

Albion Road Wetlands: Part 3

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See also [Part 1](#) (*T&L* 1990;24(2):56-78) and [Part 2](#) (*T&L* 1992;26(3):64-94)

In this article I will examine the historical relationship between the Leitrim Wetlands and others nearby. I shall present Dr. Nuttle's critique of the controversial Cumming Cockburn Report, implementation of which is likely to destroy this valuable Class I Wetland. I will also describe some of the wetland areas, with special emphasis on the "flowage" and show the fallacy of the "core concept" as promoted by the developers. In 1991, the Ontario Ministry of Natural Resources (OMNR) produced a southern wetland boundary and the relevance of this and both Federal and Ontario wetland policies to the Leitrim Wetlands will be reviewed.

My admiration and understanding of this complex, threatened, Class I Wetland increases with each successive year of study. Poring over old documents has engendered new insights into the post-settlement history of the area. The catalyst spurring on my research took the form of a disintegrating, 1917 surficial geology map depicting extensive organic deposits in the Leitrim area. These features, in conjunction with land elevations and soil types, suggest that the Leitrim Wetlands is but a fragment of a once enormous wetland complex, the main body of which sprawled east of Highway 31. The possibility that this could be a remnant of a much larger ecosystem was reinforced by the appalling statistic that Ottawa-Carleton has already lost over 60% of its original wetlands!

The presence of provincially significant birds such as Northern Harrier, Red-shouldered Hawk and Sedge Wren in the wetlands was previously established, but until I actually started compiling a list, I failed to appreciate the richness of the avifauna ([Appendix 1](#)). This wealth of species was confirmed by Richard Poulin of the Canadian Museum of Nature, who stated that in a given year, 150-160 species can be seen, migrants included. The adjacent uplands also harbour significant bird species, the most noteworthy being the endangered Loggerhead Shrike! Henslow's Sparrow, Eastern Bluebird, Clay-coloured Sparrow and Mockingbirds also breed in these open areas.

In this article I will examine the historical relationship between the Leitrim Wetlands and others nearby. I shall present Dr. Nuttle's critique of the controversial Cumming Cockburn Report, implementation of which is likely to destroy this valuable Class I Wetland. I will also describe some of the wetland areas, with special emphasis on the "flowage" and show the fallacy of the "core concept" as promoted by the developers. In 1991, the Ontario Ministry of Natural Resources (OMNR) produced a southern wetland boundary and the relevance of this and both Federal and Ontario wetland policies to the Leitrim Wetlands will be reviewed.

A Great Wetland Complex?

While rummaging through material on the Leitrim Wetlands, I came across part of a frayed, 1917 surficial geology map which was based on work completed by W.A. Johnston in 1915. His chart showed extensive organic deposits (muck and peat 30 cm [12"] or more in thickness) in the southern part of the City of Gloucester and northern part of Osgoode Township. As these deposits could originate only under extremely wet conditions (i.e.

wetlands), I wondered if they could be components of a larger wetland complex, either directly connected or linked by streams. Subsequent study of the most recent surficial geology maps of our region indicates that Johnston missed several of these deep peat deposits. (These are included in Figure 1.)

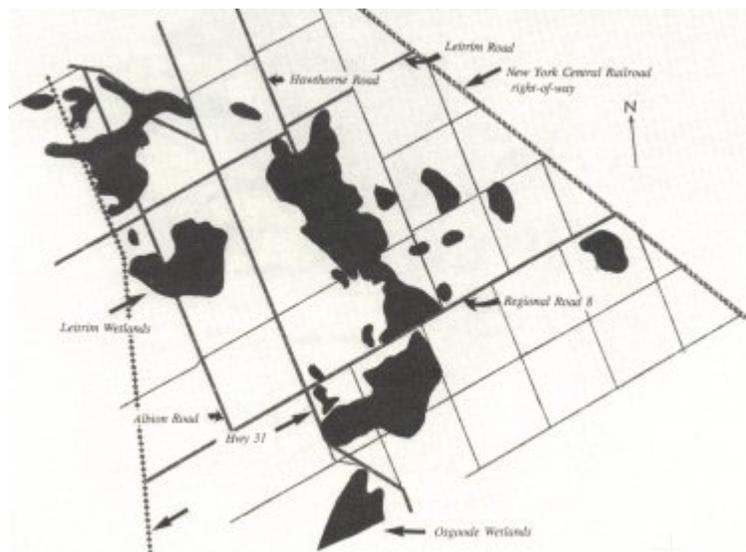
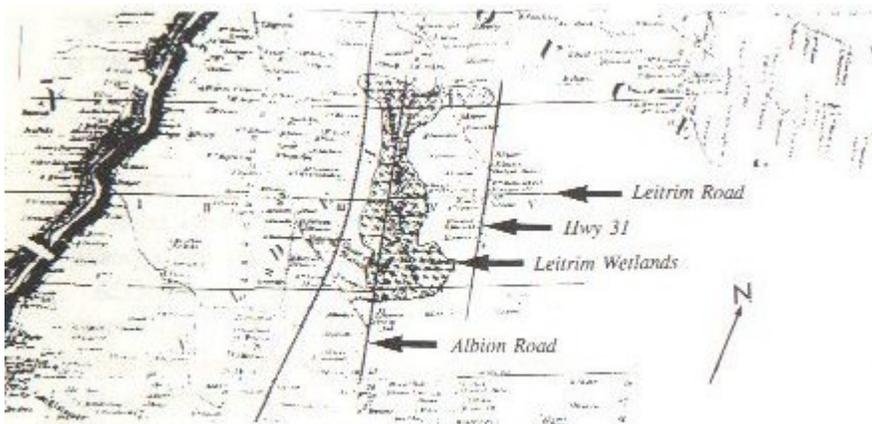
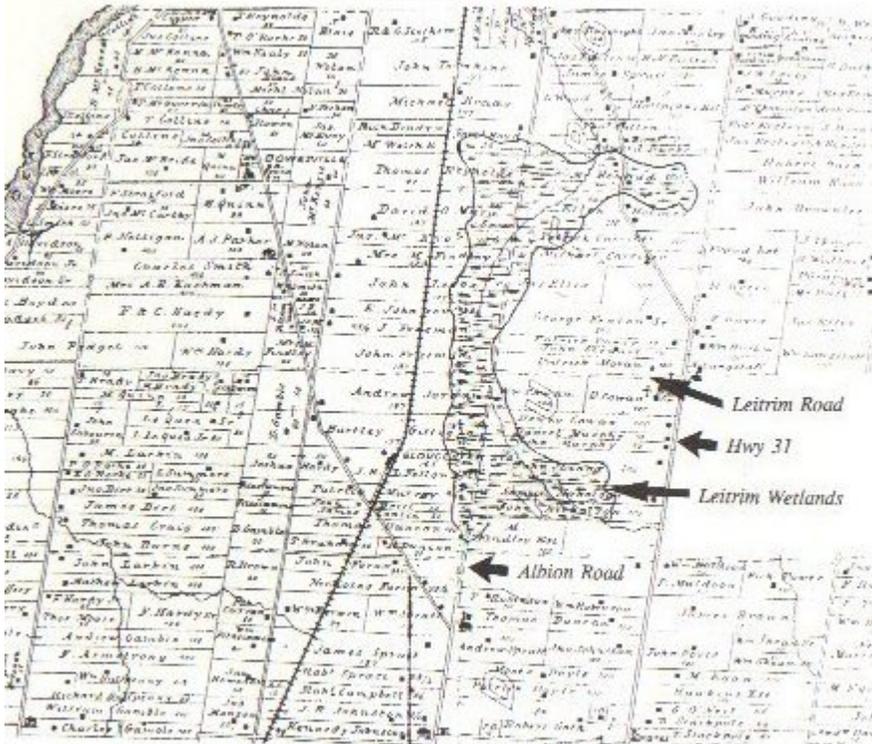


Figure 1. 1915 Organic deposits, 30 cm or more in thickness. (Primarily based on a 1917 surficial geology map (No. 1662) with additions from maps 1506A & 1507A 1982.)

Earlier maps demonstrate a direct connection between the Leitrim Wetlands and neighbouring wetland areas owned by the National Capital Commission extending from Blossom Park to Leitrim Road (Figure 2). Were these also connected to the other wetlands east of Highway 31?



1863 Walling Map of Carleton County



1879 Belden Atlas of Carleton County

Figure 2. Historical maps showing the Leirim Wetlands to have been directly connected to wetlands on present-day NCC lands north of Leirim Road

I carefully examined topographic maps dating back to 1906, and aerial photographs, especially the 1945 series (the first taken of this particular locale). Topographic maps depict changing drainage patterns due to ditching, elevation changes, and encroachments on various known wetland areas. Aerial photographs taken at the right time of year can often show old stream beds, poorly drained areas, and patterns in farm fields revealing the previous existence of wetlands.

Due to time constraints, only lands west of the New York Central Railroad right-of-way were studied. The evidence strongly suggests that most of these wetland areas were connected, forming a massive wetland complex centered east of Highway 31, hooking up with the Osgoode Wetlands in the southeast and the Leirim Wetlands to the west via an arc of wetland (Figure 3).

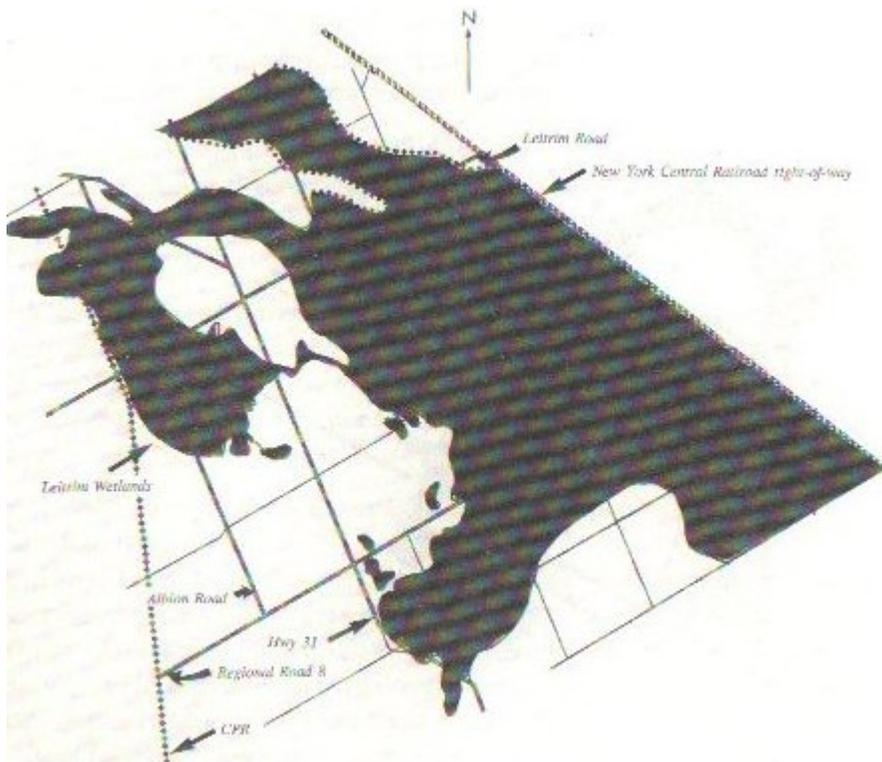


Figure 3. Approximate size of wetland complex west of N.Y.C.R. right-of-way circa 1830

Poor drainage, a feature still prevalent today, appears to be the main factor responsible for this vast, predominantly-treed wetland. Removal of excess water from the land was a prerequisite for agriculture, for as the Belden Atlas states: "Much of the land which was at first perfectly worthless on account of its low level has been brought into cultivation by a comprehensive and non- expensive system of drainage." As most of this wetland complex was covered with rich organic soils or peat, land drainage activated decay bacteria and organic materials broke down, releasing CO₂ in the process.

The initial extent of peat covering is difficult to estimate because the first surficial geology map was produced at least 40 years after the original ditching schemes, sufficient time for considerable peat wastage. Agricultural practices fragmented the once extensive wetland, leaving an assemblage of predominantly swampy woodlands. To protect these fragments, I optimistically requested that the Carleton Place OMNR incorporate them into a Class I Wetland Complex and that a new wetland complex boundary be drawn (Figure 4). Their response was: "In terms of defining a complex, firm evidence of existing biological and/or hydrological interrelationships must be present. Relative to the wetland areas which you mention in your letter, it is exceedingly difficult to make a case that such relationships exists."

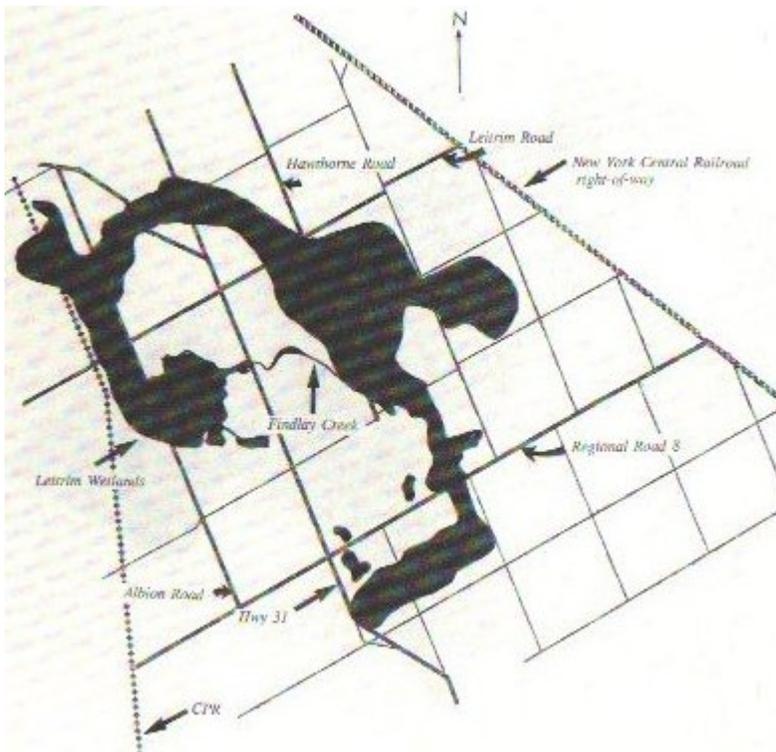


Figure 4. Proposed Class I Wetland Complex composed of fragments of pre-settlement wetlands complex

This in spite of the following:

- The Leitrim Wetlands receives water from NCC lands north of Leitrim Road;
- The Leitrim Wetlands is linked to wetland areas along Hawthorne Road via Findlay Creek; and
- The small peripheral wetland area due south of the Leitrim Wetlands supplies water most of the year via a channelized stream.

Aside from the Leitrim Wetlands fragment and those in the old South Gloucester Conservation Area, little is known of the flora and fauna of this unit. However, a biological inventory of the unstudied segments is bound to yield interesting finds.

Both the existing and former wetland ecosystems obtained water from precipitation, runoff from adjacent highlands and seepage from outwash deposits. Findlay and Sawmill Creeks originate in the wetlands, which also contribute water to the North Castor River, Bear Brook and in the past, to Ramsay Creek.

Dr. Nuttle's Critique of the Cumming Cockburn Report and related correspondence

I had hoped that Part 2 of my article on the Leitrim Wetland which questioned the conclusions reached in the Cumming Cockburn Report "Planning for Leitrim — An Integrated Approach" (an Environmental / Storm Drainage Report) would stimulate some positive action for preserving these valuable wetlands. Instead, the Ontario Ministry of Natural Resources (OMNR) responded to me as follows: "while the data you provided was valid, the Cumming Cockburn Study was comprehensive, and compiled in a manner that is consistent with the approach laid out in the T.C. Winter article." Refuting this contradictory statement required a highly qualified wetland hydrologist. Dr. William Nuttle of the Rawson Academy of Aquatic Science, Ottawa, kindly offered to review the controversial Cumming

Cockburn Report, and concluded that "an Environmental Assessment is justified and warranted" and he questioned OMNR's stance on this issue.

As Dr. Nuttle observes, the Cumming Cockburn Report "contains sufficient information to identify issues that must be resolved in order to preserve the wetland remaining after development goes ahead, but it offers neither a plan for preservation nor credible assurances that such a plan will be developed."

Dr. Nuttle goes on to say: "The report identifies water table levels in the wetland as the critical parameter that must be maintained in order to preserve wetland function in the remaining wetland in the face of destruction and development of the northern part of the wetland. The proposed development poses the risk that 'improved' drainage in the developed area will result in a drawdown of the water table and loss of peat in the remaining wetland. Assuring that development does not impede the inflow of groundwater to the wetland may not be sufficient to prevent changes in water table levels, because, as this report suggests, the impedance of drainage by impermeable soils and a pinching-out of a permeable water-bearing unit is responsible for the existence of the Leitrim Wetland."

Dr. Nuttle is also concerned that the report "does not identify how disturbance of water table levels will be avoided." He goes on to suggest that "there is a distinct pro-development bias in the environmental work that has been done so far on this project."

Regarding the attitude of the OMNR, Dr. Nuttle declares: "I am surprised and concerned to learn that the proposed development involves the destruction of 74 hectares of a wetland designated as Class I, provincially significant wetland, by the Ontario Ministry of Natural Resources. Further, it appears that the destruction of the wetland, which is directly opposed to Ontario's wetland policy, has the concurrence of the Ministry of Natural Resources."

Of particular interest to me were Dr. Nuttle's views of a letter I received. Dr. Nuttle states: "Comments contained in a letter to you from the Ministry of the Environment suggest that the Ministry of Natural Resources does not fully understand the issues inherent in preventing impacts of development on wetland hydrology. It is stated that the 'Ministry of Natural Resources feels that ... the Cumming Cockburn study was comprehensive, and compiled in a manner that is consistent with the approach laid out in the T.C. Winter article.' This completely misstates the message of the Winter article and its relevance to the Leitrim Wetland. The Winter article does not lay out an approach for assessing the impact of development on wetlands as this comment implies, rather Dr. Winter writes to identify some of the pitfalls and misconceptions that make such an assessment difficult."

Dr. Nuttle concludes that "an Environmental Assessment of the proposed development is justified and warranted."

The "Flowage"

The "flowage," a large, complex zone located along the eastern edge of the Leitrim Wetlands, was and continues to be an integral part of it. It extends north 1.1 km, dropping about 6m (20 ft.) in elevation (see Figure 9). The flowage is characterized by an abundance of slowly-flowing water. Most of the year much of the Leitrim Wetland flowage is overlain with water ranging up to 30 cm (12") or more in depth. Contributors to this moisture are precipitation, surface runoff from higher lands and seasonal waters from peripheral wetland as well as water carried by small streams or old ditches originating in adjacent wetland zones and seepage areas. Another possible aqueous source may be deep upwelling as indicated by rusty-coloured water seen south of the "island" (a small area of higher elevation

in the flowage). Water levels generally drop during summer's driest peak. In the prolonged drought of 1991, plants along the eastern edges of the flowage actually wilted.

An excursion into the flowage is an adventure linked to the past when much of the area was covered by elm swamp. In the late 50s and 60s, Dutch elm disease wiped out the elm trees, leaving a dead woodland. With shading largely eliminated, sun-loving marsh plants invaded, competing with the surviving flora. Abundant moisture and rich soils supported a dense, luxuriant vegetative growth. With the passage of time, dead elm skeletons toppled into the thick, green covering, becoming rapidly obscured. To penetrate the flowage's 1.5 to 1.8 m (5-6 ft.) high herbaceous vegetation demands great stamina (and fool-hardiness?). The feet must serve as sensory devices to grope a path through rotting debris and elevation changes.

The "flowage" incorporates a mosaic of plant communities including cattail marshes (Figure 5), swards of Canada bluejoint grass (*Calamagrostis canadensis*), large patches of 3.8 m (6 ft.) high spotted Joe-pye weed, willow swales, alder thickets, regenerating ash-elm stands, a silver maple grove, etc. Abundant fruit-bearing shrubs such as high-bush cranberry (*Viburnum trilobum*), wild black currant (*Ribes americanum*), and common elder (*Sambucus canadensis*) offer wildlife a bountiful food source. (One clump of elderberry was 2.4 m (8 ft.) high and 6m (20 ft.) across — the largest I have ever encountered.)

The blend of plant communities in the "flowage" reflects the vegetation's richness. To date, 185 plant species have been recorded, 42 of which are regionally significant (see [Appendix 3](#)). These numbers equal or exceed those of some plant communities in the so-called "core" area.



Figure 5. Marshy area in the flowage

Development Threat to the Flowage

If the various development proposals by Remer Holdings Ltd. and Tartan Homes Ltd. are permitted within the wetland boundaries (see Part 2, p. 68) the greater part of the flowage will be obliterated as well as the swampy woodlands and thickets bordering its eastern flank. This would fragment the wetland as the area south of the Remer property would be isolated. The biodiversity would decline because:

- certain bird species would disappear due to habitat loss;
- certain plant species found only in this part would be extirpated, e.g. black willow (*Salix nigra*), and
- certain plant communities located exclusively in the flowage would be obliterated, e.g. the silver maple grove.

Loss of the flowage lands would also impoverish the whole wetland ecosystem because:

- Large populations of regionally significant plants such as the purple-leaved willow-herb (*Epilobium coloratum*) would be destroyed, and overall, marsh vegetation dramatically decreased.
- Deer yard areas would be reduced. (I have seen deer wintering in the flowage and adjacent swampy woodlands to the east); and
- Wildlife food supplies would diminish due to the elimination of many wild black currant, common elder and high-bush cranberry shrubs.

Any new drainage scheme in the flowage and adjacent areas is likely to have an adverse impact on the wetlands. Ditching in the past resulted in continuous peat loss due to the lowered water table. At least 0.9 m (3 ft.) of peat have already disappeared from the flowage area.

Maintaining the woodland communities bordering the flowage to the east would help protect the microclimate of the flowage, reduce noise pollution from proposed subdivisions and safeguard habitat now occupied by a variety of birds and other animals.

The "Island"

An upland area in the northern part of the flowage has been dubbed the "island." Likely lumbered about 80 years ago, it increased in size as surrounding land levels dropped due to peat wastage caused by drainage. The dominant trees here are: trembling aspen, white birch, white spruce and eastern white cedar. The largest trembling aspens are 24.3 to 27.4 m (80 to 90 ft.) tall. Balsam fir, balsam poplar and black cherry occur less frequently. After poison ivy, the most abundant shrub in the understory is black buckthorn (*Rhamnus frangula*). A sprawling patch of viciously-thorned common blackberry (*Rubus allegheniensis*) binders exploration in the center. Additional shrubs such as gooseberry, hazelnut, purple-flowering raspberry and honeysuckle, are scattered throughout the "island." The herbaceous layer is not particularly diverse, but does contain species listed as sparse in Gillett & White checklist e.g. the kidney-leaved violet (*Viola renifolia*) and the nodding trillium (*Trillium cernuum*). These nodding trilliums were among the most robust I have ever seen, easily 40 cm (16") tall.

One unexpected find on the "island" was an abandoned hunting cabin (Figure 6), one of two located in the wetlands, indicative of an abundance of game.



Figure 6. Hunting cabin on the "island" in the flowage

Terrain and Vegetation West of Albion Road

The section of the Leitrim Wetlands west of Albion Road (see Figure 3) is owned primarily by Transport Canada and forms part of the airport lands. During the summer and fall of 1992, I explored parts of this terrain and was impressed by the diversity and beauty of the plant communities. In certain places access was easy, but in others, where extensive seepage areas or incredible tangles of fallen trees dominated, maneuvering was an effort. Stumps (evidence of lumbering) sporadically dotted much of the uncultivated lands. Here, trees rarely exceed the 100 year mark.

Previously farmed lands in the northwest corners were covered by poplar woodland, dominated by trembling aspen with lesser amounts of balsam poplar, red maple and red ash.

Eastern white cedar, red maple, white birch and trembling aspen are plentiful in the unfarmed sector, occurring in almost pure stands or in various combinations. Less frequently occurring species are yellow birch, balsam poplar, red ash, black ash, balsam fir, white spruce and white pine. This hodgepodge of woodland communities probably relates to varying moisture regimes and past lumbering practices.

Black alder (*Ramnus frangula*) dominates the shrub layer in most of the western section. This gray-barked, European menace chokes several sites with dense thickets. Among the more profuse native shrubs observed were mountain maple (*Acer spicatum*) and Canada yew (*Taxus canadensis*).

The herbaceous layer is varied, with ferns blanketing large expanses of understorey . Several hybrids of the shield ferns (*Dryopteris* species), such as Boott's fern (*Dryopteris X boottii*) (Figure 7) add to this lacy verdure.

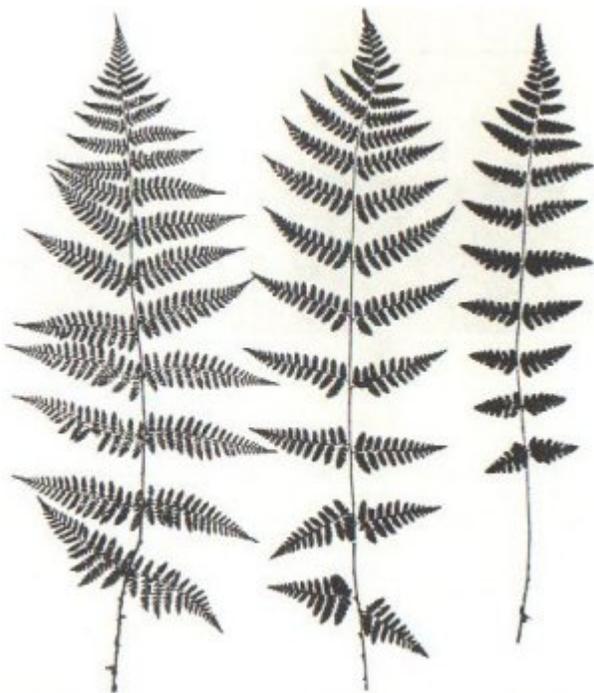


Figure 7. Boott's wood fern is a sterile hybrid resulting from the cross of evergreen and crested wood ferns. This hybrid is fairly common in the Leitrim Wetlands

To date, 39 species of regionally significant plants have been observed, and more will undoubtedly be found as this western sector is explored in more detail.

In recent years, Transport Canada constructed a radar dome in the wetland (Figure 8). This entailed construction of a roadway, a large gravel pad and ditch digging for drainage. The beaver have been in the trenches here and their dams have elevated the water levels.

Numerous green frogs (tadpoles and adults) as well as fishes inhabit the dammed ditch south of the radar dome. In this watery environment, dense growths of leafy pondweed (*Potamogeton foliosus*) provide food and shelter for aquatic animals. Lesser duckweed (*Lemna minor*) peppers the surface of ditch water.



Figure 8. Radar dome constructed within the wetland boundaries on Transport Canada lands

The effects of peat wastage due to drainage was manifest throughout most of the western section. The ground level has dropped about 0.6 m (2 ft.) and in one area, along an old drainage ditch, cedar tree roots have been exposed by rapidly decaying peat. Strong winds have toppled many of the cedars due to their weakened anchorage. Blocking up the series of east-west ditches and modifying the ditches along Albion Road would halt the peat loss.

Hopefully the new Federal Policy on Wetland conservation will prohibit future developmental incursions into this federally-owned section of the wetlands.

The "Core" Concept

The word "core" is used by the developers' various environmental consultants to denote both centrality and a higher degree of importance for the plant communities contained therein.

This term is misrepresentative in several ways:

- Historically, the Leitrim Wetlands are only a part of a massive wetland complex centered east of Highway 31 (see Figure 4);
- The most significant plant communities in the Leitrim Wetlands fragment (i.e. the fens) are located near the wetland edges (Figure 9).
- Some of the more centrally located plant communities have less diversity and fewer regionally significant species than those situated near the fringes of the wetland.
- The use of peat depth as a definer of "core" area is faulty because of rapid peat loss due to drainage. (In places, at least 0.9 m (3 ft.) of peat have disappeared). At the present rate of peat loss, the core would have to be redefined every 30 years or so, and, in each case it would be smaller.

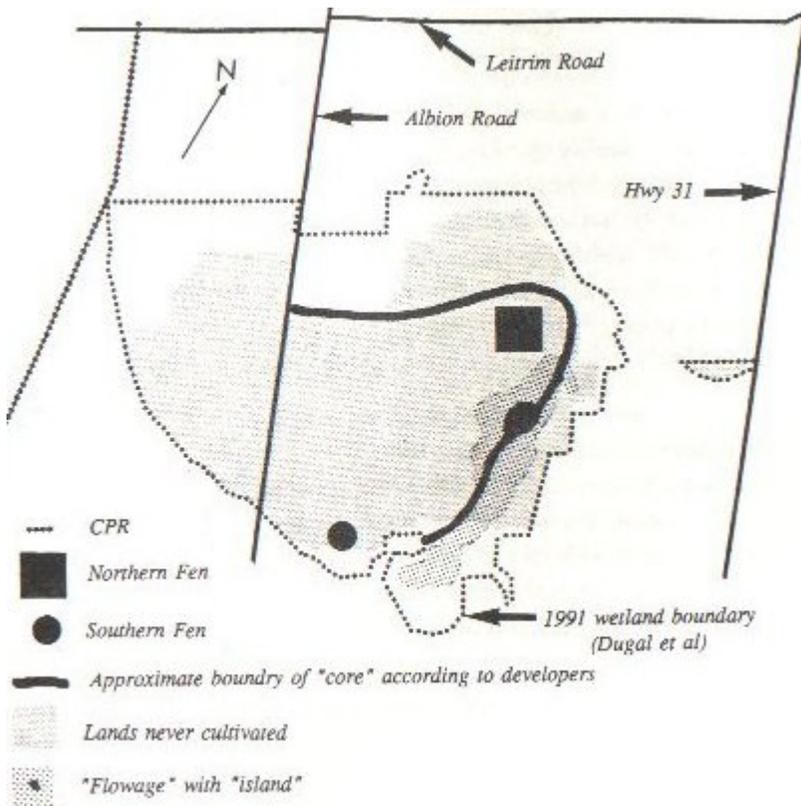


Figure 9. Peripheral location of the fens and the "flowage," the most significant plant communities of the Leitrim Wetlands

I view the "core" concept as a device to legitimize the destruction of parts of a Class I Wetland. In reality, the Leitrim Wetlands can be divided into two main components. First and most important, are lands that have never been cultivated (see Figure 9). In those "refugial" areas native wetland plants survived, while all around, the original vegetation was exterminated by axe and plow. The second component includes formerly cropped, damp fields, now reinvaded by plants, primarily from "refugial" areas. Urbanization in these areas will require "improved" drainage which would jeopardize wetland functions.

1991 OMNR Southern Wetland Boundary

The OMNR new wetland boundary for the southern section of the wetland, east of Albion Road, omitted some swampy woodland south of the Blais Road right-of-way on the eastern side of the flowage. This should not be a problem if the 120 m of adjacent land is used to protect these and former wetland areas as will be required for the rehabilitation and long-term restoration of the wetland.

The Federal Policy on Wetland Conservation

In 1991, the Federal Government unveiled its Wetland Conservation Policy, the objective of which is to "promote the conservation of Canada's wetlands to sustain their ecological and socio-economic functions, now and in the future." Among the goals the Federal Government "will strive to achieve" are several that are pertinent to the Leitrim Wetlands. These include:

- "maintenance of the functions and values derived from wetlands throughout Canada.
- no net loss of wetland functions on all federal lands and waters
- enhancement and rehabilitation of wetlands in areas where the continuing loss or degradation of wetlands or their functions have reached critical levels

- recognition of wetland functions in resource planning, management and economic decision-making with regard to all federal programs, policies and activities
- securement of wetlands of significance to Canadians."

One strategy listed in the Federal Policy on Wetland Conservation is directed towards "managing wetlands on federal lands and waters and in other federal programs." Transport Canada owns one-fifth of the Leitrim Wetlands, thus this strategy is relevant. It "encourages actions to enhance wetland functions on federal lands especially in those areas of Canada where degradation of wetlands has reached critical levels..." This strategy also commits "all federal departments to the goal of no net loss of wetland functions." The Leitrim Wetlands will challenge the federal commitment, as a subdivision requiring "improved drainage" is proposed within 30 m (100 ft.) of Transport Canada's section, thereby threatening additional wetland degradation.

Environment Canada, in response to a request from the NCC, reviewed material on the Leitrim Village proposal. The Canadian Wildlife Service (CWS), a branch of Environment Canada, reported that the Cumming Cockburn Environmental Analysis has many inadequacies and considers "the resultant loss of wetland area and function to be a MAJOR PERMANENT NEGATIVE IMPACT." They recommended that "the entire wetland be protected and that an adjacent zone of 120 m be secured around the wetland." In summary, "The CWS considers the net environmental effects of the proposed development on Leitrim Wetland are unacceptable."

Ontario's Wetlands Policy Statement

The long-awaited provincial Wetlands Policy Statement became effective June 27, 1992. According to the Manual of Implementation Guidelines for the Policy (November, 1992), the goals "are to:

- ensure that the Wetlands are identified and adequately protected through the land use planning process; and
- achieve no loss of Provincially Significant Wetlands. Policy 1.2 states: "It is the Policy of the Province of Ontario that: Where Provincially Significant Wetlands have been identified, all planning jurisdictions, including municipalities and planning boards, shall incorporate policies and protect Provincially Significant Wetlands in official plans, zoning by-laws and other development decisions under the Planning Act."

The Leitrim Wetlands is situated in the Great Lakes-St. Lawrence Region, where the greatest loss of wetlands in Ontario has occurred. For this reason, Policy 2.1 prohibits development within provincially significant wetlands. The only exception appears to be where all approvals required under the Planning Act have been obtained prior to June 27, 1992.

However, the Carleton Place office of the OMNR does not intend to follow Ontario's Wetland Policy Statement, saying: "In the case of Leitrim, the principle of development was established through the planning process prior to the wetland being identified and evaluated." This contradicts the Implementation Guidelines which clearly state: "More specifically, where the planning approval authority has not made a draft approval decision, that authority shall have regard to the Wetlands Policy Statement including the provision for an Environmental Impact Statement, regardless of how long the application has been under consideration. This is also the case even if the proposal has been given support by another decision-making level (e.g. municipal council)."

The Carleton Place office of the OMNR is apparently trying to remove itself from any future involvement with the proposed development within the Leitrim Wetland, saying: "To date, a master drainage plan and concept plan have been approved for Leitrim OPA #10 area. As these documents were prepared for the purposes of guiding future development and the Ministry of Natural Resources was part of the approval process) we will not be in a position to object to subsequent subdivision plan applications within OPA # 10 area..."

The OMNR also plans to use the Cumming Cockburn Report, which has been deemed inadequate by CWS and others, as an Environmental Impact Study!

Although Gloucester accepted the Master Drainage Plan Report (Cumming Cockburn Report) on April 28, 1992, they intend to implement more studies. According to Larry Morrison, Development Coordinator of the City of Gloucester:

"... more detailed studies pertaining to stormwater drainage and the wetland will be taking place in the near future.

In accordance with Section 10.2.2 of the Regions's Official Plan, the owners of Leitrim have completed a Master Stormwater Drainage Plan. To follow this study the RMOC requires a more detailed document referred to as a "Stormwater Design Plan." To Gloucester and the owners this means preparing a Stormwater Management Plan which will examine the details of the stormwater drainage and the impacts of it.

As indicated, more studies are pending. A Master Infrastructure Plan will be undertaken very shortly and it will examine how best to phase implementation of the infrastructure. More importantly though will be the initiation of the Stormwater Management Study. Prior to this latter study proceeding, Terms of Reference will be generated and circulated for acceptance by all concerned agencies. According to the regional O.P. these agencies should include the Ministry of the Environment, Ministry of Natural Resources, and the conservation Authority. Given the sensitivity of this development we also anticipate including federal agencies through the National Capital Commission. It is expected this study will also form part of the Environmental Assessment process and as such, interest groups and the general public may participate. Details surrounding what agencies, groups and/or individuals will be included have yet to be worked out, but I am certain your input will be welcome. ...the Stormwater Management Plan ...will delve into the details of:

- a. how stormwater drainage will be managed;
- b. how Findlay Creek will be altered by way of legislated mitigation and compensation means:
- c. how the integrity of the class I wetland and its functions will be conserved."

Conclusion

The Leitrim Wetland is a unique, irreplaceable fragment of our natural heritage. Development within or adjacent to its boundaries should be prohibited unless there is widespread scientific acceptance that detrimental effects to this ecosystem can be avoided. At present, this is not the case. Its survival depends on an abundance of water, a commodity that even now is being drained away so rapidly that peat wastage is rampant. The overall water table must be raised to halt rapid oxidation of organic materials and stabilize the ecosystem. If developers are allowed to dismember the wetlands, there is every possibility that it will slowly bleed to death. Undoubtedly, Dr. Nuttle mirrors the concerns of environmentalists when he states: "This case interests me both because of the technical problem of avoiding wetland loss due to development on adjacent lands and as a case study of how Ontario intends to implement its wetland policy."

Acknowledgements: I am most grateful to Dr. William K. Nuttle, Associate of the Rawson Academy of Aquatic Science, for reviewing the Cumming Cockburn Report and governmental correspondence. I am indebted to Martha Camfield for her continued help in the field and map research. I would also 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. I am thankful, as well, to individuals who have provided or added to the initial faunal lists.

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

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Faunal Appendices

The vegetative richness and complexity of the Leitrim Wetland suggests a great diversity of animal life. However, except for the birds, very little is known of the fauna. The lists provided are quite incomplete. The invertebrates, (the most numerous animals in this ecosystem) include snails, spiders, worms, millipedes, centipedes, mites, insects and a host of other creatures. Of all these, only the butterflies are listed. A detailed study of the fauna is required to:

- determine if any rare species inhabit those areas threatened by development, and
- to provide a base line (in the form of a total list of animals) to determine the long-term effects of adjacent development on the biodiversity of the wetlands. This poses a formidable task requiring many disciplines, and ideally, should be undertaken prior to any disruption of the natural habitat.

Appendix 1: Checklist of vertebrates of the Leitrim Wetlands

Birds

Great Blue Heron
Green Heron

White-breasted Nuthatch
Brown Creeper

American Bittern	House Wren
Black Duck	Sedge Wren
Mallard	Winter Wren
Wood Duck	Gray Catbird
Broad-winged Hawk	Brown Thrasher
Cooper's Hawk	American Robin
Northern Goshawk	Wood Thrush
Northern Harrier	Veery
Red-shouldered Hawk	Cedar Waxwing
Red-tailed Hawk	Red-eyed Vireo
Sharp-shinned Hawk	Warbling Vireo
Ruffed Grouse	Ovenbird
Virginia Rail	American Redstart
Common Snipe	Black-and-white Warbler
Woodcock	Black-throated Green Warbler
Black-billed Cuckoo	Canada Warbler
Yellow-billed Cuckoo	Chestnut-sided Warbler
Barred Owl	Common Yellowthroat
Great Horned Owl	Golden-winged Warbler
Long-eared Owl	Mourning Warbler
Saw-whet Owl	Nashville Warbler
Screech Owl	Yellow Warbler
Short-eared Owl	Yellow-rumped Warbler
Great Gray Owl**	Northern Waterthrush
Hawk Owl**	Red-winged Blackbird*
Boreal Owl**	Bobolink
Belted Kingfisher	Brown-headed Cowbird
Common Flicker	Common Grackle
Downy Woodpecker	Eastern Meadowlark
Hairy Woodpecker	Scarlet Tanager
Pileated Woodpecker	American Goldfinch
Alder Flycatcher	Indigo Bunting
Great-crested Flycatcher	Northern Cardinal
Least Flycatcher	Purple Finch
Willow Flycatcher	Rose-breasted Grosbeak
Eastern Kingbird	Chipping Sparrow
Eastern Wood Pewee	Claycoloured Sparrow
Eastern Phoebe	Field Sparrow
American Crow	Savannah Sparrow
Blue Jay	Song Sparrow
Barn Swallow	Swamp Sparrow
Tree Swallow	White-throated Sparrow
Black-capped Chickadee	
Red-breasted Nuthatch	

*A compilation of sightings of resident birds by Todd Norris, Dan Campbell, Richard Poulin and other naturalists. Richard Poulin of the Canadian Museum of Nature, had a bird monitoring station next to the wetlands for 15 years. He was kind enough to review my list and make many additions. (He suggested that with migrants included, one could see between 150-160 species in the wetland in a given year.)

**winter residents.

Fishes*

<i>Umbria limi</i>	Eastern mudminnow
<i>Cutaea inconstans</i>	Brook stickleback
<i>Semotilus atromaculatus</i>	Creek chub
<i>Pimephales notatus</i>	Bluntnose minnow

* Collected in November by Noel Alfonso, Canadian Museum of Nature. A spring through fall collection

schedule would have yielded a greater diversity of species.

Amphibians

Green frog
Leopard frog
Wood frog
Spring peeper
American toad

Reptiles

Snapping turtle
Garter snake

Mammals

Beaver	Mink
Coyote	Muskrat
White-tailed deer	Porcupine
Red fox	Raccoon
Snowshoe hare	Skunk
Meadow vole	Short-tailed weasel

Appendix 2: Partial list of butterflies and moths*

Hesperiidae

Carterocephalis palaemon
Erynnis icelus
Euphyes vestris
Poanes hobomok
Polites mystic
Polites themistocles
Thymelicus bneola
Lycaenidae
Callophrys henrici
Celastrina ladon
Glaucopsyche iygdainus
Satyrrium acadica
Satyrrium calanus

Nymphalidae

Bolona bellona
Chlosyne hamsii
Limenitis archippus
Limenitis arthemis
Nymphalis milberti
Phyciodes tharos
Polygoitia comma
Polygoniaprogne
Speyeria cybete
Vanessa atalanla

Pieridae

Colias philodice
Pieris napi
Pieris rapae

Satyridae

Cercyonispegala
Coenonympha inomala
Euptychia cymele
Lethe anthedon
Lethe eurydice

True skippers

Arctic skipper
Dreamy duskywing
Dun skipper
Hobomok skipper
Long dash
Tawny-edged skipper
European skipper
Gossimer wings
Henry's elfin
Spring azure
Silvery blue
Acadian Hairstreak
Banded Hairstreak

Brush-footed Butterflies

Meadow fritillary
Harris' Checkerspot
Viceroy
White admiral
Milbert's Tortoiseshell
Pearl Crescent
Comma
Gray comma
Great Spangled fritillary
Red admiral

Whites and Sulphurs

Common sulphur
Veined white
Cabbage white

Satyr

Wood nymph
Ringlet
Little wood satyr
Northern pearly eye

Appendix 3: Regionally Significant Vascular Plants in the Flowage

(based on Gillett and White's *Checklist of Vascular plants of the Ottawa-Hull Region, Canada*)

Rare

<i>Scirpus pedicellatus</i>	Pedicellate wool-grass
<i>Geum laciniatum</i>	Slashed avens
<i>Epilobium coloratum</i>	Purple-leaved willow-herb
<i>Galium labradoricum</i>	Bog bedstraw

Sparse

<i>Sparganium chlorocarpum</i>	Green bur-reed
<i>Cinna latifolia</i>	Drooping woodreed
<i>Sphenopholis intermedia</i>	Slender wedge grass
<i>Carex sychnocephala</i>	Compact sedge
<i>Trillium cernuum</i>	Nodding trillium
<i>Ribes triste</i>	Wild currant
<i>Epilobium leptophyllum</i>	Narrow-leaved willow-herb
<i>Myriophyllum verticillatum</i>	Whorled water-milfoil
<i>Galium trifidum</i>	Small bedstraw
<i>Lonicera oblongifolia</i>	Swamp fly-honeysuckle
<i>Aster umbellatus</i>	Umbellate aster
<i>Bidens tripartita</i>	Beggarticks

Uncommon

<i>Potamogeton epihydrus</i>	Emersed pondweed
<i>Agrostis scabra</i>	Tickle grass
<i>Alopecurus aequalis</i>	Short-awn foxtail
<i>Bromus ciliatus</i>	Fringed brome grass
<i>Glyceria canadensis</i>	Canada manna grass
<i>Carex granularis</i>	Granular sedge
<i>Carex hystericina</i>	Porcupine sedge
<i>Carex stricta</i>	Stiff sedge
<i>Carex vulpinoidea</i>	Fox sedge
<i>Eleocharis erythropoda</i>	Red-stemmed spike-rush
<i>Muhlenbergia mexicana</i>	Mexican muhlenbergia
<i>Populus deltoides</i>	Cottonweed
<i>Salix amygdaloides</i>	Peach-leaf willow
<i>Salix eriocephala</i>	Heart-leaved willow
<i>Salix nigra</i>	Black willow
<i>Salix x rubens</i>	
<i>Salix serissima</i>	Autumn willow
<i>Rumex orbiculatus</i>	Great water dock
<i>Penthorum sedoides</i>	Ditch stonecrop
<i>Callitriche verna</i>	Common water starwort
<i>Cuscuta gronovii</i>	Dodder
<i>Chelone glabra</i>	Turtlehead
<i>Veronica scutellata</i>	Marsh speedwell
<i>Viburnum trilobum</i>	Highbush-cranberry
<i>Lactuca biennis</i>	Blue lettuce
<i>Sambucus canadensis</i>	Common elder

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