



New England Wetlands

Plant Identification and Protective Laws





UNITED STATES ENVIRONMENTAL PROTECTION AGENCY

REGION I

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To: Government Agencies and Concerned Persons

1200 Sixth Avenue
Seattle, WA 98101

As a part of Region I's expanding program for the protection of the beneficial functions of inland wetlands, flood plains, and coastal ecosystems, we are pleased to present the accompanying copy of "New England Wetlands Plant Identification and Wetlands Protection Laws". This text is being distributed to Conservation Commissions in all New England states as well as to agencies of Federal and State governments charged with the responsibilities of wetland protection. The Superintendent of Documents will make this book available to the general public through the Federal Book Store.

Although Federal regulations prohibit the printing of the names of authors and preparers, I should like to acknowledge the work of EPA people responsible for the writing, composition, and much of the photography in the manual.

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Concurrence as to the accuracy of the text was received from federal, state, and academic authorities.

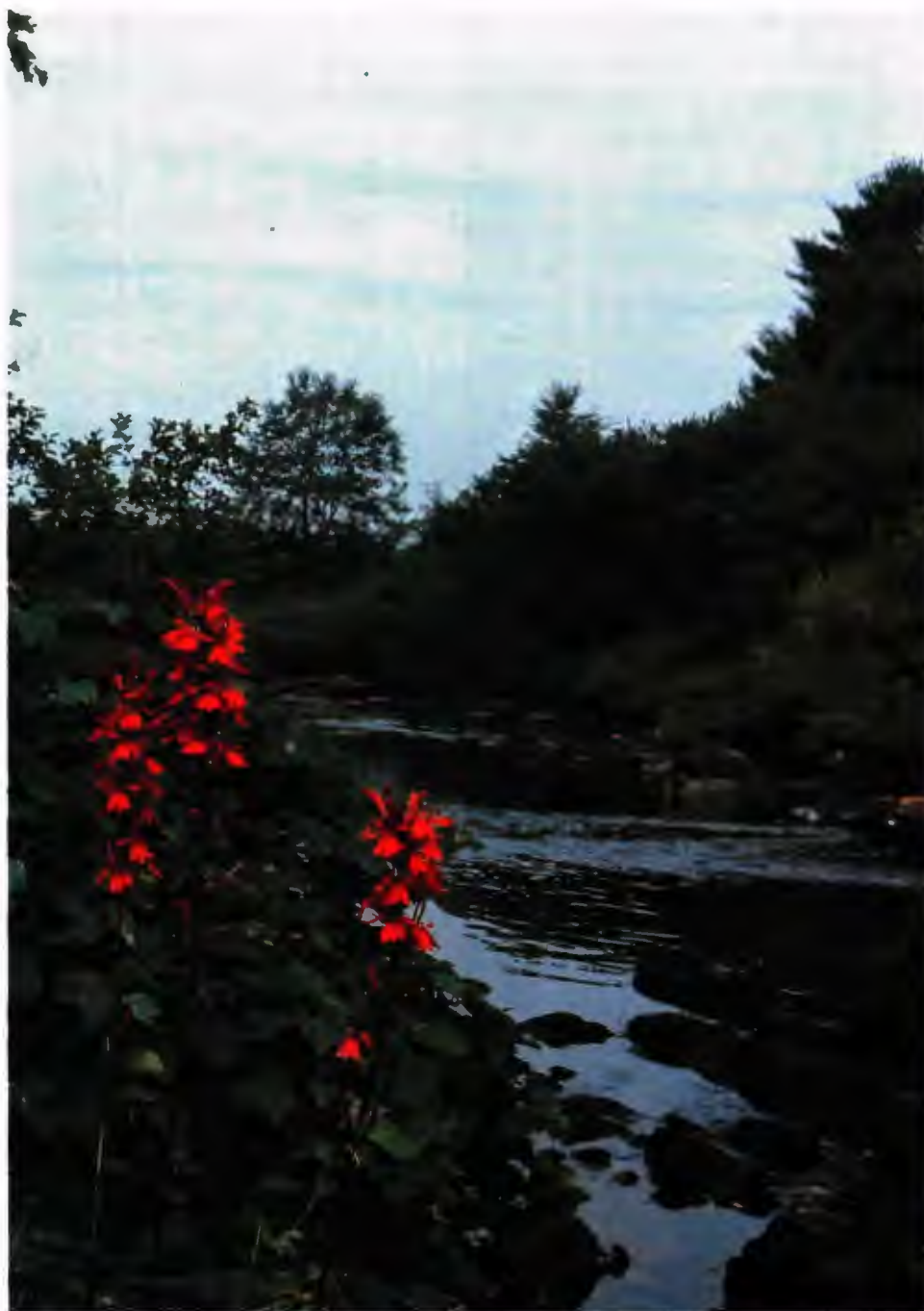
As you see, "New England Wetlands Plant Identification and Wetlands Protection Laws" is the result of the cooperative efforts of a significant number of people and talents, and it is our sincere hope that it will be of value in our shared goal of the protection of the Region's wetlands.

Sincerely,

Leslie Carothers
Acting Regional Administrator

Enclosure

Frontispiece



**CARDINAL FLOWER
WARE RIVER, MASSACHUSETTS**

1.01

PREFACE

This manual has been prepared by the U.S. Environmental Protection Agency, Region I, as part of the agency's effort to bring to the attention of the general public the regulatory framework that is in place in New England to protect wetlands. As part of its responsibilities under Section 404 of the Federal Water Pollution Control Act, (Cleanwater Act), as well as complying with President Carter's 1977 Executive Order concerning the protection of wetlands, EPA has made education of the general public concerning the values of wetlands and their protection a priority in the 404 program.

After researching the available information on wetlands identification and protective legislation in the six New England states, it was recognized by EPA that there was a need for a comprehensive field identification guide combined with an updated summary of protective laws for all the New England States. It is felt conservation commissions, municipal governments, consultants, engineering firms and planners could greatly benefit from such an assembly of information.

Accordingly, this manual provides a comprehensive summary of all wetlands laws in New England, both State and Federal. It allows the lay person to identify wetlands so that it can be determined when a wetland is involved in a particular project and to tell what statutes apply, where to get information on each regulatory program, and under what conditions permits can and cannot be issued.

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INTRODUCTION

(How To Use This Manual)

This manual is designed to aid persons interested in determining whether or not an ongoing or proposed construction project is located in wetlands. (Occasionally, wetlands in a dry season do not show visible signs of water). If the project is located in wetlands, the manual then can be used to determine what regulatory authorities apply to it.

It is recommended that the person using this manual first try to determine what type of wetland is involved. This can be done by comparing the area to figures 1 through 3. If the area does not exactly coincide with one of these figures, it simply means that it is in a transitional zone or is a combination of types. However, one should be able to tell whether or not the area is a saltmarsh, freshwater wetland or bog.

If the area in question exhibits some of the characteristics shown in figures 1 through 3, then the flora in the area should be examined and compared to the descriptions in this manual to determine if there is a predominance of wetland species. This manual is not meant to be a definitive work on wetland plants but a useful tool to help determine where wetland protection laws apply.

After it has been determined that a wetland is involved, one should refer to the section for the particular state in which the wetland is located. There, the various laws that protect inland (freshwater) wetlands, coastal (saltwater) wetlands, great ponds, and rivers and streams are described. It should be noted that under federal law, Section 404 of the Clean Water Act applies to all of the above named areas.

FRESHWATER (INLAND) WETLANDS

INLAND WETLANDS OF NEW ENGLAND (EPA, REGION I)

A precise, single, indisputable definition of the term "wetlands" has not yet been developed by any of the several regulatory agencies in Region I, simply because of the diversity of characteristics and values which are to be found in the various types of these wetlands. Generally acceptable, however, is the description of a wetland as an area where naturally occurring water is at or near the surface for a significant portion of the growing season, and that, under normal conditions, supports a prevalence of vegetation typically adapted for growth in saturated soil conditions.

This definition points to a vegetative cover as a means of identification of a wetland and its boundaries, thus providing a reliable tool for enforcement agencies or advisory bodies. Proper use of this tool is, of course, dependent upon the ability to properly and accurately identify wetland plants. The purpose of the wetland plant identification section of this manual is to provide, in layman's language, the identifying characteristics of the more important, commonly found wetland plant species.

Plant identification, in order to support valid conclusions, should include as many species as possible of the entire vegetational community. One species will not prove the existence of a wetland. The plant grouping — not the plant specimen — is the true indication of the characteristic saturated conditions. For example, if a grove of Red Maple is found to have Chokecherry, Staghorn Sumac, and Hayscented Fern as an understory and ground cover, it must be concluded that the area is well above the level of the groundwater table. If this same Red Maple canopy is undergrown with Spicebush, Winterberry, and Sensitive Fern, then the site is clearly indicated as a wetland.

Listings of indicator plants, as presented in several of the statutes and regulations, can be confusing, because they represent a whole range of ecosystems and habitats. As the beginning of an understanding, we have segregated these plants by three categories, based on degree of tolerance of wet conditions. Not all the plants listed below are described in this manual. However, a sufficient number are provided to assure reliable identification.

1. Hydrophilic — These are plants of the littoral (shoreline) habitat which include border grasses, emergents, floating-leaf plants, and submersed plants, all of which require permanent standing or slow-flowing water. All are herbaceous plants (die back to the ground annually).

<i>Callitriche</i> spp.	Water Starworts*
<i>Elodea</i> sp. (Hydrocharitaceae)	Frog's Bit*
<i>Eriocaulon</i> sp.	Pipeworts*
Gramineae	Hydrophilic Grasses*
<i>Juncus</i> sp.	Rushes*
<i>Lemna minor</i>	Duckweed
<i>Ludwigia palustris</i>	Water-Purslane*
<i>Myriophyllum</i> sp.	Water Milfoil*
<i>Nymphaea</i>	Pond Lilies
<i>Pontederia</i> sp.	Pickereel Weed
<i>Potamogeton</i> sp.	Pondweeds*
<i>Sparganium</i> sp.	Bur-Reeds*
<i>Utricularia</i> sp.	Bladderworts*
<i>Vallisneria</i> sp.	Eel Grass*

2. Phreatophytic — These are plants whose root systems extend into the water table or in the semi-saturated layer just above the water table. In natural conditions, the availability of this "free" water is a requirement for normal growth.

TREES

<i>Chamaecyparis thyoides</i>	Atlantic White Cedar
<i>Larix laricina</i>	Tamarack, Eastern Larch
<i>Nyssa sylvatica</i>	Tupelo, Black Gum
<i>Picea mariana</i>	Black Spruce
<i>Quercus bicolor</i>	Swamp White Oak
<i>Salix nigra</i>	Black Willow
<i>Thuja occidentalis</i>	Northern White Cedar

WOODY SHRUBS

<i>Alnus rugosa, serrulata</i>	Alder spp.
<i>Andromeda glaucophyllum</i>	Bog Rosemary
<i>Azalea viscosum</i>	Swamp Azalea
<i>Cephalanthus occidentalis</i>	Buttonbush
<i>Chamaedaphne calyculata</i>	Leatherleaf
<i>Clethra alnifolia</i>	Summersweet
<i>Ilex verticillata</i>	Winterberry, Black Alder
<i>Kalmia polifolia</i>	Bog Laurel
<i>Ledum groenlandicum</i>	Labrador Tea
<i>Lindera benzoin</i>	Spicebush
<i>Myrica gale</i>	Sweet Gale
<i>Rhus vernix</i>	Poison Sumac
<i>Sambucus canadensis</i>	American Elder*
<i>Vaccinium macrocarpon, oxycoccus</i>	Cranberry

*Not shown

HERBACEOUS PLANTS

<i>Araceae</i>	Arums
<i>Arethusa bulbosa</i>	Swamp Pink Orchid*
<i>Calopogon pulchellus</i>	Grass Pink Orchid*
<i>Caltha palustris</i>	Marsh Marigold*
<i>Cyperaceae</i>	Sedges*
<i>Decodon verticillatus</i>	Water-Willow
<i>Drosera sp.</i>	Sundew
<i>Dryopteris thelypteris</i>	Marsh Fern
<i>Eriophorum sp.</i>	Cotton Grass
<i>Eupatorium perfoliatum</i>	Boneset
<i>Eupatorium purpureum</i>	Joe-Pye Weed
<i>Iris versicolor</i>	Blue Flag
<i>Onoclea sensibilis</i>	Sensitive Fern
<i>Osmunda regalis</i>	Royal Fern*
<i>Pogonia ophioglossoides</i>	Rose Pogonia Orchid*
<i>Sarracenia purpurea</i>	Pitcher Plant
<i>Sphagnum sp.</i>	Sphagnum Moss
<i>Symplocarpus foetidus</i>	Skunk Cabbage*
<i>Typha latifolia, angustifolia</i>	Cattail*
<i>Veratrum viride</i>	White Hellebore*

3. Tolerant species — These are trees, shrubs, and herbs which will tolerate saturated conditions for a limited period of time during the growing season, but saturated soils are not a requirement for normal growth. These species are just as much "at home" in dry upland conditions.

TREES

<i>Acer rubrum</i>	Red Maple
<i>Tsuga canadensis</i>	Canada Hemlock*
<i>Ulmus americana</i>	American Elm*

WOODY SHRUBS

<i>Rhododendron canadensis</i>	Rhodora*
<i>Cornus amomum</i>	Silky Dogwood*
<i>Kalmia angustifolia</i>	Sheep Laurel
<i>Lyonia ligustrina</i>	Maleberry*
<i>Vaccinium corymbosum</i>	Highbush Blueberry

HERBACEOUS PLANTS

<i>Lythrum salicaria</i>	Purple Loosestrife
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*Not shown

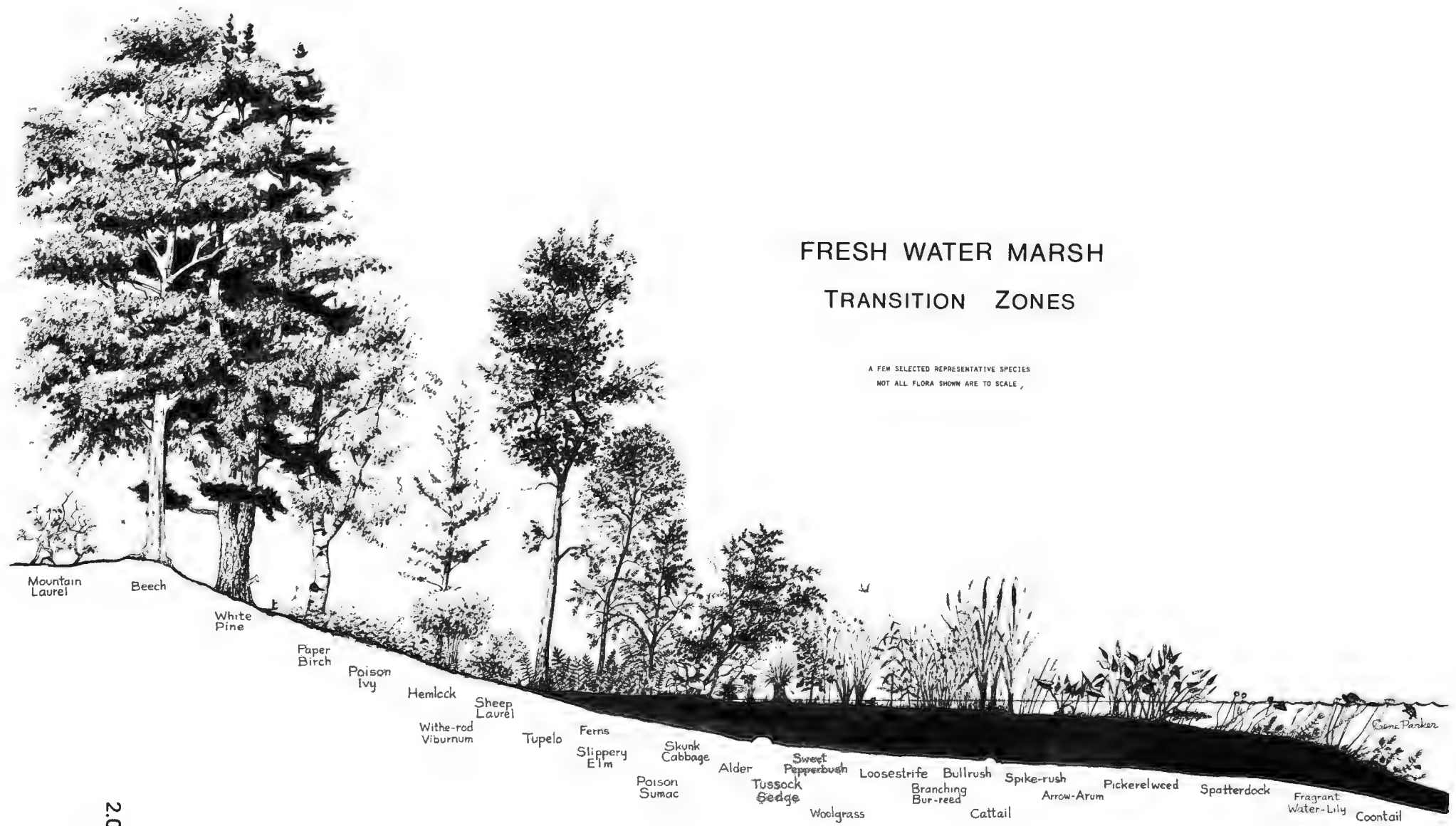


Figure 1

Fresh Water Marsh

A fresh marsh has its beginning as a wide, relatively shallow depression in a drainage system, usually with a slow flow-through current. Bottom materials are a mix of organic/mineral silts and sediments. Bottom-rooted herbaceous plants, plus the floating Duckweeds, die back each year, thus building up the substrate elevation with the decaying plant parts. Trees and shrubs at the elevated marsh edge also add their leaves and twigs to the buildup. As the water level fluctuates and this organic base slowly reaches to and above the average water level, populations of shrubs and trees begin to establish themselves, and the transition from open marsh through shrub swamp to wooded swamp begins.

BOG TRANSITION ZONES

A FEW SELECTED REPRESENTATIVE PLANTS
(NOT ALL SHOWN ARE TO SCALE)

2.07

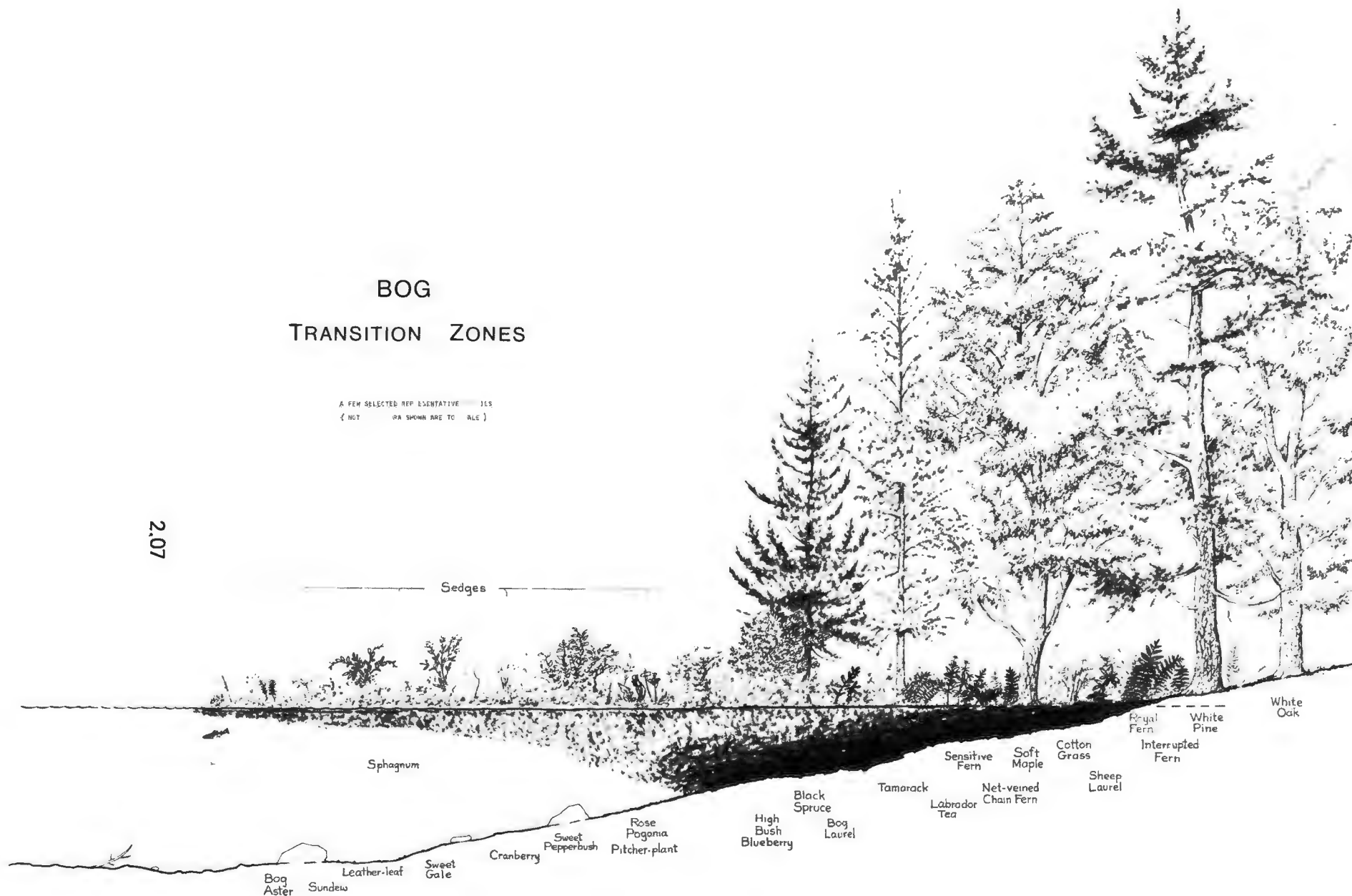


Figure 2

Bog

The bog is born in a "kettle-hole," formed by a melting ice block left by the retreating glacier. Water levels do fluctuate and are maintained by surface water or groundwater, although some bogs are fed by very slow-moving tributaries. Formation of the bog begins as a floating ring of sphagnum moss extending from the shoreline. Each year, the Sphagnum extends further into the open water, depressing the previous year's growth with the weight of the new growth. As this floating mat becomes more dense, a greater variety of plants are supported, adding their annual die-off material to the mat. As more and more of this mat is depressed, the surface is actually elevated to the aerated zone, and "islands" begin to develop, where tree seedlings can be supported. It is not uncommon to find dry-land species such as White Pine and Gray Birch growing on these "islands." Normal climax growth in the bogs are phreatophytes such as Atlantic White Cedar in the coastal and southern New England bogs, and Tamarack/Black Spruce in the higher altitudes and colder areas.

FRESHWATER WETLAND PLANTS

EASTERN LARCH, TAMARACK

Larix laricina

Deciduous conifer, 12 to 24 meters (40 to 80 feet) at maturity. Trunk usually straight, with narrow pyramidal head in forest stands — more rounded in the open. Bark thin, bright reddish-brown to gray, and scaly.

Needles: Soft, pale green in color, 2 to 3.2 cm ($\frac{3}{4}$ to $1\frac{1}{4}$ inches) long. Grow in clusters from knobs on the branches. Turn golden yellow in September — October, then drop.

Cones: 1.2 to 2 cm ($\frac{1}{2}$ to $\frac{3}{4}$ inches) long, rounded oval.

Location: The higher elevation bogs of northwest and north central Connecticut and Massachusetts, and throughout the three northern states.

To identify:

1. Needles come from both the twigs (current years growth) and from spurs on the second year and older branches. All other native conifers only bear needles directly from the twigs.
2. Cones always grow upright from the branch. Spruce and hemlock cones are pendant.

Values: Seeds and needles are eaten by ruffed grouse, snowshoe hare, red squirrel, porcupine and deer.



BLACK SPRUCE, BOG SPRUCE

Picea mariana

Evergreen conifer, rarely over 12 meters (40 feet) in Massachusetts. Narrow, pointed head while young, but can become irregular, even distorted with age. Sometimes dwarfed.

Needles: Short, .6 to 2 cm ($\frac{1}{4}$ to $\frac{3}{4}$ inches) long, blunt tipped, pale blue-green in color.

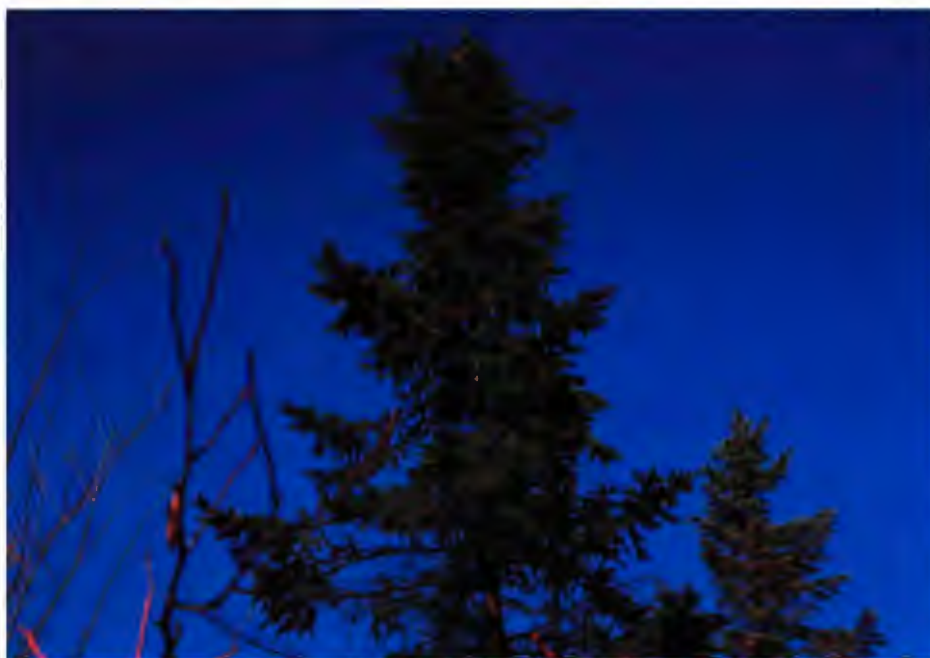
Cones: Rounded, dull grayish-brown, numerous, to 2.5 cm (1 inch) long, persistent.

Location: Usually found with Tamarack in the colder bogs throughout the Region. Not common in coastal plains.

To identify:

1. Short needles — the shortest of all the Spruces.
2. Persistent cones — Hemlock and all other Spruces lose their cones before the beginning of the next growing season, but Black Spruce cones will hang on for many years, even after the tree has died.

Values: Provides nesting and winter cover; needles are food for grouse, deer and small mammals; seeds are also food for small mammals and deer as well as songbirds.



ATLANTIC WHITE CEDAR

Chamaecyparis thyoides

Evergreen conifer, to 24 meters (80 feet), but matures much smaller. Tall, straight, and columnar, but rather loose in form. Bark light, reddish-brown, peeling off in long strips.

Needles: Dark blue-green overlapping scales about .3 cm (1/8 inch) long, often with a whitish gland on the back.

Cones: Crumpled, consisting of about 3 pairs of scales in a 2 cm (3/4 inch) globe. Bluish-purple at maturity.

Location: From the most southerly portion of Maine, southward within a narrow coastal belt. Usually not more than 80 to 115 km (50 to 70 miles) inland.

To identify:

1. This tree, from a distance, resembles Red Cedar, but the latter has loose, sharp needles, while the White Cedar's branchlets are flat and smooth to the touch.

Values: Valuable timber crop. Needles are browse for small mammals and deer. Seeds are food for some songbirds, especially in winter.



NORTHERN WHITE CEDAR

Thuja occidentalis

Evergreen conifer, to 15 meters (50 feet), conical in shape. Bark reddish-brown, fibrous, peels easily. Resembles Atlantic White Cedar, but branches are more open and spreading. Paler green foliage.

Leaves: Nearly all scale-like, .15 to .3 cm (1/16 to 1/8 inch) long. Occur in four rows around twigs, and are flattened from the sides. Twigs and leaves occur in flattened sprays which typically are aligned vertically. Smooth to the touch.

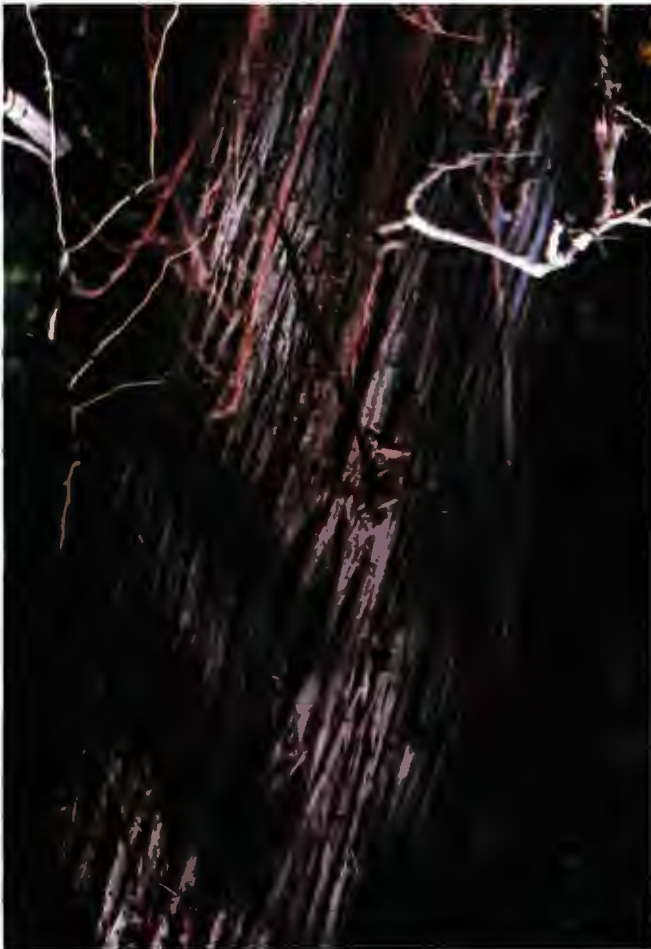
Fruit: Small cones, about 1.3 cm (½ inch) long, tan in color, with only a few scales.

Location: Throughout the 3 northern states, and in the mountainous areas of Massachusetts and Connecticut.

To identify:

1. Distinguish from Atlantic White Cedar and Red Cedar by the vertical alignment of the branch sprays, the pale green color, and the more open, spreading branch structure.

Value: Same as Atlantic White Cedar.



SWAMP WHITE OAK
Quercus bicolor

Deciduous tree, 18 to 21 meters (60 to 70 feet), occasionally to 30 meters (100 feet). A massive round head, with many long, reaching branches perpendicular to the trunk. Appears shaggy, with many short branches growing from the trunks and underside of the main limbs. Bark light gray, ridged or flaky.

Leaves: 8 to 23 cm (3 to 9 inches), wedge-shaped at the base, with wavy outer edges. Usually white, hairy on the underside.

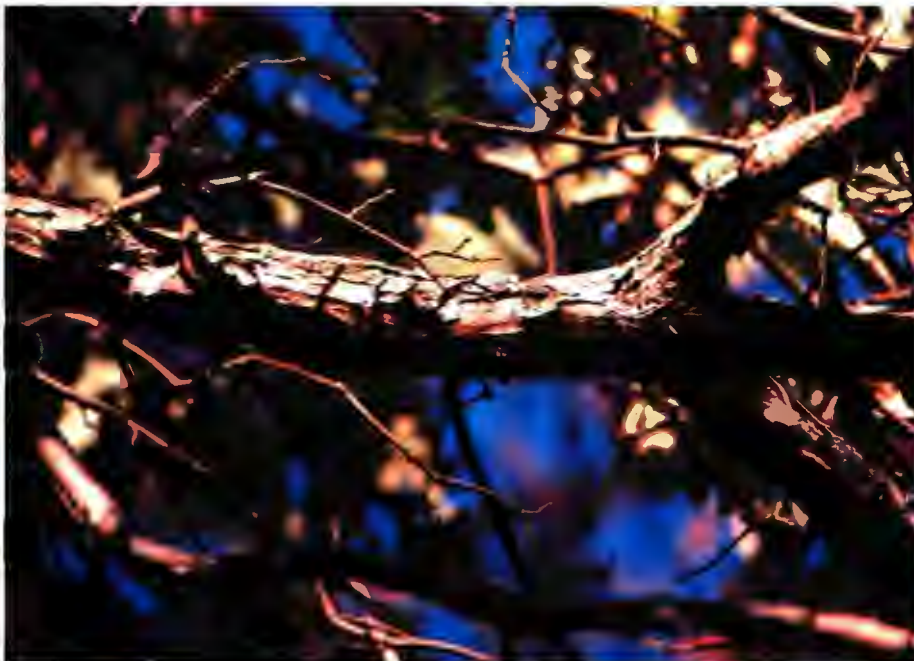
Fruit: Acorn 2 to 3 centimeters (.8 to .12 inches) long, with a bowl-shaped cap, on a long stalk (longer than the leaf stalks).

Location: From southwest Maine and southern New Hampshire and Vermont, through the southern New England states.

To identify:

1. Scaling bark on the large laterals.
2. Short branches growing from the trunk.
3. Crooked, down-turned small branches coming off the main limbs.

Value: Acorns are sweet and are eaten by squirrels, deer, wild ducks, wild turkey and other birds.



TUPELO, BLACK GUM

Nyssa sylvatica

Deciduous tree, to 30 meters (100 feet), more often 12 to 18 meters (40 to 60 feet). Trunk straight, branches horizontal. Lower branches may slant downward. Develops a broad, rounded top in the open. Crowded trees are pyramidal.

Leaves: Smooth, oval shape with no teeth or lobes, 5 to 10 cm (2 to 4 inches) long. Rather leathery, dark green, glossy, usually clustered at the tips of the zig-zag branches.

Flowers: Small, inconspicuous, greenish-white.

Fruit: 1.3 cm (½ inch) long, black, oval berry.

Location: From southern Maine and southeast New Hampshire, through three southern states except for the Berkshires of Massachusetts.

To identify:

1. Branches have a contorted, thorny appearance.
2. Autumn color is an intense, deep red, outstanding among all surrounding trees.

Value: Fruits and food for small mammals.



BLACK WILLOW

Salix nigra

Deciduous tree, 9 to 12 meters (30 to 40 feet). Trunk rather massive, often growing in clumps from the same root. Branching occurs low on the trunk, and develops into a wide, ragged, delicate crown. Bark appears twisted and flaky, often becoming shaggy on old trees.

Leaves: Bright, glossy green, up to 13 cm (5 inches) in length, narrow, lance-shaped, with small sharp-appearing teeth on the edges. Stipules at the base of the leaf encircle the twig.

Flowers: The familiar fuzzy, white and yellow catkins which appear just before the leaves emerge in the spring.

Fruit: .6 cm (¼ inch) capsule, green, having shape like a fig.

Location: Along stream banks and in low, rich land throughout the Region, south of the 45th parallel (central Maine).

To identify:

1. Winter identification is by the bright golden yellow color of the branches and twigs.

Value: Buds and twigs are food for grouse and pine grosbeak. Bark, buds and wood are important to beaver, hare and other mammals. Provides excellent browse for deer and moose.



RED MAPLE, SWAMP MAPLE
Acer rubrum

Deciduous medium size tree, 23 to 24 meters (75 to 80 feet). In the open, branching is low and wide-spreading. In dense stands, the branches are more ascending, and lower branches die off as the canopy becomes more elevated. Bark on old trunks is thick, dark gray, and separated by vertical ridges into plate-like scales.

Leaves: 3 to 5 lobed, with V-shaped sinuses between the lobes. Margins are coarsely toothed. Light green on the the top surface, whitish on the underside.

Flowers: Dark red to scarlet; appear in clusters well before the leaves in the Spring (one variety has yellow flowers).

Fruits: The winged fruits (maple keys), called samaras, are also reddish, ripening in late spring and early summer.

Location: Throughout the Region in all conditions from swamps to uplands.

To identify:

1. The typical Fall colors (red, orange and yellow), occurring early, are familiar to all.
2. Leaves are opposite.
3. Twigs (the current season's growth), as well as the leaf stalks are bright red.

Value: Bark and twigs are preferred deer browse and food for hares. Birds and small mammals use seeds, buds and flowers for food.



SPECKLED ALDER

Alnus rugosa

Tall, coarse, deciduous shrub, 3 to 4.5 meters (10 to 15 feet). Branching from the base, a colony of these Alder can form an almost impenetrable thicket. The bark varies from warm brown to blackish-gray marked distinctively with whitish linear lenticels.

Leaves: 5 to 10 cm (2 to 4 inches) ovate to broadly elliptic, coarsely toothed, with saw-tooth edges on the large teeth. They appear somewhat wrinkled on the top surface due to the prominent cross-veins, and often brownish on the underside.

Flowers: Catkins, blossoming before the unfolding of the leaves.

Fruit: Cone-like, about 1.3 cm (½ inch) in length.

Location: Throughout the Region, common in all types of wetland areas.

To identify:

1. Leaves with very prominent veins.
2. Conspicuous male flower buds at branch terminals.
3. Cone-like fruits which may persist through two growing seasons.

Values: Important ground cover for grouse and woodcock; beavers use alders in dam construction; food for moose, muskrats, beavers, cottontails, snowshoe hares and deer. Fixes nitrogen which means leaves, twigs, etc., are high in protein.



WINTERBERRY, BLACK ALDER

Ilex verticillata

Deciduous shrub, to 2 to 2.5 meters (6 to 8 feet). Branches spreading. Bark grayish-black, lightly speckled. One of our native Hollies.

Leaves: Alternate, 4 to 8 cm (1 ½ to 3 inches) long, with toothed edges. Dull green on the upper side, downy underside. In sun, or in poor conditions, the leaves have a yellowish cast.

Flowers: Inconspicuous, small, pale greenish-white flowers occur in June and July at the leaf axils on the current season's growth. Male and female flowers are on separate plants.

Fruit (only on female plants): Ripens in October. Bright red, .6 cm (¼ inch) in diameter, round, on very short stems in leaf axils. Will remain on the bare stems until January, or until eaten by birds.

Location: A common shrub of swamps, pond margins, and damp thickets in all parts of the Region.

To identify:

1. Round, short-stemmed showy berries are in tight clusters.
2. Complete absence of Fall color. Leaves turn black after the first hard frost and fall rapidly.

Value: Food for songbirds and small mammals; Browse for deer, moose, cottontail and snowshoe hare; when associated with speckled Alder it enhances the habitat value.



SPICEBUSH, WILD ALLSPICE

Lindera benzoin

Deciduous shrub, 2 to 4.5 meters (6 to 15 feet). Of spreading habit, much like Winterberry, but somewhat more open and faster growing. Branches are green, even in winter. Bark smooth.

Leaves: Alternate, 7.6 to 13 cm (3 to 5 inches) long, bright green with pale green underside; oblong, pointed, with smooth edges. Autumn color a clear yellow.

Flowers: Appear as early as March. Small, delicate, and honey-yellow in color, they cover much of the shrub. The earliest to flower of all wetland shrubs.

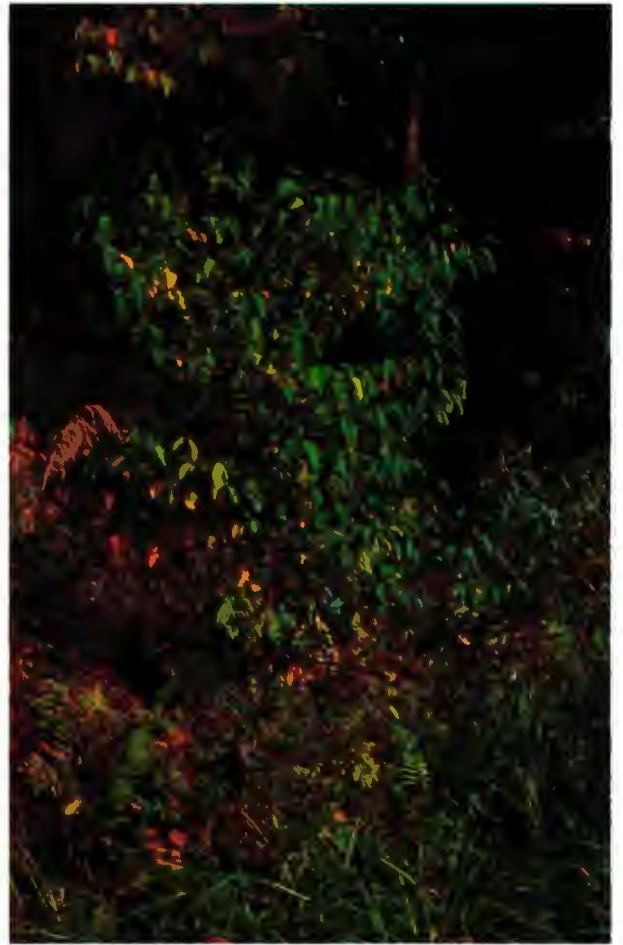
Fruits: Oblong, 1.3 cm (½ inch) long, bright red in October, in clusters on short stems. Very spicy to the taste. Used as substitute for allspice in colonial days.

Location: Shade swamps and stream banks throughout the Region, south of southwest Maine.

To identify:

1. Distinguished from Winterberry by the large (2X) oval fruits, smooth-edged leaves, and yellow Autumn color.
2. All parts of this plant — twigs, leaves, fruits — are highly aromatic.

Value: Fruits are food for many songbirds and grouse, pheasant and quail.



HIGHBUSH BLUEBERRY

Vaccinium corymbosum

Deciduous shrub, 2 to 3 meters (6 to 10 feet). Forms compact clumps while young, becoming more spreading with age. Branchlets yellowish-green or red, warty. Quite variable, as many natural hybrids occur.

Leaves: 4 to 7.5 cm (1 ½ to 3 inches) long, green on both sides with smooth margins. Fall color variable and distinctive. Among the more ornamental leaves in the late season, being deep red.

Flowers: Cylindrical, urn-shaped .6 to 1.3 cm (¼ to ½ inch) long, White. Occur when the leaves are half grown.

Berries: Vary from blue to blue-black, with a whitish bloom. Ripen from June to early September.

Location: Region-wide, in acid soils of swamps or bogs to dry hillsides. Generally grows with roots partly in fresh water.

To identify:

1. Very similar to *Lyonia* (Maleberry), and found in the same locations. The latter has persistent brown seed capsules which identify it.
2. In the late season, the new growth has .3 cm (1/8 inch) round to pointed, bright red buds at the leaf axils.

Value: Very important food for many birds and mammals. Twigs and leaves are also important as browse and berries are eaten by man.



SUMMERSWEET, SWEET PEPPERBUSH

Clethra alnifolia

Deciduous shrub, 1 to 3 meters (3 to 10 feet) at maturity. Varies from a compact, rounded shrub to a tall branched cluster of thin stems, preferring semishaded locations for its best growth.

Leaves: Foliage very similar to Alder (its old name was White Alder). Same shape and size, with the heavy veins on the underside. Green rather than brownish on the underside.

Flowers: From late July to September, the fragrant, white, 7.6 to 10 cm (3 to 4 inch) flower spikes are borne in profusion at the ends of each of the branches.

Seeds: Seed heads are spikes of light brown, dry capsules, remaining on the shrub for two years or longer. Seeds tiny and dust-like.

Location: From southern Maine and New Hampshire, through the coastal plains of the southern states.

To identify:

1. The persistent terminal seed capsules separate this shrub from other shrubs of similar form.



SHEEP LAUREL, LAMBKILL
Kalmia angustifolia

Broadleaf evergreen, to 1 meter (3 feet). Upright, straight branches.

Leaves: 2.5 to 6.5. cm (1 to 2 ½ inches), oblong obtuse. Light green above, pale beneath. Opposite, on short stems, often drooping.

Flowers: Deep rose-pink to crimson, less than 1.3 cm (½ inch) across, cup-shaped, in *axillary* clusters so that new growth is always found above the clusters.

Seeds: Fruits are small, brown, globular, persistent. Seeds are tiny and dust-like.

Location: Region-wide, in either wet areas or dry conditions.

BOG LAUREL, PALE LAUREL
Kalmia polifolia

Similar to Sheep Laurel, but not over .6 meter (2 feet). A low, straggling shrub.

Leaves: 1.3 to 3.8 cm (½ to 1 ½ inches), more oval than Sheep Laurel. Lustrous green above, conspicuously whitened beneath. Nearly sessile (without stems).

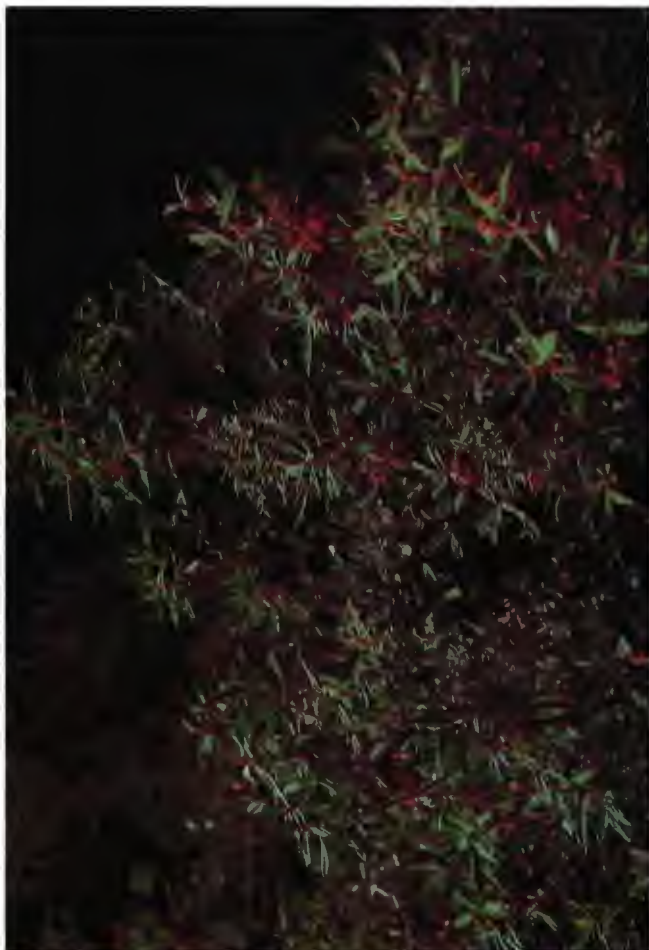
Flowers: To 2 cm (¾ inch) across, occurring at the branch *terminals* in May and June. Deep pink to crimson, cup-shaped.

Location: Regionwide, but not common in Massachusetts, Rhode Island, or the lower elevations in Connecticut. A true bog plant, found only in saturated conditions.

To identify:

1. Leathery, evergreen leaves.
2. The unique and distinctive cupshape flower.
3. Distinguish between these two by the location of the flowers.

Value: Ruffed grouse and deer feed on the foliage buds and twigs.



LEATHERLEAF

Chamaedaphne calyculata

Almost evergreen, spreads in a marsh or bog, becoming a dense, .6 meter (2 foot) high shrub cover. Individuals may reach 1 meter (3 feet) in height.

Leaves: About 2.5 cm (1 inch) long; oblong, pointed, diminishing in size toward the tips of the arching branches. Remain on the branches long after other shrubs have dropped their leaves. Dull green, leathery, with rusty underside.

Flowers: Occur April to June in the axils of the small outer leaves. White, urn-shaped, about 2 cm ($\frac{3}{4}$ inch) long, nodding, on short stems.

Seeds: Seed pods are small, pale brown, 5 lobed capsules, not persistent.

Location: Common in bogs and marshes throughout the Region. Prefers open, sunny exposure.

To identify:

1. Nearly evergreen leaves, diminishing in size at the branch tips;
2. Arching branches;
3. Rusty appearance of underside of leaf.

Value: Fruits and buds used as food by grouse; twigs browsed by snowshoe hare.



SWEET GALE, BOG MYRTLE
Myrica gale

A strong, upright-growing shrub, .6 to 1.2 meters (2 to 4 feet) in height, with dark brown bark.

Leaves: 2.54 to 7.5 cm (1 to 2 ½ inches) long, leathery, dark glossy green on the upper side, grayish and hairy on the underside. Narrowly wedge-shaped, with distinct teeth on the tips.

Flowers: Occur in April, before the leaves, with the male and female flowers usually on separate plants. Male flowers are brownish, 1.3 cm (½ inch) catkins. Female flowers are cone-like.

Fruit: Ripens in September at the ends of the previous year's branches. The nuts are compressed, 3-pointed, yellowish, and resinous, about .8 cm (1/3 inch) in length.

Location: Region-wide, along pond shorelines or in bogs, marshes, and swamps. Tolerant of sun or shade.

To identify:

1. Twigs, leaves, and fruit are highly aromatic, with a strong, spicy odor when bruised.
2. Teeth on the tips of the leaves are prominent.
3. Twigs smooth, purplish or brownish, with yellow markings.

Value: Noted for its ability to fix nitrogen in low nitrate soils.



SWAMP AZALEA, CLAMMY AZALEA
Rhododendron (Azalea) viscosum

An upright, rigid shrub, growing 1.2 to 2.4 meters (4 to 8 feet) tall. The almost whorled arrangement of the branches gives this shrub the appearance of growing in tiers. Twigs are light brown, bristly.

Leaves: 5 to 10 cm (2 to 4 inches) long; elliptic to reverse egg-shaped. Usually green on both sides, with hairs on the margins and on the underside of the mid-rib.

Flowers: Appear after the leaves, usually in late June or early July. Sometimes pale pink, but more often white, up to 3.8 cm (1 ½ inches) long. Heavy sweet fragrance, and sticky to the touch.

Seeds: Seed capsule is cylindrical, brown, splitting into 5 valves when seed is released.

Location: Southerly from southwest Maine, in swamps, wet thickets, and bogs, in sun or shade.

To identify:

1. In late season, prominent flower bud centered in a rosette of leaves at the tip of new growth.
2. Appearance of growing in tiers.



BUTTONBUSH
Cephalanthus occidentalis

An open, straggling shrub, usually not over 2.5 meters (8 feet). Branches pale in color, 4- sided, brittle.

Leaves: Large 7.5 to 15 cm (3 to 6 inches) in length, on rather long stems, opposite or whorled in groups of 3 or 4. Lustrous, bright green on the upper surface, and lighter, somewhat hairy underneath.

Flowers: Fragrant, white, in densely aggregated spherical heads, 2.5 cm (1 inch) in diameter, occur in July and August.

Seeds: Seed heads retain the globular form, and remain on the plant until hard frost.

Location: Region-wide, in swamps, pond border, and margins of streams, often with stems partly submerged.

To identify:

1. Brittle, 4-angled small branches.
2. From mid-summer to frost, spherical flower and seed heads.

Value: Important waterfowl food; Beaver, muskrat and deer eat wood and foliage.



BOG-ROSEMARY
Andromeda glaucophylla

A low shrub of cold acid bogs.

Leaves: Not toothed; whitened, upper surface bluish, slightly hairy beneath; leaf edges rolled; 1 - 1 ½" long.

Flowers: Small, pink or white, bell-like, in end clusters, May-July or later.

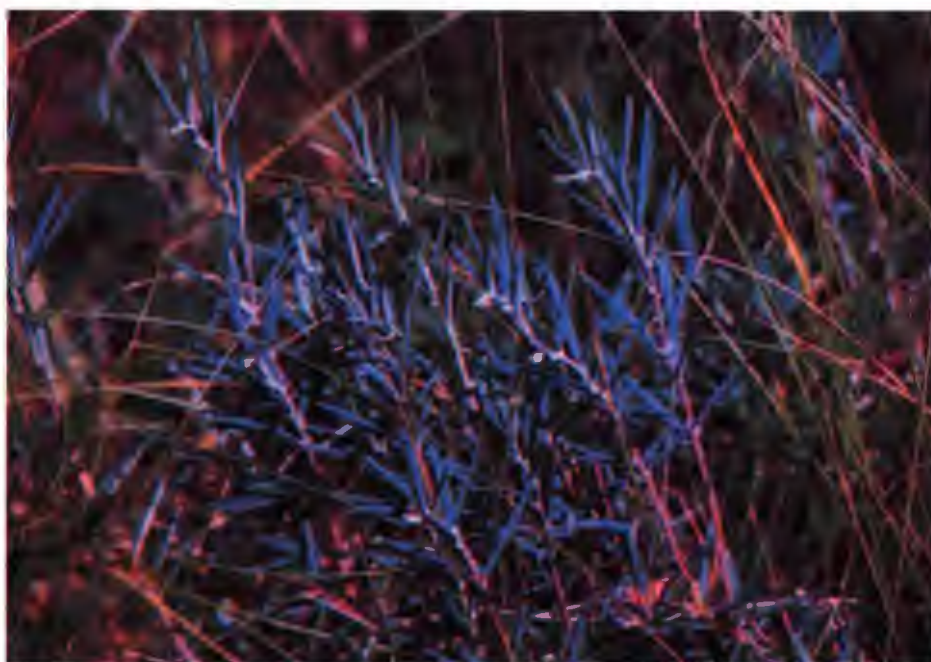
Seed Capsule: Flattened, Turban-shaped, shiny, 3/16" diameter.

Location: Northern 3 states and high Bogs of Western Massachusetts.

To identify:

1. Unique toothless leaves; dark-bluish green.
2. Rolled leaves much whitened underneath.

Value: Not known.



LABRADOR TEA
Ledum groenlandicum

A low northern shrub of the evergreen heath family found in cold acid bogs.

Leaves: Leathery evergreen leaves with rolled edges; narrow, toothless, fragrant when crushed; underside of leaves brown and wooly; twigs are also wooly.

Flowers: Small, white 5-petaled in terminal clusters; bloom in May-June or later.

Seeds: Seed capsule is held on a short stalk; oblong, slender and nodding.

Location: Northern three states and high bogs of Western Massachusetts.

To identify:

1. Toothless leaves — brown wooly underneath.
2. Fragrance of crushed foliage.

Value: Dried leaves have been used for tea.



SHRUB WILLOW

Salix spp.

Usually erect shrubs, often developing with only one trunk in the form of a small tree. Hybridize freely, thus are quite variable and difficult to identify as to species.

Leaves: Simple, and alternate on the stems. The common form is elongated and pointed, most often with a shiny upper surface, with teeth on the margins.

Flowers: Silky catkins, appearing before the leaves. The "Pussy-willow" is familiar.

Fruit: An inconspicuous green capsule. Natural reproduction more often takes place as brittle twigs break off and find a rooting medium in damp soil or sphagnum.

Location: Common throughout the Region along water-courses, shores and in swamps. A few species tolerate dry situations.

To identify:

1. Winter buds are covered with only one large scale, and always appear waxy.
2. In most species, the leaf shape is distinctive.

Value: Important browse for moose and deer; shoots and buds eaten by muskrat, beaver, rabbits and hares; provides excellent brood cover for waterfowl.



POISON SUMAC, POISON DOGWOOD, POISON ELDER
Toxicodendron (Rhus) vernix

CAUTION: All parts of this tree are contact poison.

Erect shrub or small tree to 6 meters (20 feet), usually without a distinct form. All parts of this plant excrete a serious contact poison. Bark is gray and smooth. New twigs shiny.

Leaves: Compound, with 7 to 13 leaflets, each 5 to 10 cm (2 to 4 inches) long, with untoothed edges. The leaflets are opposite on the leaf stem, but the leaves are alternate on the branches.

Flowers: Small, greenish, occurring in early summer as loose panicles at the leaf axils.

Fruit: Small (.5 cm) (1/5 inch) flattened globes, grayish-green. Begins to ripen in late August, and serves as a food for song birds.

Location: South and West from southwest Maine, throughout the Region only in swamps or at pond edges.

To identify:

1. All other native Sumacs bear flowers at the branch terminals; those of Poison Sumac are in the leaf axils (junction between leaf and stem).
2. Distinguish from Elder by the alternate leaves and the smooth leaf edges.
3. Fall color is distinctive and decorative. *DO NOT TOUCH!*

Value: Fruits eaten by numerous birds including pheasant and ruffed grouse; twigs are food for cottontail rabbit.



AMERICAN CRANBERRY

Vaccinium macrocarpon

Slender, creeping broad-leaf evergreen with stems often 1 meter (3 feet) long. The flowering branches are upright.

Leaves: .6 to 1.3 cm ($\frac{1}{4}$ to $\frac{1}{2}$ inch) long, with rounded tips, leathery in texture, dark glossy green above, pale below.

Flowers: Small, pink, with recurved petals, occurring from June to August.

Fruit: A round red berry 1.3 cm ($\frac{1}{2}$ inch) or more in diameter, ripening from September through November.

Location: Throughout the Region, in open acid bogs.

To identify:

1. Resembles Small Cranberry (*Vaccinium oxycoccus*), but all parts of this plant — leaves, stems, fruit — are larger. Deep red color in late fall through early spring.
2. Other than seedlings of some shrub species, there are few plants which could be mistaken for Cranberry.

Value: Important commercial crop to man; Also eaten by small mammals, grouse and pheasants.



BLUE FLAG

Iris versicolor

In marshes, wet meadows, and along stream banks, this is the showy, graceful, sword-leaved plant which closely resembles the Siberian Iris of gardens. The blue-violet flowers appear from May to July. Slender Blue Flag, with somewhat smaller flowers and almost grass-like leaves are found in the marshes near the seacoast, never more than 50 kilometers (30 miles) from tidewater.

Value: Food for muskrats; Marsh birds eat seeds.



THOROUGHWORT

Eupatorium spp.

Several species of Thoroughworts grow in dry upland conditions, but two, Boneset (*E. perfoliatum*) and Joe-pye-weed (*E. purpureum*) are common in wooded swamps and meadows. The flowers of both appear from mid-July to late season and are composed of numerous small, fuzzy heads in large, somewhat domed clusters.

Bonesets are white-flowered, .6 to 1.5 meters (2 to 5 feet) high, with pairs of wrinkled, veiny leaves which unite basally to encircle the stem.

Joe-pye-weeds are dull, pinkish purple, up to 2 meters (6 feet) in height, with leaves arranged in whorls of 3 or 4. Have an odor of vanilla when crushed.

Value: Leaves and fruits are food for mallards and grouse.



THE LOOSESTRIFES

WATER-WILLOW, SWAMP LOOSESTRIFE

Decodon verticillatus

This half-shrub, half-herb of swamps, bogs, and shallow water has 4- to 6-sided arching branches which root at the tips, then send out more arching branches. Leaves are dark green, glossy, willow-shaped, opposite or in whorls of 3, turning bright red in Autumn.

Small lavender flowers appear as tufts in the upper leaf axils in July and August.

Winter die-back rarely reaches the crowns of these plants, and Spring budding begin near the bases of old stems.

Value: Cover for waterfowl; Seeds are food for ducks; Stems are eaten by muskrats. Stabilizes muds at pond edges.



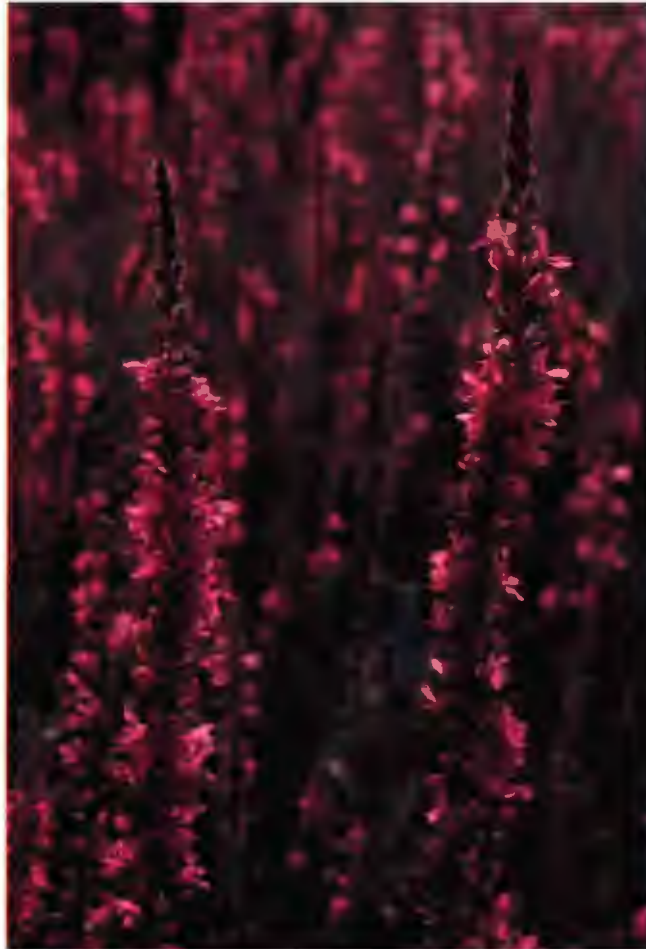
PURPLE LOOSESTRIFE, SPIKED LOOSESTRIFE

Lythrum salicaria

This is the tall, aggressive import from Europe which has formed the magenta covers now common to many of our broad meadows. The tapering spikes of slender-petaled flowers occur from June to September at the tips of every branch of this upright, much-branched, shrub-like perennial. Most often found in wet situations, this Loosestrife and other similar species may be found in dry locations.

The leaves are stemless, downy, somewhat heart-shaped at the base, opposite or in 3's.

Value: This plant is considered to be low in value for wildlife and may monopolize an area better occupied by more valuable flora.



THE FERNS

SENSITIVE FERN

Onoclea sensibilis

A common, yet unusual fern of wet soils, in either sun or shade, earning its name by its sensitivity to early frosts, dying quickly.

Leaves are 1.2 meters (2 feet) tall, coarse, broad, almost triangular, tilting upward and backward. Network-forming veins in the leaflets are prominent. Upper leaflets are connected by wings along the stem.

Best identification is the presence of the fertile leaflets, which remain upright after the sterile leaves have died. These are about .3 meters (1 foot) high, and bear the small hardened, bead-like spore cases. Often remain through two seasons.



MARSH FERN
Dryopteris thelypteris

Common in swamps, sterile meadows, and bogs. A delicate fern, usually 45 cm (18 inches) tall, pale green forming rather dense masses of fernery. Similar to several other ferns, but have a few distinguishing features: (1) The stalk is smooth, slender and pale green in the area of the leaflets, but *black* at the *base*; (2) The fertile leaflets (those which bear the spores) are narrow, and constricted by the margins curving over the fruitdots (clusters of spores); (3) The lowest leaflets exhibit a twisting growth while those above are in a flat plane.



THE CARNIVORES

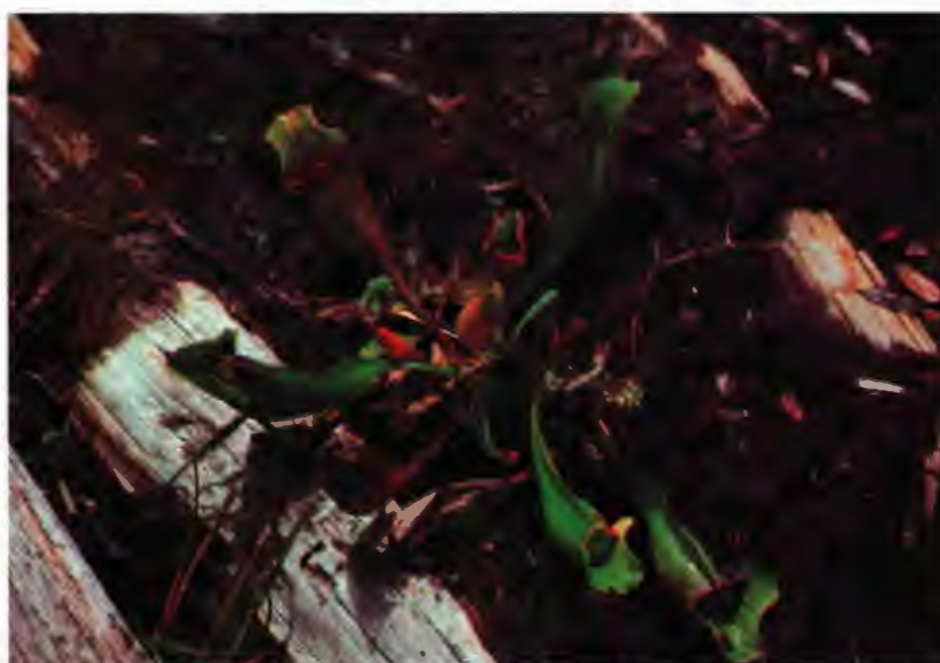
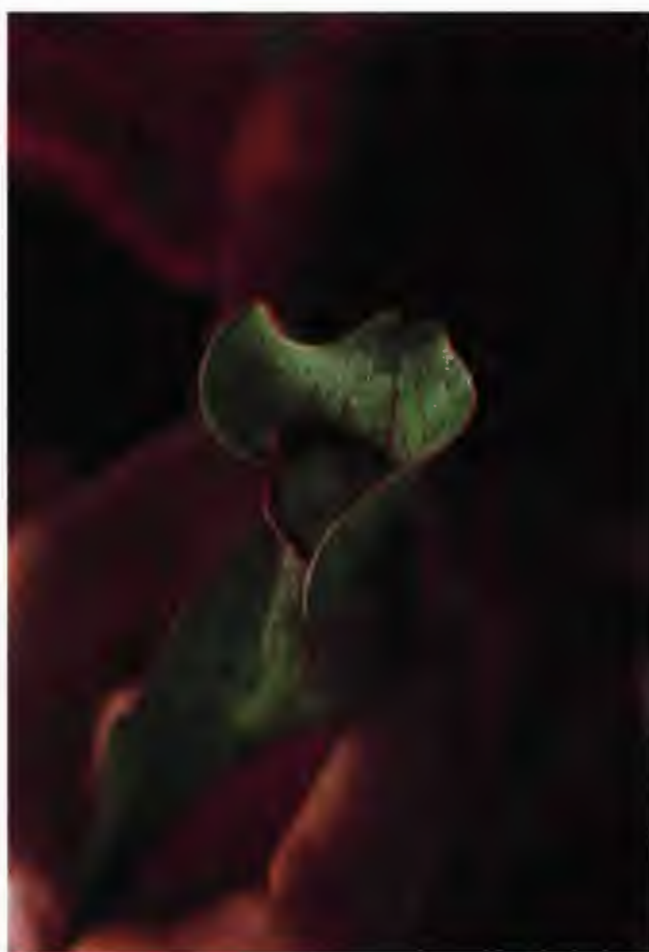
PITCHER PLANT

Sarracenia purpurea

With the tube as a receptacle, the prominent wing as the handle, and the large lip as the pouring spout, it is the leaf of this plant which gives it its name. The rosette of leaves, which vary in color from bright green in shady places to dark purple in the sun, may be from 15 to 50 cm (6 to 20 inches) in diameter. These leaves are usually found half-filled with water and drowned insects whose nutrients are absorbed by the plant. These insects are attracted by a "honey gland" inside the leaf, and the down-turned hairs on the lip prevent their escape.

The flower occurs May — July on a separate stalk, extending 20 to 60 cm (8 to 24 inches) above the leaves. Nodding, almost globular, up to 4.5 cm (1 $\frac{3}{4}$ inches) in diameter, a dull, dark red color.

Found in Sphagnum bogs, leather-leaf stands or peat barrens.



SUNDEW
Drosera spp.

In the same habitats as the Pitcher Plant, only in full sun, 3 species of Sundew may be found in Region I. Round-leaf, Spatulate-leaf, and Threadleaf, the last only in the southeastern section. The names describe the differences. All have reddish gland-bearing bristles which exude a glutinous fluid, glittering like dew-drops. It is these bristles which attract and then entrap insects which are then digested by a proteinaceous ferment.

This is a small plant, the rosette of leaves rarely exceeding 15 cm (6 inches) in diameter. Flowers, white to pinkish, are borne on only one side of a naked arching stem. Usually, only one flower at a time is open, and this is always at the top of the arch.

Pictured: Top — *Drosera rotundifolia* (Round-leaf)
Bottom — *D. rotundifolia* in flower.



THE ARUMS

All the members of this family (*Araceae*) are mud lovers. Our natives include Skunk Cabbage, Sweetflag, Jack-in-the-Pulpit, Green Dragon, Arrow Arum, and Water Arum. The flower is distinctive. Using a familiar Jack-in-the-Pulpit as an example, the "Jack" is the flowering part (*spadix*) and the "Pulpit" is its protective envelope (*spathe*). Only the Sweetflag blossom is naked, without a spathe.

ARROW ARUM

Peltandra virginica

The large, fleshy arrowhead-shaped leaves with a prominent upside-down "Y" formed by the midribs, identifies this Arum. The slender spadix is almost concealed by the 10 to 18 cm (4 to 7 inch) erect, pointed spathe. 30 to 45 cm (12 to 18 inches) in height. The fruit is a cluster of green berries.

Value: Excellent cover for waterfowl; berries are food for waterfowl, marsh birds and muskrat.



WATER ARUM, WILD CALLA

Calla palustris

The spathe (enclosing sheath) of the Calla only partially clasps the short golden spadix (spike-like flowers) and broadens out as an attractive, pure white "petal" 2.5 to 5 cm (1 to 2 inches) across. Closely resembles the Calla Lily used by commercial florists. The fruit is a cluster of bright red berries. Leaves are heart-shaped, 5 to 13 cm (2 to 5 inches) long, dark glossy green.



PICKEREL WEED

Pontederia cordata

This fleshy leaved plant with the blue flower in spikes, which wilt rapidly when picked are commonly found throughout the region, in the shallow waters of marshes, ponds, or slow-moving streams. Often intermingled with Arrow Arum, the leaves are distinguishable by the parallel veins which follow the contours of the arrowhead-shaped, round-lobed foliage.

Value: Leaves eaten by Canada goose; roots and seeds are food for muskrats and waterfowl; provides cover.



BOG-COTTON, COTTON-GRASS

Eriophorum spp.

Perennial rush-like or grass-like herbs, with slender, wiry stems. 6 species found in Region I, but not commonly. Depending upon the species, height is from 15 cm to over 1 meter (6 inches to over 3 feet). Found in wet bogs and along shorelines where roots are kept cool by spring water. The tightly-packed wooly heads — pure white to tawny in color — show from late June to October.



BOG MOSS, PEAT MOSS

Sphagnum spp.

The thick spongy pale green mats common to many wetland situations are composed of one or more species of *Sphagnum*. It is the largest growing moss in the Region, often growing a foot in one season. Its most distinguishing characteristic is, unfortunately, microscopic, involving the identification of the two kinds of leaf cells: small, green cells for food production, and large, dead cells for water storage.

Sphagnum's most important function as a member of the wetland plant community is in providing a rooting medium or a seed bed for its companion plants and storing water in times of excess moisture.

It floats on water. Successive generations of floating *sphagnum* can form "quaking bogs" (so named because of flexing when walked over), and floating islands.



SMARTWEED
Polygonum spp.

There are some 25 to 30 species and varieties of Smartweed in Region I, found in full range of habitats from aquatic to dry barrens. Determination of exact species is a science for expert only. Leaf sizes vary from 3 to 15 cm (1 ¼ to 6 inches) in length. The tiny flowers, pink to white, are in terminal spike-like clusters. The most easily identifiable feature is the swelling and the sheath at each leaf joint.

Value: Food for waterfowl, marsh birds and upland game birds; also food and cover for fish.

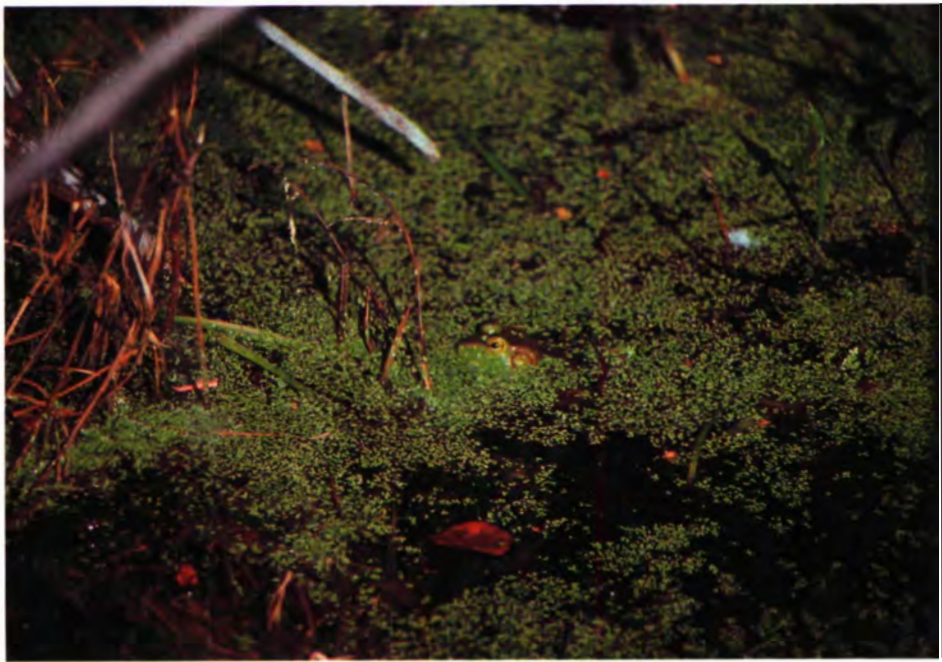


DUCKWEED

Lemna minor

Four genera of the family Lemnaceae may be found in the Region, but the most common is the Lesser Duckweed (illustrated). All are minute stemless plants, floating free on or in the water. These are almost the simplest and smallest of all our flowering plants. Only *Wolffia sp.* (water-meal) is smaller. The tiny fronds of the Lesser Duckweed are individual, but usually two or three cohere, giving the appearance of being a multiple-leaf plant. Each frond has a single hanging rootlet.

These are the plants which often mat together and form a solid mantle of green on a ponded area. Ducks and some fish eat them.



FRAGRANT WATER LILY

Nymphaea odorata

This is the more common White Water Lily of New England, but, in many ponds, the Tuberous Water Lily (*Nymphaea tuberosa*) has been naturalized. Two very obvious features distinguish between the two: (1) The Fragrant Water Lily has a sweet, heavy scent, detectable even from a distance, while the Tuberous Water Lily is almost odorless; (2) The underside of the platter-like leaves of the Fragrant Water Lily are usually purplish red, while those of the Tuberous are green. Flowers forms are similar, and quite variable.

Value: Seeds, stems and roots are food for ducks and marsh birds; Plant is food for beaver, muskrat, deer and moose.



COASTAL WETLANDS

COASTAL WETLANDS OF REGION I

Just as the permanently saturated areas of an inland wetland may be identified by the vegetative cover, so too, may the tidal zones of a coastal marsh be determined by the changes in vegetation as one progresses from one zone to the next. For the purpose of administration of existing laws and regulations, the identification of the following three zones should be sufficient: (1) The inter-tidal zone; (2) the high marsh; and (3) the transition zone between high marsh and upland. A wetland *boundary* is often difficult to delineate in the transition zone, but one should be able to tell complete wetland from complete upland using this manual.

The following listing of plant species separated by zonal location are typical of New England coastal marshes.

1. The Inter-Tidal Zone. This is the lowest part of the marsh, subject to twice daily flooding by the ebb and flow of normal tides.

ALGAE (SEAWEED)

<i>Ascophyllum nodosum</i>	Knotted Wrack*
<i>Enteromorpha intestinalis</i>	Green Seaweed*
<i>Fucus vesiculosus</i>	Rockweed*
<i>Rhodomenia palmata</i>	Dulse*
<i>Ulva lactuca</i>	Sea Lettuce*

VASCULAR PLANTS

<i>Spartina alterniflora</i>	Salt Marsh Cordgrass
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2. The High Marsh. This is the area subject to flooding only by the higher spring tides. At some seasons there may be intervals of no tidal flooding.

GRASSES AND RUSHES

<i>Distichlis spicata</i>	Spike Grass
<i>Juncus gerardii</i>	Black Grass
<i>Spartina patens</i>	Salt Meadow Cordgrass

*Not shown

SHRUBS AND HERBS

<i>Atriplex sp.</i>	Orach*
<i>Aster tenuifolius</i>	Marsh Aster*
<i>Baccharis halimifolia</i>	Groundsel Tree*
<i>Iva frutescens</i>	Marsh Elder
<i>Limonium carolinianum</i>	Sea Lavender
<i>Plantago oliganthos</i>	Seaside Plantain*
<i>Pluchea purpurascens</i>	Salt Marsh Fleabane*
<i>Solidago sempevirens</i>	Seaside Goldenrod
<i>Suaeda spp.</i>	Sea Blite

2a. Pannes. These are depressions in the high marsh where evaporation of sea water has elevated the salt levels to 50-60 parts per thousand.

<i>Plantago juncooides</i>	Early Seaside Plantain*
<i>Salicornia bigelovii</i>	Dwarf Saltwort (Annual)
<i>Salicornia europaea</i>	Samphire (Annual)
<i>Salicornia virginica</i>	Perennial Glasswort

3. The Transition Zone. Flooding occurs only by extreme storm tides. Grades into the brackish area, influenced by freshwater mixing.

GRASS-LIKE SPECIES

<i>Agrostis alba var. palustris</i>	Redtop Grass*
<i>Ammophila breviligulata</i>	Beach Grass
<i>Eleocharis spp.</i>	Sedges*
<i>Elymus virginicus</i>	Seaside Wild Rye*
<i>Festuca rubra</i>	Red Fescue Grass*
<i>Panicum longifolium</i>	Panic Grass*
<i>Panicum virgatum</i>	Switch Grass*
<i>Phragmites australis</i>	Reed Grass
<i>Scirpus spp.</i>	Rushes*

SHRUBS AND HERBS

<i>Amelanchier laevis</i>	Shadbush*
<i>Chenopodium rubrum</i>	Coast Blite*
<i>Gerardia maritima</i>	Seaside Gerardia*
<i>Hibiscus palustris</i>	Mallow (Cape and Islands)*
<i>Lythrum salicaria</i>	Spiked Loosestrife
<i>Myrica pensylvanica</i>	Bayberry
<i>Oenothera biennis</i>	Evening Primrose*
<i>Polygonum glaucum</i>	Seabeach Knotweed*
<i>Rosa palustris</i>	Swamp Rose*
<i>Salsola kali</i>	Saltwort
<i>Spergularia marina</i>	Sand Spurry*
<i>Typha spp.</i>	Cattail*

*Not shown

SALT MARSH TRANSITION ZONES

A FEW SELECTED REPRESENTATIVE SPECIES
NOT ALL FLORA SHOWN ARE TO SCALE

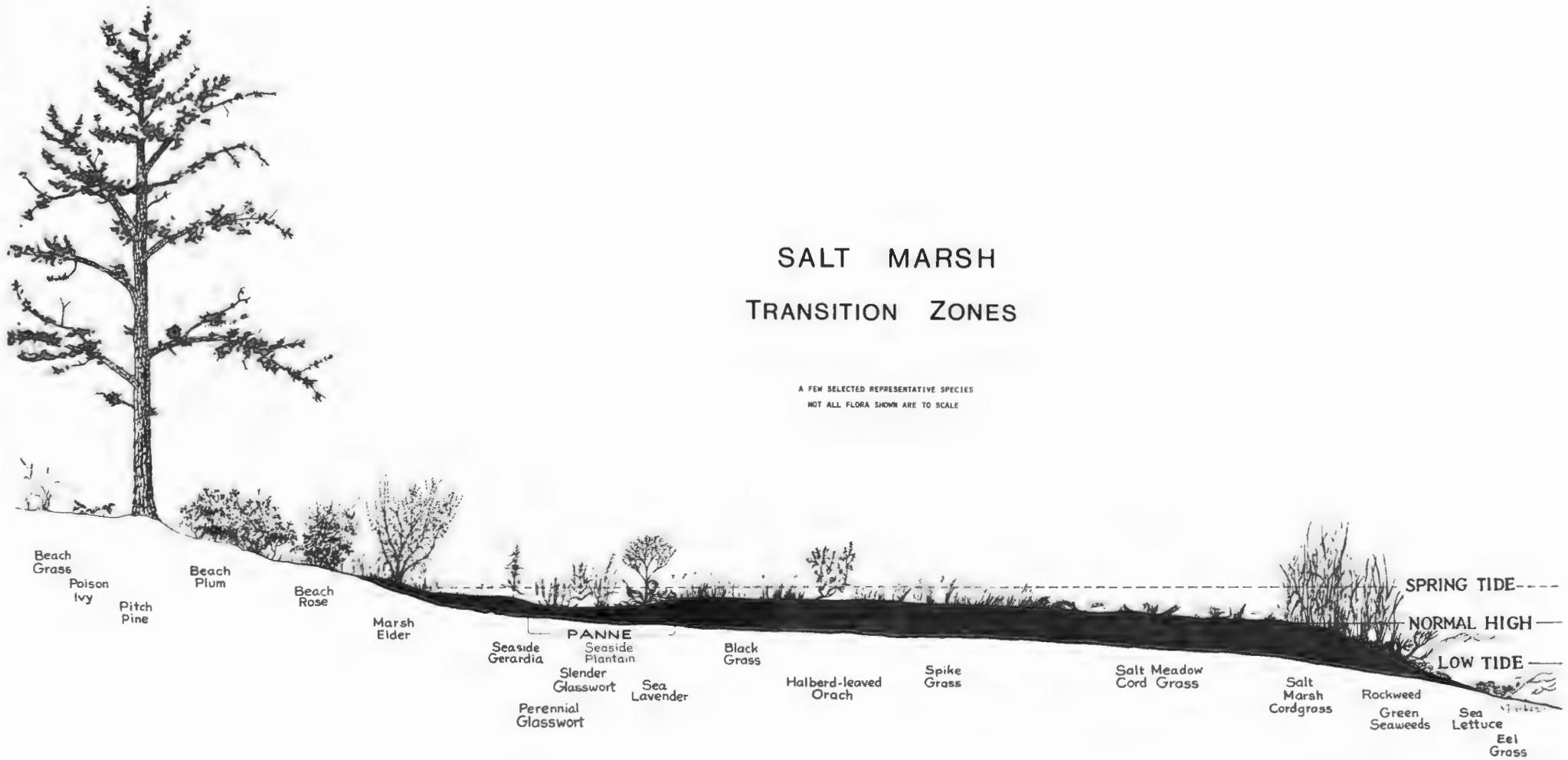


Figure 3

SALT MARSH

Tidal marshes, as they exist today, are the youngest of New England's wetlands. During the last Ice Age, part of the present continental shelf formed the coastal plain, but rising sea levels due to glacial melt have "drowned" former fresh marshes, bogs, and river valleys. The land/sea interface constantly changes, as submergence continues at a rate of about one foot per century, (apparently 2-3 times this rate has been recently recorded), but as rivers continue the seaward transport and deposition of inland sediments, the coastal area is just about holding its own along river supplied barrier beaches. Along glacially-deposited shores, erosion rates of up to 6 feet per year occur with no unusual storms to accelerate the process; 20 feet per year has been catalogued as storm loss in some localities. These marshes and the banks of their streams are alternately flooded and exposed on each tidal cycle. The area that is flooded is dependent upon its elevation above the mean water level and its slope from the water's edge to the bordering upland. The vegetative cover changes in species, abundance, and size, depending on environmental factors such as water salinity, duration of inundation, ground water influence, hydrogen sulfide concentration, and soil temperature.

COASTAL WETLAND PLANTS

CORDGRASS

There are four common species of *Spartina* found along the New England coast: *Spartina alterniflora*, *Spartina patens*, *Spartina cynosuroides*, and *Spartina pectinata*. The various species of *Spartina* can quite predictably be located in specific areas of salt marshes, depending on elevation and the amount of tidal irrigation (and thus the water level and salinity of the plant's environment. *Spartina alterniflora*, for example, predominates low marsh areas which are daily flooded or on mud banks adjoining tidal streams. This is the most common species of cordgrass found in New England. *Spartina patens* inhabits the middle elevation levels, which remain quite wet from tidal influx, but are frequently brackish. *Spartina patens* is also common in New England. Most marshes along the Cape, for example, are composed almost entirely of *S. alterniflora* and *S. patens*; the progression from one species to another often clearly visible in the dark green line of demarcation where the *S. patens* growth begins. *S. cynosuroides* (reaches north only to Cape Cod) can be found in high-water or spring and storm tide levels of some salt marshes. *S. pectinata* is usually found in fresh water marshes or occasionally at the outer edges of estuarine wetlands. Only *Spartina alterniflora* and *Spartina patens* are described herein.

SALT MARSH CORDGRASS

Spartina alterniflora

Tall (1 to 2 meters), or short (.5 meters) varieties of Salt Marsh Cordgrass. Stems arise from interconnected rhizomes (underground root stalks).

Leaves: Flat, smooth, tough stalks, tapering to a long, thin tip; 0.4 to 1.5 cm (1/8 to 1/2 inch) wide; grows up to 1.5 meters (5 feet) tall.

Flowers: Flower spikes 2 to 15 cm (3/4 to 5 3/4 inches) long, consisting of short, broad, white spikelets, growing in the same direction from one side of the stem. Present from July through September.

Location: Common throughout coastal areas of New England. Best growth occurs primarily in lower salt marsh areas, especially along tidal creeks where aeration of the root zone occurs.

To identify:

1. Smooth, flat, leathery blades of grass.
2. White flower cluster from July through September.

Value: Major source of food for entire estuarine food chain; entire plant (including detritus) utilized by birds, fish, shellfish and other tide-water invertebrates and mammal species inhabiting a salt marsh. Seeds and rootstock are significant food sources for waterfowl. Also, of primary value as first-line erosion control defense and absorption of stormwave energy.



SALT MEADOW CORDGRASS

Spartina patens

A finer species of salt marsh grass, sometimes referred to as Saltmeadow Hay. Grows in almost pure stands.

Leaves: Dark green, blade folded in a u-shape with the "u" facing upward; usually two to five leaves per stem; stems arise from matted vegetation from previous years growth.

Flowers: Purple flowers. Smaller spike than *Spartina alterniflora* [1 to 6 cm long (.4 to 2.4 inches)] with an overall more oval and compact appearance.

Location: Occurs on the high or in brackish saltmeadows above normal high tide. Common throughout the New England coastline regions.

To identify:

1. Dark green folded leaves;
2. Purple flower spikes through the summer;
3. Stands of this plant have windblown "cowlick" appearance.

Value: Can be harvested as hay to be used as food for domestic livestock. Erosion and storm damage control; entire plant is edible — seeds, stems, roots, and detritus provide food for shellfish and other tide-water invertebrates, ducks, geese, shore and marsh birds, deer and small mammals.



SALT GRASS, SPIKE GRASS, ALKALI GRASS

Distichlis spicata

Pale or whitish green grass with rigid stems, usually forming dense colonies in association with *Spartina patens* 8 to 60 cm (3 inches to 2 feet tall). Common invader of newer marsh areas claimed by the rising sea and of the higher bare tidal marsh pannes. But found in a variety of locations through the salt marsh where elevation is slightly greater than compared to surrounding areas.

Leaves: Smooth margins with bluntish tips, up to 15 cm (5.9 inches) long. Arranged in two vertical rows along the stem. The base of the leaves wrap around the stem and overlap each other.

Flowers: In pale green clusters, dense and spike-like, up to 8 cm (3.2 inches) long, blooming from August through October.

Location: Common throughout all coastal areas of New England.

To identify:

1. A distinguishing feature is that the previous years leaf blades remain curled around the stem.

Value: Provides nesting cover and food for waterfowl. The seeds, plants, and roots are eaten by ducks, geese, marsh and shore birds, small mammals and deer. Along with *Spartina patens*, it is an important source of food for detritus feeders (organisms which live on dead plants and other organic materials).



SEA LAVENDER, MARSH ROSEMARY, MARSH HEATHER

Limonium spp., Limonium carolinianum, Limonium nashii

Perennial plant 15 to 60 cm (6 to 24 inches) tall, growing from July to October commonly found in the tidal marsh.

Leaves: Only at the base of the plant (basal rosette), thick, smooth, spoon shaped or broad-lance shaped.

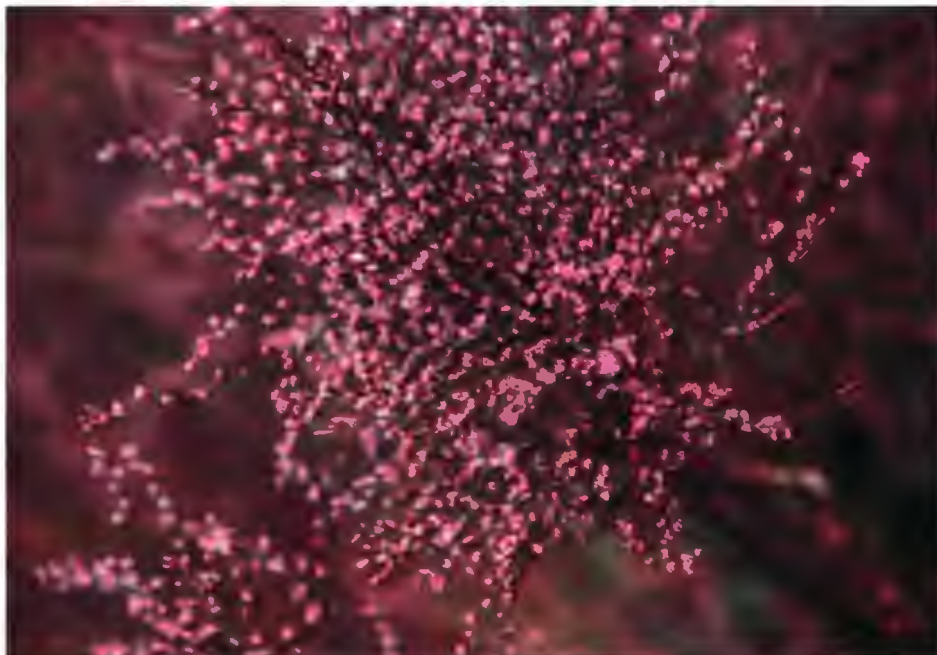
Stem: One or more leafless, many branched stems, bearing flowers, grow from a central point of this plant. Thick and woody at the base.

Flowers: Small 5-petaled, lavender flowers cover the branches of the flowering stalk from late summer to early fall. These two species are very difficult to tell apart, differing only in the detailed structure of the tiny flowers.

Location: Common throughout all coastal areas of New England.

To identify:

1. The stalk of this plant resembles an elaborate candelabra. When in flower, Sea Lavender is one of the most beautiful marsh plants.
2. Basal rosette.



BLACK GRASS

Juncus gerardi

Dark green rush 15 to 80 cm (6 to 31 inches), salt tolerant, it can grow throughout the marsh. A bank of black grass usually is present at the upper landward drier edge of the tidal marsh. Growth season June through September.

Leaves: Very narrow, soft and green. One leaf usually extends level to or above the flower seed head.

Stems: In small tufts, scarcely flattened, stiff.

Flowers: The stem ends in a cluster of brown flowers resembling miniature lilies with a dark brown seed (with vertical purple stripes if examined closely) protruding from the floral envelope in late summer. This produces a dark brown-black color in this marsh zone lasting through late Autumn.

Location: Common throughout all coastal areas of New England.

Value: Used as food by waterfowl and upland game birds; attracts marsh and song birds; roots may be eaten by muskrat and moose. At lower elevations, fiddler crabs burrow under its roots. *Juncus sp.* may be important nitrogen-fixing plants in the marsh.



GLASSWORT

Salicornia spp.

Salicornia europaea — Glasswort or Samphire

Salicornia bigelovii — Dwarf Saltwort

Salicornia virginica — Woody Glasswort

These are three species of the plant which are salt-tolerant, green fleshy (succulent) jointed but leafless plants. All three species grow close to the ground, usually no taller than 30 cm (12 inches), forming small patches, sometimes filling large salt depression areas entirely.

Two of the species are annuals: *S. europaea* and *S. bigelovii*. Both turn yellow or red in the autumn. The third species, *S. virginica*, is a perennial and turns brown or lead-colored in the fall.

Flowers: Greenish, inconspicuous flowers which are recessed in the joints from August through November in all three species.

To identify:

S. europaea: Grows approximately 5 to 30 cm (2 to 12 inches) high; joints are longer than they are thick 1.5 to 3 mm thick (.06 to .1 inches). Each branch of the plant has the shape of the classic western fork cactus.

S. bigelovii: Grows 3 to 30 cm (1 to 12 inches) high; joints are thicker than they are long 4 to 6 mm thick (.15 to .24 inches).

S. virginica: Plant has creeping main woody stem from which the jointed stalks grow up; also located along borders of salt marshes.

Value: In all three species, the stems are edible and serve as food for waterfowl, geese and ducks. *S. europaea* and *S. bigelovii* are attractive "wild edibles" for man and can be pickled.



SEA BLITE — Suaeda spp.
Low Sea Blite — *Suaeda maritima*
High Sea Blite — *Suaeda linearis*

Fleshy, salt-tolerant pale green plant growing in depressions of the salt marsh and along the high tide line of the seashore. Growth season July through October.

Leaves: Fleshy, linear, almost cylindrical with a flattened surface on top and rounded tip, up to 5 cm (2 inches) long. The stems may be tinged with red.

Flowers: One to four inconspicuous pale green flowers grow out of the junction of the leaves with the stems (*axils*).

Suaeda maritima may form dense low mats of profusely branching individuals, 5 to 40 cm (2 to 15 inches) high. Flowers are replaced by small red seeds, 2 mm broad. Leaves pale green and usually whitened.

Suaeda linearis may grow upright (erect) reaching .6 meters (two feet) or more. Flowers are replaced by small black seeds, 1.2 to 1.5 mm (.05 to .06 inches) broad. Leaves deep green and not whitened.

Location: Common throughout all coastal areas of New England.



SALTWORT, PRICKLY GLASSWORT, BARRILA-PLANT
Salsola kali

Fleshy, salt-tolerant, bushy, annual plant that is commonly found on sandy beaches, July to October. Its many stout rigid branches may reach up to 60 cm (2 feet) high.

Leaves: Grayish green, awl-shaped, stiff with a hair-like prickly at tip; .6 to 2.6 cm ($\frac{1}{4}$ to 1 inch) long.

Flowers: Whitish or yellowish flowers grow singly out of the leaf axils (junction of the leaves with the stems) blooming July through September.

Location: Common throughout all coastal areas of New England.

To identify: Very prickly.

Value: Seeds, foliage and stems may be eaten by small mammals and deer. Seeds may be eaten by birds.



MARSH ELDER

Iva frutescens

A perennial shrub which invades the edges of salt marshes and grows in clumps or thickets. Only the lower portion of the plant is woody. Height is up to 2 meters (6.5 feet).

Leaves: Lance shaped, sharply toothed and oblong.

Flowers: Occur from August through October and are pale greenish white, distinctive pistils and stamens in the same flower head. The flowers are on spikes arising from the leaf axils.

Location: Estuaries along the edges of salt marshes from the coast of Maine to Southern Connecticut. This species is used to help identify the transition zone from salt marsh to upland.

To identify: Grows up from one main woody stem then branches out.

Value: Transition zone plant, useful in identifying where saltmarsh ends and low lying lands subject only to occasional tidal or storm inundation occur.



BAYBERRY
Myrica pensylvanica

A shrub which can attain heights of approximately 2 meters (6.5 feet). Found at the edge of salt marshes or higher ground.

Leaves: Oblong shaped and slightly toothed at the margins near the tip. 2.5 to 5 cm (1 to 2 inches).

Flowers: Greenish, inconspicuous flowers with no petals or sepals. Bloom occurs during early spring.

Fruit: Clusters of small pearl-shaped, grayish-white wax-covered fruits which grow in clumps along the woody stalk like mini-berries. The berries appear in late summer and remain into early winter.

Location: The plant is located on the upland side of the saltmarsh. This plant species may be used to help identify the transition zone from salt marsh to upland vegetation. Grows only where freshwater occurs in the soil.

To identify: A shrub with characteristic bush shape; leaves shiny and fruit (berries) are usually present. Leaves or berries, when crushed, have characteristic bayberry smell.

Value: The berries are the source of the aromatic wax used in making bayberry candles and some industrial deodorants. The plant fixes nitrogen thus is deep green and through shedding of leaves enriches the soil.



SEASIDE GOLDENROD

Solidago sempervirens

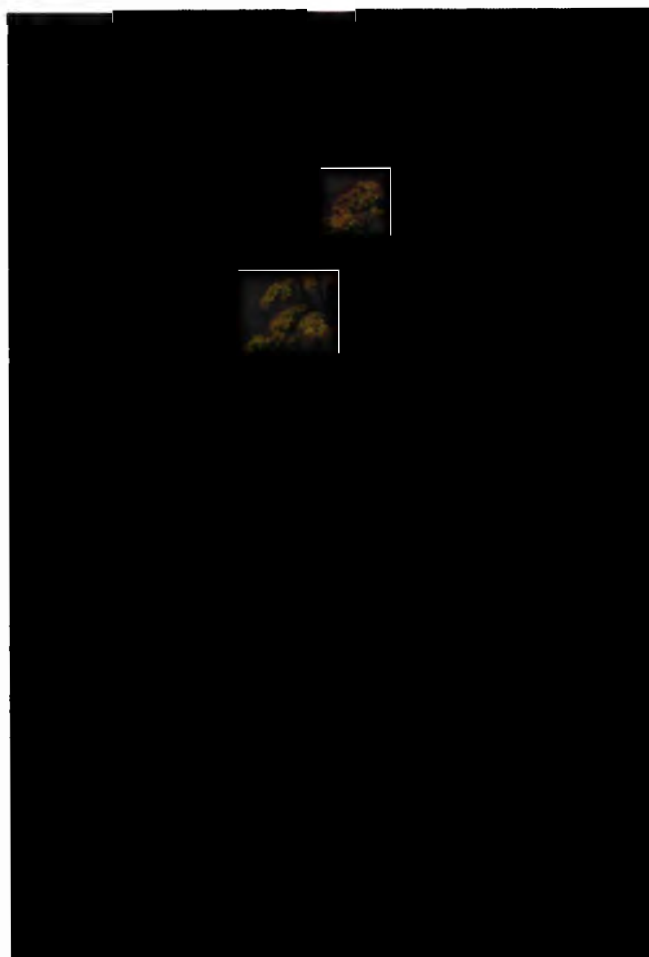
Conspicuous salt-tolerant plant found throughout vegetated dune areas, on sea cliffs, and in high portions of salt marshes. Its size ranges from 20 cm (.8 inches) on poor soils to 2 meters (6.5 feet) tall in fertile soils, usually 45 to 60 cm (18 to 24 inches) tall. Growth season July through November. Note that it flowers later than common goldenrod.

Leaves: Lance-shaped fleshy, smooth leaves cover its stout fleshy stem. The lower leaves partly clasp the stem.

Flowers: Brilliant golden yellow flowers in fall, mostly September, from arching elongate, branching flower clusters at the ends of the stems.

Location: Common throughout all coastal areas of New England.

Value: The seeds and foliage are occasionally eaten by some song birds and small animals.



BEACH GRASS
Ammophila breviligulata

Tall deep green grass associated with sand dunes and sand ridges located along and behind the beaches.

Leaves: Can be identified by the leaf alone; the top side of the leaf (blade) has ten or twelve parallel lines running from the base of the blade to its tip.

Flower: Thick, white flower spike 2 to 16 cm (.8 to 6.3 inches) long. Flowers bloom in late June into July. Usually the beach grass blooms slightly earlier than *Spartina alterniflora*.

Location: Coastal areas throughout New England.

To identify:

1. Grows in stands; associated with sand dunes or other sandy areas. The grass blades are rough and jagged. The plant can grow well above the tide level.
2. Rhizomes (underground rootstocks) grow in a linear fashion producing new clumps of growth.

Value: It is used for dune reclamation, formation, and to help reduce wind erosion of both dunes and portions of the beach. Food for Ipswich Sparrow and Snow Bunting. Valuable as a soil binder.



COMMON REED, REED GRASS

Phragmites australis (communis)

A very conspicuous grass, 1 to 4 meters (3 to 13 feet) tall, found in both fresh and brackish marshes. An invader of wet disturbed areas, these plants can grow in dense stands.

Leaves: • Green, 15 to 60 cm (6 to 24 inches) long, 1.3 to 5 cm (½ to 2 inches) wide.

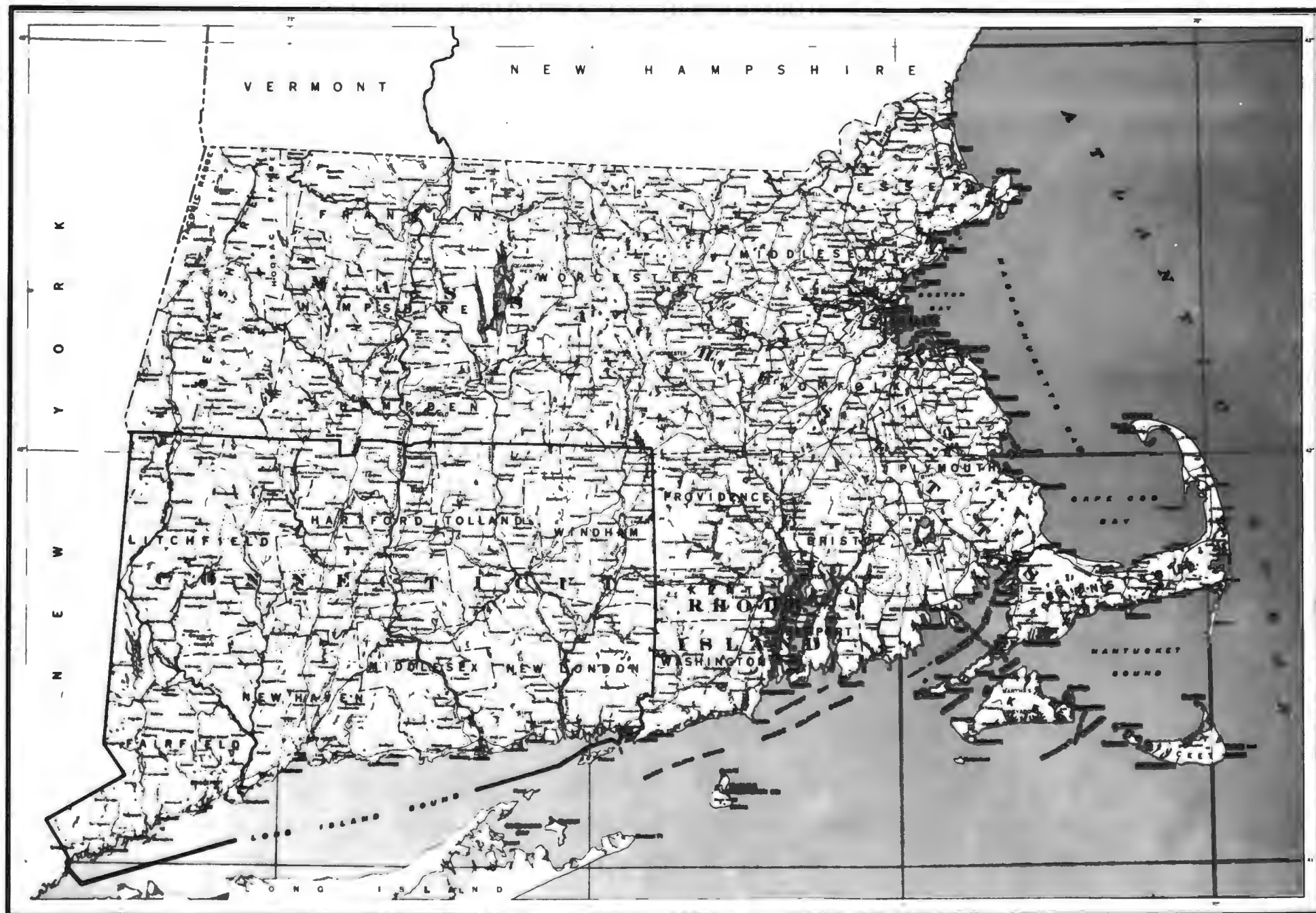
Flowers: In the fall, the stout erect stems end in a plume-like flowering head, which may exceed 30 cm (1 foot) in length, purplish in color. The whole plant turns a light brown in fall and persists through winter.

Location: Commonly found in fresh and brackish marshes, pond margins, ditches and disturbed wet areas throughout New England, especially where a salt/freshwater interface occurs.

Value: Serves as food for muskrats and supports insects, which in turn serve as food for fish. Little food value to wildfowl. Because of its thick, mat-like roots, it helps stabilize soil subject to erosion. *Phragmites sp.* has a great capacity to remove and store nutrients, it can also be used for dewatering dredged materials. Originally from Europe, this plant has become a nuisance by outcompeting more valuable plants, especially in Connecticut's coastal marshes.



SUMMARIES OF NEW ENGLAND WETLAND LAWS



CONNECTICUT WETLAND LAWS

A. Freshwater Wetlands

- I. *Definition* — Freshwater wetlands are areas such as banks, bogs, swamps, meadows and submerged land. Soil types designated as poorly drained, very poorly drained, alluvial and flood plain by the National Cooperative Soils Survey define inland (freshwater) wetlands for regulatory purposes.

II. *Permits*

1. Activities Covered — Permits are required for regulated activities in wetlands (C.G.S.A. Sections 22a-28 to 22a-45, as amended). Regulated Activities include:

- | | |
|---------------|----------------|
| — excavation | — construction |
| — deposition | — alteration |
| — obstruction | — pollution |

That is, any development or alteration of a wetland or watercourse requires a permit.

2. Criteria for Issuance — The local wetland agency or the Commissioner of the Connecticut Department of Environmental Protection must consider the effect of the proposed project according to the following values:

- a. environmental impact of the proposed action;
- b. alternatives to the proposed action;
- c. relationship between short term uses of the environment and the maintenance and enhancement of long-term productivity;
- d. irreversible and irretrievable commitments of resources which would be involved in the proposed project;
- e. the character and degree of injury to or interference with safety, health or the reasonable use of property which is caused or threatened; and
- f. the suitability or unsuitability of such a project to the area for which it is proposed.

3. Agency — The State has delegated regulatory authority to 143 towns. Usually a town has established an inland wetlands agency. In towns where such an agency has not been established, very often the Conservation Commission or the Planning Board performs this function. As of August 1980, the following municipalities had not received delegation:

Bantam (Borough only)	New London
Bridgeport	Portland
Bridgewater	Preston
Chaplin	Sterling
Columbia	Stratford
Milford	Voluntown
Monroe	Wallingford
New Haven	Waterbury
New Milford	Willington
	Windsor Locks

Towns that do not have their own wetlands agency are regulated by the State Inland Wetlands Unit. Information and applications for permits can be obtained from the:

Inland Wetlands Unit
Department of Environmental Protection
State Office Building
Hartford, CT 06115
(203) 566-7280

B. Coastal Wetlands

- I. *Definition* — Tidal wetlands are those areas which border on or lie beneath tidal waters such as banks, salt marshes, swamps, meadows, flats or other low lands subject to tidal action; including those areas now or formerly connected to tidal waters, and whose surface is at or below an elevation of one foot above local extreme high water; and upon which may grow or be capable of growing saltwater tolerant plants.

II. Permits

1. Activities Covered — A permit is required from the Connecticut Department of Environmental Protection, Wetlands Management Section, Coastal Program for projects in coastal wetlands that involve any of the following activities (C.G.S.A. Sections 22a- to 22a-45, as amended):

Erection of structures; placement of fill; encroachment; dredging; draining; excavation; removal of soil, mud, sand or gravel; driving of piles.

2. Criteria for Issuance — The Commissioner of the DEP must consider the effect of the proposed project on public health and welfare, marine fisheries, shell fisheries, wildlife, the protection of life and property from floods, hurricanes, and other natural disasters and the public policy set forth in the act.

3. Agency — The Coastal program of the Wetlands Management Section, Water Resources Unit of the Connecticut Department of Environmental Protection regulates activities in Coastal Wetlands. Information and applications for permits can be obtained from:

Connecticut Department of Environmental Protection
Water Resources Unit
Wetlands Management Section (Coastal Program)
State Office Building
Hartford, CT 06115
(203) 566-7160

C. Stream Channel Encroachment

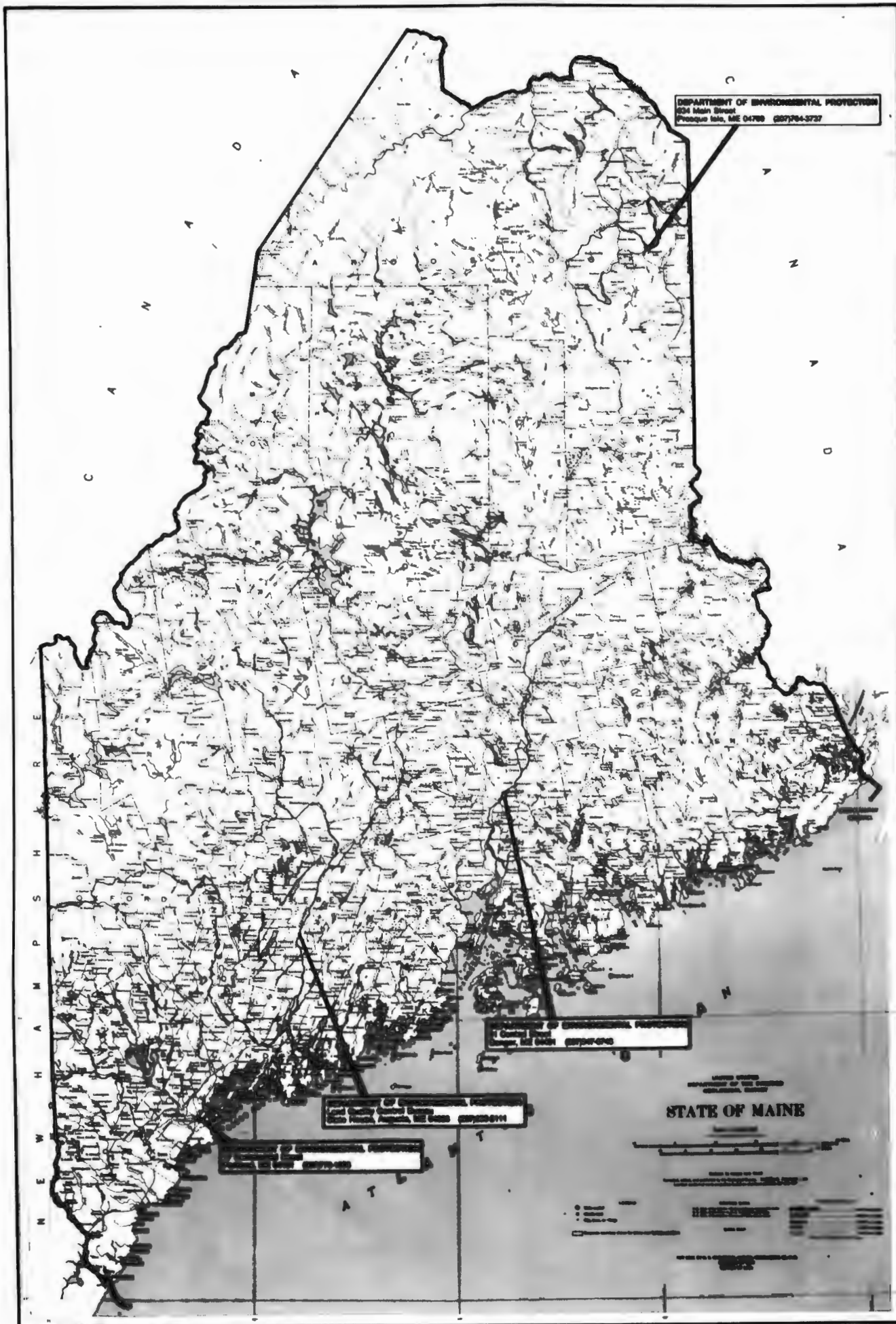
I. *Definition* — Channel encroachment lines are established by the Commissioner of the Connecticut Department of Environmental Protection along any tidal or inland waterway or flood-prone area beyond which, in the direction of the waterway or flood-prone area, no obstruction or encroachment may be placed unless authorized by the Commissioner.

II. *Permits* — Permits are required under C.G.S.A. Sections 25-4a to 25-4g, as amended, for construction channelward of stream channel encroachment lines.

III. *Criteria for Issuance* — The Commissioner shall issue or deny permits based upon his findings of the effect of the proposed project on flood carrying and water storage capacity of the waterway and flood plains, flood heights, hazards to life and property, and protection and preservation of the natural resources and ecosystems of the state including ground and surface water, animal, plant and aquatic life, nutrient exchange and energy flows and cumulative impacts of similar encroachments.

IV. Information on encroachment lines and permit application can be obtained from:

State of Connecticut
Department of Environmental Protection
Water Resources Unit
State Office Building
Hartford, CT 06115
(203) 566-7244



MAINE WETLAND LAWS

One of the services that the Maine Department of Environmental Protection offers is called Citizens Environmental Assistance Service ("CEAS"). The Department maintains a toll free phone number (800-452-1942) which can be reached from any exchange in Maine. The receptionist who will answer will not in all instances be able to answer a caller's question. The receptionist will take the caller's name, phone number, question and any other information that applies to the situation and will have someone who can answer the question call back. This service can be used to get answers to Stream Alteration and Land Use Regulation Commission questions as well as questions about the Department of Environmental Protection and other programs.

A. Freshwater Wetlands

I. Great Ponds

- a. *Definition* — A "great pond" is any inland body of water which in its natural state has a surface area in excess of 10 acres, and any body of water artificially formed or increased which has a surface area in excess of 30 acres, the shore of which is owned by two or more persons, firms or other legal entities. Marshes, bogs and swamps that are actually part of a great pond (the "normal high water line" of the pond can be followed around the adjacent marsh, bog or swamp and back into the pond) are included in this definition and are regulated.
- b. *Activities Covered* — Construction or major repair of any permanent structure below the normal high water mark or permanent filling or alteration of land adjacent to a great pond in a way that material may be washed into the pond and its adjacent wetlands requires a permit under the Great Ponds Alteration Act, 38 M.R.S.A. Section 386 *et seq.*
- c. *Criteria for Issuance* — The Department of Environmental Protection must consider the impact of proposed projects on existing recreational use, navigation, scenic and aesthetic value, natural environs of the great pond, soil erosion, natural flow of water, fish and wildlife habitat, and water quality.
- d. *Agency* — The Department of Environmental Protection is responsible for administering the Great Ponds Act. Information and applications for permits can be obtained from:

Maine Department of Environmental Protection
Land Quality Control Bureau
State House, Augusta, ME 04333
(207) 289-2111

Regional Offices:

17 Commercial Street
Portland, ME 04101
(207) 773-0196

31 Central Street
Bangor, ME 04401
(207) 947-6746

634 Main Street
Presque Isle, ME 04769
(207) 764-3737

II. Rivers, Streams and Brooks

- a. *Definition* — Rivers, streams and brooks are defined as channels between defined banks created by the action on surface water. Intermittent watercourses are included in this definition. Channels that are completely man-made are not included in the definition except where alteration of these channels may cause fill or a structure to fall or be washed into natural channels.
- b. *Activities Covered* — Dredging, filling or activities causing filling, or erection of any permanent structure in, on, over or abutting any river, stream or brook requires a permit under the Stream Alteration Act (Alteration of Rivers, Streams, and Brooks, 12 M.R.S.A. Sections 7776 *et seq*). Permits are not required for public works projects that alter not more than a total of 300 feet in any mile or shore nor for private crossing or dam projects that alter not more than 100 feet in any mile of shore.
- c. *Criteria for Issuance* — The Department of Inland Fisheries and Wildlife must consider the effect of the proposed project on recreation, navigation, soil erosion, natural flow of any waters, fish and wildlife habitat, and water quality when deciding whether or not to issue a permit.
- d. *Agency* — Information and applications for permits can be obtained from the:

Department of Inland Fisheries and Wildlife
284 State Street
Augusta, ME 04333
C/O Planning Division
(207) 289-3286

III. Inland Wetlands as zoned by the Land Use Regulation Commission (LURC) in the unorganized territories of the State.

- a. *Definition* — The Wetlands Protection Subdistrict for Inland Wetlands includes areas enclosed by the normal high water mark of flowing waters, stream channels, standing waters, and areas encompassing 10 acres or more in size identified by LURC as inland wetlands. Inland wetlands include areas identified on the basis of soils or vegetation.
- b. *Activities Covered* — Agricultural management activities, land management roads, level B road projects, permanent docking and mooring projects, water impoundments and structures require a permit from LURC in accordance with 12 M.R.S.A. Section 685-B. Low intensity uses within the subdistrict, such as fishing, hiking, boating, wildlife study, and forest management practice, are allowed without a permit.
- c. *Criteria for Issuance* — LURC will not approve an application for a permit unless the proposed project will comply with the state's air and water pollution control and other environmental laws. LURC will also consider the proposed project's impact on land, air, and water traffic; scenic, natural, and historic resources; soil erosion; and water retention capability to ensure that the public's health, safety, and general welfare will be adequately protected. 12 M.R.S.A. Section 685-B.
- d. *Agency* — Information and applications for permits can be obtained from:

Land Use Regulation Commission
Maine Department of Conservation
State House
Augusta, ME 04333
(207) 289-2631

It should be noted that in some cases the Department of Environmental Protection and the Land Use Regulatory Commission may both have jurisdiction over the same area. (i.e., a great pond in an unorganized territory). In this case, if an applicant applies to and receives a permit from LURC, a concurrent DEP permit will be issued. Also, it should be noted that certain freshwater wetlands in the organized part of the state are not covered by the state programs. Such would be the case of an isolated wetland that is not associated with a stream, river, brook or great pond.

B. Coastal Wetlands

I. Organized Territories

- a. *Definition* — Coastal wetlands are all tidal and subtidal lands including all areas below any identifiable debris line left by tidal action, all areas

with vegetation present that is tolerant of salt water and occurs primarily in a salt water habitat; and any swamp, marsh, bog, beach, flat or other contiguous lowland which is subject to tidal action or normal storm flowage at any time excepting periods of maximum storm activity. Coastal wetlands may include portions of coastal sand dunes.

- b. *Activities Covered* — Construction of any permanent structure in, on, or over a coastal wetland, or filling, dredging or draining a coastal wetland requires a permit from the Maine Board of Environmental Protection under 38 M.R.S.A. Section 471, *et seq.*, or from the local municipality if the Board has granted permitting authority to the municipality. As of August 1980, Boothbay Harbor, Harrington and Southport, Maine are the only municipalities with permit granting authority.

In 1979, the legislature of the State of Maine passed an amendment to the Coastal Wetlands Act to incorporate regulation of sand dune alteration. Dunes are defined as sand areas deposited by wind or wave action within a marine beach system. The regulatory jurisdiction begins at high tide and covers the entire dune system including beach dunes.

- c. *Criteria for Issuance* — In considering an application for a permit, the Maine Board of Environmental Protection (or an authorized municipality) must consider the impact of the proposed project on existing recreational and navigational uses; soil erosion; flow and circulation of waters; fish and wildlife; and water quality. The applicant for a permit must demonstrate that the project proposed will not unreasonably interfere with or degrade these values.
- d. *Agency* — Information and applications for permits can be obtained from:

Department of Environmental Protection
Bureau of Land Quality Control
State House
Augusta, ME 04333
(207) 289-2111

II. Unorganized Territories

- a. *Definition* — Coastal wetlands include areas with vegetation present that is tolerant of salt water and occurs primarily in a salt water habitat and any swamp, marsh, bog, beach, flat or other contiguous lowland which is subject to tidal action or normal storm flowage at any time excepting periods of maximum storm activity.

- b. *Activities Covered* — Agricultural management activities, land management roads, level B road projects, permanent docking and mooring projects, water impoundments and structures require a permit from LURC in accordance with 12 M.R.S.A. Section 685-B. Low intensity uses within the subdistrict, such as fishing, hiking, boating, wildlife study, and forest management practice, are allowed without a permit.
- c. *Criteria for Issuance* — LURC will not approve an application for a permit unless the proposed project will comply with the state's air and water pollution control and other environmental laws. LURC will also consider the proposed project's impact on land, air, and water traffic; scenic, natural, and historic resources; soil erosion; and water retention capability to ensure that the public's health, safety, and general welfare will be adequately protected. 12 M.R.S.A. Section 685-B.
- d. *Agency* — Information and applications for permits for activities in coastal areas in the unorganized territory of Maine can be obtained from:

Land Use Regulatory Commission (LURC)
Maine Department of Conservation
State House
Augusta, ME 04333
(207) 289-2631

In some instances, the Department of Environmental Protection and the Land Use Regulatory Commission may both have jurisdiction over the same area. On such a case, if the application applies to and receives a permit from LURC, a concurrent DEP permit will be issued.



MASSACHUSETTS WETLAND LAWS

A. Freshwater Wetlands

I. *Definition*

Freshwater Wetlands are defined as wet meadows, marshes, swamps, bogs; and areas where groundwater, flowing or standing surface water or ice provides a significant part of the supporting substrate for a wetland plant community for at least five months of the year. Freshwater wetlands are also defined as emergent and submergent plant communities in inland waters and that portion of any bank which touches any inland waters.

II. *Permits*

1. Activities Covered — Locally issued permits are required for any activity that involves filling, dredging, removing or altering any bank, marsh, meadow, swamp, bog, creek, river, stream, pond or lake. Permits are also required for any of these activities on land subject to flooding. (M.G.L. Chapter 131, Section 40; C.M.R. 310:10.00 - Part I).

2. Criteria for Issuance — In considering an application (Notice of Intent) for a permit (Order of Conditions), the issuing authority must evaluate the impact of the proposed project on public and private water supply, ground water supply, flood control, storm damage prevention, prevention of pollution, protection of land containing shellfish, and protection of fisheries.

3. Administering Agencies — The Wetlands Protection Act is administered first at the local level by Conservation Commissions.* Any proponent of a project that will affect wetlands in Massachusetts must receive permission from the conservation commission of the town in which the project is located. The applicant must file an application, known as a Notice of Intent, with the Conservation Commission and DEQE. If the Conservation Commission does not meet any required permit processing period or if the applicant, abutter, ten citizens of the town or any aggrieved person appeals the permit (known as an Order of Conditions), DEQE will review the case and issue a superseding Order of Conditions. Any person may request a Conservation Commission to issue a written determination of whether any land is subject to the jurisdiction of the wetland act. This is usually a determination of whether the area in question supports a prevalence of wetland vegetation. An

*A few communities in Massachusetts do not have Conservation Commissions and the mayor or selectman may act. If no local authority administers the program, the Act is administered completely by the Department of Environmental Quality Engineering (DEQE).

applicant can request that the agency that issued the Order of Conditions inspect the work after it is completed and issue a certificate of compliance if the work was completed according to the Order of Conditions. Orders of Conditions are valid for one year from the date of issuance, but may be extended for additional one year periods by the issuing agency.

For information and applications, interested persons should contact the local Conservation Commission or the DEQE regional office.

Massachusetts Environmental Policy Act (MEPA) — A filing under MEPA is required for projects which will alter more than one acre of wetlands. For information on this requirement, contact:

Department of Environmental Quality Engineering
Division of Wetland Protection
100 Cambridge Street, 20th Floor
Boston, MA 02202
(617) 727-9706

B. Coastal Wetlands

I. Definition

Coastal Wetlands are defined as any bank, marsh, swamp, meadow, flat or other lowland (including beaches and dunes) subject to tidal action or coastal storm flowage.

II. Permits

1. Activities Covered — Locally issued permits are required for any activity that involves filling, dredging, removing or otherwise altering any coastal wetland, coastal dune, tidal flat, coastal bank, land subject to coastal storm flowage or tidal action, or land under an estuary, a salt pond, or the ocean or under certain streams, ponds, rivers, lakes, or creeks within the coastal zone that are anadromous/catadromous fish runs. (M.G.L. Chapter 131, Section 40; C.M.R. 310:10.00 — Part II).

2. Criteria for Issuance — In considering an application for a permit (Order of Conditions), the local Conservation Commission must evaluate the impact of the proposed project on public and private water supply, groundwater supply, flood control, storm damage prevention, prevention of pollution, protection of land containing shellfish, and protection of fisheries. DEQE's coastal wetlands regulations are in the form of performance standards, which are intended to identify the level of protection the conservation commission must impose in order to protect the interests of the Act.

ERRATUM

To holders of EPA publication New England Wetlands: Plant Identification and Protective Laws.

There is an error on pages 9.02 and 9.03 where it reads that a filing under the Massachusetts Environmental Policy Act (MEPA) is required for projects that will alter more than one acre of wetlands.

In actuality, a filing under MEPA is required only for projects which alter more than one acre and for which the local Order of Conditions has been appealed. Where there is no appeal to the State agency (DEQE), no filing under MEPA is required.

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3. Administering Agencies — Any proponent of a project that will affect wetlands in Massachusetts must receive permission from the Conservation Commission of the town in which the project is located or from the State Department of Environmental Quality Engineering (DEQE). (In a few towns that have no Conservation Commission, the mayor and selectmen act). The applicant must file an application, known as a Notice of Intent, with the Conservation Commission and DEQE. If the Conservation Commission does not meet any required permit processing period or if the applicant, abutter, ten citizens of the town or any aggrieved person appeals the permit (known as an Order of Conditions), DEQE will review the case and issue a superseding Order of Conditions. Any person may request a Conservation Commission to issue a written determination of whether any land is subject to the jurisdiction of the wetland act. An applicant can request that the agency that issued the Order of Conditions inspect the work after it is completed and issue a certificate of compliance if the work was completed according to the Order of Conditions. Orders of Conditions are valid for one year from the date of issuance, but may be extended for additional one year periods by the issuing agency.

For information and applications, interested persons should contact the local Conservation Commission or the DEQE regional office (see map at end of this section).

Massachusetts Environmental Policy Act (MEPA) — A filing under MEPA is required for projects which will alter more than one acre of wetlands. For information on this requirement, contact:

Department of Environmental Quality Engineering
Division of Wetland Protection
100 Cambridge Street, 20th Floor
Boston, MA 02202
(617) 727-9706

C. Ocean and Coastal Sanctuaries

I. Definition

In Massachusetts, five areas have been designated to be ocean sanctuaries: the Cape Cod Ocean Sanctuary, the Cape Cod Bay Ocean Sanctuary, the Cape and Island Ocean Sanctuary, the North Shore Ocean Sanctuary, and the South Essex Ocean Sanctuary. The boundaries of these sanctuaries are described at M.G.L. c.132A, s.13 and generally extend three miles seaward from a point on the mean low water line.

II. Permits

The Ocean Sanctuaries Act and its regulations do not require any permits other than those already required by law. However, state and local per-

mitting agencies are required to make their policies, permits, licenses, or any other action conform to the Act. M.G.L. c.132A, s.18.

1. Activities Covered – The Department of Environmental Management (DEM) has the responsibility to protect the ocean sanctuaries from any exploitation, development, or activity that would seriously alter or otherwise endanger the ecology or the appearance of the ocean, the seabed, or the subsoil thereof, or the Cape Cod National Seashore. Such responsibility includes the protection of marine productivity, storm buffers, habitat values, water quality, flood control, navigation, recreation, and public health.

Certain activities in ocean sanctuaries are prohibited altogether, including the removal of any minerals, such as sand or gravel; the dumping or discharge of any industrial or commercial wastes; the incineration of solid waste material or refuse on or in any vessel or boat; and the building of any structure on the seabed or under the subsoil. M.G.L. c.132A, s.15.

2. Agency – Information may be obtained from the Department of Environmental Management, 19th Floor, 100 Cambridge Street, Boston, MA 02202. Telephone (617) 727-8893.

D. Wetland Restriction Program (From: Environmental Handbook for Massachusetts Conservation Commissions, 1978 edition, by Massachusetts Association of Conservation Commissions; Lincoln-Filene Center, Tufts University, Medford, MA) by Alexandra D. Dawson and N.H. Nickerson.

THE INLAND WETLANDS RESTRICTION ACT (M.G.L. C.131, s.40A)

This legislation was designed to supplement the regulative approach of the Wetlands Protection Act with a planning approach not dependent upon the landowner coming forward to apply for a permit. The Commissioner, Department of Environmental Management, in order to preserve and promote public safety, private property, wildlife, fisheries, water resources, flood plain areas and agriculture, is directed to issue orders restricting or prohibiting development of inland wetlands, defined as "freshwater wetlands" and "that portion of any bank which touches any inland waters, or any freshwater wetland." The Commissioner is also directed to protect flood plains in areas subject to orders under this statute, by forbidding obstruction or encroachment along waterways or flood prone areas. No order can be issued until there has been a public hearing, notice of which is sent to the conservation commission as well as every affected landowner. Although orders are issued by the Department, the selectmen or city council must first review them. If the city or town officials disapprove an order, they must state reasons for disapproval within 30 days. The Commissioner may override local disapproval after a period of six months has elapsed. The final order is recorded in the Registry of Deeds. It thereafter runs with the land and is binding upon all present and future landowners.

The statute requires the landowner to petition the Superior Court within 90 days to release the land. If the court agrees that the restriction upon use is unconstitutionally severe, it will invalidate the order for the parcel in question. Thereafter, the Department has the right to purchase or take the land or the development rights, with the approval of the Governor and the Council. There is a limited exemption for agricultural land. The order does not apply to work done by various state agencies.

The Department has concentrated on the Charles River Watershed and Cape Cod. The law, like the Coastal Wetlands Restrictions Act, has two advantages over zoning or the Wetlands Protection Act: notice to prospective buyers, through recorded maps, and finality, because of the 90-day limitation period for landowner lawsuits.

THE COASTAL WETLANDS RESTRICTION ACT (M.G.L. c.130, s.105)

The statute is essentially similar to the Inland Wetlands Restriction Act as amended in 1972. In order to promote public health, safety and welfare and protect public and private property, wildlife and marine fisheries, the commissioner issues an order to restrict or prohibit dredging, filling, removing or otherwise altering or polluting coastal wetlands. These include "any bank, marsh, swamp, meadow, flat or other low land subject to tidal action or coastal storm flowage and such contiguous land as the Commissioner of Environmental Management reasonably deems necessary to affect by any such order." The goal of the Department is the protection of all barrier beaches, salt marshes, contiguous freshwater marshes and tidal flats. This law is an important part of the state's Coastal Zone Management program.

It should be noted that these two restriction laws allow for protection of wildlife, while the wetlands protection act does not.

For information on the wetlands restriction program for any particular area of the state, call or write:

Wetlands Restriction Program
Room 1904
Department of Environmental Management
100 Cambridge Street
Boston, MA 02202
(617) 727-8893



NEW HAMPSHIRE WETLAND LAWS

A. Freshwater Wetlands

- I. *Definition* — In New Hampshire, freshwater wetlands are defined as areas wherever water stands or flows. These areas include streams, swamps, marshes or bogs, which are determined by the presence of wetland vegetation. Also, areas such as banks that are contiguous to the wet area and from which fill would be likely to fall into the wet area if deposited, are included under the jurisdiction of N.H.R.S.A., Chapter 483-A.

II. *Permits*

a. *Chapter 483-A*

1. **Activities Covered** — Activities such as filling, dredging, excavation, mining, construction, and culverting in waters of the State require a permit.

2. **Criteria for Issuance** — The state Wetlands Board is required to consider the impact of the project on the following values before issuing a permit: water quality (effects of siltation and turbidity), fish and wildlife habitat, groundwater recharge, flood storage, pollution absorption, recreation, aesthetics, and the interest of the general public. The Board is not permitted to consider economic benefits claimed for the project.

Conservation commissions may raise issues that they think are important to consideration of a project in a written report to the Wetlands Board. The Wetlands Board must specifically consider the issues raised and must make written findings with respect to each issue raised that is contrary to the decision of the Board.

A municipality also has the right to designate its most valuable wetlands as "prime wetlands." Permits for projects in areas so designated cannot be granted by the Wetlands Board without special notification, documentation, and hearings.

3. **Agency** — Information and applications for permits may be obtained from the:

New Hampshire Wetlands Board
37 Pleasant Street
Concord, NH 03301
(603) 271-2147

b. *Chapter 149:8-A*

1. Activities Covered — Activities such as filling, dredging, culverting and skidding logs in great ponds, streams, and swamps, and any activity that causes significant alteration of the terrain and impedes natural run-off and creates an unnatural run-off are prohibited without a permit.

2. Criteria for Issuance — Jurisdiction will be asserted under this chapter if the activity causes or threatens to cause a violation of water quality standards for the State.

3. Agency — The New Hampshire Water Supply and Pollution Control Commission is charged with administering this chapter. They review major projects or any that might prove to be controversial. Information on applications for permits can be obtained by the:

New Hampshire Water Supply and Pollution Control Commission
Hazen Drive
P.O. Box 95
Concord, NH 03301
(603) 271-3503

B. Great Ponds

I. *Definition* — Great ponds are natural water bodies greater than 10 acres in size, are publicly owned, and are overseen by the State of New Hampshire.

II. *Permits*

a. *Chapter 483-A*

1. Activities Covered — Activities such as filling, dredging, excavation, mining, construction, and culverting in waters of the State require a permit.

2. Criteria for Issuance — The State Wetlands Board is required to consider the impact of the project on the following values before issuing a permit: water quality (effects of siltation and turbidity), fish and wildlife habitat, groundwater recharge, flood storage, pollution absorption, recreation, aesthetics, and interest of the general public. The Board is not permitted to consider economic benefits claimed for the project.

Conservation commissions may raise issues that they think are important to consideration of a project in a written report to the Wetlands Board. The Wetlands Board must specifically consider the issues raised and must make written findings with respect to each issue raised that is contrary to the decision of the Board.

A municipality also has the right to designate its most valuable wetlands as "prime wetlands." Permits for projects in areas so designated cannot be granted by the Wetlands Board without special notification, documentation and hearings.

3. Agency — Information and applications for permits may be obtained from the:

New Hampshire Wetlands Board
37 Pleasant Street
Concord, NH 03301
(603) 271-2147

b. *Chapter 149:8-A*

1. Activities Covered — Activities such as filling, dredging, culverting and skidding logs in great ponds, streams and swamps, and any activity that causes significant alteration of the terrain and impedes natural run-off and creates an unnatural run-off are prohibited without a permit.

2. Criteria for Issuance — Jurisdiction will be asserted under this chapter if the activity causes or threatens to cause a violation of water quality standards for the State.

3. Agency — The New Hampshire Water Supply and Pollution Control Commission is charged with administering this chapter, they review major projects or any that might prove to be controversial. Information on applications for permits can be obtained by the:

New Hampshire Water Supply and Pollution Control Commission
Hazen Drive
P.O. Box 95
Concord, NH 03301
(603) 271-3503

c. *Chapter 482:41 e through h*

1. Activities Covered — Any filling or dock building or erection of any structure in the beds of great ponds or on lands purchased by the State for flowage behind State owned dams.

2. Criteria for Issuance — Consideration of permits under this chapter is bound by a public interest standard. This means that the project may be criticized on grounds other than narrow environmental standards that apply in the case of other laws. A project may be criticized because it will be too noisy, will be ugly, will disrupt the local economy or social order and for any other reason that bears on the public interest.

3. Agency — Applicants must apply to the Wetlands Board, which must make an affirmative finding before the matter can be considered by the Governor and Council. Further information on this chapter may be obtained from the:

New Hampshire Wetlands Board
37 Pleasant Street
Concord, NH 03301
(603) 271-2147

d. *Chapter 488-A*

1. Activities Covered — Any dredging in great ponds or on lands purchased by the State for flowage behind state owned dams is subject to a permit under this chapter.

2. Criteria for Issuance — Under this chapter a public interest standard is applied rather than the narrow environmental standards that apply in the case of other laws. A project may be criticized because it will be too noisy, will be ugly, will disrupt the local economy or social order or for any other reason that bears on the public interest.

3. Agency — Applicants must apply to the Wetlands Board, which must make an affirmative finding before the matter can be considered by the Governor and Council. Further information on this chapter may be obtained from the:

New Hampshire Wetlands Board
37 Pleasant Street
Concord, NH 03301
(603) 271-2147

C. Coastal Wetlands

I. *Definition* — Coastal wetlands are considered to be all areas below the local mean high tide line and those areas above mean high tide up to an elevation of 3.5 feet above mean high tide on which certain listed salt tolerant plants grow or are capable of growing.

II. *Permits*

a. *Chapter 483-A*

1. Activities Covered — Activities such as filling, dredging, excavation, mining, construction, and culverting in waters of the State require a permit.

2. Criteria for Issuance — The State Wetlands Board is required to consider the impact of the project on the following values before issuing a permit: Water quality (effects of siltation and turbidity), fish and wild-life habitat, groundwater recharge, flood storage, pollution absorption, recreation, aesthetics, and interest of the general public. The Board is not permitted to consider economic benefits claimed for the project.

Conservation commissions may raise issues that they think are important to consideration of a project in a written report to the Wetlands Board. The Wetlands Board must specifically consider the issues raised and must make written findings with respect to each issue raised that is contrary to the decision of the Board.

A municipality also has the right to designate its most valuable wetlands as "prime wetlands." Permits for projects in areas so designated cannot be granted by the Wetlands Board without special notification, documentation, and hearings.

3. Agency — Information and applications for permits may be obtained from the:

New Hampshire Wetlands Board
37 Pleasant Street
Concord, NH 03301
(603) 271-2147

b. *Chapter 149:8-A*

1. Activities Covered — Activities such as filling, dredging, culverting, and skidding logs in great ponds, streams, swamps and any activity that causes significant alteration of the terrain and impedes natural run-off and creates an unnatural run-off are prohibited without a permit.

2. Criteria for Issuance — Jurisdiction will be asserted under this chapter if the activity causes or threatens to cause a violation of water quality standards for the State.

3. Agency — The New Hampshire Water Supply and Pollution Control Commission is charged with administering this chapter. They review major projects or any that might prove to be controversial. Information on applications for permits may be obtained by the:

New Hampshire Water Supply and Pollution Control Commission
Hazen Drive
P.O. Box 95
Concord, NH 03301
(603) 271-3503

c. *Chapter 4:40 a and b*

This chapter requires a deed from the Governor and Council before any sand and gravel can be excavated from any navigable water or great pond. It applies to activities undertaken below the mean high tide line, which in New Hampshire is a limit of public ownership. Any such activity under this chapter must be proven to be in the interest of land-owners in the vicinity, to the Governor and Council. Further information may be obtained from the:

New Hampshire Water Supply and Pollution Control Commission
Hazen Drive
P.O. Box 95
Concord, NH 03301
(603) 271-3503

11.00



RHODE ISLAND WETLAND LAWS

A. Freshwater Wetlands

I. *Definition*

In Rhode Island, freshwater wetlands are defined as areas including bogs, marshes, swamps, ponds and any land within fifty feet of the edge of any bog, marsh, swamp or pond; rivers; river and stream flood plains and banks; and areas subject to flooding or storm flowage. Marshes, bogs, and swamps are determined by the presence of a predominance of wetland vegetation (R.I.G.L. Section 2-1-18).

II. *Permits*

1. Activities Covered — Activities such as filling, draining, excavating, running a ditch or drain into, or otherwise altering the flow of water into or from, a wetland require a permit.

2. Criteria for Issuance — The Director of the Department of Environmental Management is authorized to consider the following values when evaluating a permit for any project that will alter the biological or hydrological character of a freshwater wetland: water quality, flood retention capacity, groundwater recharge capacity, wildlife and fisheries habitat, recreation, and the general public interest. The Director has the authority to deny a permit if in his opinion approval would not be in the best public interest.

3. Agency — Applications for permits and additional information concerning freshwater wetlands protection can be obtained from the Department of Environmental Management, Division of Planning and Development, 83 Park Street, Providence, RI 02903, Telephone No.: (401) 277-2476.

B. Coastal Wetlands

I. *Definition*

Coastal wetlands are determined by the presence of a predominance of plants adapted to living in soils saturated by salt water (R.I.G.L. Section 2-1-14).

II. *Permits*

1. Activities Covered — Any development or alteration of coastal wetlands, including but not limited to dredging; filling; excavating; depositing mud, dirt, fill, refuse or effluent; and marine construction requires a permit.

2. Criteria for Issuance — The Coastal Resources Management Council is required to consider the impact of the project on the following values before issuing a permit: water quality, erosion control, marine life and wildlife habitat, flood water retention capacity, recreational and aesthetic assets, and the general public interest.

The Council may permit disturbances to the biologic and/or hydrologic processes within or affecting a coastal wetland only where it is demonstrated by clear and convincing evidence that a bona fide benefit to the public welfare will result and that no reasonable alternative exists.

3. Agency — Applications for permits and all other necessary information may be obtained from the Coastal Resources Management Council, Room 508, Veterans Memorial Building, 83 Park Street, Providence, RI 02903, Telephone (401) 277-2476.



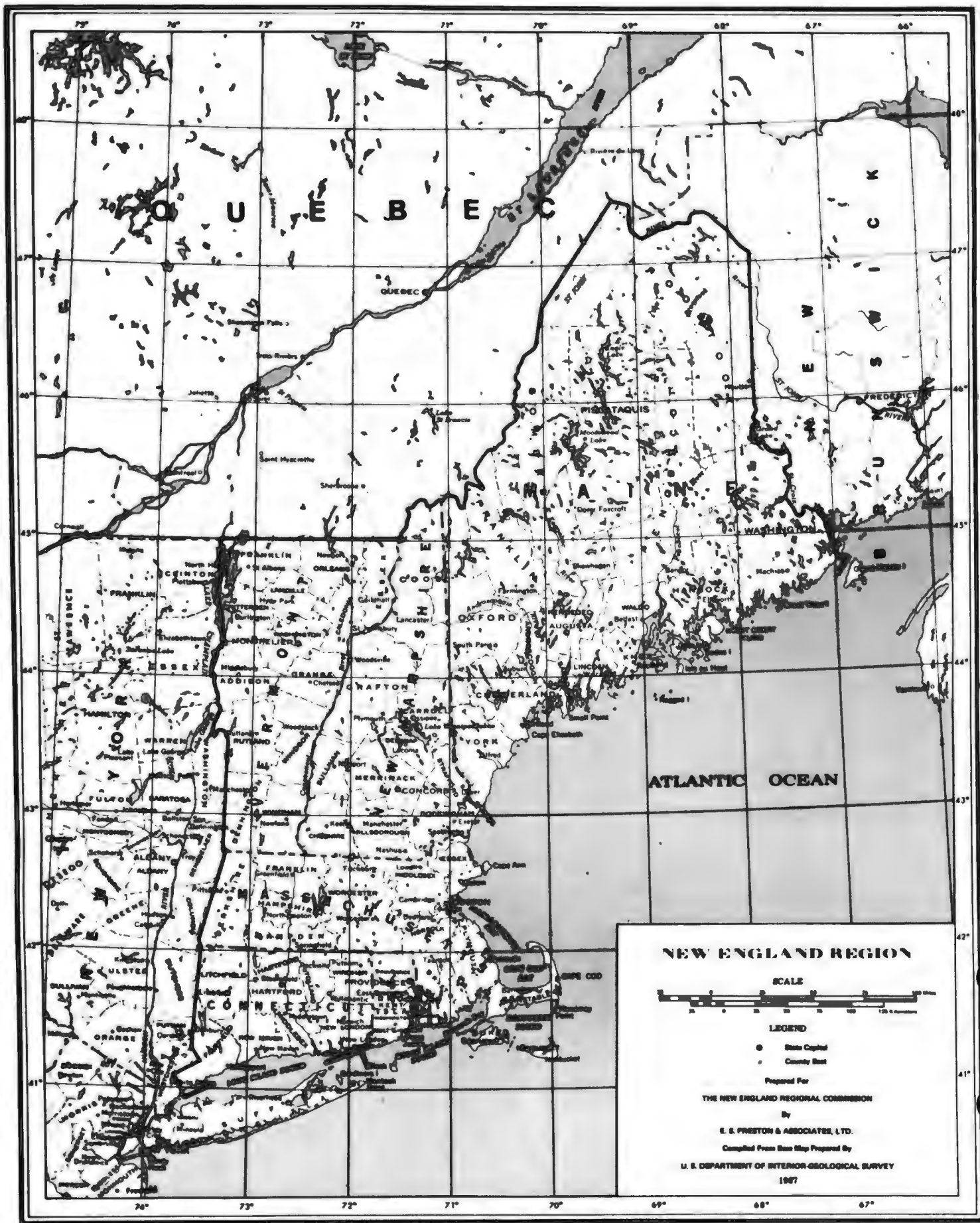
VERMONT WETLAND LAWS

Vermont does not have a single wetland protection law at this time (September 1980). Rather there are several statutes which can incorporate wetland alteration in their review process. The following table is designed to explain how and when permits are required and also to show the state review procedures when information on wetlands alteration can become an important part of the environmental assessment.

Law and Adminstrating Agency	Program	Role of Wetlands	Remarks
ACT 250 (DISTRICT ENVIRON- MENTAL COMMISS- IONS 5 Regional Of- fices or through the En- vironmental Board) (10 VSA Ch. 151)	Vermont's land use and development law. Pro- jects are reviewed for compatibility against 10 criteria.	Criteria # 8 relates to necessary wildlife habi- tat; floodplains and wa- ter pollution are cover- ed under criteria 1.	Wetland alteration can be reviewed under these two criteria.
STREAM ALTERA- TION (protection Div., Agency of Environ- mental Conservation (10 VSA Ch. 41, sub- chapter 2)	Streams or rivers with a drainage greater than 10 sq. miles require a permit before any change to the bed or bank can be made.	The role of riparian wetlands is evaluated if they are applicable be- cause of loss of flood protection or necessary fish and wildlife habitat.	Permits can be applied for at Regional Of- fices.
DEVELOPMENT OF LANDS UNDER PUB- LIC WATER (Vt. Water Resources Board) (29 VSA Ch. 11)	Construction or depos- iting dredge and fill ma- terial under the mean water levels of any lake or pond requires a permit.	Shoreline wetland alter- ation can be reviewed as part of the procedure.	
FRAGILE AREAS (Planning Div., Agency of Environmental Con- servation)	A registry of areas with unique material natural features is established. Alteration of any of these areas by a federal- ly funded project requires an Impact Statement.	Several prominent wet- lands are on the regis- try.	Project Reviews take place in the A-95 pro- cess.

Any person interested in further information should contact the Planning Division of Environmental Conservation (828-3357) or the State Planning Office (828-3326).

(This information was prepared for EPA by the State Planning Office of Vermont).



FEDERAL WETLAND LAWS

In New England, protection for wetlands at the Federal level is found principally in Section 404 of the Clean Water Act, as amended (1977). Under Section 404, a permit is required from the U.S. Army Corps of Engineers for the placement of dredged or fill material in waters of the United States. In addition, under Section 10 of the Rivers and Harbors Act of 1899, Corps authorization is required for the placement of structures in navigable waterways.

I. *Definitions*

The term "waters of the United States" means:

- (1) The territorial seas with respect to the discharge of fill material.
- (2) Coastal and inland waters, lakes, rivers, and streams that are navigable waters of the United States, including adjacent wetlands;
- (3) Tributaries to navigable waters of the United States, including adjacent wetlands (man-made non-tidal drainage and irrigation ditches excavated on dry land are not considered waters of the United States under this definition).
- (4) Interstate waters and their tributaries, including adjacent wetlands; and;
- (5) All other waters of the United States not identified in paragraphs (1) – (4) above, such as isolated wetlands and lakes, intermittent streams, prairie pot-holes, and other waters that are not part of a tributary system to interstate waters or to navigable waters of the United States, the degradation or destruction of which could affect interstate commerce.

The landward limit of jurisdiction in tidal waters, in the absence of adjacent wetlands, shall be the high tide line and the landward limit of jurisdiction in all other waters, in the absence of adjacent wetlands, shall be the ordinary high water mark.

In effect, the Corps of Engineers has jurisdiction over nearly every waterway and wetland in New England.

Wetlands are areas that are inundated or saturated by surface or groundwater at a frequency and duration sufficient to support, and that under normal circumstances do support, a prevalence of vegetation typically adapted for life in saturated soil conditions. Wetlands include swamps, bogs, marshes, and similar areas in fresh and salt water.

II. *Permits*

Under Section 404 of the Clean Water Act, the Corps of Engineers has three categories of permits that it may issue for the placement of dredged or fill material in waters of the United States.

a. **Nationwide Permits** may be issued by the COE for discharges into minor waterways and for certain types of activities in all waters of the United States. If an area is defined as "headwaters" that is, if it has an average annual flow of less than 5 cubic feet/second (approximately 2250 gals/min) or is an isolated lake of less than 10 acres in size, no individual application for a discharge is required. However, in order for an activity to comply with the provisions of nationwide authorization, it cannot (1) involve the discharge of toxic or hazardous materials; (2) adversely impact threatened or endangered species; (3) be in a component of the wild and scenic rivers system; or (4) become a non-point source of pollution. In New England, projects in headwater areas and isolated wetlands are permitted by nationwide authorization. Also, utility line crossings, limited bank stabilization, minor road crossing fills, fill placed incidental to construction of bridges across tidal waters, including cofferdams and temporary construction and access fills and repair or replacement of previously authorized fills are covered by nationwide permits. No written notification or authorization is required for activities under nationwide permit. It is recommended that the appropriate Corps office be contacted to see if a project qualifies for a nationwide permit.

b. **General Permits** may be issued by the COE for certain types of activities in specific, relatively small geographic areas within their jurisdiction. The activities must cause only minimal environmental harm, both individually and cumulatively. The permit must terminate within 5 years, and may be modified or revoked earlier should the adverse environmental impacts become greater. After a general permit has been issued, individual activities falling within those categories will not require individual permit processing unless the Division/District Engineer determines on a case-by-case basis, that individual review is necessary to protect the public interest. Authorization for activities under general permit consists of a "letter of authorization" from the appropriate Corps office. In New England, small pile and timber piers, minor soil conservation projects, small government agency roadway projects and work associated with powerline construction adjacent to existing right of ways are covered by general permits. Application must be made to the appropriate COE office for authorization under general permit.

c. **Individual Permit**

If a project does not qualify for a general or nationwide permit, then it is subject to individual permitting procedures under Section 404 of the Clean Water Act. This requires that the party responsible for the project that will involve the discharge of dredged or fill material into waters of the United States apply to the appropriate Corps of Engineers Office for a 404 permit. After a complete application is received, the project will be sent out on Public Notice for 30-days during which time interested members of the public as well as state and federal agencies, including the Environmental Protection Agency, U.S. Fish and Wild-

life Service and the National Marine Fisheries Service, will comment on the proposed project. After all comments are received, the Division or District Engineer will decide to issue or deny the permit. In some cases, the Division or District Engineer will hold a public hearing prior to making a final decision.

It is important to note that the COE may not issue a 404 permit for a project for which a state or local permit has been denied. It may issue a permit that is more restrictive than the state or local authorization and would thus be the permit to whose specifications the project must conform. Also, it should be remembered that where applicable, a project must have *all three authorizations* — state, local and federal — before it can proceed.

III. Criteria for Issuance

In judging whether or not to issue a permit under section 404 of the Clean Water Act, the Corps must consider the following factors:

Conservation	Recreation
Economics	Land Use
Aesthetics	Water Supply
General Environmental	Water Quality
Concerns	Navigation
Fish and Wildlife Values	Energy Needs
Needs & Welfare of	Safety
the People	Food Production
Historic Values	Flood Damage Prevention

An essential part of the evaluation process is a finding of compliance with the jointly developed EPA/COE 404(b) guidelines found at 30 C.F.R., Part 230 (1979). These guidelines call for a careful consideration of alternatives that do not involve the discharge of dredged or fill material into waters of the United States. The guidelines call for written documentation of the practicable alternatives considered by the applicant in planning for the project. The Corps must find in writing that the project will comply with the 404(b) guidelines which include a complete evaluation of alternatives to filling and an evaluation of impact on water quality, endangered species, marine sanctuaries, aquatic ecosystem, fish and wildlife, recreational, aesthetic and economic values. In fact, compliance with the 404(b) guidelines is so important, Congress has granted EPA the authority, under Section 404(c) to withdraw a permit if it finds, after public notice and hearing that a project will have a significant adverse effect on municipal water supplies, shellfish beds and fishery areas, wildlife or recreational areas.

It is important to note also that the act of granting a 404 permit places the COE in the potential position of taking a federal action significantly affecting the environment. As such, the COE is required to comply with the National Environmental Policy Act and is required to prepare environmental assessments and in some cases environmental impact statements on its permitting actions.

IV. Agency

In New England, there are two Corps of Engineers offices that administer the the 404 Program. In most of New England, the New England Division in Waltham, Massachusetts handles 404 permit matters. Therefore, activities in Maine, New Hampshire, Massachusetts (except for the Hoosic River), Connecticut (except for the Byram River), Rhode Island and the Connecticut River drainage of Vermont are under the jurisdiction of the Corps in Waltham. The Lake Champlain and Hudson River Drainage of Vermont and Massachusetts and the Byram River in Connecticut are under the jurisdiction of the New York District Corps.

Information and applications may be obtained from the appropriate Corps offices listed below:

The Division Engineer
U.S. Army Engineer Division
424 Trapelo Road
Waltham, MA 02254
Attn: NEDOD-R
Telephone: 617-894-2400 X332

The District Engineer
U.S. Army Engineer District
26 Federal Plaza
New York, NY 10007
Attn: NANOP-E
Telephone: 212-264-3996

State 404 Programs

In December 1977, Congress made a major overhaul of the Federal Water Pollution Control Act, now known as the Clean Water Act. Section 404 of the Clean Water Act has expanded the provisions of the 1972 Act. Perhaps the most important of these new provisions is EPA's responsibility under Subsections 404(g) and (h) for reviewing and approving State permit programs to operate in lieu of the Corps permitting responsibilities in certain State waters which traditionally have been considered non-navigable. The statutory language and the legislative history of the 1977 Act indicate that EPA's role, both in approving and overseeing these State programs, is to be similar to EPA's role in State National Pollution Discharge Elimination System (NPDES) programs established under Section 402 of the 1972 and 1977 Acts. However, the touchstone of the Section 404 permit process is compliance with EPA's Section 404 (b) (1) Guidelines rather than the technology-based effluent limitations which establish a basis for NPDES permit decisions.

The 1977 Act places strict time limits on EPA's review of State programs submitted for approval. Failure of EPA to act within the time limit (120 days from receipt)

will result in automatic approval of a State-submitted program. Even after a State program becomes operable, EPA must review State permit applications and may object to the issuance of a permit if the Administrator finds that issuance would be in conflict with requirements of Section 404. If permit decisions by one State may affect the waters of another State, the potentially affected State may submit its recommendations to the permitting State, who must either accept them or explain reasons for not doing so.

At the present time (February, 1981) there are no states in New England that have been delegated 404 permitting authority. However, EPA is working with several states to explore ways in which delegation may be achieved.

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Arrow Arum	<i>Peltandra virginica</i>	3.63
Barrila Plant	<i>Salsola kali</i>	5.16
Bayberry	<i>Myrica pensylvanica</i>	5.20
Beach Grass	<i>Ammophila breviligulata</i>	5.24
Black Alder	<i>Ilex verticillata</i>	3.19
Black Grass	<i>Juncus gerardi</i>	5.10
Black Gum	<i>Nyssa sylvatica</i>	3.11
Black Spruce	<i>Picea mariana</i>	3.03
Black Willow	<i>Salix nigra</i>	3.13
Blueberry, Highbush	<i>Vaccinium corymbosum</i>	3.23
Blue Flag	<i>Iris versicolor</i>	3.47
Bog Cotton	<i>Eriophorum spp.</i>	3.69
Bog Laurel	<i>Kalmia polifolia</i>	3.27
Bog Moss	<i>Sphagnum spp.</i>	3.71
Bog Myrtle	<i>Myrica gale</i>	3.31
Bog Rosemary	<i>Andromeda glaucophylla</i>	3.37
Bog Spruce	<i>Picea mariana</i>	3.03
Boneset	<i>Eupatorium perfoliatum</i>	3.49
Buttonbush	<i>Cephalanthus occidentalis</i>	3.35
Clammy Azalea	<i>Rhododendron (Azalea) viscosum</i>	3.33
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Common Reed	<i>Phragmites australis (communis)</i>	5.26
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Duckweed	<i>Lemna minor</i>	3.75
Dwarf Saltwort	<i>Salicornia bigelovii</i>	5.12
Eastern Larch	<i>Larix laricina</i>	3.01
Fragrant Water Lily	<i>Nymphaea odorata</i>	3.77
Glasswort	<i>Salicornia europaea</i>	5.12
Joe-pye-weed	<i>Eupatorium purpureum</i>	3.49
Labrador Tea	<i>Ledum groenlandicum</i>	3.39
Lambkill	<i>Kalmia angustifolia</i>	3.27
Leatherleaf	<i>Chamaedaphne calyculata</i>	3.29
Marsh Elder	<i>Iva frutescens</i>	5.18
Marsh Fern	<i>Dryopteris thelypteris</i>	3.57
Marsh Heather	<i>Limonium spp.</i>	5.08
Marsh Rosemary	<i>Limonium spp.</i>	5.08
Northern White Cedar	<i>Thuja occidentalis</i>	3.07
Pale Laurel	<i>Kalmia polifolia</i>	3.27
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Pitcher Plant	<i>Sarracenia purpurea</i>	3.59
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Poison Elder	<i>Toxicodendron (Rhus) vernix</i>	3.43
Poison Sumac	<i>Toxicodendron (Rhus) vernix</i>	3.43
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Red Maple	<i>Acer rubrum</i>	3.15
Reed Grass	<i>Phragmites australis (communis)</i>	5.26
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Salt Meadow Cordgrass	<i>Spartina patens</i>	5.04
Saltwort	<i>Salsola kali</i>	5.16
Salt Grass	<i>Distichlis spicata</i>	5.06
Samphire	<i>Salicornia europaea</i>	5.12
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Seaside Goldenrod	<i>Solidago sempervirens</i>	5.22
Sensitive Fern	<i>Onoclea sensibilis</i>	3.55
Sheep Laurel	<i>Kalmia angustifolia</i>	3.27
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Smartweed	<i>Polygonum spp.</i>	3.73
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Speckled Alder	<i>Alnus rugosa</i>	3.17
Spike Grass	<i>Distichlis spicata</i>	5.06
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Tamarack	<i>Larix laricina</i>	3.01
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