Appendix D

updated Oct 13, 2016

Embro Conservation Area

Vegetation and Bird Inventory

2015

Vegetation Inventory by: Brenda Gallagher, Vegetation Specialist and Forestry Technician
Bird Inventory by: John Schwindt, Aquatic Biologist
Report by: Cathy Quinlan, Terrestrial Biologist

UPPER THAMES RIVER
CONSERVATION AUTHORITY

Document #610

Published by and Project Management by

Upper Thames River Conservation Authority
1424 Clarke Road
London, ON N5V 5B9
Phone: (519) 451-2800
Web: www.thamesriver.on.ca
Email: info@thamesriver.on.ca

Cover Photo

A Great Blue Heron visits Embro Reservoir, summer 2015. Photo by Cathy Quinlan.

Cite as:

Upper Thames River Conservation Authority. 2015. *Embro Conservation Area Vegetation and Bird Inventory 2015.*

Executive Summary

This study examines the vegetation and bird and wildlife of Embro CA to flag any rare or sensitive species that might be impacted if changes to the Embro Dam and reservoir are undertaken. It is part of the Embro Dam Class Environmental Assessment.

A three-season botanical inventory was completed in 2015 of 5.4 ha of the Embro CA, within 100 m of the reservoir. Of the 198 plant species found, 31% are non-native, an average number. The overall quality of the terrestrial habitats (Cultural Savanna, Cultural Meadow and Mixed Forest) was assessed as average or moderate. Efforts to plant native trees and tallgrass prairie plants into the CA have added to the diversity of the site. The reservoir has a dense growth of rooted aquatic waterweeds and pondweeds, but all three native species are common. There are very few rooted emergent wetland plants along the edges of the pond owing to the steep sides and constant water levels.

No plant species-at-risk or Special Concern species were found in the study area (on the land or in the water) and no records of plant Species at Risk were found within a 2 km radius. The four plant species with SRanks of S1-S3 (rare or uncommon) have all been planted in the two tallgrass prairie plots in Community 1 and are not dependent on the pond habitat.

Thus, no plant Species at Risk or rare or uncommon or sensitive species were found on the land or in the reservoir that require special consideration prior to making changes to the dam and reservoir.

There are no wetlands within the 120 m trigger distance of the Embro CA that need to be considered and, in fact, no wetlands within 1000 m of the study area.

The wooded areas of Embro CA area part of a larger significant natural heritage feature that includes the Oxford County Forest as defined by the Oxford Natural Heritage System (ONHS 2006). This feature will be unaffected by changes to the dam and reservoir.

A three season bird survey was undertaken in 2015 as well. Most of the 40 species of birds recorded in the study area are common species and most are forest birds. One bird species-at-risk, the Barn Swallow (Threatened), was seen in the study area but it was not nesting here. Since it nests in old buildings, its nesting habitat will be unaffected by changes to the dam/reservoir.

The reservoir does provide limited significance for a few resident waterfowl for raising broods (e.g., Wood Ducks, Canada Geese). These are common species. Migrating waterfowl make little use of the Embro Reservoir during spring migration, likely due to the isolation of this pond from other ponds or lakes in the area.

The only species that should be given consideration is the Snapping Turtle, a species of Special Concern that was seen in the reservoir. A slow, summer-time drawdown of the reservoir should safeguard any individuals by allowing them to move into nearby stream habitats, and ultimately, back into the creek within Embro CA.

In conclusion, there are no sensitive plants, plant communities, birds or wildlife that would be threatened from the changes to the Embro Dam and reservoir environment.

Contents

List of Tables

List of Figures

1.0 Purpose of the Vegetation and Bird Study

This study is a component of a larger Environmental Assessment study on the Embro Dam and Reservoir. The purposes of this study are to:

- document the vegetation communities within Embro Conservation Area (CA) to establish baseline conditions and to flag any unique or rare species that need protection or consideration prior to any potential changes to the CA (i.e., the dam and reservoir), and

- document the bird species that use the aquatic and terrestrial habitats of Embro CA, either year round, seasonally or infrequently, to establish baseline conditions and to flag any unique or rare species that need protection or consideration prior to any potential changes to the CA (i.e., the dam and reservoir).

2.0 Vegetation Inventory

2.1 Methodology

A three-season vegetation inventory was carried out in 2015 on an area within Embro Conservation Area (CA) 100 m from the reservoir. This 5.4 ha area was inventoried by Brenda Gallagher, Vegetation Specialist and Forestry Technician with the Upper Thames River Conservation Authority (UTRCA). The study area did not include the western wooded section of Embro CA or the adjacent Oxford County Forest as they are outside the 100 m buffer around the pond/reservoir. Private properties (farms) to the north and east of the reservoir were not studied as they are not part of the CA and are not in natural cover.

The study area was inventoried in May, again in July and lastly in August. Each season's inventory spanned two field days. Table 1 summarizes the survey effort.

Table 1. Vegetation Survey Dates in 2015

Dates Inventoried	No. Days
May 27, 28	2
July 8, 10	2
August 26, 28	2
Total days	**6**

After walking the entire study area once, the ELC (Ecological Land Classification) vegetation communities were mapped onto 2010 colour orthoimagery. Vascular plant species in each vegetation community were recorded on field sheets. At the end of the study, the plant lists were entered into the UTRCA plant database to produce a full checklist of vascular plants by community. Statistics were generated also.

Aquatic plants in the pond/reservoir were collected and identified by John Schwindt, Aquatic Biologist, when undertaking the fish inventory. Brenda Gallagher also recorded incidental wildlife sightings, especially of birds, amphibians, reptiles and mammals, while undertaking the vegetation inventories.

2.2 Results and Discussion

Figure 1 shows the three ELC vegetation communities plus the pond/reservoir (Shallow Aquatic) for the study area within Embro CA. Table 2 shows the area of each community. ELC communities less than 0.5 ha in size are usually merged with neighbouring vegetation communities, as per Lee *et al*. 1998. A full annotated checklist of vascular plants found in all three terrestrial communities is provided in Appendix A.

Table 2. Area of ELC Vegetation Communities

Com #	ELC Code	Community Description	Area	Terrestrial vs. Aquatic
1	CUS	Cultural Savanna	2.1 ha	4.4 ha (terrestrial)
2	CUM	Cultural Meadow	0.7 ha	
3	FOM	Mixed Forest	1.6 ha	
4	SA	Shallow Aquatic	1.0 ha	1.0 ha (aquatic)
	Total		**5.4 ha**	

Table 3 summarizes the number of species, both native and non-native, as well as MCC (Mean Coefficient of Conservatism) and Average Wetness for each plant community and overall. Descriptions of these parameters are provided in Appendix C. The overall quality of the vegetation in the study area is average. The sections that follow describe the conditions in greater detail for each of the communities.

Table 3. Summary of Plant Statistics

Community Number and ELC		# Species	# Native Species	# Non-native Species	% Non-native Species	MCC	# Species with CC 8-10	Avg Wet-ness	Overall Quality Assessment
1	CUS	168	115	53	32	3.8	4	-0.8	Average
2	CUM	93	61	31	34	3.0	0	-0.8	Moderately Poor
3	FOM	101	77	24	24	3.5	0	0.2	Average
Overall		**198**	**137**	**61**	**31**	**3.8**	**4**	**-0.8**	**Average**

Figure 1. Embro Conservation Area Study Area and ELC Vegetation Communities

2.2.1 Community 1, Cultural Savanna (CUS)

The Cultural Savanna of Community 1 is 2.1 ha in size and encompasses the north part of the CA on both sides of the pond/reservoir. Cultural Savannas have a canopy cover of 25 - 35%. Cultural communities result from, or are maintained by, cultural or anthropogenic-based disturbances (Lee *et al.*, 1998)

This community has a variety of small but different habitats within it. The day-use area has an understory of mowed grass with scattered shade trees (planted over the last 40 years). There are also small naturalized areas of meadow/marsh along the pond's shore and by Rd 84 as well as two planted tallgrass prairie plots. Appendix F provides a short history of the tree and wildflower plantings in Embro CA.

A total of 168 plant species were recorded: 115 native and 53 non-native or adventive species. The number of plant species is relatively large for such a small area, owing to the diversity of micro-habitats within it. The percentage of non-native plants is 32%, which is about average or moderate for the Upper Thames watershed. The site is disturbed by past land use changes and day-use activities.

The MCC (Mean Coefficient of Conservatism) is 3.8, an average or moderate score. There is a slight predominance of wetland plants in this community (Average Wetness is -0.8).

Mature trees in the overstory include Silver Maple, Red Pine, White Birch with some Black Cherry and Sugar Maple (see Appendix B). The younger trees include Sugar Maple, Red Oak, Burr Oak, with some Silver Maple. In the naturalized areas, there are raspberries, dogwoods, and Choke Cherry.

Photo 1. Community 1 – View looking south from Rd 84 at the small meadow and treed areas on the north side of the reservoir/pond.

Photo 2. Community 1 – Cultural Savanna, showing the day use area of spaced shade trees and the pavilion west of the reservoir

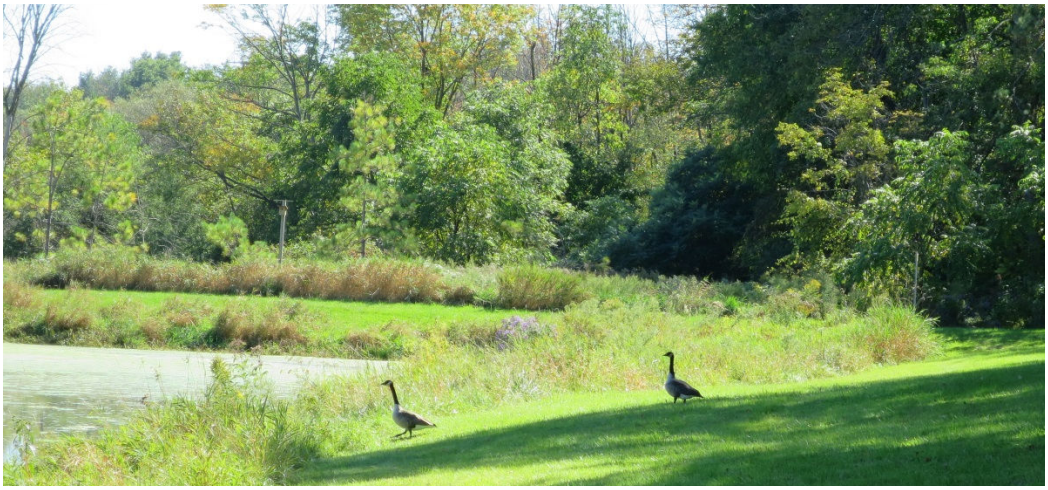


Photo 3. Community 1 (lawn and pond fringe) meets Community 2 at the far side of the reservoir (behind bird box).

2.2.2 Community 2, Cultural Meadow (CUM)

The Cultural Meadow of Community 2 is located on the south or downstream side of Embro Reservoir on both sides of the Youngsville Drain. It is 0.7 ha in size. Cultural meadows area open areas characterized by grasses and flowers with tree cover ≤25% and shrub cover ≤25% and resulting from or maintained by cultural anthropogenic-based disturbances (Lee et al, 1998).

A total of 92 species were recorded, 61 native and 31 non-native. The percentage of non-native species (34%) is average or moderate and reflects the natural and human disturbances this community experiences. The MCC score is 3.0, a moderately poor to average score.

Some trees have been planted or have naturalized and include ashes, willows, Black Cherry, Black Walnut and White Elm. The herbaceous layer was dominated by Joe Pye-weed, jewelweeds, asters, goldenrods, teasels, thistles, milkweeds, and grasses (see Appendix B).

Photo 3. Community 2 – Riparian area along Youngsville Drain downstream of Embro Dam.

Photo 4. Community 2 – Trail through the grasses and trees

2.2.3 Community 3, Mixed Forest (FOM)

The mixed forest of Community 3 is 1.6 ha but is part of a larger wooded area that extends west towards Embro Creek and the Oxford County Forest. Under the Ecological Land Classification (ELC) system, mixed forests have conifer (evergreen) tree species >25% and deciduous tree species >25% of canopy cover. The coniferous trees were planted about 50 years ago. The older deciduous trees have self-seeded in, while younger trees were planted by the UTRCA a few years ago to infill amongst dying Red Pines.

A total of 101 species were recorded from the community, 77 native species and 24 non-native species. The percent of non-native plants (24%) is relatively low, which indicates the habitat is moderately good. The MCC score is 3.5, an average to moderately poor score.

Dominant overstory tree species include Red Pine (in decline), Black Cherry, Silver Maple and Sugar Maple (see Stand Descriptions in Appendix B). The understory trees include ashes, Black Cherry, Black Walnut, and apple. Common shrubs include raspberries and Choke Cherry.

The forest is young to mid age, having been planted by the UTRCA post 1961. In 2010/2011 the conifer plantations were thinned by the UTRCA to remove dying pines and to encourage hardwood forest regeneration. In addition, 2100 native hardwood seedlings were planted between the rows (see history in Appendix F).

Photo 6. Community 3 of pines and other deciduous species west of the reservoir.

2.2.4 Community 4, Shallow Aquatic (SA)

The Embro Pond/Reservoir is classified as Shallow Aquatic with standing water <2 m depth and a low percentage of emergent vegetation, and floating-leaved macrophytes. The pond has silted in over the years and is likely 0.5 m deep on average today and the bottom substrate is very soft.

Duckweed and algae float on the surface of this shallow aquatic community. Four rooted aquatic species were identified by John Schwindt and these are listed in Table 4.

Table 4. Aquatic Plant Species in Embro Reservoir

Common Name	Scientific Name	Exotic Status	SRank	SARO	Sensitivity
Broad-leaved Arrowhead	*Sagittaria latifolia*		S5		Non-sensitive
Broad Waterweed	*Elodea Canadensis*		S5		Non-sensitive
Curly-leaved Pondweed	*Potamogeton cirspus*	SE			Non-sensitive
Slender Pondweed	*Potamogeton pusillus* ssp. *pusillus*		SU		Non-sensitive

Because there is good water clarity and a surplus of nutrients in the water, there is a heavy growth of these pondweeds and waterweeds, and smaller amounts of arrowheads. It is estimated that 50% of the pond/reservoir volume is filled with aquatic vegetation. This vegetation does provide good cover for fish species that are adapted to ponds. Other sections of the Embro Environmental Assessment discuss the fisheries.

There are very few wetland emergent plants growing along the edges of the pond. The Pond contours don't seem to favour these plants (e.g., steep sided). As well, the pond is kept at the same elevation all year with no drawdowns that would expose mudflats and promote colonization of species such as cattails and rushes. Any shoreline vegetation is included in Community 1.

Photo 7. Community 4 – Floating Duckweed on the surface, pondweeds and waterweeds under the surface and beggarticks on the shore. Photo by Cathy Quinlan, Sept 2015

Photo 8. Community 4 – View of Embro Pond/Reservoir in Sept. 2015, looking east.

Photo 9. Historical photo of Embro Pond shortly after construction in the 1960s. Source: *Twenty Five Years of Conservation on the Upper Thames Watershed 1947 – 1973*, published by the UTRCA.

2.2.5 Plants with High Coefficient of Conservatism (CC) Scores

Plants with a CC score of 8, 9 or 10 are considered more specialized in habitat or condition and conserve themselves to very specific environments, usually unaltered communities. Plants with low CC scores are considered generalist species that are found in a wide variety of habitats, including disturbed sites.

Table 5 summarizes the four plant species that had a CC score of 8, 9 or 10, all found in Community 1 in the planted tallgrass prairie plots. These plots were planted in 2007 and 2010 by the UTRCA, Embro Pond Community Association, and local school groups. They planted 2800 native wildflowers and grasses to add diversity to the site (see Appendix F).

Table 5. Plant Species with high CC Scores

Common Name	Scientific Name	CC Score	Community	Comments
Butterfly-weed	*Asclepias syriaca*	8	1	planted
Tall Coreopsis	*Coreopsis tripteris*	9	1	planted
Gray-headed Coneflower	*Ratibida pinnata*	9	1	planted
Indian Grass	*Sorgahastrum nutans*	8	1	planted

2.2.6 Plants with Species at Risk (SAR) Designations

There are no plant species-at-risk in the study area. Appendix B lists the various species-at-risk categories.

2.2.7 Plant species with Provincial Ranking (SRANK) of S1, S2 or S3

Four plant species were found that have a SRank of S1, S2 or S3 (very rare to rare to uncommon). Table 6 summarizes the list of species. All of these species were planted in the tallgrass prairie plots. These plantings should not be negatively affected by any potential changes to the dam and reservoir as they are on higher ground and are not reliant on the pond ecosystem.

Table 6. Plant species with SRanks of S1 to S3

Common Name	Scientific Name	SRank	Community	Comments
Tall Coreopsis	*Coreopsis tripteris*	S2	1	planted
Gray-headed Coneflower	*Ratibida pinnata*	S3	1	planted
Giant Ironweed	*Vernonia gigantea*	S1?	1	planted
Culver's Root	*Veronicastrum viginicum*	S2	1	planted

3.0 Bird Survey and Incidental Wildlife

3.1 Methodology

A three-season bird survey was undertaken in 2015 by John Schwindt, Aquatic Biologist with the UTRCA who has years of birding experience with the Breeding Bird Atlas and Christmas Bird Count. Incidental bird observations were made by Brenda Gallagher while she was undertaking the botanical inventories. Brenda is also an experienced birder.

Table 7 summarizes the dates of each of their visits. John Schwindt focused his efforts on the spring and early summer to capture the spring migration and breeding seasons. Approximately four hours were spent each time, with particular effort around the pond. Brenda Gallagher also spent six days at Embro CA from May to late August.

Table 7. Bird Survey Dates in 2015

Season	John Schwindt	Brenda Gallagher
Early Spring	April 22	
Spring	May 5, 14, 26	May 27, 28
Summer	June 24	July 8, 10
Late Summer		Aug 26, 28
12 days total	**6 days total**	**6 days total**

3.2 Results

A total of 40 bird species were seen by John Schwindt and Brenda Gallagher on their separate visits to the study area in Embro CA from April to August, 2015. Appendix D provides a full list of the bird species recorded. One exotic or introduced species was seen (European Starling). Of the 39 native species:

- 28 are **common breeding species** in Oxford County,
- 9 are **common permanent residents** in Oxford County,
- 1 is an **uncommon permanent resident** in Oxford (Red-bellied Woodpecker), and
- 1 is a **common breeding** species in Oxford but **Threatened** in Ontario (Barn Swallow).

The Barn Swallow is a common breeding species found throughout southern Ontario but there was no breeding evidence at Harrington CA. Barn Swallow is listed as Threatened by SARO (Species at Risk in Ontario), meaning the species lives in the wild in Ontario, is not endangered, but is likely to become endangered if steps are not taken to address factors threatening it.

According to the Ministry of Natural Resources and Forestry (http://www.ontario.ca/page/barn-swallow), Barn Swallows often live in close association with humans, building their cup-shaped mud nests almost exclusively on human-made structures such as open barns, under bridges and in culverts. Barn Swallows have experienced a significant decline since the mid-1980s. While there have been losses in the number of available nest sites, such as open barns, and in the amount of foraging habitat in open agricultural areas, the causes of the recent population decline are not well understood. This bird's nests are often destroyed when old buildings in rural areas are demolished or fall down. Massive pesticide spraying of fields can also reduce the insect population barns swallows need for food.

The Red-bellied Woodpecker, an uncommon breeder in Oxford County, was seen in the mixed forest (Community 3). There is anecdotal evidence this species is more common than reported.

Of the 40 bird species recorded, none are exclusively pond dwellers. Species such as Canada Goose, Mallard, Great Blue Heron, and Wood Duck, feed in or by standing water but these species utilize rivers and streams as well. The pond does support some small fish species and amphibians (Green Frogs), which are suitable for Great Blue Herons. Other fish-eating birds such as Osprey or Belted Kingfishers were not seen.

The pond provides habitat for a few resident ducks and geese. A family of Wood Ducks was seen. They are cavity nesters so they likely nested in a tree nearby, and used the pond to raise their ducklings. A family of Canada Geese was seen also and they likely nested on the shores of the pond. Both of these waterfowl are common species.

Very few species of waterfowl were seen using the pond/reservoir in the spring migration period. The pond/reservoir does not appear to be important for waterfowl staging perhaps because the pond is small and isolated from other ponds or wetlands in the vicinity.

Most of the birds seen are forest birds, likely attracted to the area by the larger Oxford County Forest adjacent to the Embro CA. Nesting boxes installed by the community and UTRCA seem to be fairly well used but are in disrepair.

Photo 12. Indigo Buntings were seen nesting in the mixed forests near the parking lot of Embro CA, May 2015. Photo by Brenda Gallagher.

Photo 12. Male Tree Swallow in a nest box at Embro in Community 2. Photo by Brenda Gallagher.

Photo 13. Kingbirds were seen in Community 1 and feeding over the pond.

3.3 Other Wildlife Sightings

Brenda Gallagher recorded incidental wildlife seen while undertaking the botanical inventories. Appendix E lists the six insect species, three herptiles and three mammal species seen, all of which are common to abundant in our area.

The Monarch and Snapping Turtle are both designated as Special Concern (SC) under SARO (Species at Risk in Ontario). "Special Concern" means the species lives in the wild in Ontario, is not endangered or threatened, but may become threatened or endangered due to a combination of biological characteristics and identified threats. Special concern species do NOT receive species or habitat protection, however.

The **Snapping Turtle** spends most of its life in water and was seen in the Embro Reservoir. They prefer shallow waters so they can hide under the soft mud and leaf litter with only their noses exposed to the surface to breathe (http://www.ontario.ca/page/snapping-turtle). In summer, females travel overland in search of a suitable nesting site, usually gravelly or sandy areas along streams. The long-lived adults are killed primarily by cars on roads and intentional persecution. Turtle eggs in nests around urban and agricultural areas are subject to predators such as raccoons and Striped Skunks. The possible removal of the Embro Dam and Reservoir may impact individual turtles that use the pond, but they are just as likely to re-establish in the restored creek. See Section 5 for further discussion.

The **Monarch butterfly** uses three different types of habitat over its life cycle. The caterpillars feed on milkweed plants and are confined to meadows and open areas where milkweed grows. The adults can be found in more diverse habitats where they feed on nectar from a variety of wildflowers. Monarchs spend the winter in Oyamel Fir forests in central Mexico. The largest threat to Ontario Monarchs is habitat loss and fragmentation at overwintering sites in central Mexico where forests are being logged. Widespread pesticide and herbicide use throughout the Monarch's range may also limit recovery. The planting of tallgrass prairie plots in Embro is a positive step for this species. As well, there is a lot of milkweed in Communities 1 and 2. The removal of the Embro Dam and Reservoir will not impact this species or their food plants.

The Green Frog has a strong affiliation to permanent water bodies and it may be impacted by the loss of the pond/reservoir. However, it is a common species with no population threats at this time.

3.4 Other Species at Risk Records within 2 km of the Study Area

Within 1.5 km of the study area there are records of Bobolink (S4B, Threatened) and Barn Swallow (S4B, Threatened). The Bobolink uses prairies and large open meadows, so it is unlikey to be found in the Embro CA which has too much tree cover. The Barn Swallow was seen in the study area and is discussed in Section 3.2.

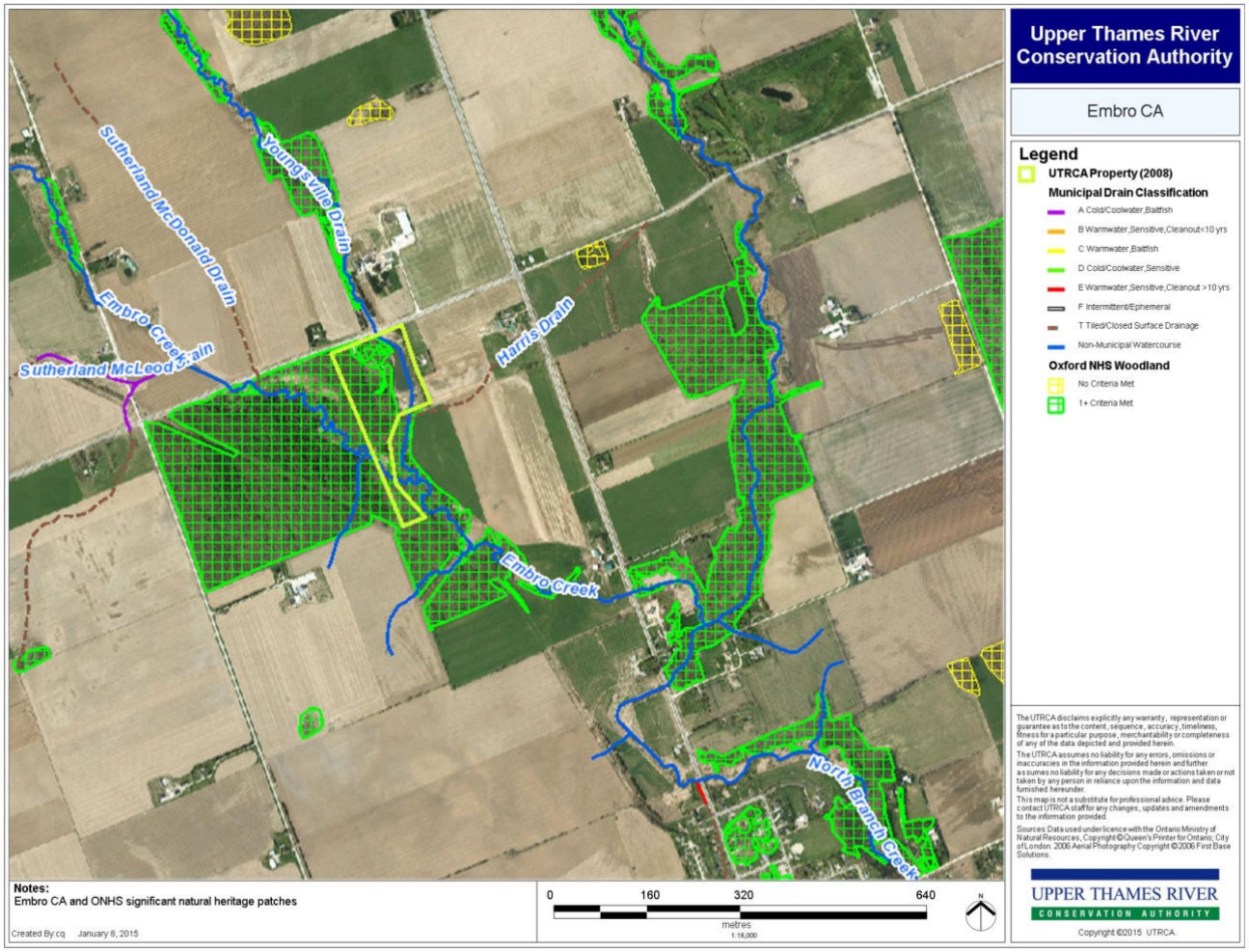
4.0 Significant Natural Heritage Features

4.1 Oxford Natural Heritage Study (ONHS)

The Oxford Natural Heritage Study (Oxford County 2006) identified significant woodland features in the county based on a set of ecological criteria. Figure 2 shows the significant features identified in and around Embro CA. The woodlands of Embro CA are part of a larger woodland feature that includes the Oxford County Forest and adjacent riparian woodlands downstream, considered significant on the county landscape.

The ONHS did not include meadows, marshes, ponds or manicured parkland (e.g., mowed lawn areas). Thus the pond/reservoir and open shoreline habitats around Embro Pond were excluded from the significant natural heritage features. The next iteration of the ONHS study planned for 2016 will include meadows, marshes and ponds as part of the natural features so more of the CA may be identified as significant if it meets the size criteria.

Figure 2. Significant Woodland Patches near Embro CA, ONHS 2006

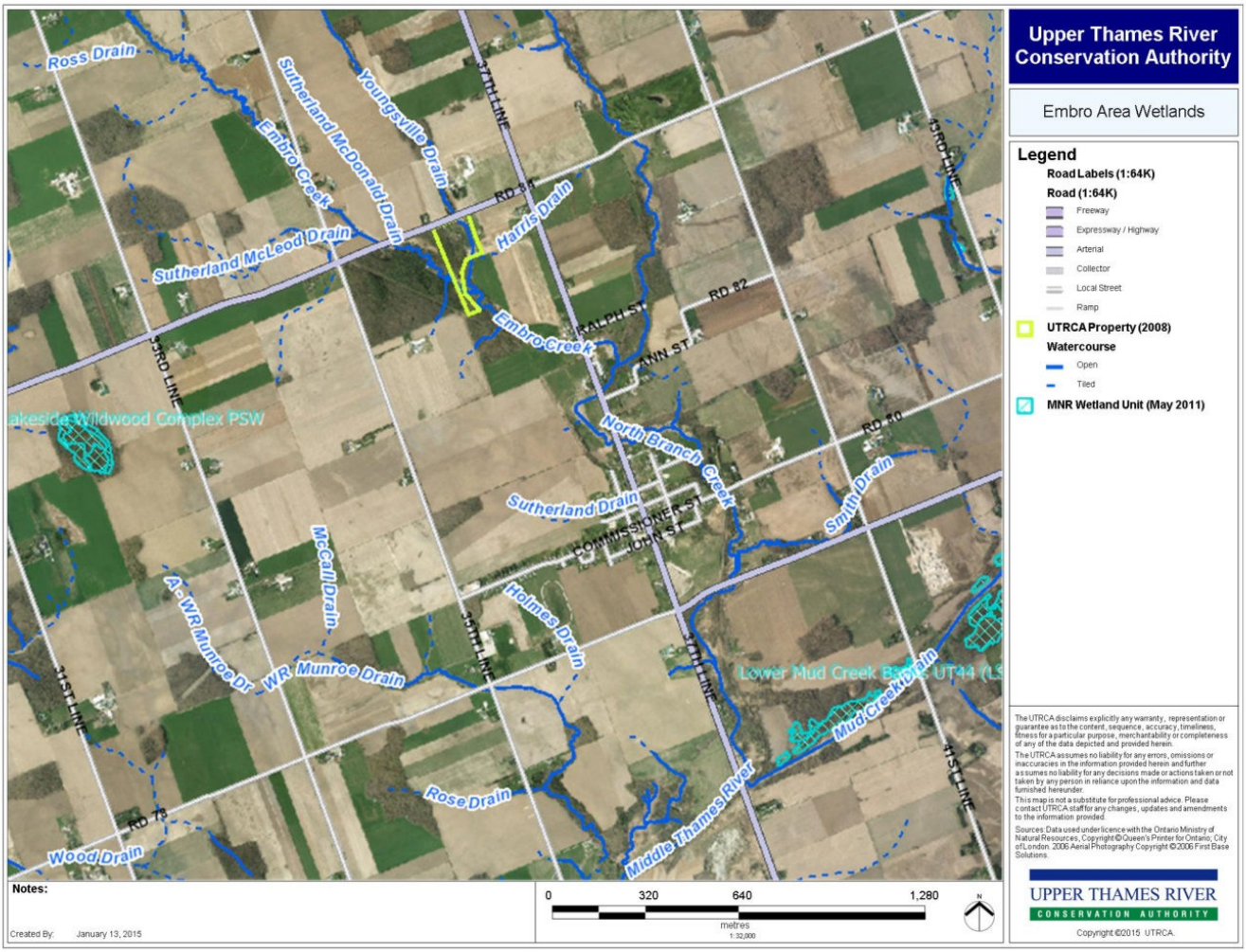


4.2 Wetlands

Figure 3 shows there are no evaluated or unevaluated wetlands within the 120 m trigger distance of Embro CA.

The nearest wetland, approximately 1.5 km to the west, is a small portion of the Lakeside Wildwood Wetland Complex (Provincially Significant Wetland), but it is not connected hydrologically to Embro CA. Approximately 4 km downstream of the North Branch Creek is the Lower Mud Creek Banks Wetland (Locally Significant Wetland), but it not hydrologically connected either.

Figure 3. Harrington Area Wetlands (Lakeside Wildwood Complex)



5.0 Summary and Conclusions

5.1 Vegetation

The vegetation within Embro Conservation Area is quite diverse owing to the mix of habitats including manicured parkland, pond edge, naturalized plots and maturing mixed forest plantation. Efforts to plant more native plants in Embro CA over the years have added to the diversity of the vegetation cover.

While the diversity of plants is quite large for a small site, the overall quality of the three vegetation communities ranges from average to moderately poor. The overall percentage of non-native species is 31% (24 - 34% range), which is about average and expected for a small, disturbed area. Community 3, Mixed Forest, had the lowest percentage of non-native species (24%) and is naturalizing quite well as a result of natural processes and thinning and planting by the UTRCA.

The Embro Pond/Reservoir supports only three native rooted aquatic plant species (pondweeds and waterweeds). They are prolific and occupy approximately half of the water volume due to good water clarity and a surplus of nutrients. All of the species are common.

There are very few emergent plants growing along the edges of the pond, possibly due to the steep sidedness of the reservoir and the constant water level that does not expose mudflats. By comparison, shallow natural ponds often fill in with wetland plants over time. Most of the plants that grow along the edge of Harrington pond/reservoir also grow along the shores of Harrington Creek and nearby creeks and rivers and wetlands and are not uncommon in our area. Therefore, no unique plants are seen as a result of the reservoir.

No plant species at risk was found in the study area. Four plants with a high Conservatism of Conservation score were found, all tallgrass prairie species that were planted in the plots. Four plant species with SRanks of S1-S3 were found as well, but these species are also all planted tallgrass prairie species. The prairie plots should be unaffected by the potential reservoir to creek restoration project.

5.2 Birds and Wildlife

Forty bird species were seen in the study area. Of the 39 native species, 37 are common breeding or permanent residents of Oxford County. One uncommon permanent resident, the Red-bellied Woodpecker, was seen in mixed forest community and should be unaffected by the dam/reservoir work.

One Threatened bird species was seen, Barn Swallow. While Barn Swallows are common breeders in Oxford County, their overall population has been declining and may be attributed to loss of barns and human structures, pesticide spraying of fields that reduce insect populations. Since they were not seen breeding in Embro CA (they use old buildings) and are habitat generalists, there is no special action that needs to be taken to protect them if any changes are made to the Embro dam/reservoir.

Most of the native birds seen are forest birds, likely attracted to the area by the larger Oxford County Forest adjacent to Embro CA. As such, they will be unaffected by changes to the dam/reservoir.

The pond/reservoir does provide habitat for a few resident ducks and geese as a family of Wood Ducks and Canada Geese were seen, both common species. The reservoir does not appear to be important for waterfowl staging during spring migration, likely because of the pond's small size and isolation from other ponds or wetlands in the vicinity.

Six insect species, three herpitles and three mammal species were seen, all of which are common in our area.

The Monarch butterfly is a species of Special Concern and was seen in the study area. The abundance of milkweeds in the naturalized portions of the Embro CA is a positive element for this species. This insect will not be affected by the restoration of the creek, as long as the wildflower areas are left intact or re-planted.

The Snapping Turtle is a species of Special Concern and it was seen in the reservoir. Special concern species do not receive species or habitat protection. They are likely to re-establish along the restored creek if the reservoir is decommissioned

The Green Frog, a common species, does has affinity to permanent water bodies and they are present in the reservoir. They may be affected by changes to the reservoir.

If the dam and reservoir are to be decommissioned, the timing is important to protect wildlife. The reservoir should be drawn down slowly in the summer, allowing hibernating frogs and turtles time to move out of the pond sediments and into surrounding stream habitats. These species will likely re-establish in the restored creek.

5.3 Conclusions

This report examines the vegetation and bird/wildlife of a 5 ha study area within Embro CA to flag any rare or sensitive species that might be impacted if changes to the Embro Dam and reservoir are undertaken.

No rare or sensitive plant species will be affected by any proposed restoration work. No plant species-at-risk or species of Special Concern were found in the study area (on the land or in the water) and no records of plant species at risk were found within a 2 km radius. The four plant species with SRanks of S1-S3 (rare or uncommon) have all been planted in the two tallgrass prairie plots in Community 1 and are not dependent on the pond habitat.

There are no wetlands within the 120 m trigger distance of the Embro CA that need to be considered.

The wooded areas of Embro CA area part of a larger significant natural heritage feature that includes the Oxford County Forest as defined by the Oxford Natural Heritage System (ONHS 2006). This feature will be unaffected by changes to the dam and reservoir.

One bird species-at-risk, the Barn Swallow (Threatened), was seen in the study area but it was not nesting here. Since it nests in old buildings, its nesting habitat will be unaffected by changes to the dam/reservoir.

The reservoir does provide limited significance for a few resident waterfowl for raising broods (e.g., Wood Ducks, Canada Geese). These are common species. Migrating waterfowl make little use of the Embro Reservoir during spring migration, likely due to the isolation of this pond from other ponds or lakes in the area.

The only species that should be given consideration is the Snapping Turtle, a species of Special Concern. A slow, summer-time drawdown of the reservoir should safeguard any individuals by allowing them to move into nearby stream habitats, and ultimately, back into the creek within Embro CA.

Photo 13. Youngsville Drain downstream of the dam

References

Lee, H., W. Bakowsky, J. Riley, J. Bowles, M. Puddister, P. Uhlig and S. McMurray. 1998. *Ecological Land Classification for Southern Ontario. First approximation and its application.* Ontario Ministry of Natural Resources, Southcentral Science Section, Science Development and Transfer Branch. SCSS Field Guide FG-02.

Ministry of Natural Resources and Forestry, http://www.ontario.ca/page/barn-swallow.

Ministry of Natural Resources and Forestry, http://www.ontario.ca/page/snapping-turtle

Oxford County. 2006. *Oxford Natural Heritage Study*. Prepared by the Upper Thames River Conservation Authority.

UTRCA. *25 Years of Conservation on the Upper Thames Watershed, 1947 – 1973.*

UTRCA. 2007. *Managed Forest Tax Incentive Program Report*

Appendices

A. Annotated Checklist of Vascular Plants for the Embro CA Study Area

B. Stand Descriptions

C. Descriptive Indices for Vegetation Communities

D. Bird Sightings at Embro CA, 2015

E. Animal Sightings (Incidental)

Appendix A. Annotated Checklist of Vascular Plants for the Embro CA Study Area

Scientific Name	Common Name	Native or Adv-entive	Weed	CC	Cwet	SARO	Srank S1-S3	Com 1	Com 2	Com 3
Acer rubrum	Red Maple	N		4	0			x	x	x
Acer saccharinum	Silver Maple	N		5	-3			x		x
Acer saccharum	Black Maple	N		7	3			x		
Acer saccharum	Sugar Maple	N		4	3			x	x	x
Achillea millefolium	Yarrow	A	-1					x	x	
Agrimonia gryposepala	Agrimony	N		2	2			x	x	x
Alliaria petiolata	Garlic Mustard	A	-3					x	x	x
Amelanchier sp	Serviceberry species	N		5	3			x		x
Anemone canadensis	Canada Anemone	N		3	-3			x	x	
Angelica atropurpurea	Angelica	N		6	-5			x		x
Anthriscus sylvestris	Wild Chervil	A	-2					x		
Apocynum cannabinum	Indian Hemp	N		3	0					x
Arctium minus	Common Burdock	A	-2					x	x	x
Arisaema triphyllum	Jack-in-the-pulpit	N		5	-2			x		x
Aronia melanocarpa	Chokeberry	N		7	-3			x		
Asclepias syriaca	Common Milkweed	N		0	5			x	x	
Asclepias tuberosa	Butterfly-weed	N		8	5			x		
Athyrium filix-femina var. *angustum*	Northeastern Lady Fern	N		4	0					x
Bellis perennis	English Daisy	A	-1					x		
Berberis vulgaris	Common Barberry	A	-2					x		
Betula papyrifera	Paper Birch	N		2	2			x		
Bidens cernua	Nodding Beggarticks	N		2	-5			x		
Bidens frondosa	Devil's Beggarticks	N		3	-3			x		
Boehmeria cylindrica	False Nettle	N		4	-5			x		
Bromus inermis	Smooth Brome	A	-3					x	x	
Caltha palustris	Marsh-marigold	N		5	-5				x	

Scientific Name	Common Name	Native or Adv-entive	Weed	CC	Cwet	SARO	Srank S1-S3	Com 1	Com 2	Com 3
Carex cristatella	Crested Sedge	N		3	-4			x		
Carex lacustris	Lake Sedge	N		5	-5			x	x	
Carex stricta	Tussock Sedge	N		4	-5			x	x	
Carex vulpinoidea	Fox Sedge	N		3	-5			x		
Carya cordiformis	Bitternut Hickory	N		6	0			x		x
Celtis occidentalis	Common Hackberry	N		7	1					x
Centaurea jacea	Brown Knapweed	A	-1					x		
Cerastium fontanum	Mouse-eared Chickweed	A	-1					x		
Chelone glabra	Turtlehead	N		7	-5			x	x	
Cichorium intybus	Chicory	A	-1					x		
Cicuta bulbifera	Bulb-bearing Water-hemlock	N		5	-5			x		
Cicuta maculata var. *maculata*	Spotted Water-hemlock	N		6	-5			x		
Circaea canadensis	Enchanter's-nightshade	N		3	3			x	x	x
Cirsium arvense	Canada Thistle	A	-1					x	x	
Cirsium vulgare	Bull Thistle	A	-1					x		
Coreopsis tripteris	Tall Coreopsis	N		9	0		S2	x		
Cornus alternifolia	Alternate-leaved Dogwood	N		6	5			x	x	x
Cornus amomum	Silky Dogwood	N		5	-4			x	x	x
Cornus racemosa	Grey Dogwood	N		2	-2					x
Cornus stolonifera	Red-osier Dogwood	N		2	-3			x	x	x
Crataegus sp.	Hawthorn species	N		4	5			x	x	x
Dactylis glomerata	Orchard Grass	A	-1					x	x	x
Daucus carota	Wild Carrot	A	-2					x		
Desmodium canadense	Showy Tick-trefoil	N		5	1			x		
Dipsacus fullonum	Teasel	A	-1					x	x	
Doellingeria umbellata var. *umbellata*	Flat-topped White Aster	N		6	-3			x		
Dryopteris carthusiana	Spinulose Wood Fern	N		5	-2					x

Scientific Name	Common Name	Native or Adv-entive	Weed	CC	Cwet	SARO	Srank S1-S3	Com 1	Com 2	Com 3
Dryopteris clintoniana	Clinton's Wood Fern	N		7	-4			x		x
Echinocystis lobata	Wild Cucumber	N		3	-2			x	x	x
Elymus repens	Quack Grass	A	-3					x		
Elymus virginicus var. *virginicus*	Virginia Wild-rye	N		5	-2			x		
Epilobium ciliatum	Willow-herb	N		3	3			x	x	x
Epilobium hirsutum	Great Hairy Willow-herb	A	-2					x	x	
Equisetum arvense	Field Horsetail	N		0	0			x	x	x
Erechtites hieracifolius	Pilewort	N		2	3					x
Erigeron annuus	Daisy Fleabane	N		0	1			x	x	x
Erigeron philadelphicus	Philadelphia Fleabane	N		1	-3			x	x	
Euonymus europaeus	Spindle-tree, European Euonymus	A	-1							x
Euonymus obovatus	Running Strawberry-bush	N		6	5					x
Eupatorium perfoliatum	Boneset	N		2	-4				x	x
Euthamia graminifolia	Grass-leaved Goldenrod	N		2	-2			x	x	x
Eutrochium maculatum var. *maculatum*	Spotted Joe-Pye-weed	N		3	-5			x	x	x
Fagus grandifolia	American Beech	N		6	3					x
Fragaria vesca	Woodland Strawberry	N		4	4					x
Fragaria virginiana	Wild Strawberry	N		2	1			x	x	x
Frangula alnus	Glossy Buckthorn	A	-3					x	x	x
Fraxinus americana	White Ash	N		4	3			x	x	x
Fraxinus pennsylvanica	Red/Green Ash	N		3	-3			x	x	x
Galium asprellum	Rough Bedstraw	N		6	-5			x	x	
Galium mollugo	Wild Madder	A	-2					x	x	x
Galium palustre	Marsh Bedstraw	N		5	-5			x		
Geranium	Herb Robert	A	-2					x	x	x

Scientific Name	Common Name	Native or Adv-entive	Weed	CC	Cwet	SARO	Srank S1-S3	Com 1	Com 2	Com 3
robertianum										
Geum aleppicum	Yellow Avens	N		2	-1			x	x	x
Geum canadense	White Avens	N		3	0			x	x	x
Geum laciniatum	Cut-leaved Avens	N		4	-3			x		
Glechoma hederacea	Gill-over-the-ground	A	-2					x	x	x
Helianthus divaricatus	Woodland Sunflower	N		7	5			x		
Heliopsis helianthoides	Ox-eye	N		3	5			x		
Hesperis matronalis	Dame's Rocket	A	-3					x		x
Hypericum perforatum	Common St. John's-wort	A	-3							x
Impatiens capensis	Spotted Touch-me-not	N		4	-3			x	x	x
Inula helenium	Elecampane	A	-2					x		
Juglans nigra	Black Walnut	N		5	3			x	x	x
Juncus tenuis	Path Rush	N		0	0			x		
Juniperus communis	Common Juniper	N		4	3			x		
Leersia oryzoides	Rice Cut Grass	N		3	-5			x		
Lemna minor	Common Duckweed	N		2	-5			x		
Leonurus cardiaca	Motherwort	A	-2					x	x	
Linaria vulgaris	Butter-and-eggs	A	-1						x	
Lindera benzoin	Spicebush	N		6	-2					x
Lobelia siphilitica	Great Lobelia	N		6	-4			x		
Lonicera tatarica	Tartarian Honeysuckle	A	-3					x		x
Lycopus americanus	American Water-horehound	N		4	-5			x	x	
Lycopus uniflorus	Bugleweed	N		5	-5			x		
Lysimachia ciliata	Fringed Loosestrife	N		4	-3			x		x
Lysimachia nummularia	Moneywort	A	-3					x		x
Maianthemum stellatum	Starry False Solomon's-seal	N		6	1					x
Malus pumila	Apple	A	-1					x	x	x
Medicago lupulina	Black Medick	A	-1					x	x	
Mentha arvensis	Field Mint	N		3	-3			x	x	

Scientific Name	Common Name	Native or Adv-entive	Weed	CC	Cwet	SARO	Srank S1-S3	Com 1	Com 2	Com 3
Mentha x *piperita*	(M. *aquatica* X M. *spicata*)	A	-1					x		
Monarda fistulosa var. *fistulosa*	Wild Bergamot	N		6	3			x		
Oenothera biennis	Hairy Yellow Evening-primrose	N		0	3			x	x	
Onoclea sensibilis	Sensitive Fern	N		4	-3			x		x
Oxalis stricta	European Wood-sorrel	N		0	3			x		x
Parthenocissus inserta	Virginia Creeper	N		3	3			x	x	x
Persicaria lapathifolia	Pale Smartweed	N		2	-4			x		
Phalaris arundinacea	Reed Canary Grass	N		0	-4			x	x	
Phleum pratense	Timothy	A	-1					x	x	
Phragmites australis ssp. *australis*	Common Reed	A	-3					x		
Picea abies	Norway Spruce	A	-1							x
Picea glauca	White Spruce	N		6	3			x	x	
Pilea pumila	Clearweed	N		5	-3					x
Pinus resinosa	Red Pine	N		7	3			x	x	x
Pinus strobus	White Pine	N		4	3			x		x
Plantago lanceolata	English Plantain	A	-1					x		
Plantago major	Common Plantain	A	-1					x	x	
Plantago rugelii	Rugel's Plantain	N		1	0			x	x	x
Poa pratensis ssp. *pratensis*	Kentucky Bluegrass	N		0	1			x	x	
Populus tremuloides	Trembling Aspen	N		2	0					x
Potentilla norvegica	Rough Cinquefoil	N		0	0					x
Prunella vulgaris ssp. *lanceolata*	Heal-all	N		1	0			x	x	x
Prunus avium	Sweet Cherry	A	-2					x		
Prunus serotina	Wild Black Cherry	N		3	3			x	x	x
Prunus virginiana	Choke Cherry	N		2	1			x		x
Quercus macrocarpa	Bur Oak	N		5	1			x		x
Quercus rubra	Red Oak	N		6	3			x		x

Scientific Name	Common Name	Native or Adv-entive	Weed	CC	Cwet	SARO	Srank S1-S3	Com 1	Com 2	Com 3
Ranunculus acris	Common Buttercup	A	-2					x	x	x
Ranunculus hispidus var. *caricetorum*	Hispid Buttercup	N		7	0			x		
Ranunculus repens	Creeping Buttercup	A	-1					x		
Ratibida pinnata	Gray-headed Coneflower	N		9	5		S3	x		
Rhamnus cathartica	Common Buckthorn	A	-2					x	x	x
Rhus typhina	Staghorn Sumac	N		1	5			x	x	x
Ribes americanum	Wild Black Currant	N		4	-3			x	x	x
Ribes cynosbati	Prickly Gooseberry	N		4	5			x		x
Ribes rubrum	Garden Red Currant	A	-2					x	x	x
Robinia pseudoacacia	Black Locust	A	-3					x		x
Rosa multiflora	Multiflora Rose	A	-3							x
Rubus allegheniensis	Common Blackberry	N		2	2			x		x
Rubus idaeus ssp. *strigosus*	Wild Red Raspberry	N		0	-2			x	x	x
Rubus occidentalis	Black Raspberry	N		2	5			x	x	x
Rudbeckia hirta var. *pulcherrima*	Black-eyed Susan	N		0	3			x		
Rudbeckia laciniata	Cut-leaved Coneflower	N		7	-4			x		
Rumex crispus	Curly Dock	A	-2					x		
Rumex obtusifolius	Bitter Dock	A	-1					x		x
Sagittaria latifolia	Common Arrowhead	N		4	-5			x		
Salix alba	White Willow	A	-2					x	x	
Salix bebbiana	Bebb's Willow	N		4	-4				x	
Salix euxina	Crack Willow	A	-3						x	
Sambucus canadensis	Common Elder	N		5	-2			x	x	x
Sambucus racemosa	Red-berried Elder	N		5	2			x		x
Schedonorus pratensis	Meadow Fescue	A	-1					x	x	
Scirpus atrovirens	Dark Green	N		3	-5			x		

Scientific Name	Common Name	Native or Adv-entive	Weed	CC	Cwet	SARO	Srank S1-S3	Com 1	Com 2	Com 3
	Bulrush									
Scirpus pendulus	Nodding Bulrush	N		3	-5			x		
Solanum dulcamara	Climbing Nightshade	A	-2					x	x	x
Solidago altissima ssp. *altissima*	Late Goldenrod	N		1	3			x	x	x
Solidago canadensis var. *canadensis*	Canada Goldenrod	N		1	3			x	x	x
Sonchus arvensis ssp. *arvensis*	Perennial Sow-thistle	A	-1					x	x	
Sonchus oleraceus	Annual Sow-thistle	A	-1					x		
Sorghastrum nutans	Indian Grass	N		8	2			x		
Spiraea alba	Meadowsweet	N		3	-4				x	
Symphyotrichum lanceolatum ssp. *lanceolatum*	Panicled Aster	N		3	-3			x	x	x
Symphyotrichum lateriflorum	Calico Aster	N		3	-2			x	x	x
Symphyotrichum novae-angliae	New England Aster	N		2	-3			x	x	x
Symphyotrichum puniceum	Purple-stemmed Aster	N		6	-5			x		
Symplocarpus foetidus	Skunk-cabbage	N		7	-5			x	x	x
Syringa vulgaris	Common Lilac	A	-2					x		
Taraxacum officinale	Common Dandelion	A	-2					x	x	x
Thalictrum pubescens	Tall Meadow-rue	N		5	-2			x	x	
Thuja occidentalis	White Cedar	N		4	-3			x		
Tilia americana	Basswood	N		4	3					x
Toxicodendron rydbergii	Rydberg's Poison Ivy	N		0	0			x		x
Tragopogon pratensis	Yellow Goat's-beard	A	-2						x	
Trifolium repens	White Clover	A	-1					x	x	
Tussilago farfara	Coltsfoot	A	-2					x	x	x
Typha latifolia	Common Cattail	N		3	-5				x	
Ulmus americana	American Elm	N		3	-2				x	x
Urtica dioica ssp. *gracilis*	Stinging Nettle	N		2	-1			x	x	

Scientific Name	Common Name	Native or Adv-entive	Weed	CC	Cwet	SARO	Srank S1-S3	Com 1	Com 2	Com 3
Verbascum thapsus	Common Mullein	A	-2					x		
Verbena hastata	Blue Vervain	N		4	-4			x		
Verbena urticifolia	White Vervain	N		4	-1			x	x	x
Vernonia gigantea	Giant Ironweed	N		6	0		S1?	x		
Veronica officinalis	Common Speedwell	A	-2					x		x
Veronica peregrina ssp. *peregrina*	Purslane Speedwell	N		0	-4			x		
Veronica serpyllifolia ssp. *serpyllifolia*	Thyme-leaved Speedwell	A	-1					x		
Veronicastrum virginicum	Culver's root	N		7	0		S2	x		
Viburnum lentago	Nannyberry	N		4	-1			x	x	x
Viburnum opulus ssp. *Trilobum*	Highbush-cranberry	N		5	-3			x		x
Vicia cracca	Cow Vetch	A	-1						x	
Viola canadensis var. *canadensis*	Canada Violet	N		6	5					x
Viola cucullata	Marsh Violet	N		5	-5			x		x
Vitis riparia	Riverbank Grape	N		0	-2			x	x	x
TOTAL			**-108**	**520**	**-104**					
COUNT		**198**	**61**	**137**	**137**	**0**	**4**	**168**	**93**	**101**
MEAN / AVERAGE			**-1.8**	**3.8**	**-0.8**					

	Over-all	By Community		
Adventive Species	**61**	**53**	**31**	**24**
Native Species	**137**	**115**	**61**	**77**
Total Species	**198**	**168**	**92**	**101**
% Adventive Species	**31**	**32**	**34**	**24**
Avg Weediness	-1.8	-1.8	-1.7	-2.1
Mean Coefficient of Conservatism (MCC)	**3.8**	**3.8**	**3.0**	**3.5**
# species with CC 8-10	**4**	4	0	0
Avg Wetness	-0.8	-0.8	-0.8	0.2
# Species with SARO	4	4	0	0
# Species with SRANK S1-S3	4	4	0	0

Appendix B. Stand Descriptions

Community 1

Canopy:	Silver Maple (>25 m tall, 25-60% cover) > Red Pine > White Birch
Sub-Canopy:	Sugar Maple (2-10 m tall, 10-25% cover) = Red Oak = Burr Oak > Silver Maple
Understory:	Raspberries (1-2 m tall, 0-10% cover) >> dogwoods = Choke Cherry
Ground Layer:	Grasses

Community 2

Canopy:	Green Ash (10-25 m tall, 10-25% cover) = willows > Black Walnut = Black Cherry
Sub-Canopy:	Red Pine (2-10 m tall, 10-25% cover) = Black Walnut > American Elm = Green Ash
Understory:	Dogwoods (1-2 m tall, 1-10% cover) = raspberries

Community 3

Canopy:	Red Pine (10-25 m tall, >60% cover) > Black Cherry = Silver Maple > Sugar Maple
Sub-Canopy:	White Ash (10-25 m tall, >60% cover) > Black Cherry = apples >> Black Walnut
Understory:	American Elm (2-10 m tall, >60% cover) >> Choke Cherry = Black Cherry = raspberries

Appendix C. Descriptive Indices for Vegetation Communities

Descriptive indices such as Mean Conservatism Coefficient (MCC), Floristic Quality Index (FQI) and Wetness Index (CW) can decrease the variability that is caused by misidentification of species (Coles-Ritchie *et al*. 2004). This is because similar dominant species are often ecological equivalents, in that they are found in similar habitats and perform similar ecosystem functions. For this reason, taxonomic differences, which can be difficult to identify in the field, may not be important when trying to understand the functioning of the riparian ecosystem (Coles-Ritchie *et al*. 2004). Descriptive indices have the advantage of minimizing the influence of differences in species that are unimportant for the index. The most useful indices are those with many gradations that are based on scientific information about vegetation.

Code and Measure	Description	Examples
CC **Coefficient of Conservatism**	Each native plant species is assigned a coefficient of conservatism (CC) score between 0 and 10 using the floristic quality assessment system for southern Ontario (Oldham *et al*., 1995) CCs represent an estimated probability that a plant species is likely to occur in a landscape relatively unaltered from what is believed to be pre-European settlement conditions (DNR Wisconsin 2001). Higher CCs are given to plants more specialized in habitat or condition and conserve themselves to very specific environments and communities (i.e., fidelity to a habitat).	0 to 3: Plants found in a wide variety of plant communities, including disturbed sites 4 to 6: Plants that typically are associated with a specific plant community but tolerate moderate disturbance. Most woodland species fall in this category 7 to 8: Plants associated with a plant community in an advanced successional stage that has undergone minor disturbance. 9 to 10: Plants with a high degree of fidelity to a narrow range of synecological parameters or habitat specialists.
MCC **Mean Conservatism Coefficient**	MCC is used as a measure of the pristiness or lack of disturbance of a site (Oldham *et al*. 1995). Communities or sites with high MCCs contain more plants unlikely to be found in disturbed habitat. Middlesex Natural Heritage Study (UTRCA 2003) found MCC scores of 3.0 to 5.0 in woodland sites. Burke *et al*. 2007 found MCC scores of 4.1 to 5.3 at 12 woodlots with 75 km of London. ***Formula***: Add all of the CC scores for a particular site or community and then divide by the number of species (native only).	3.0 to 5.0 MNHS, UTRCA 2003 4.1 to 5.3 Burke 2007 3.3 to 3.8 London Dykes (UTRCA 2013) London Subwatershed Study, thresholds for woodland protection: <4.0 low priority 4.0 to 4.5 medium priority >4.5 high priority

Appendix C continued

Number of Conservative Species	The number of plant species with a CC of 8 to 10 gives an indication of site quality and highlights species of concern for management. Dr. Jane Bowls (pers. com) indicated that using CC of 8 to 10 for Conservative Plants is a combination of intuition, convention, experience and data. Species with 0 to 2 CC score are generalists, and 8 to 10 are specialists. The rest are the in-betweens. ***Formula***: Count the number of species with CC score of 8, 9 and 10.	CC scores: 0 to 2 generalist species 3 to 7 in-betweens 8 to 10 specialist species
WEED **Weediness Score**	Each non-native plant species has been assigned a weediness score between -1 and -3, where -1 represents a weed with low invasiveness and a -3 a very invasive species (Oldham *et al*, 1995). The Weediness Score represents an estimated probability that a non-native plant is likely to infest and negatively impact a natural area by displacing native plants.	-1 little or no impact on natural areas -2 occasional impacts on natural areas, generally infrequent or localized -3 major potential impacts on natural areas
MWS **Mean Weediness Score**	The mean weediness score can be used like MCC to measure the representation of weedy adventive (alien) species abundance in a site (Moc 2001). In combination with the percentage of non-native plants, this measure can be used as an indicator of disturbance. Also, it is an indication of the threat to native species from highly invasive adventive species. ***Formula:*** Add all the weediness scores from a particular site or community and divide by the number of non-native species.	-1.0 to -1.6 little or no impact on natural areas -1.7 to -2.3 occasional impacts on natural areas, generally infrequent or localized -2.4 to -3.0 major potential impacts on natural areas **The above is an estimation devised by C. Quinlan at UTRCA using equal divisions between -1 and -3.*
CW (CWet) **Coefficient of Wetness**	Each plant species is assigned a value from -5 to +5 based on the probability of being found in a wetland or not. Usually only native species are used, even though a CW exists for adventive species also.	-5 occurs in wetlands under natural conditions (obligate wetland species) -4 to -2 usually occurs in wetlands, but occasionally found in non-wetlands -1 to 1 equally likely to be occur in wetlands or non-wetlands (facultative) 2 to 4 occasionally occurs in wetlands, but usually occurs in non-wetlands 5 almost never occurs in wetlands under natural conditions (obligate upland)

Appendix C continued

Code and Measure	Description	Values, Examples, Assessments
WI **Wetness Index (Mean Wetness Coefficient)**	Wetness Index is an assessment of a plant community as to whether it has a predominance of wetland species or not. It is not an indication of site quality. The MNHS 2003 found mean wetness coefficients from individual woodland patches ranged from -2.5 to +2.1. Formula: Add all the CW scores (native species only) from a particular site or community and divide by the number of native species found (Michigan DNR).	Examples: -0.4 to -1.1 London Dykes -2.5 to 2.1 MNHS 2003 woodlands Overall: <0 site has a predominance of native wetland species >0 site has a predominance of native upland species

Provincial (SARO) Status:

The Committee on the Status of Species at Risk in Ontario (COSSARO), an independent committee of experts, considers which plants and animals should be listed as at risk. There are seven categories:

Extinct	A wildlife species that no longer exists
EXT - Extirpated	A wildlife species no longer existing in the wild in Ontario but exists elsewhere
END - Endangered	A wildlife species facing imminent extirpation or extinction in Ontario
THR - Threatened	A wildlife species likely to become endangered if limiting factors are not reversed.
SC – Special Concern	A wildlife species that may become a threatened or endangered species because of a combination of biological characteristics and identified threats.
NAR – Not at Risk	A wildlife species that has been evaluated and found to be not at risk of extinction given the current circumstances
UNK – Data Deficient	A category that applies when the available information in insufficient (a) to resolve a wildlife species' eligibility for assessment of (b) to permit an assessment of the wildlife species' risk of extinction

SRanks – Provincial Ranks

SRANKS are used by the Natural Heritage Information Centre (NHIC) to set protection priorities for rare species and natural communities in Ontario.

SX	Presumed Extirpated	**S1**	Extremely rare in Ontario
SH	Possibly Extirpated (Historical)	**S2**	Very rare in Ontario
SNR	Unranked, or, if following a ranking, rank uncertain (e.g. S3?). S? species are thought to be rare in Ontario but there is insufficient information available to assign a more accurate rank.	**S3**	Rare to uncommon in Ontario
SE	Exotic; not believed to be a native component of Ontario's flora	**S4**	Common and apparently secure in Ontario
SNA	Not Applicable; a conservation status rank is not applicable because the species is not a suitable target for conservation activities (e.g. is exotic or migrant)	**S5**	Very common and demonstrably secure in Ontario
SU	Status unknown		

Appendix D. Bird Sightings at Embro CA, 2015

Common Name	SARO	SRank (S1-S3)	Regional Status	Br	s	S	F	W
American Goldfinch			Common PR	4	C	C	C	C
American Robin			Common BS	4	A	C	A	U
American/Common Crow			Common PR	4	A	C	C	A
Baltimore/Northern Oriole			Common BS	4	C	C	U	
Barn Swallow	THR		Common BS	4	C	C	C	
Black-capped Chickadee			Common PR	4	C	C	C	C
Blue Jay			Common PR	4	C	C	C	C
Brown Headed Cowbird			Common PR	4	C	C	C	U
Canada Goose			Common BS	4	A	C	A	C
Cedar Waxwing			Common BS	4	C	C	C	E
Chipping Sparrow			Common BS	4	C	C	C	O
Common Grackle			Common BS	4	C	C	A	R
Common Yellowthroat			Common BS	4	C	C	C	O
Downy Woodpecker			Common PR	4	C	C	C	C
Eastern Kingbird			Common BS	4	C	C	C	
Eastern Wood-pewee			Common BS	4	C	C	C	
European Starling			Common PR (SE)	4	C	C	C	C
Gray Catbird			Common BS	4	C	C	C	O
Great Blue Heron			Common BS	4	C	C	C	U
Great Crested Flycatcher			Common BS	4	C	C	C	
Hairy Woodpecker			Common BS	4	C	C	C	C
House Wren			Common BS	4	C	C	C	
Indigo Bunting			Common BS	4	C	C	C	
Mallard			Common BS	4	C	C	A	C
Northern Cardinal			Common PR	4	C	C	C	C
Northern Flicker			Common BS	4	C	C	C	R
Northern Rough-winged Swallow			Common BS	4	C	C	C	
Pine Warbler			Common BS	4	C	C	U	
Red-bellied Woodpecker			Uncommon PR	4	U	U	U	U
Red-breasted Nuthatch			Common PR	4	C	U	C	E
Red-eyed Vireo			Common BS	4	C	C	C	
Red-winged Blackbird			Common BS	4	C	C	R	R
Rose-breasted Grosbeak			Common BS	4	C	C	C	
Song Sparrow			Common BS	4	C	C	C	U
Spotted Sandpiper			Common BS	4	C	C	C	
Tree Swallow			Common BS	4	C	C	C	U

Appendix D continued

Common Name	SARO	SRank (S1-S3)	Regional Status	Br	s	S	F	W
Warbling Vireo			Common BS	4	C	C	C	
White Breasted Nuthatch			Common PR	4	C	C	C	C
Wood Duck			Common BS	4	C	U	C	R
Yellow Warbler			Common BS	4	C	C	C	
Total # Common PR			**9**					
Total # Common BS			**29**					
Other			**2**					
TOTAL	1	0	**40**					

NOTES

BS – Breeding Species, PR – Permanent Resident, WR – Winter Resident, SE = Status Exotic

Regional Status based on: Checklist of the Birds of Oxford County, 1st edition, May 2007 by Jeffrey H. Skevington and James M. Holdsworth. Available through The Woodstock Field Naturalists' Club

Br (Breeding Codes)

0 = no evidence of breeding

1 = status uncertain, possibly breeds

2 = formerly bred

3 = sporadically breeds

4 = regularly breeds

Seasonal Codes (relating to bird activities, not calendar dates)

s = Spring; period when a species is migrating to its breeding area

S = summer; the period when a species is nesting

F = Fall; the period when a species is migrating to its wintering area

W = Winter; the period when a species is over-wintering.

Abundance Codes

V = accidental vagrant

O = occasional; very few records; normally absent

R = rare; usually present annually, but seen infrequently

U = uncommon; present in low numbers, unlikely to be found daily without concerted effort

C = common; can be found daily, usually in moderate numbers

A = abundant; found daily in large numbers

E = erratic; numbers highly variable

Appendix E. Animal Sightings (Incidental)

Common Name	SARO	SRank (S1-S3)	Regional Status
Mammals			
Eastern Chipmunk			Common
Grey Squirrel			Common
Red Squirrel			Common
Reptiles and Amphibians			
Reptiles and Amphibians			
Green Frog			Common
American Toad			Common
Snapping Turtle	SC	S3	Common
Insects			
Cabbage White (exotic)			Abundant
Eastern Comma			Common
Eastern Tiger Swallowtail			Common
Monarch	SC	S2N S4B	Common
Red Admiral			Common
Spring Azure			Common

SC – Special Concern (a wildlife species that may become a threatened or endangered species because of a combination of biological characteristics and identified threats.

S2N S4B: N = Non-breeding, B = Breeding

Appendix F. History of Embro CA and Tree Planting Programs

From: 25 Years of Conservation on the Upper Thames Watershed 1947 – 1973, UTRCA.

In 1958 development began on the Embro CA with the replacement of the old dam with a new 300 feet wide structure and a lake (600 feet long and 300 feet wide). To provide a suitable recreation area, 14 acres of the Oxford County Forest and 7 ac of the Charles Harris property were purchased. The area embraces 21 acres. The official opening was Oct 26, 1959. In 1968 existing recreation area expanded to better accommodate the general public.

Embro Conservation Area.

From: Managed Forest Tax Incentive Program Report, UTRCA 2007

Approximately 14 acres of the 21 acre conservation area is in tree cover, some of it mixed plantation and some natural woodland.

Prior to UTRCA ownership in 1961, approximately 8 acres of plantation and woodland were part of the Oxford County Forest and these trees were established between 1947 and 1957. An additional 7 acres were purchased to create the Conservation Area and much of that was planted to trees by the UTRCA in subsequent years.

In 1997 the UTRCA assisted the Embro Pond Community Association (who took over management of the CA in 1993) with shade tree planting around the pond. In 2007, an additional 80 trees were planted by students under the UTRCA's Communities for Nature Program. In 2007 and in 2010, 2800 native wildflowers and grasses were planted in a plot along the laneway (Mud Creek 2012 Watershed Report Card).

In 2010/2011 the conifer plantations were thinned by the UTRCA to encourage hardwood forest regeneration. As well, 2100 native hardwood seedlings were planted between the rows. The project was funded by Oxford County and the Clean Water Project. Trail enhancements were carried out in 2012.