8.0 Conservation Goals, Management Strategies and Implementation Plans

8.1 Review of the 1992 Integrated Resource Management Study Recommendations

A review of the recommendations from the 1992 *Sifton Bog Integrated Resource Management Study* (UTRCA 1992) was undertaken to document actions that have occurred since that time and to identify issues that need to be brought forward for this Master Plan update. Table 15 summarizes the 1992 recommendations and the outcomes to date.

Of the 25 recommendations, 18 have been implemented, two have been partly implemented, and five have not been implemented or are awaiting proposals for implementation. Many of the recommendations focused on issues relating to the development of lands flanking the east side of Sifton Bog along Hyde Park Road. Figure 19 shows the boundaries of the various Planning Units described.

Table 15. Summary of the 1992 Management Study Recommendations and Outcomes

	Recommendation	Outcome / 2006 Status
Earth Science		
ES.1	With respect to Planning Units PR 2.3 and 4.1: a. Near-term surface water management strategies should minimize any deviation from the character of the existing hydrologic regime until additional data collection and analysis is carried out. b. Identify, through any proposal-specific environmental impact studies required in the future by regulatory agencies: - Potential post-development surface flows that are compatible with the wetland features of the bog - Incompatible post-development surface flows c. Retain any compatible post-development surface flows within the existing hydrological catchment of the bog. d. Modify, as required, the qualitative and quantitative characteristics of surface flows retained within the catchment. e. Divert incompatible post-development surface flows from the hydrological catchment of the bog.	**Implemented.** (a) An extensive study was completed and approved. Report titled *Storm Water Management Plan Functional Design*. August 12, 2003. Oxford Street and Hyde Park Road Lands Draining to the Sifton Bog. (b) EIS completed for Drewlo Holdings Inc. & Crich Holdings and Building Ltd. and Norquay. City of London and McCormick Rankin. (c,d) Resource monitoring and stormwater pond monitoring completed by BioLogic. **Carry Forward:** (e) Oxford Street widening in future (see ES.9)
ES.2	Determine the extent of land assembly for the Natural Area in Planning Unit PR 2.2 (2 ha) on the basis of the hydrogeological, hydrological and biological constraints identified in Section 3.1, and the impact of any proposed landform alterations on the wetland function and special features of the bog. This assessment will also recognize the presence of *Crataegus dodgei*, a nationally and provincially rare plant species on adjoining land at the north end of Planning Unit PR 2.1	**Implemented.** The Environmental Impact Study by Gartner Lee showed these sloping lands functioned as a buffer. The City's Planning Committee upheld this recommendation as did the OMB decision in 1994. The lands remain undeveloped and have been zoned OS5. **Carry Forward:** Look for the hawthorn (*Crataegus dodgei*).
ES.3	Retain Planning Unit PR2.1 in its biotically-evolving condition.	**Implemented.** These lands have been zoned OS5.
ES.4	The alteration of Planning Unit PR3 to a regulated, intensified urban end use would not impact negatively on the hydrogeological, hydrological and biological systems of the Bog. In the future, following a proposal-specific assessment, potential post-development surface flows of comparable quality from this unit might be directed into the hydrological catchment of the bog to compensate for the loss of surface volumes from within the historical catchment.	**No current proposal for PR3.** This recommendation can be **carried forward**.

	Recommendation	Outcome / 2006 Status
ES.5	Regulate intensified urban end uses in Planning Units PR 2.3 and 4.1 with respect to compatibility with biological resources.	**Implemented.** Issues of set-backs, buffers, fencing, natural landscaping, stewardship and education of landowners were dealt with in the Environmental Impact Study.
ES.6	Decisions relating to landform alterations in Planning Units PR 2.2 and 4.2 should be considered within the context of the UTRCA's fill line regulation. The ability of these units to support urban use is restricted by their geological characteristics.	**Being Implemented.** Fill line no longer applicable as a hazard line.
ES.7	The ability of Planning Unit PR 4.3 to support urban use in a manner compatible with the wetland functions of the bog is restricted by its proximity to the Class 2 wetland in Planning Unit PR 5.	**Implemented.** Medium density residential and commercial development on eastern tablelands based on an OMB and Council approved EIS.
ES.8	Retain Planning Unit PR 5 in its biotically-evolving condition, since it consists almost entirely of Class 2 wetland.	**Implemented.** This parcel is now owned by the City of London and zoned OS5.
ES.9	Re-engineer or close the parking lot immediately south of Oxford Street in Planning Unit P3 to incorporate biotic and abiotic filters to eliminate the surface entry of chlorides and other municipal road-related contaminants into the aquatic environment of the site.	**Partly Implemented.** The parking lot was re-graded and the trail head was moved away from the gully that formed as a result of the runoff. The gully area was planted with native grasses. A culvert was installed at the bottom of the gully/slope where it crosses the foot path. The non-trail areas were naturalized. **Carry Forward:** Issues surrounding runoff from Oxford Street. A set of recommendations should be made regarding Oxford Street widening.
ES.10	Conduct long-term monitoring of both the hydrologic and hydrogeological regimes, according to the protocol established in the accompanying hydrogeological and water chemistry reports, for resource planning and management purposes. The recommendations in the reports should be critically reviewed and prioritized as additional data become available so that specific questions regarding the hydrology and water chemistry can be answered.	**Implemented.** Sampling of the groundwater wells has continued. **Carry Forward:** A long-term monitoring project should concentrate on sampling the permanent wells and surface water chemistry in the bog.
ES.11	Consider the feasibility of road surface removal and vegetation community restoration within the road easement of Old Hyde Park Road when it is legally closed in the future.	**Carry Forward:** Land use development and public ownership along the Old Hyde Park Road is not complete.

Recommendation		Outcome / 2006 Status
Life Science		
LS.1	Prepare a trail management strategy consistent with the accompanying concept that encourages user exposure to the site's diverse biota if detailed study determines it is compatible with the fragility of certain portions of the site.	**Addressed in this Master Plan.**
LS.2	Prepare a vegetation management strategy consistent with the accompanying Management Unit Classification.	**Addressed in this Master Plan.**
LS.3	Prepare a vegetation rehabilitation strategy for previously disturbed portions of the site.	**Partially addressed in this Master Plan.** Challenging issues of deer browse pressure discussed.
LS.4	Prepare a strategy for the management of alien species consistent with the recommendations of the Life Science Report. Purple Loosestrife control should be considered an immediate priority. Alien species control programs should be carefully planned, rigorously monitored and re-evaluated within the context of new information as it becomes available.	**Implemented.** A Purple Loosestrife pull was carried out in 1992 and was successful. Buckthorn is the most pressing issue and is **addressed in this Master Plan**. Immediate action is required. The perimeter of the peat zone needs special attention in order to halt the advance of buckthorn.
LS.5	Conduct long term monitoring of biotic conditions within the core pond, marsh and peatland communities for the purposes of monitoring successional influences and the effects of changes in chemical and biological regimes.	**Implemented.** Vegetation plots were established in the late 1990s. These plots were re-established and re-evaluated in 2008 (to be reported on later).
LS.6	Retain all the deciduous forest community and wetland of Planning Unit PR6 in the southwest corner of the site in its biotically evolving conditions for the purposes of habitat connectivity and habitat diversity.	**Implemented.** This parcel is now owned by the City of London and has been added to the public ESA.
LS.7	The rear portions of institutional and residential lands presently fronting on Oxford Street are not considered a land assembly priority from a resource management standpoint. Vegetation and nutrient management strategies should be discussed with all adjacent landowners.	**Carry Forward.** The ESA Team has documented encroachments. There are questions related to runoff from Oxford St. being discharged through these properties to the ESA so this should be dealt with as part of the Oxford Street widening project (ES.1).
LS.8	Prepare an information package that a. describes the site's fragility b. identifies the manner in which prior human activities on the site's perimeter have impacted its hydrological and biological systems c. explains future management practices designed to protect the site's critical features d. seeks community co-operation in the ongoing protection of the Sifton Bog	**Implemented.** The Master Plan describes most of these issues/features. The Master Plan process involved the public. As well, information signs were erected in 2001 and 2005 at the Oxford Street entrance. These large signs outline the history and formation of bog, and describe plants and animals and threats. Recognition of volunteers is also given.

Recommendation		Outcome / 2006 Status
Recreational Resources		
RR.1	Retain the minimum maintenance interior trail in its existing location.	**Implemented.** The existing trails on public land have been maintained and enhanced.
RR.2	Retain existing pedestrian access points.	**Implemented.** The seven existing pedestrian access points have been maintained and enhanced with signage.
RR.3	Extend a perimeter trail with a higher level of maintenance to access points on the south and east boundaries of the site.	**Partly Implemented.** The trail that runs along the south end of the site (runs east-west) has been maintained and managed. **Carry Forward.** The 'illegal' trail on the east boundary of the site (runs north-south) is on private land and cannot be managed until land negotiations are complete and it is transferred to the City.
RR.4	Connect the perimeter trail to the boardwalk.	**Carry forward.** See RR3.
RR.5	Connect the boardwalks to an access point near Oxford Street.	**Implemented**. The boardwalk was extended twice (2002 and 2006) and now stretches from near the Oxford Street entrance to Redmond's Pond.
RR.6	Redesign or close the Oxford Street parking lot to minimize the impact of perimeter sediment loadings on interior vegetation communities.	**Implemented.** See ES9. The parking lot was redesigned and paved. The entrance was naturalized and the trail head re-routed to allow the gully to heal.

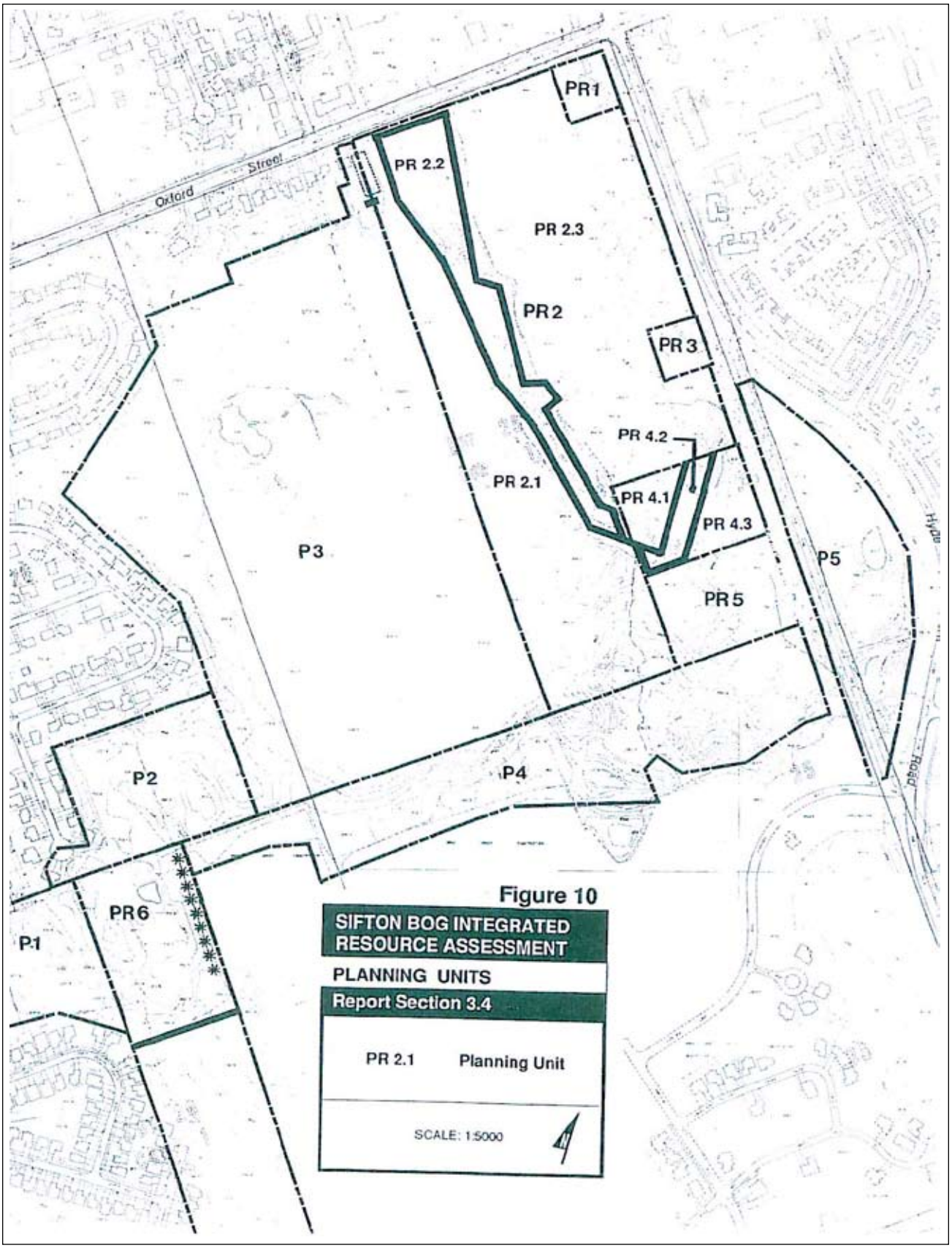

Figure 19. 1992 Planning unit map (Note: PR = Private Ownership, P = Public Ownership)

8.2 Goals, Objectives, Recommendations and Implementation Plans

This chapter summarizes the three goals (guiding principles) and key management strategies (objectives and recommendations) generated by the Local Advisory Committee, UTRCA and City of London (Table 16).

The hierarchy and definition of mission, goals, objectives, recommendations and implementation plan are as follows:

- *Mission* – sets direction for what we are trying to accomplish
- *Goals (guiding principles)* – set ecological and social values to be achieved
- *Objectives* – set broad targets to achieve goals
- *Recommendations* – set out steps and actions required to achieve each objective
- *Implementation Plan* – sets priorities, measures of success and outcome, lead agency, costs and funding sources

Table 16. Summary of Goals, Objectives and Recommendations

Goals (Guiding Principles)	Objectives	Number of Recommendations
1. Conserve and Enhance Ecological Health	1.1 Acquire additional lands	3
	1.2 Manage human encroachment	5
	1.3 Manage human use impacts on vegetation	8
	1.4 Manage invasive species	8
	1.5 Monitor permanent vegetation plots and plants of concern in the bog proper	5
	1.6 Manage deer populations	5
	1.7 Maintain the hydrological balance and water quality of the bog	5
	1.8 Address the threat of fire	1
2. Develop an Access and Use Plan that Minimizes Human Impact	2.1 Develop and maintain a minimal, well-marked and safe trail system and associated access points	6
3. Encourage Awareness and Environmental Education	3.1 Promote research, education and awareness	5
	3.2 Involve the community in ecological restoration efforts and projects.	4
TOTAL: 3 Goals, 11 Objectives, 55 Recommendations		

The majority of management objectives are consistent with the primary mission of conserving the ecological health and uniqueness of the Sifton Bog ESA.

Each objective has specific actions or recommendations to be implemented over the 10 year period of the Conservation Master Plan. The implementation plans detail the recommendations by priority, measures of success, lead agency, approximate costs, and funding sources.

Priority

The priorities are set according to perceived urgency, logical progression, and availability of resources. Based on these criteria, the recommendations are grouped into five priority time periods:

- *A* – Top priority - start within one year (2009), including operational items already underway
- *B* – High priority - start within two years (2010)
- *C* – Moderate priority - start within three years (2011)
- *D* – Low priority - start within four years (2012)
- *E* – Long range - projects without specified time frames

Lead Agency

- *ESA Mg Cte* – ESA Management Committee includes City of London Parks Planning and Design, Parks Operations and UTRCA staff
- *ESA Mg Team* – ESA Management Team based out of the UTRCA is responsible for day-to-day operations, education and enforcement in publicly owned ESAs.

Funding Sources

- *City ESA Budget* – The City funds the ESA Management Team annually under a special agreement.
- *City ESA Capital Budget* – The City funds capital projects in ESAs, over-and-above the annual City ESA Budget.

The estimated cost to implement all 55 recommendations is approximately $300,000, spread over 10 years (see table below). Some recommendations are inexpensive, others can be absorbed in existing projects, and some are moderately to very costly. Some recommendations can be implemented right away, and others will take more time and/or resources.

Summary of Implementation Projects by Priority

Priority	Estimated Total Cost
A	$129,500 – 139,500
A/B	97,000
B	$54,500 – 69,000
C	$12,000
D	0
E	$50,000 – 100,000
TOTAL	**$343,000 – 417,500**

*Note: Projects with unknown costs were not included

The UTRCA and City of London will host annual (or as needed) community meetings as a forum to communicate updates and issues that arise from the implementation of the recommendations.

8.2.1 Goal 1 – Conserve and Enhance Ecological Health

Objective 1.1 – Acquire Additional Lands

Sifton Bog ESA is a relatively small natural area surrounded by residential and commercial development. From an ecological standpoint, larger natural areas tend to be more sustainable than smaller ones. Natural areas connected to other natural areas are also more sustainable. Thus, it is essential that as much property as possible be included within the protective boundaries of the ESA and that any non-natural areas be naturalized to maximize the site's functional size. Although the majority of the Sifton Bog ESA is in public ownership, there are parts of the ESA still in private ownership (see Map 2) that have been identified as important to acquire.

Recommendation 1.1.1

The City and/or UTRCA should acquire private lands to the east of the current public ESA boundary and west of the Marsh Trail condominiums and include these lands in any rehabilitation plans for the Sifton Bog ESA (see Objectives 1.3 and 1.4).

Recommendation 1.1.2

If the lands identified in 1.1.1 above cannot be acquired, consider establishing easements for trail use.

Recommendation 1.1.3

The City and/or UTRCA should develop a contingency plan to acquire lands around the ESA that are currently developed, in the event these properties are no longer needed for their current uses (i.e., John Dearness School, parts of CPRI). These lands could be naturalized or rehabilitated to re-establish natural corridors between the bog and the Thames River.

Implementation

Rec. No.	Priority	Measures of Success	Lead Agency	Cost	Funding Source
1.1.1	A	Acquisition complete and lands transferred. Enlarged publicly protected site and buffer against adjacent land uses.	City	Unknown	City Capital Budget
1.1.2	B	Signed easement allows users a safe and legal route to both ends of the ESA.	City	Unknown	City Capital Budget
1.1.3	D	Acquisition complete and lands transferred and naturalized. Enhanced corridor between the bog and Thames River.	City	Unknown	City Capital Budget

Objective 1.2 – Manage Human Encroachment

Residential and some commercial development surround the Sifton Bog ESA. The ESA Management Team has walked the perimeter of the public ESA and recorded encroachments by type and severity. Some of the more frequently observed encroachments are

- Extension of backyard onto the publicly owned area and planting horticultural gardens and mowing naturalized areas,
- Erecting sheds, tree forts or swimming pools,
- Dumping yard waste and compost in the public natural area,
- Feeding deer,
- Installing gates in fences and creating personal trails through the natural area to join the managed trails.

These activities are prohibited under the existing Parks By-law and subject to removal by the landowner or, if not compliant, by the City or UTRCA with clean-up expenses added to property tax bills. The cumulative impact of these activities effectively shrinks and fragments the size of the natural area and introduces organic matter (e.g., non-native plants and animals) that threaten the ecological health of the site.

Recommendation 1.2.1

Clarify the City's encroachment prevention policy/procedure regarding steps to be taken when encroachment is found within ESAs and other public natural spaces. Steps may include education, encouragement, warning, charges, court appearance and order to remove or restore. Implement the policy in the ESA.

Recommendation 1.2.2

Implement an on-going program at Sifton Bog ESA that includes boundary identification and annual monitoring and follow-up of encroachment activities. Target the most serious encroachments first.

Recommendation 1.2.3

Produce and distribute a Sifton Bog-specific package similar to the "Living Next to Natural Areas" factsheet/ brochure to all landowners in the general neighbourhood. Distribute it annually or biannually to educate new neighbours. Emphasize cooperation of all users.

Recommendation 1.2.4

Inventory existing property fencing and document the effectiveness of various designs in minimizing human encroachment. Make recommendations from these findings/ observations. Educate neighbours about the City's cost-sharing policies regarding fencing.

Recommendation 1.2.5

Once the illegal mowing of the ESA land behind Naomee Crescent is halted, develop a restoration plan for the area.

Implementation

Rec. No.	Priority	Measures of Success	Lead Agency	Cost	Funding Source
1.2.1	A	A written procedural guideline that allows the ESA Mg Team to take appropriate action to remedy encroachment problems in all ESAs.	City and ESA Mg Cte	n/a	City ESA Budget
1.2.2	A	Reduced encroachment, illegal trails, non-native species, garbage, etc.	ESA Mg Team	n/a	City ESA Budget
1.2.3	A	Brochures produced and distributed.	UTRCA	$5000	City ESA Capital Budget
1.2.4	C	Report on the effectiveness of fencing to control encroachment.	ESA Mg Team	n/a	City ESA Budget
1.2.5	A	Mowing halted. Vegetation diversity increasing.	City	$2500	Foundation grants, partnerships with UTRCA or ReForest London, City ESA Capital Budget

Objective 1.3 – Manage Human Use Impacts on Vegetation

The Sifton Bog ESA contains several habitats that have been negatively influenced by stressors that include the presence of illegal trails and trails in inappropriate locations, development-related construction projects such as storm water management outlet, gravel pit extraction, and management of tree hazards. Impacts of these activities must be mitigated through the use of site-specific best management practices and ecological restoration.

Recommendation 1.3.1

Develop and implement a restoration plan for the former gravel pit area, if and when the City acquires the land. The plan should include maintaining and enhancing the tallgrass prairie/savanna species that have become established there and controlling illegal uses such as bush parties (fire pits). The restoration could be done through additional seeding and planting, closure of side trails, removing non-savanna shrubs and trees, and possible use of prescribed burns. Prairie grasses are not heavily grazed by deer (judging from their present growth and abundance) and so enhancement of this plant community type is feasible if and when the land is acquired.

Recommendation 1.3.2

Map all unmanaged trails and work towards closing these off using the best available methods (e.g., installing fencing, reworking the ground and covering with leaves, planting alive or dead standing shrubs to block the view of the former trail, etc.). Minimizing the number of trails will reduce disturbance, fragmentation and the number of tree hazards that may need to be removed. Install signage to inform trail users of the closed trails.

Recommendation 1.3.3

Work closely with utility agencies (e.g., London Hydro) regarding tree management issues to ensure any tree/limb cutting is carried out in such a way as to minimize disruption to the environment and neighbours.

Recommendation 1.3.4

Remove the old Paige-wire property fence that follows previous land use and land ownership and serves no current purpose. Cut fence posts to ground level and remove wire to minimize disturbance to the environment.

Recommendation 1.3.5

Investigate the costs and feasibility of road surface removal and vegetation community restoration within the road easement of Old Hyde Park Road, if and when it is legally closed in the future. Implement the restoration work if feasible after deer numbers are reduced. Prior to restoration, if warranted, conduct archaeological surveys.

Recommendation 1.3.6

a) Investigate the effectiveness of selective de-limbing or top removal of dead trees in order to preserve a dead tree's wildlife value versus removal of the whole tree (e.g., does the standing trunk provide value to birds or raccoons, etc.?).
b) If there is evidence that selective delimbing is much more preferable than cutting at ground level, retain foresters or arborists who can climb trees to cut the tops off of tree hazards that are identified as significant wildlife trees.

Recommendation 1.3.7

Monitor forest health and the impact of the tree hazard cutting program on the density and distribution of wildlife trees and wildlife activity.

Implementation

Rec. No.	Priority	Measures of Success	Lead Agency	Cost	Funding Source
1.3.1	C if acquired	Improved biodiversity and enlargement of an uncommon savanna plant community.	City	$10,000	Foundations, grants, partnerships with other organizations, ESA Capital Budget
1.3.2	A	Mapped trails. Illegal trails no longer or rarely used.	ESA Mg Team	n/a	City ESA Budget
1.3.3	B	Reduced impact on habitat from utility work.	ESA Mg Team	n/a	City ESA Budget
1.3.4	A / B	Removal of fence, minimizing disturbance to the habitat.	ESA Mg Team	$15,000	City ESA Capital Budget
1.3.5	E	Report on feasibility of road surface removal. Increased extent of natural habitat and connection to rest of ESA.	ESA Mg Cte	$50,000 – 100,000	City ESA Capital Budget
1.3.6	A	Report on effectiveness of delimbing from a wildlife value point of view. Increased number of snag trees (or tall stumps) left standing for wildlife use from selective de-limbing.	City	$10,000	City ESA Capital Budget (contract)
1.3.7	A / B	Increased density and distribution of wildlife trees and wildlife activity.	City	$10,000	City ESA Capital Budget (contract)

Objective 1.4 – Manage Invasive Species

Non-native, invasive species pose an immediate threat to biodiversity. Invasive species have no natural population controls outside of their homeland, making them effective competitors against native species. Large areas of natural habitat at Sifton Bog ESA have been severely altered by the spread of Glossy Buckthorn (primarily in swamp areas) and Common Buckthorn (primarily in upland areas). A high abundance of buckthorn leads to both local and system-wide influences on ecosystem processes (Bradwill Ecological Consulting 2008). The effects of buckthorn are far greater than the simple competitive replacement of one or more species; they extend to the loss or reduction of whole guilds or strata, with consequent losses in species diversity and changes to community structure and natural succession trajectories (Lundgren *et al.* 2004). Soil nutrient dynamics are altered where buckthorn is present; among the changes are elevated pH and higher concentrations of nitrogen and carbon (Heneghan *et al.* 2006). Buckthorn has high herbivore tolerance due to its stem armature and waxy leaf cuticle. It also regrows vigorously after being cut, making removal challenging.

Integrated pest management suggests that multiple strategies are important for the successful control of a pest. A three-pronged conservation approach is recommended that focuses on protecting areas that are not yet fully invaded by Glossy Buckthorn and reducing the impact of currently invading populations by (1) containment, (2) pre-emptive niche occupancy (i.e., planting native species), and (3) management of the disturbance (Bradwill Ecological Consulting 2008).

Recommendation 1.4.1

a) On teh open bog mat and Black Spruce swamp zone, hand-pull Glossy Buckthorn seedlings (i.e., stems under 30 cm tall) to halt the advance. Allocate a team of 5 - 10 people, 1 - 3 days a year. When grabbed near the base, the entire root should come out easily from the moist ground. Because of the sensitive nature of the bog mat, only trained staff and volunteers should carry out this activity. Track areas completed using GPS to ensure coverage of the entire containment area.

b) Develop a methodology to deal with the mature, seed-bearing Glossy Buckthorn shrubs. Because they are growing in a wetland environment on organic soils, traditional removal methods (i.e., herbicide and Weed Wrench™) are inappropriate. When removal methodology has been decided upon, locate seed-bearing shrubs with GPS and mark with spray paint. Remove these large shrubs first from the open bog mat and then work outward to the outer swamp zone. Cut the suckers that grow from the stumps for as many years as required to weaken or kill the shrubs.

Recommendation 1.4.2

In the swamp and thicket communities, establish plots that contain some seed-producing native trees and erect deer-proof fencing around them. Restore the vegetation by a) allowing native saplings to establish, removing Glossy Buckthorn shrubs (e.g., by cutting and applying herbicide to the cut stump in the dry season), hand-pulling seedings that germinate, and planting appropriate native species in the bare areas. Monitor progress and adjust the methodology as required. This action may serve to 'buy time' for the swamp vegetation until the deer population is reduced and larger-scale buckthorn management is feasible.

Recommendation 1.4.3

Undertake education and awareness programs to make residents aware of the need to control and remove buckthorn and the necessity to selectively use herbicides to control invasive species and achieve positive ecological restoration.

Recommendation 1.4.4

If and when biological controls (i.e., host-specific insects) for buckthorn and Garlic Mustard are approved for use in Canada, consider using them at Sifton Bog ESA.

Recommendation 1.4.5

In upland areas, implement the following herbicide management plan for Common Buckthorn, Tartarian Honeysuckle and Autumn Olive:

- Locate and map the largest, fruit-bearing shrubs.
- Apply Garlon4™ (25% concentration) to the bark of the standing shrub. The shrub will die and remain standing. If it becomes unsightly or hazardous, cut and/or chip the standing dead shrubs. The dead shrubs could be "replanted" over closed trails to block access, but they must be monitored to ensure they do not re-grow.
- Make this an ongoing activity, allocating 1-5 days per year of the ESA Management Team's time.
- Locate the rare hawthorn (*Crataegus dodgei*) for protection.

Recommendation 1.4.6

Continue to remove Goldfish from Redmond's Pond using electroshocking and other proven techniques, under MNR permits, by the ESA Management Team.

Recommendation 1.4.7

Install signs or update existing signs at access points that warn "Do not dispose of pets or other wildlife in the ESA (e.g., turtles, goldfish, tropical fish).". Also, install signs that state "No Fishing" and "No Feeding of Wildlife."

Recommendation 1.4.8

Monitor Purple Loosestrife in the meadow marsh areas (lagg zone) and pull out the plants as needed.

Implementation

Rec. No.	Priority	Measures of Success	Lead Agency	Cost	Funding Source
1.4.1	A / B	Reduced population of Glossy Buckthorn on peat mat and adjoining areas.	City	$20,000 initial year	City ESA Capital Budget (partnerships or contract)
1.4.2	A	Presence of intact or reasonably healthy swamp communities within the ESA, mostly free of buckthorn and deer browse pressure.	ESA Mg Team	$25,000	City ESA Capital Budget (partnership or contract)
1.4.3	A	Fewer seed-bearing buckthorn shrubs and fewer buckthorn seedlings emerging. Greater emergence of native seedings.	ESA Mg Team	na	City ESA Budget
1.4.4	A / B	Greater understanding by the public of the benefits of ecological restoration methods.	UTRCA and ESA Mg Cte	$2000 per yr	City ESA Budget
1.4.5	E	Reduced population of buckthorn and garlic mustard throughout ESA	ESA Mg Team	na	City ESA Budget
1.4.6	A	Reduced population of Goldfish and increased population of aquatic plants.	UTRCA and ESA Mg Team	$1000 per yr	City ESA Budget
1.4.7	A	Reduced invasive animal presence and reduced habitat damage from deer- feeding areas. This will educate the public about the negative impact of dumping and feeding wildlife that are out of balance in the environment.	ESA Mg Team	n/a	City ESA Budget
1.4.8	A	Continued reduced presence of Purple Loosestrife.	ESA Mg Team	n/a	City ESA Budget

Objective 1.5 – Monitor Permanent Vegetation Plots and Plants of Concern in the Bog Proper

The Sifton Bog (specifically, the bog proper) is a boreal community located within the Carolinian Zone of Ontario. Non-bog plants such as Common Cattail and Three-way Sedge infiltrate the bog mat on deer tracks and disturbed areas. However, this process may be a natural successional transition. Further monitoring is required.

Recommendation 1.5.1

Locate the 13 permanent vegetation plots established in the 1998 by consultants (BioLogic). Monitor the plots every three to five years to track successional or other changes in vegetation within the bog that may be caused by development or other disturbances. Prepare vegetation status reports.

Recommendation 1.5.2

Monitor aquatic plants (e.g., Southern Pond Lily) in Redmond's Pond annually in response to changes in water level or Goldfish populations.

Recommendation 1.5.3

Monitor the abundance, spread and density of Common Cattail and Three-way Sedge in Redmond's Pond, in ditches and in deer trails in the shrub and treed bog communities annually. Develop a management plan in response to significant increases in cattail or sedge populations.

Recommendation 1.5.4

Conduct basal area analysis on the mature upland woods and the young woods every five years to monitor forest regeneration. Make recommendations on forest management based on the findings.

Recommendation 1.5.5

Conduct counts of orchids and other uncommon or rare plants in the Sifton Bog ESA every three to five years.

Implementation

Rec. No.	Priority	Measures of Success	Lead	Cost	Funding Source
1.5.1	A	Long term vegetation changes documented and increased understanding of impacts of development-related activities and ability to intervene if needed.	City	$15,000 every 3 -5 yrs	City ESA Capital Budget (contract)
1.5.2	A	Maintenance of marsh/aquatic communities.	City	$1,000 per yr	City ESA Capital Budget (contract)
1.5.3	A	Maintenance of bog communities.	City	$1,000 per year	City ESA Capital Budget (contract)
1.5.4	C	Long-term success will be a positively regenerating forest and greater understanding of the stresses on the forest and an ability to intervene if needed to ensure forest regeneration.	UTRCA	$2,000 every 5 yrs	UTRCA budget
1.5.5	A	A long term record of rare or unusual species populations and recommendations for management.	City	$5,000 every 3-5 yrs.	City ESA Capital Budget (contract)

Objective 1.6 – Manage Deer Populations

A challenge to managing white-tailed deer (*Odocoileus virginianus*) populations in suburban and park environments, even when we have agreement on the need to control deer, is finding a method that is acceptable to a broad public, effective at decreasing deer numbers and applicable at reasonable cost (Cote *et al.* 2004; Porter *et al.* 2004).Resolving these issues involves discussion of human values, economic realities and ecological feasibilities (Porter 1997). Hunting and culling, translocation and contraception/sterilization methods all meet some of these criteria. Lethal methods have immediate effect; however, without knowing the dispersal rate of the population, the result may be very short-lived and likely need to be repeated. Non-lethal methods to control female fertility may be effective over a longer time period; however, they are time-consuming and costly and deer must be captured and ear-tagged for identification and subsequent booster injections. Depending on the goal for herd reduction, this method may not lower the density to required levels.

There is evidence of negative effects of an overabundant deer population on the ecology and health of Sifton Bog ESA, as examined in this Conservation Master Plan process. Indicators of stress include:

- an increase of well-worn wildlife (deer) trails on the sensitive bog mat and throughout the ESA, often leading to the public using these trails and causing further damage to the bog mat;
- increased quantities of deer droppings that may affect nutrient levels;
- a shift in vegetation structure to a monoculture of buckthorn within swamp communities;
- a reduction in the number of orchids and Pitcher Plants on the bog mat; and
- a loss of spring wildflowers, shrubs and saplings in the upland forest communities. The absence of regeneration (saplings) threatens the future of these forest communities as old trees die without being replaced with new trees.

Many members of the LAC still strongly support the original recommendation of the White-tailed Deer Community Steering Committee – a recreational hunt to drastically reduce deer numbers – to protect the ecosystem of the ESA and stop damage to private property. The need, rationale, method, cost and efficacy of such a hunt was reported to Council in December 2005. Given the difficulty of carrying out a hunt in the middle of the City and no guarantee that a similar number of deer would not just return to the Bog the following year, Council did not support this recommendation. Council acknowledged that, while this action may address issues in and around Sifton Bog, even a yearly hunt at the bog would likely have no effect on the overall number of deer in the City, and other neighbourhoods would seek similar action to address their similar concerns.

The recommendations below are a balance of population-management strategies and monitoring tools to explore new and evolving deer management options for the City as well as for Sifton Bog.

Recommendation 1.6.1

Continue to implement the Council approved non-lethal deer management strategies including:

- education and communication with neighbours as to how to deal with urban deer issues;
- enforcement of no feeding of deer, as this only encourages high numbers of deer to remain in the Bog;
- annual deer counts to track population trends; and
- monitoring of all deer-human incidents (e.g., car collisions) to flag any significant trends.

Recommendation 1.6.2

Work with university academics on a deer exclosure study (now underway at Sifton Bog and other London ESAs) to assess the impact of deer browse on native vegetation communities within London's natural areas. Examine the vegetation within and outside the exclosures for two or more years.

Recommendation 1.6.3

Evaluate the preliminary results of the deer exclosure study (Recommendation 1.6.2) and vegetation monitoring plots (Recommendations 1.5.1 and 1.5.4), yearly deer numbers and trends (annual counts since 2003), and the success of other management strategies to support a herd reduction as the only remaining feasible intervention to protect the unique ecosystem of Sifton Bog ESA by February 2010.

Recommendation 1.6.4

Continue to work with the Ontario Ministry of Natural Resources on issues related to urban deer management and control. Seek MNR advice and statistics on overall deer population trends in southwest Ontario and how the trends may affect deer populations in London in the coming years.

Implementation

Rec. No.	Priority	Measures of Success	Lead Agency	Cost	Funding Source
1.6.1	A	No deer feeding, less garden damage and better information on deer population trends in and around Sifton Bog ESA.	City and ESA Mg Cte and ESA Mg Team	$15,000/yr for deer counts	City ESA Capital Budget
1.6.2	A	Quantifiable results of deer browse pressure on the various ESAs and vegetation communities, including the bog mat, and recommendations to address any negative impacts.	City and ESA Mg Cte	$34,000	City ESA Capital Budget (contract)
1.6.3	B	A final recommendation and action plan to reduce deer browse impacts.	City and ESA Mg Cte	Min. $50,000 annually for herd reduction	City ESA Capital Budget
1.6.4	B	Increased awareness of deer issues, strategies and population trends.	City	$50,000	City ESA Capital Budget (contract wildlife biologist)
1.6.5	A	Reduction in deer feeding and vegetation trampling at feeding sites.	City and ESA Mg Team	n/a	City ESA Budget

Objective 1.7 – Maintain the Hydrological Balance and Water Quality of the Bog

The long-term survival of the Sifton Bog is dependent upon maintaining a positive water balance and appropriate water levels in the acrotelm zone. The bog is ombrotrophic, meaning it has no permanent inlets or outlets and relies mainly on precipitation for water supply. The lagg zone receives water from surface runoff within the small catchment area. Contaminants can enter the bog from this surface runoff. In dry to typical years, the surface inputs are either processed by the perimeter lagg zone and swamp areas or are infiltrated rapidly through the *Sphagnum* layer. In excessively wet years, contaminants within the surface runoff move further out into the bog and cause localized changes (e.g., higher chloride levels detected at the north end of Redmond's Pond). The stormwater management plan for the most recent development on Hyde Park Road has a built-in contingency measure that can allow more water into the lagg zone of the bog in the event that the water levels in Redmond's Pond and the bog mat fall below the level of the acrotelm zone. The stormwater management ponds on the eastern tableland are designed to collect sediment that is carried in runoff. Containing the sediment helps to contain contaminants and deliver clean water to the lagg zone. Targets have been established for various environmental parameters.

Recommendation 1.7.1

Establish a Sifton Bog Water Monitoring Committee of agency staff and other hydrological experts to:

a) Review and integrate the bog monitoring programs designed by BioLogic (2003) and McCormick Rankin (2003). Re-start monitoring of piezometers within the bog to track water levels and environmental variables (total phosphorus, nitrate, chloride, conductivity, calcium, pH).
b) Integrate and revaluate current monitoring by UTRCA of the wells at the periphery of the site and of surface water at Redmond's Pond.
c) On an annual basis, compare the measured values to the target values, and identify the need for any contingency action.

Recommendation 1.7.2

a) Monitor wells 1 (1S, 1D) and 5 (5S, 5D) and water levels in Redmond's Pond.
b) Based on the information from (a) above, take action to maintain the difference between the static water level in the aquifer and the water level in Redmond's Pond (i.e., Redmond's Pond must be higher than the acquifer; typical difference is 0.25 - 1.00 m). The difference in water levels prevents contamination and ensures the continued recharge function of the bog and the processing of contaminants prior to reaching the sensitive communities in the *Sphagnum* bog mat. The monitoring program must be able to distinguish between natural variability in water levels and the role of adjacent development and road runoff from Oxford Street in influencing the quantity and quality of water entering the bog.
c) Implement contingency measures if needed. Threshold values for environmental variables (total phosphorus, nitrate, chloride, conductivity, calcium, pH) that would trigger a response and contingency measures have been developed and approved (BioLogic 2002, McCormick Rankin 2003). Overall, it is anticipated that treated stormwater on the tablelands will improve inputs of environmental parameters if Marsh Trail subdivision road runoff is redirected or winter salting reduced or eliminated. The approved SWM pond plan redirects all road runoff away from the bog unless additional water is required in a drought year. Stormwater targets will be more critical in wet years when there is little difference in the static water levels between the bog and the aquifer.
d) Produce annual reports summarizing the findings of the monitoring. Make the reports available on City and UTRCA websites.

Recommendation 1.7.3

Provide input into the Oxford Street widening project for the specific purpose of assessing and managing water runoff to the Sifton Bog ESA. Chloride loading should be minimized by keeping the extent of roadway draining to the bog to the minimum necessary to maintain the water balance (McCormick Rankin 2003), or by implementing management practices such as the use of beet extract or other salt substitutes, the use of oil-grit separators, or the creation of a stormwater management facility.

Recommendation 1.7.4

Encourage research on the potential impacts of climate change on the hydrology and vegetation of the bog.

Recommendation 1.7.5

In the future, following a proposal-specific assessment for Planning Unit PR3 (Figure 13), consider the possibility of directing potential post-development surface flows of comparable quality from this unit into the hydrological catchment of the bog to compensate for the loss of surface volumes from within the historical catchment.

Implementation

Rec. No.	Priority	Measures of Success	Lead Agency	Cost	Funding Source
1.7.1	A	A well designed monitoring program to track changes in water quantity and quality in the bog and surrounding groundwater with annual reports.	UTRCA and City	$15,000 – 25,000	City ESA Capital Budget (contract)
1.7.2	B	Reduced water contamination reaching the sensitive bog mat.	City	unknown	City ESA Capital Budget (contract)
1.7.3	E	Reduced chloride in surface and groundwater and a positive water balance.	City	n/a	City Engineering Budget
1.7.4	D	Increased knowledge about the potential impacts of climate change on the hydrology and vegetation of the bog.	ESA Mg Cte	n/a	All
1.7.5	D	No changes in surface water input as a result of development of this parcel.	Developer	n/a	Developer

Objective 1.8 – Address the Threat of Fire

Bogs are not fire-tolerant vegetation communities. Peat, once dry, can burn and smolder underground for considerable time, destroying centuries of peat development and releasing large amounts of carbon into the atmosphere. Fire occurred in Sifton Bog on July 1st, 1988 and at that time firefighters were hampered by their lack of understanding of the ecosystem (e.g., how fire can remain under the surface, smoldering in the dry peat layers) and the distance to fire hydrants.

Recommendation 1.8.1

Request the London Fire Department, in consultation with the City and UTRCA, produce a contingency plan in case of fire in the Sifton Bog ESA (especially peat areas). Share this information with the neighbours by posting the report on the UTRCA and City websites, and adding this information to the "Living Next to Natural Areas" brochure so that people know who to call.

Implementation

Rec. No.	Priority	Measures of Success	Lead Agency	Cost	Funding Source
1.8.1	B	A contingency plan to control fires in the bog.	City, City Fire Department	n/a	n/a

8.2.2 Goal 2 -- Develop an Access and Use Plan that Minimizes Human Impact

Objective 2.1 – Develop and Maintain a Minimal, Well-marked and Safe Trail System and Associated Access Points

Sifton Bog ESA is a popular site for nature appreciation, walking and hiking. To minimize negative effects, it is important to limit the number of trails and access points. Ideally, trails should be strategically aligned so that visitors may enjoy the uniqueness of the place in the safest and least intrusive manner. The current trail system (Map 9a) forms the basis of the Conceptual Trail and Access Plan (Map 9b).

Recommendation 2.1.1

Adopt the following Guiding Principles for Trails at Sifton Bog:

- Add no new trails within the bog mat and swamp.
- Avoid moving trails to areas of large wildlife trees that would have to be removed because of safety hazard.
- On managed trails, to minimize disturbance, provide boardwalks in wet/sensitive areas.
- Follow professional trail construction standards and methods, especially regarding appropriate slopes on erosion-prone soils.
- Adopt a long term goal of having significant portion of ESA unpenetrated by trails to ensure a large undisturbed area for wildlife.
- Avoid Y-intersections in order to minimize trail footprint.
- Where a trail is to be re-routed, ensure the old route is effectively closed simultaneously with opening of the new route.

Recommendation 2.1.2

Formalize and implement the Conceptual Trail and Access Plan provided in Map 9b, in consultation with the City, UTRCA, and community stakeholders. The Plan includes the following elements:

a) Educational kiosks and bike racks
   - Create educational kiosks and provide bicycle racks at three major access points: Oxford Street, Naomee Place, Old Hyde Park Road. Build bike barriers at all access points, except the Oxford Street entrance to the boardwalk to enable strollers and wheelchairs to access the bog boardwalk.

b) Naomee Place Access
   - Move entrance to avoid steep terrain and maximize distance from property lines.
   - Improve and shorten the trail between access points 6 and 4 (Naomee Place and Havenwood Way) by incorporating a boardwalk through the swamp and closing down longer trails.
   - Close all unmanaged trails as alternative routes are developed. Barricade closed trails by installing fence posts, laying logs and branches on the former trail.

c) East-West Trail
   - Maintain and improve the major east-west trail that runs between Havenwood Way and Old Hyde Park Road. Realign the trail in specific areas as needed for safety. Actual trail alignment to be determined on-site with ecologists, park planners and other staff. The map shows only major trail routes.
   - Close all unmanaged trails.

d) Oxford Street Entrance
   - If the land to the east is acquired, develop an entrance plan that will place the parking lot and entrance away from erosion-prone areas. If the lands are not immediately acquired, control of erosion and water from Oxford Street needs to be addressed.

e) North-South Trail
   - If the land on which the north-south trail runs is acquired by the city, manage this trail to the same level as current trails within the ESA and realign slightly as needed to avoid sensitive or dangerous areas. Avoid creating new trails where possible.

Recommendation 2.1.3

Evaluate and assess the proposed alignment of a bike path (paved) east of the ESA on table land, perhaps next to the sidewalk on the west side of Hyde Park Road or on Old Hyde Park Road, to connect the City's bikeway system and provide linkages to Sifton Bog and neighbourhouds. This project is part of the City's Bicycle Master Plan and the responsibility of Parks Planning & Design and Transportation Division.

Recommendation 2.1.4

Maintain an appropriate trail marking and guiding system (e.g., blazes, trail names such as the Dr. Judd Boardwalk).

Recommendation 2.1.5

Continue to maintain the safety of the trails through boardwalk repairs, removal of tree hazards (e.g., dead trees at risk of falling on the trail), removal of obstacles on the trails, permitted-activity signage, etc.

Recommendation 2.1.6

a) Request that the City amend its Parks By-law to include provision that ESAs can be designated pet-free zones. Further request that Sifton Bog be so designated and that dogs (and cats), both on and off leash, be prohibited in the ESA.
b) Conduct before-after control-impact study for any new trails to study the impact of dogs on wildlife.

Implementation

Rec. No.	Priority	Measures of Success	Lead	Cost	Funding Source
2.1.1	A	No new trails created and sensitive trail design	ESA Mg Cte	n/a	City ESA Capital Budget
2.1.2	A or B	Fewer unmanaged trails and a well-respected trail and access system that minimizes impacts on the environment.	City and Transportation Division	$50,000	City ESA Capital Budget
2.1.3	B	An assessment of the feasibility of a bike path to create a bicycle accessible ESA.	City Parks and Transportation Dept	$4,000	City ESA Capital Budget
2.1.4	B	A well marked safe trail system	ESA Mg Team	n/a	City ESA Budget
2.1.5	B	A low-impact trail system.	ESA Mg Team	n/a	City ESA Budget
2.1.6	E	Reduced conflict with dogs and users and reduced impact from dogs on plants and wildlife.	City and ESA MG Cte	unknown	City ESA Capital Budget (contract)

8.2.3 Goal 3 – Encourage Awareness and Environmental Education

Objective 3.1 Promote Research, Education and Awareness

Sifton Bog offers an environmental experience that is unique in London and southwestern Ontario. It is a disjunct boreal landscape within the Carolinian Life Zone. By encouraging appropriate research within the ESA's boundaries, the City and UTRCA may learn more about the site's functions and ways to preserve it. Educating citizens and students about the bog and its formation will foster appreciation and a conservation ethic.

Recommendation 3.1.1

Continue to develop on-site and in-class education programs and materials related to the bog that are geared to the various grade levels and curricula. Consider developing education programs for other areas of the ESA such as the Silver Maple swamps and upland forests.

Recommendation 3.1.2

Continue to encourage and allow responsible research in the bog (e.g., studies on vegetation, insects, climate change).

Recommendation 3.1.3

Where feasible, involve high school students in monitoring, or invasive-species removal that would count towards community service hours.

Recommendation 3.1.4

Make available an updated "Living Next to Sifton Bog ESA" brochure and provide additional information on the UTRCA and/or City of London website (see 1.2.3).

Implementation

Rec. No.	Priority	Measures of Success	Lead	Cost	Funding Source
3.1.1	B	Continued education programs held at the ESA for hands-on learning experience.	UTRCA, local school boards, individuals	$500 – 15,000	Foundations
3.1.2	D	Ongoing research projects being undertaken in the ESA and increased understanding of the unique habitats.	Academics, students	n/a	n/a
3.1.3	D	Additional assistance with studies and increased awareness of the students.	City, UTRCA	n/a	partnerships
3.1.4	D	Increased public knowledge about the ESA.	UTRCA	n/a	City ESA Capital Budget
3.1.5	See 1.2.3			See 1.2.3	

Objective 3.2 Involve the Community in Ecological Restoration Efforts and Projects

Establish and promote partnerships with all stakeholder groups for the betterment of the Sifton Bog ESA.

Recommendation 3.2.1

Encourage neighbours and users of the ESA to undertake "neighbourhood watch" type activities and report any vandalism or encroachment to the City or UTRCA.

Recommendation 3.2.2

Examine the feasibility of using Westervelt College police students in a voluntary or work experience capacity to help with regular surveillance of London's ESAs and/or to assist with perimeter safety and enforcement if a deer herd reduction is ever approved.

Recommendation 3.2.3

Support the volunteer "Friends of Sifton Bog" group to assist with community input and outreach and projects and fundraising for special projects.

Recommendation 3.2.4

When and where appropriate, encourage community involvement (e.g., neighbours, students) in such activities as:

- planting or seeding projects (after deer numbers are reduced),
- garbage clean up days,
- buckthorn control,
- assistance in closing old trails by making them look less like trails, and
- erecting deer-proof fencing in trial plots.

Implementation

Rec. No.	Priority	Measures of Success	Lead	Cost	Funding Source
3.2.1	C	Increased awareness and knowledge.	UTRCA and City	n/a	n/a
3.2.2	E	Better surveillance and practical experience for students, and budget savings.	UTRCA and City	n/a	n/a
3.2.3	C	Active volunteers and projects.	UTRCA and City	n/a	n/a
3.2.4	C	Active and positive participation in Sifton Bog projects.	ESA Mg Team and City	n/a	City ESA Budget