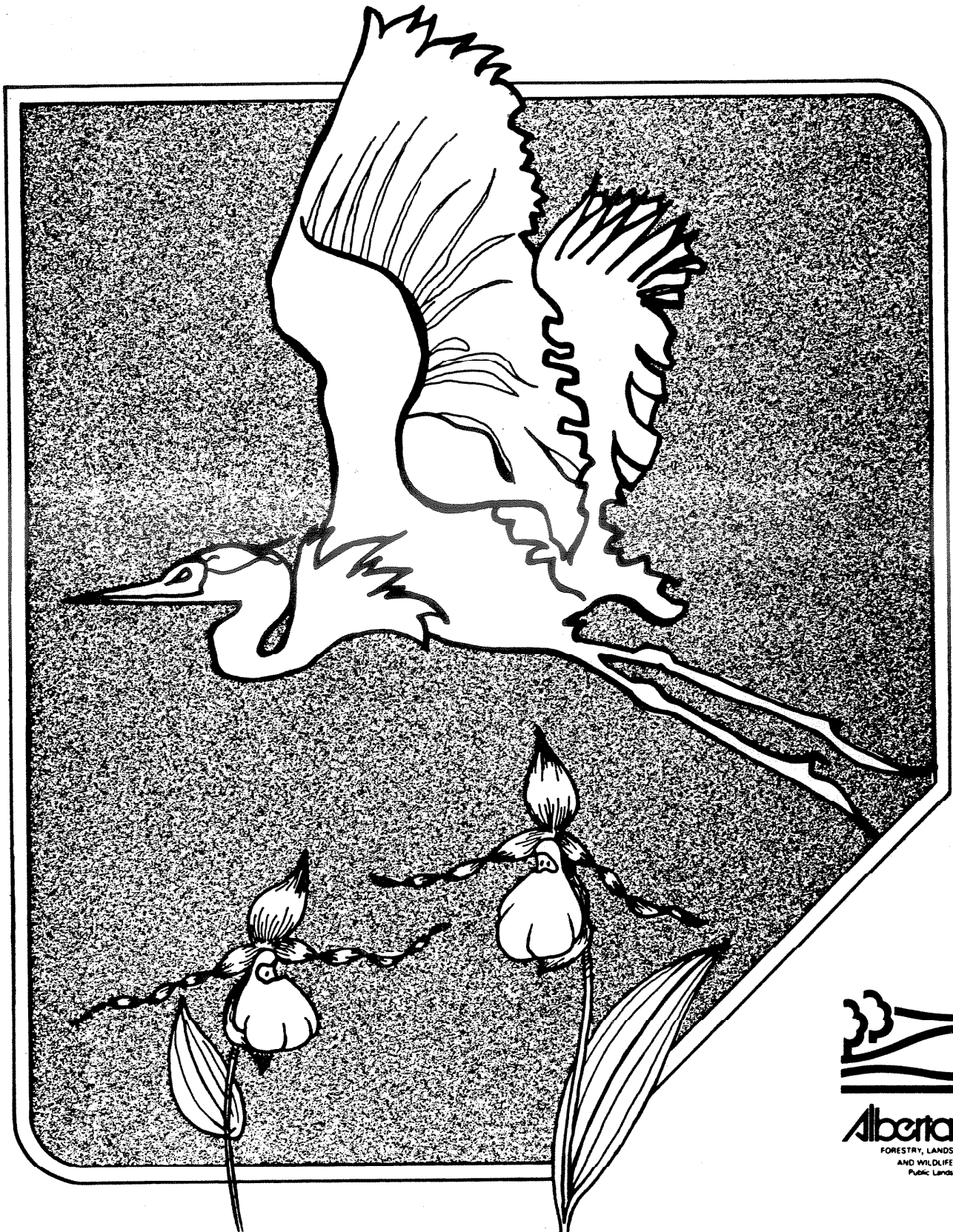


BIOPHYSICAL SURVEY OF COYOTE LAKE NATURAL AREA, ALBERTA



PLEASE NOTE

The views and recommendations expressed in this report are those of the author and not necessarily those of the department.

BIOPHYSICAL SURVEY OF THE
COYOTE LAKE DISTRICT,
LEDUC COUNTY, ALBERTA

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and

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SUMMARY

A biophysical inventory of several contiguous land parcels adjacent to or near Coyote Lake (53°16'N, 114°32'W), Leduc County, Alberta, was completed in 1987. The total area involved was 647.5 ha (2.5 sq.mi.).

The inventory included a description of the physical environment (surficial and bedrock geology, landforms, drainage and soils), which was based on a literature review; field identification and analyses (including soil samples) of vegetation types; an assessment of the mammal, bird, amphibian, reptile and fish fauna; preparation of annotated checklists of both vascular flora and vertebrate fauna; mapping of the vegetation types; photographs and documentation of rare species and new records of distribution; and recommendations for future studies.

The area contained 266 species of vascular plants, 22 species of mammals, 154 species of birds, one species of reptile, three species of amphibians and two species of fish. One of the plant species, Wolffia columbiana (family Lemnaceae), is a new record for Alberta.

Because the area is just within the Boreal Foothills region, it is an ecotone between boreal and cordilleran vegetation. Six rare plant species were recorded and two possibly new species were found.

The fauna species of the vegetation types, which are dominated by birch-aspen forest species of the Boreal Mixedwood ecoregion.

Special features identified were:

1. unusual aquatic and shoreline vegetation;
2. a high diversity of breeding and transient waterbirds;
3. a plant, Wolffia columbiana, recorded for the first time in Alberta;
4. a high number of orchid species, some uncommon;
5. extensive willow carrs, which are significant botanically and important for ungulate habitat; and
6. Many species of large mammals (moose, elk, mule deer, white-tailed deer and black bear).

The Coyote Lake district is an excellent choice for a conservation area because of its unique and representative of the region. Much of the area should be retained in an undisturbed and undeveloped condition.

Future inventories are recommended and needed for breeding birds, small mammals, reptiles, amphibians, aquatic insects and general invertebrates.

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1. INTRODUCTION

The study area discussed in this report included several contiguous land parcels adjacent or near to Coyote Lake (53°16'N, 114°32'W), Leduc County. The land included two designated Natural Areas (S 30, SW 28-49-4-W5), two areas of Crown land under potential Natural Area reservation (29, NE 20-49-4-W5), and a half section owned by Mr. and Mrs. E. Hopkins (SE 32, SW 33-49-4-W5). The total area involved in the survey was 647.5 ha (2.5 sq.mi.).

This report represents data gathered during the summer of 1987, during eight visits to the study area by the authors in July (12, 14, 18, 20, 22, 24, 26 and 27), after a preliminary reconnaissance on June 23. During the visit of July 22, the authors were accompanied by Dr. Brij Kohli (Assistant Curator of the University of Alberta herbarium), and accompanied him on a second visit August 13. Information on fish was received from Dr. Joe S. Nelson of the Department of Zoology, University of Alberta, who led a fish and herptile study trip on August 26. Information on reptiles and amphibians was provided by Wayne Roberts (Zoology Museum, University of Alberta). Bird, wildflower and mammal records for Coyote Lake and half section S 33 were received from Eric and Doris Hopkins, owners of the land.

Deirdre E. Griffiths did the faunal observations, photography and mapping; Graham C. D. Griffiths did the vegetation analysis. Both authors prepared and are responsible for the conclusions and recommendations.

A photographic record of color slides was deposited with the Natural Areas Manager, Peter Lee.

Extensive collections of plants were made by both authors and by Dr. Brij Kohli. About 75 species were represented. Most of the specimens were deposited in the University of Alberta herbarium, with some in the Alberta Forestry, Lands and Wildlife herbarium. Uncommon plants identifiable in the field (such as orchids) were documented with photographs rather than specimens.

During 1987, priority was given to documenting the flora and fauna in the immediate vicinity of Coyote Lake and in the two designated natural areas nearby. These represent only a portion of the land of potential interest for conservation in this district.

1.1 Objectives

The objective of the 1987 study was to complete an initial biophysical inventory of the Coyote Lake area.

The inventory included a description of the physical environment (surficial and bedrock geology, landforms, drainage and soils), based on a literature review; field identification and analysis (including soil samples) of vegetation types; an assessment of the mammal, bird, herptile and fish fauna; preparation of annotated checklists of both flora (vascular plants) and vertebrate fauna; mapping the vegetation types; photography; and recommendations for future studies.

1.2 Methods

Plant communities were classified on the basis of experience and previous literature, especially Looman's current series of papers entitled "The Vegetation of the Canadian Prairie Provinces" (1987), and Jeglum's (1972-73) work on "Boreal Forest Wetlands Near Candle Lake, Central Saskatchewan". Representative stands of the more extensive communities were described by enumerating the vegetation above ground level in large quadrats (mostly 20 m x 20 m/66 ft. x 66 ft.). Overall and close-up photographs of each quadrat were included in the photographic record. Further botanical data were gathered by walking trails and transects through the study area. Aquatic vegetation in Coyote Lake was studied and sampled from canoes belonging to Eric and Doris Hopkins.

Vegetation mapping is based on field notes, with extrapolation by study of aerial photograph series number AS 2202 - 157, 158, 180, 181 (September 8, 1980; scale 1:30 000).

The fauna was surveyed as comprehensively as possible. Birds were surveyed in the greatest detail. They were identified by sight and song/call notes, their habitat preferences and general abundance in each noted, as well as any evidence of breeding (active nests, feeding nestlings or recently fledged young, food carrying, localized alarm behaviour).

Additionally, mammal sightings and sign (tracks, feeding, droppings), amphibians and a few conspicuous insects, were recorded during this survey, but no trapping or collecting was undertaken.

2. PHYSICAL FEATURES

Coyote Lake is a perched lake situated in hummocky terrain at the north end of a low ridge. It has an area of about 55 ha (135 acres). The lake surface is 823 m (2 700 ft.) above sea level. High points of land in the vicinity reach over 853 m (2 800 ft.). The land soon slopes down to lower elevations (762 m [2 500 ft.] or less) to the west, north and east, maintaining its elevation only in a southerly direction.

Coyote Lake is located near the height of land and has only a small drainage basin, receiving run-off and seepage from less than 1.6 km (1 mi.) in any direction. This lake is oligotrophic (trophic status established by measurement of electrical conductivity as per Looman 1986a). This may be because of the small drainage basin and the relative infertility of the watershed soils and parent material, rated by Lindsay et al. (1968) as poor to fair for agricultural purposes. The water of Coyote Lake has a fairly high pH, i.e., it is slightly alkaline (see Appendix 4). The lake is shallow (maximum recorded depth about 2.5 m/8 ft.).

The surficial geology map by Andriashek, Fenton and Root (1979) showed the Coyote Lake district as being without, or having only thin deposits of glacial till. Glacial erratics are rare. The hummocky terrain was caused by glacial deformation (folding and faulting) of sedimentary deposits belonging to the (Tertiary and Cretaceous) Paskapoo formation. This is composed of sandstone, siltstone and mudstone, a minor conglomerate (Green 1972).

Soil and bedrock profiles can be inspected on the road, along the south boundary of SW 28 and along the trail in S 30. The parent material throughout the district is sand or sandy clay. The predominant upland soils are Orthic Gray Luvisols. Lindsay et al. (1968) referred upland soils in the immediate vicinity of Coyote Lake to the Hubalta series developed on glacial till. However, the boundaries of their mapping unit must be overextended, since Mr. Hopkins confirmed that the parent material north of the lake is sandy clay. Probably most or all upland soils in the Coyote Lake district can be referred to the Culp and Modeste series (sandy loam or loamy sand). This is the mapping unit shown by Lindsay et al. (1968) for the area southwest of Coyote Lake which should be extended to include the land around the lake.

Organic soils (Fibrisols and Mesisols) occur widely along watercourses and in wet depressions occupied by fen vegetation. Lindsay et al. (1968) referred sedge peats of the district to the

Eaglesham series, and Sphagnum peats to the Kenzie series. This is no doubt a simplification, since there are more than two vegetational types involved in peat formation. The soil around the shores of Coyote Lake appears to be an Orthic Regosol, since silt deposition has prevented development of organic peat.

3. VEGETATION

Botanical data (including description of the content of large quadrats representing 22 sample stands) were collected, mainly in NE 20, SW 28, NW 29, SW 29, SE 29, SE 30, SW 30, SE 32 and SW 33 (all in 49-4-W5). Mapping of the vegetation of additional land has been based on extrapolating data with the aid of aerial photographs.

The hummocky nature of the terrain has produced a mosaic of vegetation types. Most undisturbed upland is occupied by birch-aspen poplar forest (Fa), with very restricted coniferous stands, probably because of past fires. Natural grassland does not occur. Shrubby slopes are seral in nature, an indication of recent fires. According to Eric Hopkins, setting fires to clear land and promote grass growth continued in this district until quite recently. In the absence of fire, and under present climate conditions, all upland areas will eventually become forested.

Wet depressions are frequent and are occupied by a great diversity of carr, fen and swamp communities. During 1987, water levels in these depressions were maintained by rainfall throughout the growing season, a condition probably typical of most years. Bogs occur locally and are indicative of ombrotrophic conditions, since groundwater in the area is alkaline.

3.1 Birch-Aspen Poplar Forest

Birch-aspen poplar forest (Fa) occupies most of the upland. Typical stands (ungrazed) are represented by Quadrats 1 and 2 (on north- and south-facing slopes, respectively). Note that paper birch (Betula papyrifera) is abundant in both stands, and generally in the upland forest in this district. Accordingly, the upland deciduous forest can be classified in the alliance Betulion papyriferae (birch-aspen poplar forest) of Looman (1987), but it does not fit his definition of any of the associations very well. The floral composition differs from that of birch-aspen poplar forest in other parts of the Edmonton region in including two cordilleran species: false Solomon's-seal (Smilacina racemosa) and white meadowsweet (Spiraea betulifolia). Shrubs are generally diverse and dense.

Quadrat 5 represents a moist stand with a higher cover of balsam poplar (Populus balsamifera) than aspen (P. tremuloides).

However, the composition of the understory is similar to that of Stand 1, so it is doubtful whether this stand should be referred to a different association.

On some sites (especially north-facing slopes), this deciduous forest is being colonized by seedlings of white spruce (Picea glauca), and eventual succession to white spruce forest may occur in the absence of fire. However, spruce seedlings are lacking over wide areas, probably because the shrub layer is too dense to allow the establishment of conifer seedlings.

Forest stands which were heavily grazed (e.g., in SE 32) were extensively invaded by white clover (Trifolium repens) and red paint-brush (Castilleja miniata), which were absent from ungrazed forest.

3.2 Mixedwood Forest

Quadrat 12 represents a stand transitional between birch-aspen poplar forest (Fa) and white spruce forest (Fs). Such intermediate stands have been mapped as mixedwood forest (Fx). The white spruce trees were all relatively small and clearly colonized this site after the establishment of aspen poplar. The shrub layer is sparsely developed, probably caused by poor soil development on the extreme slope. This allows dense establishment of spruce seedlings, and succession to white spruce forest to occur.

3.3 White Spruce Forest

Mature white spruce forest (Fs) is rare in this district because of widespread fires since settlement. One stand of moist, mossy forest dominated by white spruce was found on a low-lying bench in SE 29 (Quadrat 11). Black spruce (Picea mariana) was subdominant in this stand. No shrub layer was developed. The herb layer was dominated by sedge (Carex vaginata). Particularly noteworthy was the diversity of orchids. Rattlesnake plantain (Goodyera repens) was the most abundant species. Others noted were round-leaved orchid (Habenaria orbiculata), northern green orchid (H. hyperborea), heart-leaved twayblade (Listera cordata) and sparrow's-egg lady's-slipper (Cypripedium passerinum). The high diversity of orchids alone qualifies the site as a special feature.

3.4 Spruce-Lodgepole Pine Forest

Stands with lodgepole pine and white or black spruce codominant (Fsp) occur on the west side of the mapping area. East of Section 30, only isolated lodgepole pine trees were noted.

Quadrat 21 documents the only mature stand reached during 1987. The dominant tree was lodgepole pine (Pinus contorta), with white spruce (Picea glauca) subdominant. The understory had a heathy character, consisting largely of labrador tea (Ledum groenlandicum), blueberry (Vaccinium myrtilloides) and bog cranberry (V. vitis-idaea).

Quadrat 19 documents a stand at an intermediate stage of succession. The codominant lodgepole pine and white spruce have not yet reached tree height. This site appears formerly to have been an open Labrador tea-Sphagnum bog with trees only around its periphery. Enhanced drainage of the site by ditch construction along the boundary of the natural area has allowed colonization by lodgepole pine and white spruce.

3.5 Black Spruce Forest

Mature forest, dominated by black spruce (Picea mariana) of tree size with moss-dominated understory (BFs), is scarce in the mapping area, probably on account of fires in earlier decades. Quadrat 16 documents a typical stand in an intermediate stage of development, still relatively open because only a small proportion of the black spruce have reached tree size. Labrador tea is overwhelmingly dominant in the understory, whose species composition is depauperate.

Quadrat 10 documents an anomalous stand lacking black spruce but dominated by Alaska birch saplings (Betula neoalaskana) (BFb). The understory composition is not significantly different from that of Quadrat 16 (dominated by black spruce). Possibly the absence of black spruce at this site merely reflects lack of a seed source.

Both stands sampled and others in the district contained the rare sedge, Carex trisperma.

Mossy areas transitional between bog forest and larch-black spruce swamp in SE 32 contained the orchids Goodyera repens, blunt-leaved orchid (Habenaria obtusata) and Listera cordata.

3.6 Larch-Black Spruce Swamp

The terms "tamarack swamp" and "black spruce swamp" were applied to the present vegetational type by Jeglum (1972-73), according to whether tamarack (Larix laricina) or black spruce (Picea mariana) was dominant. However, there does not appear to be any clear distinction between these types in terms of the rest of the vegetation. So, only a single mapping unit (larch-black spruce swamp, MFs1) is recognized here. The most significant ecological distinction, with respect to larch-black spruce stands in the Coyote Lake district, is between bog forest, in which the understory is depauperate (in its early stages dominated by dwarf shrubs such as Ledum, Vaccinium and Rubus chamaemorus, in its later stages by mosses), and swamp (treed fen) in which there is a highly diverse understory. This high diversity is associated with the development of a hummocky ground surface. Bog plants (especially Ericaceae) colonize raised mounds where conditions are ombrotrophic, while fen plants occupy water-filled hollows.

Swamp vegetation forms extensive stands in the Coyote Lake district. Typical stands are represented by Quadrats 8 and 15. The former quadrat represents a stand where larch and black spruce are equally abundant, the latter represents a stand dominated by larch. In both stands, there is little development of a tall shrub layer and sufficient light penetrates to allow a rich development of herbs. Particularly characteristic is the abundance of Carex disperma and Caltha palustris. Other fen plants regularly present include Equisetum fluviatile, Carex paupercula, Smilacina trifolia, Galium labradoricum and Epilobium palustre. The bog vegetation occupying mounds in these swamps is more diverse than in bog forest. Particularly characteristic is the presence of Oxycoccus quadripetalus (in place of O. microcarpus in bog forest).

3.7 Birch Swamp

The term birch swamp (MFb) is applied to a single stand (documented by Quadrat 6) in which two Betula species, B. neoalaskana and B. pumila var. glanduliflora, are codominant. The understory is dominated by Calamagrostis canadensis, with Rubus arcticus ssp. acaulis and Potentilla palustris also prominent. This vegetation possibly represents a stage in the development of a larch-dominated swamp, since the ground is somewhat hummocky and colonization by larch is occurring.

3.8 Balsam Willow Carr

Balsam willow carr (Mwb), dominated by Salix pyrifolia (balsam willow), occurs in the Coyote Lake district both as extensive stands and in bands around the margins of bogs (occupying the "moat"). This vegetation association is not discussed in available phytosociological works. Looman (1986b) has described an association, Salicetum pyrifoliae, which he states to "occur along lakeshores and rivers, and in sedge marshes. Soils range in texture from sand to loam; the pH is commonly circumneutral, and electrical conductivity is $< 500 \mu\text{Scm}^{-1}$." Looman's stands had a depauperate herb layer. It is doubtful whether they belong to the same association as the balsam willow carr occurring west and north of Edmonton, which has a dense and diverse herb layer. We have already documented one stand of this type in the Bilby Natural Area (Griffiths and Griffiths 1987).

The physiognomy of stands of balsam willow carr in the Coyote Lake district resembles that of larch-black spruce swamp with respect to the development of a hummocky ground surface. Bog plants (especially Ericaceae) colonize raised mounds where conditions are ombrotrophic, while fen plants occupy water-filled hollows. The density of willow growth is generally not sufficient to suppress herb growth. Thus, the heterogeneity of microhabitat results in a high diversity of herb species.

Quadrat 18 represents a typical mature stand. The composition of the herb layer shows little difference from that of some stands of larch-black spruce swamp (compare Quadrat 8). Equisetum fluviatile, Carex disperma and Caltha palustris are prominent in both quadrats. The reasons for Larix laricina and Picea glauca being dominant at one site, but Salix pyrifolia at the other, have not been determined. Fire history may be a contributory factor, as a few old burned stumps were found on drier mounds among the willows.

Quadrat 7 represents a transitional or seral stand. The high prominence of ericaceous shrubs suggests that it represents a stage in the redevelopment of a bog following disturbance.

3.9 Mixed Willow Carr

Mixed willow carr (Mw), dominated by Salix planifolia with S. monticola and S. petiolaris also prominent, was described as the Salix planifolia variant of the Salicetum monticolae association within the alliance Salicion petiolaris in Looman's (1986b) classification. This vegetation is common around the shores of lakes and sloughs in the Edmonton region, particularly on intermittently-flooded ground. Quadrat 17 documents a stand of this type. It is heavily grazed and so

contains some weedy herbs. The presence of fen species, such as Carex diandra and C. rostrata, suggests regular flooding.

Quadrat 22 documents a permanently wet stand with hummocky ground surface (in this respect similar to balsam willow carr and larch-black spruce swamp). The composition of the herb layer appears transitional to broad-leaved sedge fen (as indicated by the prominence of Carex lacustris and C. aquatilis). The presence of numerous saplings of Betula neoalaskana and seedlings of Picea and Larix in this stand suggests that the present vegetation may not represent the final stage of succession, but may be replaced by some form of swamp. It is unclear whether the present dominance of Salix planifolia is persistent from an earlier phase of intermittent flooding, or whether more than one association dominated by this species should be recognized in the Edmonton region.

We have also reported mixed willow carr with Carex-dominated understory in flooded depressions in the Bilby Natural Area (Griffiths and Griffiths 1987).

3.10 Broad-leaved and Narrow-leaved Sedge Fen

Jeglum (1972-73) made a distinction between narrow-leaved sedge fen, dominated by Carex lasiocarpa, and broad-leaved sedge fen, dominated by one of several species (C. atherodes, C. rostrata, C. aquatilis, C. lacustris or Calamagrostis spp.). The latter evidently represents more than one association. In the present treatment, the term will be restricted to sedge fens with C. lacustris dominant or codominant (Jeglum's B-14). Jeglum (1972-73) considered this species to be associated with mud bottoms.

Quadrats 13 and 14 illustrate the distinction between broad-leaved (Mcb) and narrow-leaved (Mcn) sedge fen in a wet depression where the communities are clearly delimited. The outer zone of this depression was occupied by broad-leaved sedge fen, dominated by Carex lacustris with C. aquatilis and C. rostrata also prominent. The quaking centre of the depression was occupied by narrow-leaved sedge fen, dominated by C. lasiocarpa, with Menyanthes trifoliata and Carex diandra prominent. Other noteworthy species were the possibly undescribed species of Carex (cf. rostrata) and Calamagrostis (cf. purpurascens).

However, the boundary between broad-leaved and narrow-leaved sedge fen cannot be drawn satisfactorily in the fen around the shores of Coyote Lake, where the members of both communities grow interspersed. While Carex lasiocarpa and C. cf. rostrata are most abundant towards the outer edge of the fen, they also grow together with C. lacustris, C. aquatilis and C. rostrata. Consequently, this fen has been mapped as mixed sedge fen (Mcbn). Quadrat 3 documents this vegetation.

These diverse sedge fens have to be counted as a special feature of the Coyote Lake district. One of the dominant species, Carex lacustris, is on the rare plants list (Packer and Bradley 1984) and another prominent species (C. cf. rostrata) is apparently undescribed.

In the classification of marsh vegetation of the prairie provinces, proposed by Looman (1982), sedge fens dominated by Carex lacustris can only be referred to the subassociation Caricetosum lacustris of the association Carici-Phragmitetum. However, this classification is problematical in the case of the Coyote Lake stands, because of the absence of Phragmites communis, indicated in Looman's table as a constant member of this association. The placement of stands dominated by Carex lasiocarpa is also problematical. Looman treated this species as characteristic of the alliance Rumicion orbiculati, but neither of his two described associations seems appropriate. These problems suggest a need for further studies on how to incorporate the sedge fens of the Edmonton region into the phytosociological system.

3.11 Water Sedge Fen

Sedge fens dominated by water sedge (Carex aquatilis) (Mcq) are much commoner in Alberta than are those dominated by C. lacustris. Many examples were given by Lewis, Dowding and Moss (1928), who called this community the Carex aquatilis association. Jeglum's (1972-73) B-13 is the same.

Quadrat 20 documents water sedge fen around the shores of the slough in S 30. This stand is noteworthy for the abundance of three species of Utricularia.

3.12 Bluejoint Beds

Bluejoint (Calamagrostis canadensis), also called marsh reed grass, is an abundant plant in the Coyote Lake district, and may form almost pure stands (Mb) on disturbed sites (e.g., wet depressions which have been burned over). This vegetation was named the Calamagrostis canadensis sociation by Looman (1982).

3.13 Water Arum Beds

Water arum (Calla palustris) is common in sedge fens on the shores of lakes and sloughs (Mcbn, Mcq), and can also form pure beds (Mk) in shallow water. The Wolffia pond in SW 28 is fringed by such water arum beds.

3.14 Aquatic Vegetation

Aquatic vegetation (Ap) in Coyote Lake was observed and collected from a canoe, but not sampled quantitatively. The dominant hydrophyte, in most areas where the lake bottom was visible, was Potamogeton pusillus. Other species of Potamogeton common in shallow water (about one metre depth) were P. richardsonii and P. zosteriformis. A few patches of P. praelongus were found in deeper water towards the centre of the lake. P. robbinsii (on the rare plants list) was found in shallow water, along the north shore of the peninsula in NE 29. All species of Potamogeton produced flowers, except P. robbinsii. Other prominent species close to shore were Nuphar variegatum and Najas flexilis. Aquatic species noted as forming isolated patches close to shore were Sagittaria cuneata, Sparganium angustifolium and Polygonum amphibium.

Myriophyllum exalbescens was the only floating plant noted in the lake proper. Other floating plants (Lemnaceae, Utricularia minor and Ricciocarpus natans) were noted only within the shelter of the sedge fen or in sheltered pools along the shore (see Quadrat 3). Algae were not surveyed, except to note the presence of a Chara species in shallow water along the shore.

A new classification of the Potamogeton-dominated communities of the prairie provinces was proposed by Looman (1986a). The vegetation around the shore of Coyote Lake approaches his association Potametum zosterifolii, in the alliance Potamo-Nupharion, but differs in the abundant representation of Potamogeton pusillus treated by Looman (1986a) as characteristic of a different alliance. How the vegetation of Coyote Lake should be incorporated into the phytosociological system is unclear.

A new community of floating plants (Aw) was found on July 27 in a sheltered corner of a large beaver pond in SW 28. The dominant species was Wolffia columbiana (new to Alberta), growing together with lesser amounts of Lemna minor and Spirodela polyrhiza. The floating liverwort Riccia fluitans (uncommon in Alberta) was common, submersed below the surface layer of Lemnaceae. Lemna trisulca was also present in the subsurface layer, but scarce. On a later visit (August 13), it was found that the Wolffia had multiplied enormously, and a large

sample was obtained for taxonomic study. The position of this floating plant community within the pond had changed as a result of wind action.

The slough in SW 29 contained abundant Nuphar variegatum, as well as Myriophyllum exalbescens and Ranunculus circinatus. But an adequate survey of the aquatic vegetation of this slough and others in S 30 and SE 29 was not undertaken, as no boat was available. The slough in SE 29 also contains Nuphar variegatum.

3.15 Seral Scrub

Shrub slopes (Ss) in the Coyote Lake district are all seral in nature (following fire clearance or beaver cutting), and eventual succession to forest is to be expected. However, the process will be slow at some sites, because a series of fires has extirpated poplar, and seedling colonization is impeded by extremely dense growth of shrubs and herbs. Quadrat 4 documents a stand of this type. Poplar saplings are scarce. The dominant species are tall or climbing herbs, especially Lathyrus venosus, Epilobium angustifolium, Apocynum androsaemifolium and Aster conspicuus. Shrubs have less coverage than these herbs (the most abundant being Prunus virginiana and Rubus idaeus). Note the presence of the uncommon Convolvulus sepium. This and Rosa woodsii are the only species confined to these open slopes, and are not found in birch-aspen poplar forest in the vicinity. At some sites, the tall shrubs (especially Prunus virginiana and P. pensylvanica) form dense thickets to the detriment of herbs. At others, the low shrub, Symphoricarpos occidentalis, is dominant.

Quadrat 9 documents a quite different type of seral scrub following fire. This slope is situated within a heavily-grazed area. Some regrowth of aspen poplar from surviving roots has occurred, and grazing had prevented the formation of a continuous layer of tall shrubs and herbs. Contrary to expectation, the diversity of herbs is much greater on this grazed slope than on neighboring shrub slopes to which cattle have no access. Several weedy species (e.g., Silene noctiflora, Arabis glabra, Crepis tectorum and Cerastium vulgatum) were noted only in this habitat.

Regeneration of forest after removal of mature trees by beaver cutting is rapid, with poplar shoots soon growing through the shrub and herb layers. However, the time required for the re-establishment of mature forest depends on the longevity of the colony and the size of its foraging area. Some slopes may be recut well before the second growth of aspen poplar has reached maturity, thus maintaining a seral scrub community for many years.

3.16 Disturbed Ground

Disturbed ground (Dg) within the mapping area consists mainly of earth roads and trails constructed by oil companies and holders of grazing rights. The weeds, Medicago lupulina and Collomia linearis, were noted only along such roads. Several old well sites and roads leading to them contain species originating from seed mixtures, such as Medicago sativa, Trifolium pratense, Phleum pratense and Bromus inermis ssp. inermis.

Also mapped as disturbed ground is a cleared meadow in SE 32, now being colonized by aspen saplings, despite continued grazing. Succession to birch-aspen poplar forest will occur in the absence of fire or other intervention.

4. FAUNA

The large size of the study area, set in a region where significant portions of the landscape and vegetation remain in a more or less natural state, together with its topographic and wetlands diversity, and stream connections with the North Saskatchewan River, all contribute to a substantial faunal diversity. Unfortunately, the peak of the breeding season for many terrestrial birds was just before the Coyote Lake study commenced, so a number of species may have been missed because singing was much reduced.

In this section, mammals, birds, amphibians and fish are discussed as they occurred in the vegetation communities described in Section 3. The 1987 survey records are supplemented with 1987 and earlier observations by Eric and Doris Hopkins, which include their unpublished plant and bird list (Hopkins and Hopkins 1986) covering primarily quarter sections SW 33 and SE 32 as well as Coyote Lake. Use was also made of the January 1987 ungulate survey by the Fish and Wildlife Division (Gunderson 1987).

Insects were not surveyed formally; however, some casual observations are worth noting. On July 14, a mature larva of an uncommon swallowtail butterfly (Papilio zelicaon, or its hybrid with P. machaon) was photographed at the base of a scrub slope (SE 33) feeding on cow parsnip (Heraclium lanatum) (see Sperling 1987). On July 20, the following butterflies were noted in the sedge fen and willow carr adjacent to Slough SE 29: green comma (Polygonia faunus), Holland's Atlantis fritillary (Speyeria atlantis hollandi), wood nymph (Cercyonis pegala), sulphur (Colias sp.) and ringlet (Coenonympha tullia).

An annotated checklist of mammals, birds, reptiles, amphibians and fish is presented in Appendix 3.

4.1 Birch-Aspen Poplar Forest (Fa)

The region has been subject to numerous fires, although none have occurred in the study area during the past several years. Nevertheless, this history has produced a patchwork of forest of various ages and densities, the oldest stands being on north slopes and moist soil. In May and June, the region experienced a moderate forest tent caterpillar (Malacosoma disstria) outbreak, but defoliation was

patchy and almost all trees and shrubs had released by the time the main survey started on July 12.

4.1.1 Mammals

In the more continuously forested study area, mule deer appeared to outnumber white-tailed deer, although moose may be more numerous than either deer species. Browsing on shrubs, especially red-osier dogwood, is general, although it varies from light (in dense young aspen stands) to moderate (in mature, open stands, as well as where forest forms an edge with more open habitats, especially treed slopes cut over by beaver). Elk are quite rare in the region, but the Hopkins reported small herds in winter on the ice and grazing the sedge margins of Coyote Lake. That elk are present in the general region throughout the year was proven when a mature bull crossed the county road several kilometres south of the study area in the early evening of July 20.

Several medium-sized mammals frequent this habitat. In summer, coyotes tend to avoid poplar forest with dense undergrowth, although they use any well-defined trails through it. Lynx are rare except when snowshoe hare populations are high, which they were not this year. The status of the larger mustelids is uncertain. Eric Hopkins once saw a large animal that he first thought was a black bear. However, it seemed too small even for a yearling, was not the same shape as a bear and moved differently. It is possible that the animal was a wolverine. Although beaver are aquatic mammals, they rely heavily on adjacent aspen forest to provide them with winter food and much of their lodge- and dam-building material. Thus, they have a moderately long-term impact on the forest within foraging distance. These changes create browse for ungulates (regenerating tree saplings, more abundant shrubs), as well as an ideal habitat for least chipmunks and Franklin's ground squirrels (see Section 4.8.1). Red squirrels are typically rare in pure stands of Fa that are distant from any conifers. Snowshoe hares are sparingly distributed, generally close to depressions with willow or bog forest. Additional forest mammals include: short-tailed weasel, red-backed vole, deer mouse and shrews (no species of the last named have yet been identified).

4.1.2 Birds

A total of 45 species (34 confirmed nesting, three probable, eight transient) has been recorded in this community, of which 23 were observed during the 1987 survey.

The least flycatcher, western wood pewee, black-capped chickadee, robin, red-eyed vireo, house wren, yellow-bellied sapsucker, northern oriole and white-throated sparrow are the most common species, especially in mature stands. Hairy and downy woodpeckers, blue jay, white-breasted nuthatch, hermit thrush, veery, ruby-throated

hummingbird, warbling vireo, rose-breasted grosbeak, ruffed grouse and red-tailed hawk are much less frequent, some because of large territory requirements; others may have seemed less numerous than they actually were because the peak song period had passed.

Several species occur only where forest forms an edge with a more open habitat such as a fen, shrub carr, seral scrub, beaver-cut slope and man-made clearing or track. Northern flicker, mourning dove, cedar waxwing, yellow warbler, brown-headed cowbird and clay-colored sparrow belong to this group.

The frequency of white-breasted nuthatches indicates that this species continues to expand its Alberta range. When Birds of Alberta (Salt and Salt 1976) was published, this species nested in a narrow band of central Alberta from Athabasca south to about Calgary.

One rarity, a pair of black-billed cuckoos, was observed closely in a stand of young aspen on the west side of Coyote Lake (NE 29) on June 23. Although never common in the province, scattered pairs of this species were recorded by naturalists in north-central Alberta in 1987. The species nests as far north as Athabasca (Salt and Salt 1976).

4.1.3 Amphibians

Small numbers of wood frogs can be found in forests close to wetlands. An adult Canadian toad was seen in moist poplar-birch forest at the base of a north-facing slope adjacent to Slough S 30. The Hopkins' report the species as fairly common, especially during the breeding season when activity and singing are at a maximum.

4.2 Upland Mixedwood and Coniferous Forest (Fx, Mature Fsp)

At present, these communities are small and scattered with the result that a distinctive fauna is poorly developed.

4.2.1 Mammals

The presence of conifers attracts and sustains red squirrels in small numbers. The reduced shrub undergrowth, especially in the spruce-lodgepole pine community, makes these habitats less attractive to ungulates for food, although they may use them in winter for shelter from severe storms. Snowshoe hare occur, as do smaller species such as red-backed vole and deer mouse. Flying squirrels, although not recorded

in this survey, no doubt occur in the study area and would prefer a mixedwood forest habitat to birch-poplar.

4.2.2 Birds

A total of 37 species has been recorded in these two communities (26 confirmed nesting, six probable and five transient), of which 19 were observed during the 1987 survey.

Birds which tend to be more numerous in and near these communities include: ruffed grouse, pileated woodpecker (feeding holes), hermit thrush and white-throated sparrow. Yellow-bellied sapsuckers use white birch for feeding, although they prefer to nest in aspen. Boreal chickadee and red-breasted nuthatch are restricted to these, as well as other conifer-dominated communities (Section 4.3.2).

4.2.3 Amphibians

Wood frogs occur in mixedwood forest only, adjacent to a wetland.

4.3 Moist Coniferous Forest, Bog Forest and Swamp (Fs, BFs, MFs1, Fsp-immature)

These communities are grouped because of several basic similarities in physiognomy, species overlap and the presence of a willow or willow/alder "moat" around all or part of the periphery. Additionally, all are moist (subhygric to subhydric). They include Quadrats 8, 11, 15, 16 and 19.

4.3.1 Mammals

Except for the willow or willow/alder moat, ungulates do not seem to use these communities extensively for feeding, although they probably enter them for winter shelter. The abundance of red squirrels in these habitats is directly related to the abundance of conifers, and several cone-scale middens were noted. Snowshoe hares browse deciduous shrub twigs. Lemming vole evidence (runways and feeding) was found in BFs1 near Quadrat 8, and the species probably occurs at other sites as well.

4.3.2 Birds

A total of 30 species (15 confirmed nesting, eight probable and seven transients) has been recorded for these communities, of which 18 were observed in the 1987 survey. Sora, common snipe, eastern kingbird and olive-sided flycatcher occur only in those BFsl and BFs that are continuous with Coyote Lake. The recent 15 cm rise in lake level has drowned many trees near the lake edge and broadened the band of sedge fen. The dead trees provide singing and feeding perches for the kingbird and olive-sided flycatcher, and, less frequently, cedar waxwings as well as other species resting. The first two also nest in this habitat. The fen is nesting and feeding habitat for the sora and snipe.

Densely treed mature Fs, BFs and MFsl are characterized by nesting gray jay, boreal chickadee, red-breasted nuthatch, yellow-rumped (myrtle) warbler, pine siskin and white-throated sparrow (the last toward the edge where birch, willow and alder mingle with the spruce and larch). Other species are transients, some of which come to these communities to feed but which nest elsewhere. They are: hairy woodpecker, blue jay, robin and black-capped chickadee.

Open coniferous communities with an understory dominated by heath (Ericaceae) shrubs; namely, Fsp and some forms of BFs, have quite a different breeding bird assemblage: chipping sparrow, dark-eyed (slate-colored) junco, Lincoln's sparrow and, closer to the edge, yellowthroat, song sparrow and swamp sparrow. Transients are varied and related more to the adjacent plant communities than the bog or swamp. In June, cowbirds may be common as the females seek nests to parasitize.

4.3.3 Amphibians

Both chorus and wood frogs were seen in these habitats during the survey, most commonly in the BFsl, probably because it is the wettest and least acidic of the series. The frogs are also more common in the bogs and swamps confluent with Coyote Lake.

4.4 Moist Birch-dominated Communities (BFb, MFb)

These are rare and small in area, and are not mature plant communities (see 3.5, Quadrat 10 and 3.7, Quadrat 6). Nevertheless, certain vegetational features attract a distinctive though limited number of animals.

4.4.1 Mammals

Moose and probably deer feed in both Bfb (mainly in winter) and MFb (summer and winter). In winter, moose break over the main stems of smaller Betula neoalaskana to reach the upper twigs. Snowshoe hares also browse on the lower twigs of both Betula neoalaskana and B. pumila, as well as various willows. The Hopkins refer to the birch swamp (Quadrat 6) as the "moose meadow" because of the frequency with which they encounter moose there. On our survey, we found droppings and fresh beds in the tall Calamagrostis canadensis around the periphery.

No small mammals or their sign were noted in either community, although voles and shrews are no doubt present. Red squirrels were absent because of the lack of conifers.

4.4.2 Birds

A total of nine species (five nesting, four transient) can be expected in these two communities. Five were observed during the survey. A Lincoln's sparrow and a white-throated sparrow were recorded at the Bfb site, while alder flycatcher, yellowthroat, white-throated sparrow and swamp sparrow were the species at the MFb site. Almost certainly, pine siskins and redpolls (in winter) visit both sites to feed on birch seeds, and probably juncos and tree sparrows pass through the areas during migration.

4.4.3 Amphibians

None were observed at Bfb; however, a few adult wood frogs were present in the moat around the edge of MFb.

4.5 Willow Carr (Mw, Mwb)

These communities range from subhygric to subhydric in mid-summer, though doubtless all are flooded by snowmelt in spring. They include Quadrats 7, 17, 18 and 22 (see 3.8 and 3.9), and are also developed as linear communities around the margins of bogs, swamps and fens, as well as parts of the shore of Coyote Lake, Beaver Pond SW 28 and the three sloughs (SE 29, SW 29 and S 30). The woody vegetation ranges from discontinuous (Quadrats 7 and 17, as well as most moats, lake and slough shorelines) to very dense throughout the community (Quadrats 18 and 22).

4.5.1 Mammals

Ungulates, particularly moose, are almost the only mammals in this habitat in summer, and show a preference for discontinuous willow. Winter would bring deer (browsing), snowshoe hare (browsing and shelter) and voles (feeding and shelter).

4.5.2 Birds

A total of 26 species (13 nesting, five transient and eight regular migrants) has been recorded in this habitat, of which 14 were observed in the 1987 survey.

Characteristic and common nesting species of discontinuous willow communities include: alder flycatcher, catbird, yellow warbler (drier sites), yellowthroat, red-winged blackbird (around lake, sloughs, beaver ponds), white-throated sparrow (periphery of BF, MFs1 and MFb), Lincoln's sparrow, swamp sparrow and song sparrow. Black-capped chickadee, blue jay, downy woodpecker, yellow-bellied sapsucker (if sizeable birch are present) and ruffed grouse (in winter for buds and shelter in dense sedges) are common transients in this habitat; all but the grouse being observed during this survey.

Populations were lower in dense, continuous willow communities and only four nesting species were observed: alder flycatcher, yellowthroat, swamp sparrow and song sparrow. None of these communities bordered open water wetlands, so it is not known if red-winged blackbirds would nest in them. Yellow-bellied sapsucker feeding holes were noted in birch (Betula neoalaskana), particularly in and near Quadrat 22 (see map).

4.5.3 Amphibians

Wood frogs were the most common amphibians observed in the wettest areas of these communities, although a number of adult chorus frogs were also noted. It is more difficult to assess frog populations and distribution once the breeding season is over and singing has ceased. A large adult Canadian toad was encountered at the edge of a willow zone along the east end of the immature Fsp (Quadrat 19). It was only the second toad seen during the entire survey (see 4.1.3).

4.6 Open Fens (Mcb, Mcn, Mcbn, Mcq, Mk, Mb)

These include a variety of related communities that comprise two basic types: (a) those that form in enclosed depressions in the landscape and no matter how wet, do not have open water centres; and

(b) those that surround lakes, sloughs and linear water channels (see map). As discussed in Section 3.10, many of the sedge fens of the Coyote Lake area are floristically and physically different from superficially similar fens in the Edmonton region. Fens that form the initial community around the open water of Slough SE 29, Slough S 30, and are particularly well-developed around Coyote Lake, constitute thick, floating mats rather than emergent vegetation rooted directly in the substrate, although beds of rooted submergents (Potamogeton spp., Nuphar variegatum, Najas flexilis, Polygonum amphibium, Chara sp. and Myriophyllum exalbescens - the last may also grow floating freely) are present in open shallow water. The nature of the floating mat fen affects use of the wetland by waterbirds and some mammals (see also Sections 4.7.1 and 4.7.2).

4.6.1 Mammals

One fairly dry fen in the same depression occupied by a balsam willow carr (Quadrat 7) had a large, open peat wallow in one corner, probably initially developed by moose and/or elk. Tracks indicated deer use also, and there were nearby fresh "beds" in the sedges and Calamagrostis. There is no indication of any mineral deposit at the surface. Such drier fens (no standing water in mid-summer) are probably colonized by voles and jumping mice, although no direct evidence was obtained on this survey. Probably all fens are used by small rodents in winter and, in turn, attract hunting coyotes, weasels and mink (the latter along sloughs and the lake). Coyotes hunt year-round for small rodents in the drier Calamagrostis fens (Mb).

Beaver and muskrats may slow the expansion of floating fen mats by feeding on the shoots, tubers and rhizomes. Beaver also cut canals through the mat to reach aspen-forested slopes. A certain amount of fragmentation may follow during strong winds. There is limited grazing of the fens by deer and elk (especially around Coyote Lake) during winter.

4.6.2 Birds

A total of 21 species (15 confirmed nesting, five probable, one transient) has been recorded for this habitat, of which 16 were observed during the 1987 survey. Since some waterbirds use the fen habitat only for nesting, they will be treated in more detail in the next section (4.7.2).

"type a" fens have the fewest nesting species: LeConte's sparrow, savannah sparrow (Mb only), common snipe (if the sedges are not too dense, and flooding not deep or prolonged) and possibly northern harrier. At the fen with the floating mat centre (Quadrats 13 and 14), there are only song sparrows and yellowthroat warblers in the scattered willows toward the outer edge. The fen itself seems too wet for snipe and LeConte's sparrows, yet not open enough for soras.

In the driest "type b" fens, the extensive sedge and Calamagrostis meadows downstream from the beaver dams on the outlet stream from Coyote Lake, only LeConte's sparrows were recorded. A similar but smaller community along the stream channel, through a drained beaver pond in SE 30, appears to have no specifically associated breeding birds, although red-winged blackbirds nest in the nearby willows.

Most of the "type b" fens form a broad band around water bodies -- Coyote Lake (especially the east bay and the outlet area above the beaver ponds) and Sloughs SE 29, SW 29 and S 30. These fens are used for nesting habitat by: common loon, American bittern, Canada goose, mallard, gadwall, green-winged teal, blue-winged teal, ring-necked duck, lesser scaup, sora and snipe. At present, the nesting status of coot, northern harrier, spotted sandpiper, solitary sandpiper, greater yellowlegs and black tern is uncertain. The American coot seems to require more emergent cover for their very young broods than is presently provided by any of the water bodies in the study area (Gullion 1954; Kiel 1955). The Hopkins report hearing American coot every summer up to 1986 on Coyote Lake; however, none were seen or heard there or elsewhere in the study area during the 1987 survey. The only American coot seen in the general area was one pair with two or three chicks on a shallow cattail-bordered slough near the county road in NE 21. The recent rise in level at Coyote Lake may have caused abandonment of that site, but does not explain their absence from the sloughs, especially Slough SW 29, the most eutrophic of the series.

Northern harriers occur regularly in spring and fall; however, none were seen during the survey, in spite of visits to suitable habitat. The spotted sandpiper may well nest at beaver ponds (the Hopkins have June records); however, the only bird seen was an independent immature on July 22 at a beaver lodge on Coyote Lake. There is also abundant suitable nesting and feeding habitat for the solitary sandpiper, but the only one recorded (an immature on July 27) was just outside the study area along the Coyote Lake outlet stream. Greater yellowlegs are regular migrants according to the Hopkins' records, but there is no direct evidence of nesting, despite suitable habitat. None were recorded on the 1987 survey.

Black terns almost certainly nest in the study area. A small number of adults (20-26) are present at Coyote Lake every summer, including 1987. They were first observed on this survey June 23, and on every subsequent visit, including August 13, when only one adult was seen. On July 18, a fully fledged juvenile was flying with the adults but catching its own food. On July 27, two adults were still feeding a fledged juvenile occasionally, when it perched. At Slough SW 29, on July 24, the behavior of two pairs of adults indicated nesting.

The major development of water arum beds (Mk) occurs in Beaver Pond SW 28. These intervene between open water and the shoreline sedge, and do not seem to be used directly by any bird species, probably because they are unsuitable as cover or nesting support, and also all parts of the plant are poisonous (Hultén 1968).

4.6.3 Amphibians

Chorus frogs, wood frogs and toads appear to be most numerous in "type b" fens, and especially around Coyote Lake (Hopkins 1987b), no doubt because water levels are more stable through the summer. Tadpoles were seen from time to time in small, open pools between the mainland edge and the beginning of the main sedge mat.

4.7 Lake, Sloughs, Beaver Ponds and Streams (Ap, Aw)

Both the marginal (floating mat and emergent) as well as the submergent/floating vegetation reflect distinctly oligotrophic conditions (see Section 2 and Appendix 4). However, these do not restrict faunal diversity and abundance as much as might be expected, presumably because all water bodies have adequate essential nutrients and, being shallow, warm rapidly early in the growing season. Nutrient cycling and availability in sloughs and shallow lakes is a complex interaction of many factors (Sheenan et al. 1987):

"The bulk of the nutrients are found in the sediments and, to a lesser degree, in plants. Water seems to hold little of the nutrients found in a wetland, probably due to either rapid uptake by algae and some plants, or incorporation into the sediments ... the nitrogen and phosphorus in sediments exists in 2 phases: dissolved in interstitial water or bound to particles. The particles exist in different forms which differ in their ability to release nutrient ions. The availability of the nutrients in the sediments to plants depends strongly on the relative dominance of these forms of binding and how they are affected by changes in the redox potential associated with fluctuating oxygen concentration" pg. 17

From the initial investigations of this survey, the open-water wetlands can provisionally be arranged in the following series from most oligotrophic to least: Coyote Lake and outlet beaver ponds, Slough S 30, Slough SE 29, Beaver Pond SW 28 and Slough SW 29. Nevertheless, because of its size and permanency, Coyote Lake is used by more animals, both aquatic and terrestrial, than any one of the other wetlands (Table 1).

4.7.1 Mammals

The most obvious aquatic mammal is the beaver. Coyote Lake has at least five lodges, of which four appeared to be occupied in 1987. Three dams are located in series along the lake's outlet stream, and the Hopkins believe that activity at the dams has largely been responsible for the 1985-1986 rise in lake level of approximately

Table 1
FAUNAL DIVERSITY RELATED TO WETLAND SIZE

Group	No. of Species	Wetlands	Approximate Area ¹
Mammals	9 ² (2) ³ (2) (1) (2) (1)	Coyote Lake Slough S 30 Slough SW 29 Beaver Pond SW 28 Slough SE 29	55.0 ha 7.0 ha 3.6 ha 3.5 ha 1.0 ha
Birds	46 (18) (6) (7) (8) (9)	Coyote Lake Slough S 30 Slough SW 29 Beaver Pond SW 28 Slough SE 29	
Amphibians	3 (2) (3) (2) (2) (2)	Coyote Lake Slough S 30 Slough SW 29 Beaver Pond SW 28 Slough SE 29	
Fish	(2) ? ? ? (1)	Coyote Lake Slough S 30 Slough SW 29 Beaver Pond SW 28 Slough SE 29	

¹ Area of open water.

² First number for Coyote Lake includes Hopkins' records.

³ Numbers in brackets refer to species recorded on 1987 survey.

15 cm. The slough in SW 28 is an active beaver pond that has existed at least since 1980. A new pond is being created to the north of it now (1987), as a dam has been constructed across the Coyote Lake outlet stream in the northeast corner of the quarter section. Slough SE 29 has an abandoned beaver lodge and no dam on the outlet stream, although, where this passes under the oil well track (SW 29), another abandoned lodge stands just to the east. The track may have been built on top of the beaver dam. It now acts as a partial dam, and the valley east to Slough SE 29 has many drowned trees as a result of the raised water levels. There is no beaver activity at Slough SW 29, possibly because of the long distance to a source of poplar. The beaver dam on the stream flowing north out of the northeast corner of SE 30 has been breached (since 1980), the pond behind it drained, and the two beaver lodges abandoned. A new lodge has been built near the east end of Slough S 30 (see map), as well as new dams on the outlet before it joins the main stream, eventually flowing into the North Saskatchewan River. There is also a small beaver colony established on the hydro transmission right-of-way near the southeast corner of SE 33.

Muskrat appear to be less numerous than beaver, although they occur on Coyote Lake, sloughs and beaver ponds; no doubt, they also use the stream.

The abundance of mink is unknown, although sign (scats) was quite frequently seen around the periphery of Coyote Lake and on the lower branches of beaver lodges.

Terrestrial mammals frequently cross Coyote Lake, both summer and winter. The same probably occurs at sloughs and beaver ponds, but is less frequently observed. Some of the species have already been discussed (Section 4.6.1). Moose have crossed the lake in summer but experience difficulty climbing on the floating mat, as the soft bottom drops off steeply. However, moose often enter water in summer to feed on a variety of aquatic plants (Martin et al. 1951). In late July 1987, the Hopkins saw two yearling black bears swim across the narrow east bay of Coyote Lake.

4.7.2 Birds

A total of 46 waterbird species has been recorded (11 confirmed nesting, three probable, 32 transient), of which 18 were observed on the 1987 survey (11 confirmed nesting, Table 2).

Great blue herons frequently fly over the study area and also stop to feed along shores, but no nesting colony is known to exist on the study area itself. Likewise, Bonaparte's gulls frequently visit Coyote Lake (two on July 18, four on July 22 - all adults in full breeding plumage), but no evidence of nesting on the study area was found, nor were any juveniles seen.

Coyote Lake's size and depth, as well as its permanent fish population, make it particularly attractive to diving birds (loons,

Table 2

NESTING WATERBIRD SPECIES FOR WHICH THERE WAS
DIRECT EVIDENCE OF SUCCESS IN 1987

Species	Wetland ¹	Status	Date	Comments
Common Loon	Coyote Lake	1 pair + 2 young	Jul 12	Young 1/4 grown
			Jul 18	Young 1/3 grown
			Aug 13	Young 3/4 grown; parents still present
				was this one of the pair nesting on Coyote Lake?
red-necked grebe	Coyote Lake	1 adult	Jul 26	} present
		1 adult	Jul 24	

Canada goose	Coyote Lake	4 pair with 2-3 young each	Jul 12	most young 1/3 grown
			Jul 22	most young 2/3 grown
			Aug 13	2 adult + 1 juvenile nearly full grown; 3 full grown juveniles without adults

Canada goose	Coyote Lake	2 pair + 1 young each	Jul 24	young 1/2 and 2/3 grown - 1 young per pair

Canada goose	Coyote Lake	1 pair + 2 young	Jun 23	2 adults
			Jul 20	2 adults + 2, 1/2 grown young
Canada goose	Coyote Lake	(2 adults + 3 young)	Jul 12	young approximately 2/3 grown
		(2 adults + 5 young)	Jul 22	young 3/4 grown
Canada goose	Coyote Lake	(2 adults + 5 young)	Jul 27	} total population of 36 seen - almost full grown young not distinguished from adults (birds distant)
		(2 adults + 2 young)	Aug 13	

Species	Wetland	Status	Date	Comments
Canada goose (continued)	Slough S 30	8 flew in, early evening	Jul 26	2 adults + 6 juveniles?
	Slough SW 29	-----	-----	-----
	Beaver Pond SW 29	-----	-----	-----
	Slough SE 29	-----	-----	-----
mallard	Coyote Lake	adults only	Aug 13	2 in flight
	Slough S 30	-----	-----	-----
	Slough SW 29	-----	-----	-----
	Beaver Pond SW 28	2 juveniles	Jul 26	feeding
	Slough SE 29	1♂(eclipse or juvenile) 2 f	Jul 20 Jul 24	feeding feeding
gadwall	Coyote Lake	-----	-----	-----
	Slough S 30	-----	-----	-----
	Slough SW 29	-----	-----	-----
	Beaver Pond SW 28	1 f + 4, IIb ducklings	Jul 20	feeding
	Slough SE 29	1 f + 3, Ia ducklings	Jul 20	feeding
green-winged teal	Coyote Lake	-----	-----	-----
	Slough S 30	-----	-----	-----
	Slough SW 29	-----	-----	-----
	Beaver Pond SW 28	2 f or eclipse m 1 f + 4, IIc ducklings } 2 juveniles (fledged)	Jul 20 Jul 27	resting on partly submerged log feeding
	Slough SE 29	-----	-----	-----
blue-winged teal	Coyote Lake	2 adults (f or m eclipse)	Jul 20	feeding above outlet beaver ponds - openings in sedge fen
	Slough S 30	-----	-----	-----
	Slough SW 29	-----	-----	-----
	Beaver Pond SW 29	1 f + 4, III ducklings	Jul 27	feeding
	Slough SE 29	-----	-----	-----

Species	Wetland ¹	Status	Date	Comments
ring-necked duck	Coyote Lake	5 f adults; 1 f + 4, 1a ducklings	Jul 20	beaver ponds at outlet
	Slough S 30	1 f	Jul 22	main lake
	Slough SW 29	1 f	Jul 26	may have been a juvenile
		3 f at least	Jul 24	probably adults (together in group)
	Beaver Pond SW 28	1 f; 1 f + 4, 1Ib ducklings	Jul 27	feeding
	Slough SE 29	2 pair; 1 f + 7, 1Ia ducklings	Jul 20	feeding; pairs swimming, not diving
Tesser scaup	Coyote Lake	1 f + 3, 1b ducklings	Jul 12	ducklings close to females and near shore; ducklings feeding
		1 f + 7, 1c ducklings		
		1 f + 6, 1c ducklings		
		1 f + 10, 1b ducklings		
		1 f + 5, 1Ia ducklings	Jul 18	behavior as for July 12
		1 f + 5, 1Ia ducklings	Jul 27	group well out from shore, all diving
		1 f + 4, 1Ib ducklings	-----	-----
		-----	-----	-----
		Slough S 30	-----	-----
		Slough SW 29	-----	-----
	Beaver Pond SW 28	-----	-----	
	Slough SE 29	1 f + 4, 1c ducklings	Jul 20	close to shore, ducklings diving
bufflehead	Coyote Lake	-----	-----	-----
	Slough S 30	-----	-----	-----
	Slough SW 29	-----	-----	-----
	Beaver Pond SW 28	4, 1II ducklings, not fledged	Jul 27	together in group, diving
	Slough SE 29	-----	-----	-----

Species	Wetland ¹	Status	Date	Comments
black tern	Coyote Lake	20 adults	Jul 12	feeding over lake, especially toward west side
		15 adults + 1 fledged juvenile	Jul 18	feeding over all lake area
		5 adults	Jul 22	feeding over all lake area
		2 adults + 1 fledged juvenile	Jul 27	adults still feeding young occasionally
	1 adult	Aug 13	starting to molt; feeding over water	
	Slough S30	-----	-----	-----
	Slough SW 29	2 pair	Jul 24	adults appeared to be feeding unfledged juveniles in dense cattail
	Beaver Pond SW 28	-----	-----	-----
	Slough SE 29	-----	-----	-----

¹ Wetlands arranged in decreasing order of size.

grebes, diving ducks, mergansers), long-legged waders (great blue heron, bittern), gulls and terns (common tern, black tern, Bonaparte's gull, Franklin's gull, California gull, ring-billed gull) and belted kingfisher. It is also superior nesting habitat for the common loon, red-necked grebe (this species builds floating nests), ring-necked duck, lesser scaup, Canada goose and black tern (Table 2). On the other hand, dabbling ducks showed a greater preference for shallow sloughs and beaver ponds. The association of bufflehead, eastern kingbird and tree swallow with beaver ponds (especially SW 28) is related to the presence of suitable nesting cavities in standing drowned trees (although the bufflehead will nest in suitable forest stubs some distance from water). Standing drowned trees also provide lookout and feeding perches for belted kingfishers and a variety of hawks, eagles and owls (only red-tailed hawks were observed on this survey).

A probable belted kingfisher nest burrow was found in a cutbank along the old trail to the south of Slough S 30, so this species may nest in the study area. However, only single individuals were seen at any one time, and all appeared adult.

Red-winged blackbirds nested on the periphery of all open-water wetlands. This adaptable species will nest in cattail stands and large sedge clumps, in addition to willows and birch (Section 4.5.2).

4.7.3 Amphibians

No frog or toad tadpoles, nor larval tiger salamanders were seen in the main open water areas of Coyote Lake.

4.7.4 Fish

The purpose of a trip on August 26, 1987 (Dr. Joe Nelson, Zoology; Wayne Roberts, Zoology Museum; and assistants, all from the University of Alberta) was to sample Coyote Lake and two stream channels (one entering Slough SE 29 from the south, the other an outlet which connected to Slough SW 29 and which ultimately reaches the North Saskatchewan River). Fish had been observed at these sites earlier in the summer but no collections were made.

In Coyote Lake, both brook stickleback (Culaea inconstans) and fathead minnow (Pimephales promelas) are permanent residents. Both species ranged in size from somewhat under 15 mm total length to approximately 50 mm total length. The samples have not yet been fully analysed (Nelson 1987), but initial assessment indicates that both species seem normal morphologically (in some situations, brook stickleback have a reduced number of dorsal spines and/or loss of all or part of the external pelvic skeleton), as well as being generally healthy.

In the sample of 100 sticklebacks, nine were hosting Schistocephalus solidus larvae. This tapeworm is common in sticklebacks in eutrophic lakes in the Edmonton region where, even as a larva (its form in the fish host), it has a debilitating effect, affecting locomotion, feeding behavior, reproductive capability and general vitality (Robinson 1972). The larvae mature in the intestinal tract of almost any bird that eats the infected fish. However, passage through the bird is rapid and, in three to four days, the entire worm is eliminated, as it cannot attach to the intestinal wall (Hopkins and Smyth 1951). Thus, this parasite seems to endanger birds only if a large number of infected fish are eaten in a short period. The rate of infection in Coyote Lake seems quite low - nine per cent in sticklebacks and four per cent in fathead minnows. Additionally, four per cent of the sticklebacks are infected with a tumor-causing virus. The only fish species in the stream samples was the brook stickleback (this drainage system is not directly connected to Coyote Lake). These fish are generally smaller than brook sticklebacks in lakes and a few seem to show incomplete pelvic skeletons. One was hosting Schistocephalus larvae, while none appeared to have the virus tumor.

4.8 Seral Scrub (Ss)

This transitional community occurs as isolated small areas usually surrounded by continuous poplar forest and, except for beaver-cleared slopes, occurred almost exclusively on south-facing slopes. No two sites are identical (Section 3.15). Nevertheless, a number of mammals and birds are characteristic of, or use, this habitat extensively.

4.8.1 Mammals

At least nine mammals frequent this habitat. Some, such as black bear, moose, deer, coyote, snowshoe hare and weasel, are transients. Slopes dominated by herbs (such as those at Quadrat 4) attract deer and snowshoe hares in summer, but others with a larger shrub component are preferred by bears (during the fruit season) and moose (especially for winter browsing).

The most common small mammal on beaver-cut slopes is the least chipmunk. Stumps and felled tree trunks provide lookout posts and travelways, herbs and shrubs, and abundant food and escape cover. The less common and conspicuous Franklin's ground squirrel is another occupant of this habitat. The woodchuck is sporadic in its occurrence, and none were seen during this survey.

4.8.2 Birds

A total of 23 species has been recorded in this habitat (13 confirmed nesting, seven transient, three winter), of which 17 were observed during the 1987 survey.

Nesting species that seem universal, regardless of variation in vegetation, are: yellow warbler, goldfinch and clay-colored sparrow. Other species are more characteristic of the "edge" between poplar forest and the seral scrub and do not actually nest in the latter. These include mourning dove, northern flicker, house wren, catbird, robin, veery (one heard singing in a very dense pincherry stand at the top of one slope), cedar waxwing and brown-headed cowbird. A savannah sparrow was noted only on the grazed seral scrub (Quadrat 9).

4.9 Disturbed Ground (Dg)

This includes primarily the land around the Hopkins' residence and a small pasture area in SE 32. There are also several oil well access tracks and clearings (some of which have been abandoned and seeded to grass), other tracks (especially in Section 29), cutlines and fence line clearings.

4.9.1 Mammals

Most mammals were associated with the Hopkins' residence and the nearby pasture. Deer (both mule and white-tailed) are frequent visitors (salt blocks were set out by the Hopkins). Franklin's ground squirrels are resident, with dens at the edge of shrub clumps and patches of young aspen. A number of pocket gopher mounds are near the upper edge of the pasture, the only site where evidence of this mammal was found. In this area, it is at the western limits of its range (Soper 1964). Short-tailed weasel, voles (probably Microtus pennsylvanicus), deermice and shrews are common in this habitat.

Larger mammals use the oil well tracks and other trails for travel routes.

4.9.2 Birds

A total of 21 species has been recorded in this habitat (eight nesting, 11 feeding, two winter visitor), of which six were seen during the 1987 survey: mourning dove, northern flicker, yellow warbler, clay-colored sparrow, American goldfinch and savannah sparrow. A nest box in the pasture usually attracts a pair of mountain bluebirds. The

only phoebe seen in the study area has built a nest above the Hopkins' garage door annually since 1980.

4.9.3 Reptiles

The only reptile in the area is the red-sided garter snake, which was recorded by the Hopkins in open sites near their house and the pasture to the west. Numbers appear to be declining, as sightings have decreased in recent years.

5. DISCUSSION

5.1 Rare Plants

The most recent list of the rare vascular plants of Alberta is that of Packer and Bradley (1984). These authors have, "for the most part, included species known from five or fewer localities and collections". Included in their list are both species which are rare in the sense of only occurring in small populations, and species which are locally abundant but of a very restricted distribution in Alberta.

The major areas of concentration of rare plant species in Alberta are: (1) the southwest corner of the province (including Waterton Lakes National Park), (2) the dry grassland region along the United States boundary, and (3) the Lake Athabasca region of northeast Alberta (Wallis et al. 1986). This is because many species which are more abundant outside Alberta's borders marginally penetrate the province in these areas. Normally, few or no rare species are encountered at sites in the Edmonton region, close to the geographic centre of the province.

Thus, the presence of several rare plants at Coyote Lake was surprising. Investigations during 1987 found three species of vascular plants on Packer and Bradley's (1984) list, together with three which are even more interesting because they are not on the list; one of these has now been confirmed as a species new to the province, while two remain unrecognized (not identifiable with existing literature, possibly undescribed). All six rare species are monocots (one Potamogeton, one grass, three Carices and one member of the Lemnaceae). Discussion of each species follows:

Potamogeton robbinsii Oakes - This species was collected in shallow water (about 1 metre depth) along the north shore of the peninsula in Coyote Lake (NE 29). The species is otherwise known in Alberta from Glenevis (north of Lac Ste. Anne on the Alexis Indian Reserve), where it was collected in shallow water of a small muskeg lake (data of specimen in University of Alberta herbarium) and from a site on the Canadian Shield (Kazan Upland) in the extreme northeast of the province. It is more common in northern Saskatchewan and Manitoba, where Looman (1986a) reported it as associated with Potamogeton praelongus and Nuphar variegatum (both also growing in Coyote Lake). The complete range was listed by Wallis (in press).

Calamagrostis sp. cf. purpurascens R.Br. - A sample of Calamagrostis collected in quaking narrow-leaved sedge fen (Mcn) in the centre of a depression on the north boundary of SW 33 (Stand 14) remains unidentified. It is characterized by long geniculate awns on the glumes. Three species with this feature are recognized in Alberta: C. purpurascens R.Br., C. montanensis Scribn. and C. rubescens Buckl. However, all are dry-ground plants with larger spikelets. No comparable specimen was found in the University of Alberta herbarium, so we can only assume that we are dealing with a rare taxon. It is generally recognized that Calamagrostis is a problematical genus which may contain undescribed or unrecognized taxa.

Carex lacustris Willd. - This species was shown to have been collected at only four Alberta localities by Packer and Bradley (1984). These are: Pigeon Lake (Ma-Me-0 Beach and Mulhurst), Buck Lake, Gunn (Lac Ste. Anne) and Beaverlodge in the Peace River region. In the Coyote Lake district, C. lacustris is abundant as the dominant or codominant species in the association here called broad-leaved sedge fen (Mcb) and its transition to narrow-leaved sedge fen (mixed sedge fen, Mcbn). This vegetation is best developed around the shores of Coyote Lake, along its outlet channel and in wet depressions in the vicinity. The conditions which lead to dominance of C. lacustris are not entirely clear. Looman (1982) suggested that stands of this species may be associated with deposition of mineral soil, something which clearly applies to the shores of Coyote Lake (silty bottom). But other stands are growing in peat. Outside Alberta, C. lacustris is more common in northern Saskatchewan and Manitoba (see Jeglum 1972-73, Hudson 1977, Looman 1982). Jeglum's sedge fen category B-14 from the Candle Lake district of Saskatchewan can probably be identified with our "mixed sedge fen" around the shores of Coyote Lake. The complete range of this species was listed by Wallis (in press).

Carex sp. cf. rostrata Stokes - This species was common in mixed sedge fen (Mcbn) along the shores of Coyote Lake. It was also collected in quaking narrow-leaved sedge fen (Mcn) in the centre of a depression on the north boundary of SW 33 (Stand 14, which also contained the unidentified Calamagrostis). It can be readily distinguished in the field from the true C. rostrata (which is also common along the shores of Coyote Lake) by the foliage: leaves 1.5 mm to 3.5 mm wide, very long (up to one metre), glaucous (pale whitish green) above, dark green beneath. This foliage is similar to that of C. lasiocarpa with which the species grows. It may well be identical with the "population of narrow-leaved C. rostrata" in the Candle Lake district (Saskatchewan) mentioned by Hudson (1977:154) on the basis of collections made by Jeglum in similar habitat.

Carex trisperma Dewey - This species was found at several sites in the Coyote Lake district in immature bog forest dominated by Ledum groenlandicum. The best known previous locality in Alberta is Elk Island National Park, where the species was collected in small bogs on several occasions. It was also collected at Glenevis and in the Swan Hills (Moss and Pegg 1963). The species has a boreal distribution, becoming more common in Eastern Canada. It is also considered rare in

Saskatchewan (Hudson 1977). The complete range was listed by Wallis (in press).

Wolffia columbiana Karsten - This species is new to Alberta. It was found abundantly (the dominant floating plant) in a large beaver pond in SW 28 (Coyote Lake Natural Area). The chemical water analysis report for this site is given in Appendix 4. Previously, the only Wolffia species reported in Alberta was W. arrhiza (L.) Wimm. (first reported by Looman 1986a). But the Coyote Lake population has now been identified as W. columbiana, following extensive study by J. G. Packer and B. Kohli. Previously, this species was reported in western Canada only from Riding Mountain National Park (Manitoba) (Cody 1980). It is widespread in eastern North America (reaching as far north as southwest Quebec), but with only isolated occurrences in the west. Like other Lemnaceae, this species can be dispersed by waterfowl. It can hardly have been introduced into Coyote Lake Natural Area by human agency, since the ponds there are not used for boating or fishing.

5.2 Affinities of Vegetation and Fauna

The Coyote Lake district was included by Strong and Leggat (1981) as being just within the eastern boundary of their Boreal Foothills ecoregion, which they described as an "ecotone between boreal and cordilleran vegetation". Their comments indicated that they determined the eastern boundary of this ecoregion by the eastern limit of the range of lodgepole pine (Pinus contorta). There is some validity in their proposal, since there is a significant cordilleran element in the forest flora in this district. We recorded five cordilleran species here at, or near, the eastern limits of their range, namely: Abies lasiocarpa, Pinus contorta, Smilacina racemosa, Listera cordata and Spiraea betulifolia. The low ridge on which Coyote Lake is situated marks the beginning of the transition from boreal mixedwood forest, typical of the Edmonton region, to cordilleran (foothills) forest types. There were no rare species in the forest flora.

However, the wetland vegetation of the Coyote Lake district does not contain any specifically cordilleran element. The flora of the lake and its immediate vicinity contains an especially strong representation of species which are more common in northern Saskatchewan and Manitoba than in Alberta, namely: Najas flexilis, Potamogeton praelongus, P. robbinsii, P. zosteriformis and Carex lacustris (two of these are on the Alberta rare plants list). The probable explanation of this situation lies in the water quality (see Appendix 4). Coyote Lake has water of low electrical conductivity but moderately high pH, i.e., slightly alkaline oligotrophic water. Lakes of this type are not known to us elsewhere in the Edmonton region, where lakes and sloughs are generally eutrophic. Of course, mountain lakes also have low conductivity, but they have a different and depauperate flora because of low water temperatures. Coyote Lake is

shallow, so becomes warm in summer. Similar habitats providing warm oligotrophic water are more likely to be found on low hills in boreal areas than at higher elevations in the foothills. The affinities of the wetland vegetation should thus be considered boreal, not cordilleran, and with a distinct eastern boreal element. The rare bog plant, Carex trisperma, as well as the lake and fen plants previously listed, represent an eastern boreal element.

Particularly characteristic of the vegetation of the Coyote Lake district is the development of extensive tracts of swamp (treed fen) and wet willow carr with similar hummocky understory. This vegetation has been given minimal discussion in works on the vegetation of Alberta, so we are unable to determine how widely distributed it may be. The greater prevalence of swamp and hummocky carr, rather than bog forest, on wet sites in this district is probably attributable to the calcareous nature of the groundwater which restricts the development of Sphagnum. The rare Carex lacustris also occurs in this habitat, as well as in open sedge fens.

Since natural grassland does not occur in the Coyote Lake district, the flora contains very few exclusively open-ground species apart from anthropochorous weeds. Only Convolvulus sepium and Rosa woodsii are considered to represent a parkland element in the native flora.

Like the flora, the fauna also contains a diversity of elements, with species characteristic of the boreal mixedwood and aspen forest predominating. Such species include the flying squirrel and red-backed vole. The lemming vole represents an exclusively boreal element. Mammals primarily distributed in the aspen parklands and here near the northern limit of their distribution in Alberta (see Soper 1964), are the Franklin's ground squirrel and northern pocket gopher. Bird species with truly boreal breeding distributions include Bonaparte's gull, greater yellowlegs, olive-sided flycatcher, hermit thrush, gray jay, boreal chickadee and red-breasted nuthatch. Several species typical of aspen forest and parkland are here near the western limits of their breeding range, namely: eastern phoebe, catbird, ruby-throated hummingbird, black tern, ring-billed gull, California gull, Franklin's gull and Wilson's phalarope (see Salt and Salt 1976). The bald eagle, golden eagle and raven are regular visitors with a cordilleran/high boreal breeding range.

5.3 Special Features

- (1) The primary special feature of the district is Coyote Lake itself, which may be of provincial significance because of its aquatic and shoreline (sedge fen) vegetation. This is the only site in Alberta where the presence of a plant community with Carex lacustris codominant has been documented. This community extends around the lakeshore and along the outflow channel. Rare and

uncommon plants occur, both in this sedge fen and in the lake itself. The vegetation of other sites in Alberta where Carex lacustris has been collected has not been surveyed, and none of these sites are protected. Coyote Lake is also special for its high diversity of waterbirds (46 species recorded to date).

- (2) The ponds in Coyote Lake Natural Area (SW 28) are of provincial (and possibly national) significance as the only known Alberta locality of Wolffia columbiana (new to Alberta).
- (3) Moist spruce forest near one of the inlets to the slough in SE 29 is of local significance as an orchid site. Five species were recorded here, including the uncommon Habenaria orbiculata and Listera cordata.
- (4) Extensive stands of moist willow carr in this district are of local significance as prime ungulate habitat, as well as high botanical diversity.
- (5) The high diversity of large mammals (moose, elk, mule deer, white-tailed deer, coyote and black bear) is of local significance.

5.4 Conclusions and Recommendations

The Coyote Lake district is an excellent choice for a conservation area from the points of view both of uniqueness and representativeness: it is unique because it contains rare plants and plant communities not reported elsewhere in Alberta; it is representative because it includes extensive tracts of forest and wetlands and their associated fauna in a natural state.

Conservation of the unique aquatic and shoreline vegetation of Coyote Lake will require maintenance of the present water quality (i.e., prevention of eutrophication). According to Looman (1986a), the two main causes of eutrophication in northern lakes are the use of motorboats and contamination by (human or livestock) faeces. Management should develop strict policies aimed at preventing either type of pollution.

We recommend further that neither stocking with sportfish nor recreational boat or canoe use of Coyote Lake be permitted. Boating would cause undue disturbance to waterbirds because of the small size of the lake. Additionally, the overwhelming aesthetic appeal of Coyote Lake lies in its natural setting, combined with the absence of human activity on the water, so that the natural behavior of birds and mammals using the lake can be observed.

Protection of the Wolffia site (Beaver Pond SW 28) will be dependent on ensuring that the beaver dam controlling the water level remains intact.

Conservation of the large mammal fauna will be dependent on retaining sufficiently extensive habitat for their long-term survival. Further clearing of public land in the district should not be permitted, and corridors for dispersal maintained.

The present survey did not extend to all land in the Coyote Lake district of potential value for inclusion in a conservation area. We recommend that surveys of additional land be conducted in the near future. We recommend further that additional information be gathered relating to the land we have surveyed in 1987, including an early-season breeding bird survey, a small mammal, amphibian and reptile survey, as well as surveys of terrestrial and aquatic insects, and other invertebrates.

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Appendix 1

STAND DESCRIPTIONS FOR 22 SAMPLE STANDS

COYOTE LAKE SURVEY

STAND DESCRIPTION

Vegetation Type: Birch - Aspen Poplar Forest Sample No.: 1 Location: NE29-49-4-W5 Date: 12th July 1987
Elevation: 2700 feet Slope: 25-50% Aspect: N Quadrat Size: 20 x 20 m
Landform & Topography: slope on knob forming peninsula in Coyote Lake

Drainage Class: rapid Hygrotope: mesic
Soil: Orthic Gray Luvisol (10 cm humus, 5-20 cm grey-brown Ae over loamy sand)

Ground cover other than vegetation (e.g. rocks, water, deadfalls, bare soil)
Deadfalls + Bare soil 1

Successional Status (early/ intermediate/ advanced/ mature)

TREES >5m high (cover, dbh, height, age if cored)	Cover	Scale
<i>Populus tremuloides</i> C5 up to 30 cm dbh 14-16 m high	+	< 1%
<i>Populus balsamifera</i> C2 up to 40 cm dbh 14-16 m high	1	1-5%
<i>Betula papyrifera</i> C2 up to 18 cm dbh 12-14 m high	2	6-15%
(Most trees of all species 10-15 cm dbh)	3	16-25%
	4	26-50%
	5	51-75%
	6	76-85%
	7	86-95%
	8	96-100%

SHRUBS 0.5 - 5 m high
Prunus virginiana C4
Cornus stolonifera C2
Amelanchier alnifolia C2
Rosa acicularis C2
Viburnum edule C2 (browsed)
Populus tremuloides saplings +
Populus balsamifera saplings +
Betula papyrifera saplings +
Ribes oxycanthoides +

DWARF SHRUBS < 0.5 m high
Viburnum edule C2 (browsed)
Lonicera involucrata C1
Ribes triste C1
Rubus pubescens C1
Symphoricarpos albus C1
Rubus idaeus +

HERBS
Gymnocarpium dryopteris C2
Aster ciliolatus C2
Mitella nuda C2
Aralia nudicaulis C2
Smilacina racemosa C1 (to 70 cm, in fruit)
Galium triflorum C1
Disporum trachycarpum C1
Maianthemum canadense C1
Agropyron trachycaulum C1
Cornus canadensis +
Viola renifolia +
Actaea rubra +
Mertensia paniculata +
Bromus ciliatus +
Calamagrostis canadensis +
Galium boreale +
Lathyrus ochroleucus +
Aster conspicuus +
Petasites palmatus +

MOSSES AND LICHENS

Mosses C1, mainly on tree bases and old deadwood

EPIPHYTES (common/ frequent scarce/ rare) - grey foliose and crustose lichens on barks, especially of *Populus balsamifera*

OTHER COMMENTS

Also noted in this stand (outside the quadrat): *Prunus pensylvanica*, *Viburnum opulus*, *Ribes lacustre* and *Corylus cornuta* (where slope less steep).

Browsing attributable to moose (dung present).

Eventual colonization by *Picea glauca* expected (trees on shoreline below). Shrubs well spaced, not dense enough to prevent tree colonization.

COYOTE LAKE SURVEY

STAND DESCRIPTION

Vegetation Type: Birch-Aspen Poplar Forest Sample No.: 2 Location: NE29-49-4-W5 Date: 12th July 19
Elevation: 2700 feet Slope: 50-60% Aspect: SW Quadrat Size: 20x20m
Landform & Topography: slope on knob forming peninsula in Coyote Lake

Drainage Class: rapid Hygrotope: mesic
Soil: Orthic Gray Luvisol (5cm humus, 5cm grey-brown Ae over loamy sand)

Ground cover other than vegetation (e.g. rocks, water, deadfalls, bare soil)
Deadfalls + Bare soil +

Successional Status (early/ intermediate/ advanced/ mature)
TREES >5m high (cover, dbh, height, age if cored)

Populus tremuloides C4 up to 29 cm dbh 18-24 m high
Betula papyrifera C3 up to 12 cm dbh 15-18 m high

Cover Scale	
+	<1%
1	1-5%
2	6-15%
3	16-25%
4	26-50%
5	51-75%
6	76-85%
7	86-95%
8	96-100%

SHRUBS 0.5 - 5 m high

Prunus virginiana C3
Amelanchier alnifolia C2
Cornus stolonifera C1
Corylus cornuta C1
Rubus idaeus C1
Populus tremuloides saplings C1
Rosa acicularis +

DWARF SHRUBS <0.5 m high

Spiraea betulifolia C1 (in flower)
Symphoricarpos albus +
Rubus pubescens +

HERBS

Aster conspicuus C3
Maianthemum canadense C2
Viola canadensis C2
Lathyrus ochroleucus C2
Aster ciliolatus C2
Smilacina stellata C2
Lathyrus venosus C2 (in flower)
Aralia nudicaulis C1
Epilobium angustifolium C1
Galium boreale C1
Schizachne purpurascens C1

Vicia americana C1
Apocynum androsaemifolium C1
Cornus canadensis C1
Clematis occidentalis +
Disporum trachycarpum +
Achillea millefolium +
Smilacina racemosa +
Petasites palmatus +
Actaea rubra +
Fragaria virginiana +

MOSSES AND LICHENS

Mosses scarce (+), mainly on tree bases

EPIPHYTES (common/ frequent/ scarce/ rare) - grey crustose lichens on old tree bark

OTHER COMMENTS

COYOTE LAKE SURVEY

STAND DESCRIPTION

Vegetation Type: Mixed Sedge Fen Sample No.: 3 Location: SW33-49-4-W5 Date: 12th July 198.
Elevation: <2700 feet Slope: level Aspect: none Quadrat Size: 10x40m
Landform & Topography: shore of Coyote Lake

Drainage Class: no drainage Hygrotope: hydric (mostly 20-30 cm water depth)
Soil: Orthic Regosol, hydric (grey alluvial silt below surface litter)

Ground cover other than vegetation (e.g. rocks, water, deadfalls, bare soil)
open water channels C2

Successional Status (early/ intermediate/ advanced/ mature)
TREES >5m high (cover, dbh, height, age if cored)

NONE

Cover	Scale
+	< 1%
1	1-5%
2	6-15%
3	16-25%
4	26-50%
5	51-75%
6	76-85%
7	86-95%
8	96-100%

SHRUBS 0.5 - 5 m high
Salix planifolia C1

DWARF SHRUBS <0.5 m high
Salix pedicellaris +
Betula pumila var. *glandulifera* +

HERBS	
<i>Carex lacustris</i> C3	in fruit
<i>Carex lasiocarpa</i> C3	in fruit
<i>Carex</i> sp. cf. <i>rostrata</i> C2	in fruit
<i>Carex aquatilis</i> C2	in fruit
<i>Calla palustris</i> C2	in fruit
<i>Calamagrostis canadensis</i> C1	flowering
<i>Carex rostrata</i> C1	in fruit
<i>Nuphar variegatum</i> C1	(in channels) flowering
<i>Potentilla palustris</i> C1	
<i>Cicuta bulbifera</i> C1	flowering
<i>Equisetum fluviatile</i> C1	
<i>Menyanthes trifoliata</i> C1	in fruit
<i>Caltha palustris</i> +	
<i>Typha latifolia</i> +	
<i>Lycopus uniflorus</i> +	on mounds
<i>Scutellaria galericulata</i> +	on mounds
<i>Rumex occidentalis</i> +	
<i>Triglochin maritima</i> +	in fruit
<i>Bidens cernua</i> +	on mounds
<i>Polygonum amphibium</i> +	

FLOATING HERBS		
<i>Spirodela polyrhiza</i> C2	<i>Utricularia minor</i> C2	Also fragments of <i>Potamogeton</i> spp
<i>Lemna minor</i> C2	<i>Lemna trisulca</i> +	and <i>Najas flexilis</i> drifted in from

MOSSES AND LICHENS

Mosses scarce (+), around *Carex* tussocks

EPIPHYTES (common/ frequent/ scarce/ rare) - NONE

OTHER COMMENTS

No clear zonation between narrow-leaved (*Carex lasiocarpa*-dominated) and broad-leaved (*C. lacustris* dominated) fen at this site.

Mr. Hopkins reports that the lake level has risen about 15 cm in the last 2 years. The shrub appear under stress, and are probably persistent from an earlier phase with shallower water.

COYOTE LAKE SURVEYSTAND DESCRIPTION

Vegetation Type: *Seral Scrub* Sample No.: 4 Location: SW33-49-4-W5 Date: 14th July 1987
 Elevation: 2750 feet Slope: 20-25% Aspect: S Quadrat Size: 20 x 20 m
 Landform & Topography: *burnt-over slope*

Drainage Class: *rapid* Hygrotope: *mesic*
 Soil: *Orthic Gray Luvisol (10 cm humus, then grey-brown Ae over loamy sand)*

Ground cover other than vegetation (e.g. rocks, water, deadfalls, bare soil)
NONE

Successional Status (early/ intermediate/ advanced/ mature)
 TREES >5m high (cover, dbh, height, age if cored)

Cover	Scale
+	< 1%
1	1-5%
2	6-15%
3	16-25%
4	26-50%
5	51-75%
6	76-85%
7	86-95%
8	96-100%

NONE

SHRUBS 0.5 - 5 m high

<i>Prunus virginiana</i> C2	<i>Cornus stolonifera</i> +
<i>Rubus idaeus</i> C2	<i>Salix bebbiana</i> +
<i>Prunus pensylvanica</i> C1	<i>Populus tremuloides</i> saplings +
<i>Rosa acicularis</i> C1	<i>Populus balsamifera</i> saplings +
<i>Rosa woodsii</i> C1	

DWARF SHRUBS < 0.5 m high

NONE

HERBS

<i>Lathyrus venosus</i> C6	flowering, to 1.25 m (browsed)
<i>Epilobium angustifolium</i> C6	flowering, to 1.5 m (browsed)
<i>Apocynum androsaemifolium</i> C4	flowering, to 75 cm
<i>Aster conspicuus</i> C3	with flower buds, to 1 m
<i>Calamagrostis canadensis</i> C2	flowering, to 1.5 m
<i>Vicia americana</i> C1	flowering, to 1.25 m
<i>Convolvulus sepium</i> C1	flowering, to 80 cm
<i>Heracleum lanatum</i> +	in fruit, to 1.25 m
<i>Sanicula marilandica</i> +	in fruit, to 1 m
<i>Bromus ciliatus</i> +	flowering, to 1.25 m

MOSES AND LICHENS

NONE

EPIPHYTES (common/ frequent/ scarce/ rare) *NONE*

OTHER COMMENTS

*Also noted in this stand (outside the quadrat): Viburnum opulus.
 Trees extirpated by succession of fires (the latest 9 years ago). Establishment of tree seedlings presently impeded by dense herb growth. Slow succession to birch-aspen poplar forest expected, if no further fires occur.
 Deer feed and bed down here (mainly eating Epilobium and Lathyrus).*

COYOTE LAKE SURVEY

STAND DESCRIPTION

Vegetation Type: Birch-Poplar Forest Sample No.: 5 Location: SW33-49-4-W5 Date: 14th July 1987
 Elevation: 2750 feet Slope: 10-15% Aspect: N Quadrat Size: 20 x 20 m
 Landform & Topography: slope above wet depression in hummocky terrain

Drainage Class: well Hygrotope: mesic
 Soil: Orthic Gray Luvisol (5 cm humus over deep grey-brown A₂)

Ground cover other than vegetation (e.g. rocks, water, deadfalls, bare soil)
 Deadfalls C1

Successional Status (early/ intermediate/ advanced/ mature)

TREES >5m high (cover, dbh, height, age if cored)				Cover Scale
<i>Populus balsamifera</i>	C5	up to 53 cm dbh	to 20 m high	+ <1%
<i>Populus tremuloides</i>	C2	up to 29 cm dbh	to 18 m high	1 1-5%
<i>Alnus tenuifolia</i>	C2	up to 12 cm dbh	to 7 m high	2 6-15%
<i>Betula papyrifera</i>	C1	up to 19 cm dbh	to 15 m high	3 16-25%
				4 26-50%
				5 51-75%
SHRUBS 0.5 - 5 m high				6 76-85%
<i>Viburnum edule</i>	C2	browsed	<i>Lonicera involucrata</i>	+ 7 86-95%
<i>Cornus stolonifera</i>	C2		<i>Lonicera dioica</i>	+ 8 96-100%
<i>Prunus virginiana</i>	C1		<i>Rosa acicularis</i>	+ 8 96-100%
<i>Alnus crispa</i>	C1		<i>Viburnum opulus</i>	+ 8 96-100%
<i>Corylus cornuta</i>	C1		<i>Populus balsamifera</i> suckers	+
<i>Rubus idaeus</i>	C1		<i>Populus tremuloides</i> suckers	+
<i>Alnus tenuifolia</i>	C1			

DWARF SHRUBS <0.5 m high

Rubus pubescens C2
Symphoricarpos albus C1
Linnaea borealis +
Prunus virginiana seedlings +

HERBS

<i>Mitella nuda</i>	C2		<i>Botrychium virginianum</i>	+
<i>Aralia nudicaulis</i>	C2	in fruit	<i>Gymnocarpium dryopteris</i>	+
<i>Osmorhiza depauperata</i>	C1	to 85 cm, in fruit	<i>Disporum trachycarpum</i>	+
<i>Aster conspicuus</i>	C1	to 1 m, with flowerbuds	<i>Clematis occidentalis</i>	+ climbing to 1.5 m
<i>Bromus ciliatus</i>	C1		<i>Galium triflorum</i>	+
<i>Smilacina racemosa</i>	C1	to 80 cm, in fruit	<i>Poa pratensis</i>	+
<i>Lathyrus ochroleucus</i>	C1	to 1.25 m, in fruit	<i>Epilobium angustifolium</i>	+ to 1 m
<i>Petasites palmatus</i>	C1		<i>Mertensia paniculata</i>	+
<i>Fragaria virginiana</i>	C1		<i>Maianthemum canadense</i>	+
<i>Cornus canadensis</i>	C1		<i>Aster ciliolatus</i>	+
<i>Galium boreale</i>	C1		<i>Actaea rubra</i>	+
			<i>Viola renifolia</i>	+

MOSES AND LICHENS

Mosses scarce (+), on tree bases and old deadwood on ground

EPIPHYTES (common/ frequent/ scarce/ rare) - grey foliose lichens on bark, especially of old *Alnus*; orange crustose lichens (*Xanthoria*) on *Populus balsamifera*

OTHER COMMENTS

Browsing by ungulates light

COYOTE LAKE SURVEYSTAND DESCRIPTION

Vegetation Type: Birch Swamp Sample No.: 6 Location: SW33-49-4-WS Date: 14th July 1987
 Elevation: 2750 feet Slope: level Aspect: none Quadrat Size: 20x20 m
 Landform & Topography: moist depression on hummocky terrain

Drainage Class: very poor Hygrotope: hygric to subhydryc
 Soil: Fibrisol (fibrous peat >30 cm)

Ground cover other than vegetation (e.g. rocks, water, deadfalls, bare soil)
 NONE

Successional Status (early/ intermediate/ advanced/ mature)

TREES >5m high (cover, dbh, height, age if cored)

Cover	Scale
+	<1%
1	1-5%
2	6-15%
3	16-25%
4	26-50%
5	51-75%
6	76-85%
7	86-95%
8	96-100%

Betula nealaskana C2 up to 7 cm dbh 5-6 m high (lightly browsed)

SHRUBS 0.5 - 5 m high

Betula pumila var. *glandulifera* C4 (lightly browsed)
Salix pedicellaris C1
Betula nealaskana saplings C1 (lightly browsed)
Salix bebbiana +
Lonicera involucrata +

DWARF SHRUBS <0.5 m high

Rubus arcticus ssp. *acaulis* C3
Salix pedicellaris C1

HERBS

<i>Calamagrostis canadensis</i>	C6	flowering	<i>Triglochin maritima</i>	+	80 cm
<i>Potentilla palustris</i>	C4	to 60 cm, flowering	<i>Equisetum fluviatile</i>	+	to 80 cm, in wet holes
<i>Bromus ciliatus</i>	C1	on drier mounds	<i>Rumex occidentalis</i>	+	
<i>Geum macrophyllum</i>	C1	to 80 cm, flowering	<i>Habenaria hyperborea</i>	+	flowering
<i>Aster puniceus</i>	C1	to 1m, with flowerbuds	<i>Stellaria longifolia</i>	+	
<i>Menyanthes trifoliata</i>	C1	in wet holes	<i>Epilobium angustifolium</i>	+	
<i>Viola palustris</i>	C1		<i>Epilobium leptophyllum</i>	+	flowering
<i>Lysimachia thyrsiflora</i>	C1	flowering	<i>Potentilla norvegica</i>	+	flowering
<i>Carex diandra</i>	C1	in fruit	<i>Aster modestus</i>	+	
<i>Carex curta</i>	+	in fruit	<i>Scutellaria galericulata</i>	+	
<i>Cicuta bulbifera</i>	+	seedlings			
<i>Caltha palustris</i>	+	in fruit			

MOSESSES AND LICHENS

Sphagnum warnstorffii C1
 Mosses C5, mostly *Polytrichum commune* (*Campylium stellatum* also collected)

EPIPHYTES (common) frequent/ scarce/ rare) - green fruticose and grey foliose lichens on *Betula* bark

OTHER COMMENTS

Also noted in this stand (outside the quadrat): *Larix laricina*. It is possible that *Larix* is the eventual dominant at this site.

Beds of moose or deer noted.

COYOTE LAKE SURVEY

STAND DESCRIPTION

Vegetation Type: *Balsam Willow Carr* Sample No.: 7 Location: SW33-49-4-WS Date: 14th July 198
Elevation: 2700 feet Slope: level Aspect: none Quadrat Size: 20x20m
Landform & Topography: moist depression on hummocky terrain

Drainage Class: very poor Hygrotope: hygric
Soil: *Fibrisol*

Ground cover other than vegetation (e.g. rocks, water, deadfalls, bare soil)

NONE

Successional Status (early/ intermediate/ advanced/ mature)

TREES >5m high (cover, dbh, height, age if cored)

Betula neoalaskana C1 up to 7cm dbh 5-6m high

Cover	Scale
+	<1%
1	1-5%
2	6-15%
3	16-25%
4	26-50%
5	51-75%
6	76-85%
7	86-95%
8	96-100%

SHRUBS 0.5 - 5 m high

Salix pyrifolia C4
Betula neoalaskana C2 heavily browsed
Rubus idaeus C1
Salix planifolia C1
Salix bebbiana C1
Salix petiolaris +
Ribes hirtellum +

DWARF SHRUBS <0.5 m high

Rubus chamaemorus C3
Vaccinium myrtilloides C3
Ledum groenlandicum C2
Rubus arcticus ssp. acaulis C2

HERBS

<i>Calamagrostis canadensis</i> C4	<i>Galium triflorum</i> +
<i>Epilobium angustifolium</i> C1	<i>Potentilla palustris</i> +
<i>Carex brunnescens</i> C1	<i>Caltha palustris</i> +
<i>Equisetum sylvaticum</i> C1	<i>Solidago canadensis</i> +
<i>Petasites vitifolius</i> C1	<i>Petasites sagittatus</i> +
<i>Carex lacustris</i> C1	<i>Lathyrus ochroleucus</i> +
<i>Aster puniceus</i> + 80cm	<i>Geum macrophyllum</i> +
<i>Hieracium umbellatum</i> + on mounds	<i>Aster modestus</i> +
<i>Equisetum arvense</i> +	<i>Carex bebbii</i> +
<i>Scutellaria galericulata</i> +	
<i>Stellaria longifolia</i> +	

MOSSES AND LICHENS

Sphagnum warnstorffii C2
 Mosses C1 (mainly *Drepanocladus*)

EPIPHYTES (common/ frequent/ scarce rare) - grey foliose lichens on old *Salix* stems

OTHER COMMENTS

This stand is surrounded by beds of *Calamagrostis canadensis*, a socation suggestive of former disturbance (such as fire). The vegetation probably does not represent the final stage of succession, but a stage in bog redevelopment following disturbance.

COYOTE LAKE SURVEY

STAND DESCRIPTION

Vegetation Type: Larch-Black Spruce Swamp Sample No.: 8 Location: SE32-49-4-WS Date: 18th July 1987
 Elevation: <2700 feet Slope: level Aspect: none Quadrat Size: 20x20m
 Landform & Topography: lowlying seepage zone only slightly above lake level

Drainage Class: very poor Hygrotope: hygric to subhydryc
 Soil: Fibrisol (deep fibrous peat)

Ground cover other than vegetation (e.g. rocks, water, deadfalls, bare soil)
 Deadfalls C2

Successional Status (early/ intermediate/ advanced/ mature)

TREES >5m high (cover, dbh, height, age if cored)	Cover	Scale
<i>Picea mariana</i> C2 up to 22 cm dbh to 12m high	+	<1%
<i>Larix laricina</i> C2 up to 18 cm dbh to 15m high	1	1-5%
<i>Alnus tenuifolia</i> + up to 8 cm dbh 5-6 m high	2	6-15%
	3	16-25%
	4	26-50%
	5	51-75%

SHRUBS 0.5 - 5 m high

<i>Betula pumila</i> var. <i>glandulifera</i> C3	<i>Salix planifolia</i> C1 (in hollows)	6	76-85%
<i>Larix laricina</i> saplings C2	<i>Salix pyrifolia</i> C1 (in hollows)	7	86-95%
<i>Picea mariana</i> saplings C1	<i>Salix serissima</i> + (in hollow)	8	96-100%
<i>Betula nealaskana</i> saplings C1			
<i>Salix pedicularis</i> C1 (on mounds)			
<i>Alnus tenuifolia</i> C1 (in hollows)			

DWARF SHRUBS <0.5 m high

<i>Ledum groenlandicum</i> C2 (on mounds)	<i>Rubus chamaemorus</i> + (on mounds)
<i>Rubus arcticus</i> ssp. <i>acaulis</i> C1 (on mounds)	<i>Rubus pubescens</i> + (on mounds)
<i>Vaccinium vitis-idaea</i> + (on mounds)	<i>Gaultheria hispidula</i> + (on mounds)
<i>Oxycoccus quadripetalus</i> + (on mounds)	<i>Lonicera involucrata</i> + (on mounds)

HERBS

<i>Carex disperma</i> C5 fruiting	<i>Aster puniceus</i> + with flower buds
<i>Equisetum fluviatile</i> C5 (in hollows)	<i>Stellaria longifolia</i> +
<i>Caltha palustris</i> C3 fruiting (in hollows)	<i>Epilobium palustre</i> + flowering (in hollows)
<i>Menyanthes trifoliata</i> C3 fruiting (in hollows)	<i>Orthilia secunda</i> + (on mounds)
<i>Glyceria striata</i> C3 flowering (in hollows)	<i>Poa pratensis</i> + (on mounds)
<i>Potentilla palustris</i> C2 (in hollows)	<i>Habenaria hyperborea</i> +
<i>Carex paupercula</i> C1 fruiting	<i>Carex aquatilis</i> + (in hollows)
<i>Petasites sagittatus</i> C1 (in hollows)	<i>Fragaria virginiana</i> + (on mounds)
<i>Smilacina trifolia</i> C1 fruiting	<i>Bromus ciliatus</i> + flowering (on mounds)
<i>Viola palustris</i> C1	<i>Carex tenuiflora</i> + (in hollows)
<i>Carex curta</i> C1 fruiting (in hollows)	<i>Agrostis scabra</i> + flowering (in hollows)
<i>Calamagrostis canadensis</i> + (on mounds)	<i>Chrysosplenium iowense</i> + (in hollows)
<i>Rumex occidentalis</i> + flowering	<i>Taraxacum officinale</i> + (on mounds)
<i>Galium labradoricum</i> + flowering	<i>Aster ciliolatus</i> + (on mound)
<i>Epilobium ciliatum</i> + flowering (in hollows)	<i>Galium triflorum</i> +
	<i>Carex lacustris</i> +

MOSSES AND LICHENS

<i>Sphagnum warnstorffii</i> C3	<i>Polytrichum</i> + (on dry mounds)	<i>Cladonia rangiferina</i> +
<i>Marchantia polymorpha</i> C1	Diverse other mosses C5	

EPIPHYTES (common) frequent/ scarce/ rare) - *Fistulariella* abundant on *Larix* and *Picea*

OTHER COMMENTS

Picea mariana, ericaceous shrubs etc. generally growing on raised mounds under ombrotrophic conditions. Presence of mounds creates diversity of microhabitats, hence high diversity of plant species.

Also noted in this stand (outside the quadrat): *Cornus stolonifera*, *Triglochin maritima* (in hollows), *Andromeda polifolia* (on mounds), *Eriophorum viridi-carinatum*, *Epilobium angustifolium* (on mounds), *Drosera rotundifolia* (on mounds) and *Moneses uniflora* (on mound).

COYOTE LAKE SURVEY

STAND DESCRIPTION

Vegetation Type: Grazed Seral Scrub Sample No.: 9 Location: SE32-49-4-W5 Date: 18th July 1987
 Elevation: 2750 feet Slope: 25% Aspect: S Quadrat Size: 20x20m
 Landform & Topography: burnt-over slope grazed by cattle

Drainage Class: rapid Hygrotope: mesic
 Soil: Orthic Gray Luvisol (5 cm humus over grey-brown Ae)

Ground cover other than vegetation (e.g. rocks, water, deadfalls, bare soil)
Deadfalls +

Successional Status (early/ intermediate/ advanced/ mature)
 TREES >5m high (cover, dbh, height, age if cored)

Cover	Scale
+	< 1%
1	1-5%
2	6-15%
3	16-25%
4	26-50%
5	51-75%
6	76-85%
7	86-95%
8	96-100%

NONE

SHRUBS 0.5 - 5 m high - All shrubs heavily browsed, few exceeding 1.5m high

<i>Corylus cornuta</i>	C3	<i>Prunus virginiana</i>	C1
<i>Salix bebbiana</i>	C2	<i>Rosa acicularis</i>	C1
<i>Populus tremuloides</i> saplings	C1	<i>Symphoricarpos occidentalis</i>	C1
<i>Prunus pensylvanica</i>	C1		
<i>Amelanchier alnifolia</i>	C1		
<i>Rosa woodsii</i>	C1		

DWARF SHRUBS < 0.5 m high

<i>Symphoricarpos occidentalis</i>	C3	<i>Rubus idaeus</i>	+
<i>Corylus cornuta</i>	C1	<i>Rosa woodsii</i>	+
<i>Populus tremuloides</i> saplings	C1	<i>Rosa acicularis</i>	+
<i>Spiraea betulifolia</i>	C1		

HERBS

<i>Trifolium repens</i>	C6	open ground	<i>Vicia americana</i>	+	in thickets
<i>Aster ciliolatus</i>	C3	mainly on open ground	<i>Castilleja miniata</i>	+	open ground
<i>Poa pratensis</i>	C3	open ground	<i>Lathyrus ochroleucus</i>	+	in thickets
<i>Trifolium pratense</i>	C2	open ground and thickets	<i>Aster conspicuus</i>	+	thicket edges
<i>Taraxacum officinale</i>	C2	open ground	<i>Epilobium angustifolium</i>	+	thicket edges
<i>Achillea millefolium</i>	C1	open ground	<i>Silene noctiflora</i>	+	open ground
<i>Campanula rotundifolia</i>	C1	in thickets	<i>Arabis glabra</i>	+	open ground and thicket edge
<i>Lathyrus venosus</i>	C1	in thickets	<i>Crepis tectorum</i>	+	open ground
<i>Fragaria virginiana</i>	C1	open ground and thickets	<i>Stellaria longipes</i>	+	thicket edges
<i>Galium boreale</i>	C1	in thickets	<i>Viola canadensis</i>	+	in thickets
<i>Aralia nudicaulis</i>	+	in thickets	<i>Plantago major</i>	+	open ground
<i>Apocynum androsaemifolium</i>	+	thicket edges	<i>Stachys palustris</i>	+	in thickets
<i>Bromus ciliatus</i>	+	in thickets	<i>Thalictrum venulosum</i>	+	in thickets
<i>Phleum pratense</i>	+	open ground	<i>Cerastium vulgatum</i>	+	open ground
<i>Gentianella amarella</i>	+	thicket edges	<i>Lilium philadelphicum</i>	+	open ground, browsed
MOSSES AND LICHENS			<i>Sanicula marilandica</i>	+	thicket edge, in fruit
			<i>Oryzopsis asperifolia</i>	+	open ground

NONE

EPIPHYTES (common/ frequent/ scarce/ rare) - grey crustose lichens on larger dead stems of shrubs

OTHER COMMENTS

Also noted in this stand (outside the quadrat): *Medicago sativa*.

Heavily grazed by cattle during the summer.

COYOTE LAKE SURVEY

STAND DESCRIPTION

Vegetation Type: *Bog Forest* Sample No.: *10* Location: *SE32-49-4-WS* Date: *18th July 1987*
Elevation: *<2750 feet* Slope: *level* Aspect: *none* Quadrat Size: *20 x 20 m*
Landform & Topography: *moist depression in hummocky terrain*

Drainage Class: *poor* Hygrotope: *hygric*
Soil: *Fibrisol (Sphagnum peat)*

Ground cover other than vegetation (e.g. rocks, water, deadfalls, bare soil)
NONE

Successional Status (early/intermediate/ advanced/ mature)
TREES >5m high (cover, dbh, height, age if cored)

Cover	Scale
+	< 1%
1	1-5%
2	6-15%
3	16-25%
4	26-50%
5	51-75%
6	76-85%
7	86-95%
8	96-100%

NONE

SHRUBS 0.5 - 5 m high

Betula nealaskana saplings C4
Betula pumila var. *glandulifera* +

DWARF SHRUBS <0.5 m high

Ledum groenlandicum C7 with mature seed
Rubus chamaemorus C5 fruit fallen
Vaccinium vitis-idaea C3 in fruit
Oxycoccus microcarpus +
Andromeda polifolia +
Vaccinium myrtilloides +

HERBS

Carex trisperma C1
Eriophorum vaginatum +
Smilacina trifolia +

MOSES AND LICHENS

Sphagnum warnstorffii and *fuscum* C7
Polytrichum juniperinum C1

EPIPHYTES (common/frequent/ scarce/ rare) - *Diverse lichens on Betula (Fistulariella, greenish brown foliose, grey crustose, grey foliose); bright yellow foliose lichen on old Ledum stems.*

OTHER COMMENTS

Betula browsed by moose (stems broken 1.5-1.8 m above ground); moose dung present. Chipping by snowshoe hares also noted on *Betula*.

Succession to bog forest is occurring, as evidenced by abundance of saplings of *Betula nealaskana*. The absence of *Picea mariana* is puzzling, and may merely reflect lack of a seed source.

COYOTE LAKE SURVEY

STAND DESCRIPTION

Vegetation Type: White Spruce Forest Sample No.: 11 Location: SE29-49-4-WS Date: 20th July 1987
 Elevation: >2650 feet Slope: level Aspect: none Quadrat Size: 20x20 m
 Landform & Topography: lowlying bench near slough inlet (at base of N-facing slope)

Drainage Class: poor Hygrotope: subhygric
 Soil: Mesisol (deep moss peat)

Ground cover other than vegetation (e.g. rocks, water, deadfalls, bare soil)
 Stumps and Deadfalls C1 Bare soil around trees C1

Successional Status (early/ intermediate/ advanced/ mature)

TREES >5m high (cover, dbh, height, age if cored)		Cover	Scale
<i>Picea glauca</i> C5	11-38 cm dbh up to 25 m high	+	<1%
<i>Picea mariana</i> C3	14-22 cm dbh up to 20 m high	1	1-5%
<i>Betula neolaskana</i> C1	to 8 cm dbh up to 10 m high, chipped by snowshoe hares	2	6-15%
		3	16-25%
		4	26-50%
		5	51-75%
SHRUBS 0.5 - 5 m high		6	76-85%
<i>Betula neolaskana</i> saplings C1		7	86-95%
<i>Picea glauca</i> saplings +		8	96-100%
<i>Picea mariana</i> saplings +			
<i>Ribes hudsonianum</i> + in fruit			

DWARF SHRUBS <0.5 m high

<i>Linnaea borealis</i> C2	<i>Vaccinium vitis-idaea</i>	+
<i>Rubus pubescens</i> C1	<i>Gaultheria hispidula</i>	+
<i>Rubus arcticus</i> ssp. <i>acaulis</i> C1	<i>Vaccinium myrtilloides</i>	+
<i>Shepherdia canadensis</i> +	<i>Cornus stolonifera</i>	+
<i>Lonicera dioica</i> +	<i>Lonicera involucrata</i>	+

HERBS

<i>Carex vaginata</i> C5 in fruit	<i>Aralia nudicaulis</i>	+
<i>Carex disperma</i> C3 in fruit	<i>Equisetum fluviatile</i>	+
<i>Equisetum arvense</i> C3	<i>Streptopus amplexifolius</i>	+ in fruit
<i>Cornus canadensis</i> C2	<i>Agropyron trachycaulum</i>	+
<i>Mitella nuda</i> C2 in fruit	<i>Carex atherodes</i>	+
<i>Goodyera repens</i> C1 flowering	<i>Viola renifolia</i>	+
<i>Equisetum pratense</i> C1	<i>Lathyrus ochroleucus</i>	+
<i>Orthilia secunda</i> C1 flowering	<i>Equisetum scirpoides</i>	+
<i>Geocaulon lividum</i> C1 in fruit	<i>Galium triflorum</i>	+
<i>Smilacina trifolia</i> C1	<i>Listera cordata</i>	+
<i>Habenaria orbiculata</i> + flowering	<i>Pyrola asarifolia</i>	+
<i>Epilobium angustifolium</i> +	<i>Pyrola chlorantha</i>	+
<i>Moneses uniflora</i> + flowering	<i>Habenaria hyperborea</i>	+ flowering

MOSES AND LICHENS

Sphagnum warnstorffii C1
 Diverse mosses C5 on ground, deadwood, rotting stumps etc. (especially *Pleurozium schreberi*)

Peltigera aphthosa +
 EPIPHYTES (common/ frequent/ scarce/ rare) - *Fistulariella* on spruce branches, grey foliose lichens on bark and stumps

OTHER COMMENTS

Also noted in this stand (outside the quadrat): *Cypripedium passerinum* (in fruit).

COYOTE LAKE SURVEYSTAND DESCRIPTION

Vegetation Type: Mixedwood Forest Sample No.: 12 Location: SE29-49-4-W5 Date: 20th July 1987
 Elevation: 2700 feet Slope: 50-70% Aspect: N Quadrat Size: 20x20m
 Landform & Topography: extreme slope in hummocky terrain

Drainage Class: rapid Hygrotope: mesic
 Soil: Orthic Regosol (about 10 cm humus over loamy sand, A_e scarcely developed)

Ground cover other than vegetation (e.g. rocks, water, deadfalls, bare soil)
 Bare soil C2 Deadfalls C1

Successional Status (early/ intermediate/ advanced/ mature)

TREES >5m high (cover, dbh, height, age if cored)	Cover Scale
<i>Picea glauca</i> C3 up to 13 cm dbh to 15 m high	+ <1%
<i>Populus tremuloides</i> C2 22-35 cm dbh to 21 m high	1 1-5%
<i>Betula papyrifera</i> C2 7-21 cm dbh to 10 m high	2 6-15%
	3 16-25%
	4 26-50%
	5 51-75%
SHRUBS 0.5 - 5 m high	6 76-85%
<i>Picea glauca</i> saplings C2	7 86-95%
<i>Cornus stolonifera</i> C1	8 96-100%
<i>Populus tremuloides</i> saplings +	
<i>Viburnum edule</i> +	

DWARF SHRUBS <0.5 m high

<i>Rubus pubescens</i> C2	<i>Ribes hirtellum</i> +
<i>Cornus stolonifera</i> C1	<i>Ribes triste</i> +
<i>Populus tremuloides</i> suckers C1	<i>Linnaea borealis</i> +
<i>Rosa acicularis</i> C1	<i>Vaccinium vitis-idaea</i> +
<i>Viburnum edule</i> C1	<i>Symphoricarpos albus</i> +
<i>Ledum groenlandicum</i> C1	<i>Loniceria dioica</i> +

HERBS

<i>Aralia nudicaulis</i> C4	<i>Maianthemum canadense</i> +
<i>Cornus canadensis</i> C2	<i>Aster conspicuus</i> +
<i>Mitella nuda</i> C2	<i>Mertensia paniculata</i> +
<i>Gymnocarpium dryopteris</i> C1	<i>Viola renifolia</i> +
<i>Pyrola asarifolia</i> C1	<i>Aster ciliolatus</i> +
<i>Goodyera repens</i> + flowering	<i>Elymus innovatus</i> +
<i>Fragaria vesca</i> +	<i>Epilobium angustifolium</i> +
<i>Lycopodium annotinum</i> +	<i>Fragaria virginiana</i> +
<i>Lathyrus ochroleucus</i> +	
<i>Petasites palmatus</i> +	

MOSESSES AND LICHENS

Diverse mosses C4
Peltigera aphthosa +

EPIPHYTES (common/ frequent/ scarce/ rare) - *Fistulariella* on lower *Picea* branches

OTHER COMMENTS

Succession to white spruce forest will occur, if nothing intervenes.

COYOTE LAKE SURVEY

STAND DESCRIPTION

Vegetation Type: Broad-leaved Sedge Fen Sample No.: 13 Location: SW33-49-4-W5 Date: 22nd July 19
Elevation: 2750 feet Slope: level Aspect: none Quadrat Size: 20x20 m
Landform & Topography: wet depression in hummocky terrain

Drainage Class: no drainage Hygrotope: hydric (mostly 10-20 cm water depth)

Soil: Fibrisol (sedge peat)

Ground cover other than vegetation (e.g. rocks, water, deadfalls, bare soil)
NONE

Successional Status (early/ intermediate/ advanced/ mature)

TREES >5m high (cover, dbh, height, age if cored)

NONE

Cover	Scale
+	<1%
1	1-5%
2	6-15%
3	16-25%
4	26-50%
5	51-75%
6	76-85%
7	86-95%
8	96-100%

SHRUBS 0.5 - 5 m high

Salix planifolia C1

DWARF SHRUBS <0.5 m high

NONE

HERBS

<i>Carex lacustris</i>	C4	in fruit, to 1m
<i>Carex aquatilis</i>	C3	in fruit, to 1m
<i>Carex rostrata</i>	C2	in fruit, to 1m
<i>Potentilla palustris</i>	C1	vegetative
<i>Equisetum fluviatile</i>	+	to 1m
<i>Caltha palustris</i>	+	in fruit
<i>Galium trifidum</i>	+	flowering

FLOATING HERBS

Lemna minor +

MOSES AND LICHENS

Drepanocladus aduncus C2 on bases of *Carex* tussocks

EPIPHYTES (common/ frequent/ scarce/ rare) - *Fistulariella* and grey crustose lichens on dead *Salix* branches

OTHER COMMENTS

Centre of depression occupied by narrow-leaved sedge fen (quadrat no. 14).

COYOTE LAKE SURVEY

STAND DESCRIPTION

Vegetation Type: *Narrow-leaved Sedge Fen* Sample No.: 14 Location: SW33-49-4-W5 Date: 22nd July 1987
Elevation: 2750 feet Slope: level Aspect: none Quadrat Size: 20x20 m
Landform & Topography: centre of wet depression in hummocky terrain

Drainage Class: no drainage Hygrotope: hydric (10-20 cm free water above floating mat)
Soil: Hydric Fibrisol, quaking (fibrous sedge peat)

Ground cover other than vegetation (e.g. rocks, water, deadfalls, bare soil)

Open Water C2

Successional Status (early/ intermediate/ advanced/ mature)

TREES >5m high (cover, dbh, height, age if cored)

NONE

SHRUBS 0.5 - 5 m high

NONE

Cover Scale	
+	< 1%
1	1-5%
2	6-15%
3	16-25%
4	26-50%
5	51-75%
6	76-85%
7	86-95%
8	96-100%

DWARF SHRUBS < 0.5 m high

Betula neolaskana seedlings +
Salix pedicellaris seedlings +

HERBS

<i>Carex lasiocarpa</i>	C7	in fruit	<i>Potentilla palustris</i>	+	flowering
<i>Menyanthes trifoliata</i>	C6	dominant around open water			
<i>Carex diandra</i>	C3	in fruit			
<i>Carex sp. cf. rostrata</i>	C1	in fruit			
<i>Triglochin maritima</i>	C1	in fruit			
<i>Cicuta bulbifera</i>	+				
<i>Eriophorum polystachion</i>	+	flowering			
<i>Rumex occidentalis</i>	+	in fruit			
<i>Equisetum fluviatile</i>	+				
<i>Epilobium leptophyllum</i>	+	flowering			
<i>Galium trifidum</i>	+	flowering			
<i>Scutellaria galericulata</i>	+				
<i>Calamagrostis cf. purpurascens</i>	+	flowering			
<i>Calamagrostis stricta</i>	+	flowering			

MOSES AND LICHENS

Drepanocladus aduncus C6 on bases of *Carex* tussocks

EPIPHYTES (common/ frequent/ scarce/ rare) - NONE

OTHER COMMENTS

Surrounded by broad-leaved sedge fen (quadrat no. 13).

COYOTE LAKE SURVEYSTAND DESCRIPTION

Vegetation Type: Larch-Black Spruce Swamp Sample No.: 15 Location: NE20-49-4-W5 Date: 22nd July 1987
 Elevation: < 2700 feet Slope: level Aspect: none Quadrat Size: 20x20m
 Landform & Topography: bench in extensive swamp/bog forest complex

Drainage Class: very poor Hygrotope: hygric to subhydryc
 Soil: Fibrisol (deep fibrous peat)

Ground cover other than vegetation (e.g. rocks, water, deadfalls, bare soil)
 open Water C1 Deadfalls + Bare Soil around trees +

Successional Status (early/ intermediate/ advanced/ mature)

TREES >5m high (cover, dbh, height, age if cored)

Larix laricina C7 up to 12 cm dbh 7-9 m high
Picea mariana C1 up to 13 cm dbh 7-10 m high

Cover	Scale
+	< 1%
1	1-5%
2	6-15%
3	16-25%
4	26-50%
5	51-75%
6	76-85%
7	86-95%
8	96-100%

SHRUBS 0.5 - 5 m high

Picea mariana saplings +
Betula pumila var. *glandulifera* +

DWARF SHRUBS < 0.5 m high

<i>Ledum groenlandicum</i> C5	fruiting, on mounds	<i>Rubus arcticus</i> ssp. <i>acaulis</i>	+
<i>Oxycoccus quadrifidus</i> C2	on mounds	<i>Linnaea borealis</i>	+ on mounds
<i>Picea mariana</i> seedlings C1		<i>Vaccinium vitis-idaea</i>	+ on mounds
<i>Gaultheria hispidula</i> C1	on mounds	<i>Betula neoalaskana</i> seedling	+
<i>Larix laricina</i> seedlings	+		

HERBS

<i>Caltha palustris</i> C4	in hollows	<i>Epilobium palustre</i>	+	in hollows
<i>Carex disperma</i> C3	fruiting	<i>Epilobium leptophyllum</i>	+	fruiting, in hollows
<i>Smilacina trifolia</i> C2	fruiting	<i>Geocaulon lividum</i>	+	fruiting, on mounds
<i>Mitella nuda</i> C2	fruiting, on mounds	<i>Listera cordata</i>	+	in flower and fruit, on mounds
<i>Orthilia secunda</i> C2	in flower and fruit	<i>Chrysosplenium iowense</i>	+	in hollows
<i>Galium labradoricum</i> C2	in flower and fruit	<i>Veronica americana</i>	+	in hollows
<i>Pyrola asarifolia</i> C1	fruiting	<i>Agropyron trachycaulum</i>	+	on mounds
<i>Carex paupercula</i> C1	fruiting	<i>Habenaria hyperborea</i>	+	flowering
<i>Galium boreale</i>	+	<i>Corallorhiza trifida</i>	+	fruiting
<i>Polygonum amphibium</i>	+	<i>Stellaria longifolia</i>	+	flowering
<i>Equisetum fluviatile</i>	+	<i>Cornus canadensis</i>	+	

MOSSES AND LICHENS

Sphagnum warnstorffii C3 *Peltigera aphthosa* +
 Diverse other mosses C5

EPIPHYTES (common) frequent/ scarce/ rare) - *Fistulariella*, greenish brown and blue-gray foliose lichens on living trees and standing deadwood

OTHER COMMENTS

Picea mariana, ericaceous shrubs etc. generally growing on raised mounds under ombrotrophic conditions.

COYOTE LAKE SURVEY

STAND DESCRIPTION

Vegetation Type: *Bog Forest* Sample No.: 16 Location: NE29-49-4-WS Date: 24th July 1987
Elevation: 2700 feet Slope: level Aspect: none Quadrat Size: 20x20m
Landform & Topography: *lowlying land near Coyote Lake*

Drainage Class: *poor* Hygrotope: *subhygric*
Soil: *Fibrisol (moss peat)*

Ground cover other than vegetation (e.g. rocks, water, deadfalls, bare soil)

Successional Status (early/^{Deadfalls +}intermediate/ advanced/ mature)
TREES >5m high (cover, dbh, height, age if cored)

Cover	Scale
+	<1%
1	1-5%
2	6-15%
3	16-25%
4	26-50%
5	51-75%
6	76-85%
7	86-95%
8	96-100%

Picea mariana C2 6-18 cm dbh 7-12 m high

SHRUBS 0.5 - 5 m high

Picea mariana saplings C2

DWARF SHRUBS <0.5 m high

Ledum groenlandicum C7 in fruit
Rubus chamaemorus C3 in fruit
Oxycoccus microcarpus C2 in fruit
Picea mariana seedlings C2
Andromeda polifolia +

HERBS

Eriophorum vaginatum C2
Smilacina trifolia C2
Carex aquatilis + in fruit
Carex pauciflora + in fruit

MOSSES AND LICHENS

Sphagnum warustorfii C3 *Cladonia rangiferina* C1
Polytrichum juniperinum C2 *Cladonia* spp. +
Other mosses C3

EPIPHYTES (common/frequent/ scarce/ rare) - yellow and grey foliose lichens on old *Ledum* stems

OTHER COMMENTS

The abundant representation of *Picea mariana* indicates that succession to bog forest will occur.
Also noted in this stand (outside the quadrat): *Carex trisperma*, *Betula neolaskana*, *Betula pumila* var. *glandulifera*, *Larix laricina* (scarce).
Occasional ant nests on *Ledum* mounds; also red squirrel tunnels and midden.

COYOTE LAKE SURVEY

STAND DESCRIPTION

Vegetation Type: *Mixed Willow Carr* Sample No.: 17 Location: SW29-49-4-W5 Date: 24th July 196
 Elevation: 2650 feet Slope: 1-2% (nearly level) Aspect: WSW Quadrat Size: 20x20 m
 Landform & Topography:

Drainage Class: *poor* upper shore of slough in hummocky terrain Hygrotope: *subhygric (flooded in spring)*
 Soil: *Mesisol (sedge peat)*
 Ground cover other than vegetation (e.g. rocks, water, deadfalls, bare soil)

Successional Status (early/ intermediate/ advanced/ mature)
 TREES >5m high (cover, dbh, height, age if cored)

Cover Scale	
+	< 1%
1	1-5%
2	6-15%
3	16-25%
4	26-50%
5	51-75%
6	76-85%
7	86-95%
8	96-100%

NONE
 SHRUBS 0.5 - 5 m high
Salix planifolia C2
Salix pseudomonticola C2
Salix petiolaris C1
Salix serissima C1
Salix bebbiana +
Populus balsamifera saplings +
Populus tremuloides saplings +

DWARF SHRUBS <0.5 m high
Salix planifolia C4
Salix pseudomonticola C3
Salix petiolaris C1
Salix bebbiana C1
Populus balsamifera saplings C1
Salix serissima +

HERBS			
<i>Calamagrostis stricta</i>	C3	<i>Mentha arvensis</i>	+ flowering
<i>Carex diandra</i>	C3 in fruit	<i>Phleum pratense</i>	+ flowering
<i>Parnassia palustris</i>	C2	<i>Achillea millefolium</i>	+ flowering
<i>Geum macrophyllum</i>	C2	<i>Lycopus uniflorus</i>	+ flowering
<i>Carex aurea</i>	C1 in fruit	<i>Stachys palustris</i>	+ flowering
<i>Juncus tenuis</i>	C1 in fruit	<i>Aster modestus</i>	+
<i>Juncus nodosus</i>	C1 in fruit	<i>Cirsium arvense</i>	+
<i>Agropyron trachycaulum</i>	C1	<i>Trifolium repans</i>	+ flowering
<i>Carex rostrata</i>	C1 in fruit	<i>Carex bebbii</i>	+ flowering
<i>Carex aquatilis</i>	C1 in fruit	<i>Habenaria hyperborea</i>	+ flowering
<i>Glyceria striata</i>	C1	<i>Solidago canadensis</i>	+ flowering
<i>Polygonum amphibium</i>	C1	<i>Erigeron philadelphicus</i>	+ flowering
<i>Aster puniceus</i>	C1 with flowerbuds	<i>Galium trifidum</i>	+ flowering
<i>Taraxacum officinale</i>	C1	<i>Lysimachia thyrsiflora</i>	+
<i>Sonchus uliginosus</i>	C1	<i>Viola canadensis</i>	+

MOSES AND LICHENS
 NONE

EPIPHYTES (common/ frequent/ scarce/ rare) - NONE

OTHER COMMENTS

Intrusion of weeds due to heavy use by cattle (grazing and going to the slough to drink).
Carex rostrata becomes dominant closer to the edge of the slough. The presence of small plants of *Carex rostrata* on the upper shore suggests that water levels must be higher in spring.

COYOTE LAKE SURVEY

STAND DESCRIPTION

Vegetation Type: *Balsam Willow Carr* Sample No.: 18 Location: SE29-49-4-W5 Date: 24th July 1987
 Elevation: 2700 feet Slope: level Aspect: none Quadrat Size: 20 x 20 m
 Landform & Topography: *lowlying seepage zone in hummocky terrain*

Drainage Class: *very poor* Hygrotope: *hygric to subhydric*
 Soil: *Fibrisol (deep fibrous peat)*

Ground cover other than vegetation (e.g. rocks, water, deadfalls, bare soil)
Water in hollows C2 Deadfalls C1

Successional Status (early/ intermediate/ advanced/ mature)

TREES >5m high (cover, dbh, height, age if cored) Cover Scale

<i>Betula nealaskana</i>	+	up to 7 cm dbh	5-6 m high	+	< 1%
				1	1-5%
				2	6-15%
				3	16-25%
				4	26-50%
				5	51-75%
				6	76-85%
				7	86-95%
				8	96-100%

SHRUBS 0.5 - 5 m high					
<i>Salix pyrifolia</i>	C5		<i>Salix petiolaris</i>	+	
<i>Salix bebbiana</i>	C1		<i>Salix discolor</i>	+	
<i>Salix planifolia</i>	C1		<i>Rubus idaeus</i>	+	on mounds
<i>Alnus tenuifolia</i>	C1		<i>Ribes hirtellum</i>	+	on mounds
<i>Betula nealaskana</i> saplings	C1		<i>Lonicera involucrata</i>	+	
<i>Cornus stolonifera</i>	C1	browsed			

DWARF SHRUBS < 0.5 m high

<i>Ledum groenlandicum</i>	C1	on mounds	<i>Rubus idaeus</i>	+	on mounds
<i>Rubus arcticus</i> ssp. <i>acaulis</i>	C1	on mounds	<i>Rosa acicularis</i>	+	on mounds
<i>Betula nealaskana</i> seedlings	+		<i>Vaccinium vitis-idaea</i>	+	on mounds
<i>Vaccinium myrtilloides</i>	+	on mounds	<i>Rubus pubescens</i>	+	on mounds

HERBS

<i>Equisetum fluviatile</i>	C7		<i>Senecio pauperculus</i>	+	
<i>Caltha palustris</i>	C2	in fruit	<i>Viola renifolia</i>	+	on mounds
<i>Calamagrostis canadensis</i>	C2	flowering	<i>Mitella nuda</i>	+	
<i>Potentilla palustris</i>	C2		<i>Chrysoplenium iowense</i>	+	
<i>Carex disperma</i>	C2	in fruit	<i>Carex rostrata</i>	+	in fruit
<i>Epilobium palustre</i>	C1	flowering	<i>Agrostis scabra</i>	+	flowering
<i>Cicuta maculata</i>	C1	flowering	<i>Galium trifidum</i>	+	in flower and fruit
<i>Smilacina trifolia</i>	C1	in fruit	<i>Epilobium angustifolium</i>	+	flowering, on mounds
<i>Viola palustris</i>	C1		<i>Lysimachia thyrsiflora</i>	+	
<i>Scutellaria galericulata</i>	C1	flowering	<i>Galium triflorum</i>	+	in fruit
<i>Bromus ciliatus</i>	C1	flowering, on mounds	<i>Carex curta</i>	+	in fruit
<i>Carex paupercula</i>	C1	in fruit	<i>Stellaria longifolia</i>	+	flowering
<i>Petasites vitifolius</i>	C1	on mounds	<i>Rumex occidentalis</i>	+	in fruit
<i>Glyceria striata</i>	C1		<i>Aster puniceus</i>	+	with flower buds
<i>Poa palustris</i>	+		<i>Epilobium leptophyllum</i>	+	flowering

MOSESSES AND LICHENS

<i>Drepanocladus aduncus</i>	C3	in hollows	<i>Peltigera aphthosa</i>	+
<i>Sphagnum warnstorffii</i>	C2		<i>Marchantia polymorpha</i>	+
Other mosses (on mounds and tree bases)		C3		

EPIPHYTES (common) frequent/ scarce/ rare) - *Fistulariella* and grey foliose lichens common on *Salix*, *Betula* and deadfalls; also greenish brown foliose lichens on *Betula*

OTHER COMMENTS

Also noted in this stand (outside the quadrat): *Petasites sagittatus*, *Oxycoccus quadripetalus*, *Habenaria hyperborea*, *Salix candida* and *Cornus canadensis*.
 Old burnt stumps (indicative of previous fire history) form dry raised mounds which support plants adapted to mesic soil conditions.

COYOTE LAKE SURVEY

STAND DESCRIPTION

Spruce-Lodgepole Pine Forest
developing from

Vegetation Type: Labrador Tea-Sphagnum Bog Sample No.: 19 Location: SE30-49-4-WS Date: 26th July 1987
Elevation: < 2650 feet Slope: 1-2% (nearly level) Aspect: WSW Quadrat Size: 20 x 20 m
Landform & Topography: bench near slough in hummocky terrain

Drainage Class: imperfect Hygrotope: mesic to subhygric

Soil: Fibrisol (sphagnum peat)

Ground cover other than vegetation (e.g. rocks, water, deadfalls, bare soil)

Bare Soil C1 (old mounds)

Successional Status (early/intermediate/advanced/mature)

TREES > 5m high (cover, dbh, height, age if cored)

NONE

Cover Scale	
+	< 1%
1	1-5%
2	6-15%
3	16-25%
4	26-50%
5	51-75%
6	76-85%
7	86-95%
8	96-100%

SHRUBS 0.5 - 5 m high

- Pinus contorta* saplings C3
- Picea glauca* saplings C3
- Betula neoalaskana* saplings C1
- Betula pumila* var. *glandulifera* C1

DWARF SHRUBS < 0.5 m high

- Ledum groenlandicum* C7
- Vaccinium vitis-idaea* C5
- Rubus chamaemorus* C1
- Vaccinium myrtilloides* C1
- Oxycoccus microcarpus* C1
- Andromeda polifolia* +

HERBS

- Eriophorum vaginatum* C1
- Smilacina trifolia* +

MOSESSES AND LICHENS

- Sphagnum warustorfii* and *fuscum* C4 *Cladonia rangiferina* C2
- Polytrichum juniperinum* C2 *Cladonia* spp. +
- Other mosses C1

EPIPHYTES (common/frequent/scarce/rare) - NONE

OTHER COMMENTS

Enhanced drainage of this stand has been caused by a deep ditch constructed along its S boundary by the adjacent landowner. As a result *Pinus contorta* and *Picea glauca* have colonized what was formerly an open bog with trees only on its periphery. Succession to spruce-pine forest will occur, if the present drainage regime is maintained.

COYOTE LAKE SURVEY

STAND DESCRIPTION

Vegetation Type: *Water Sedge Fen* Sample No.: 20 Location: SE30-49-4-WS Date: 26th July 1987
Elevation: <2650 feet Slope: level Aspect: none Quadrat Size: 20 x 20 m
Landform & Topography: shore of slough

Drainage Class: no drainage Hygrotope: hydric (20-50 cm water depth)
Soil: Hydric Fibrisol (sedge peat)

Ground cover other than vegetation (e.g. rocks, water, deadfalls, bare soil)
Water with only floating plants C2 Deadfall +

Successional Status (early/ intermediate/ advanced/ mature)

TREES >5m high (cover, dbh, height, age if cored)

Cover	Scale
+	<1%
1	1-5%
2	6-15%
3	16-25%
4	26-50%
5	51-75%
6	76-85%
7	86-95%
8	96-100%

NONE

SHRUBS 0.5 - 5 m high - All shrubs under stress due to high water level

Betula neoalaskana C1
Salix planifolia C1
Betula pumila var. *glandulifera* +

DWARF SHRUBS <0.5 m high

NONE

HERBS

<i>Carex aquatilis</i>	C7	in fruit	<i>Rumex occidentalis</i>	+	in fruit
<i>Carex rostrata</i>	C1	in fruit	<i>Equisetum fluviatile</i>	+	
<i>Potentilla palustris</i>	C1		<i>Epilobium leptophyllum</i>	+	flowering
<i>Calla palustris</i>	C1	in fruit	<i>Calamagrostis canadensis</i>	+	flowering, on mounds
<i>Carex diandra</i>	+	in fruit	<i>Cicuta bulbifera</i>	+	
<i>Scutellaria galericulata</i>	+	flowering	<i>Galium trifidum</i>	+	

FLOATING HERBS

<i>Utricularia minor</i>	C2	dense vegetative mats	<i>Lemna minor</i>	+
<i>Utricularia intermedia</i>	C1	flowering	<i>Ricciocarpus natans</i>	+
<i>Utricularia vulgaris</i>	+	vegetative		

MOSSES AND LICHENS

Drepanocladus spp. C7

EPIPHYTES (common/ frequent/ scarce/ rare) - *Fistulariella* and grey crustose lichens on dead *Betula* and *Salix* stems

OTHER COMMENTS

Water level in slough recently raised by beaver damming.

COYOTE LAKE SURVEY

STAND DESCRIPTION

Vegetation Type: Spruce-Lodgepole Pine Forest Sample No.: 21 Location: SW30-49-4-W5 Date: 26 July 198
 Elevation: 2650 feet Slope: 15-25% Aspect: W Quadrat Size: 20 x 20 m
 Landform & Topography: low ridge near slough

Drainage Class: well Hygrotope: mesic

Soil: Orthic Gray Luvisol (± 5 cm humus over Ae, then sandy clay)

Ground cover other than vegetation (e.g. rocks, water, deadfalls, bare soil)

Deadfalls + Bare Soil (ant nests) +

Successional Status (early/ intermediate/ advanced/ mature)

TREES >5m high (cover, dbh, height, age if cored)				Cover	Scale	
<i>Pinus contorta</i>	C4	12-27 cm dbh	5-11 m high	+	< 1%	
<i>Picea glauca</i>	C3	7-17 cm dbh	5-9 m high	1	1-5%	
<i>Larix laricina</i>	C1	up to 25 cm dbh	9-12 m high	2	6-15%	
<i>Betula neoalaskana</i>	+	8-27 cm dbh	5-7 m high	3	16-25%	
<i>Populus tremuloides</i>	+	4-6 cm dbh	5-6 m high	4	26-50%	
SHRUBS 0.5 - 5 m high				5	51-75%	
<i>Picea glauca</i> saplings	C2		<i>Populus tremuloides</i> saplings	C1	6	76-85%
<i>Betula neoalaskana</i> saplings	C2		<i>Shepherdia canadensis</i>	C1 in fruit	7	86-95%
<i>Salix bebbiana</i>	C1		<i>Lonicera involucrata</i>	+	8	96-100%
<i>Amelanchier alnifolia</i>	C1		<i>Salix pyrifolia</i>	+		
<i>Betula pumila</i> var. <i>glandulifera</i>	C1		<i>Rosa acicularis</i>	+		
<i>Salix discolor</i>	C1					

DWARF SHRUBS < 0.5 m high

<i>Ledum groenlandicum</i>	C5		<i>Pinus contorta</i> seedlings	+
<i>Vaccinium myrtilloides</i>	C5		<i>Larix laricina</i> seedlings	+
<i>Vaccinium vitis-idaea</i>	C4		<i>Picea glauca</i> seedlings	+
<i>Linnaea borealis</i>	C3		<i>Populus tremuloides</i> seedlings	+
<i>Amelanchier alnifolia</i>	C1		<i>Betula neoalaskana</i> seedlings	+
<i>Rosa acicularis</i>	C1			

HERBS

<i>Lycopodium complanatum</i>	C2	with fruiting bodies	<i>Equisetum arvense</i>	+	
<i>Oryzopsis asperifolia</i>	C2		<i>Petasites palmatus</i>	+	
<i>Cornus canadensis</i>	C2	in fruit	<i>Viola renifolia</i>	+	
<i>Aster ciliolatus</i>	C1	basal rosettes	<i>Achillea millefolium</i>	+	basal leaves only
<i>Fragaria virginiana</i>	C1		<i>Carex</i> sp. (? <i>concinna</i>)	+	vegetative
<i>Maianthemum canadense</i>	C1		<i>Galium boreale</i>	+	
<i>Epilobium angustifolium</i>	C1		<i>Hieracium umbellatum</i>	+	with flower buds
<i>Equisetum sylvaticum</i>	C1		<i>Halenia deflexa</i>	+	flowering
<i>Habenaria viridis</i>	+	in fruit	<i>Agropyron trachycanlum</i>	+	flowering
<i>Lathyrus ochroleucus</i>	+		<i>Elymus innovatus</i>	+	
<i>Vicia americana</i>	+		<i>Calamagrostis canadensis</i>	+	

MOSESSES AND LICHENS

Feather mosses (mainly *Pleurozium schreberi*) C3 *Cladina rangiferina* C2
Polytrichum sp. + *Peltigera aphthosa* +

EPIPHYTES (common/ frequent/ scarce/ rare) - *Fistulariella* and grey foliose lichens on old bark and dead also greenish brown foliose lichens on *Betula*, and yellow-green foliose lich on *Ledum*.

OTHER COMMENTS

Several ant nests in quadrat.

Sapsucker holes noted in trunks of *Betula neoalaskana*.

COYOTE LAKE SURVEY

STAND DESCRIPTION

Vegetation Type: Mixed Willow Carr Sample No.: 22 Location: SW28-49-4-W5 Date: 27th July 1987
 Elevation: >2650 feet Slope: level Aspect: none Quadrat Size: 20x20 m
 Landform & Topography: Zone in extensive fen/carr/swamp complex

Drainage Class: very poor Hygrotope: hygric to subhydryc
 Soil: Fibrisol (deep fibrous peat)

Ground cover other than vegetation (e.g. rocks, water, deadfalls, bare soil)
 Open Water + Deadfalls +

Successional Status (early/ intermediate/ advanced mature)
 TREES >5m high (cover, dbh, height, age if cored)

Cover Scale	
+	<1%
1	1-5%
2	6-15%
3	16-25%
4	26-50%
5	51-75%
6	76-85%
7	86-95%
8	96-100%

Betula nealaskana C1 up to 10 cm dbh 5-8 m high

SHRUBS 0.5 - 5 m high

<i>Salix planifolia</i>	C4	<i>Salix serissima</i>	+
<i>Betula nealaskana</i> saplings	C3	<i>Salix pyrifolia</i>	+
<i>Salix bebbiana</i>	C2	<i>Lonicera involucrata</i>	+
<i>Alnus tenuifolia</i>	C1	<i>Cornus stolonifera</i>	+
<i>Salix pseudomonticola</i>	+	<i>Picea glauca</i> saplings	+
<i>Salix discolor</i>	+		

DWARF SHRUBS <0.5 m high

<i>Rubus arcticus</i> ssp. <i>acaulis</i>	C2	<i>Vaccinium vitis-idaea</i>	+
<i>Ledum groenlandicum</i>	C1	<i>Rubus pubescens</i>	+ in fruit, on mounds
<i>Salix pedicellaris</i>	C1	<i>Larix laricina</i> seedlings	+
<i>Salix myrtillifolia</i> var. <i>myrtillifolia</i>	+	<i>Ribes hirtellum</i>	+

HERBS

<i>Equisetum fluviatile</i>	C5	<i>Carex pauperula</i>	+ in fruit
<i>Carex lacustris</i>	C3 in fruit	<i>Hieracium umbellatum</i>	+ with flower buds, on mounds
<i>Potentilla palustris</i>	C3 flowering	<i>Aster ciliolatus</i>	+ on mounds
<i>Carex aquatilis</i>	C2 in fruit	<i>Fragaria virginiana</i>	+ on mounds
<i>Galium labradoricum</i>	C2 flowering	<i>Habenaria hyperborea</i>	+ flowering
<i>Calamagrostis canadensis</i>	C1 flowering	<i>Stellaria longifolia</i>	+ flowering
<i>Smilacina trifolia</i>	C1 in fruit	<i>Aster puniceus</i>	+ with flower buds
<i>Caltha palustris</i>	C1 seeds dispersed	<i>Epilobium leptophyllum</i>	+ flowering
<i>Polygonum amphibium</i>	C1	<i>Carex disperma</i>	+ in fruit, on mounds
<i>Calla palustris</i>	C1 in fruit	<i>Viola palustris</i>	+
<i>Menyanthes trifoliata</i>	C1 in wetter open areas	<i>Achillea millefolium</i>	+ basal leaves only, on mounds
<i>Epilobium angustifolium</i>	+	<i>Lysimachia thyrsiflora</i>	+

MOSSES AND LICHENS

Sphagnum warnstorffii C4
 Other mosses C1

EPIPHYTES (common/ frequent/ scarce/ rare) - *Fistulariella*, greenish brown foliose, and grey foliose and crustose lichens on old *Betula* and *Salix* bark and dead branches

OTHER COMMENTS

Succession to swamp (treed fen) seems likely at this site, since there is extensive colonization by *Betula nealaskana* and seedlings of *Picea* and *Larix* are present.

Appendix 2

LIST OF VASCULAR PLANTS

Nomenclature follows the second edition of the Flora of Alberta (Moss 1983).

Lycopodiaceae

- Lycopodium annotinum L. in north-facing forest (Stand 12)
Lycopodium complanatum L. in heathy understory of Fsp
(Stand 21)
Lycopodium obscurum L. in heathy forest (Fa, Fx) in S 30

Equisetaceae

- Equisetum arvense L. in moist forest and carr (Stands
7, 11, 21)
Equisetum fluviatile L. abundant in fens (Stands 3, 6,
8, 13, 14, 15, 18, 20, 22),
also in moist forest (Stand 11)
Equisetum pratense Ehrh. in Fs (Stand 11)
Equisetum scirpoides Michx. in Fs (Stand 11)
Equisetum sylvaticum L. in moist forest and carr (Stands
7, 21)

Ophioglossaceae

- Botrychium virginianum (L.) Sw. in Fa (Stand 5)

Polypodiaceae

- Athyrium filix-femina (L.) Roth in swamp at slough inflow in
SE 29, at edge of Mcb in SW 33
Dryopteris carthusiana (Vill.) occasional in fen margins
H. P. Fuchs (SW 33, SE 32)
Gymnocarpium dryopteris (L.) on north-facing forested slopes
Newm. (Fa, Fx) (Stands 1, 5, 12)

Pinaceae

- Abies lasiocarpa (Hook.) Nutt. on shore of slough and north-
facing slope in S 30
Larix laricina (Du Roi) K. Koch codominant in MFs1, occasional
in MFb, BFb, Fsp, Mw
(Stands 6, 8, 15, 16, 21, 22)

Picea glauca (Moench) Voss

dominant in Fs, codominant in Fx
and Fsp, scarce in Fa, Mw
(Stands 1, 11, 12, 19, 21, 22)

Picea mariana (Mill.) BSP.

dominant in BFs, codominant in
MFs1, also in Fs (Stands 8,
11, 15, 16)

Pinus contorta Loudon

codominant in Fsp (Stands 19, 21)

Typhaceae

Typha latifolia L.

abundant on shores of slough in
SW 29, occasional elsewhere
(Stand 3)

Sparganiaceae

Sparganium angustifolium Michx.

in Coyote Lake

Najadaceae

Najas flexilis (Willd.) Rostk.
& Schmidt

common close to shore in Coyote
Lake

Potamogetonaceae

Potamogeton alpinus Balbis

in ponds in SW 28

Potamogeton pectinatus L.

in beaverpond in SE 30

Potamogeton praelongus Wulf.

in deep water of Coyote Lake

Potamogeton pusillus L.

dominant in Coyote Lake, also in
ponds in SW 28 and SE 30

Potamogeton richardsonii (Benn.)
Rydb.

common in Coyote Lake

Potamogeton robbinsii Oakes

close to shore or peninsula in
Coyote Lake

Potamogeton zosteriformis Fern.

common in Coyote Lake

Juncaginaceae

Triglochin maritima L.

frequent in fens (Stands 3, 6,
8, 14)

Alismataceae

Sagittaria cuneata Sheld.

close to shore in Coyote Lake,
also in pond in SE 30

Gramineae

<u>Agropyron trachycaulum</u> (Link) Malte	frequent in forest (Stands 1, 11, 15, 17, 21)
<u>Agrostis scabra</u> Willd.	occasional in swamp and hummocky carr (Stands 8, 18)
<u>Bromus ciliatus</u> L.	frequent in forest and scrub, also in swamp and hummocky carr (Stands 1, 4, 5, 6, 8, 9, 18)
<u>Bromus inermis</u> Leyss. ssp. <u>inermis</u>	on old oilfield roads (seeded)
<u>Calamagrostis canadensis</u> (Michx.) Beauv.	abundant in fens and on open ground, less frequent in forest (Stands 1, 3, 4, 6, 7, 8, 18, 20, 21, 22)
<u>Calamagrostis</u> sp. cf. <u>purpurascens</u> R. Br.	in quaking fen (Mcq, Stand 14)
<u>Cinna latifolia</u> (Trev.) Griseb.	at margin of swamp in SE 32
<u>Elymus innovatus</u> Beal	occasional in forest (Stands 12, 21)
<u>Glyceria grandis</u> S. Wats. ex. A. Gray	in grazed Mcq in SE 32
<u>Glyceria striata</u> (Lam.) A. S. Hitchc.	common in fens (Stands 8, 17, 18)
<u>Hordeum jubatum</u> L.	along road in SW 29
<u>Oryzopsis asperifolia</u> Michx.	common in Fsp, also in grazed Ss (Stands 9, 21)
<u>Phleum pratense</u> L.	on grazed land and old roads (Stands 9, 17)
<u>Poa palustris</u> L.	occasional in fens (Stand 18)
<u>Poa pratensis</u> L.	mainly on grazed land (Stands 5, 8, 9)
<u>Schizachne purpurascens</u> (Torr.) Swallen	in dry Fa (Stand 2)

Cyperaceae

<u>Carex aquatilis</u> Wahlenb.	dominant in Mcq, common in other types of fens and bogs (Stands 3, 8, 13, 16, 17, 20, 22)
<u>Carex atherodes</u> Spreng.	occasional in moist forest and fen margins (Stand 11)
<u>Carex aurea</u> Nutt.	occasional in swamp and carr (Stand 17)
<u>Carex bebbii</u> Olney ex Fern.	in willow carr (Stands 7, 17)
<u>Carex brunnescens</u> (Pers.) Poir.	in Mwb (Stand 7)
<u>Carex curta</u> Good.	in swamp and hummocky carr (Stands 6, 8, 18)
<u>Carex diandra</u> Schrank	common in fens (Stands 6, 14, 17, 20)
<u>Carex disperma</u> Dewey	abundant in understory of moist forest, swamp and hummocky carr (Stands 8, 11, 15, 18, 22)

<u>Carex lacustris</u> Willd.	dominant or codominant in Mcb and Mcbn, also in hummocky carr and swamp (Stands 3, 7, 8, 13, 22)
<u>Carex lasiocarpa</u> Ehrh.	dominant or codominant in Mcn and Mcbn (Stands 3, 14)
<u>Carex pauciflora</u> Lightf.	in bog forest (Stand 16)
<u>Carex paupercula</u> Michx.	common in swamp and hummocky carr (Stands 8, 15, 18, 22)
<u>Carex rostrata</u> Stokes	common in fens (Stand 3, 13, 17, 18, 20)
<u>Carex stipata</u> Muhl. ex Willd.	occasional in swamp margins and wet places along trails
<u>Carex tenuiflora</u> Wahlenb.	in MFsl (Stand 8)
<u>Carex trisperma</u> Dewey	in bog forest (Stands 10, 16)
<u>Carex vaginata</u> Tausch	dominant in understory of Stand 11 (Fs)
<u>Carex</u> sp. cf. <u>rostrata</u> Stokes	common in Mcn and Mcbn (Stands 3, 14)
<u>Eleocharis palustris</u> (L.) R. & S.	in ponds in SW 28
<u>Eriophorum polystachion</u> L.	in Mcn (Stand 14)
<u>Eriophorum vaginatum</u> L.	common in bog and bog forest (Stands 10, 16, 19)
<u>Eriophorum viridi-carinatum</u> (Engelm.) Fern.	in MFsl (Stand 8)
<u>Scirpus microcarpus</u> Presl	in wet place on trail in SE 30
<u>Scirpus validus</u> Vahl	on shore of slough in SW 29 (scarce)

Araceae

<u>Calla palustris</u> L.	abundant on shores and in wet fens, in places forming pure stands (Stands 3, 20, 22)
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Lemnaceae

<u>Lemna minor</u> L.	common in ponds and wet fens (Stands 3, 13, 20)
<u>Lemna trisulca</u> L.	occasional in ponds and wet fens (Stand 3)
<u>Spirodela polyrhiza</u> (L.) Schleiden	common in ponds and wet fens (Stand 3)
<u>Wolffia columbiana</u> Karsten	dominant in beaver pond in SW 28

Juncaceae

<u>Juncus cernuum</u> Roth	common in Stand 17 (Mw), occasional elsewhere in fens
<u>Juncus tenuis</u> Willd.	in Mw (Stand 17)

Liliaceae

- Allium cernuum Roth in south-facing Fa in SW 33
Disporum trachycarpum (S. Wats.) frequent in Fa (Stands 1, 2, 5)
B. & H.
Lilium philadelphicum L. scarce in scrub and Fa (Stand 9)
Maianthemum canadense Desf. common in forest (Stands 1, 2,
5, 12, 21)
Smilacina racemosa (L.) Desf. frequent in Fa (Stands 1, 2, 5)
Smilacina stellata (L.) Desf. in south-facing Fa (Stand 2)
Smilacina trifolia (L.) Desf. common in swamp, hummocky carr,
bog and moist Fs (Stands 8,
10, 11, 15, 16, 18, 19, 22)
Streptopus amplexifolius (L.) DC. in moist Fs (Stand 11), also
beneath Abies in S 30

Iridaceae

- Sisyrinchium montanum Greene reported by Mrs. Hopkins

Orchidaceae

- Corallorhiza striata Lindl. reported by Mrs. Hopkins
Corallorhiza trifida Châtelain in MFs1 (Stand 15)
Cypripedium passerinum Richards. in moist Fs (Stand 11)
Goodyera repens (L.) R. Br. locally common in moist
coniferous forest (Stands 11,
12)
Habenaria hyperborea (L.) R. Br. frequent in carr, swamp and
moist forest (Stands 6, 8, 11,
15, 17, 18, 22)
in BFs in SE 32)
Habenaria obtusata (Pursh) occasional in moist mossy forest
Richards. (Stand 11)
Habenaria orbiculata (Pursh) in Fsp (Stand 21)
Torr. occasional in moist Fs and swamp
Habenaria viridis (L.) R. Br. (Stands 11, 15)
Listera cordata (L.) R. Br. in MFs1 in SE 32
Spiranthes romanzoffiana Cham.
& Schlecht.

Salicaceae

- Populus balsamifera L. common in Fa (locally dominant
on moist sites) (Stands 1, 4,
5, 17)
Populus tremuloides Michx. normally dominant in Fa,
codominant in Fx (Stands 1, 2,
4, 5, 9, 12, 17, 21)

<u>Salix bebbiana</u> Sarg.	frequent in fens, scrub and moist forest (Stands 4, 6, 7, 9, 17, 18, 21, 22)
<u>Salix candida</u> Fluegge ex. Willd.	in Mwb (Stand 18)
<u>Salix discolor</u> Muhl.	in carr and moist forest (Stands 18, 21, 22)
<u>Salix myrtillifolia</u> Anderss. var. <u>myrtillifolia</u>	occasional in carr and moist forest (Stand 22)
<u>Salix pedicellaris</u> Pursh	frequent in fens (Stands 3, 6, 8, 14, 22)
<u>Salix petiolaris</u> J. E. Smith	frequent in carr (Stands 7, 17, 18)
<u>Salix planifolia</u> Pursh	common in fens (Stands 3, 7, 8, 13, 17, 18, 20, 22)
<u>Salix pseudomonticola</u> Ball	frequent in carr (Stands 17, 22)
<u>Salix pyrifolia</u> Anderss.	dominant in Mwb, occasional in swamp and moist forest (Stands 7, 8, 18, 21, 22)
<u>Salix serissima</u> (Bailey) Fern.	occasional in swamp and carr (Stands 8, 17, 22)

Betulaceae

<u>Alnus crispa</u> (Ait.) Pursh	in moist forest (Stand 5)
<u>Alnus tenuifolia</u> Nutt.	common in moist forest, swamp and carr (Stands 5, 8, 18, 22)
<u>Betula neoakaskana</u> Sargent	dominant in BFb and MFb, common in fens, bog forest and moist coniferous forest (Stands 6, 7, 8, 10, 11, 14, 15, 16, 18, 19, 21, 22)
<u>Betula papyrifera</u> Marsh.	common in upland forest (Fa, Fx) (Stands 1, 2, 5, 12)
<u>Betula pumila</u> L. var. <u>glandulifera</u> Regel	common in fens, also in bogs and moist forest (Stands 3, 6, 8, 10, 15, 16, 19, 20, 21)
<u>Corylus cornuta</u> Marsh.	common in upland forest and scrub (Stands 1, 2, 5, 9)

Urticaceae

<u>Urtica dioica</u> L.	reported by Mrs. Hopkins
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Santalaceae

<u>Geocaulon lividum</u> (Richards.) Fern.	in moist Fs and on mounds in bog forest and swamp (Stands 1, 15)
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Polygonaceae

- Polygonum amphibium L. frequent in fens, also as emergent in Coyote Lake (Stands 3, 15, 17, 22)
Rumex occidentalis S. Wats. frequent in fens (Stands 3, 6, 8, 14, 18, 20)

Caryophyllaceae

- Cerastium vulgatum L. in grazed scrub (Stand 9)
Silene noctiflora L. in grazed scrub (Stand 9)
Silene pratensis (Rafn) Godron & Gren. in meadow in SE 32
Stellaria longifolia Muhl. frequent in swamp and hummocky carr (Stands 6, 7, 8, 15, 18, 22)
Stellaria longipes Goldie in grazed scrub (Stand 9)

Nymphaeaceae

- Nuphar variegatum Engelm. common in lakes and sloughs (Stand 3)

Ranunculaceae

- Actaea rubra (Ait.) Willd. frequent in Fa (Stands 1, 2, 5)
Anemone canadensis L. occasional along trails
Anemone cylindrica A. Gray by trails in SW 33
Anemone riparia Fern. in Fa in SW 28
Aquilegia brevistyla Hook. by trail in SW 33
Caltha natans Pallas in small pools in SW 29 and SE 32
Caltha palustris L. common in fens (Stands 3, 6, 7, 8, 13, 15, 18, 22)
Clematis occidentalis (Hornem.) DC. occasional in Fa (Stands 2, 5)
Ranunculus circinatus Sibth. in slough in SW 29 and beaverpond in SE 30
Thalictrum venulosum Trel. in grazed scrub (Stand 9)

Fumariaceae

- Corydalis aurea Willd. reported by Mrs. Hopkins

Cruciferae

- Arabis glabra (L.) Bernh. in grazed scrub (Stand 9)
Thlaspi arvense L. reported by Mrs. Hopkins

Droseraceae

Drosera rotundifolia L. on sphagnum mounds in MFs1
(Stand 8)

Saxifragaceae

Chrysosplenium iowense Rydb. frequent in swamp and hummocky
carr (Stands 8, 15, 18)
Heuchera richardsonii R. Br. on trail in SE 29
Mitella nuda L. common in moist forest and swamp
(Stands 1, 5, 11, 12, 15, 18)

Parnassiaceae

Parnassia palustris L. common in Stand 17 (grazed Mw)

Grossulariaceae

Ribes hirtellum Michx. occasional in forest and hummocky
carr (Stands 7, 12, 18, 22)
Ribes hudsonianum Richards. in moist Fs (Stand 11)
Ribes lacustre (Pers.) Poir. in north-facing Fa (Stand 1)
Ribes oxycanthoides L. in north-facing Fa (Stand 1)
Ribes triste Pall. occasional in forest (Stands 1,
12)

Rosaceae

Agrimonia striata Michx. by trail in SW 33
Amelanchier alnifolia Nutt. common in dry forest and scrub
(Stands 1, 2, 9, 21)
Fragaria vesca L. in north-facing Fx (Stand 12)
Fragaria virginiana Duchesne common in forest and grazed
scrub, occasional in swamp and
hummocky carr (Stands 2, 5, 8,
9, 12, 21, 22)
Geum macrophyllum Willd. occasional in swamp and carr
(Stands 6, 7, 17)
Potentilla norvegica L. in MFb (Stand 6)
Potentilla palustris (L.) Scop. abundant in fens (Stands 3, 6,
7, 8, 13, 14, 18, 20, 22)
Prunus pensylvanica L.f. common and locally dominant in
scrub, occasional in dry Fa
(Stands 1, 4, 9)
Prunus virginiana L. abundant in Fa and scrub (Stands
1, 2, 4, 5, 9)
Rosa acicularis Lindl. common in forest and scrub
(Stands 1, 2, 4, 5, 9, 12, 18,
21)

<u>Rosa woodsii</u> Lindl.	common in scrub (Stands 4, 9)
<u>Rubus arcticus</u> L. ssp. <u>acaulis</u> (Michx.) Focke	common in swamp and hummocky carr, also in moist Fs (Stands 6, 7, 8, 11, 15, 18, 22)
<u>Rubus chamaemorus</u> L.	abundant in bogs, frequent in swamp and hummocky carr (Stands 7, 8, 10, 16, 19)
<u>Rubus idaeus</u> L.	common in Fa and scrub, occasional in hummocky carr (Stands 1, 2, 4, 5, 7, 9, 18)
<u>Rubus pubescens</u> Raf.	common in forest, occasional in swamp and hummocky carr (Stands 1, 2, 5, 8, 11, 12, 18, 22)
<u>Spiraea betulifolia</u> Pallas	frequent in Fa and grazed scrub (Stands 2, 9)

Leguminosae

<u>Astragalus americanus</u> (Hook.) M. E. Jones	occasional on moist ground
<u>Lathyrus ochroleucus</u> Hook.	common in forest (Stands 1, 2, 5, 7, 9, 11, 12, 21)
<u>Lathyrus venosus</u> Muhl.	common in dry Fa and scrub (Stands 2, 4, 9)
<u>Medicago lupulina</u> L.	along roadsides
<u>Medicago sativa</u> L.	on grazed scrub (Stand 9) and old roads
<u>Melilotus alba</u> Desr.	reported by Mrs. Hopkins
<u>Trifolium pratense</u> L.	common grazed scrub, roads and trails (Stand 9)
<u>Trifolium repens</u> L.	abundant on grazed land (scrub, carr and forest) (Stands 9, 17)
<u>Vicia americana</u> Muhl.	frequent in forest and scrub (Stands 2, 4, 9, 21)

Geraniaceae

<u>Geranium bicknellii</u> Britt.	reported by Mrs. Hopkins
<u>Geranium richardsonii</u> Fisch. & Trautv.	occasional by forest trail and in scrub

Euphorbiaceae

<u>Euphorbia esula</u> L.	reported by Mrs. Hopkins
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Callitrichaceae

<u>Callitriche verna</u> L.	in small pool in SW 29
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Balsaminaceae

Impatiens noli-tangere L. on beaver dais in SW 28

Violaceae

Viola adunca J. E. Smith reported by Mrs. Hopkins
Viola canadensis L. occasional in forest and scrub
(Stands 2, 9, 17)
Viola palustris L. frequent in swamp and hummocky
carr (Stands 6, 8, 18, 22)
Viola renifolia A. Gray frequent in forest (Stands 1, 5,
11, 12, 18, 21)

Elaeagnaceae

Shepherdia canadensis (L.)
Nutt. in coniferous forest (Stands 11,
21)

Onagraceae

Circaea alpina L. at edge of MFs1 in SE 32
Epilobium angustifolium L. frequent in forest, swamp and
hummocky carr, locally dominant
in ungrazed scrub (Stands 2, 4,
5, 6, 7, 8, 9, 11, 12, 18, 21,
22)
Epilobium ciliatum Raf. occasional in swamp (Stand 8)
Epilobium leptophyllum Raf. frequent in fens (Stands 6, 14,
15, 18, 20, 22)
Epilobium palustre L. frequent in swamp and hummocky
carr (Stands 8, 15, 18)
Oenothera biennis L. reported by Mrs. Hopkins

Haloragaceae

Myriophyllum exalbescens Fern. common in sloughs and Coyote Lake

Araliaceae

Aralia nudicaulis L. abundant in forest (Stands 1, 2,
5, 9, 11, 12)

Umbelliferae

Cicuta bulbifera L. common in sedge fens (Stands 3,
6, 14, 20)
Cicuta maculata L. frequent in fens (Stand 18)

<u>Cicuta virosa</u> L.	occasional in swamp
<u>Heracleum lanatum</u> Michx.	in scrub and moist places in forest (Stand 4)
<u>Osmorhiza depauperata</u> Philippi	in moist Fa (Stand 5)
<u>Sanicula marilandica</u> L.	in scrub (Stands 4, 9)

Cornaceae

<u>Cornus canadensis</u> L.	common in forest, also on mounds in swamp and hummocky carr (Stands 1, 2, 5, 11, 12, 15, 18, 21)
<u>Cornus stolonifera</u> Michx.	abundant in forest, also on mounds in swamp and hummocky carr (Stands 1, 2, 4, 5, 8, 11, 12, 18, 22)

Pyrolaceae

<u>Moneses uniflora</u> (L.) A. Gray	in moist forest and on mounds in swamp (Stands 8, 11)
<u>Orthilia secunda</u> (L.) House	in moist forest and on mounds in swamp (Stands 8, 11, 15)
<u>Pyrola asarifolia</u> Michx.	in moist forest and on mounds in swamp (Stands 8, 11, 15)
<u>Pyrola chlorantha</u> Sw.	in moist Fa (Stand 11)

Ericaceae

<u>Andromeda polifolia</u> L.	frequent in bogs and bog forest, also on mounds in swamp (Stands 8, 10, 16, 19)
<u>Gaultheria hispidula</u> (L.) Bigel.	in moist Fs and on mounds in swamp (Stands 8, 11, 15)
<u>Ledum groenlandicum</u> Oeder	dominant in bogs and in understory of bog forest, also in mixed or coniferous forest and on mounds in swamp and hummocky carr (Stands 7, 8, 10, 12, 15, 16, 18, 19, 21, 22)
<u>Oxycoccus microcarpus</u> Turcz.	common in bog and bog forest (Stands 10, 16, 19)
<u>Oxycoccus quadripetalus</u> Gilib.	common on mounds in swamp and hummocky carr (Stands 8, 15, 18)
<u>Vaccinium myrtilloides</u> Michx.	common in coniferous forest, bog and bog forest, and on mounds in swamp and hummocky carr (Stands 7, 10, 11, 18, 18, 21)

Vaccinium vitis-idaea L.

common in coniferous forest, bog
and bog forest, and on mounds
in swamp and hummocky carr
(Stands 8, 10, 11, 12, 15, 18,
18, 19, 21, 22)

Primulaceae

Lysimachia ciliata L.
Lysimachia thyrsoiflora L.

in south-facing Fa in SW 33
frequent in fens (Stands 6, 17,
18, 22)

Gentianaceae

Gentianella amarella (L.) Börner
Halenia deflexa (Sm.) Griseb.

occasional on forest trails and
in grazed scrub (Stand 9)
occasional on forest trails, also
in Stand 21 (Fsp)

Menyanthaceae

Menyanthes trifoliata L.

common in fens (Stands 3, 6, 8,
14, 22)

Apocynaceae

Apocynum androsaemifolium L.

common in scrub and south-facing
Fa (Stands 2, 4, 9)

Convolvulaceae

Convolvulus sepium L.

in ungrazed scrub (Stand 4)

Polemoniaceae

Collomia linearis Nutt.

on roadside in SW 29

Boraginaceae

Mertensia paniculata (Ait.)
G. Don

occasional in forest (Stands 1,
5, 12)

Labiatae

Agastache foeniculum (Pursh)
Ktze.

by trail in SW 33

<u>Galeopsis tetrahit</u> L.	in meadow in SE 32
<u>Lycopus uniflorus</u> Michx.	occasional in sedge fens (Stands 3, 17)
<u>Mentha arvensis</u> L.	in willow carr (Stand 17)
<u>Scutellaria galericulata</u> L.	frequent in fens (Stands 3, 6, 7, 14, 18, 20)
<u>Stachys palustris</u> L.	occasional on moist ground (Stands 9, 17)

Scrophulariaceae

<u>Castilleja miniata</u> Dougl. ex Hook.	common on open grazed Fa, also in grazed scrub (Stand 9)
<u>Linaria vulgaris</u> Hill	reported by Mrs. Hopkins
<u>Veronica americana</u> (Raf.) Schw.	occasional in MFs1 (Stand 15)

Lentibulariaceae

<u>Utricularia intermedia</u> Hayne	common in fen on shore of slough in S 30 (Stand 20)
<u>Utricularia minor</u> L.	abundant in sheltered water of ponds, sloughs and Coyote Lake (Stands 3, 20)
<u>Utricularia vulgaris</u> L.	occasional in sloughs and ponds (Stand 20)

Plantaginaceae

<u>Plantago major</u> L.	on roadsides and grazed scrub (Stand 9)
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Rubiaceae

<u>Galium boreale</u> L.	common in forest and scrub (Stands 1, 2, 5, 9, 15, 21)
<u>Galium labradoricum</u> Weig.	common in swamp and hummocky carr (Stands 8, 15, 22)
<u>Galium trifidum</u> L.	frequent in sedge fens and carr (Stands 13, 14, 17, 18, 20)
<u>Galium triflorum</u> Michx.	frequent in forest and on mounds in swamp and hummocky carr (Stands 1, 5, 7, 8, 11, 18)

Caprifoliaceae

<u>Linnaea borealis</u> L.	common in moist forest, also on mounds in swamp (Stands 5, 11, 12, 15, 21)
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<u>Lonicera dioica</u> L.	occasional in forest (Stands 5, 11, 12)
<u>Lonicera involucreta</u> (Richards.) Banks	frequent in moist forest and on mounds in swamp and hummocky carr (Stands 1, 5, 6, 8, 11, 18, 21, 22)
<u>Symphoricarpos albus</u> (L.) Blake	frequent in forest (Stands 1, 2, 5, 12)
<u>Symphoricarpos occidentalis</u> Hook.	common and locally dominant in scrub (Stand 9)
<u>Viburnum edule</u> (Michx.) Raf.	common in forest (Stands 1, 5, 12)
<u>Viburnum opulus</u> L.	occasional in Fa and scrub (Stands 1, 4, 5)

Campanulaceae

<u>Campanula rotundifolia</u> L.	occasional in grazed scrub and dry Fa (Stand 9)
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Compositae

<u>Achillea millefolium</u> L.	common in grazed scrub, occasional in forest (Stands 2, 9, 17, 21, 22) by trail in SW 28
<u>Achillea sibirica</u> Ledeb.	common in forest and ungrazed scrub (Stands 1, 2, 5, 8, 9, 12, 21, 22)
<u>Aster ciliolatus</u> Lindl.	common in forest and scrub (Stands 1, 2, 4, 5, 9, 12)
<u>Aster conspicuus</u> Lindl.	occasional in swamp and carr (Stands 6, 7, 17)
<u>Aster modestus</u> Lindl.	common in swamp and carr (Stands 6, 7, 8, 17, 18, 22)
<u>Aster puniceus</u> L.	on shore of Coyote Lake (Stand 3)
<u>Bidens cernua</u> L.	on Dg and grazed carr (Stand 17)
<u>Cirsium arvense</u> (L.) Scop.	at edge of Mw in SW 30
<u>Cirsium drummondii</u> T. & G.	in grazed scrub (Stand 9)
<u>Crepis tectorum</u> L.	reported by Mrs. Hopkins
<u>Erigeron glabellus</u> Nutt.	in grazed carr (Stand 17)
<u>Erigeron philadelphicus</u> L.	occasional in forest and carr (Stands 7, 21, 22)
<u>Hieracium umbellatum</u> L.	on roadsides
<u>Matricaria matricarioides</u> (Less.) Porter	on Dg
<u>Matricaria perforata</u> M érat	frequent in forest (Stands 1, 2, 5, 12, 21)
<u>Petasites palmatus</u> (Ait.) A. Gray	frequent in swamp and carr (Stands 7, 8, 18)
<u>Petasites sagittatus</u> (Pursh) A. Gray	in Mwb (Stands 7, 18)
<u>Petasites vitifolius</u> Greene	in Mwb (Stand 18)
<u>Senecio pauperculus</u> Michx.	

Solidago canadensis L.
Sonchus uliginosus Bieb.
Tanacetum vulgare L.
Taraxacum officinale Weber

occasional in carr (Stands 7, 17)
in grazed carr (Stand 17)
reported by Mrs. Hopkins
common on Dg, grazed scrub and
grazed carr (Stands 8, 9, 17)

Appendix 3

COMMON NAMES OF VASCULAR PLANTS

COMMON NAMES OF THE VASCULAR PLANTS

SCIENTIFIC NAME	COMMON NAME
<i>Abies lasiocarpa</i> (Hook.) Nutt.	alpine fir
<i>Achillea millefolium</i> L.	common yarrow
<i>Achillea sibirica</i> Ledeb.	Siberian yarrow
<i>Actaea rubra</i> L.	baneberry
<i>Agastache foeniculum</i> (Pursh) Ktze.	giant hyssop
<i>Agrimonia striata</i> Michx.	agrimony
<i>Agropyron trachycaulum</i> (Link) Malte	slender wheatgrass
<i>Agrostis scabra</i> Willd.	hair grass
<i>Allium cernuum</i> Roth	nodding onion
<i>Alnus crispa</i> (Ait.) Pursh	green alder
<i>Alnus tenuifolia</i> Nutt.	river alder
<i>Amelanchier alnifolia</i> Nutt.	saskatoon berry
<i>Andromeda polifolia</i> L.	bog rosemary
<i>Anemone canadensis</i> L.	Canada anemone
<i>Anemone cylindrica</i> A. Gray	long-fruited anemone
<i>Anemone riparia</i> Fern.	anemone
<i>Apocynum androsaemifolium</i> L.	spreading dogbane
<i>Aquilegia brevistyla</i> Hook	blue columbine
<i>Arabis glabra</i> (L.) Bernh.	tower mustard
<i>Aralia nudicaulis</i> L.	wild sarsaparilla
<i>Aster ciliolatus</i> Lindl.	Lindley's aster
<i>Aster conspicuus</i> Lindl.	showy aster
<i>Aster modestus</i> Lindl.	aster
<i>Aster puniceus</i> L.	purple-stemmed aster
<i>Astragalus americanus</i> (Hook.) M.D. Jones	milk vetch
<i>Athyrium filix-femina</i> (L.) Roth	lady fern
<i>Betula neoalaskana</i> Sargent	Alaska birch
<i>Betula papyrifera</i> Marsh	paper birch
<i>Betula pumila</i> L. var. <i>glandulifera</i> Regel	dwarf birch
<i>Bidens cernua</i> L.	nodding beggar-ticks
<i>Botrychium virginianum</i> (L.) Sw.	grape fern
<i>Bromus ciliatus</i> L.	fringed brome
<i>Bromus inermis</i> Leyss. ssp. <i>inermis</i>	awnless brome
<i>Calamagrostis canadensis</i> (Michx) Beauv.	marsh reed grass
<i>Calamagrostis</i> sp. cf. <i>purpurascens</i> R. Br.	purple reed grass
<i>Calla palustris</i> L.	white calla or water arum
<i>Callitriche verna</i> L.	water starwort
<i>Caltha natans</i> Pallas	marsh marigold
<i>Caltha palustris</i> L.	marsh marigold
<i>Campanula rotundifolia</i> L.	harebell
<i>Carex aquatilis</i> Wahlenb.	sedge
<i>Carex atherodes</i> Spreng.	sedge
<i>Carex aurea</i> Nutt.	golden sedge
<i>Carex bebbii</i> Olney ex Fern.	sedge
<i>Carex brunnescens</i> (Pers.) Poir.	sedge
<i>Carex curta</i> Good.	sedge
<i>Carex diandra</i> Schrank	sedge
<i>Carex disperma</i> Dewey	two-seeded sedge
<i>Carex lacustris</i> Willd.	sedge
<i>Carex paucifloa</i> Lightf.	sedge
<i>Carex pauciflora</i> Lightf.	sedge
<i>Carex paupercula</i> Michx.	sedge

COMMON NAMES OF THE VASCULAR PLANTS

SCIENTIFIC NAME	COMMON NAME
<i>Carex rostrata</i> Stokes	sedge
<i>Carex</i> sp. cf. <i>rostrata</i> Stokes	sedge
<i>Carex stipata</i> Muhl. ex Willd.	sedge
<i>Carex tenuiflora</i> Wahlenb.	sedge
<i>Carex trisperma</i> Dewey	sedge
<i>Carex vaginata</i> Tausch	sedge
<i>Castilleja miniata</i> Dougl. ex Hook.	common red paint-brush
<i>Cerastium vulgatum</i> L.	mouse-eared chickweed
<i>Chrysosplenium iowense</i> Rydb.	golden saxifrage
<i>Cicuta bulbifera</i> L.	water hemlock
<i>Cicuta maculata</i> L.	water hemlock
<i>Cicuta virosa</i> L.	water hemlock
<i>Cinna latifolia</i> (Trev.) Griseb.	drooping wood reed
<i>Circaea alpina</i> L.	enchanter's nightshade
<i>Cirsium arvense</i> (L.) Scop.	Canada thistle
<i>Cirsium drummondii</i> T. & G.	Durmond's thistle
<i>Clematis occidentalis</i> (Hornem.) DC.	purple clematis
<i>Collomia linearis</i> Nutt.	collomia
<i>Convolvulus sepium</i> L.	wild morning-glory
<i>Corallorhiza striata</i> Lindl.	striped coral-root
<i>Corallorhiza trifida</i> Chatelain	pale coral-root
<i>Cornus canadensis</i> L.	bunchberry
<i>Cornus stolonifera</i> Michx.	red osier dogwood
<i>Corydalis aurea</i> Willd.	golden corydalis
<i>Corylus cornuta</i> Marsh.	beaked hazelnut
<i>Crepis tectorum</i> L.	annual hawksbeard
<i>Cypripedium passerinum</i> Richards.	birds-egg lady's-slipper
<i>Disporum trachycarpum</i> (S. Wats.) B. & H.	fairy-bells
<i>Drosera rotundifolia</i> L.	round-leaved sundew
<i>Dryopteris carthusiana</i> (Vill.) H.P. Fuchs	shield fern
<i>Eleocharis palustris</i> (L.) R. & S.	spike rush
<i>Elymus innovatus</i> Beal	hairy wild rye
<i>Epilobium angustifolium</i> L.	fireweed
<i>Epilobium ciliatum</i> Raf.	willow-herb
<i>Epilobium leptophyllum</i> Raf.	willow-herb
<i>Epilobium palustre</i> L.	willow-herb
<i>Equisetum arvense</i> L.	common horsetail
<i>Equisetum fluviatile</i> L.	horsetail
<i>Equisetum pratense</i> Ehrh.	horsetail
<i>Equisetum scirpoides</i> Michx.	horsetail
<i>Equisetum sylvaticum</i> L.	woodland horsetail
<i>Erigeron glabellus</i> Nutt.	fleabane
<i>Erigeron philadelphicus</i> L.	fleabane
<i>Eriophorum polystachion</i> L.	cotton grass
<i>Eriophorum vaginatum</i> L.	cotton grass
<i>Eriophorum viridi-carinatum</i> (Engelm.) Fern.	cotton grass
<i>Euphorbia esula</i> L.	leafy spurge
<i>Fragaria vesca</i> L.	woodland strawberry
<i>Fragaria virginiana</i> Duchesne	wild strawberry
<i>Galeopsis tetrahit</i> L.	hemp nettle
<i>Galium boreale</i> L.	northern bedstraw

COMMON NAMES OF THE VASCULAR PLANTS

SCIENTIFIC NAME	COMMON NAME
<i>Galium labradoricum</i> Wieg.	bedstraw
<i>Galium trifidum</i> L.	small bedstraw
<i>Galium triflorum</i> Michx.	sweet-scented bedstraw
<i>Gaultheria hispida</i> (L.) Bigel.	creeping snowberry
<i>Gentianella amarella</i> (L.) Borner	felwort
<i>Geocaulon lividum</i> (Richards.) Fern.	bastard toad-flax
<i>Geranium bicknellii</i> Britt.	crane's bill
<i>Geranium richardsonii</i> Fisch. & Trautv.	Richardson's geranium
<i>Geum macrophyllum</i> Willd.	yellow avens
<i>Glyceria grandis</i> S. Wats. ex. A. Gray	manna grass
<i>Glyceria striata</i> (Lam.) A.S. Hitch.	fowl manna grass
<i>Goodyera repens</i> R.Br.	rattlesnake plantain
<i>Gymnocarpium dryopteris</i> (L.) Newm.	oak fern
<i>Habenaria hyperborea</i> (L.) R. Br.	green bog orchid
<i>Habenaria obtusata</i> (Pursh) Richards	blunt-leaved orchid
<i>Habenaria orbiculata</i> (Pursh.) Torr.	round-leaved orchid
<i>Habenaria viridis</i> (L.) R. Br.	bracted orchid
<i>Halenia deflexa</i> (Sm.) Griseb.	spurred gentian
<i>Heracleum lanatum</i> Michx.	cow parsnip
<i>Heuchera richardsonii</i> R. Br.	alum-root
<i>Hieracium umbellatum</i> L.	narrow-leaved hawkweed
<i>Hordeum jubatum</i> L.	foxtail barley
<i>Impatiens noli-tangere</i> L.	touch-me-not
<i>Juncus cernuum</i> Roth	rush
<i>Juncus tenuis</i> Willd.	rush
<i>Larix laricina</i> (du Roi) K. Koch	larch or tamarack
<i>Lathyrus ochroleucus</i> Hook.	white peavine
<i>Lathyrus venosus</i> Muhl.	purple peavine
<i>Ledum groenlandicum</i> Oeder	common labrador tea
<i>Lemna minor</i> L.	common duckweed
<i>Lemna trisulca</i> L.	ivy duckweed
<i>Lilium philadelphicum</i> L.	western wood lily
<i>Linaria vulgaris</i> Hill	butter-and-eggs
<i>Linnaea borealis</i> L.	twin-flower
<i>Listera cordata</i> (L.) R. Br.	heart-leaved twayblade
<i>Lonicera dioica</i> L.	twining honeysuckle
<i>Lonicera involucrata</i> (Richards.) Banks	bracted honeysuckle
<i>Lycopodium annotinum</i> L.	stiff club moss
<i>Lycopodium complanatum</i> L.	ground cedar
<i>Lycopodium obscurum</i> L.	ground pine
<i>Lycopus uniflorus</i> Michx.	water horehound
<i>Lysimachia ciliata</i> L.	fringed loostrife
<i>Lysimachia thyrsoflora</i> L.	tufted loosestrife
<i>Maianthemum canadense</i> Desf.	wild lily-of-the-valley
<i>Matricaria matricarioides</i> (Less.) Porter	pineapple-weed
<i>Matricaria perforata</i> Merat	scentless chamomile
<i>Medicago lupulina</i> L.	black medick
<i>Medicago sativa</i> L.	alfalfa
<i>Melilotis alba</i> Desr.	white sweet clover
<i>Mentha arvensis</i> L.	wild mint
<i>Menyanthes trifoliata</i> L.	buck-bean
<i>Mertensia paniculata</i> (Ait.) G. Don	tall mertensia

COMMON NAMES OF THE VASCULAR PLANTS

SCIENTIFIC NAME	COMMON NAME
<i>Mitella nuda</i> L.	bishop's cap or mitrewort
<i>Moneses uniflora</i> (L.) A. Gray	one-flowered wintergreen
<i>Myriophyllum exalbescens</i> Fern.	water-milfoil
<i>Najas flexilis</i> (Willd.) Rostk. & Schmidt	
<i>Numphar variegatum</i> Engelm.	yellow pond-lily
<i>Oenothera biennis</i> L.	yellow evening-primrose
<i>Orthilia secunda</i> (L.) House	one-sided wintergreen
<i>Oryzopsis asperifolia</i> Michx.	rice grass
<i>Osmorhiza depauperata</i> Philippi	sweet cicely
<i>Oxycoccus microcarpus</i> Turcz.	small bog cranberry
<i>Oxycoccus quadripetalus</i> Gilib.	bog cranberry
<i>Parnassia palustris</i> L.	grass-of-parnassus
<i>Petasites palmatus</i> (Ait.) A. Gray	palmate-leaved coltsfoot
<i>Petasites sagittatus</i> (Pursh) A. Gray	arrow-leaved coltsfoot
<i>Petasites vitifolius</i> Greene	coltsfoot
<i>Phleum pratense</i> L.	timothy
<i>Picea glauca</i> (Moench) Voss	white spruce
<i>Picea mariana</i> (Mill.) BSP	Black Spruce
<i>Pinus contorta</i> Loudon	lodgepole pine
<i>Plantago major</i> L.	common plantain
<i>Poa palustris</i> L.	fowl bluegrass
<i>Poa pratensis</i> L.	Kentucky bluegrass
<i>Polygonum amphibium</i> L.	water smartweed
<i>Populus balsamifera</i> L.	balsam poplar
<i>Populus tremuloides</i> Michx.	trembling aspen
<i>Potamogeton alpinus</i> Balbis	pondweed
<i>Potamogeton pectinatus</i> L.	sago pondweed
<i>Potamogeton praelongus</i> Wulf.	white-stem pondweed
<i>Potamogeton pusillus</i> L.	pondweed
<i>Potamogeton richardsonii</i> (Benn.) Rydb.	clasping-leaf pondweed
<i>Potamogeton robbinsii</i> Oakes	pondweed
<i>Potamogeton zosteriformis</i> Fern.	pondweed
<i>Potentilla norvegica</i> L.	rough cinquefoil
<i>Potentilla palustris</i> (L.) Scop.	marsh cinquefoil
<i>Prunus pensylvanica</i> L.f.	pin cherry
<i>Prunus virginiana</i> L.	chokecherry
<i>Pyrola asarifolia</i> Michx.	common pink wintergreen
<i>Pyrola chlorantha</i> Sw.	greenish-flowered wintergreen
<i>Ranunculus circinatus</i> Sibth.	white water crowfoot
<i>Ribes hirtellum</i> Michx.	wild gooseberry
<i>Ribes hudsonianum</i> Richards.	wild black currant
<i>Ribes lacustre</i> (Pers.) Poir.	bristly black currant
<i>Ribes oxycanthoides</i> L.	wild gooseberry
<i>Ribes triste</i> Pall.	wild red currant
<i>Rosa acicularis</i> Lindl.	prickly rose
<i>Rosa woodsii</i> Lindl.	common wild rose
<i>Rubus arcticus</i> L. ssp. <i>acaulis</i> (Michx.) Focke	dwarf raspberry
<i>Rubus chamaemorus</i> L.	cloudberry
<i>Rubus idaeus</i> L.	wild red raspberry
<i>Rubus pubescens</i> Raf.	dewberry or running raspberry
<i>Rumex occidentalis</i> S. Wats.	western dock

COMMON NAMES OF THE VASCULAR PLANTS

SCIENTIFIC NAME	COMMON NAME
<i>Sagittaria cuneata</i> Sheld.	arrowhead
<i>Salix bebbiana</i> Sarg.	Bebb's willow
<i>Salix candida</i> Fleugge ex. Willd.	hoary willow
<i>Salix discolor</i> Muhl.	pussy willow
<i>Salix myrtilifolia</i> Anderss.	willow
<i>Salix pedicellaris</i> Pursh	willow
<i>Salix petiolaris</i> J.E. Smith	willow
<i>Salix planifolia</i> Pursh	willow
<i>Salix pseudomonticola</i> Ball	willow
<i>Salix pyrifolia</i> Anderss.	willow
<i>Salix serissima</i> (Bailey) Fern.	willow
<i>Sanicula marilandica</i> L.	snake root
<i>Schizachne purpurascens</i> (Torr.) Swallen	false melic
<i>Scirpus microcarpus</i> Presl	small-fruited bulrush
<i>Scirpus validus</i> Vahl.	common great bulrush
<i>Scutellaria galericulata</i> L.	skullcap
<i>Senecio pauperculus</i> Michx.	ragwort or groundsel
<i>Shepherdia canadensis</i> (L.) Nutt.	Canadian buffalo-berry
<i>Silene noctiflora</i> L.	night-flowering catchfly
<i>Silene pratensis</i> (Rafn) Godron & Gren.	white cockle or campion
<i>Sisyrinchium montanum</i> Greene	blue-eyed grass
<i>Smilacina racemosa</i> (L.) Desf.	false Solomon's-seal
<i>Smilacina stellata</i> (L.) Desf.	star-flowered Solomon's-seal
<i>Smilacina trifolia</i> (L.) Desf.	three-leaved Solomon's-seal
<i>Solidago canadensis</i> L.	Canada goldenrod
<i>Sonchus uliginosus</i> Bieb.	perennial sow thistle
<i>Sparganium angustifolium</i> Michx.	bur-weed
<i>Spiraea betulifolia</i> Pallas	white meadowsweet
<i>Spiranthes romanzoffiana</i> Cham. & Schledt.	ladies'-tresses
<i>Spirodela polyrhiza</i> (L.) Schleiden	larger duckweed
<i>Stachys palustris</i> L.	hedge nettle
<i>Stellaria longifolia</i> Muhl.	long-leaved chickweed
<i>Stellaria longipies</i> Goldie	long-stalked chickweed
<i>Streptopus amplexifolius</i> (L.) DC.	twisted-stalk
<i>Symphoricarpos albus</i> (L.) Blake	snowberry
<i>Symphoricarpos occidentalis</i> Hook.	buckbrush
<i>Tanacetum vulgare</i> L.	common tansy
<i>Taraxacum officinale</i> Weber	common dandelion
<i>Thalictrum venulosum</i> Trel.	meadow rue
<i>Thlaspi arvense</i> L.	pennycress or stinkweed
<i>Trifolium pratense</i> L.	red clover
<i>Trifolium repens</i> L.	white clover
<i>Triglochin maritima</i> L.	arrow-grass
<i>Typha latifolia</i> L.	cattail
<i>Urtica dioica</i> L.	nettle
<i>Utricularia intermedia</i> Hayne	flat-leaved bladderwort
<i>Utricularia minor</i> L.	small bladderwort
<i>Utricularia vulgaris</i> L.	common bladderwort
<i>Vaccinium myrtilloides</i> Michx.	blueberry
<i>Vaccinium vitis-idaea</i> L.	bog cranberry
<i>Veronica americana</i> (Raf.) Schw.	American brooklime
<i>Viburnum edule</i> (Michx.) Raf.	low-bush cranberry

COMMON NAMES OF THE VASCULAR PLANTS

SCIENTIFIC NAME

COMMON NAME

Viburnum opulus L.	high-bush cranberry
Vicia americana Muhl.	wild vetch
Viola adunca J. E. Smith	early blue violet
Viola canadensis L.	western Canada violet
Viola palustris L.	marsh violet
Viola renifolia A. Gray	kidney-leaved violet
Wolffia columbiana Karsten	

Appendix 4

FAUNAL CHECKLIST

This list is based on: (a) 10 visits to the study area by the authors from June 23 to August 14, 1987; (b) the Hopkins' written list (Birds and Wildflowers of Coyote lake and surrounding area, 1971-1986; (c) additional information verbally supplied by the Hopkins, including 1987 observations; and (d) preliminary results of the fish sampling trip by Dr. Joe S. Nelson, University of Alberta, Department of Zoology, and assistants. Again, small mammals (shrews, bats and mice/voles) are inadequately assessed as there was insufficient time for a live-trapping program.

Nomenclature of mammals follows Jones, Carter and Genoways (1975); of birds, the AOU Checklist with revisions up to the 32nd Supplement (1973)

Mammals

* indicates species recorded by the authors of this survey.

*snowshoe hare (<u>Lepus americanus</u>)	Fa, Fx, BF _s , BF _b , MF _{s1} , Mw, Mwb, Ss, Dg
*least chipmunk (<u>Eutamias minimus</u>)	Ss (especially beaver-cut slopes), Fa (edge with Dg)
woodchuck (<u>Marmota monax</u>)	Dg (pasture), Ss (grazed)-rare
*Franklin's ground squirrel (<u>Spermophilus franklinii</u>)	Fa (edge with Dg), Ss (beaver cut) - local
*red squirrel (<u>Tamiasciurus hudsonicus</u>)	Fa, MF _{s1} , BF _s , Fsp, Fx
*northern pocket gopher (<u>Thomomys talpoides</u>)	Dg (pasture - local)
*beaver (<u>Castor canadensis</u>)	Coyote Lake, sloughs SW 28, S 30; SE 29 (abandoned)
deer mouse (<u>Peromyscus maniculatus</u>)	Fa, Fx, Ss (ungrazed)
*red-backed vole (<u>Clethrionomys gapperi</u>)	Fa, Fx
*lemming vole (<u>Synaptomys b. borealis</u>)	MF _{s1}
*meadow vole (<u>Microtus pennsylvanicus</u>)	Mb, M _{cbn} (winter)
*muskrat (<u>Ondatra zibethicus</u>)	Coyote Lake, all sloughs
*coyote (<u>Canis latrans</u>)	Dg (trails), Ss, Fa, Fx, Mb, M _{cbn} , Mw (open)
black bear (<u>Ursus americanus</u>)	Dg (trails), Ss (beaver cut, fire), Fa, Coyote Lake (swimming)

short-tailed weasel (<u>Mustela erminea</u>)	Fa, Fs, Fx, Mw (dry), MFs1, BFs, Ss, Dg
wolverine? (<u>Gulo gulo</u>)	crossing east bay, Coyote Lake
mink (<u>Mustela vison</u>)	Coyote Lake, slough and stream edges
lynx (<u>Felis lynx</u>)	Fa, Fx, MFs1, BFs
wapiti (elk) (<u>Cervus elaphus</u>)	Coyote Lake (edge and ice)
*mule deer (<u>Odocoileus hemionus</u>)	Fa, Fx, Ss, Coyote Lake (edge)
white-tailed deer (<u>Odocoileus virginianus</u>)	Ss, Dg, Fa, Mcbn (dry)
*moose (<u>Alces alces</u>)	Fa, Ss (esp. beaver cut slopes), Mw, BFs, BFb, Mw, Mcbn, Coyote Lake and sloughs
Total (minimum):	22 species
Total (1987 survey):	13 species

Birds

Note: N = nesting within natural area; SpTr = spring transient; SuTr = summer transient; FTr = fall transient; Wi = winter visitor; R = year-round resident; SuV = summer visitor.

* indicates species recorded by the authors of this survey.

*common loon	N	Coyote Lake
	SuTr?	Slough SW 29, S 30
arctic loon	FTr-rare	Coyote Lake
*red-necked grebe	N	Coyote Lake, Slough SE 29, SW 29
horned grebe	SuTr	Coyote Lake
*eared grebe	SuTr	Coyote Lake
western grebe	FTr	Coyote Lake
pied-billed grebe	FTr	Coyote Lake
double-crested cormorant	SuTr-rare	Coyote Lake
*great blue heron	SuV	Coyote Lake, Sloughs SW 29, S 30
*American bittern	N	Coyote Lake
tundra swan	Sp/FTr	Coyote Lake
*Canada goose	N	Coyote Lake
*mallard	N	Coyote Lake, Beaver Pond SW 28, Slough SE 29
*gadwall	N	Slough SE 29, Beaver Pond SW 28
northern pintail	SpTr	Coyote Lake
*green-winged teal	N	Coyote Lake(?), Beaver Pond SW 28
*blue-winged teal	N	Coyote Lake(?), Beaver Pond SW 28
northern shoveler	SpTr	Coyote Lake
redhead	SpTr	Coyote Lake

*ring-necked duck	N	Coyote Lake, Sloughs SE 29, SW 29, S 30, Beaver Pond SW 28
canvasback	Sp/SuTr	Coyote Lake
*lesser scaup	N	Coyote Lake, Slough SE 29
common goldeneye	N?	Coyote Lake
*bufflehead	N	Coyote Lake(?), Beaver Pond SW 28
oldsquaw	SuTr-rare	Coyote Lake (July 26/86)
white-winged scoter	SuTr-rare	Coyote Lake
surf scoter	SuTr-rare	Coyote Lake
*ruddy duck	SuTr	Coyote Lake
hooded merganser	SpTr	Coyote Lake
red-breasted merganser	SpTr	Coyote Lake
goshawk	Wi-rare	Fa, Fx, Coyote Lake edges
*red-tailed hawk	N	Fa, Fx, Ss, Coyote Lake edges
*broad-winged hawk	N	Fa, Fx, Ss, lake/slough edges
Swainson's hawk	SuTr-rare	Ss
rough-legged hawk	Ftr	Ss, Dg (pasture), Coyote Lake
golden eagle	SuV	Coyote Lake edges
bald eagle	Sp/FTr	Coyote Lake edges
northern harrier	N?	Coyote Lake & slough edges, open fens (Mb, Mcb, Mcbn)
peregrine falcon	Tr-occ.	Coyote Lake edges, over- flight
merlin	N?	Fx, Fs, Coyote Lake edges
American kestrel	N?	Ss, Coyote Lake edges
spruce grouse	Su 1971	MFs1
*ruffed grouse	R	Fa, Fx, Mw (winter)
sharp-tailed grouse	Wi	Ss, Dg (pasture edge)
sandhill crane	FTr	overflight only
*sora	N	flooded Mw, Mcbn & Mcb around Coyote Lake, sloughs, beaver pond
American coot	N?	Coyote lake
killdeer	N?	Dg (pasture)
*common snipe	N	open fens, lake/slough edges
*spotted sandpiper	N?	Coyote Lake
solitary sandpiper	N?	beaver ponds/shore; open banked streams
greater yellowlegs	N?	open fens, Coyote Lake edges
least sandpiper	Tr-Aug/82	Coyote Lake edge
northern phalarope	FTr-rare	Coyote Lake
Wilson's phalarope	SuTr-rare	Coyote Lake (July 25/87)
California gull	SuTr-rare	Coyote Lake
ring-billed gull	SuTr-rare	Coyote Lake
Franklin's gull	SuTr	Coyote Lake
*Bonaparte's gull	Su/FTr	Coyote Lake
common tern	SuTr	Coyote Lake

*black tern	N	Coyote Lake, Slough SW 29
*mourning dove	N	Fa (open), Ss, Dg
*black-billed cuckoo	N	Fa
great horned owl	R	Fa, Fx + Ss (hunting)
great gray owl	Wi (1976)	Fa/Dg (pasture) edge
*common nighthawk	SuV	feeding flight, various sites
*ruby-throated hummingbird	N	Fa, Dg (Hopkins' feeder)
*belted kingfisher	N?	Coyote Lake, possible nest burrow in bank, Slough S 30
*northern flicker (yellow-shafted)	N	Fa/Ss, Fa/Dg, open Fa
pileated woodpecker	R	Fa, Fx, Fs
yellow-bellied sapsucker	N	Fa (mature), Fx, Fsp, Mw (if birch present)
hairy woodpecker	R	Fa (mature), Fx, MFsl
*downy woodpecker	R	Fa (mixed age, mature), Fx
black-backed three-toed woodpecker	Wi	Fx, Fs, BFsl, BFsl, Fsp (if dead conifers present)
*eastern kingbird	N	Coyote Lake margin + outlet ponds (drowned trees); Beaver Pond SW 28
western kingbird	SpTr-rare	Dg (near house-pasture)
*eastern phoebe	N	Dg (Hopkins' house)
Say's phoebe	SpTr	Dg (near house-pasture), Ss
yellow-bellied flycatcher	Sp/FTr	Mw (around MFsl, BFsl)
*alder flycatcher	N	BFsl (edge), MFb, Mw, Mwb
*least flycatcher	N	Fa, Fx (lesser frequency)
*western wood pewee	N	Fa, Fx
*olive-sided flycatcher	N	MFsl (with standing dead trees)
*tree swallow	N	Coyote Lake (feeding flight)
*barn swallow	N?	Slough SW 29 (feeding flight)
*gray jay	R	BFsl, Fs
*blue jay	R	Fa, Fs, BFsl, Mw (occasionally)
*black-billed magpie	R	Ss (edges), Dg, Mw
*common raven	Wi	variety of habitats
*common crow	N?	Fa (uncommon)
*black-capped chickadee	R	Fa, MFsl (edge), Fx, Fs, Fsp, Mw/Mwb
*boreal chickadee	R	MFsl, Fx
*white-breasted nuthatch	R	Fa, Fx, Fs (occasional)
*red-breasted nuthatch	N	MFsl, Fx, Fsp
brown creeper	N?	Fs, Fx, BFsl, MFsl, Fsp
*house wren	N	Fa (mature), Fs/Ss edge
*marsh wren	N	Slough SE 29, Coyote Lake edge
*catbird	N	Ss (beaver cut), Mw, Mwb
*robin	N	Fa, Fx, MFsl, BFsl, Bfb, Ss, Dg, Fsp

*hermit thrush	N	Fa (mature-north slopes), Fx
Swainson's thrush	N	Fa (mixed age), Fx
gray-cheeked thrush	SpTr	Fa, Fx
*veery	N	Ss (pincherry stand), Fa
mountain bluebird	N	Dg (pasture with nest box)
golden-crowned kinglet	N?	Fs, Fx, MFs1, BFs
ruby-crowned kinglet	N?	Fs, Fx, MFs1, BFs
American pipit	SpTr	Dg (pasture)
Bohemian waxwing	SpTr, N?	Fx, Fs
*cedar waxwing	N	MFs1 (drowned trees), Fa/Ss
northern shrike	SpTr	Fa (edge), MFs1, drowned trees
starling	SpTr	Dg (pasture-house area)
*red-eyed vireo	N	Fa (all ages), Fx (occasionally)
Philadelphia vireo	N?-rare	Fa (mixed age), Mw (all types)
*warbling vireo	N	Fa (all ages, prefers mature)
black-and-white warbler	N	Fa, Fx, Mw (edge of BFs, MFs1)
Tennessee warbler	N	Mw, Fa (near wetland)
*yellow warbler	N	Mw, Fa/Ss/Dg edges
*yellow-rumped warbler (myrtle)	Sp/FTr/N	Fa (migration), Fx, MFs1
ovenbird	N	Fa (mature), Fx
*yellowthroat	N	Mw (all types), BFs (open), MFb, Fsp (immature, moist)
American redstart	N?	Fa and Fx (near wetland)
house sparrow	Wi-rare	Dg (near house)
western meadowlark	SpTr-rare	Dg (pasture), Ss (grazed)
*red-winged blackbird	N	Mw/cattail around lake, all sloughs, beaver ponds
*northern oriole	N	Fa (especially mature), Fx
rusty blackbird	FTr	MFs1, BFs, slough and lake edges
Brewer's blackbird	SpTr-rare	Dg (pasture), Ss (grazed)
common grackle	Sp/FTr	Mw (lake, slough edges), Ss
*brown-headed cowbird	N	Dg, Ss, BFs (open)
western tanager	SpTr-rare	Fx, Fa
*rose-breasted grosbeak	N	Fa, Fx
black-headed grosbeak	SuV-very rare	Fa?
lazuli bunting	SpTr-v.rare	Fa (edge), Ss?
evening grosbeak	Wi	Fx, Fa, Dg (house-feeder)
purple finch	N	Fa, Fx
pine grosbeak	Wi	Ss, Fa (open)
hoary redpoll	Wi	Fx, Fa, BFb, MFb, Mw (with birch)
common redpoll	Wi	Fx, Fa, BFb, MFb, Mw (with birch)
*pine siskin	N	MFs1, Fs, Fsp

Figure 1 - Coyote Lake Area Map

L E G E N D

A	open water
Ap	Potamogeton spp. - Nuphar
Aw	Wolffia dominated
Mk	water arum beds
Mt	Typha beds
Mcq	water sedge fen
Mcbn	mixed sedge fen
Mcn	narrow-leaved sedge fen
Mcb	broad-leaved sedge fen
Mc	undifferentiated fen (air photo interpretation)
Mb	bluejoint beds
Mw	mixed willow carr
Mwb	balsam willow carr
MFs1	black spruce/larch swamp
MFb	birch swamp
MFb1	birch/larch swamp
BFs	bog forest (spruce-dominated)
BFb	bog forest (birch-dominated)
Fs	white spruce forest
Fsp	white spruce/lodgepole pine forest
Fx	mixedwood forest
Fa	birch/aspens poplar forest
Ss	seral scrub
Dg	disturbed ground
o	beaver lodge
xxx	beaver dam
-----	former extent of beaver pond (drained since 1980)
—	permanent stream
- - -	intermittent stream
○ 2700	contour (50' interval)
•	quadrat sample site (1-22)
==	all-weather road
= = =	bulldozed trail/cutline
- - -	foot trail
x = x	hydro transmission line
—	study area boundary
- . - . -	Natural Area boundary

Fish

*fathead minnow (Pimephales
promelas)

Coyote Lake-resident

*brook stickleback (Culaea
inconstans)

Coyote Lake + at least Slough
SE 29 and inlet/outlet-
resident

Total:

2 species

BIOPHYSICAL SURVEY OF THE COYOTE LAKE DISTRICT:

BOTANICAL SUPPLEMENT

August 1988

During the course of a breeding bird survey in 1988, some additional botanical information was collected and water samples obtained from two further water bodies. A collection of bog and aquatic plants was made from the bog pond in SW30/NW19 on July 21 in company with Dr. Brij Kohli of the University of Alberta herbarium. These plants (together with others verifying new records) have been deposited in that herbarium. Additional photographs have been deposited with the Natural Areas Manager, Peter G. Lee.

Vegetation Types

Streamside forest (MFr) dominated by Populus balsamifera and Alnus spp. is better developed on land to the West of the area covered by this report, but there is one stand in the SW corner of NE20. Particularly characteristic of this vegetation is the presence of ostrich fern (Matteuccia struthiopteris) and Thalictrum sparsiflorum, both northern species here close to the southern limit of their Albertan range. The shrubs most prominent in this community were Cornus stolonifera and Lonicera involucrata. Other herbs noted were Adoxa moschatellina, Agrimonia striata, Anemone canadensis, Aster modestus, Caltha palustris, Chrysosplenium iowense, Cicuta maculata, Equisetum pratense, Galium triflorum, Geranium richardsonii, Geum macrophyllum, Glyceria grandis, G. striata and Heracleum lanatum.

Awned sedge beds (Mca) dominated by Carex atherodes were noted in a depression in SW33. This vegetational type is thought to be indicative of fluctuating water levels, and is much less prevalent in the Coyote Lake district than in other parts of the Edmonton Region.

The aquatic plant community of the bog pond in SW30/NW19 differs from that of Coyote Lake in that the dominant narrow-leaved Potamogeton was not P. pusillus, but P. friesii. Other Potamogetons represented (in order of abundance) were P. zosteriformis, P. praelongus and P. richardsonii. Ceratophyllum demersum was also abundant. Along the shore there were patches of Nuphar variegatum. There was scarcely any development of a zone of emergent vegetation around this pond, since the surrounding bog forest (BFs, BFsl) extends to the water's edge as a floating mat.

Special Features

To the list of special features can be added the presence of an exceptional orchid site in the SE corner of NW28 (in very mossy larch - black spruce swamp, MFs1) visited on June 10. Orchis rotundifolia was extremely abundant throughout this swamp, and more locally there were extensive beds of Cypripedium passerinum and Goodyera repens. The inconspicuous Listera cordata also occurred throughout this area. Also noted were Corallorhiza trifida and Habenaria spp. (not yet in flower).

Additions to List of Vascular Plants

*an asterisk indicates supplementary information on a species already listed in the main report

Lycopodiaceae

Lycopodium clavatum L. in heathy forest (Fsp) in NE30
*Lycopodium obscurum L. also in NE30 (Fsp)

Polypodiaceae

Cystopteris fragilis (L.) Bernh. on vertical surfaces formed by roots of fallen trees in swamp (MFs1) in SE32
Matteuccia struthiopteris (L.) Todaro in streamside forest (MFr) in SW corner of NE20

Pinaceae

*Abies lasiocarpa (Hook.) Nutt. also at edge of MFs1 in SE32 and in Fx in NE20

Potamogetonaceae

Potamogeton friesii Rupr. abundant in bog pond in SW30/NW19
Potamogeton natans L. in watercourse in NE30
*Potamogeton praelongus Wulf. also in bog pond in SW30/NW19
*Potamogeton richardsonii (Benn.) Rydb. also in bog pond in SW30/NW19
*Potamogeton zosteriformis Fern. also in bog pond in SW30/NW19

Gramineae

Agropyron repens (L.) Beauv. at edge of meadow in SE32
Alopecurus aequalis Sobol. on mud in depressions
Festuca saximontana Rydb. in Fsp (SW30)
Glyceria borealis (Nash) Batchelder in watercourse in NE30
*Glyceria grandis S.Wats. ex A.Gray also common along creek in SE30
Poa annua L. frequent along cattle trails
Poa interior Rydb. in Fsp and open dry ground
*Poa pratensis L. s.l. a giant form found along margin of MFs1 in SE32 requires taxonomic investigation

Cyperaceae

- Carex capillaris L. in moist Fx in SW29
Carex deweyana Schwein. on trail in SW28
Carex interior Bailey in BF's (SW30)
Carex leptalea Wahlenb. in MFs1 and BF's (NW28, SW30)
Carex peckii Howe in moist Fx and on cutlines
(NE20, SW29)
Carex prairea Dewey in MFs1 (NW28, SW30)
Carex praticola Rydb. frequent on dry open ground
*Eriophorum polystachion L. also along trail in BF's (NE29)

Juncaceae

- *correct Juncus "cernuum" to Juncus nodosus L. (typographical error)
Luzula multiflora (Retz.) Lej. on disturbed moist peat on cutline (E boundary of SE29)
Luzula parviflora (Ehrh.) Desv. occasional in MF's (SE32)

Iridaceae

- *Sisyrinchium montanum Greene frequent on trails

Orchidaceae

- Corallorhiza maculata Raf. on NE-facing slope in NE30
(the previous record of C. striata probably refers to this species)
*Cypripedium passerinum Richards. abundant in MFs1 in NW28
*Habenaria viridis (L.) R.Br. generally frequent in Fa
Orchis rotundifolia Banks ex abundant in MFs1 in NW28,
Pursh occasional elsewhere

Salicaceae

- Salix lucida Muhl. ssp. in moist hollow in NW29 (tree-sized)
lasiandra (Benth.) Argus
Salix myrtillofolia Anderss. in MFs1 (NW28) - this taxon may
var. cordata (Anderss.) Dorn be more appropriately treated as
a distinct species, S. novae-angliae Anderss.

Urticaceae

- *Urtica dioica L. mainly on beaver dams

Polygonaceae

- Polygonum lapathifolium L. in mud on beaver dam (SW28)
Rheum rhabarbarum L. (rhubarb) self-sown along edge of meadow
(SE32), a relic of cultivation
40 years ago

Chenopodiaceae

- Chenopodium album L. on Dg in NE20

Caryophyllaceae	
<u>Cerastium nutans</u> Raf.	on Dg in NE20
<u>Moehringia lateriflora</u> (L.) Fenzl.	on cutline (Dg) in NE20
Ceratophyllaceae	
<u>Ceratophyllum demersum</u> L.	common in bog pond in SW30/NW19 and in watercourse in NE30
Ranunculaceae	
* <u>Aquilegia brevistyla</u> Hook.	mainly on N-facing forested slopes
<u>Ranunculus abortivus</u> L.	on cutline (Dg) in NE20
<u>Ranunculus gmelinii</u> DC.	both large- and small-flowered forms common on mud at edge of depressions and along S shore of Coyote Lake
<u>Ranunculus macounii</u> Britt.	occasional in wet places
<u>Ranunculus sceleratus</u> L.	occasional on mud (less common than <u>gmelinii</u>)
<u>Thalictrum sparsiflorum</u> Turcz.	in streamside forest (MFr) in SW corner of NE20, also along runoff channel in SW28
Fumariaceae	
* <u>Corydalis aurea</u> Willd.	frequent on cutlines (Dg)
<u>Corydalis sempervirens</u> (L.) Pers.	on Dg in NE20
Cruciferae	
<u>Arabis hirsuta</u> (L.) Scop.	frequent on cutlines (Dg)
<u>Capsella bursa-pastoris</u> (L.) Medic.	frequent on Dg
<u>Cardamine pensylvanica</u> Muhl.	occasional on moist ground
<u>Descurainia sophia</u> (L.) Webb	occasional on Dg
<u>Draba nemorosa</u> L.	in W-facing Fx in SW29
<u>Rorippa palustris</u> (L.) Besser	in moist depressions on trails
* <u>Thlaspi arvense</u> L.	frequent on Dg
Rosaceae	
* <u>Agrimonia striata</u> Michx.	common in grazed areas
<u>Geum allepicum</u> Jacq.	in Fx (SW29)
<u>Geum rivale</u> L.	occasional in fens
<u>Potentilla arguta</u> Pursh	occasional in dry Fa and on open ground
Geraniaceae	
* <u>Geranium bicknellii</u> Britt.	frequent on Dg

Callitrichaceae
 *Callitriche verna L. also in creek in SE30

Violaceae
Viola tricolor L. weed near house (SW33)

Pyrolaceae
Pyrola elliptica Nutt. in Fa in SE32

Ericaceae
Arctostaphylos uva-ursi (L.) local in Fsp (NE30, SW30)

Labiatae
Dracocephalum parviflorum Nutt. on Dg in NE20

Scrophulariaceae
Pedicularis parviflora J.E.Smith in pools in MFs1 (SE32)
Veronica peregrina L. in moist depression on trail
 in SE32

Adoxaceae
Adoxa moschatellina L. in streamside forest (MFr)
 in NE20

Compositae
Antennaria neglecta Greene occasional in forest
Antennaria pulcherrima (Hook.) on disturbed heathy ground
 Greene (W boundary of SW30)
Arnica chamissonis Less. on cutline (E boundary of
 SE29)
Arnica cordifolia Hook. in Fx in NE20, and on cutline
 in SE29
Aster borealis (T. & G.) Prov. near shore of bog pond in
 SW30/NW19
Chrysanthemum leucanthemum L. weed near house (SW33)
Erigeron acris L. ssp. politus on trail in SE30
 (E. Fries) Schinz & Keller
Helianthus annuus L. under Picea glauca in SE32
 (probably not native but
 spread through bird feeders)

