

Environmental Resources

Climate

According to Brown, McKay and Chapman, Springwater Conservation Area is located within the Lake Erie Counties Climatic Region³. It is characterized by warm, moist climate and a relatively long growing season. Typical climatic features of the area are illustrated in Table 3 below.

Table 3: Typical Springwater Climatic Features

Measure	Value
Daily Average (°C)	8.7
Rainfall (mm) Per Year	874.4
Snowfall (cm) Per Year	118.6
Precipitation (mm) Per Year	993
Days >= 0.2 mm with Rainfall Per Year	132.9
Days >= 5 mm with Rainfall Per Year	53
Days >= 10 mm with Rainfall Per Year	29.1
Days >= 25 mm with Rainfall Per Year	6.1
Days With >= 0.2 cm Snowfall Per Year	31.8
Days With >= 5 cm Snowfall Per Year	8.3
Days With >= 10 cm Snowfall Per Year	2.9
Days With >= 25 cm Snowfall Per Year	0.08
Days with >= 0.2 mm Precipitation Per Year	159
Days with >= 5 mm Precipitation Per Year	61.5
Days with >= 10 mm Precipitation Per Year	32.5
Days with >= 25 mm Precipitation Per Year	6.2
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On a regional scale, one type of weather activity that occurs periodically is freezing rain. Although harmful effects of freezing rain vary from location to location, Springwater, with its very mature forest cover, is susceptible to extensive tree damage. This is particularly true if freezing rain is followed by a cold snap accompanied by heavy snowfall. These conditions have occurred historically in which salvage logging operations were warranted due to freezing rain damage.

There are also some interesting microclimatic features noted at Springwater. For instance, temperature readings in the forest relative to the surrounding open areas is on the average 7°C less. These cooler temperatures help to maintain flora and fauna ecosystems in balance. The measured temperatures

³ Brown, D.A., McKay and L.J. Chapman 1980. The Climate of Southern Ontario. Environment Canada, Atmospheric Environment Service, Toronto, P. 67.

illustrate the moderating and cooling effect a mature forest has on air temperature which in turn helps the fragile ecosystems within. A similar effect occurs in the spring as snow is retained within the forest longer than the surrounding open areas. The longer retention of the snow pack assists with a better and more sustainable water retention within the wetlands of the Springwater Forest, which in turn assists with the fragile mature forest ecosystems of the Springwater Forest.

Wind velocities are also much lower in the forest. This contrasts with the high ground area around the schoolhouse in the northwest corner of the property where winds are always the strongest. One drawback of the climate in the surrounding area including Springwater Forest is the lower number of days with reliable snow cover. Users of the forest and other parts of the Conservation Area for winter recreation have a limited season in which to participate in winter activities.

Geology and Landforms

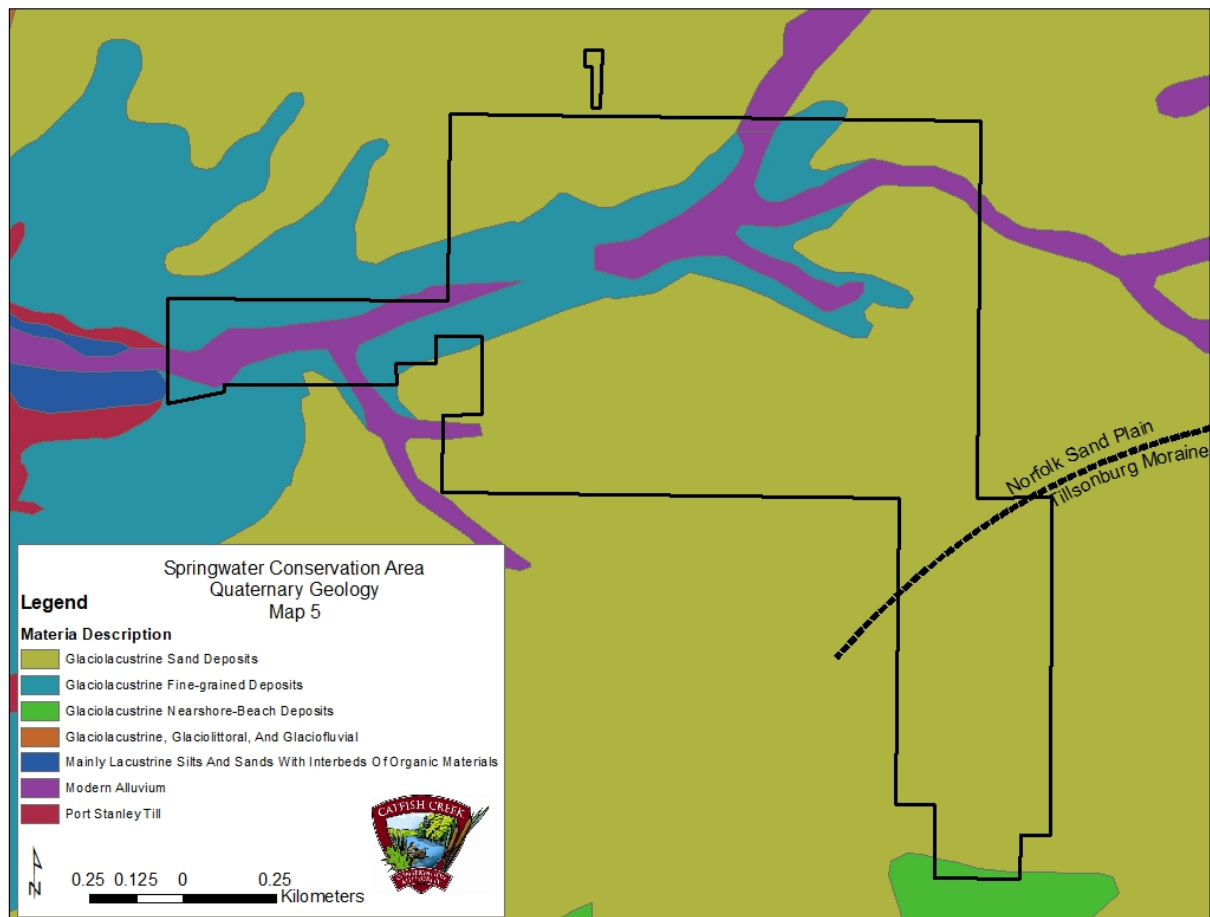
The underlying bedrock in Springwater is primarily Middle Devonian limestone of the Delaware Formation. However, all of the bedrock is overlain with over 50 meters of unconsolidated deposits as outlined in Map 5.

The primary geologic deposit found throughout Springwater is glaciolacustrine sand deposits from the Late Wisconsin glacial ice extent, and consists of fine to coarse grained sand modified slightly by wind action.

At the south end of Jaffa is found glaciolacustrine nearshore-beach deposits again from the Wisconsin Glacial Stage and consists of gravel and gravelly sand.

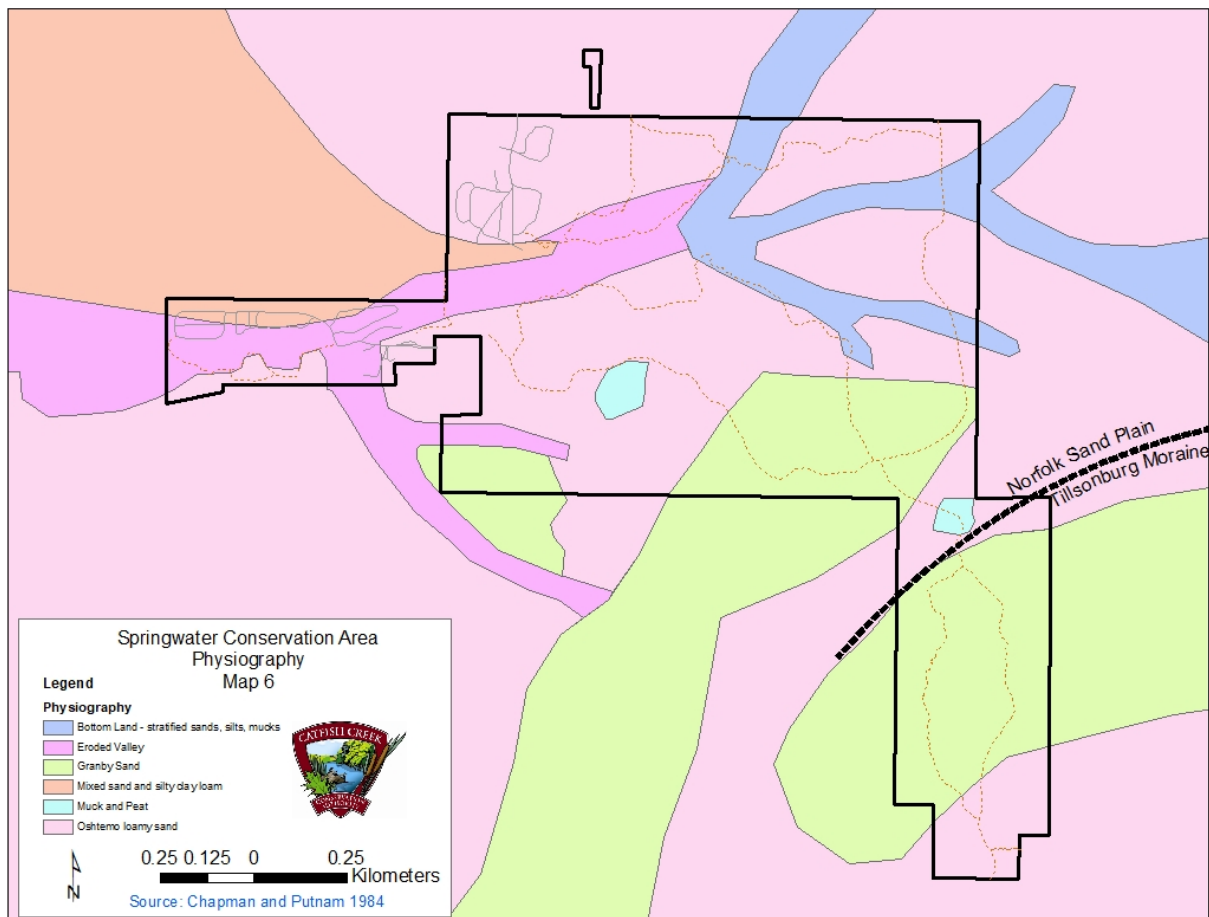
More recent alluvial deposits from the Holocene Era are found in the lower course of the river system and consist of undifferentiated material such as gravel, sand, silt, clay and muck.

Figure 5: Landforms and Geology (Map 5)



Map 6 reveals the dominant landform feature in the Springwater area is Norfolk Sand Plain which is characterized by a broadly rolling sand plain. The sand plain is formed of deep deposits of deltaic lacustrine sands which are generally level or very gently rolling except in the eastern half of the Springwater Forest where they become irregular and moderately rolling.

Figure 6: Soils and Physiography (Map 6)



Other landform features have been developed on the sand plain. Young V-shaped valleys and broad flood plain valleys up to 10 meters deep are located in Springwater. A sand plain basin wetland of muck and peat occurs south of the reservoir, occupying approximately 1.8 hectares. Depression swamps also occupy substantial portions of land, particularly in the Jaffa Tract where close to one-quarter of the area is loam and perennially covered with water.

Finally, a buried moraine sand plain encompasses all of the Jaffa Tract and is likely a buried arm of the Tillsonburg Till Moraine.

Soils

Five soil groups are represented in the Springwater Conservation Area and forest. Oshtemo loamy sand is found throughout the study area on the well drained, very gently rolling sand plain sites. The soil is generally acidic, yellowish sand that has relatively low natural organic content. Field crops such as flue-cured tobacco, corn and beans, and fruit crops such as apples, squash and berries are typically grown in the surrounding fields. A variety of tree species such as white pine, maple, beach and oak grow very well in this environment.

Granby sand is characterized by having grey mottled subsoil with neutral to alkaline reaction and naturally low fertility is found in some of the moister, poorly drained rolling lands of the Jaffa Tract (Refer to Map 6 above).

A third soil type, found on the floodplains of the broader incised valleys is referred to as bottom land soil. This soil is a mix of stratified sand, silts and mucks that help create moist terraces while very wet mucks form seepage bottoms.

Another soil type is called Eroded Valley, is the name of the soil found on the slopes of the incised valleys. This material is susceptible to slumping and erosion if trampled or cleared, has an immature sandy profile with acid reaction and irregular horizonation.

Muckland, or muck and peat deposits are found throughout the forested areas of Springwater. Two significant examples are presented in the sand plain wetland marsh and in the permanent swamp in the southeastern corner of Springwater Forest. These muck deposits exceed 0.5 meters in thickness and are perennially inundated.

Due to the sandy nature of the dominant soils, the inherent water-holding capacity plus the nutrient holding capacity are both low. In terms of agricultural land use (e.g. for tobacco), irrigation, fertilization and erosion control must be used extensively. In terms of recreational land use (e.g. hiking, mountain biking), care must be taken to avoid over compaction of soils which can lead to nutrient loss, accelerated erosion and further reduction of the water-holding capacity.

Geomorphology

About 15,000 years ago, Elgin County began to emerge from beneath the heavy glacial ice lobes of the Lake Erie and Lake Huron basins. Many features were being created and modified as the ice retreated and melted. In this part of the province, terminal and recessional moraines were formed as the ice lobes moved away. Vast water bodies occupied large areas and had different shorelines far further inland than they are today.

Glacial Lake Maumee occupied the Lake Erie basin at different stages approximately 14,000 years ago. Later, Lake Arkona and Lake Whittlesey produced new features and deposited new lacustrine sands, silts and clays. Earlier features were subsequently buried while the latest deposits helped to form the Norfolk Sand Plain on which Springwater is now located. By 12,000 years ago, the Springwater area was a terrestrial environment and isostatic readjustment helped to promote stream incision as the entire region drained. Even smaller streams such as Bradley Creek were probably carrying substantial volumes of water through the Springwater area, although it is not shown as a spillway on quaternary geology maps.

Today, Springwater is situated on a land mass that has been dramatically modified by glacial and post-glacial activity. Even now, wind and water continue to rework the land with valleys widening and deepening and surface sediments being carried away by aeolian⁴ and fluvial forces. Alterations to the landscape are subtle in a short time frame but the terrestrial environment will always be changing.

⁴ Aeolian processes pertain to wind activity in the study of geology and weather and specifically to the wind's ability to shape the surface of the Earth

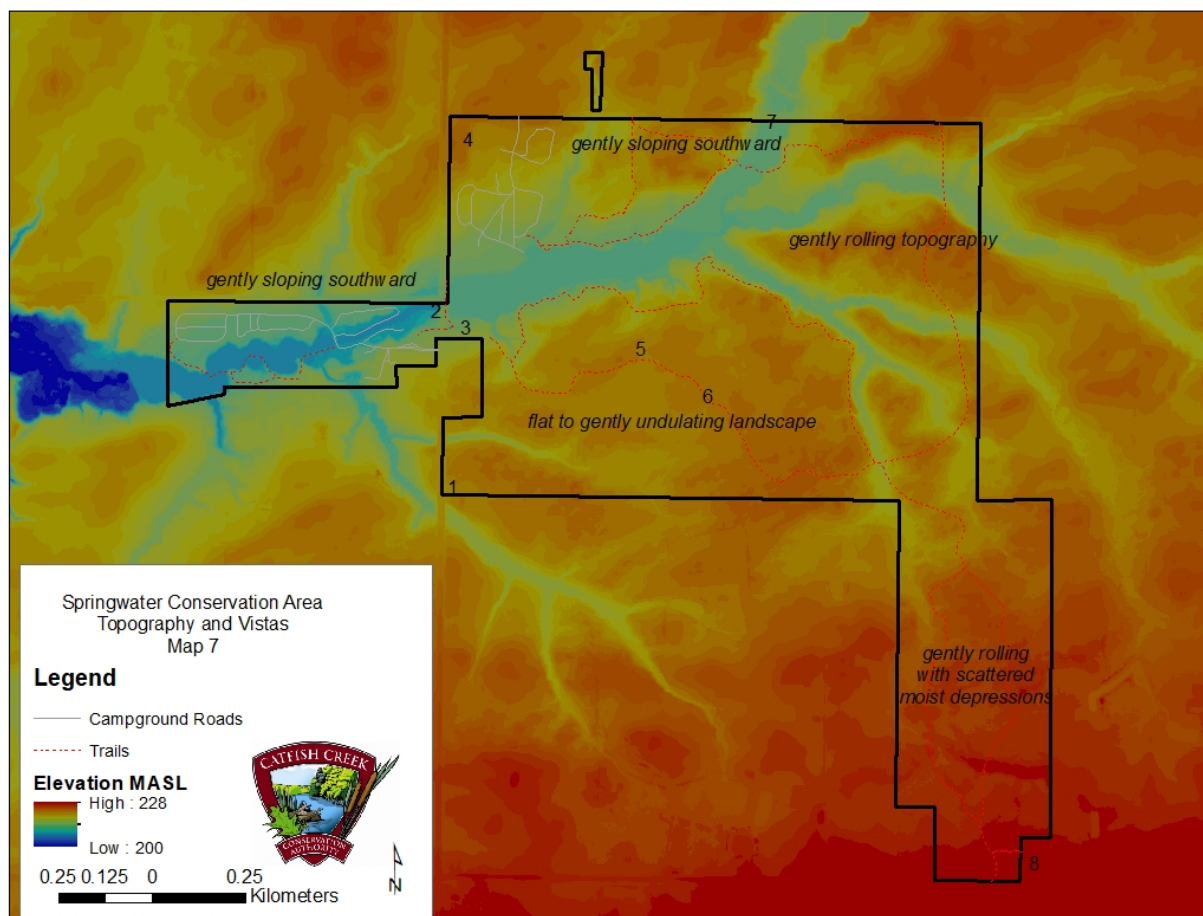
Topography

Elevations vary from 200-220 meters above mean sea level. The lowest areas are those in the creek valley and beach area, and the highest areas are found in the south end of the Jaffa tract. Most of the day use area, the developed camping sections and the wooded areas have an elevation of approximately 205 meters above mean seal level.

Map 7 describes the topographic features in the park including the broad or narrow incised valley land. Much of the eastern half of Springwater Forest is dissected by these fluvial incisions. The valleys have cut down 5 to 10 meters into the sand plain with slopes of over 30 percent observed. Similar topography is noted downstream of the reservoir as Bradley Creek and some minor tributaries cut through this part of Springwater.

The rest of the park land is gently sloping, gently rolling and undulating. A land unit with irregular topography is the Jaffa Tract and the southeast corner of the Springwater Forest. Distinct from other parts of the property, this area has an irregular, moderately rolling surface scattered with wet depressions.

Figure 7: Topography (Map 7)



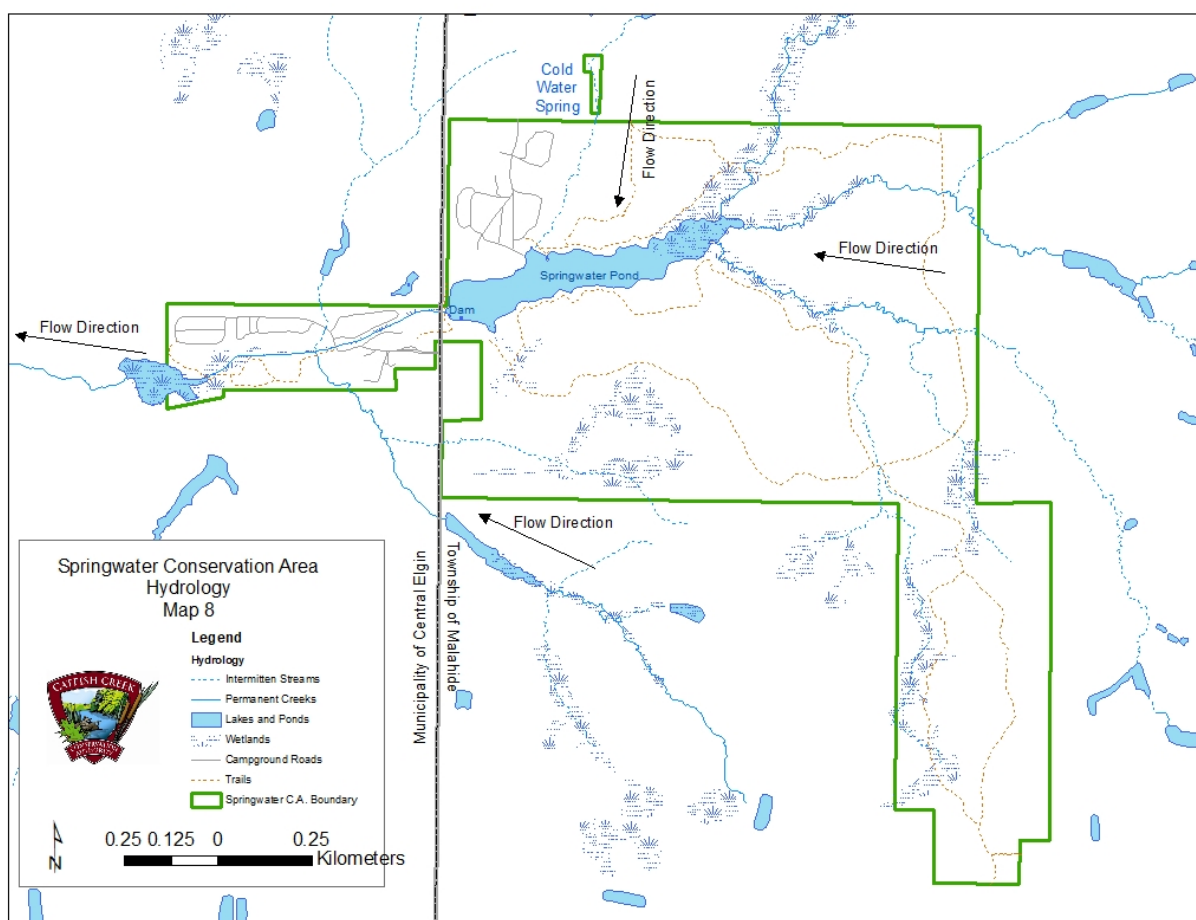
Hydrology

Springwater Conservation Area and forest is recognized as one of the most important sources of water in the Catfish Creek watershed. The forest and wetland depression areas contained within it have significant water storage capacity.

Springwater Reservoir was a beaver pond until at least 1830, and is fed by Bradley Creek and two of its tributaries which enter the Pond at the eastern end. Springwater Reservoir is the largest of several man made water bodies in the small 18 km² Bradley creek sub-watershed. Over a dozen water control structures exist for the purposes of irrigation for agriculture, wildlife habitat, and recreation purposes⁵.

Early landowners of the Springwater property built a dam on Bradley creek in about 1860. Water power generated here was used for a grist mill that was situated on the south end of the pond. Cold spring water (hence the name Springwater) found in the vicinity feeds into the pond and the streams and trout were found in Bradley Creek until the late 1800's. One such spring is located within the small portion of the property north of Conservation Line across from the Schoolhouse (Refer to Map 8). Up until the mid 1900's, warm water species such as bass were abundant in the sub watershed.

Figure 8: Hydrology



⁵ CCCA Dam Inventory, 2008

Gradually, as more land in the surrounding area was used for intensive agriculture (e.g. tobacco and other cash crops) the stream carried larger sediment loads into the pond and water temperatures rose with the removal of riparian vegetation. By the time the CCCA had purchased the Springwater property in 1963, heavy sediment deposition filled the reservoir, particularly at the eastern end. Between 1967 and 1969, the western end of the reservoir was dredged, logs and other debris removed and a new dam was constructed. This new dam uses a wooden stop log system and is used to balance the water level to support multiple purposes such as recreation, habitat, ensure sufficient water down stream in low flow conditions, retain water for the purposes of flood control.

Near the dam itself, water depth reaches a maximum of 4.9 meters while at the eastern end of the reservoir water depths average only 1 metre. Heavy sediment loads continue to be deposited in the Reservoir and average water depths are slowly decreasing as seen in Table 4 below. The Reservoir will eventually transform into a wetland unless dredging activities are carried out.

Table 4: Average Depths of Springwater Reservoir over time

Year	West End Depth	East End Depth
1983	4.9 Metres	1 metre average
2019	4.2 Metres	.6 metre average

Water quantity in Bradley Creek downstream of the Reservoir is influenced by the water levels in the Reservoir and the management of the dam and stop log system. There is significant use of water for irrigation of cash crops during the summer months that results in lower water levels in the pond.

The Catfish Creek Irrigation Advisory Committee (IAC) was formed in 2006 as part of the “Coordinating Crops Irrigation Water Across the Norfolk Sand Plain Project” funded by the Canada-Ontario Water Supply Expansion Program (COWSEP) over a two (2) year period. Funding for this particular project ended in 2007 and was never reinstated, however the IAC governance is still in place should it be required. CCCA has no jurisdiction over the amount of water used for irrigation purposes which is managed through the Permit to Take Water (PTTW) Program with the Ontario Ministry of Environment, Conservation and Parks⁶. The applicable legislation for water taking permits is Ontario Water Resources Act, R.S.O. 1990⁷, c. O.40 Sections 34 to 34.11 and the associated regulations contained within O. Reg. 387/04: Water Taking and Transfer⁸. As reported in CCCA’s Programs and Services Guide⁹, CCCA staff do help landowners with PTTW Program applications as required.

Low rainfall and hot weather can result in low flows and low groundwater levels. This can affect the amount of water available for agriculture and industry, as well as the health of the ecosystem. The Catfish Creek Low Water Response Program coordinates and supports the response to low water. The program is based on the Ontario Low Water Response Program¹⁰. The Ontario Low Water Response program funded the Catfish Creek Low Water Response Team which was active from 2015 – 2018 communicating extensively through e-mails with government agencies, municipal and team members regarding low water conditions within the watershed. Being in a small rural watershed located in the

⁶ <https://www.ontario.ca/page/permits-take-water>

⁷ <https://www.ontario.ca/laws/statute/90o40>

⁸ <https://www.ontario.ca/laws/regulation/040387>

⁹ <https://www.catfishcreek.ca/about-us/publications/>

¹⁰ <https://www.ontario.ca/page/surface-water-monitoring-centre>

Norfolk Sand Plain with high agricultural water takings, staff have found that one on one contact with the farming community is the best and most effective way to communicate the Ontario Low Water Response Program.

Member municipalities have their own water conservation programs that run parallel to the Low Water Response Program. Even those water users who are not required to have permits are also urged to conserve water in low water conditions.

Table 5: Water Quality and Quantity Information for Springwater Reservoir

Measure	Value
Size of Reservoir	5.7 Ha (14 acres)
Main Water Source	Bradley Creek and Bradley Creek Tributaries
Average Bradley Creek Discharge into Reservoir in July	1.5-3 Cubic Ft / Second
Average Bradley Creek Discharge into Reservoir in August	2-4 Cubic Ft / Second
Reservoir Depth in 2019	4.2 Meters at West End, .6 m at East End
Secchi Disk Depth	.6 - .9 meters
Average Summer Temperature	23 degrees Celsius
PH	8-8.5
Suspended Solids	20Mg/L
Dissolved Oxygen	8.5 ppm
Number of Beach Closures due to E-Coli in 2019	Zero (0)

As mentioned previously, there are over a dozen water control structures (e.g. dams, weirs) upstream of the Reservoir on Bradley Creek and its tributaries. During the hot summer months, little water enters the Reservoir from Bradley Creek, and most of the water comes from springs on the tributaries feeding directly into the pond. As a result, the flushing rate of the Reservoir is very poor and the pond is in stagnant condition in the summer months. This is harmful for several reasons including:

1. It creates poor fish and wildlife habitat;
2. It reduces the water quality and aesthetic appeal;
3. Water based recreational activities are threatened.

As a result of these concerns, CCCA commissioned the Springwater Reservoir Rehabilitation Study in 1981. The study was completed in 3 phases. The Phase 1 report was titled *A Review and Evaluation of Existing Information and Determination of Additional Information Needs*¹¹. The purpose of the first phase was to review what new hydraulic information was required for the subsequent phases. The phase 2 report was titled *A Review of the Problems and Identification of their Probable Causes*¹². The purpose of this report was diagnosing and reporting on potential short and long term solutions. The Phase 3 report was called *Summary of Problems and Investigation or Remedial Measures*¹³. This report identified a number of pollution sources and related water quality impacts, and identified remedial measures to deal with each.

¹¹ Ecologistics Limited, September 28, 1981. Phase 1 Report: A Review and Evaluation of Existing Information and Determination of Additional Information Needs

¹² Ecologistics Limited, December 1982. Phase 2 Report: A Review of the Problems and Identification of their Probable Causes

¹³ Ecologistics Limited, November 1985. Summary of Problems and Investigation or Remedial Measures

The primary use of the Springwater Reservoir is to provide a multi-use recreational facility for visitors to the Conservation Area. Other benefits include flood and erosion control, fish and wildlife habitat, and supply of groundwater to neighboring wells. The Springwater Reservoir Rehabilitation Study provided a number of ideas for maintaining the reservoir. In particular, the pond aerator installed in the 1990's is used to minimize phosphorous loading, bacterial contamination and algae formation around the dam.

As seen in Map 6, the majority of the land surrounding the forest is well drained sandy material. However, another large proportion of the property is poorly drained (e.g. Jaffa, muck/peat areas) and associated with the wetland depressions identified earlier in the Plan. The poor draining soils is beneficial in many ways to the broader watershed health such as providing a source of water to Catfish Creek and surrounding landowners. Consequently, efforts to modify the drainage network in the Springwater Conservation Area to any great extent are unnecessary and should be avoided.

Overview of Vegetation

Springwater is recognized by naturalists across the province due to its Carolinian vegetation components. The Springwater Forest and Jaffa Tract are considered some of the best examples of maple, beech and oak upland forest in Southwestern Ontario.

Springwater Forest and Jaffa Tract were subject to major logging operations until the turn of the century, incremental harvesting between 1900 and 1950, and more recently were disturbed by the clear-cutting of two 2 hectare blocks in partnership with the Ministry of Natural Resources and Forestry in 1979. More recently, red and white pine have been planted in the northwest and north-central parts of the Springwater Forest, while younger trees occur in the Jaffa Tract portion. An arboretum in the day use area consists of a large variety of Carolinian species such as chestnuts.

In 1981, a detailed research study of the vegetation communities was conducted by Ian MacDonald of the Ministry of Natural Resources.¹⁴ The report identifies 631 species of vascular plants from 104 families (507 native and 124 introduced species). The Springwater Forest has a large number of species for its surface area since the forest is relatively undisturbed and has a number of micro-environments within it. The number of species is also supplemented by various local disturbance phases (e.g. camping, day use, arboretum sections).

There are 139 species (over 20% of the total) of vascular plants which are of floristic significance such as some rare species including:

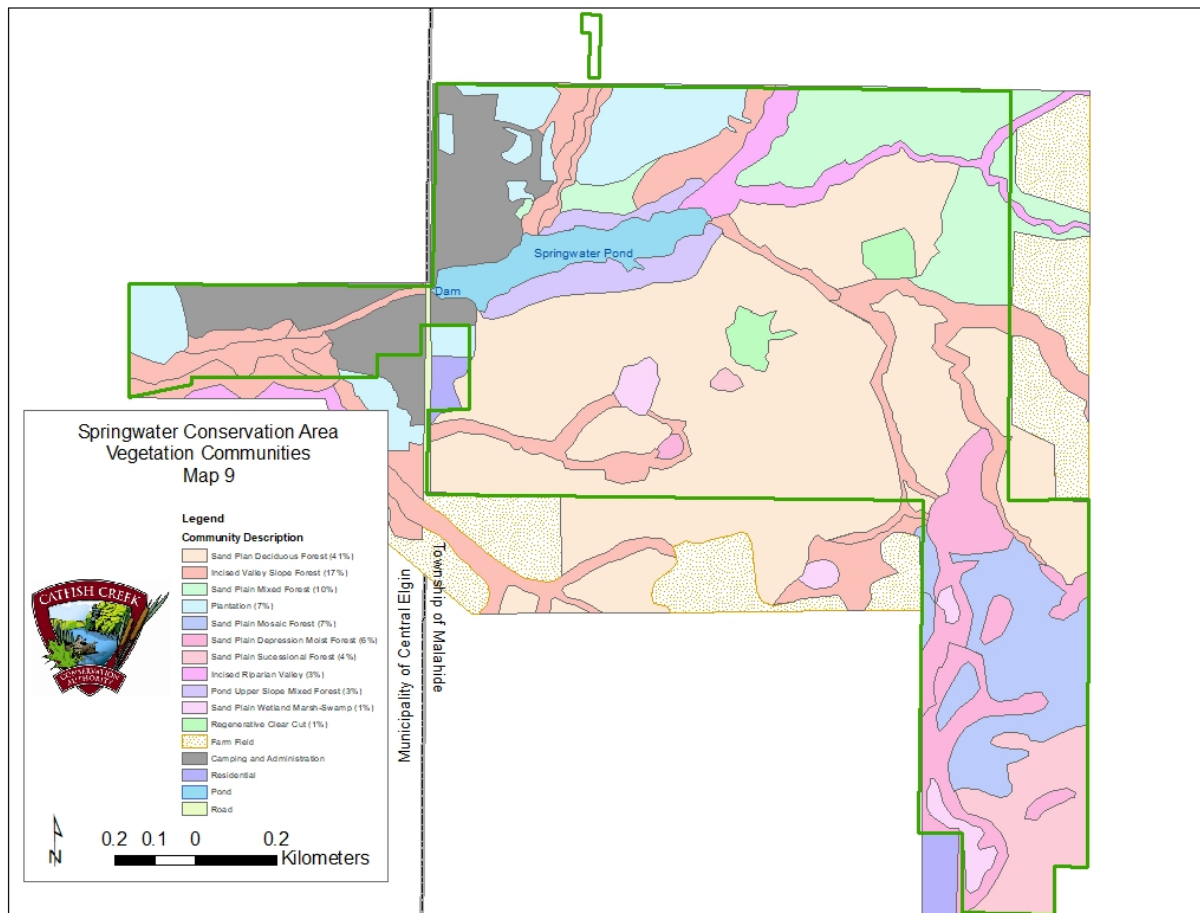
- Autumn Coral Root
- Black Gum
- Poke Milkweed
- Rough Leaf Goldenrod
- Soft Hairy Wild Rye
- Swamp White Oak

¹⁴ MacDonald, Ian D. 1982. Springwater Study: Floristics, Community Patterns and Regeneration Transects. Ontario Ministry of Natural Resources, Aylmer District.

Other species of provincial significance include Tulip Tree (*Liriodendron tulipifera*), Black Walnut (*Juglans nigra*), Eastern Flowering Dogwood (*Cornus florida*), and Yellow Mandarin (*Disporum lanuginosum*). In total, 24 species are reported by Argus and White¹⁵.

The MacDonald report (1982) lists 35 environmental community patterns including six types of sand plain forest, six distinct incised valley types, six different sand plain basin wetland/depressions and six forms of disturbed communities. These vegetation communities have been simplified on Map 9 where 12 types are summarized.

Figure 9: Vegetation Communities (Map 9)



Before describing the dominant vegetation communities, a brief history and regional perspective should be presented. As noted previously, logs were taken from the Springwater woods to supply numerous mills in the vicinity before the turn of the century. The heaviest tree removal probably occurred between 1860 and 1900. Only selective cutting occurred at this time. On the other hand, the Jaffa Tract was intensively cut until 1964 when CCCA purchased the land.

Two serious disturbances hit the forest between the mid 1930's and the mid 1940's. Blight hit the stands of chestnut that were once common in the forest. Fred White, landowner at the time, was

¹⁵ Argus, G.W. and D.J. White. 1982. The Rare Vascular Plants of Ontario. Syllogeus No. 14, The National Museum of Natural Sciences. Ottawa.

forced to have all the chestnut trees removed and floated on the pond. By 1938 approximately 3000 logs were in the pond and those that did not sink to the bottom were removed the following year.

In 1964, another threat to the forest came in the form of fire. One source states that before the fire was extinguished in the north west section close to 70 acres had been destroyed.¹⁶ This section was subsequently planted with Red and White Pine.

Since CCCA purchased Springwater in 1963 and the Jaffa Tract in 1964, several forest disturbances have been recorded as follows:

Table 6: List of Forest Disturbances

Year	Disturbance
1963	0.4 Hectare plot just northeast of the sand plain basin was clear cut
1979	A salvage cut was made following a severe ice storm
1979	Two experimental 2 hectare plots were clear cut and planted
2005-06	400 trees removed due to Emerald Ash Borer
2020	As a result of Beech Disease, 300 Hazard Mature Beech trees were removed

To fully understand the nature of the vascular plant flora in Springwater requires an examination of the regional perspective. MacDonald indicates that the predominant affinity of the vegetation is toward the southern life zones¹⁷. More specifically, this area lies within the deciduous forest region where common tree species include Sugar Maple, Beech, White Elm, Basswood, Ash, White Oak and Butternut.

Additionally, the Carolinian Floristic Zone has its northern limit within the deciduous forest region. Species confined to this zone include Tulip Trees, Sassafras, Pawpaw, Black Gum, Black Oak and Red Mulberry. A total of sixty-six species of vascular plants are restricted to the Carolinian zone and an additional 25 species also characterize the zone but have isolated occurrences elsewhere in Southern Ontario. Many of the species occur in the Springwater area.

Springwater also presents several examples of species within western, eastern, and northern or even boreal affinities. The northern or boreal species in the Springwater area are associated with the cooler, most sites of shaded valleys and wetlands, or with dry, acidic pine forest locations. Non-native species have also entered the area by various means. Several examples are found here, some thriving and others not. Examples of invasive species include:

Table 7: Examples of invasive species found in Springwater Park

Species	Latin Name	Year First Observed
Emerald Ash Borer	<i>Agrilus planipennis</i>	2002
Elm Bark Beetle	<i>Ophiostoma ulmi</i>	2005
Phragmites (Reed Canary Grass)	<i>Phragmites australis</i>	2009
Garlic Mustard	<i>Alliaria petiolata</i>	2009
Purple Loosestrife	<i>Lythrum salicaria</i>	2009
Autumn Olive	<i>Elaeagnus umbellata</i>	2009
Canada Thistle	<i>Cirsium arvense</i>	2009
Rusty Crayfish	<i>Orconectes rusticus</i>	2009
Beech Scale Insect	<i>Cryptococcus fagisuga</i>	2015

¹⁶ McKenna, Ward. The Whites of Springwater. Aylmer Express, Aylmer, January 6, 1981

¹⁷ MacDonald, I.D., op. cit., p.17

Dominant Vegetation Communities

The dominant vegetation community descriptions including the percentage of the Park covered are represented in Map 9 above, and further described as follows:

Sand plain deciduous forest (41% of forest)

Sand plain deciduous forest is the largest component of the Springwater forest. The most common species are extremely Hard Maple and American Beech. The large proportion of beech is due primarily to past selective cutting of the maple and oak trees. Human impact has certainly altered this area of the forest but the size of the individual trees combined with the vast acreages covered make these woods significant. Other subdominant tree species located in this portion of the forest include Red Oak, White Ash, White Oak, Red Maple and Yellow Birch. Commonly occurring shrub and herb species include Ironwood, Arrowwood, Eastern Flowering Dogwood and American Sweet Chestnut. Ground cover includes such significant species as Wood's Sedge, Downy Rattlesnake Plantation and Yellow Mandarin. 171 species have been recorded from this section. More naturally occurring openings in the canopy through tree fall could further diversify the species compliment.

Incised valley forest (17% of forest)

A relatively common type of vegetation community is the incised valley forest. Several species occurring in the sand plain forest are also recorded here including Yellow Birch, Sugar Maple, Red Oak and American Basswood. However, other characteristics and significant species distinguish this community including Bladdernut, Green Violet, Wild Yam, Horsebalm and Silvery Glade Fern. At least 125 vascular plant species exist in this vegetation type.

Sand plain mixed forest (10% of forest)

Another dominant vegetation community is the sand plain mixed forest occurring in the northern and eastern parts of the Springwater Forest. This area is dominated by Red Oak, Red Maple and White Pine with subdominants including Sugar Maple White Oak, American Beech and Sassafras. Significant plant types include Yellow Panic Grass, Carrion Flower, Autumn Coral Root, Pinesap and variegated forms of White Trilliums.

Plantation (7% of forest)

The human influence on Springwater is also represented by the substantial sand plain coniferous plantation between the pond and the northern boundary. It was in this area in 1964 that fire destroyed approximately 70 acres of woods. Plantations had already been partially developed prior to the fire but after this major disturbance had occurred, Red Pine, White Pine and Scots Pine were planted.

Sand plain mosaic forest (7% of forest)

A sand plain mosaic forest occurs in the Jaffa Tract on irregularly rolling low sand ridges where a higher water table results in moist soils. This section, frequently cut over until 1964 when the CCCA purchased the land has a younger canopy consisting of Sugar Maple, American Beech, White Ash, Yellow Birch, Shagbark Hickory, and Red Oak. Other interesting and significant species including Northern Maidenhair Fern, Tulip-tree, Wild Ginger, Round Leaf Hepatica, Christmas Fern and Showy Orchid.

Sand plain depression moist forest (6% of forest)

A sand plain depression moist forest is also identified in the Springwater area. MacDonald has further subdivided this category into classes such as spring/summer swamp forest, perennial scrubby, swamp forest and wetland/swamp depression backshore fringe¹⁸. This type of vegetation community is generally confined to the southwestern part of Springwater Forest as well as the Jaffa Tract. The frequently occurring tree species are Silver Maple, Red Maple, Yellow Birch, Red Ash, White Elm, Swamp White Oak and Black Ash. Interesting plant types include Goldthread, Christmas Fern, Skunk Cabbage, Red Trillium, Spice Bush, False Nettle and Nannyberry.

Sand plain successional forest (4% of forest)

The sand plain successional forest is confined to the southern half of the Jaffa Tract, although the clear cut areas may develop in a similar manner. The dominant tree species are Sugar Maple, American Beech, White Ash, Red Oak and some Trembling Aspen. The poorly developed community structure has Riverbank Grape, Wild Cucumber and Wild Garlic Mustard as typical ground cover species.

Incised riparian valley (3% of forest)

The incised riparian valley scrubland/meadowland is found in the broad valley portions of the three main eastern tributaries. Several sedge species such as Red Osier, Dogwood, Canada Blue Joint and Pussy Willow frequent this area. Also present is the rare southern species, Rough Leaf Goldenrod and the provincially significant River Bank Wild Rye.

Pond Upper slope mixed forest (3% of forest)

On each side of the Pond is found a distinct vegetation community known as Pond Upper Slope Mixed Forest. There has been some disturbance in this area (i.e. exposed tree roots) due to trail networks used by fishermen and hikers. Common tree species are White Pine, Red Oak, Sugar Maple and American Beech. Some of the significant plants found here are Wild Pansy, Wood Betony and the provincially rare Low Blueberry. Also in the understory are Hawthorn, Eastern Flowering Dogwood and Bottle Gentian.

Sand Plain wetland marsh-swamp (1% of forest)

Sand Plain wetland marsh-swamp exists in several depressed areas of the property. Perhaps the central wetland, found about 215 meters south of the pond, should be treated as a separate unit but similarities in drainage, soil composition and some vascular plant species (i.e. Pussy Willow, Yellow Birch, Highbush Blueberry, and Northern Bugelwood) help to justify including it with other wetlands in the forest. One distinct difference is that the amount of canopy cover in the central basin wetland is minimal while other wetlands have more tree growth.

Regenerative clear cut (1% of forest)

Although it is an area which has experienced substantial human disturbance, the regenerative clear cut deciduous forest presents an interesting collection of vascular plant species. A management decision to clear cut two, 2 hectare plots in 1979 left openings in the sand plain deciduous forest. Since that time, 115 species have been recorded as members of a new vegetative community. Dominant species include Brambles, Red Elderberry, American Beech, Sugar Maple, White Ash, Red Oak. American Sweet Chestnut saplings have also been observed here. MacDonald also noted that some species were

¹⁸ *Ibid.*, p.87

discovered in this section that had not been identified previously in Elgin County including False Melic Grass, Nodding Mountain Rice, Soft Hairy Wild Rye and Climbing Honeysuckle.

Fauna

The Springwater area is one of the most significant natural environments for flora in the Catfish Creek watershed. In fact, Springwater is possibly one of the more valuable tracts of land in the entire Southwest Ontario region for bird habitats. As the diversity of vegetative communities suggests, this property provides several disparate habitats, particularly for birds and other wildlife.

Over the years there have been several changes to the fish and wildlife populations in Springwater. For example, the ornithological composition has changed with some the quality of bird habitat in some cases deteriorated, while in some cases habitat has improved. Broomans "Birds of Elgin County" suggests that some species may have been more frequently observed in the past.¹⁹ The rare Hooded Warbler was probably most common in the 1940's when it was first recorded and Great Blue Herons were possible more common in the 1940's and 1950's as well. The number and variety of waterfowl species is reduced today too.

Records indicate that mammals such as Beaver, Badger, and Muskrat are far less frequent today than they were in the 50's²⁰. The quality of fish species in the streams and pond in Springwater has also deteriorated primarily due to poor habitat. A fish habitat structure (fish crib) was installed off the West end of the Beach in 2007, however additional action such as dredging can maintain or improve the diversity of habitats in Springwater Pond.

Springwater Forest, because it is one of the largest, most mature upland stands in the province, provides a special habitat for several bird species. Although surveys conducted in the area have found that bird numbers are not necessarily high, the quality of species is excellent. For example, this tract is the first recorded (1941) nesting site for the Hooded Warbler in Canada. Another rare and unusual species is the Pileated Woodpecker which requires at least 40 hectares of forest with numerous dead trees for its habitat. This species is so common that it forms the basis of the Springwater logo.

Figure 10: Springwater Logo



Other species are rare in the province but observed in this area are the Sharp-shinned Hawk, Barred Owl and Le Conte's Sparrow. In addition to these rare birds, some interesting species observed include Red Eyed Vireo, Wood Thrush, Scarlet Tanager, Rose-breasted Grosbeak, Indigo Bunting, Great Horned Owl and Turkey Vulture.

¹⁹ Brooman, R.C., 1954. The Birds of Elgin County. St Thomas, Ontario

²⁰ Stewart, W.G. 1982. Mammals of Elgin County Ontario. St Thomas, Ontario. P.15

The species found will vary depending on where the observer is situated. For examples, species such as the Pine Warbler, Winter Wren and Ruffed Grouse are found regularly within the White Pine stand of the northeast corner of the property. Fish eating birds such as the Belted Kingfisher, Green Heron and Great Blue Heron use the reservoir and Bradley Creek as a feeding area. Great Blue Herons were first spotted in 1982 with frequent sightings to the present day.

Common Loons were once regular migrants appearing in the reservoir but the number of recorded sightings has diminished in recent years. Since the spring of 1982, two or three loons have been observed for a period of one or two weeks. Since then, no records of loon sightings exist including no observations in 2019.

Waterfowl use of Springwater has changed during the past fifty years. Hunting used to be allowed on the pond and around 1960 on the opening day of the season some 50-100 Mallards, Black Ducks, Wood Ducks and Mergansers would be expected. Since that time, hunting has been banned and Mallards and Mergansers make up the most prominent species observed. The reservoir had only a small resident population at that time but it is primarily used as a stopover for migrating species because there are a number of areas where waterfowl can congregate.

Today, the reservoir receives seasonal waterfowl use in the Spring and Fall for migration purposes with 437 Canada geese counted on the beach and pond on October 6 2020, and 347 geese counted on November 4, 2020 and 417 geese counted on November 12, 2020²¹. Very few birds call Springwater Pond home because there are other ponds nearby and perhaps the quality of the habitat has diminished, although a brood of Ducks was observed in the summer of 2019. A brood of Canada Geese was recently reared on the reservoir and continue to inhabit the area but otherwise waterfowl numbers are relatively low. Within Elgin County, the Wood Duck seems to have increased in numbers considerably. Recorded sightings of Wood Ducks on the Reservoir, in the water-filled depressions of the forest, and the adjacent White's Pond are numerous, but declining water quality in recent years may be eliminating appropriate habitat for this species.

A complete list of all bird species reported for Springwater graciously provided by Bird Studies Canada is attached as Appendix A.

Again because of habitat diversity, a variety of mammal species reside in, or migrate through the Springwater area. Although complete and updated records are not kept, several mammals have been reported. Common residents include Eastern Chipmunk, Striped Skink, Eastern Gray Squirrel (Black Squirrel), Red Squirrel, Eastern Cottontail, Raccoon, Woodchuck, and White-tailed Deer.

Raccoon populations in the park peaked in 2018 with several daily sightings and negative human-wildlife interactions documented, in particular within the seasonal area of the Campground. Distemper and Rabies within the racoon populations are on the increase in Ontario, in particular in this area as outlined by MNRF²². CCCA in partnership with the Aylmer District Trappers Council (ADTC), began a wildlife management pilot to manage the wildlife population within the park. Monitoring observations and subsequent management activities occurred along the wooded stretches of Bradley Creek drainage system by the waste facility where the racoons were observed residing and travelling.

²¹ Counted by East Elgin Secondary School Co-Op placement staff

²² MNRF Rabies Unit Distribution Map, <https://www.ontario.ca/page/rabies>

As with other parts of Ontario, the deer population in the Springwater area is constantly changing. The size of the forested tract is certainly large enough to support a resident heard, but the mature nature of the trees makes it more difficult to find adequate food supply. This remains true today in the formerly clear cut areas where the vegetation has matured making it less desirable for deer and wintering. In recent winters, groups of 5-6 deer, some not fully mature, have been sighted cutting across the day-use area between the forest edge and the pine plantations. An additional crossing area is south of the Administration office on Springwater Road. It appears as though the deer are migrating along the wooded stretches of Bradley Creek drainage system.

Although not as common as other mammals, Red Fox, Muskrat, Badger, species of Shrew and Mole, Bats, Mice, Coyote, Long Tail Weasel, Possum, and Mink might occasionally be seen. Unfortunately, the Beaver, once a popular resident of Springwater, no longer has an appropriate habitat here.

The Eastern Flying Squirrel has been observed in the forest in the past, however as it is nocturnal is rarely seen. This species inhabits Carolinian forest zone where they favour beech-maple stands. Mature woodlots with sufficient number of dead or hollow trees are ideal habitat.

The character of the fish population in the Reservoir and along Bradley Creek has experienced dramatic change over the past 100 years. Fish surveys indicate the presence of Largemouth Bass, Carp, White Sucker, Bluegill, Brown Bullhead and Pumpkinseed. Park visitors report catching Largemouth Bass, Yellow Perch, Bluegill and Pumpkinseed. Stocking of the pond has occurred since 1987 when regular stocking of Rainbow Trout at a rate of 450 fish per year up to 750 in the months of April and May through the late 1990's. Since 2003, stocking has occurred each year with approximately 1000 Rainbow Trout stocked for the Tim Hortons Kids Fishing Derby.

In 1981 and 1982 the stop logs were removed from the Springwater Dam for inspection and repair work. When the water was at its lowest point observations of fish could be made. The most obvious species at the time was Carp, averaging over 50 centimeters in length. The previous Springwater Management Plan indicated the drawdown activity had a detrimental effect on the quality of fish habitat and species quantities in Springwater Reservoir. The Pond was once again lowered in 2013 to perform routine maintenance on the dam, clearing of sediment, and installation of the fish crib.

Examining historical excerpts gives an indication of how the quality of fish habitat has diminished considerably since the early days of settlement. Around the mid 1870's, the streams and creeks were suitable for trout. Between 1885 and 1905 the Springwater Trout Reserve produced trout in the ponds found north of the reservoir. As lands adjacent to Bradley Creek and its tributaries became cleared for agricultural use, as riparian vegetation was removed and as storm water discharges from Aylmer increased, water temperatures rose, nutrient levels increased and sediment loads rose. Conditions necessary for trout and other sport fish were eliminated and "less desirable" species began to dominate.

Along with high water temperatures, the most important factor involved in reduced fisheries quality is large sediment loads containing high nutrient levels. In Springwater Reservoir, particularly at the Eastern end, thick deposits of silt have been laid down. Most of the more desirable warm water fish species require harder substrates to spawn on and as a result, the quality fish species once common in this area have virtually disappeared.

There are a number of reptiles, amphibians and decapods that depend on the natural characteristics of Springwater to survive. Painted and Snapping Turtles live in the reservoir and in some of the permanent wet portions of the forest. Green Frogs, Bullfrogs, Leopard Frogs, Wood Frogs, Spring Peepers and American Toads also breed in or near the reservoir or the marsh. Other reptiles and amphibians that have been observed in Springwater include Eastern Garter Snake, Milk Snake, Green Snake, Newts and various Salamander species. Another species observed in large numbers when the reservoir was drawn down include Crayfish, noted close to the edge of the pond near the dam.

Sensitive Areas and Hazard Lands

There are several sections of Springwater that are relatively sensitive to any kind of disturbance – human or otherwise. Fortunately, some of the most sensitive areas are generally inaccessible because of distances from the trails, excessive water and unstable soils. In many cases, several factors combine to make a specific area particularly fragile.

As shown in Map 10, there are three types of Sensitive Areas and Hazard Lands including:

1. **Steep slopes.** The steep slopes are basically confined to the incised stream valleys while the poorly drained mucks and silts are found in depressions south and southeast of the reservoir. The valleys are subject to erosion from human use.
2. **Mucky soil** (even quick sand). These areas are the incised riparian valley scrubland / meadow communities of Bradley Creek upstream from the Reservoir including the east and south-east branches of Bradley Creek and the marsh/swamp areas.
3. **Periodic flooding.** Low lying meander scars downstream from the dam are regularly flooded during spring runoff.

Elements combining to make these areas sensitive include a high frequency of significant vascular plant species, soft, mucky soil and valley slopes susceptible to erosion initiated by trampling or some other ground disturbance.