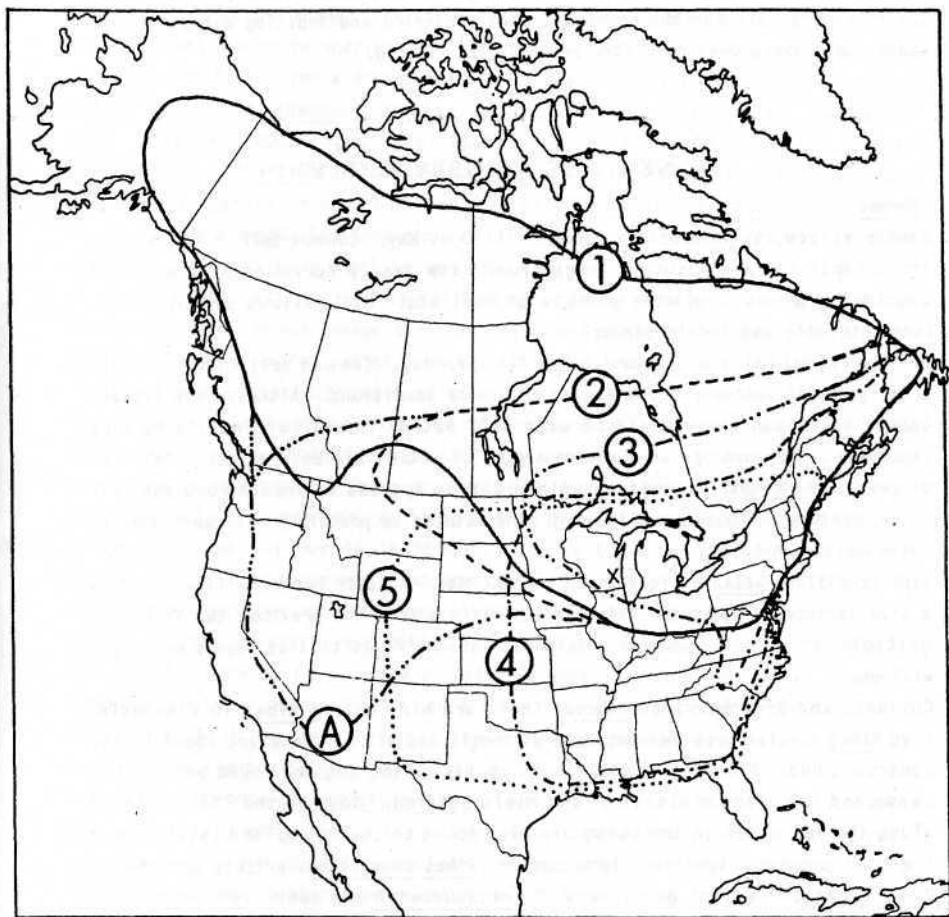


Fig. 1. Five general range patterns that include most of the plant species found in the Cedarburg Bog (location marked with an "X"). Some plants with ranges 1 and 2 also grow in the southwestern United States and their ranges are appended with range "A".

plants from the north than from the south. Near the limits of a range, suitable habitats often tend to be infrequent and more widely scattered. 2) One area is common to all five of the repeated range patterns, the northeastern United States. Most of our plants are found, therefore, at least in scattered localities, elsewhere in the northeastern United States.

If one set of dates is shown following the range information, it indicates the flowering date for the species. When flowering and fruiting dates are provided, they are preceded by Flr. and Fr. respectively.

ZONE 1: THE SHRUBBY "MOAT"

Shrubs

Bebb's Willow, Salix bebbiana. Range 1-A. Apr.-May. Common tall shrub to small tree; tends to have a single large trunk with deeply furrowed bark on older specimens; grows in a wide variety of habitats. All willows are dioecious (separate male and female plants).

Pussy Willow, Salix discolor. Range 2. Apr.-May. Common tall shrub to small tree, variable species; grows in wide range of conditions. Although the flowers appear as though they should be wind pollinated, insect pollination is very important. They produce an abundant supply of pollen for bees at a crucial time of year. The great variability within willow species in growth form and leaf shape, texture and pubescence, causes many authors to postulate a large number of interspecific hybrids.

Slender Willow, Salix petiolaris. Range 2. May. Another common willow found in a wide variety of habitats, this species differs from the previous two in having multiple, very slender stems. Only gets about 1/2 as tall as Bebb's and pussy willows.

Currants and Gooseberries, Ribes. There are nine native Ribes in Wisconsin. Five Ribes species grow in southeast Wisconsin and all of these are found in the Cedarburg Bog. All five of the Ribes species of the Bog are found both in the swamp and in upland habitats of the Field Station. Most of the species found along the boardwalk in the swamp are also found on the two upland islands that the trail crosses. American black currant, Ribes americanum; prickly gooseberry, R. cynosbati; Missouri gooseberry, R. missouriense and swamp red currant, R. triste are all found both on the island and in the swamp.

American Black Currant, Ribes americanum. Range 2. Apr.-May.

Prickly Gooseberry, Ribes cynosbati. Range 3. May-June. The large berries are sweet and pleasant when ripe, but are armed with very sharp spines. Rarely individuals are found with smooth, unarmed berries. One of these rare, smooth berried individuals is found on the West island (Zone 6).

Smooth Gooseberry, Ribes hirtellum. Range 3. Flr., late May-June; Fr., July-Sept. We have two different varieties. Typical R. hirtellum has leaves only

slightly pubescent beneath and is much more common farther north. In this part of the state it is rare and found only in boggy places. R. hirtellum var. callicola is more common in southeast Wisconsin and has leaves densely pubescent or velvety beneath.

Poison Sumac, Rhus vernix. Range 4. Flr., June; Fr., Aug.-Sept. Grows in swamps, often in the shade. The shrub has white berries like those of poison ivy and brilliant orange to scarlet fall foliage like the upland sumacs (staghorn and smooth). See Part I for a discussion of its toxic properties.

Glossy Buckthorn, Rhamnus frangula. Range 3, but native of Eurasia. June-early July. Two introduced species of buckthorns are found in the Bog. Common buckthorn (R. cathartica) is the less common of the two along the boardwalk, but is the more aggressive in the uplands. Glossy buckthorn (R. frangula) is found in nearly every vegetation zone along the boardwalk. It escapes from cultivation and grows particularly well in wet soil. A tall shrub (up to 20 ft.) it is planted for its attractive, shiny foliage. It is easily recognized by its smooth-margined, broad leaves that typically end abruptly in very small, acute points. The 8-10 lateral veins in each leaf curve toward the leaf tip.

Glossy buckthorn is a cause of great concern. At this time, it does not "dominate" any community or stratum of a community in the Bog. However, it is now found in every habitat except the very wettest. Glossy buckthorn is very common as an understory tree in the conifer clumps of the string bog. A survey of this species is necessary as it may occur primarily along the local disturbance caused by the boardwalk itself! It has the potential to spread very rapidly and to become noxious. Introduction of an aggressive, non-native species can be a disturbance as severe as flooding or drainage. The capacity for a habitat to hold plants is not unlimited. Plants of buckthorn are taking places that would otherwise be occupied by native plants. If this non-native comes to dominate the shrub community, it could alter the environment so as to affect not only other shrub species, but also the entire herbaceous community. Control measures may eventually be necessary for the buckthorn in the Bog.

Red-osier Dogwood, Cornus stolonifera. Range 1-A. Flr., May-Aug.; Fr., July-Oct. Common in wet areas. The bright red bark of its young stems is very characteristic. All dogwoods, including this species, may be recognized by the unusual, spiraled reinforcements which surround the veins in the leaves. If a leaf is carefully torn, it will stay attached only by the dangling threads of these spirals. Native Americans used the inner bark of red-osier dogwood as an ingredient in their "kinnikinnik", or smoking tobacco. Red-osier dogwood is found in almost every vegetation type in the Bog. In many specimens you will notice that the lower bark has become white as a result of a dense cover of the sap-sucking, scale insects. Nearby, other individuals will be completely free of scale. Is this difference the result of chance or of differences in resistance between the individuals?

Herbs

Red top, *Agrostis gigantea*. Range 1-A & Range 5 (i.e., all of U.S. and Canada) native of Europe. June-Sept. This grass is thought to be an introduction from Europe, but it is so well established even in undisturbed habitats, that it often appears to be indigenous.

Sawgrass, *Carex lacustris*. Range 5. Late May-Aug. Found mostly in calcareous or circumneutral (near neutral pH) swamps.

Sedge, *Carex Pseudo-Cyperus*. Range 2. June-Aug.

Sedge, *Carex vulpinoidea*. Range 2-A & Range 5. June-Aug.

Purple Meadow-rue, *Thalictrum dasycarpum*. Range 2-A. June-July. Purple meadow-rue plants are nearly always dioecious, with unisexual flowers. The flowers don't have petals but the long pendulous stamens can be quite showy. This tall (3-4 ft.), robust meadow-rue is found in a wide variety of wetland habitats.

Swamp Milkweed, *Asclepias incarnata*.

Range 5. June-Aug. The milkweeds and orchids share an interesting trait. Instead of having pollen sacs that open and shed pollen grains individually, the pollen grains are fused within the sac, called a pollenium. Two pollenia are attached like tiny saddlebags (Fig. 2) to a structure called a corpusculum which is wonderfully designed to catch onto the hairs on insects legs. As insects gather nectar from the flowers, the corpusculum becomes stuck to their legs. The insects then carry a single pollen load, capable of fertilizing an entire fruit, to the next flower that they visit.

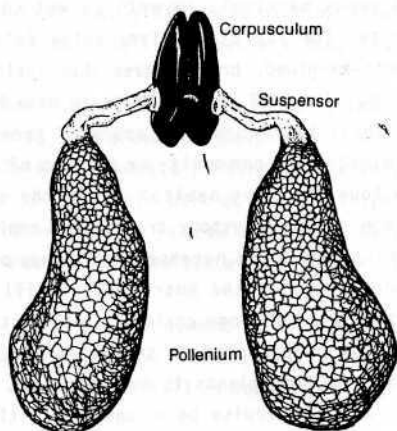


Fig. 2. Milkweed pollenia.

Mint, *Mentha arvensis*. Range 1-A. July. It is also distributed widely in Eurasia. This is our only native true mint.

Turtlehead, *Chelone glabra*. Range 4. Aug.-Sept. The species is highly variable and several varieties have been recognized. Most of the named varieties occur in our part of turtlehead's range. The hooded flowers of this plant, which is in the snapdragon family, are said to resemble turtle heads. This species is the primary food plant for the larvae of the Baltimore butterfly (*Euphydryas phaeton*). The butterfly is widespread, but throughout its range, it is found only where turtlehead grows, and seldom wanders more than a hundred yards from the plant. Curiously, the butterflies seldom visit its blossoms (Klots, 1951).

Lousewort, *Pedicularis lanceolata*. Range 3. Aug.-Sept.

Joe-Pye Weed, *Eupatorium maculatum*. Range 2-A. July-Sept.

ZONE 2: CEDAR — TAMARACK CONIFER SWAMP

Trees

Tamarack, Larix laricina. Range 1. Small forms of tamarack extend northward to the limits of tree growth. Normally found in low places, it also grows well when planted on well-drained sites. Why is tamarack deciduous? Our only deciduous conifer, it has a smaller leaf area, but probably a higher productivity per unit of leaf area than the evergreen conifers. Evergreens keep their needles over 3 to 7 winters and, therefore, must have very thick, tough, waxy leaves. Tamarack can afford fleshy leaves with a relatively thin covering because it drops them before the dry frozen period. (See Part I for additional notes.)

White Cedar, Thuja occidentalis. Range 3. (See Part I for notes.)

Paper Birch, Betula papyrifera. Range 1. Late Apr.-May. This is a circumboreal species with a great deal of variation that has led to recognized varieties. The Woodland Indians used the bark extensively for construction of canoes, containers and tepees. The state's largest paper birch stood on the island in Mud Lake until it died in the early 1970's.

Yellow Birch, Betula lutea. Range 3. May. One of the most valuable timber trees of eastern North America, its wood is light brown, hard and heavy, takes a beautiful polish; used for furniture. Twigs are a source of oil of wintergreen; if you scratch their bark, you can smell a wonderful wintergreen odor. Why have so many of the birches in the Cedarburg Bog area died? There were local woods that consisted of beautiful stands of large yellow birch that are now virtually all dead.

Shrubs

American Black Currant, Ribes americanum. Zone 1, pg. 4.

Smoother Gooseberry, Ribes hirtellum. Zone 1, pg. 4.

Dwarf Red Raspberry, Rubus pubescens. Range 1. Flr., May; Fr., July. Stems are low and creeping and most are nearly herbaceous. Confined to the cedar-tamarack woods of the Bog and fairly common there. Its habitats include not only swamps but also cliffs and ledges of sandstone and igneous rock.

Poison Sumac, Rhus vernix. Zone 1, pg. 5.

Alder-leaved Buckthorn, Rhamnus alnifolia. Range 2-A. May. A low shrub, 1 to 2 ft. tall, with beautiful, shiny leaves, prominently marked with the veins. Sometimes used horticulturally because of its attractive foliage. Separate male and female plants. This is our native buckthorn and is considered an indicator of alkaline fens. See Zone 1 for a discussion of introduced species.

Glossy Buckthorn, Rhamnus frangula. Zone 1, pg.

Wild Honeysuckle, Lonicera dioica. Range 3. May-June. This is a twining shrub with red, trumpet-like flowers. The upper leaves are united at their bases so that the stem appears to pass through the leaves.

Herbs

Water Plantain, *Alisma plantago-aquatica*. Range 2-A; also grows in Europe. June-early Sept. Plants vary greatly in size; different varieties or subspecies are usually recognized. Leaf shape is affected by water depth. In deep water, narrow, lance-shaped leaves are formed. In shallow water, the leaves are broad and heart-shaped. Large plants, striking in appearance are common in the Bog.

Jack-in-the-Pulpit, *Arisaema triphyllum*. Range 4. Mid-Apr.-June. Plants in the Arum family (e.g., this species, skunk cabbage, and wild calla, Zone 3) have tiny flowers packed tightly into a dense, fleshy spike called a spadix. The spadix is covered by an often showy hood called a spathe. Jack-in-the-pulpit has separate male and female flowers, usually on separate plants. Jack-in-the-pulpit is unusual in that individuals change sex in a pattern determined by their sizes: small individuals do not flower, larger plants reproduce as males, and the largest plants function as females (Bierzuchudek, 1982). During a plant's 15-25 year life span, as it increases or decreases in size it also changes sex. The large clusters of bright red berries produced by the females are extremely showy during September and October.

Skunk Cabbage, *Symplocarpus foetidus*. Range 3. Also in east Asia. Feb.-Apr. Our first plant to flower in the spring. The unattractive odor of skunk cabbage (i.e., skunk crossed with onion and rotten meat), and the mottled maroon, rotten meat color of its spathe, make skunk cabbage attractive to flies which serve as its pollinators. Skunk cabbage is the first to flower because it can produce its own heat. A temperature probe placed in the spathe in early spring will record a much higher temperature than in the surrounding environment. There is some controversy about how this is accomplished. It has been suggested that its rate of metabolism is sufficient to generate this heat internally. Another hypothesis is that the leaf bases from the previous year decompose rapidly at this time, generating heat externally. Perhaps both methods are involved! The large, bright green leaves of skunk cabbage are a striking feature of this zone in early to mid-summer.

Canada Mayflower or Wild Lily-of-the-Valley, *Maianthemum canadense*. Range 3. May-June. Canada mayflower spreads by rhizomes. When you see a "group" of plants on a hummock, they are usually the same genetic individual that has reproduced vegetatively. Grouse and mice eat the pale red, speckled berries.

Three-leaved False Solomon's Seal, *Smilacina trifolia*. Range 1. May-June. This is one of several species that reach the southern edge of their Wisconsin range in the Bog. This and Canada mayflower, both in the Lily family, are often confused. Solomon's seal is readily distinguished, even in the absence of flowers, by its tapering leaf bases. In Canada mayflower, the leaves have definitely cordate (heart-shaped) bases. Three-leaved False Solomon's Seal, like Canada mayflower, forms patches by vegetative spread.

Small Yellow Lady's Slipper, *Cypripedium calceolus* var. *parviflorum*. Range 1-A and Range 5. May-June. The large yellow lady's slipper is more common through-

out Wisconsin. This small lady's slipper is found mostly in northwestern and southeastern Wisconsin in bogs and swamps. A large number of individuals are found in our cedar-tamarack woods.

Showy Lady's Slipper, *Cypripedium reginae*. Range 3. June. This species earns its name by being our showiest orchid. A clump of shoots is a single individual formed by vegetative spread. We are fortunate that the boardwalk passes right through the densest population of showies known in the Bog. They seem to have been spreading in this area over at least the period from 1980-85. In 1980, there were about 5-10 clumps in this area; in 1985, almost 40! The plant is densely covered with short coarse hairs. Contact with the hairs causes severe cases of dermatitis in people who are allergic to the plant (Fuller, 1933). Bacon (1902) conducted an experiment in which he rubbed the leaves of showy lady's slippers on the hands, wrists and forearms of students! He then went on to describe the symptoms of poisoning, including: "...general symptoms of poisoning manifesting themselves...arm swollen; blotches dark red; great burning and itching; temperature 100.3°...headache across the temples, blotches...across the chest, under the arms, and one on the face." Oh the joys of being a biology student at the turn of the century!

Clearweed, *Pilea pumila*. Range 4. July. In the nettle family, but does not produce the sting of stinging nettle, *Urtica dioica*.

Goldthread, *Coptis groenlandica*. Range 3. Also found in east Asia. May-June. Waxy evergreen leaves and slender, golden, threadlike rhizomes make this plant distinctive. Its bright yellow rhizomes are often collected for medicinal properties.

Marsh Marigold, *Caltha palustris*.

Range 1. Apr.-May. One of our early spring bloomers, it produces a very showy display in the conifer swamp. The petal-like sepals vary in number from 3 to 10 or more (usually 5). I have watched plants from year-to-year and found that those with a tendency to produce a large number of petals do so year-after-year; perhaps genetic variation. From June through July the fruits on the plants grow rather conspicuous. This is a member of the primitive Buttercup family and its fruits (Fig.3) show some primitive traits. Fruits in the flowering plants are thought to have evolved from leaves folded in half and bearing seeds on the leaf margins. If you

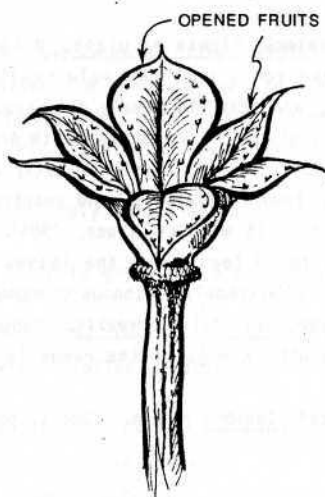


Fig. 3. Marsh Marigold fruits.

split open a marsh marigold fruit or look at one that has dehisced, you will see a small leaf with seeds along its margin.

Swamp Saxifrage, Saxifraga pensylvanica. Range 3. May-June. A rosette of large, leathery and fuzzy leaves, is topped by a leafless flowering stalk, 3-4 feet tall, producing a very unusual looking plant.

Bishop's Cap or Naked Miterwort, Mitella nuda. Range 1; also east Asia. May-June. Another species at the southern edge of its Wisconsin range in the Bog; is more common in northern Wisconsin, bishop's cap is found in the south only in tamarack bogs. This and the previous species are most common in alkaline tamarack and cedar swamps.

Touch-me-not or Jewelweed, Impatiens capensis (I. biflora). Range 4. July-Sept. Both the common name and generic name, meaning impatient, refer to the capsules which burst at a touch when mature shooting the seeds a great distance. In addition to its showy, orange, insect-pollinated (chasmogamous) flowers, the plant produces tiny flowers which never open (cleistogamous flowers). These flowers are automatically self-pollinated and produce an assured seed crop even when conditions are unfavorable for the pollination of the open flowers. The seeds produced by the open (chasmogamous) flowers may be of higher quality (more hybrid vigor) but the self-produced seeds are a sure thing for this annual which must re-establish from seeds each year and whose seeds are not long-lived in the soil.

Common Blue Violet, Viola sororia. Range 4. Apr.-June. Violets also produce cleistogamous (closed, self-pollinated) flowers. The cleistogamous flowers of the common blue violet are at first buried in the litter but become erect when the seed is ripe.

Water Hemlock, Cicuta maculata. Range 5. June-Aug. This biennial plant has tuber-like roots that resemble small sweet potatoes with the fragrance of parsnips, and that are deadly poisonous. Water hemlock is considered the most poisonous plant in temperate North America both to humans and to livestock. Symptoms of poisoning appear promptly and include "abdominal pain, violent convulsions, fever, paralysis, and respiratory failure, followed by death - sometimes within 15 minutes" (Voss, 1985). Larvae of swallow-tail butterflies can often be found feeding on the leaves of this plant. How can an insect eat something so extremely poisonous to mammals?

Starflower, Trientalis borealis. Range 2. May-June. This northern species is at the southern edge of its range in the Bog. It is perennial by a slender rhizome.

Turtlehead, Chelone glabra. Zone 1, pg. 6.

ZONE 3: SHRUB CARR

PART I. Willow-Dogwood Carr

Trees

Tamarack, Larix laricina. Zone 2, pg. 7.

White Cedar, Thuja occidentalis. Zone 2, pg. 7.

Paper Birch, Betula papyrifera. Zone 2, pg. 7.

Shrubs

Bebb's Willow, Salix bebbiana. Zone 1, pg. 4.

Pussy Willow, Salix discolor. Zone 1, pg. 4.

Slender Willow, Salix petiolaris. Zone 1, pg. 4.

Autumn Willow, Salix serissima. Range 2. Flr. late May-June. Fruits held until Sept.-Oct. All our other willows flower in very early spring and shed their fruit in late spring. Autumn willow is distinctive in flowering in late spring, holding its fruits all summer and shedding its seeds in fall. The fruits of autumn willow pop open and become silky rather suddenly and dramatically. It has beautiful, very shiny green foliage. Its graceful, long-tapered leaves are regularly toothed, each tooth ending in a small glandular knob.

Poison Sumac, Rhus vernix. Zone 1, pg. 5.

Glossy Buckthorn, Rhamnus frangula. Zone 1, pg. 5.

Alder-leaved Buckthorn, Rhamnus alnifolia. Zone 2, pg. 7.

Red-osier Dogwood, Cornus stolonifera. Zone 1, pg. 5.

Herbs

Arrow-head, Sagittaria latifolia. Range 2-A and Range 4. July. Typical leaves in midseason have arrow-shaped blades, however, in deeper water the blades are often much reduced. Other common names are wapato and duck potato, referring to its edible and tasty, starchy tubers. This was a staple of the native Americans of the area.

Fringed Brome, Bromus ciliatus. Range 2-A. July. Long hairs on the lemmas produce a feathery inflorescence.

Red Top, Agrostis gigantea. Zone 1, pg. 6. This grass has a spreading, very feathery and reddish colored inflorescence.

Wiregrass, Carex lasiocarpa. Range 2-A. May-July. This sedge (not a grass) has slender culms, leaf blades 1-3 mm broad with inrolled margins. Infructescence only 4-5 mm broad.

Sedge, Carex hystericina. Range 2-A. May-June. Widest leaf blades 3-10 mm broad. Perigynia narrowed to slender beaks. Plant red at base.

Sawgrass, Carex lacustris. Zone 1, pg. 6. Leaves blue-green, strongly M- shaped in cross section, very harsh and cutting on edges, basal sheath of leaves with connected, pinnate fibers. Infructescence 10-15 mm broad with perigynia ascending (pointing toward tip).

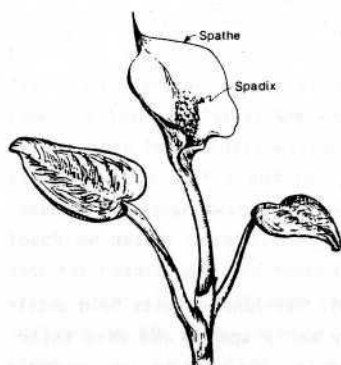


Fig. 4. Wild calla inflorescence.

Bottlebrush Sedge, *Carex comosa*. Range 5. July. Widest leaf blades 7-18 mm broad. Perigynia reflexed (bent backwards) at maturity, teeth of the perigynia beak ~2mm long and divergent curved (spreading). Infructescence ~15 mm broad.

Wild Calla, *Calla palustris*. Range 2. Also in Eurasia. June-early July. Another plant in the Arum family also containing jack-in-the-pulpit and skunk cabbage (Fig. 4).

Showy Lady's Slipper, *Cypripedium reginae*. Zone 2, pg. 9. Showy lady's slippers, common in the cedar-tamarack swamp, are also found in the dogwood-willow shrub carr and are common in areas where the canopy of the conifer swamp has been damaged by flooding. In sites where tamaracks have been killed and shrubs have invaded, lady's slippers seem to flourish.

Cuckoo Flower, *Cardamine pratensis* var. *palustris*. Range 1, and found around the world in northern habitats. May-June. This species is rare in Wisconsin and is on the State Endangered and Threatened Plant List. Fruit and seed formation is uncommon in this delicate plant which usually reproduces vegetatively. Young plantlets are produced on the bases of leaflets.

Swamp Saxifrage, *Saxifraga pensylvanica*. Zone 2, pg. 10.

Willow Herb, *Epilobium coloratum*. Range 4. July-Sept. These perennial plants produce thousands of very tiny seeds that have a tuft of long hairs at the summit and can be carried great distances by the wind.

Water Parsnip, *Sium suave*. Range 2-A and Range 4. July-Sept. Water parsnip produces two different kinds of leaves. The rosette leaves formed early in the season are 2-3 times pinnately compound with fine, linear segments. Later leaves are only once pinnately compound with much broader leaflets. In this habitat there is a high probability that the plant is submerged early in the season. Finely dissected leaves are more efficient for gas exchange under water because of a much higher surface area to volume ratio. In addition, fine leaves are less prone to being torn by flowing water.

Water Hemlock, *Cicuta maculata*. Zone 2, pg. 10.

Cut-leaved Water Hemlock, *Cicuta bulbifera*. Range 2. July. This species is characterized by an unusual method of vegetative reproduction. It produces small clusters of bulblets in the axils of the upper leaves. These bulblets are dispersed and can float on the water before taking root. This species is supposedly less toxic than *Cicuta maculata*, but nonetheless poisonous.

Tufted Loosestrife, Lysimachia thyrsiflora. Range 1-A. Also boreal Eurasia. June-July. This species, despite its common name, is in the primrose family (with starflower) not in the loosestrife family.

Buckbean, Bogbean, Menyanthes trifoliata. Range 1; also throughout boreal Eurasia. Late Apr.-May. The flowers are dimorphic; in some plants the style is much longer than the stamens, in others, the stamens surpass the style. An individual plant thereby deposits pollen on pollinators at a level that does not match its own style length. While found in the shrub carr, buckbean is more abundant in the string bog area. See Part I., pg. 41 for a discussion of its ability to pump oxygen from its leaves to its roots.

Swamp Milkweed, Asclepias incarnata. Zone 1, pg. 6.

Mad Dog Skullcap, Scutellaria lateriflora. Range 2-A and Range 5. June-Aug. All of the 220 species of the genus have a distinctive protuberance on the top of calyx (green tubular part of the flower below the petals). This may be a good lesson for those of us who look for an evolutionary (adaptive) explanation for everything we see. What possible function could be served by this appendage so constant to the genus, but not present in any other plants? The neutral theory of molecular evolution states that at least at the molecular genetic level, most variation that exists in plant and animal populations is selectively neutral (i.e. conferring no advantages or disadvantages) and, therefore, given to random fluctuations. Could this be a neutral trait that was fixed in the history of the genus?

Nightshade, Solanum dulcamara. Range 3; introduced and naturalized from Europe. Mid-May-Sept. The beautiful bright red berries are poisonous and cause nausea if eaten. This species has a very wide tolerance to moisture. It can be found in almost every community in the Bog from standing water to dry land. Could we expect wet and dry ecotypes of nightshade? A white-flowered form named forma albiflora has been found in scattered localities in the Bog.

Great Lobelia, Lobelia siphilitica. Range 4. Aug.-Sept. A white-flowered form (albiflora) of this blue-flowered species is also found in the Bog. The Bog is also home for both the taller, hairier eastern variety (var. siphilitica) and the shorter, nearly smooth western variety (var. lucoviciana).

Golden Ragwort, Senecio aureus. Range 4. Apr.-June. A variable species in which at least five varieties have been named. The genus is one of the largest known with over 1200 species, and is undoubtedly evolving actively.

Goldenrod, Solidago gigantea. Range 2 and Range 5. Aug.-Oct.

Red-stemmed Aster, Aster puniceus. Range 4. Aug.-Oct. Another variable species with several named varieties. The color of the beautiful flowers varies from blue-violet to lilac, pink or rarely white. The composites, of which Senecio is one genus and Aster another, is thought to be a young family still evolving rapidly, hence the large variability and amount of hybridization. Variation is, of course, the fuel of evolution.

Joe-Pye Weed, Eupatorium maculatum. Zone 1, pg. 6.

Boneset, Eupatorium perfoliatum. Range 4. July-Oct. This well known medicinal plant was used to treat a wide variety of ailments. At one time, it was widely believed that plant parts which resembled body parts were effective for treatment of the ailments of those parts. This belief was called the doctrine of signatures. The common name, boneset, refers to the belief that, because of the fused bases of the plant's opposite leaves, this species aided the healing of broken bones. Indian tribes generally did not follow the doctrine of signatures. Their uses for boneset preceded uses by Europeans, including use for cold and flu symptoms.

PART II. Bog Birch-Bog Willow Carr.

Trees

Tamarack, Larix laricina. Zone 2, pg. 7.

Shrubs

Autumn Willow, Salix serissima. Zone 3, pg. 11.

Bog Willow, Salix pedicellaris var. hypoglauca. Range 1. Late Apr.-early June. A small un-willow-like shrub with a whitened, waxy undersurface of the small oval leaves. Usually found in sphagnum bogs, it occurs only in a rather narrow range of habitats.

Sage-leaved Willow, Salix candida. Range 2. Apr.-June. Like the previous species, sage-leaved willow grows only in bogs; most often in calcareous bogs like this one. The undersurface of the leaves is normally extremely tomentose (hairy). We also have good examples along the boardwalk of Salix candida forma denudata which has no hairs on the leaves. This may be of hybrid origin. Hybrids of S. candida and S. petiolaris are found in the Bog. Several authors interpret much of the variation in the willows as hybridization among species. However, Argus (1964) who studied the willows of Wisconsin, believes that many willow species are just inherently variable and does not interpret this as being caused by a hybrid origin. Some of the few forms and hybrids that Argus does recognize are these from the Cedarburg Bog.

Slender Willow, Salix petiolaris. Zone 1, pg. 11.

Swamp Birch, Betula pumila and B. pumila var. glandulifera. Range 3. Late Apr.-May. The typical B. pumila and the variety, B. pumila var. glandulifera, grow side-by-side in the Bog. The small, waxy leaves of this species seem adapted to avoid excessive water loss.

Swamp Birch x Paper Birch Hybrids, Betula x sandbergi. Range: very local in tamarack swamps. This shrub to small tree, which is common in the center of the shrub zone, is a hybrid between paper birch (Betula papyrifera) and B. pumila var. glandulifera. In virtually every character, it is intermediate between a

paper birch tree and a swamp birch shrub.

Speckled Alder, *Alnus rugosa*. Range 1. March-May. We have two varieties of alder in the Bog, *A. rugosa* var. *typica* and *A. rugosa* var. *americana*. Both have a number of interesting features. The alders spread clonally with underground rhizomes, a very common trait in shrub species. Unlike most clonal shrubs that the author has investigated, in which shoots or clumps stay connected underground, alders form new plants which quickly lose their connections and become physiologically independent individuals. Therefore, in a long established thicket of alder, different genetic individuals are found completely intermixed (Huenneke, 1985). Another interesting aspect of alder biology is the fixation of atmospheric nitrogen. Bright orange nodules can be found on the shallow roots. These nodules are the home for symbiotic nitrogen-fixing bacteria. Over the course of time, this bacterial action removes large amounts of nitrogen from the atmosphere and adds it to the pool cycling within the ecosystem.

Meadow-sweet, *Spiraea alba*. Range 3. June-Aug. This shrub is very typical of northern wet areas.

Swamp Rose, *Rosa palustris*. Range 4. July-Aug.; hips ripe in the autumn. One of our most abundant native roses.

Winterberry, *Ilex verticillata*. Range 3. June-Aug. The flowers of winterberry are inconspicuous, but by October this shrub really comes into its own. Scarlet berries often cover the slender branches to the tip and remain on the branches until midwinter. This shrub in fruit adds gaiety to an otherwise bleak winter landscape.

Glossy Buckthorn, *Rhamnus frangula*. Zone 1, pg. 5.

Red-osier Dogwood, *Cornus stolonifera*. Zone 1, pg. 5.

Herbs

Marsh Fern, *Dryopteris thelypteris*. Range 4; also in east Asia. June-Oct. This is our most common fern, found in a wide range of habitats in the bog.

Common Cat-tail, *Typha latifolia*. Range: throughout North America from Alaska to Mexico, also Eurasia and Africa. Late May-July. Cat-tails are perhaps our most important wildlife plant, providing both food and shelter for a wide range of species. The starchy, edible rhizomes and tender shoot bases are especially important for muskrats. In addition to producing an average of 220,000 seeds per spike, the cat-tails spread prolifically by rhizomes. Distinct individual clones covering large areas are often noticeable in marshes, especially from the air. In a single season, under ideal conditions, growth from one seed may produce a rhizome system 10 feet in diameter with a hundred shoots. Cat-tail was a very important wigwam cover for Wisconsin Indian tribes. The leaves were sewn together vertically with basswood bark strips.

Narrow-leaved Cat-tail, *Typha angustifolia*. Range 2; also Eurasia. Late May-July. The common and narrow-leaved cat-tails have very interesting and intricate ecological relationships. The narrow-leaved cat-tail tends to grow in somewhat

deeper water and also tends to become established faster and respond more positively to disturbance than does I. latifolia. Large, pure stands of I. latifolia are said to be an indication of a long undisturbed habitat.

Hybrid Cat-tail, Typha x glauca. Range: wherever the two parental species overlap. I. latifolia and I. angustifolia form hybrids so readily and commonly that the hybrids have been given a separate name. Wherever the two species grow together, they form hybrids and all degrees of introgressions caused by the hybrids back-crossing with the parents. It is probably more difficult to find genetically pure individuals of the parental species than to find hybrids. Hybrids are intermediate in all the characters that separate the common and narrow-leaved cat-tails.

Arrow-head, Sagittaria latifolia. Zone 3, pg. 11.

Sedge, Carex aquatilis. Range 1-A; also circumpolar. July-Aug. Sometimes in water up to a foot deep. Leaves are blue-green, V-shaped and 3-8 mm wide. The blue-green infructescence is ~8 mm broad, long and cylindrical.

Sedge, Carex bebbii. Range 1. June-July. A common species in Wisconsin. There are about 200 species of sedges found in Wisconsin. Carex bebbii is tall, very slender sedge with small and rounded spikelets (usually 5) crowded at the tip of the culm.

Sawgrass, Carex lacustris. Zone 1, pg. 6.

Wiregrass, Carex lasiocarpa. Zone 3, pg. 11.

Spring Cress, Cardamine bulbosa. Range 5. Apr.-June. Its Latin name refers to the thickened "bulbous" root near the plant base.

Cuckoo Flower, Cardamine pratensis var. palustris. Zone 3, pg. 12.

Marsh Cinquefoil, Potentilla palustris. Range 1-A; also in Eurasia. June-Aug. There are about 25 species of Potentilla in this area; this one is unusual for two reasons. Most cinquefoils are plants of dry, sandy habitats and most have yellow or white flowers. The habitat and the dark maroon-purple blossoms of this marsh beauty render it unique in the genus.

Willow-herb, Epilobium coloratum. Zone 3, pg. 12.

Tufted Loosestrife, Lysimachia thyrsiflora. Zone 3, pg. 13.

Swamp Milkweed, Asclepias incarnata. Zone 1, pg. 6.

Common Skullcap, Scutellaria epilobiifolia. Range 1-A. June-Aug. Like so many other blue-flowered species, this one sometimes has white or pink flowers. There is some disagreement about whether this species is distinct from its closely related Eurasian relative, S. galericulata.

Water Horehound, Lycopus americanus. Range 2-A & Range 5. July-Aug.

Mint, Mentha arvensis. Zone 1, pg. 6.

Bedstraw, Galium labradoricum. Range 3. Late May-Aug. This is a northern bedstraw found primarily in sphagnum bogs. The leaves feel "sticky" because they are covered with short recurved hairs which seem to function as grappling hooks to hold onto other adjacent vegetation. The weak and slender stems originating from a slender perennial rhizome, cannot support the plant. Galium tends to grow

in dense stands of herbaceous vegetation to which it clings for support; an effective way for a plant to support itself without investing materials in structural tissues. This adaptation is common for many other herbs of wet thicket environments.

Great Lobelia, Lobelia siphilitica. Zone 3, pg. 13.

Golden Ragwort, Senecio aureus. Zone 3, pg. 13.

Joe-Pye Weed, Eupatorium maculatum. Zone 1, pg. 6.

ZONE 4: SEDGE MEADOW — EMERGENT AQUATICS BORDERING THE STREAM

Shrubs

Sage-leaved Willow, Salix candida. Zone 3, pg. 14.

Herbs

Marsh Fern, Dryopteris thelypteris. Zone 3, pg. 15.

Common Cat-tail, Typha latifolia. Zone 3, pg. 15.

Narrow-leaved Cat-tail, Typha angustifolia. Zone 3, pg. 15.

Arrow-head, Sagittaria latifolia. Zone 3, pg. 11.

Sedge, Carex pseudo-cyperus. Zone 1, pg. 6. Tall (up to 3 ft.) stout sedge in clumps with thick, sharply triangular culms. Leaves 5-10 mm broad and rough. Spikes have slender peduncles and droop, slenderly cylindric 8-11 mm, perigynia reflexed.

Tussock Sedge, Carex stricta. Range 3. May-July. Culms forming large tussocks. Bases of culms are slender and reddish with pinnate fibers. Leaves M-shaped, 2-4 mm wide, wiry. Perigynia ascending.

Dock-leaved Smartweed, Polygonum lapathifolium. Range: throughout temperate North America; also throughout much of the Old World; probably both native and introduced. July-Oct. A highly variable annual plant. Its nodding inflorescence is characteristic.

Marsh Cinquefoil, Potentilla palustris. Zone 3, pg. 16.

Swamp Milkweed, Asclepias incarnata. Zone 1, pg. 6.

Common Skullcap, Scutellaria epilobiifolia. Zone 3, pg. 16.

Mad Dog Skullcap, Scutellaria lateriflora. Zone 3, pg. 13.

Joe-Pye Weed, Eupatorium maculatum. Zone 1, pg. 6.

ZONE 5: STREAM

Herbs

Duckweed, *Lemna minor*. Range: throughout North America and the Old World. This is our smallest flowering plant with a tiny (2-4 mm) thallus (vegetative plant body without differentiation into leaf and stem) and a single root arising from the bottom. Most reproduction is vegetative by budding; this produces colonies of 2-8 plants. The miniscule flowers, formed in lateral reproductive pouches, are rarely found.

Star Duckweed, *Lemna trisulca*. Range 2-A & Range 5; also widely distributed in the Old World. The thallus of this species is oblong, 4-10 mm long, and narrowed at the base into a 4-16 mm long "tail". Several series of budded offshoots usually remain connected.

Coontail, *Ceratophyllum demersum*. Range: throughout North America and the Old World: July-Sept. The flowers are minute and seldom seen in this submerged, rootless plant, but seeds are produced in abundance and are an important food for water fowl. Coontail has a unique method of pollination. The stamens are released and float to the water surface before their pollen is discharged. The pollen then sifts down through the water, and with a lot of luck, finds a pistil.

Yellow Pond Lily, *Nuphar variegatum*. Range 2. June-Aug. Some leaves float, others are held erect above the water surface. Native Americans ate the tubers roasted or boiled; the seeds were ground into meal or parched and eaten like popcorn.

White Water Lily, *Nymphaea tuberosa*. Range 3. July-Aug.

Fragrant Water Lily, *Nymphaea odorata*. Range 4. June-Sept. Voss (1985) treats the white and fragrant water lilies as the same species *Nymphaea odorata*. The characters used to distinguish the two species are indistinct and variable (e.g., *N. odorata*, more fragrant; *N. tuberosa*, flowers closing later in the afternoon and with larger leaf blades and flowers). Leaf and petiole coloration differences have been shown to be quite phenotypically plastic (i.e. depending on habitat more than genetics). "A rhizome from a typical large plant of *N. tuberosa* when transplanted to a lake in which *N. odorata* grew would produce leaves and flowers resembling the latter in color and size" (Voss, 1985).

Water Milfoil, *Myriophyllum exalbesens*. Range 1-A July-Sept. Only the wind-pollinated flowering spikes are held above the surface of the water. At the water surface, there is an abrupt transition from foliage leaves to bracts. This species produces winter buds or turions, specialized shoots with short internodes and compact leaves, which aid in winter survival and dispersal.

Bladderwort, *Utricularia vulgaris*. Range 1-A & Range 5; also Eurasia. Late June-Aug. Only the beautiful, delicate yellow flowers are held above the water. The bladders of this species are born on the leaves, not on specialized branches. However, some botanists suggest that the so-called dissected leaves of the bladderworts are actually systems of highly adapted and modified branches and that in the course of evolution these plants have lost their true leaves. The

plants are perennial by the development of special buds, consisting of very crowded clusters of small leaves, that form the overwintering plant. These hard buds can often be found on the plants late in the season. See Part I, pg. 41 for notes on the operation of their bladders.

ZONE 6: WEST ISLAND

A partial plant list for both the west and east islands is provided here. However, since this guidebook concerns primarily the natural history of the wetland only a few annotations are included.

Trees

Quaking Aspen, Populus tremuloides. Range 1-A. Apr.-May. Note the flattened petioles. The leaves seem to be specially adapted to shake in the slightest breezes. Why? Increase air movement on the leaf surface? Shake off herbivore insects? Shake off water droplets after a rain?

Blue Beech or Musciewood, Carpinus caroliniana. Range 5. Apr.-May. Fluted trunk and smooth gray bark gives the trunk of this small tree a sinewy, muscular appearance. Occurs primarily on the east island.

Beech, Fagus grandifolia. Range 3. May-June. Beech is primarily an eastern tree and extends only as far west as central Wisconsin. Most beech in Wisconsin is found close to Lake Michigan.

White Oak, Quercus alba. Range 4. Apr.-June.

Red Oak-Black Oak, Quercus borealis, Q. velutina. Range 4. May-June. These oaks are difficult to distinguish, and hybridize extensively.

Black Cherry, Prunus serotina. Range 5. May-June. An important lumber tree in the northeast, in this part of its range it seldom obtains major stature.

Sugar Maple, Acer saccharum. Range 4. Apr.-May.

Basswood or Linden, Tilia americana. Range 3. July. An important honey tree; during the major nectar flow of the summer, the islands sometimes hum with the thousands of honey bees working these trees.

White Ash, Fraxinus americana. Range 4. Apr.-May.

Shrubs

Canada Yew, Taxus canadensis. Range 3.

American Black Currant, Ribes americanum. Zone 1, pg. 4.

Prickly Gooseberry, Ribes cynosbati. Zone 1, pg. 4. Some smooth-berried individuals are found on the west island.

Missouri Gooseberry, Ribes missouriense. Range 3. Apr.-May. This is the only one of our gooseberries that grows only in the upland habitats.

Swamp Red Current, Ribes triste. Range 1; also in north Asia. May-June.

Service Berry or **Shad-bush**, Amelanchier arborea. Range 4. Apr.-May. Beautiful, fragrant, spring blooming tall shrub or small tree.

Pogoda Dogwood, Cornus alternifolia. Range 4. May-June. This shrub, bearing light blue fruits, is our only alternate-leaved dogwood; all the others are opposite-leaved. East island.

Round-leaved Dogwood, Cornus rugosa. Range 3. May-July. Also has light blue fruits. East island.

Arrow-wood, Viburnum acerifolium. Range 4. May-June. Lacks the showy flowers of high-bush cranberry, Viburnum opulus, which is found in the shrub carr just west of the west island.

Bush Honeysuckle, Diervilla lonicera. Range 3. June-July. Primarily on the east island.

Herbs

Rattlesnake Fern, Botrychium virginianum. Range 1-A & Range 5; also Eurasia.

Maidenhair Fern, Adiantum pedatum. Range 1.

Bottle-brush Grass, Hystrix patula. Range 4. July.

Rice Grass, Oryzopsis racemosa. Range 3. July.

False Solomon's Seal, Smilacina racemosa. Range 2-A & Range 5. May-June.

Bellwort, Uvularia grandiflora. Range 3. Apr.-May.

White Trillium, Trillium grandiflorum. Range 3. Apr.-May.

Helleborine, Epipactis helleborine. Range 3; an introduced species from Europe, helleborine seems to be rapidly spreading in northeast North America. July-Aug. Grows in a wide variety of habitats. This is our only "weedy" orchid. Weedy orchids are common in the tropics but are unusual in temperate regions.

White Baneberry or **Doll's Eyes**, Actaea pachypoda. Range 4. May-June. Don't be fooled by the name! You can't tell white baneberry and red baneberry (A. rubra) apart by the color of the fruit. White baneberry has a red-fruited form and red baneberry has a white-fruited form. The species can be identified by the thickness of the pedicels (fruit stalks), which are thick in white baneberry and thin in red baneberry. The Field Station has both species and both forms.

Early Meadow Rue, Thalictrum dioicum. Range 4. Apr.-May. Has separate male and female plants (dioecious).

Columbine, Aquilegia canadensis. Range 5. Apr.-June. It has been interesting to watch the spread of this plant on the islands over the last 5 years. In 1980, there were only a few plants on the west island; by 1985, the west island had about 30 plants and they had colonized the east island.

Hepatica, Hepatica acutiloba. Range 4. Mar.-May.

Rock Cress, Arabis laevigata. Range 5. May-June.

Wild Sarsaparilla, Aralia nudicaulis. Range 2. May-June.

Spikenard, Aralia racemosa. Range 5. July.

Lopseed, Phryma leptostachya. Range 4; also east Asia. July-Aug.

Zig-zag Goldenrod, *Solidago flexicaulis*. Range 4. Aug.-Oct.

Large-leaved Aster, *Aster macrophyllus*. Range 3. July-Sept.

ZONE 7: SWAMP HARDWOODS - CONIFERS (BETWEEN ISLANDS)

Trees

Tamarack, *Larix laricina*. Zone 2, pg. 7.

White Cedar, *Thuja occidentalis*. Zone 2, pg. 7.

American Elm, *Ulmus americana*. Range 5. Mar.-early May. See Part I for discussion of the ecology of elm.

Red Elm or Slippery Elm, *Ulmus rubra*. Range 4. Mar.-early May. Its common name describes the slippery, mucilaginous inner bark. Red elm is also susceptible to Dutch Elm Disease.

Service Berry or Shad-bush, *Amelanchier arborea*. Zone 6, pg. 20.

Silver Maple, *Acer saccharinum*. Range 4. Mar.-Apr. A fast-growing, rather short-lived maple. From 1982-1985 we watched the decline of the large individual just east of the west island. In 1980 it appeared to be a healthy tree; now it may simply be dying of old age.

Black Ash, *Fraxinus nigra*. Range 3. May. The most flood tolerant of our ash species. All of our ashes produce separate male and female flowers, but both male and female are usually produced by each tree.

Shrubs

Bebb's Willow, *Salix bebbiana*. Zone 1, pg. 4.

Pussy Willow, *Salix discolor*. Zone 1, pg. 4.

Slender Willow, *Salix petiolaris*. Zone 1, pg. 4.

Swamp Red Currant, *Ribes triste*. Zone 6, pg. 20.

Swamp Rose, *Rosa palustris*. Zone 3, pg. 15.

Glossy Buckthorn, *Rhamnus frangula*. Zone 1, pg. 5.

Red-osier Dogwood, *Cornus stolonifera*. Zone 1, pg. 5.

Herbs

Cinnamon Fern, *Osmunda cinnamomea*. Range 4; also tropical America. Called cinnamon fern because the fronds are covered with a cinnamon-colored wool when young. The fertile and sterile fronds are normally separate and different in appearance. This is a southern species which is less common as you go northward in Wisconsin.

Common Cat-tail, *Typha latifolia*. Zone 3, pg. 15.

- Canada Mayflower, Maianthemum canadense. Zone 2, pg. 8.
- Three-leaved False Solomon's Seal, Smilacina trifolia. Zone 2, pg. 8.
- Gold Thread, Coptis trifolia. Zone 2, pg. 9.
- Marsh Marigold, Caltha palustris. Zone 2, pg. 9.
- Cuckoo Flower, Cardamine pratensis var. palustris. Zone 3, pg. 12.
- Pitcher Plant, Sarracenia purpurea. Zone 10, pg. 28.
- Willow-herb, Epilobium coloratum. Zone 3, pg. 12.
- Tufted Loosestrife, Lysimachia thyrsiflora. Zone 3, pg. 13.
- Starflower, Trientalis borealis. Zone 2, pg. 10.
- Buckbean, Bogbean, Menyanthes trifoliata. Zone 3, pg. 13.
- Mad Dog Skullcap, Scutellaria lateriflora. Zone 3, pg. 13.
- Turtlehead, Chelone glabra. Zone 1, pg. 6.
- Lousewort, Pedicularis lanceolata. Zone 1, pg. 6.
- Great Lobelia, Lobelia siphilitica. Zone 3, pg. 13.
- Beggar-ticks or Stick-tight, Bidens cernua. Range 2-A. Aug.-Sept. A highly variable species with a number of recognized varieties. This is an annual plant which demonstrates extreme plasticity with respect to plant size at flowering. Depending on conditions, a plant can be 3 inches tall and have only one head or can reach almost 6 feet tall and have several hundred heads, yet even the tiny plants may successfully bear seeds.
- Beggar-ticks or Tickseed-Sunflower, Bidens coronata. Range 3. Aug.-Sept. This species is an annual or biennial, probably depending on the time of year of germination. It is the showier of the two Bidens species. It shares the variability and extreme size plasticity of the previous species.

ZONE 8: EAST ISLAND

(See Zone 6; West Island)

ZONE 9: EAST ISLAND TO THE STRING BOG

Trees

- Tamarack, Larix laricina. Zone 2, pg. 7.
- White Cedar, Thuja occidentalis. Zone 2, pg. 7.
- Sugar Maple, Acer saccharum. Range 4. Apr.-May. It may seem strange to see sugar maple, a tree of rich upland woods, listed here. The seed rain on this part of the Bog must be sufficient to provide for the continued establishment of a small number of seedlings. These never grow beyond the sapling stage, and therefore, must grow from seeds blown in from elsewhere.
- Green Ash, Fraxinus pennsylvanica var. subintegerrima. Range 4.

Red Ash, Fraxinus pennsylvanica var. pennsylvanica. Range 4.

Black Ash, Fraxinus nigra. Zone 7, pg. 21.

Shrubs

Bebb's Willow, Salix bebbiana. Zone 1, pg. 5.

Sage-leaved x Slender Willow Hybrids, Salix candida x S. petiolaris. Range: unknown, collected in Wisconsin only from the Cedarburg Bog (Argus, 1964). An apparent hybrid (intermediate between the parental species in all characters) is located south of the boardwalk just west of the loop.

Black Chokeberry, Aronia melanocarpa. Range 3. Flr., May-June; Fr., Aug.-Sept. Closely related to the pears; some authors include black chokeberry in that genus (Pyrus). A showy flowering, erect shrub. It is common here and throughout the strings of the string bog.

Poison Sumac, Rhus vernix. Zone 1, pg. 5.

Winterberry, Ilex verticillata. Zone 3, pg. 15.

Mountain Holly, Nemopanthus mucronata. Range 3. Late Apr.-early June. In Wisconsin found primarily in deep cedar-tamarack bogs.

Red-osier Dogwood, Cornus stolonifera. Zone 1, pg. 5.

Herbs

Sphagnum Moss, Sphagnum spp. There are at least 5 species of Sphagnum in the Bog. Most of these have a circumboreal distribution. A few lush hummocks of Sphagnum are found along the boardwalk just before you reach the loop. Otherwise, there is little Sphagnum along the boardwalk. Sphagnum is much more common in the northern string bog and in the cedar-tamarack forest just west of the open string bog west of Long Lake. These areas are locally acidic because of the moss' acidifying effects. The ability to drastically alter water chemistry through ion exchange makes this diminutive moss a giant with respect to its ecological influence on the habitat. Most of the complex reactions that affect water chemistry are extremely dependent on water pH. Because of its acidity, Sphagnum is particularly sterile with respect to bacteria. This, in combination with its extreme absorbancy when dry, made it very useful for dressing wounds. Sphagnum was also used for diapering infants by the Indian tribes of northern Wisconsin.

Cinnamon Fern, Osmunda cinnamomea. Zone 7, pg. 21.

Royal Fern, Osmunda regalis. Range 5; also tropical American; either the same taxon or a closely related variety of the more or less cosmopolitan Old World royal fern. The large individual of this fern on the north side of the walk truly earns its name. It not only bears its fronds in circular crowns, but it has expanded radially to form a large annulus or a fern "fairy-ring". Royal ferns, when allowed to grow undisturbed, are capable of forming large rings and growing to great age.

For the last six years, I've watched this fern. It was about 2 1/2 to 3 feet across at the base when I first saw it, and still bore fronds from its center. Each year it has expanded at an average rate of about 5 inches and the center, if alive, no longer produces fronds. I expect, although I have never excavated a royal fern, that large clonal individuals become many physically separated individuals. The rhizomes are probably not as long lived as they are in most clonal shrubs, and so the connections between shoots are lost. Is there an adaptive (evolutionary) explanation for new fronds being produced only to the outside of the rings rather than reinventing the center of the ring after a period of time? Once the genetic individual has split into many physiological individuals, how do they manage to maintain a constant orientation to their growth? Is there some way one could cause them to turn back toward the center (e.g., nutrient addition, physical blockage of expansion, etc.)?

Royal fern is common in the Cedarburg Bog and other peatlands of the immediate area, but it is not found frequently in the more disturbed wetlands in this vicinity. Royal fern, a more or less cosmopolitan species, reminds one of the proportionately large number of cosmopolitan ferns and mosses relative to the number of widely distributed flowering plants. Spores of ferns and mosses can be extremely hardy and are small enough to be blown world-wide in the wind. Spores are abundant even in the upper jet streams! Presumably this wide distribution of propagules means that a single species can grow anywhere in the world where it finds suitable habitat, and still maintain enough world-wide gene flow so that local types and species tend not to form readily.

The fertile pinnae (smallest leaf divisions) are born terminally on the leaves and are very different morphologically from the sterile pinnae. Spores mature from June to July.

Shield Fern, Dryopteris cristata. Range 2; also Europe. Dryopteris is a large cosmopolitan genus. Natural hybrids occur between most of the species.

Water Plantain, Alisma plantago-aquatica. Zone 2, pg. 8.

Skunk Cabbage, Symplocarpus foetidus. Zone 2, pg. 8.

Canada Mayflower, Maianthemum canadense. Zone 2, pg. 8.

Three-leaved False Solomon's Seal, Smilacina trifolia. Zone 2, pg. 8.

Northern Green Orchis, Habenaria hyperborea. Range 1-A. June-early July. This is one of the most widespread of native American orchids; it tolerates a wide variety of habitats. This plant looks much like the bog candle (Habenaria dilatata), a close relative with which it hybridizes, but (H. hyperborea) has green rather than white flowers and is somewhat leafier.

Gold Thread, Coptis groenlandica. Zone 2, pg. 9.

Bishop's Cap, Mitella nuda. Zone 2, pg. 10.

Violet, Viola missouriensis. Range 5, but not east of Indiana. Apr.-May.

Bunchberry, Cornus canadensis. Range 1-A, also east Asia. June-July. This diminutive herbaceous dogwood spreads by slender, forking underground rhizomes. Those of you familiar with the flowering dogwood of the southeast will

immediately recognize the flowers of this little herb. The bright red bunches of fruits are very showy in the fall. A northern species, bunchberry comes into southern Wisconsin only along Lake Michigan.

Pink Pyrola, Pyrola asarifolia. Range 1-A. June-July. A creeping, evergreen, perennial species. Uncommon in southern Wisconsin where it is found only in a few bogs.

Starflower, Trientalis borealis. Zone 2, pg. 10.

Buckbean, Menyanthes trifoliata. Zone 3, pg. 13.

Partridge Berry, Mitchella repens. Range 5. June-July. Another common name is two-eyed berry, referring to the double fruit formed by the fusion of two ovaries with separate flowers. The flowers are dimorphic. One form has long, exerted stamens and a short style; the other, a long, exerted style and short stamens that are contained within the flower tube. This type of flower dimorphism increases outcrossing and minimizes selfing. Pollen is deposited on insect visitors in a discrete zone which matches the length of the style (female part) in the other flower form. Most pollination, therefore, occurs across forms.

ZONE 10: STRING BOG

Trees

Tamarack, Larix laricina. Zone 2, pg. 7.

White Cedar, Thuja occidentalis. Zone 2, pg. 7.

Shrubs

Ground Juniper, Juniperus communis var. depressa. Range 1 and circumpolar in temperate and arctic zones. Typical habitat of this old-field juniper is poor, dry, rocky soil and pastures. The same species is found in the old field between the gate and the steps which lead to the boardwalk. What is it doing growing out here in the string bog? See the text (Part I, pg. 41) for a discussion of low nutrient conditions in the string bog and the reasons why this area is physiologically dry. Perhaps the habitat conditions experienced by the plants of dry, infertile uplands and by the plants of the string bog are not as different as they might at first appear.

Black Chokeberry, Aronia melanocarpa. Zone 9, pg. 23.

Poison Sumac, Rhus vernix. Zone 1, pg. 5.

Winterberry, Ilex verticillata. Zone 3, pg. 15.

Bog Rosemary, Andromeda glaucophylla. Range 2. May-June. This is a low evergreen shrub. One of the common constituents of the flora of acid bogs wherever they are found, this species is obviously also at home in this calcareous fen. The leathery evergreen leaves of this species are superbly adapted to reduce water loss with their stomates (leaf pores) concentrated on the lower side and protected by a waxy bloom, fine hairs and the down-turned margins of the leaves.

Leatherleaf, Chamaedaphne calyculata. Range 1; also northern Eurasia. Apr.-May. Another low evergreen shrub of the Heath family, it is found in all bogs and in many, makes up the bulk of the woody plant material. In northern Wisconsin, Leatherleaf becomes dominant in open bogs, giving them the name "Leatherleaf-Sphagnum Bogs".

Velvet-Leaf Blueberry, Vaccinium myrtilloides. Range 2. Flr., May-June; Fruit ripe July-Sept. Both the branches and leaves are velvety hairy. This is yet another example of a species found in swamps and bogs and also in dry, sandy soil.

Mountain Fly Honeysuckle, Lonicera villosa. Range 1. May-June. This honeysuckle is a small shrub (less than 3 ft. tall) found growing in the strings. It is rather rare and found in bogs in northern and eastern Wisconsin, but in other parts of its range it is also found in dry, rocky barrens.

Herbs

Arrow Grass, Triglochin maritima. Range 1-A; also Europe and Asia. May-July. This plant is in the Juncaginaceae or Arrow Grass family and is not a grass as its common name implies. A perennial herb, it grows in freshwater marshes, saline and brackish coastal marshes and also in bogs. The tall, slender, leafless spikes of arrow grass often fall over in the string bog before they shed their seeds. In the spring a dense, straight line of seedlings often germinates directly from the capsules of the floating infructescence.

Reed Grass, Phragmites communis. Range 2-A & Range 5; also into southern South America, Eurasia, Africa and Australia. May-June. This is our tallest and showiest grass species. It spreads vegetatively and fertile seed is only rarely produced. The horizontal stolons by which it spreads can be up to 30 to 45 feet long!

Cotton Grass, Eriophorum viridi-carinatum. Range 2. Fruit, late May-Aug. Another misnomer, cotton grass is in the sedge family (Cyperaceae).

Cotton Grass, Eriophorum virginicum. Range 4. Fruit, Aug.-Oct.

Beak Rush, Rhynchospora alba. Range 1-A; also Puerto Rico and Eurasia. Fruit, July-Sept.

Sedge, Carex disperma. Range 1-A; also Eurasia. May-July.

Sedge, Carex tenuiflora. Range 1; also Eurasia. June-Aug. A rather rare sedge found only in scattered locations in Wisconsin, mostly in Sphagnum bogs. Cedarburg Bog is the southern edge of the range of C. tenuiflora.

Sedge, Carex interior. Range 2-A. May-Aug.

Wiregrass, Carex lasiocarpa. Zone 3, pg. 11.

Sedge, Carex limosa. Range 1; also northern Eurasia. May-Aug.

Path Rush, Juncus tenuis. Ranges throughout N. America; it has been naturalized in Europe, South America and Australia. May-Sept. Path rush grows in dry or moist habitats but is especially common in compacted soils and is abundant along most woodland paths. It seems to respond favorably to disturbance by foot traf-

fic. Path rush is found in the open flats of the string bog, an unusual habitat for the species.

Tall White Bog-Orchid or Bog Candle, Habenaria dilatata. Range 1. June-July. This species grows only in scattered localities in Wisconsin. Its flowers have a wonderful aroma of cloves. Bog candle hybridizes readily with Habenaria hyperborea, also found in the string bog. The bog candle is less tolerant of habitat variation than the northern green orchis. Although they grow together in the Cedarburg Bog, H. hyperborea grows in many situations where H. dilatata would never be found.

Northern Green Orchis, Habenaria hyperborea. Zone 9, pg. 24.

Prairie Fringed Orchid, Habenaria leucophaea. Range 3. June-July. This species was once common on wet prairies in the eastern tall grass prairie region. Occasionally it is also found in bogs in the northeastern part of its range.

Rose Pogonia, Pogonia ophioglossoides. Range 4. July. This species and the next two, are normally found together. Usually where rose pogonia grows, grass pink and dragon's mouth will also be found. Flowers in this species are usually solitary on the stalk.

Dragon's Mouth, Arethusa bulbosa. Range 3. Early June-mid-July. This species is an exceedingly rare orchid found only in very scattered localities in Wisconsin. It was collected from the string bog in the 1920's and 30's and then not recorded again until the 1980's. Until 1982, it was assumed that the plant may have been extirpated from the Cedarburg Bog. In that year, a few individuals were observed. In 1983, from June 10-30, a large number of individuals, estimated to total at least in the hundreds, bloomed throughout a large part of the string bog. 1984 was again a good year for dragon's mouth. Case (1964) notes that "blooming populations of this orchid can fluctuate considerably at a given station. At one northern Michigan bog, observed for over 15 years, the number of blooming plants varied from as low as 12 to over 1,000 in different seasons". He goes on to hypothesize that because dragon's mouth has an early flowering season, late frosts frequently cut down most of the flowers and prevent seed production. Following a series of years of late frosts, the blooming population declines markedly. This suggests that individual plants may be rather short-lived and that they depend on heavy seed production for the maintenance of their populations.

Grass Pink, Calopogon pulchellus. Range 4. June-July. When the string bog is adorned with grass pink, rose pogonia and dragon's mouth, it is a glorious sight indeed. Grass pink multiplies by offset corms and, where it grows, frequently reaches great abundance. Grass pink blooms with the lip uppermost so that the flowers are upside down compared to most orchid species.

Loesel's Twayblade, Liparis loeselii. Range 3; also Europe. June-July. Though it may be common, the uniform yellow-green color and small size of this plant make it rather inconspicuous so that it may often be overlooked. Loesel's twayblade grows in the string just south of where the loop trail joins the main walk.

Pitcher Plant, Sarracenia purpurea. Range 3. May-June. See the text (Part I, pg. 40) for a discussion of the insect-trapping pitchers and related ecological notes. Another interesting aspect of its biology involves a complex interrelationship of insects dependent on the plant. A moth, Endothenia daecheana, is an obligate associate of pitcher plants. It lays its eggs only in the flowering stalks of pitcher plants and the moth larvae develop within the hollowed out stems. About 20% of the flowering stalks in the string bog were found to have larvae in them (Guntenspergen and Rupprecht, 1983). However, when they reared these larvae in the laboratory, they found that over 80% of them did not develop into the moth, but produced a parasitoid wasp, Ascogaster sp. The wasp lays its eggs in the moth larvae which are completely concealed within the flower stalks. How can the wasp accurately locate 80% of the moth larvae which are completely enclosed and found in only 20% of the flower stalks? The wasp may lay its eggs only into this species of moth and, therefore, may require the moth for its reproduction.

Linear-leaved Sundew, Drosera linearis. Range 1. July. Found only in the wettest, most open parts of the flarks. See Part I, pg. 42 for a discussion of its biology.

Round-leaved Sundew, Drosera rotundifolia. Range 1. July. Not nearly as rare as the preceding species. In the string bog it is found only on the strings. Some beautiful patches of this species are found on hummocks along the walk through the string.

Willow Herb, Epilobium coloratum. Zone 3, pg. 12.

Bunchberry, Cornus canadensis. Zone 9, pg. 24.

Wintergreen, Gaultheria procumbens. Range 3. July-Aug. This low-growing, evergreen, somewhat woody plant, has oil of wintergreen in its leaves which produce a wonderful fragrance when crushed.

Small Cranberry, Vaccinium oxycoccus. Range 1; also northern Eurasia. June-early July. This small cranberry is very closely related to the cultivated cranberry, Vaccinium macrocarpon. Cranberries were much prized by the Indians and early settlers for their remarkable keeping qualities.

Buckbean, Menyanthes trifoliata. Zone 3, pg. 13.

Horned Bladderwort, Utricularia cornuta. Range 4; also West Indies. July-Aug. Where this species grows, it sometimes occurs in great profusion. The bladders are produced below the surface of the loose peat. See discussion of insect trapping for U. vulgaris (Part I, pg. 41).

Intermediate Bladderwort, Utricularia intermedia. Range 2; also Eurasia. Late May-Sept. Creeping at the bottom of shallow pools.

Kalm's Lobelia, Lobelia kalmii. Range 2. July-Aug. This species grows almost exclusively in calcareous swamps. It has beautiful, delicate blue flowers that dot the flarks in midsummer.

Bog Goldenrod, Solidago uliginosa. Range 3. July-Sept. A variable species with several recognized varieties.

VASCULAR PLANTS OF THE CEDARBURG BOG

The following plant list is not complete; new species are added to the list each year. It is, however, the Field Station's most current list. The list is included both as reference material and in the hopes that its publication will encourage reports of unlisted species. The letters in parentheses following the common names provide a rough indication of the species' habitats:

- L - lake, stream
- M - marsh, meadow
- B - string bog
- S - shrub carr
- C - conifer swamp
- H - hardwood swamp
- I - island

ACERACEAE

- Acer rubrum, Red maple (C, H, I)
- Acer saccharinum, Silver maple (S, H)
- Acer saccharum, Sugar maple (I)

ALISMATACEAE

- Alisma plantago-aquatica, Water Plantain (L, M, S)
- Sagittaria cuneata, Arrowhead (L, M, S)
- Sagittaria latifolia, Arrowhead (L, M, S)

ANACARDIACEAE

- Rhus radicans, Poison ivy (C, H, I)
- Rhus vernix, Poison sumac (B, S, C, H)

APIACEAE (UMBELIFERAE)

- Cicuta bulbifera, Bulb-bearing water hemlock (M, S, C, H)
- Cicuta maculata, Water hemlock (S, C, H)
- Osmorhiza longistylis, Aniseroot (I)
- Oxypolis rigidior, Cowbane (C, H)
- Sanicula gregaria, Black snakeroot (I)
- Sium suave, Water parsnip (M, S, H)

APOCYNACEAE

- Apocynum androsaemifolium, Dogbane (I)

AQUIFOLIACEAE

- Ilex verticillata, Winterberry (S, H)
- Nemopanthes mucronatus, Mountain holly (B, C)

ARACEAE

- Arisaema triphyllum var. triphyllum, Jack-in-the-pulpit (C)
- Arisaema triphyllum var. stewardsonii, Jack-in-the-pulpit (C)
- Calla palustris, Wild calla (M, S, C, H)
- Symplocarpus foetidus, Skunk cabbage (C, H)

ARALIACEAEAralia nudicaulis, Wild sarsaparilla (I)Aralia racemosa, Spikenard (I)**ASCLEPIADACEAE**Asclepias exaltata, Poke milkweed (I)Asclepias incarnata, Swamp milkweed (M, S)**ASTERACEAE (COMPOSITAE)**Achillea millefolium, Yarrow (I)Ambrosia artemisiifolia, Common ragweed (I)Aster ericoides, Heath aster (I)Aster junciformis, Rush aster (S, H)Aster lucidulus, (C, H)Aster macrophyllus, Large-leaved aster (I)Aster puniceus, Purple-stemmed aster (S, C)Aster simplex, Aster (M, S, C, H)Bidens aristosa, Tickseed sunflower (S, C, H)Bidens cernua, Bur marigold (S, C, H)Bidens coronata, Beggar ticks (L, M, B)Bidens frondosa, Beggar ticks (S, C, H)Cirsium muticum, Swamp thistle (M)Erigeron canadensis, Daisy fleabane (I)Erigeron philadelphicus, Philadelphia daisy (M)Eupatorium maculatum, Joe-pye weed (M, S)Eupatorium perfoliatum, Boneset (M, S)Eupatorium purpureum, Joe-pye weed (M)Eupatorium rugosum, White snakeroot (I)Prenanthes alba, White lettuce (S, H)Senecio aureus, Golden ragwort (C)Solidago flexicaulis, Zigzag goldenrod (I)Solidago gigantea, Late goldenrod (S, H)Solidago patula, Rough-leaved goldenrod (C)Solidago uliginosa, Bog goldenrod (B, C)**BALSAMINACEAE**Impatiens capensis, Jewel weed (C, H)**BERBERIDACEAE**Caulophyllum thalictroides, Blue cohosh (I)Podophyllum peltatum, Mayapple (I)**BRASSICACEAE (CRUCIFERAE)**Arabis canadensis, Sticklepod (I)Arabis laevigata, Rock cress (I)Cardamine pratensis var. palustris, Cuckoo flower (M, S, H)Cardamine bulbosa, Spring cress (M, S, H)Rorippa islandica var. hispida, Marsh cress (C)

CAMPANULACEAECampanula aparinoides, Bedstraw bellflower (M, S)**CAPRIFOLIACEAE**Diervilla lonicera, Bush honeysuckle (I)Linnaea borealis, Twinflower (C)Lonicera oblongifolia, Swamp fly honeysuckle (B)Lonicera villosa, Mountain fly honeysuckle (B)Triosteum perfoliatum, Tinker's weed (I)Viburnum acerifolium, Maple-leaved viburnum (I)Viburnum lentago, Nannyberry (S, H)Viburnum opulus var. americanum (V. trilobum), High bush cranberry (S)**CARYOPHYLLACEAE**Cerastium vulgatum, Mouse-eared chickweed (I)Stellaria longifolia, Long-leaved chickweed (S, C)**CERATOPHYLLACEAE**Ceratophyllum demersum, Coontail (L)**CLUSIACEAE**Triadenum fraseri, Marsh St. John's-wort (L, M, S)**CONVOLVULACEAE**Cuscuta cuspidata, Dodder (C, H)Cuscuta gronovii, Dodder (C, H)**CORNACEAE**Cornus alternifolia, Alternate-leaved dogwood (I)Cornus canadensis, Bunchberry (B, C)Cornus obliqua, Silky dogwood (S)Cornus racemosa, Gray dogwood (S, H, I)Cornus rugosa, Round-leaved dogwood (C, I)Cornus stolonifera, Red-osier dogwood (B, S, C, H, I)**CORYLACEAE (BETULACEAE)**Alnus rugosa, Speckled alder (L, S, H)Betula lutea, Yellow birch (C, H)Betula papyrifera, Paper birch (S, C, H, I)Betula pumila, Bog birch (B, S, C)Betula sandbergii (B. papyrifera x B. pumila var. glandulosa) (S)Ostrya virginiana, Ironwood (I)**CUPRESSACEAE**Juniperus communis var. depressa, Ground juniper (B)Thuja occidentalis, White cedar (B, S, C, I)**CYPERACEAE**Carex aquatilis, SedgeCarex aquatilis var. substricta, SedgeCarex bebbii, SedgeCarex brunnescens, Sedge

- Carex canescens, Sedge
Carex chordorrhiza, Sedge
Carex comosa, Sedge
Carex cristatella, Sedge
Carex disperma, Sedge
Carex gracillima, Sedge
Carex hirtifolia, Sedge
Carex hystericina, Sedge
Carex interior, Sedge
Carex katahdinensis, Sedge
Carex lacustris, Sedge
Carex lasiocarpa, Sedge
Carex lasiocarpa var. americana, Sedge
Carex laxiflora var. blanda, Sedge
Carex limosa, Sedge
Carex peckii, Sedge (I)
Carex pedunculata, Sedge
Carex pensylvanica, Sedge (I)
Carex pseudo-cyperus, Sedge
Carex retrorsa, Sedge
Carex rosea, Sedge (I)
Carex stipata, Sedge
Carex stricta, Sedge
Carex tenuiflora, Sedge
Carex tetanica, Sedge
Carex trisperma, Sedge
Carex vulpinoidea, Sedge
Dulichium arundinaceum, 3-way sedge (L)
Eleocharis palustris, Spikerush (L)
Eleocharis pauciflora, Spikerush (L)
Eriophorum angustifolium, Cottongrass (B)
Eriophorum virginicum, Cottongrass (B)
Eriophorum viridi-carinatum, Cottongrass (B)
Rhynchospora alba, Beak-rush (B)
Scirpus acutus, Great-bulrush (L)
Scirpus atrovirens, Bulrush (M)
Scirpus subterminalis, Bulrush (L)
Scirpus validus, Bulrush (L, M, H)

DROSERACEAE

- Drosera intermedia, Sundew (B)
Drosera linearis, Linear-leaved sundew (B)
Drosera rotundifolia, Round-leaved sundew (B, C)

EQUISETACEAEEquisetum arvense, Common horsetail (B, S, C, H, I)Equisetum fluviatile, Horsetail (B, S, C, H)**ERICACEAE**Andromeda glaucophylla, Bog rosemary (B)Chamaedaphne calyculata, Leatherleaf (B)Gaultheria procumbens, Wintergreen (B, C)Kalmia polifolia, Pale laurel (B, S)Ledum groenlandicum, Labrador tea (B)Vaccinium angustifolium, Low sweet blueberry (B)Vaccinium macrocarpon, Large cranberry (B)Vaccinium myrtilloides, Velvet-leaf blueberry (B, C)Vaccinium oxycoccus, Small cranberry (B)**FABACEAE (LEGUMINOSAE)**Amphicarpa bracteata, Hog peanut (C, H)**FAGACEAE**Fagus grandifolia, Beech (I)Quercus bicolor, Swamp white oak (H)Quercus borealis, Northern red oak (I)**GENTIANACEAE**Menyanthes trifoliata, Buckbean (B, S, L)**HALORAGACEAE**Myriophyllum spicatum var. exalbescens, Water milfoil (L)Myriophyllum verticillatum, Water milfoil (L)**HYDROCHARITACEAE**Vallisneria americana, Tape grass (L)**IRIDACEAE**Iris versicolor, Blue flag iris (M, S, H)**JUGLANDACEAE**Carya ovata, Shagbark hickory (I)**JUNCACEAE**Juncus tenuis, Pathrush (B)**JUNCAGINACEAE**Triglochin maritima, Arrowgrass (B)**LAMIACEAE (LABIATAE)**Lycopus americanus, Cut-leaved water horehound (M, S)Lycopus rubellus, Bugle weed (S, H)Lycopus uniflorus, Water horehound (M, S, H)Lycopus virginicus, Bugle weed (I)Mentha arvensis, Wild mint (S, H)Prunella vulgaris, Heal-all (S, H)Scutellaria galericulata, Marsh skullcap (M, S)Scutellaria lateriflora, Mad dog skullcap (L, M, S, H)

LEMNACEAELemna minor, Duckweed (L)Lemna trisulca, Duckweed (L)Spirodela polyrhiza, Duckweed (L)**LENTIBULARIACEAE (UTRICULACEAE)**Utricularia cornuta, Horned bladderwort (B)Utricularia intermedia, Bladderwort (B)Utricularia purpurea, Purple bladderwort (B)Utricularia vulgaris, Greater bladderwort (L)**LILIACEAE**Allium canadense, Wild garlic (I)Clintonia borealis, Bluebead lily (B, C)Erythronium americanum, Yellow trout lily (I)Maianthemum canadense, Canada mayflower (B, C)Smilacina racemosa, False Solomon's seal (I)Smilacina trifolia, Three-leaved false Solomon's seal (C)Smilax ecirrhata, Greenbrier (I)Smilax tamnoides var. hispida, Bristly greenbrier (I)Trillium grandiflorum, Large-flowered trillium (I)Uvularia grandiflora, Large-flowered bellwort (I)**LOBELIACEAE**Lobelia cardinalis, Cardinal flower (S, H)Lobelia kalmii, Bog lobelia (B)Lobelia siphilitica, Great lobelia (M, S, H)**LYTHRACEAE**Decodon verticillatus, Water willow (L)**NYMPHAEAE**Brasenia schreberi, Water shield (L)Nuphar advena, Yellow pond lily (L)Nuphar variegatum, Bullhead lily (L)Nymphaea odorata, Fragrant water lily (L)Nymphaea tuberosa, Water lily (L)**OLEACEAE**Fraxinus nigra, Black ash (C, H)Fraxinus pennsylvanica, Red ash, Green ash (H)**ONAGRACEAE**Circaea alpina, Small enchanter's nightshade (I)Circaea quadrisulcata, Enchanter's nightshade (I)Epilobium ciliatum, Willow herb (M, S)Epilobium coloratum, Willow herb (M, S, H)Epilobium glandulosum, Northern willow herb (M, S)Epilobium leptophyllum, Narrow-leaved willow herb (M, S)Epilobium palustre, Willow herb (L, M, S, H)

OPHIOGLOSSACEAEBotrychium virginianum, Rattlesnake fern (I)**ORCHIDACEAE**Arethusa bulbosa, Dragon's mouth (B)Calopogon pulchellus, Grass pink (B)Corallorhiza odontorhiza, Coral root (I)Corallorhiza trifida, Coral root (I)Cypripedium arietinum, Ram's head lady's slipper (C)Cypripedium calceolus var. parviflorum, Small yellow lady's slipper (C)Cypripedium reginae, Showy lady's slipper (S, C, H)Epipactis helliborine, HelliBORINE (I)Habenaria dilatata, Tall white bog orchis (B)Habenaria hyperborea, Northern green orchis (B)Habenaria lacera, Ragged-fringed orchis (B)Habenaria leucophaea, Prairie white-fringed orchis (B)Habenaria obtusata, Blunt-leaf orchis (B)Habenaria psycodes, Small purple-fringed orchis (C, B)Liparis loeselii, Twayblade (B)Malaxis brachypoda, White adder's mouth (B)Malaxis unifolia, Green adder's mouth (B)Pogonia ophioglossoides, Rose pogonia (B)Spiranthes spp., Ladies' tresses (B)**OROBANCHACEAE**Epifagus virginiana, Beechdrops (I)**OSMUNDACEAE**Osmunda cinnamomea, Cinnamon fern (S, H)Osmunda regalis, Royal fern (S, C, H)**PAPAVERACEAE**Sanguinaria canadensis, Bloodroot (I)**PHYRMACEAE**Phryma leptostachya, Lopseed (I)**PINACEAE**Larix laricina, Tamarack (S, C, H)Picea mariana, Black spruce (B)**POACEAE (GRAMINEAE)**Bromus ciliatus, Fringed brome (M, S)Calamagrostis canadensis, Blue joint grass (M, S)Elymus villosus, Wild rye (I)Hystrix patula, Bottle-brush grass (I)Leersia oryzoides, Rice cutgrass (M, S, H)Muhlenbergia spp., Muhly grass (S)Oryzopsis racemosa, Rice grass (I)Phalaris arundinacea, Reed canary grass (M, S)

Phragmites communis, Reed grass (B)

Poa palustris, Fowl meadow grass (M, S)

Sphenopholis intermedia, Wedge grass (I)

Zizania aquatica, Wild rice (L)

POLEMONIACEAE

Polemonium reptans, Jacob's ladder (H)

POLYGALACEAE

Polygala paucifolia, Gay wings (C)

POLYGONACEAE

Polygonum hydropiper, Common smartweed (L, M)

Polygonum lapathifolium, Smartweed (L, M)

Polygonum amphibium var. stipulaceum, Water smartweed (C, H)

Rumex crispus, Curly dock (S, C, H)

POLYPODIACEAE

Adiantum pedatum, Maidenhair fern (I)

Cystopteris bulbifera, Bladder fern (C, H)

Dryopteris cristata var. clintoniana, Shield fern (S, C, H)

Dryopteris thelypteris var. pubescens, Marsh fern (M, S, C, H)

PONTEDERIACEAE

Pontederia cordata, Pickerel weed (L)

PRIMULACEAE

Lysimachia thyrsiflora, Tufted loosestrife (S, H)

Trientalis borealis, Starflower (B, C)

PYROLACEAE

Moneses uniflora, One-flowered pyrola (C)

Pyrola asarifolia, Pink pyrola (C)

Pyrola rotundifolia, Round-leaved pyrola (C)

Pyrola secunda, One-sided pyrola (C)

RANUNCULACEAE

Actaea pachypoda, White baneberry (I)

Actaea rubra, Red baneberry (I)

Anemone riparia, Thimbleweed (I)

Anemone virginiana, Thimbleweed (I)

Anemonella thalictroides, Rue anemone (S, H)

Aquilegia canadensis, Columbine (I)

Caltha palustris, Marsh marigold (M, S, C, H)

Coptis trifolia, Goldthread (C)

Hepatica acutiloba, Sharp-lobed hepatica (I)

Ranunculus abortivus, Kidney-leaf buttercup (I)

Ranunculus flabellaris, Yellow water crowfoot (L)

Ranunculus recurvatus, Hooked buttercup (I)

Ranunculus sceleratus, Cursed crowfoot (M, S, H)

Ranunculus septentrionalis, Swamp buttercup (S, H)

Thalictrum dasycarpum, Purple meadow rue (S, H)

Thalictrum dioicum, Early meadow rue (I)

RHAMNACEAE

Rhamnus alnifolia, Alder-leaved buckthorn (C, S)

Rhamnus cathartica, Common buckthorn (S, L, H)

Rhamnus frangula, Glossy buckthorn (B, S, C, H, I)

ROSACEAE

Amelanchier spp., Juneberry (C, I)

Aronia melanocarpa, Black chokeberry (B)

Fragaria vesca, Wood strawberry (I)

Fragaria virginiana, Common strawberry (I)

Geum canadense, White avens (I)

Geum rivale, Water avens (C, H)

Potentilla palustris, Marsh cinquefoil (L, M, S)

Prunus serotina, Black cherry (I)

Pyrus americana, American mountain ash (S, H)

Rosa palustris, Swamp rose (M, S, H)

Rubus idaeus var. strigosus, Red raspberry (I)

Rubus pubescens, Dwarf red raspberry (C)

Spiraea alba, Meadowsweet (M, S)

RUBIACEAE

Galium concinnum, White wild licorice (S, H)

Galium labradoricum, Bedstraw (B, S, C, H)

Galium trifidum, Bedstraw (S, H)

Galium triflorum, Fragrant bedstraw (S, H, I)

Mitchella repens, Partridge berry (B)

SALICACEAE

Populus alba, White poplar (H)

Populus deltoides, Cottonwood (H)

Populus tremuloides, Quaking aspen (I)

Salix alba, White willow (H)

Salix bebbiana, Bebb's willow (S, H)

Salix candida, Sage-leaved willow (M, S)

Salix candida x petiolaris (M, S)

Salix discolor, Pussy willow (S, C, H)

Salix pedicularis var. hypoglauca, Bog willow (M, S)

Salix petiolaris, Slender willow (M, S, H)

Salix petiolaris x bebbiana (M, S)

Salix serissima, Autumn willow (S, H)

SARRACENIACEAE

Sarracenia purpurea, Pitcher plant (B)

SAXIFRAGACEAE

Mitella diphylla, Bishop's cap (C)Mitella nuda, Miterwort (C)Ribes americanum, American black currant (S, C, H)Ribes cynosbati, Prickly gooseberry (S, C, H, I)Ribes hirtellum, Smooth gooseberry (S, C, H, I)Ribes hirtellum var. calcicola, Smooth gooseberry (S, C, H, I)Ribes lacustre, Swamp black currant (S, C, H, I)Ribes missouriense, Missouri gooseberry (S, C, H, I)Ribes triste, Swamp red currant (S, C, H, I)Saxifraga pennsylvanica, Swamp saxifrage (S, H)

SCROPHULARIACEAE

Chelone glabra, Turtlehead (M, S, C)Gerardia paupercula, Gerardia (M, S)Gerardia purpurea var. parviflora, Small-flowered gerardia (C)Pedicularis lanceolata, Swamp lousewort (M, S, C)Veronica officinalis, Common speedwell (I)

SOLANACEAE

Solanum dulcamara, Nightshade (L, M, B, S, C, H, I)Solanum nigrum, Deadly nightshade (S, C, H)

SPARGANIACEAE

Sparganium eurycarpum, Bur-weed (L)

STAPHYLEACEAE

Staphylea trifolia, Bladdernut (I)

TAXACEAE

Taxus canadensis, American yew (I)

TILIACEAE

Tilia americana, Basswood (H, I)

TYPHACEAE

Typha angustifolia, Narrow-leaved cat-tail (L, M, S)Typha latifolia, Common cat-tail (L, M, S)

ULMACEAE

Ulmus americana, American elm (H)Ulmus rubra, Slippery elm (H)

URTICACEAE

Boehmeria cylindrica, False nettle (S, C, H)Pilea pumila, Clearweed (S, C, H)

VERBENACEAE

Verbena hastata, Blue vervain (M)Verbena urticifolia, White vervain (M)

VIOLACEAE

Viola conspersa, American dog violet (C, H, I)

Viola cucullata, Blue marsh violet (M, S, H)

Viola missouriensis, Missouri violet (C, H)

Viola pubescens, Downy yellow violet (I)

Viola renifolia, Kidney-leaved violet (I)

Viola sororia, Hairy blue violet (C, H, I)

VITACEAE

Parthenocissus quinquefolia, Virginia creeper (I)

Vitis riparia, River grape (S, C, H, I)

ZOSTERACEAE (NAJADACEAE)

Najas flexilis, Naiad pondweed (L)

Potamogeton berchtoldii, Naiad pondweed (L)

Potamogeton berchtoldii var. acuminatus, Naiad pondweed (L)

Potamogeton berchtoldii var. lacunatus, Naiad pondweed (L)

Potamogeton berchtoldii var. tenuissimus, Naiad pondweed (L)

Potamogeton foliosus, Naiad pondweed (L)

Potamogeton gramineus, Naiad pondweed (L)

Potamogeton gramineus var. myriophyllus, Naiad pondweed (L)

Potamogeton illinoensis, Naiad pondweed (L)

Potamogeton natans, Naiad pondweed (L)

Potamogeton nodosus, Naiad pondweed (L)

Potamogeton obtusifolius, Naiad pondweed (L)

Potamogeton pectinatus, Naiad pondweed (L)

Potamogeton pulcher, Naiad pondweed (L)

Potamogeton richardsonii, Naiad pondweed (L)

Potamogeton robbinsii, Naiad pondweed (L)

Potamogeton zosteriformis, Naiad pondweed (L)

VERTEBRATES OF THE TERRESTRIAL AND WETLAND ECOSYSTEMS OF THE UWM FIELD STATION AREA

CHARLES M. WEISE

INTRODUCTION

This account of the vertebrates of the UWM Field Station area is divided into two parts. Part I is a community-by-community listing of the most characteristic or interesting species that you are likely to see or encounter on a walk into the Bog along the boardwalk, or on a walk through the upland woods and fields along the visitor trails. Part II consists of complete lists of the birds, mammals, reptiles and amphibians that have been observed or recorded at the Field Station or in the adjacent Cedarburg Bog or adjoining woods and farms since the Field Station was founded in 1965. An attempt has been made to indicate the relative abundance of each species (and seasonal occurrence in the case of birds), and to annotate some of the more unusual species. These abundance status designations apply specifically to the Field Station area; some species that are common in Cedarburg Bog, for example, may be rare in southeastern Wisconsin generally, or vice versa.

Birds are the most familiar and easily seen of the vertebrates in terrestrial and wetland ecosystems. Some 200 species are of regular and predictable occurrence in southeastern Wisconsin and there are additional species that have occurred rarely or accidentally. Since the founding of the Field Station, 214 species of birds have been recorded definitely.

Mammals, reptiles and amphibians have been less well studied at the Field Station than birds. The occurrence and abundance of mice and shrews and the several species of ground and tree squirrels are well known, but other mammals have been observed only haphazardly and documentation of rare or unusual species is poor. A few sporadic collections have been made of reptiles and amphibians, but generally the abundance status of these is also poorly documented. The lists of mammals, reptiles and amphibians in Part II, therefore, must be considered provisional with changes and additions to be expected in the future.

PART I. CHARACTERISTIC SPECIES OF THE FIELD STATION ECOSYSTEMS

Route from Blue Goose Road to center of Cedarburg Bog, along boardwalk

A. Old field successional community, with sumac, pine plantings and grassy areas.

The characteristic animals here are often known as forest-edge species, adapted to live in areas of shrubs, grassy or weedy openings, and scattered trees. In summer, listen for the songs or calls of Field Sparrow, Rufous-sided Towhee, Indigo Bunting, Gray Catbird, Cardinal, Robin, Goldfinch, and Blue-winged Warbler. In the wetter areas along the Bog edge you may find Song Sparrow and Yellowthroat. In winter you will find Junco, Tree Sparrow, Cardinal, Blue Jay and Chickadee. With a little luck you could see Robin, Flicker, Northern Shrike, Cedar Waxwing, Pine Grosbeak or Evening Grosbeak.

Red squirrels are frequently seen in the pines or along the Bog-edge, especially in winter. You may see the tunnels of Meadow Voles in the grass, or under the snow in winter. In spring look for the Garter Snake.

B. Cedar-tamarack conifer forest

It is harder to see birds here and many will have to be identified only by their songs or calls. Listen particularly for Northern Waterthrush, one of the "disjunct" species found in Cedarburg Bog, i.e. a species of more northern distribution which is found this far south because of the predominantly coniferous forest vegetation of the Bog. Other species you are likely to see or hear in summer are Veery, Rose-breasted Grosbeak, Cardinal, Blue Jay, Great Crested Flycatcher, Black-and-White Warbler, House Wren, Downy Woodpecker, Hairy Woodpecker, and Chickadee. Scattered through the conifer forest, but not often seen from the boardwalk are other northern species: Brown Creeper, Winter Wren, Red-breasted Nuthatch, and Canada Warbler. If you see Chickadees, look for color bands on their legs. Nearly all of the Chickadees in the Field Station area are color-coded for individual recognition. In spring you may hear the drumming of Ruffed Grouse. In winter the woodpeckers and chickadees are present, along with Junco, Tree Sparrow, Cardinal, Goldfinch; in some winters Pine Grosbeak, Purple Finch, Redpoll, or White-winged Crossbill may be seen. A Sharp-shinned Hawk or Goshawk is always a possibility and on dark days or toward evening, the calls of Barred Owl or Great Horned Owl may be heard.

The Red Squirrel is the only conspicuous mammal, although signs of deer or raccoons are often seen. The most common mouse is a disjunct northern species, the Red-backed Vole. In spring and summer the Wood Frog is often seen.

C. Bog shrub and sedge communities along channels at north end of Mud Lake.

This is a good place to see a variety of birds rather than to just hear them. In summer look for Yellow Warbler, Yellowthroat, Song Sparrow, Swamp Sparrow, Red-winged Blackbird, Willow Flycatcher, Catbird, Cedar Waxwing, and Goldfinch. If you are lucky you may see or hear Sora or Virginia Rail, Green-backed Heron or Kingfisher. In early spring or late fall there is a good chance of seeing migrant ducks or geese flying around the Mud Lake area.

From the bridge you can see the extensive Mud Lake marshes, inhabited by American Bittern, Least Bittern, Coot, Pied-billed Grebe, Marsh Wren, blackbirds, Swamp Sparrows and rails; although it is too far to see much, you can often hear some of these. Listen especially for the calls of the Sandhill Cranes; one pair nests in the marsh each year.

Muskrats, raccoon and mink are present here although seldom seen. Frogs are conspicuous by their sounds: Wood Frog, Green Frog, Leopard Frog, and Spring Peeper can be heard in their appropriate seasons.

There is usually not much to be seen here in winter, but mammal tracks are often visible along the frozen channel.

D. Islands covered by upland deciduous forest

You will cross two islands with a section of boardwalk in between. These islands are too small to support a full community of upland forest bird and mammal species but you may see (or hear): Red-eyed Vireo, Wood-pewee, Crested Flycatcher, Scarlet Tanager, Rose-breasted Grosbeak, Flicker, Downy Woodpecker, Hairy Woodpecker, White-breasted Nuthatch. Ruffed Grouse often nest along the edges of the islands. If you should encounter an adult grouse giving its famous injury-feigning distraction display, please move on as quickly as possible, as the nest and young are highly vulnerable to various predators (raccoon, for example) that come quickly to the outcries of the displaying bird.

The Chipmunk, an upland deciduous forest species, is common on the islands. Red Squirrels and Gray Squirrels are sometimes found. In winter there is little to be seen except occasional woodpeckers or chickadees.

E. Bog forest east of second island

This area is similar to B although it becomes more dense and the trees more stunted as you approach the string bog area. The vertebrate fauna is much the same as in area B.

F. String bog

This is essentially a wet coniferous forest-edge community, consisting of small sedge meadows (flarks) interspersed with lines or strings of stunted trees and shrubs. Here and there are "clumps" of taller trees: bog conifer forest.

Two of the most common birds here are disjunct boreal species: White-throated Sparrow and Nashville Warbler, both easily detected by their songs, and fairly easily seen with a little patience. In the vicinity of clumps you may find Canada Warbler, Northern Waterthrush and Veery, all boreal species. Other birds are of more general wet forest-edge distribution: Black-and-White Warbler, Swamp Sparrow, Song Sparrow, Yellowthroat, Willow Flycatcher, Cedar Waxwing, Catbird, Blue Jay, Chickadee, Cardinal, Black-billed Cuckoo, Red-winged Blackbird. In winter watch for Goshawk, Ruffed Grouse, Cedar Waxwing, Bohemian Waxwing (rarely) or Golden-crowned Kinglet.

Deer trails criss-cross the string bog and are easily followed in winter. Tracks of weasels, foxes or coyotes are sometimes seen. Amphibians are not abundant but a few Spring Peepers and Wood Frogs can be heard in spring.

Visitor trails through upland fields and woods

F. Old field grasslands

Several fields are deliberately maintained (by mowing and burning) in the old field grassland stage of succession. Here you can find Red-winged Blackbird, Eastern Meadowlark, Bobolink, Tree Swallow and Barn Swallow. Eastern Kingbird and Eastern Bluebird often feed around the edges of the fields. Until recent years Savannah Sparrow, Henslow's Sparrow and Sedge Wren were numerous, but have

become unaccountably rare. In winter Red-tailed Hawk, American Kestrel or Northern Shrike may be seen in the scattered trees or hedge rows.

The most abundant mammal is the Meadow Vole. Shrews are sometimes found and occasionally a Meadow Jumping Mouse can be seen hopping through the grass; unlike other mice which are active under the snow in winter, this species hibernates deep underground. In some short grass areas the Thirteen-lined Ground Squirrel can be seen or heard (a bird-like twitter). There are a few Woodchucks scattered about the fields, as well as a couple of perennial fox dens. The Common Garter Snake is frequently encountered in spring. The marshy ponds both east and west of the lab building are breeding sites for several of the frogs: Chorus Frog, Spring Peeper, Wood Frog, Leopard Frog, Tree Frog and American Toad. In spring these can easily be identified if you learn to recognize their calls.

G. Shrubby old field and forest-edge communities

Previously described for area A. The most typical sound in summer is the song of the Field Sparrow. Indigo Buntings can usually be found, as well as the other species listed for area A.

H. Upland deciduous forest (maple-beech-ash forest)

Extensive tracts of mature deciduous forest support a well-defined bird community of 25-30 species in summer. Many of these are long-distance migrants spending the winter in Central or South America. In comparison with larger tracts of forest, the Field Station woods is somewhat impoverished. In addition to its small size and relative isolation from other such tracts, it has irregular borders (increasing the "edge effect") and has had several recent disturbances such as Dutch elm disease in the late 1960's and the devastating ice storm of March 1976. In addition, being near the northern limits of the deciduous forest, many bird species typical of more eastern or southern forests are absent or rare here in Wisconsin (Tufted Titmouse, Carolina Wren, Hooded Warbler, Kentucky Warbler, Cerulean Warbler, to name a few).

Nevertheless, you can find many birds here in summer: Red-eyed Vireo, Ovenbird, Wood Thrush, Wood-pewee, Crested Flycatcher, Scarlet Tanager, Robin, Northern Flicker, Downy, Hairy, Red-bellied and Pileated Woodpeckers, White-breasted Nuthatch, Chickadee. Starlings began nesting in the woods in the 1960's and are presently very abundant in the spring; by June most have finished nesting and have left. In spring watch for pairs of Wood Ducks looking for nest cavities. Barred Owl and Red-tailed Hawk nest regularly in these woods, as does occasionally Great Horned Owl. Until a few years ago, the trademark of the upland woods in spring was the calling of a pair of nesting Red-shouldered Hawks; we hope that someday a pair will again take up residence here.

Chipmunks, Gray Squirrels and Fox Squirrels are the most frequently seen mammals in the upland woods. Opossum and Raccoon are sometimes found. The White-footed Mouse is abundant but seldom seen. In wet periods during the summer

and fall you often see or hear Tree Frogs, Spring Peepers, Toads and Wood Frogs. These move around on the forest floor and occasionally up into the trees (Tree Frogs and Spring Peepers). Red-bellied and Brown snakes are found here, but very rarely seen.

In winter the upland woods appears nearly lifeless, but woodpeckers, nut-hatches and chickadees can be found and tracks attest to the presence of mice, squirrels, fox and other mammals. In May and September the woods are full of migrating warblers and thrushes (as are the other forest communities previously described).

PART II. ANNOTATED LISTS OF VERTEBRATES

BIRDS

Explanatory note: in the following list the migratory or seasonal status of these species is given as a capital letter, followed by the abundance as a lower case letter. As most birds are migratory they may differ in abundance at different seasons, as indicated. The abbreviations are:

SB = some individuals of the species nest or breed here during spring or summer

SN = found in summer as a non-breeding species, or at least there is no evidence of the species having nested in the area

T = transient; individuals migrate through the area in spring and fall

W = some individuals of the species spend the winter here

P = non-migratory species; individuals live in the area year-round

FO = usually seen flying over the area rather than in the vegetation or on ground

c = common; may usually be found (in the proper habitat) on a single visit

u = uncommon; regularly present but may not be found on a given single visit to the proper habitat

r = rare; occur in such low numbers that the species will be detected only occasionally during many visits

The names used here are standardized common names given (along with scientific names) in the American Ornithologist Union Checklist of North American Birds, 6th Edition, 1983.

Common Loon, Tu (FO)

Pied-billed Grebe, SBU, Tc

Horned Grebe, Tu

Double-crested Cormorant, Tr

American Bittern, SBU, Tu, Wr - one winter record, January 15, 1983.

Least Bittern, SBU, Tu

Great Blue Heron, SNU, Tc

Great Egret, Tr - one record, April 17, 1976.

Green-backed Heron, Bu, Tu

Black-crowned Night-heron, T

Tundra Swan, Tc (FO) - although listed as common, these swans have a relatively synchronized migration and pass over on only a few days in late March-early April and November-early December.

Snow Goose, Tu

Wood Duck, SBc, Tc

Green-winged Teal, Tu, SN? - summer records on June 6, 1978 and May 6 and 14, 1986.

American Black Duck, Tu

Mallard, SBc, Tc

Northern Pintail, Tu

Blue-winged Teal, SBU, Tc - more common as a breeder in 1960's and 70's than at present.

Northern Shoveler, Tu

Gadwall, Tu

American Wigeon, Tc

Canvasback, Tu

Redhead, Tu

Ring-necked Duck, Tc

Lesser Scaup, Tc

Common Goldeneye, Tc (FO)

Hooded Merganser, Tu

Common Merganser, Tc (FO)

Red-breasted Merganser, Tu (FO)

Ruddy Duck, Tu

Turkey Vulture, SNU, Tu

Osprey, Tu

Bald Eagle, Tr - most records are in February.

Northern Harrier, SN?r, Tu, Wr - until about 1970 it bred regularly; now seen only occasionally in summer.

Sharp-shinned Hawk, SBr, Tc, Wu - a nest found in bog forest in 1982 along with sightings each summer suggests that at least one pair nests regularly in Cedarburg Bog.

Cooper's Hawk, SBr, Tu, Wr - one unsuccessful nest in 1982 is the only known nesting attempt. However, there are occasional sightings every summer suggesting nesting somewhere nearby.

Northern Goshawk, Tu, Wu - although uncommon, this is the characteristic winter hawk of Cedarburg Bog.

Red-shouldered Hawk, SBr, Tu, Wr - from at least 1960 until 1982 a pair nested each year in the Field Station upland woods; since then there are occasional summer observations indicating that the species still nests nearby.

Broad-winged Hawk, Tc - like the Tundra Swan, this species has highly synchronized migrations and is likely to be seen only for short periods in spring and fall.

Red-tailed Hawk, SBc, Tc, Wc

Rough-legged Hawk, Tu, Wr (FO)

American Kestrel, SBU, Tc, Wu

Merlin, Tu

Peregrine Falcon, Tr (FO)

Ring-necked Pheasant, Pu - has become scarce in recent years.

Ruffed Grouse, Pu - grouse populations are cyclic but even allowing for this, the species seems to have declined over the last 20 years.

Wild Turkey - a few were released in the area about 1965 and were seen occasionally for about 2 years. No longer present.

Northern Bobwhite, Pr - only 2 or 3 records, the most recent July 31, 1986.

King Rail - status unknown; although never recorded alive at the Field Station, we have two specimens collected in the area, one as a road kill, the other found dead under power lines.

Virginia Rail, SBU, Tu, Wr - there are 3 or 4 records for early winter.

Sora, SBc, Tc

Purple Gallinule, Tr - one record, April 23, 1976.

American Coot, SBc, Tc

Sandhill Crane, SBU, Tu - each year 1 pair nests in Mud Lake marshes; often there are 1 or 2 immature non-breeding birds in the area as well; the birds are most often seen as they fly over upland farm fields.

Killdeer, SBc, Tc

Greater Yellowlegs, Tu (FO)

Lesser Yellowlegs, Tu

Solitary Sandpiper, Tu

Spotted Sandpiper, Tu (FO)

Least Sandpiper, Tu

Pectoral Sandpiper, Tu

Common Snipe, SBU, Tu - nests in the area in some years.

American Woodcock, SBc, Tc

Bonaparte's Gull, Tu (FO)

Ring-billed Gull, SNU, Tc, Wr

Herring Gull, SNU, Tc, Wr

Forster's Tern, Tu

Black Tern, Tr? - in the 1960's and early 1970's this species nested in several small colonies on Long Lake and Gough Lake (just north of Hwy. 33 and the Bog). In recent years it has been rare even as a transient.

Rock Dove, Pc

Mourning Dove, SBc, Tc, Wu - it is not known if the relatively few birds present in winter are permanent residents or are migrants from farther north.

Black-billed Cuckoo, Bc, Tu

Yellow-billed Cuckoo, SBr, Tu

Eastern Screech Owl, Pr - most of our records are in fall, probably dispersing young of the year.

Great Horned Owl, Pu

Long-eared Owl, Tu

Short-eared Owl, Tu

Northern Saw-whet Owl, Tu, Wr

Common Nighthawk, Tc (usually FO)

Whip-poor-will, SNr, Tu - there are a few summer records, but no evidence of nesting.

Chimney Swift, SBU, Tu (FO)

Ruby-throated Hummingbird, SBU, Tu

Belted Kingfisher, SBU, Tu

Red-headed Woodpecker, SBU, Tu, Wr - has wintered in the area only in a couple of years since 1965. Has become less common in summer.

Red-bellied Woodpecker, Pu - 1 or 2 pairs have inhabited the upland wood continuously since 1965.

Yellow-bellied Sapsucker, Tc

Downy Woodpecker, Pc

Hairy Woodpecker, Pc

Northern Flicker, SBc, Pu, Tc - our banding studies indicate that the few birds found in winter also nest here in summer; obviously, however, most of the summer breeding birds migrate southward for the winter.

Pileated Woodpecker, Pu - after years of absence a male moved into our upland woods in fall, 1976; it was joined by a female in 1981 and a nest has been found each year since 1982.

Eastern Wood-pewee, SBc, Tc

Yellow-bellied Flycatcher, SN?r, Tc - found in string bog in several summers (1972, 1975, 1976, 1977, 1978) but no definite nesting evidence.

Acadian Flycatcher, SBr, Tr - occurred regularly each summer in upland woods until the 1976 ice storm; since then more erratic.

Alder Flycatcher, SBr?, Tc - this species can be distinguished from the next only by song; some birds in the area have songs not definitely assignable to either species.

Willow Flycatcher, SBc, Tc - see comment for preceding species.

Least Flycatcher, SBU, Tc - each year 1 or 2 pairs are found in the area, most regularly in the upland woods; presumed to nest although direct evidence is lacking.

Eastern Phoebe, SBU, Tc

Great Crested Flycatcher, SBc, Tc

Eastern Kingbird, SBc, Tc

Horned Lark, Tu, Wr (FO)

Purple Martin, SBC, Tc - at the time the Field Station was founded, a colony was present in a large martin house near the old (MacFarland) farmhouse. This blew over in early 1966 and was never replaced.

Tree Swallow, SBC, Tc - has become more abundant as nest boxes put out for Bluebirds have been usurped by this species.

Northern Rough-winged Swallow, Tu

Bank Swallow, SBr, Tr - prior to the founding of the Field Station in 1965, the former landowner maintained a small gravel pit which was occupied by a colony of Bank Swallows. This died out about 1968 as slumping occurred in the inactive pit.

Barn Swallow, SBC, Tc - the old MacFarland barn supported a moderate colony of Barn Swallows until it was torn down in the late 1970's. Subsequently a few pairs nested around the lab building and the old farmhouse. Several pairs nest in the barn and shed at the manager's residence.

Cliff Swallow, SBr, Tr - a few pairs tried to establish a nesting colony on the old MacFarland barn in 1974 but were eventually driven away by House Sparrow competition for their nests.

Blue Jay, SBC, Tc, Wc - a partial migrant, most of the summer birds migrate south in fall while a few stay during the winter.

American Crow, SBC, Tc, Wu - a partial migrant like the Blue Jay.

Black-capped Chickadee, Pc, Tr - banding results show that a few migrants from farther north pass through in fall.

Red-breasted Nuthatch, SNr, Tc - frequent summer records but no evidence of nesting.

White-breasted Nuthatch, Pc

Brown Creeper, SBU, Tc, Wu - nests regularly in bog conifer forest.

House Wren, SBC, Tc

Winter Wren, SBU, Tc - many summer records but most have been of unmated males; however, there are two confirmed breeding records, in 1970 and 1986.

Sedge Wren, SBr, Tr - formerly nested regularly in old fields; has been virtually absent since 1982.

Marsh Wren, SBC, Tu

Golden-crowned Kinglet, Tc, Wr - in winter mainly in cedar thickets in string bog.

Ruby-crowned Kinglet, Tc

Blue-gray Gnatcatcher, SBr, Tu

Eastern Bluebird, SBU, Tu - 1 or 2 pairs have nested in most years.

Veery, SBC, Tc - a northern disjunct species common in the bog conifer forests.

Gray-cheeked Thrush, Tc

Swainson's Thrush, Tc - a few birds appear in July and August each year but these are apparently early migrants.

Hermit Thrush, Tc

Wood Thrush, SBC, Tc

American Robin, SBc, Tc, Wu - not known if the winter birds have nested in this area or come from farther north.

Gray Catbird, SBc, Tc

Brown Thrasher, SBr, Tu

Bohemian Waxwing, Wr

Cedar Waxwing, SBc, Tc, Wu

Northern Shrike, Wu

European Starling, Pc

White-eyed Vireo, Tr - one record.

Solitary Vireo, Tu - a few early June records, probably late migrants.

Yellow-throated Vireo, SBu, Tu

Warbling Vireo, Tu

Philadelphia Vireo, Tc

Red-eyed Vireo, SBc, Tc

Blue-winged Warbler, SBc, Tc

Golden-winged Warbler, SBr, Tc - seen frequently in summer in 1960's but now rare.

Tennessee Warbler, Tc

Orange-crowned Warbler, Tu

Nashville Warbler, SBc, Tc - nests in string bog and bog conifer forest.

Northern Parula, Tu

Yellow Warbler, SBc, Tc

Chestnut-sided Warbler, SN?r, Tc - many summer records, but all appear to be non-territorial singing males.

Magnolia Warbler, Tc

Cape May Warbler, Tu

Black-throated Blue Warbler, Tu - a few early June records, probably late migrants.

Yellow-rumped Warbler, Tc, Wr - a few January records.

Black-throated Green Warbler, Tc - several early June records and a few midsummer records, but no evidence of nesting.

Blackburnian Warbler, Tc - one summer record, June 22, 1982.

Pine Warbler, Tr

Palm Warbler, Tu

Bay-breasted Warbler, Tc

Blackpoll Warbler, Tu

Cerulean Warbler, SBr, Tr - prior to the 1976 ice storm, 1 or 2 singing males could be found each year in upland woods; since then only a few records.

Black-and-white Warbler, SBu, Tc - nests in bog conifer forest.

American Redstart, SBr, Tc - formerly nested in small numbers in disturbed swamp hardwood forest; few recent records.

Prothonotary Warbler, SN?r - one record, June 4, 1974.

Ovenbird, SBc, Tc

Northern Waterthrush, SBc, Tc - nests in bog conifer forest.

Louisiana Waterthrush, Tr

Kentucky Warbler, SNr, Tr - one summer record, June 10, 1975.

Connecticut Warbler, Tu

Mourning Warbler, SBu, Tu - nests around islands in bog and in several of the small outlying bogs and wetlands.

Common Yellowthroat, SBc, Tc

Hooded Warbler, S?r, Tr - several summer records of singing males; no evidence of nesting.

Wilson's Warbler, Tc

Canada Warbler, SBu, Tu - nests in bog conifer forest.

Summer Tanager, Tr - one record, May 5, 1968.

Scarlet Tanager, SBc, Tc

Northern Cardinal, Pc

Rose-breasted Grosbeak, SBc, Tc

Indigo Bunting, SBc, Tc

Dickcissel, SBr - a few records from farms near Field Station.

Rufous-sided Towhee, SBc, Tc

American Tree Sparrow, Tc, Wc

Chipping Sparrow, SBc, Tc

Clay-colored Sparrow, Tr - some summer records in nearby areas.

Field Sparrow, SBc, Tc

Vesper Sparrow, SBr, Tu - more common in nearby agricultural fields.

Savannah Sparrow, SBr, Tu - more common in nearby agricultural fields.

Grasshopper Sparrow, Tr

Henslow's Sparrow, SBu, Tu - formerly nested regularly in oldfields; nearly absent in 1985 and 1986.

Fox Sparrow, Tc

Song Sparrow, SBc, Tc, Wr

Lincoln's Sparrow, SN?r, Tu - this is a typical bird of Canadian bogs but was never seen here in summer until 1986, June 3 and 14, a singing bird in string bog.

Swamp Sparrow, SBc, Tc, Wr

White-throated Sparrow, SBc, Tc, Wr - very common nesting bird in string bog, some in bog conifer forest.

Dark-eyed Junco, Tc, Wc

Snow Bunting, Tr, Wr (usually F0)

Bobolink, SBc, Tc

Red-winged Blackbird, SBc, Tc

Eastern Meadowlark, SBc, Tc

Western Meadowlark, SBr - no records since late 1960's.

Yellow-headed Blackbird, Tr - no records since late 1960's.

Rusty Blackbird, Tc

Common Grackle, SBc, Tc

Brown-headed Cowbird, SBc, Tc

Orchard Oriole, Tr

Northern Oriole, SBU, Tc

Pine Grosbeak, Tu, Wu - this species, like many of those following, is erratic in occurrence; fairly common in some winters, absent in others.

Purple Finch, Tc, Wu - erratic in winter.

Red Crossbill, Tu, Wu - erratic.

White-winged Crossbill, Tu, Wu - erratic.

Common Redpoll, Tc, Wu - erratic.

Pine Siskin, Tc, W - erratic.

American Goldfinch, SBc, Tc, Wc

Evening Grosbeak, Tu, Wu - erratic.

House Sparrow, Pc

MAMMALS

Explanatory Note: most mammals are nocturnal and secretive and are usually detected by their signs (tracks, feces) rather than direct observation, or by special trapping efforts. Abbreviations:

C = common, species can usually be detected easily by the above methods

U = uncommon

R = rare

Mammal names are from Jackson: Mammals of Wisconsin, 1961.

Opossum, Didelphis marsupialis, C

Masked Shrew, Sorex cinereus, C

Short-tailed Shrew, Blarina brevicauda, C

Star-nosed Mole, Condylura cristata, status unknown. We have 2 specimens collected as road kills at the Field Station. This is a boreal species which reaches the southern limits of its range near here.

Little Brown Bat, Myotis lucifugus, U

Silver-haired Bat, Lasiorycteris noctivagans, status unknown.

Big Brown Bat, Eptesicus fuscus, status unknown.

Red Bat, Lasiurus borealis, status unknown.

Cottontail, Sylvilagus floridanus, C

Woodchuck, Marmota monax, C

Thirteen-lined Ground Squirrel, Citellus tridecemlineatus, C (along roadsides and lawns).

Chipmunk, Tamias striatus, C

Gray Squirrel, Sciurus carolinensis, C

Fox Squirrel, Sciurus niger, U

Red Squirrel, Tamiasciurus hudsonicus, C - a boreal species near the south end of its range.

Beaver, Castor canadensis, R - extirpated in this area in the 1800's, and absent

until May 1986 when one appeared in Mud Lake, constructing a dam at the outlet.

White-footed Mouse, Peromyscus leucopus, C

Red-backed Vole, Clethrionomys gapperi, C or U? a boreal species at the south end of its range; found mainly in bog forest.

Meadow Vole, Microtus pennsylvanicus, C

Muskrat, Ondatra zibethicus, C

Norway Rat, Rattus norvegicus, U - found mainly around barns.

House Mouse, Mus musculus, C - found around houses and barns.

Meadow Jumping Mouse, Zapus hudsonius, R

Coyote, Canis latrans, status unknown, possibly fairly common.

Red Fox, Vulpes fulva, C

Gray Fox, Urocyon cinereoargenteus, R

Raccoon, Procyon lotor, C

Short-tailed Weasel, Mustela erminea, C

Least Weasel, Mustela rixosa, status unknown. A road-killed specimen was collected at the Field Station in the early 1970's.

Long-tailed Weasel, Mustela frenata, status unknown; possibly fairly common.

Mink, Mustela vison, C

Badger, Taxidea taxus, R - some sight records in late 1960's.

Striped Skunk, Mephitis mephitis, C

River Otter, Lutra canadensis, R - after extirpation in the 1800's, this species was absent in the Field Station area until April 1985 when one was seen in the channel at the north end of Mud Lake. In March 1986, we found the unmistakable track of an otter alternately running and sliding on the snow-covered ice in the same location.

White-tailed Deer, Odocoileus virginianus, C

AMPHIBIANS AND REPTILES

Abundance symbols same as for mammals. Species names are from Vogt: Natural History of Amphibians and Reptiles of Wisconsin, 1981.

AMPHIBIANS

Blue-spotted Salamander, Ambystoma laterale, status unknown.

Tiger Salamander, Ambystoma tigrinum, status unknown.

Newt, Notophthalmus viridescens, U

American Toad, Bufo americanus, C

Chorus Frog, Pseudacris triseriata, C

Spring Peeper, Hyla crucifer, C

Gray Tree Frog, Hyla sp.? (not known whether the Field Station species is chrysoscelis or versicolor or whether both occur.), U

Green Frog, Rana clamitans, C

Leopard Frog, Rana pipiens, C

Wood Frog, Rana sylvatica, C

REPTILES

- Snapping Turtle, Chelydra serpentina, C
Blandings Turtle, Emydoidea blandingi, R
Painted Turtle, Chrysemys picta, C
Ringneck Snake, Diadophis punctatus, R
Milk Snake, Lampropeltis triangulum, U
Garter Snake, Thamnophis sirtalis, C
Brown Snake, Storeria dekayi, U
Red-bellied Snake, Storeria occipitomaculata, U