Ecosystem Classification Mapping of Chignecto (Amherst Point Sanctuary) and Tintamarre National Wildlife Area

by

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Introduction

The need for a vegetation cover map of each National Wildlife Area was acknowledged at several National Wildlife Area Committee meetings in 1976 when the lack of such basic information on habitat was found to hinder wildlife management decisions. Knowledge of vegetative cover on a broad scale, showing species composition and patterning of plant communities, is a fundamental pre-requisite for effective habitat and wildlife management because (1) plants play an important role as a food resource and cover component to wildlife; and, (2) plants are indicators of soil and water characteristics including pH and basic fertility. This information is important to the management of wetland wildlife, the focus of Atlantic Region National Wildlife Areas.

Ecosystem classification maps will provide basic data to meet the needs of various users in the Canadian Wildlife Service, including personnel in the fields of Migratory Birds, Research and Interpretation, and for a variety of appreciative uses required by the public.

Tintamarre NWA and the Amherst Point Migratory Bird Sanctuary were the first areas to be mapped in the 1977 field season. They became pilot projects to develop uniform methodology and terminology for future ecosystem classification of each Atlantic Region National Wildlife Area. Mapping techniques will remain subject to change if needs dictate and as expertise in the area is developed. Criticism and suggestions for change are welcomed and encouraged from users of these maps. The maps to accompany this report are on file at the Canadian Wildlife Service Atlantic Region Headquarters, Sackville, New Brunswick.

Methods

Ecosystems were interpreted from colour air photos, using field checks where necessary to verify identification. The results were then outlined on a base map. In some areas depth of peat was determined and plant specimens were collected for identification in the lab.

Ecosystems rarely show neat, well-defined boundaries; instead a continuum of vegetation exists. The boundary in such merging zones was drawn medially between the two ecosystems, an arbitrary decision which the user must bear in mind.

Large areas transitional between two ecosystems were designated intergrades and identified as such by a hyphenated term, for example "bog-fen." The first word, bog, is the ecosystem (1) whose characteristics are most strongly represented, or, (2) it is the ecosystem which the area will subsequently become either through natural succession or as a result of our management activities. Such areas have dominant plant species of the two ecosystems.

Small areas less than approximately 8 m in width could not be mapped at the scale used. In this category is, for example, the narrow band of swamp occurring as a transition between dryland and wetland.

Classification and Mapping Units

Level 1 Classification

Wetland terms and definitions for the mapping scheme were obtained directly from Zoltai (1976), except for a minor revision to the

definition of marsh. The reader is referred to that source for more detail on many aspects of ecological land classification. Definitions for "impoundment" and the three dryland ecosystems were compiled by the author.

The mapping scheme is hierarchical in outline and thus can be broken down to finer levels of classification depending on needs of specific users. Level 1, the broadest or ecosystem level, is composed of nine basic classes defined as follows:

(1) Wetland Ecosystems

a. Bog - Bogs are peat-covered areas or peat-filled depressions with a high water table and a surface carpet of mosses, chiefly *Sphagnum*. The water table is at or near the surface in the spring, and slightly below during the remainder of the year. The mosses often form raised hummocks, separated by low, wet interstices. The bog surface is often raised, or if flat or level with the surrounding wetlands, it is virtually isolated from mineral soil waters. Hence the surface bog waters and peat are strongly acid and upper peat layers are extremely deficient in mineral nutrients. Peat is usually formed *in situ* under closed drainage and oxygen satuartion is very low. Although bogs are usually covered with *Sphagnum*, sedges may grow on them. They may be treed or treeless, and they are frequently characterized by a layer of ericaceous shrubs.

b. Fen - Fens are peatlands characterized by surface layers of poorly to moderately decomposed peat, often with well-decomposed peat near the base. They are covered by a dominant component of sedges, although grasses and reeds may be associated in local pools. *Sphagnum* is usually subordinate or absent, with the more exacting mosses being common. Often there is much low to medium-height shrub cover and sometimes a sparse layer of trees. The waters and peats are less acid than in bogs of the same area. Fens usually develop in restricted drainage situations where oxygen saturation is relatively low and mineral supply is restricted. Usually very slow internal drainage occurs through seepage down very low gradient slopes, although sheet surface flow may occur during spring melt or periods of heavy precipitation.

c. Swamp - Swamps are wooded wetlands where standing to gently flowing waters occur seasonally or persist for long periods on the surface. Frequently there is an abundance of pools and channels indicating subsurface water flow. The substrate is usually continually waterlogged. Waters are circumneutral to moderately acid in reaction,

and show little deficiency in oxygen or in mineral nutrients. The substrate consists of mixtures of transported mineral and organic sediments, or peat deposited *in situ*. The vegetation cover may consist of coniferous or deciduous trees, tall shrubs, herbs, and mosses. In some regions, *Sphagnum* may be abundant.

d. Marsh - Marshes are grassy wet areas, periodically inundated up to a depth of 2 m or less with standing or slowly moving water. Surface water levels may fluctuate seasonally, with declining levels exposing drawdown zones of matted vegetation or mud flats. Marshes are subject to a gravitational water table, but water remains within the rooting zone of plants during at least part of the growing season. The substratum usually consists of mineral or organic soils with a high mineral content, but there is little peat accumulation. Waters are slightly acidic (pH 6.0-6.5) to alkaline. Marshes characteristically show zonal or mosaic surface patterns of vegetation, comprised of unconsolidated grass and sedge sods, frequently interspersed with channels or pools of open water. Marshes may be bordered by peripheral bands of trees and shrubs, but the predominant vegetation consists of a variety of emergent non-woody plants such as rushes, reeds, reedgrasses, and sedges. Where open water areas occur, a variety of submerged and floating aquatic plants flourish.

e. Shallow Open Water - Shallow open waters, which are locally known as ponds, are relatively small, non-fluvial bodies of standing water occupying a transitional stage between lakes and marshes. In contrast to marshes, these waters impart a characteristic open aspect, with proportionately large expanses of permanent surface water that lack emergent cover, except for relatively narrow zones adjoining shorelines. Open water usually occupies most of a defined basin area, or is held within large depressions within extensive peat mats. The discrimination of shallow open waters from deeper lakes is based upon the relative extent of the littoral zone, usually indicated by maximum growth of rooted aquatic macrophytes. This zone, which is arbitrarily defined as the range in depth from 0 to 2 m, usually extends to the middle of the basin or occupies at least 75% of the basin area, with remaining portions occasionally attaining greater depths. Shorelines may be firm, soft or floating, and they consist of materials varying from rock or silt to organic deposits.

f. Impoundment - Impoundments are artificially created wetlands overlying one or several ecosystems. Dikes and water control structures are constructed to contain and manipulate water levels within the impoundment. The area can be drawn down, allowed to dry, and manipulated on a regular or irregular schedule which usually varies from three to five years, depending upon the rate of vegetation succession. Habitat manipulation practices, for example mowing of undesirable plant species (i.e. *Typha* spp.),

construction of islands and digging of internal drainage ditches are often carried out during the drawdown period. Upon re-flooding, the impoundment ecosystem subjected to such disturbance undergoes rapid changes in succession, usually leading from a shallow open water condition lasting for two to three years, to a marsh condition dominated by *Typha* spp. and *Sparganium* spp. after about five years. Overall impoundment vegetation is typified by marsh and aquatic disturbance species, however, fen and abandoned field taxa often persist when present before impounding.

(2) Dryland Ecosystems

a. Forest - Forests are areas dominated by trees occurring naturally or as plantations on a variety of upland soil types. All forests within the two National Wildlife Areas have been disturbed to a certain degree by numerous factors, among them logging, pasturing of livestock, road, railway and power transmission rights-of-way, fire, and clearing for past agricultural use.

b. Abandoned Field - Formerly cleared for agricultural purposes, unused fields are now reverting to forests. They exist at various stages of succession. Drainage is usually good.

c. Agricultural Land - Certain lands within National Wildlife Areas are leased to farmers for agricultural use. A variety of crops are planted, those with food value to wildlife being encouraged.

Level 2 Classification

Level 2 classes are based primarily on the work of Harries (1968) in the case of wetlands, while those for drylands have been devised by the author.

The Level 2 classification will be mapped by means of clear acetate overlays to be placed over the Level 1 base map. These overlays will be completed first for the marsh and shallow open water ecosystems. The remaining ecosystems will be further classified to Level 2 as needs arise. The complete classification is presented in Table 1.

Table 1. Ecosystem classification (Level 1) and proposed Level 2 divisions

Level 1	Level 2
Wetland	
Bog	*Sphagnum* Heath Treed
Fen	*Sphagnum* Sedge Treed
Marsh	Eutrophic Mesotrophic Meadow
Swamp	Shrub Treed
Shallow Open Water	Eutrophic Mesotrophic Dys-oligotrophic Dystrophic
Impoundment	-
Dryland	
Forest	Coniferous Mixed
Agricultural Land	Pasture Hay Grain
Abandoned Field	Plants and shrubs <2 m in height Shrubs and trees >2 m in height

Vegetation of Ecosystems

Dominant vegetation for bog, fen, marsh, swamp, and shallow open water ecosystems has been described by Harries (1968). Following is a description of the flora of the remaining four ecosystems, and for the special situation of settlement sites.

Impoundment

Upon re-flooding after drawdown, the shallow open water condition of the impoundment hosts an impoverished flora. Vegetation on those areas undisturbed by management activities remains relatively unchanged. Sedges (*Carex* spp.), grasses (*Calamagrostis canadensis*, *Spartina pectinata*), cat-tail (*Typha* spp.), and meadowsweet (*Spiraea latifolia*) persist on such sites (Whitman, 1976). After one to three years those species dependent on disturbance factors are common, for example: bur-reed (*Sparganium eurycarpum*), knotweeds (*Polygonum sagittatum, P. Hydropiper*), beggar ticks (*Bidens frondosa*), bedstraw (*Galium palustre*), water plantain (*Alisma triviale*), arrowhead (*Sagittaria latifolia*), and grasses (*Agrostis scabra, Torreychloa pallida*) (Malone, 1976).

After this period, as conditions stabilize, impoundments often become dominated by heliophytes, especially cat-tail and bur-reed. A variety of submergent and floating leaf species inhabit those areas not invaded by the dominants, for example: pondweeds (*Potamogeton pusillus, P. natans, P. epihydrus*), smartweed (*Polygonum natans*), duckweed (*Lemna minor, Spirodela polyrhiza*), cinquefoil (*Potentilla palustris*), water-milfoil

(*Myriophyllum* spp.), wild rice (*Zizania aquatica*), and bladderwort (*Utricularia vulgaris*).

Forest

Loucks (1962) describes the predominant forest vegetation in the Bay of Fundy Ecoregion as an association of red spruce, balsam fir, and red maple, with scattered white spruce and white and yellow birch. Occasional individuals of hemlock, white and jack pine, black spruce, tamarack, sugar maple, mountain ash, and grey birch also occur in the two National Wildlife Areas. Flora of the forest ground layer has yet to be investigated in detail. Some of the more common species present are elderberry (*Sambucus* spp.), wood sorrel (*Oxalis* spp.), raspberry (*Rubus* spp.), wood fern (*Dryopteris spinulosa*), broad-leafed avens (*Geum macrophyllum*), tall buttercup (*Ranunculus acris*), blue violet (*Viola cucullata*), and common speedwell (*Veronica officinalis*).

Agricultural Land

Leased agricultural lands on National Wildlife Areas fall within three classes. Harries (1968) describes the dominant vegetation for the first two areas as follows:

1. Pasture, for cattle and/or horses, is vegetated primarily by perennials, grasses, and herbs, chief among them bent grasses (*Agrostis* spp.) and white clover (*Trifolium repens*).
2. Hay field, dominated by timothy (*Phleum pratense*), is mown annually. Clovers (*Trifolium pratense, T. hybridum*) are common.

3. Grain crops, grown on suitable well-drained fields. Principally oats (*Avena* sp.) and barley (*Hordeum* spp.) are sown.

Abandoned Field

In early stages of succession abandoned fields are represented mainly by the families Graminae, Compositae, and Leguminosae. On richer soils such species as timothy, red clover, asters (*Aster novi-belgii, A. lateriflorus, A. umbellatus*), goldenrod (*Solidago canadensis, S. rugosa*), tufted vetch (*Vicia cracca*), and Joe-pye weed (*Eupatorium maculatum*) are common. Poorer soils often host wire grass (*Danthonia spicata*), brown-top (*Agrostis tenuis*), goldenrod (*Solidago puberula, S. bicolor*), mouse-ear hawkweed (*Hieracium pilosella*), and cinquefoil (*Potentilla simplex*).

As succession progresses tree and shrub species colonize those fields. Red and white spruce, tamarack, and pin cherry (*Prunus pensylvanica*) are most common. The shrub component is frequently represented by alder, meadowsweet, chokeberry (*Aronia prunifolia*), wild-rose (*Rosa* spp.). raspberry (*Rubus* spp.), and by a variety of ericaceous shrubs, principally sheep laurel (*Kalmia angustifolia*), rhodora (*Rhododendron canadense*), and blueberry (*Vaccinium angustifolium*).

Settlement Sites

Occasional formerly inhabited sites are encountered in National Wildlife Areas. Those sites are quite fertile due to concentrations of livestock manure, fertilized gardens, compost heaps, and other domestic wastes. The resultant vegetation of such an area

is often a diverse variety of introductions and species requiring enriched soils, hence those sites are indicated on the map. Tree and shrub species such as Manitoba maple (*Acer negundo*), striped maple (*A. pensylvanicum*), silver maple (*A. saccharinum*), scotch pine (*Pinus sylvestris*), basswood (*Tilia cordata*), trembling aspen (*Populus tremuloides*), apple (*Malus* spp.), and lilac (*Syringa vulgaris*) may often be present. In addition, plants like raspberry, hemp-nettle (*Galeopsis Tetrahit*), burdock (*Arctium minus*), curled dock (*Rumex crispus*), hops (*Humulus lupulus*), garden escapes, and medicinal herbs are encountered.

Literature Cited

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