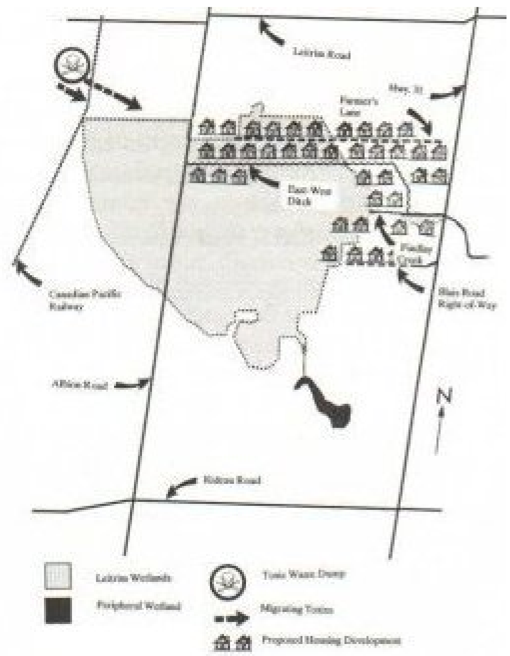
The Ottawa Field-Naturalists' Club

# Albion Road Wetlands: Part 2

***by Albert W. Dugal***
[reproduced from *Trail & Landscape* 1992;26(3):64-94]
See also Part 1 (*T&L* 1990;24(2):56-78) and Part 3 (*T&L* 1993;27(4):118-139)

This article updates events since 1990 and reports on additional regionally significant plants found throughout 1990-91. The wetlands are evaluated and relevant topics such as wetland formation, drainage, peat wastage, endangered plant communities, boundaries and Findlay Creek are discussed. The Cumming Cockburn Report, "Planning for Leitrim — An Integrated Approach", is examined with emphasis on its errors, inconsistencies and highly debatable conclusion that "a functional sustainable wetland and stream ecosystem will persist with the development proposal". Various negative environmental impacts posed by this project and suggested wetland safeguards are outlined.

**Figure 1. Site plan of Leitrim (Albion Road) wetlands**




For over three years I have plodded and snowshoed my way through this remarkable wetland ecosystem (Figure 1), continuously amazed by its rich diversity. Within its boundaries lies a spectrum of moisture-loving plant communities that encompasses a variety of woodlands, several kinds of shrubby thickets, marshes, old fields, a fen and an unusual seepage area embracing both fen and bog affinities. Some of the oldest trees in Ottawa-Carleton have been discovered here — the growth rings of one Larch yielded an age of 250 years. The oldest cedars, enormous, often tilled specimens, are about 200 years old. Views of some trees are given in Figures 3, 5 and 23, The botanically important open fen component contains an assemblage of plants — White Camas (*Zygadenus glaucus*), Marsh Valerian (*Valeriana sitchensis* ssp. *uliginosa*), Arrow Grass (*Triglochin palustris*) (Figure 2) and Sterile Sedge (*Carex sterilis*) (Figure 6) unknown in Eastern Ontario. The Stoco Fen near Belleville is the closest locale in Southern Ontario harbouring a similar plant association.

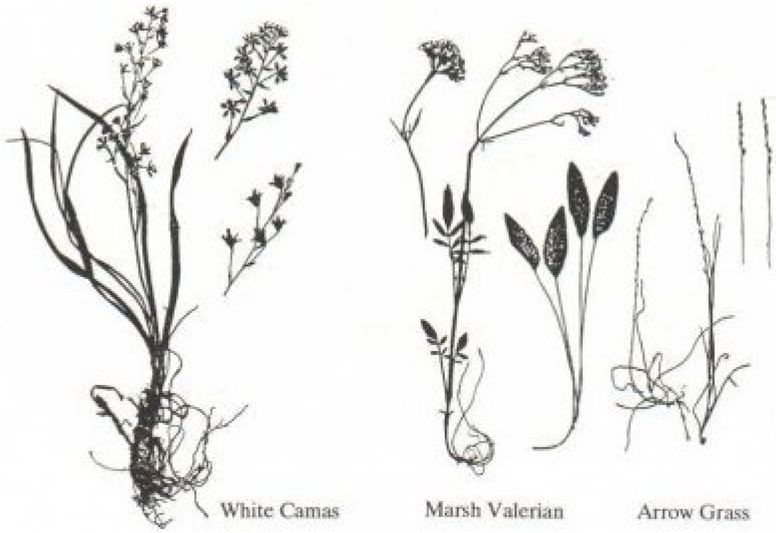



**Figure 2: Three of the plants previously unknown in Eastern Ontario**

The Leitrim Wetlands sustain an assortment of animal life including insects, fishes, amphibians, birds and mammals. Noteworthy among the birds are such provincially significant species as Northern Harrier, Red-Shouldered Hawk and Sedge Wren. Cooper's Hawk and Eastern Bluebird have been sighted in the vicinity of the wetlands and might be observed there in the future as the area provides an ideal habitat. There is also sufficient browse and cover for a deer yard.

Sadly, this regionally and provincially significant Class I wetland, one of the crown jewels of our local natural areas, is destined for ultimate destruction by proposed urbanization within its boundaries.

This article updates events since 1990 and reports on additional regionally significant plants found throughout 1990-91. The wetlands are evaluated and relevant topics such as wetland formation, drainage, peat wastage, endangered plant communities, boundaries and Findlay Creek are discussed. The Cumming Cockburn Report, "Planning for Leitrim — An Integrated Approach", is examined with emphasis on its errors, inconsistencies and highly debatable conclusion that "a functional sustainable wetland and stream ecosystem will persist with the development proposal". Various negative environmental impacts posed by this project and suggested wetland safeguards are outlined.

**Figure 3. Ancient Cedar Woods**

## Overview of Events: 1990-91

In November 1989, the Carleton Place District Office of the Ontario Ministry of Natural Resources (OMNR), declared:

> "Considering the wetland classification work just completed and noting that the development proposed would have an adverse effect on the wetland, we must now object to Official Plan Amendment #10 (Leitrim). Our objection would be withdrawn however, if the wetland is deleted from the area covered by the Official Plan Amendment."

January, 1990 brought about a stunning reversal of OMNR's position when it reneged on its responsibility to defend that part of the wetlands within the proposed Leitrim Urban Area before the OMB Protest letters were written to both the OMNR Minister and the Carleton Place District Manager reminding them of their mandate to protect Class I wetlands. However, their position remained unchanged and no reasonable explanation was offered. The developer, along with local politicians, pressed forward with their agenda.

On April 24,1990, the Planning Committee of the Regional Municipality of Ottawa-Carleton (RMOC) reviewed Gloucester's Official Plan Amendment #10 (OPA #10), Ignoring presentations from The Ottawa Field-Naturalists' Club (OFNC) and others seeking to preserve this unique Eastern Ontario wetland, Planning Committee adopted OPA #10 without modification. The politicians, quick to criticize what they considered an eleventh-hour disruption of two years of planning, remained unimpressed by the ecological value of the wetlands. No acknowledgement was made of the fact that I had informed officials the previous summer of the wetland's existence.

Within a few days of OPA #10 approval, six requests for its referral to the Ontario Municipal Board were filed with the support of RMOC's Planning Department. However, the Planning Committee declared on June 19 that the requests were "frivolous, vexatious or made for the purpose of delay", and refused to refer the matter to OMB. The following day, Regional Council waived the notice requirements under By-law 170-82 (two-week waiting period) and upheld the Planning Committee's decision.

In July, the OFNC, several other groups and I began meeting periodically with Tartan Homes Ltd., the lead developer, hoping to agree on methods to protect the wetlands and Findlay Creek while permitting some form of development. To gain more scientific data, Tartan retained Colder Associates Ltd. to undertake a hydrological study and Cumming Cockburn Limited to prepare an environmental analysis. Cumming Cockburn drew up wetland boundaries for the Lietrim Urban Area which were quite similar to those of OMNR. Cumming Cockburn also delimited a boundary for what they considered to be the "core" area for the wetland based on vague criteria. Discussions focused on how much additional land beyond the "core" was essential to protect the wetlands. To help resolve this question, a group interested in preserving the wetlands began investigating the zone outside the "core" and provided the findings to Cumming Cockburn.

In September, 1990, Gloucester finally acknowledged the presence of a Class I wetland within its boundaries. Two months later, Tartan delineated that part of the wetlands it was willing to save (Figure 4) and deed to public ownership. The boundary line was virtually unchanged from the core line presented earlier. Saving additional wetlands was considered by the developer to be "economically unfeasible". Unwilling to condone the destruction of one-fifth of the wetland, I abstained from future discussions, but Michael Murphy, representing a coalition of environmental groups and individuals, continued, hoping for a change in Tartan's position.

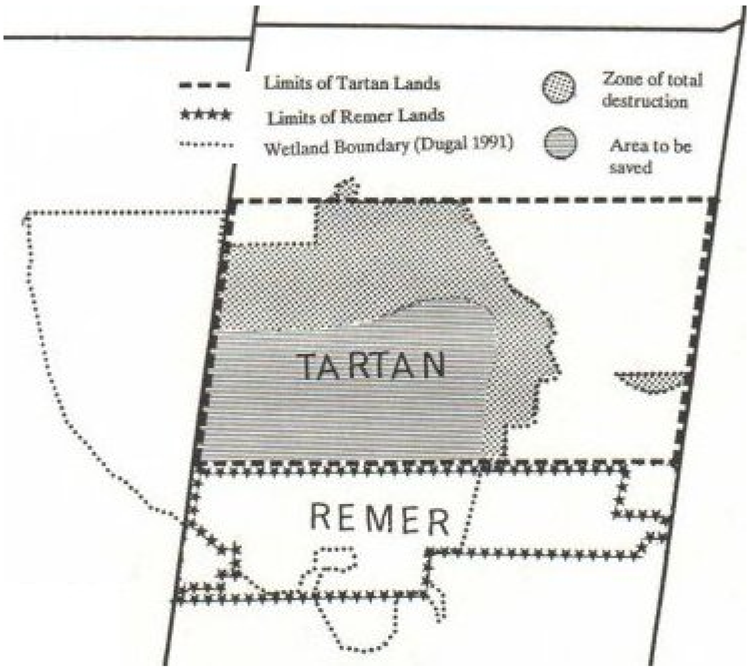


**Figure 4. Wetland Area to be Destroyed for Proposed Subdivision**

A positive note at this time was Gloucester's willingness to introduce zoning and land use designations for adjacent areas to protect the wetland's watershed. Following the release of the Cumming Cockburn Report concluding that development would not adversely affect the remainder of the wetland or the trout stream, I requested that the project be designated under the Provincial Environmental Assessment Act. (At the time of writing (March 1992), this request was before the Minister of the Environment for a decision, and is being contested by Tartan as being premature and unjustified).

In late summer, 1991, on application of the landowners, the OMB extended the Leitrim Urban Area southward to include the lands of Remer Holdings Ltd. (another developer) with the proviso that the wetland segment to be protected be defined to the satisfaction of the OMNR, Gloucester and RMOC. Remer has stated a willingness to hand over this portion of the wetland to the public domain.

Tartan's subdivision plans must be approved by Gloucester and RMOC. Once these plans are submitted, an OMB hearing can be requested without RMOC's consent.


**Figure 5. Towering, mature Cottonwoods (*Populus deltoides*)**

**in the southern part of the wetlands**

Ongoing investigations of the wetland east of Albion Road yielded a clearer understanding of its origins, complexity, plant communities, hydrology and history. A study of aerial photos (back to 1945) and old topographic maps (back to 1906), and careful observation of the plant communities have formed the basis for evaluation of major events since European settlement. The hydrogeological evaluation by Colder Associates Ltd. and the Cumming Cockburn Report did provide some useful data, but I strongly disagree with many of their conclusions.

## Additional Regionally Significant Plants

In 1990-91, an additional 61 regionally significant plants [based on Gillett & White's "*Checklist of Vascular Plants of the Ottawa-Hull Region, Canada*"] were found (Table 1) which included two plants new to the Ottawa District and three plants new to Ottawa-Carleton. A "new" record for the Ottawa District is the nationally and provincially rare Limestone Oak Fern (Figure 6) discovered by H. Senn in 1941. In three years of exploration, I have failed to locate its site but remain optimistic it is still extant in the area.

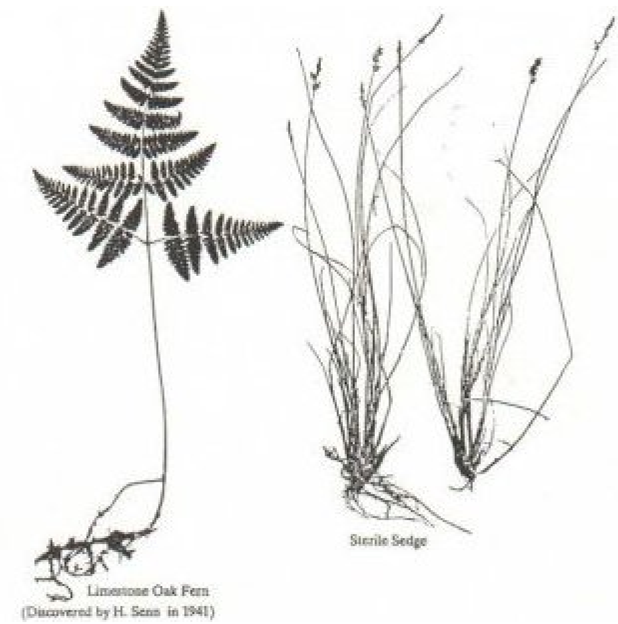



**Figure 6. Vascular Plants new to the Ottawa District**

## Regional Significance of the Leitrim Wetlands

Botanical evidence indicates that the Leitrim Wetlands is the only one of its kind in Eastern Ontario. As such, it is impossible to make comparisons with other ecosystems in the area. Even though it may contain more regionally significant plants and bryophytes than Mer Bleue (Table 2), it cannot be accorded a higher value because these ecosystems are so different (i.e. Mer Bleue is an acid bog, Leitrim, primarily an alkaline fen). However, it does have one of the highest percentages of significant vascular plants in the areas studied in Ottawa-Carleton (Table 3), and was assigned one of the highest ratings for wetlands in Eastern Ontario by OMNR using "An Evaluation System for Wetlands in Ontario".

**Table 1. Additional significant vascular plants and bryophytes in the Leitrim (Albion Road) Wetlands, 1990-91 (based on collections and identifications made by members of Botany Section, Canadian Museum of Nature.)**

**Vascular Plants New to the Ottawa District**

| | |
|---|---|
| *Carex sterilis* | Sterile Sedge |
| *Gymnocarpium robertianum* | Limestone Oak Fern |

**Vascular Plants New to Ottawa-Carleton**

| | |
|---|---|
| *Ceratophyllum echinatum* | Prickly Hornwort |

**Bryophytes (mosses) New to Ottawa-Carleton**

*Polytrichum formosum*
*Drepanocladus revolvens* var. *intermedius*

**Other Significant Vascular Plants**
(based on Gillet and White's *Checklist of Vascular Plants of the Ottawa-Hull Region, Canada*)

***Rare***

| | |
|---|---|
| *Carex gynocrates* | Ridged Sedge |
| *Scirpus pedicellatus* | Pedicellate Wool-grass |
| **Salix purpurea* | Basket Willow |
| *Betula* x *sandbergii* | Sandberg's Birch |
| *Lactuca muralis* | Wall Lettuce |

***Sparse***

| | |
|---|---|
| **Pinus sylvestris* | Scot's Pine |
| *Sparganium chlorocarpum* | Green Bur-reed |
| *Potamogeton foliosus* | Leafy Pondweed |
| *Potomogeton nodosus* | Knotted Pondweed |
| **Hydrocharis morsus-ranae* | Frog's-bit |
| *Brachyelytrum erectum* | Bearded Shorthusk |
| *Sphenopholis intermedia* | Slender Wedge Grass |
| *Carex debilis* | Weak Sedge |
| *Carcx paupercula* | Stunted Sedge |
| *Carex sychnocephala* | Compact Sedge |
| *Cyperus strigosus* | Strigose Cyperus |
| *Juncus canadensis* | Canada Rush |
| *Salix myrsinifolia* | |
| *Acer ginnala* | Amur Maple |
| **Rhamnus frangula var. asplenifolia* | Black Buckthorn |
| *Hypericum punctatum* | Spotted St. John's-wort |
| *Viola renifolia* | Kidney-leaved Violet |
| *Epilobium strictum* | Downy Willow-herb |
| *Myriophyllum verticillatum* | Whorled Water-milfoil |
| *Hackelia virginiana* | Virginian Stickseed |
| *Utricularia minor* | Lesser Bladderwort |
| **Hieracium pilosella* | Mouse-ear Hawkweed |
| **Hieracium pratense* | Field Hankweed |

***Locally Common***

| | |
|---|---|
| *Pogonia Ophioglossoides* | Rose Pogonia |
| *Penstemon digitalis* | Fox-glove Beard Tongue |

***Uncommon***

| | |
|---|---|
| *Equisetum variegatum* | Variegated Horsetail |

| | |
|---|---|
| *Potamogeton epihydrus* | Emersed Pondweed |
| *Najas flexilis* | Naiad |
| *Alopecurus aequalis* | Short-awn Foxtail |
| *Glyceria canadensis* | Canada Manna Grass |
| *Carex aurea* | Golden Sedge |
| *Carex comosa* | Bristly Sedge |
| *Carex granularis* | Granular Sedge |
| *Carex leptonervia* | Finely-nerved Sedge |
| *Carex vulpinoides* | Fox Sedge |
| *Eleocharis erythropoda* | Red-stemmed Spike-rush |
| *Scirpus microcarpus* | Red-sheathed Bulrush |
| **Salix alba* | White Willow |
| *Salix amgdaloides* | Peach-leaf Willow |
| *Salix eriocephala* | Heart-leaved Willow |
| *Salix nigra* | Black Willow |
| **Salix* x *rubens* | Bristly Crowfoot |
| *Ranunculus pensylvanicus* | Hooked Crowfoot |
| *Ranunculus recurvatus* | Shadbush |
| *Penthorum sedoides* | Water-Hemlock |
| *Amelanchier spicata* var. *spicata* | Bottle Gentian |
| *Cicuta maculata* | Dodder |
| *Gentiana andrewsii* | Marsh Speedwell |
| *Cuscuta gronovii* | Common Tansy |
| *Veronica scutellata* | |
| **Tanacetum vulgare* | |

* = adventive, naturalized or escaped from cultivation

**Table 2. Numbers of Bryophytes and regionally significant vascular plants in the wetland components of the Mer Bleue and Leitrim Wetlands complexes as of December 31, 1991.**

| | **Mer Bleue** | **Leitrim Wetlands** |
|---|---|---|
| Provincially significant plants | 10 (3 probably extinct) | 2 |
| Total rare vascular plants | 27 (4 probably extinct) | 19 |
| Total sparse vascular plants | 46 (1 probably extinct) | 48 |
| Total locally common vascular plants | 12 | 12 |
| Total uncommon vascular plants | 56 | 68 |
| Total regionally significant vascular plants | 151 | 149 |
| Total bryophytes | 44 | 128 |

**Table 3. Percentage of significant vascular plants in areas studied botanically in**

**Ottawa-Carleton as of December 31, 1991.**

| | |
|---|---|
| Leitrim Wetlands Complex* (Dugal 1989)<br>Wetland component** 43% | 37% |
| Mer Bleue Complex (Brunton 1984)<br>Wetland component 37% | 37% |
| South Gloucester Study Area (Dugal 1989) | 33% |
| Stony Swamp (Brunton 1982) | 32% |
| Shirley's Bay (Brunton 1980) | 27% |
| Green's Creek (Brunton 1983) | 21% |

* both wetland and non-wetland plant communities
** wetland only plant communities

## Bases for Wetland Formation

T.C. Winter, U.S. Geological Survey, Denver Federal Center,writes: "All wetlands are a result of a physiographic setting and water balance that favour the accumulation or retention of soil water and/or surface water for a period of time". Two principal topographic controls responsible for the Leitrim Wetlands are minimal land slope and discontinuities in the slope of the water table and land surface. On the east side of Albion Road, the northern third of the wetland slopes gently and consequently surface drainage is slow. To the south and west, the land rises upwards to 21.3 m. [70 ft.] (Figure 7).

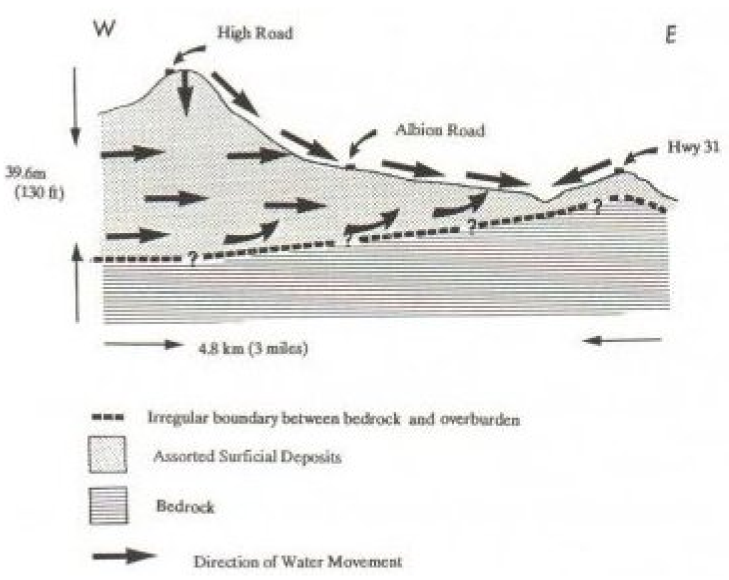



**Figure 7. Schematic surface water and groundwater flow systems in an east-west transect through the wetlands slightly south of the East-West Ditch**

In some areas where the slope changes rapidly, constant groundwater seepage can be observed. Elsewhere, upwelling is caused by changes in the permeability of surficial deposits and subsurface configurations of the bedrock. The importance of the latter is underlined by Cumming Cockburn: "bedrock ridge located approximately parallel to Highway 31 (Bank Street) impedes groundwater movement to the east. As a result of this and in combination with on-site conditions, the water table is near the surface over much of the site. Drainage from the west side of the bedrock ridge is via a single outlet at Highway

31. As a result of the poor drainage characteristics, a peat wetland and a fen were formed.". Cumming Cockburn, in the same report, also concluded that "the wetlands including the fen, exist as a direct result of the local sand and gravel outwash formations which force ground water to the surface in the southwest part of the property."

There are, according to the Geological Survey of Canada, four types of surficial deposits in the area: 1) till, 2) gravel and sand, 3) fine-to-medium-grained sand, and 4) organic deposits (Figure 8). More detailed studies in the area of the toxic waste dump indicate the presence of additional sediments such as very fine silty sands, silty sand and silt, clayey sand and silt and even some interbedded silt and clay. Cumming Cockburn describe three types of surficial soils:

> "silt and fine-to-medium (calcareous) sand, nearshore sediments located north of the East-West Ditch
>
> glacial till immediately east, and in the northeasternmost corner,of the property
>
> peat to depths of 2.4 m. over sandy silt to silty sand in much of the southwestern sector of the property."

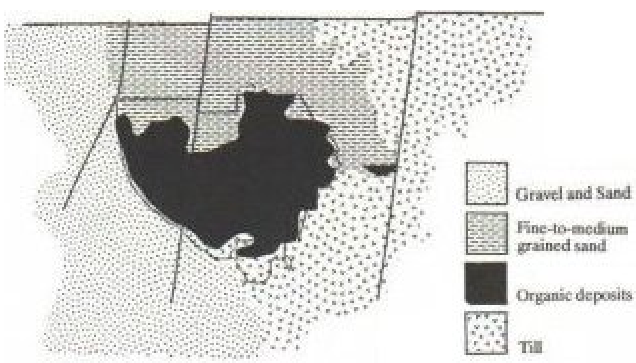



**Figure 8. Surficial geology of the Leitrim Wetlands area based on Map 1506A, Geological Survey of Canada**

Prior to settlement, water flowed slowly through the wetlands via several branches of Findlay Creek. Between 1879 and 1906, construction of a system of ditches diverted waterflows from some branches and channelized others (Figure 9). A more extensive drainage scheme was completed *ca*. 1920 further modifying and deepening Findlay Creek and profoundly affecting the wetlands. The fen, as visible in aerial photos from 1945 to the present, gradually diminished. Cumming Cockburn noted a dramatic increase in tree growth ring size dating about 70 years ago, indicating a drop in the water table that correlates with the *ca*. 1920 drainage. Tartan's 1988 ditching aggravated the situation by removing even more moisture, raising the temperature of ditchwater, increasing erosion rates, killing Larch trees, and spurring the growth of the invasive Black Buckthorn in the fen. Both the pre-1906 and *ca*. 1920 drainage schemes (and to a much lesser extent Tartan's 1988 ditching) affected the peat deposits.

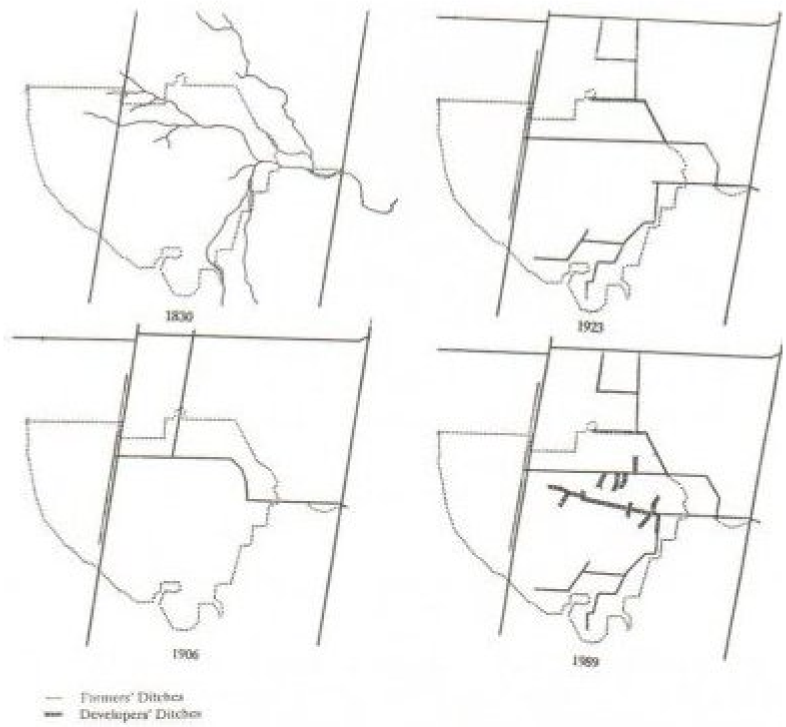


**Figure 9. Wetlands drainage, 1830-1989**

## Peat Wastage

Peat deposits are formed under conditions where oxygen is largely excluded, arresting the decay of plant remains (accumulation exceeds decomposition). Draining peatlands disrupts this process, reducing accumulation and accelerating decay to the point where peat wastage or oxidation is prevalent. As observed by S.R. Eyre in "Vegetation and Soils":

> "This organic material persisted almost unchanged under the waterlogged conditions in which it had accumulated but as soon as the water table was lowered decay bacteria were activated in the aerated upper layer. Very little insoluble material remains when peat decays so that inch by inch, the soil in drained cultivated fields has fallen below its original level."

J.N. Hutchinson, lmperial College, London, reports that at Holme Fen in England the land surface fell 3.65 m. (12 ft.) in 100 years due to peat decay caused by drainage. He also claims that alkaline fen peats tend to have higher rates of wastage than acid bog peats. As much of the peat at Leitrim is alkaline by nature, wastage rates would have been substantial in areas where the water table was lowered for a lengthy period. For example, the long-cultivated fields bordering Albion Road would have had an initial peat covering of at least 0.6-0.9 m (2-3 ft.).

Although pre-1906 drainage activated peat wastage along Albion Road, it apparently had little effect on the remaining southern part of the wetlands east of the road. However, the extensive *ca*. l920 ditching with its widespread lowering of the water table had dramatic effects. It halted most of the peat accumulation process east of Albion Road and started extensive, ongoing peat oxidation in parts north and south of the East-West ditch. Perched trees (Figure 10) indicate peat losses up to 0.6m. (2 ft.) in places hundreds of metres away from the ditches. Aerial photos indicate even greater wastage occurring in the ditch area southeast of the fen where an "island" of higher ground increased by over 50% due to lowering of the organic substrate.

**Figure 10. Perched Eastern White Cedar with 0.6 m of roots exposed (foreground) due to peat wastage**

As peat oxidizes, soil level drops and approaches the water table where a state of stabilization is reached. This continues to be an ongoing process. It is worth noting that peat wastage releases $CO_2$, a greenhouse effect gas. According to George Lee, Canmet Branch of Energy, Mines and Resources, a cubic metre of peat releases approximately 225-250 kilograms of $CO_2$ (personal communication). Several hundred thousand metric tonnes of $CO_2$ have likely already been released because of drainage schemes at Leitrim.

## Cultivated vs. Non-Cultivated Lands

Throughout 1991-92, I carefully examined most of the Tartan-owned wetlands in order to verify the contradictory statements made by Cumming Cockburn as to which areas had been cultivated in the past. I searched for indicators of non-cultivation such as large, fallen and decaying tree trunks, old stumps, irregular or hummocky topography and rocks. Aerial photos and old topographic maps supplemented ground studies. Fortunately, the time span between the last major agricultural assault and the first aerial photos was only about 25 years, allowing observation of ploughing patterns in land that had been rapidly abandoned due to excessive wetness. My study indicated less land cultivation than suggested by Cumming Cockburn (Figure 11).

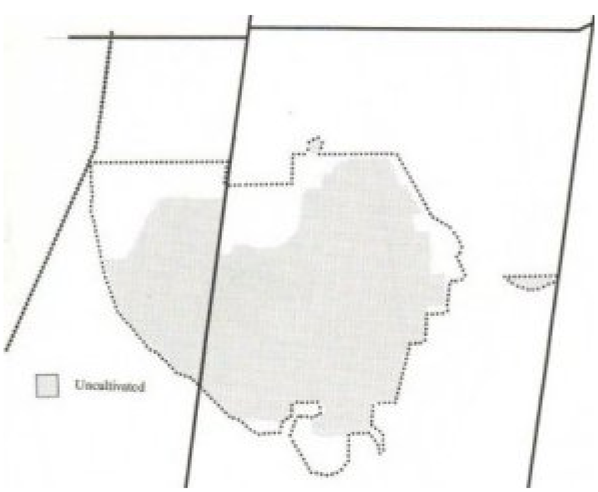



**Figure 11. Wetlands area never cultivated (in grey)**

## Immediately Threatened Plant Communities

At present, about 30 plant communities,varying in age and composition, lie within the area proposed for housing. Twenty-four of these will be totally destroyed and six reduced in size. Among those destined for annihilation are: cattail marshes, assorted woodlands, a variety of shrubby thickets and several kinds of wetfield communities. These contain at least 63 species of regionally significant plants, 20 of which have been seen only in this part of the wetands, including Prickly Hornwort (Figure 12) — a new record for Ottawa-Carleton.

**Figure 12. Prickly Hornwort**

Seventy years ago, the area was quite different (Figure 13). Old cedar stumps south of the East-West ditch and drowned cedar trees up to 130 years old, as well as large, fallen and decaying Elm trunks (over 100 years old) on the north side of the East-West ditch, indicate the presence of a fairly continuous woodland. Shortly after 1923, most of the trees between the Larch woods and the East-West ditch were cut, but the area was not cultivated. Natural succession followed. North of the East-West ditch extending to the farmer's lane, limited lumbering took place. However, between 1955 and 1967, Dutch Elm disease devastated the Elm woodland here and southeast of the fen. In the late 1970's and early 1980's beaver flooding drowned most of the cedar trees and remaining hardwoods, as well as some of the shrubby growth around the East-West ditch. These natural events destroyed most of the old trees, but the rich herbaceous flora remained and the cycle of regeneration is slowly underway. Large parts of the area are now covered with cattail marsh.

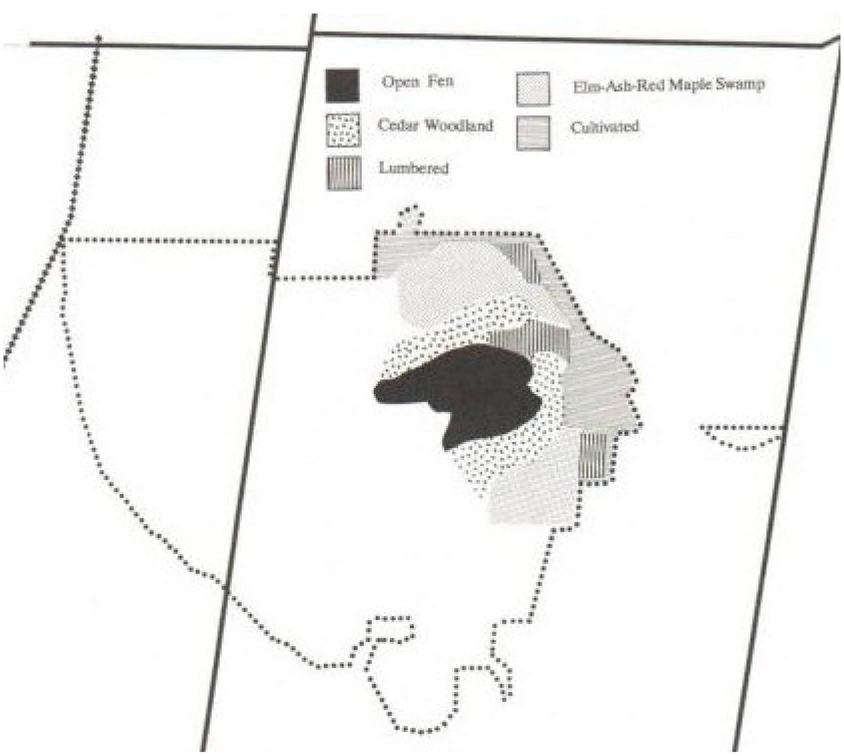



**Figure 13. Northeast section of the wetland in 1923**

## Wetland Boundaries Past to Present

The earliest mappings of the Leitrim Wetlands — the 1863 Map of the County of Carleton by H.F. Walling and the 1879 Belden Atlas of Carleton County — depicted only the wettest parts of this ecosystem (Figure 14). Existing plant communities, soil types, highwater table, past drainage schemes and slow surface drainage all indicate a total wetland area much larger than illustrated in the 19th Century maps. This is confirmed by old drainage records in Gloucester's archives. Determining the actual extent of the wetlands prior to settlement is difficult. However, based on present-day knowledge, a plausible boundary *ca*. 1830 can be suggested. The wetlands extended beyond Highway 31 in the vicinity of Findlay Creek. A remnant of the wetlands lies immediately west of the highway, located between the old stream bed and channelized creek. With cultivation appeared an onslaught of ditching, and by the early 1920's over one-third of the original wetlands was being farmed. This same decade witnessed the beginning of land abandonment which continued until recently with old fields gradually reverting to wetland plant communities.

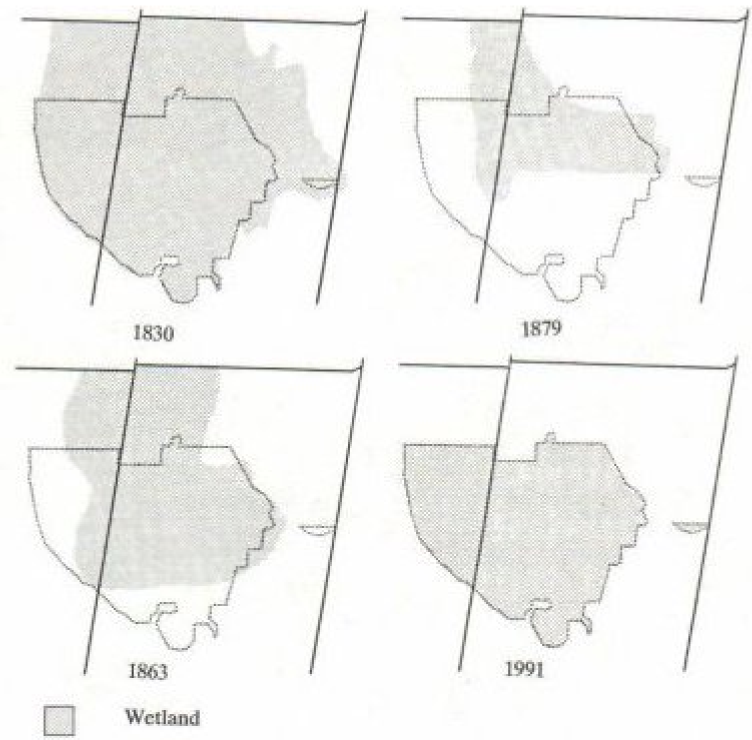



**Figure 14. Wetland boundaries 1830-1991. Note: The 1863 and 1879 boundaries show only the *wettest* parts of the wetland**

OMNR's acknowledgement in November 1989 that the Leitrim Wetlands was indeed a Class I, regionally and provincially significant wetland, sparked some discussion as to whether or not their boundaries represented the actual limits of today's wetlands. In 1990, Cumming Cockburn delimited a boundary on the Tartan et al lands (north of the Blais Road right-of-way) which differed slightly from OMNR's. Later that year, environmental groups produced a boundary incorporating parts of the OMNR and Cumming Cockburn limits plus some necessary modifications to the OMNR boundary south of the Blais Road. In 1991, further exploration indicated that adjacent areas (originally part of the wetlands) had been re-established due to beaver activity (Figures 15 and 16). Therefore, the southern boundary was altered to reflect these regenerating areas, plus a critical buffer zone to the east. The remnant of the wetland immediately west of Highway 31 was also discovered.

**Figure 15. Martha Camfield examines the trunk of a 120-year old Eastern White Cedar, north of the East-West Ditch. This tree was drowned by beaver activity**

**Figure 16. Reclamation by beaver activity in the southernmost section of wetland**

## Findlay Creek

Findlay Creek is one of the last put-and-take trout streams in Ottawa-Carleton. It is predominantly channelized, drains the wetland, and eventually joins the North Castor River. West of Highway 31, between the old stream bed and new ditch, lies a small, lush plant community, a fragment of the once more extensive wetlands. It contains at least eleven regionally significant plant species and many mature trees, including Yellow Birch, Butternut, Cedar and Elm, some of which are more than 100 years old.

East of Highway 31, the creek flows through a farmer's field, bordered by cedars and deciduous trees. Passing under the farmer's lane, the creek enters a small valley with mature riparian (stream bank) vegetation extending to Blais Road. This stretch of waterway is rocky-bottomed, flows over a number of riffles, has a series of pools and is shaded by trees and shrubs — an excellent fish habitat! Vegetation abounds with wildlife food species (Figures 17 and 18).

**Figure 17. Shady pool in threatened part of Findlay Creek**

**Figure 18. Findlay Creek at Blais Road**

Contrary to assurances by Tartan that this part of the stream would remain unaltered, Cumming Cockburn states: "Development of OPA #10 lands located west of Highway 31 is dependent on the lowering of the Findlay Creek invert between Highway 31 and Blais Road" — i.e., deepening the channel and destroying most of the riparian vegetation. Once disrupted, vegetation could take 70 years to emulate its present condition, and the fishery would, of course, suffer in the interim.

## The Cumming Cockburn Report: "Planning for Leitrim — An Integrated Approach"

This report contains useful and valid information, however, parts of it tend to be vague, confusing or erroneous. Not one reference is made to wetland hydrology, in spite of the recent publication of several important papers in the field; nor is there a single listing dealing with ecological processes. Certain conclusions indicate a lack of comprehensive understanding of peat wastage and its ramifications. As well, the dramatic effects of Dutch Elm disease and beaver flooding on plant communities were largely unappreciated. Some judgments based on their study of aerial photos appear to be inaccurate, e.g., they claimed that one area had been used for agriculture, when, in fact, a sea of old cedar stumps indicates lumbering, not cultivation. Claims of impermeability of substrate beneath and north of the wetland are unjustified as even most rock types exhibit some degree of permeability. Their use of the term "peripheral wetland" is inappropriate both historically and now.

Cumming Cockburn theorize: "In general, the conclusion of this study is that a functional, sustainable wetland and stream ecosystem will persist with the development proposed". Their claim is based on the supposition that "the water table would be maintained at the desired level". This deduction is totally unsupported by recent wetland studies. T.C. Winter notes: "It is apparent that the scientific foundation for understanding wetland hydrology is very weak. The topic has not attracted the attention of many hydrologists; therefore, field studies have been few and most have not been comprehensive. Most hydrologic information relative to wetlands has been based largely on theoretical studies of generalized settings, on scattered field studies and on hydrologic intuition."

Of special interest is his conclusion: "Because the hydrologic system is a continuum, any modification of the continuum will impact contiguous parts. Therefore, modification of the hydrologic system is a self-perpetuating process, because the solution to one problem generally creates a problem for the contiguous area, which in turn must be modified. The seriousness of the impact commonly is related to scale."

Direct evidence from the Leitrim Wetlands also casts serious doubt on Cumming Cockburn's prediction of a sustainable ecosystem. The extensive, ongoing peat wastage and the dramatic shrinkage of the open fen *ca*. 1920 (Figure 19) contradict the claim that sufficient surface and ground water is entering the wetlands to maintain it.

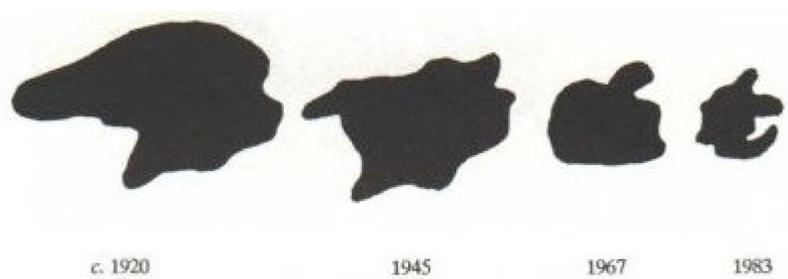



**Figure 19. Reduction in size of open fen from c. 1920 to 1983 illustrating the dramatic effects of lowered water table due to drainage**

Cumming Cockburn were aware of, but failed to fully explore, the ramifications of a dramatic lowering of the water table about 70 years ago as demonstrated by cores they had extracted from old Larch trees. One hundred and eighty years of tiny annual growth rings were followed by substantially larger ones, indicating drier conditions (i.e. drop in soil water levels). They had some inkling as to the cause for they remark: "One possible scenario might have involved surrounding drainage efforts connected with agricultural activities — for example, changes to local groundwater table elevations, and the nature of groundwater upwelling". As no major climatic changes occurred at that time, the most plausible explanation for a drop in the overall water table is the ditching completed *ca*. 1920.

If lowering the water table by those few ditches caused such profound effects, imagine what would happen if Tartan destroyed one-fifth of the wetlands (75 hectares), including the lowest sections (Figure 20) and the critical outlet area. The water table would have to be lowered about 1.8 m. (6 ft.) to accommodate basements. Considering the complexity of the hydrology and existing abundance of water, an extensive, highly efficient drainage system will be required (Figure 20). The housing project will, in effect, create a gigantic sumphole with a critical interface of over 2.4 km (1.5 miles) with what remains of the wetlands.

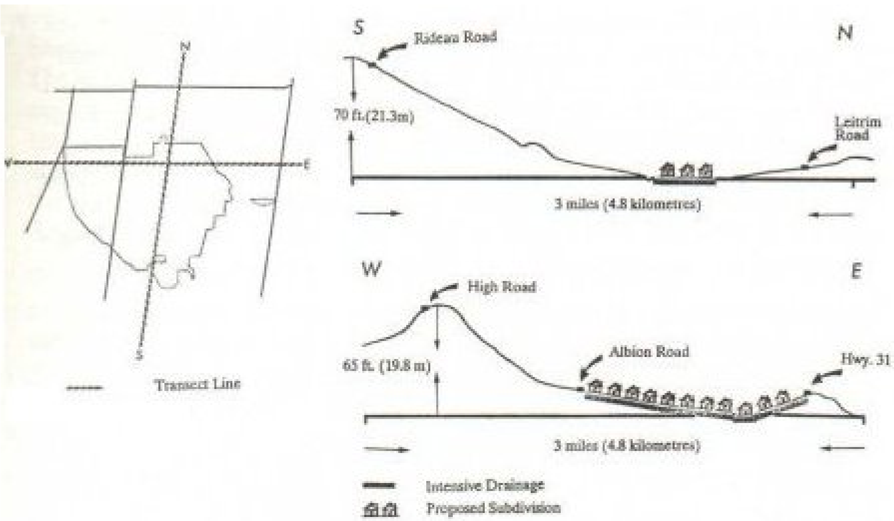



**Figure 20. Transverse sections of the wetland and proposed subdivision**

This will have a disastrous impact on the entire ecosystem as the critical substrate (sandy-to-silty subsoil) is, contrary to Cumming Cockburn, quite permeable and will allow draining of groundwater. Cumming Cockburn have falsely assumed that "impermeable soil conditions beneath and north of the Leitrim peatland precludes groundwater". Obviously, this did not impede the movement of toxic wastes which have migrated downward 25.9 metres and laterally over 600 metres from the landfill site. In fact, the surficial deposits ranging from sandy silt to medium sand are, according to Dr. W.D. Reynolds, a soil scientist with Agriculture Canada, permeable (personal communication). As depicted in Beards "Hydraulics of Groundwater", the most permeable soils are clean gravels and the least, unweathered clays. Even clay permits water movement otherwise tile drainage would be ineffectual.

Not only do these sediments allow for infiltration of water, but they also permit upwelling. Several people have witnessed water bubbling up through this "impermeable" material north of the peatland on the north side of the new ditch during the height of the severe 1991 drought! West of this site is another area of upwelling where rust-coloured deposits abound. Dr. Gray Merriam, Professor of Ecology at Carleton University, Ottawa, has suggested that this staining is evidence for deep-seated upwelling (personal communication). It is known that the water emanating from this site comes from below because: 1) a walk around this low area shows no surface water entering from the south or east, and 2) due to its proximity to Albion Road, the deep west ditch effectively diverts all surface and shallow subsurface waters. Nearby, large quantities of water feeding the western section of the new Tartan ditch can be traced to a similar origin.

Rusty-coloured sediment in water channels north of the East-West ditch also suggest upwelling, possibly explaining why this section was never cultivated, even though it was surrounded by ditches which should have controlled surface and shallow subsurface water as in adjoining fields to the east and west.

To exacerbate the situation, the developers plan to deepen Findlay Creek from within the wetland boundaries to Blais Road. Part of this stream bed lowering includes excavating a storage channel through part of the critical bedrock ridge just west of Bank Street. According to Cumming Cockburn, "this would remove a present impediment to groundwater to Findlay Creek in the vicinity of Bank Street", and "increase groundwater and base flows". In other words, once the rock dike is breached, additional water will flow from the so-called "impermeable" substrate near Bank Street. Since this substrate is the same as that to the north and beneath the wetlands, it follows that the same effect on groundwater will be generated by the proposed subdivision's drainage scheme, thereby, as Dr. Merriam points out, "draining out at depth the upwelling source that is largely responsible for the wetland".

The entire wetland's water table was dramatically affected *ca*. 1920 by lowering the Findlay Creek channel. As it is a major control unit for maintenance of the water table, it can be compared to the plug in a bathtub, and any modification of the stream channel's depth will have far-reaching negative impacts. I agree with Cumming Cockburn's assertion that "no lowering of the water table through drainage is compatible with the wetland system in areas where the cone of influence of the lowering can affect the wetland water table or annual flow regime". However, development, as proposed, will, ironically, effectuate this exact situation.

## "Peripheral" Wetlands

One of the most misleading terms used by Cumming Cockburn is "Non-Peatland Peripheral Wetlands". Their delimiting line "was based on an interpretation of the soils, hydrogeology and peat thickness", and "was intended to reflect the boundary between the permeable soils and the impermeable soils of the northern slope. This line would then define the area fed by the dominant groundwater flows from the main recharge areas to the southwest." Since the advent of farming, at least 0.6 m. (2 ft.) of peat has oxidized in these areas. The peripheral wetlands would have been at least 50% smaller if Cumming Cockburn had delimited their "peripheral wetlands" based on peat depth in 1920. The implication that there is a change of substrate associated with their boundary crumbles under scrutiny. The most recent surficial geology map, the new 1988 ditching system, and the redigging in 1991 of the Albion Road ditches, amply demonstrate that substrate change occurs well to the west and south of the pseudo "peripheral wetlands". The visible upwelling of water also negates their definition and implies that the area hydrology is improperly understood.

Cumming Cockburn declare these areas "exhibit little-to-no-peat accumulation although they have moist-to-wet soil moisture regimes". In fact, most plant communities and much of the remaining wetland have been in a negative peat-accumulating state due to lowering the water table by drainage. Areas around the East-West ditch, flooded by beavers in the late 1970's and 1980's, were building up more organic material than most parts of the wetlands. Historically (contrary to Cumming Cockburn's opinion), the areas north and south of the East-West ditch were and continue to be intimately connected. The only human disruptions here were the channelization of the original Findlay Creek and tree cutting activities no more disruptive than construction of the Albion Road. I suspect the use of the term "peripheral wetland" is an attempt to downplay the importance of this part of the wetland, thereby justifying urban development within a Class I wetland.

It is worth noting that a real, peripheral wetland does exist about 0.8 km. (0.5 mile) south of the Leitrim wetland and is connected to it by a channelized stream.

## Safeguarding the Wetlands and Findlay Creek

Preservation of the Leitrim wetland and Findlay Creek hinges on the implementation of a protection strategy which would:

1. safeguard water supplies feeding the wetlands;

2. ensure the water table in the lowest areas (and particularly near the outlet areas) is raised at least to the level of highest recent beaver flooding;
3. prohibit deepening Findlay Creek; and
4. halt all proposed development within the wetland boundaries as defined by Dugal 1991 (Figure 4).

## Protecting Water Supplies

An important aspect of safeguarding water supplies is the production of a master drainage plan for all the lands (including Tartan and Remer properties) suitable for housing east and south of the wetlands. This would ensure that rain water and subsurface waters normally entering the wetlands remained undiverted by future urbanization.

Buffer and restrictive-use zones have to be established in the critical water recharge area. These would restrict the extraction of sand and gravel and large housing developments. Fortunately, the noise cone from aircraft using Uplands Airport should preclude the latter.

At the request of Gloucester, OMNR and Tartan, a schematic was produced to facilitate formulation of appropriate water recharge protection policies.

## Restoring the Water Table

A drainage-induced lowering of the water table has resulted in insufficient water entering the wetlands since the 1920's, causing extensive peat wastage and open fen reduction. Elevating the water table would help to reverse this condition, but accomplishing this would entail: 1) excluding all development within the wetland boundary; 2) prohibiting deepening Findlay Creek; and 3) refilling or modifying the ditches to impede water drainage.

In the fall of 1991, Tartan plugged up its new 1988 ditch which bisected the fen. This was an excellent first step as the ditch was increasing water flow out of the wetland, adversely affecting the unusual fen community and killing many Larch trees.

The East-West ditch should be modified with a series of dams designed to elevate the water table (Figure 21). I would suggest the same number (and placement) as built by beavers over the last two decades. Someone removed most of these dams early in 1991 causing a substantial water table drop in the surrounding plant communities, particularly on the north side of the ditch where beavers had dug a series of channels leading to the Poplar trees about a hundred metres to the north. Destruction of the beaver dams converted their channels into effective drainage ditches, further compounding the problem (Figure 22). Another two dams should be constructed in Findlay Creek east of the fen within the wetland boundary. The north-flowing drains southeast of the fen should also be plugged to retard water loss.

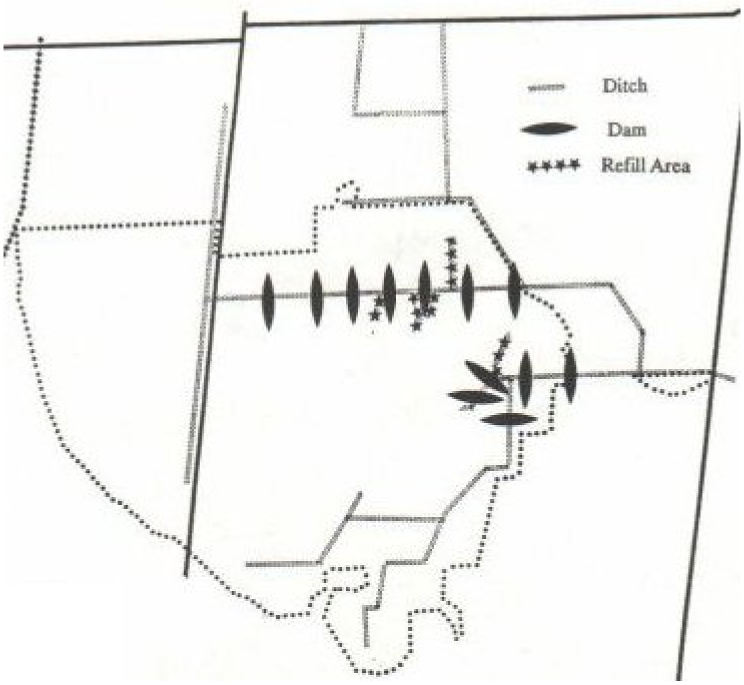



**Figure 21. Suggested damming and refilling of existing ditches to elevate water table**

The deep west-side ditch, along Albion Road south of the East-West ditch, diverts a substantial volume of water. (During the height of the 1991 drought, over a third of the water feeding the East-West ditch originated here.) This water should be redirected to its original course via a series of culverts or a modified, highly permeable roadbed under Albion Road. Widening of Albion Road should be prohibited due to inherent pollution from salt and motor vehicles.

**Figure 22. East-West Ditch lowered by a metre following destruction of the beaver dam**

## The Black Buckthorn Menace

Black Buckthorn, *Rhamnus frangula*, an introduced European shrub, is spreading rapidly. It has already overwhelmed several plant communities (in one area forming an enormous 100-metre wide band) and will require an eradication/control program.

## Saving Findlay Creek

Findlay Creek is jeopardized by plans to deepen the channel from Highway 31 to Blais Road. A reasonable method of protecting the rich riparian vegetation, animal habitat and stream shading, would be construction of a floodway paralleling the creek east of Highway 31 and following the old stream bed west of this arterial. (A floodway is a channel excavated to reroute floodwaters, once a certain level is reached, around an area and back into the watercourse at some point downstream.) The floodway banks should be planted with trees and shrubs east of Highway 31, and the existing vegetation preserved west of the highway.

A further possible threat to Findlay Creek is contamination by toxic materials. If a "sumphole effect" is created by drainage requirements, migration of dangerous chemicals from the nearby landfill site could accelerate (Figure 1), enter subdivision drains, and be redirected into Findlay Creek.

## Conclusion

Although developers have generously offered to deed a large part of the wetlands to the public domain, the section they plan to destroy for housing controls the critical water table for the whole ecosystem. A housing project within the wetland boundary would lower the water table throughout, ensuring the disappearance of the provincially significant fen community within a couple of decades. Many plant community components would change, and some regionally significant plant species die out. The diminution of the wetlands, and modifications or losses of plant communities, will affect the numbers and diversity of animal species, with some bird species disappearing altogether.

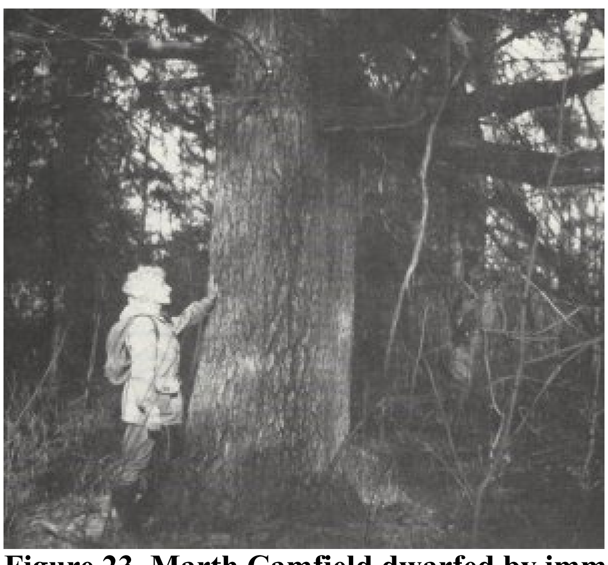


**Figure 23. Marth Camfield dwarfed by immense,
100-year plus, White Pine in the southeast sector of wetland**

The rate of peat oxidation throughout the wetlands will increase due to the lowering of the water table. The large volumes of carbon dioxide already removed from the atmosphere through photosynthesis and stored for long periods of time as undecayed peat, will gradually be released (over a million metric toimes) and contribute to global warming. (The ability to remove $CO_2$ from the air and store it for long periods is one of the great attributes of peatlands.) The destruction of vegetation and organic soils in the 75 hectares of wetland destined for housing will also contribute $CO_2$ to the atmosphere. Findlay Creek will be affected by lowering the water table. Several years after construction of the subdivision and the initial burst of rapid wetland drainage, there may be insufficient water to sustain this stream year-round, leading to fishery collapse.

The development block plan calls for massive storm water retention ponds, deepening of Findlay Creek and destruction of much of the riparian vegetation shading it. Developers profess the stream will be "enhanced" but, in my opinion, it will take decades to re-establish equivalent shading along its banks. With land suitable for housing adjacent to the wetlands, why was the lowest, wettest, most environmentally sensitive, targeted for urbanization? It is abundantly clear to me that drainage required for the proposed subdivision will dry out the remaining wetland and a unique, natural area in Ottawa-Careton will be the victim of unsustainable development.

**Acknowledgements:** I am grateful to Dr. Robert R. Ireland and Linda M. Ley for collecting, identifying and rating bryophyte specimens, I am also thankful to Martha Camfield and other naturalists for help in the field. I would like to express my appreciation to Gilles Seguin, Records Management Co-ordinator, City of Gloucester, and the volunteers of the Gloucester Historical Society for their aid in finding old maps and drainage records. I am also indebted to Dr.Gray Merriam, Professor of Ecology at Carleton University, for his valuable comments and suggestions.

Voucher specimens of the vascular plants and bryophytes collected during this study have been deposited in the National Herbarium of Canada, Ottawa.

## Literature cited

Bear, Jacob l979. *Hydraulics of groundwater*, McGraw Hill International Book Company, Toronto

Brunton, D.F. 1980D. *Shirley Bay Life Sciences*. Conservation Studies, Greenbelt Division, National Capital Commission, Ottawa

Brunton, D.F. 1982A. *An Ecological Inventory of the Stoney Swamp Conservation Area*, National Capital Commission Greenbelt, Nepean, Ontario. NCC Greenbelt Division Conservation Studies 5, Ottawa

Brunton, D.F. 1983A. *An Ecological Inventory of the Green's Creek Study Area*, National Capital Commission Greenbelt, Gloucester, Ontario. Conservation Section, National Capital Commission, Ottawa

Brunton, D.F. 1984. *The Vegetation and Flora of the Mer Bleue Conservation Area*, National Capital Commission Greenbelt, Ottawa-Carleton, Ontario

City of Gloucester Archives, records of the City Clerk, Ditch or Drain Awards 1883-1907, Boxes 416-421

Dugal, A. 1989. South Gloucester Study Area Update 1978-1988. *Trail & Landscape*, 23(1):4-14

Eyre, S.R. 1963. *Vegetation and Soils*, Camelot Press Ltd., London and Southampton

Gillett, J.M. and DJ. White. 1978. *Checklist of Vascular Plants of the Ottawa-Hull Region, Canada*. National Museum of Natural Sciences, Ottawa

Hutchinson, J.N. 1980. Record of Peat Wastage in East Anglian Fenlands at Holme Post 1848-1978 A.D. *Journal of Ecology*, 68: 229-249

*Illustrated Historical Atlas of the County of Carleton*, H. Belden & Co., Toronto, 1879. Second reprint edition, 1976, Cumming Atlas Reprints, Stratford, Ontario

Walling, H.F., 1863. Map of Carleton County, Gloucester, surveyed by O.W. Gray

Winter, Thomas C. 1988 A Conceptual Framework for Assessing Cumulative Impacts on the Hydrology of Nontidal Wetlands. *Environmental Management*, 12(5):605-620

Top of Page

---


This page was revised on 2 October 2002
Contact the OFNC

---