3.0 Land Parcel Classification (Methods and Results)

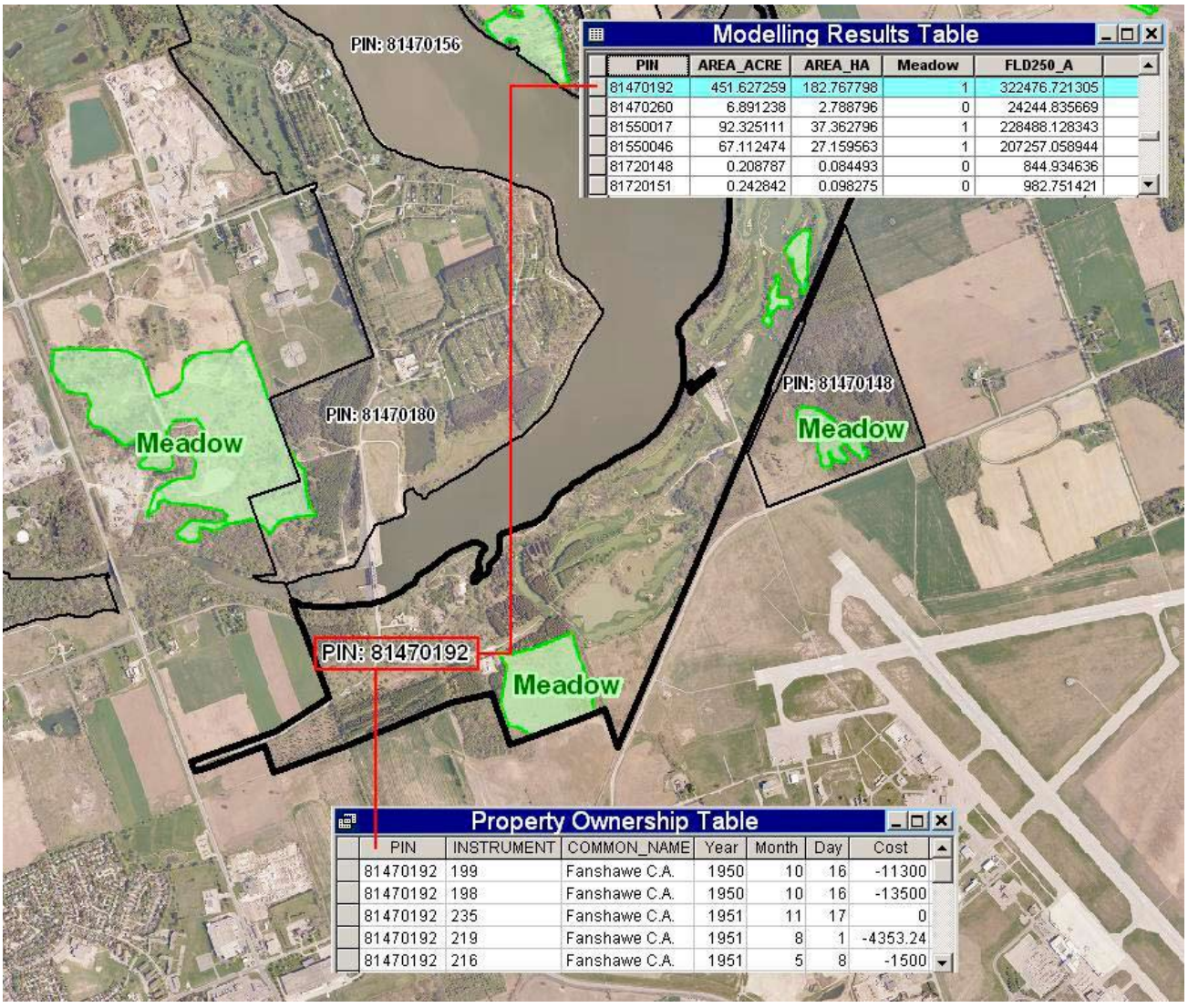
Three steps were followed to evaluate UTRCA land parcels:

Step 1. Determine land parcel ownership and collect information for parcels the UTRCA currently owns.

Step 2. Develop scientifically defensible criteria.

Step 3. Use the criteria to evaluate UTRCA land parcels.

All parcel-based information was entered into a property database that was designed to incorporate new technical studies and/ or new land parcels as they arise. Figure 1 shows how the database may be used to display all the information associated with a particular parcel, as well as all parcels associated with a particular data field.



Modelling Results Table

PIN	AREA_ACRE	AREA_HA	Meadow	FLD250_A
81470192	451.627259	182.767798	1	322476.721305
81470260	6.891238	2.788796	0	24244.835669
81550017	92.325111	37.362796	1	228488.128343
81550046	67.112474	27.159563	1	207257.058944
81720148	0.208787	0.084493	0	844.934636
81720151	0.242842	0.098275	0	982.751421

Property Ownership Table

PIN	INSTRUMENT	COMMON_NAME	Year	Month	Day	Cost
81470192	199	Fanshawe C.A.	1950	10	16	-11300
81470192	198	Fanshawe C.A.	1950	10	16	-13500
81470192	235	Fanshawe C.A.	1951	11	17	0
81470192	219	Fanshawe C.A.	1951	8	1	-4353.24
81470192	216	Fanshawe C.A.	1951	5	8	-1500

Figure 1. Example of the database associated with a land parcel

3.1 Determine Parcel Ownership (Step 1)

Until the late 1990s, property information management consisted of organizing land-related paper documents in filing cabinets that contained a list of document numbers, areas purchased or disposed of, transaction parties, etc. There were very few land parcel survey maps at the time, so details such as area measurements were only as good as the information recorded in the original, text-based descriptions.

Between 2000 and 2003, UTRCA staff converted the property information list into an electronic database. Information from the tax assessment offices such as areas, roll numbers, and legal descriptions were incorporated into the database, and the paper assessment mapping was digitized into a Geographic Information System (GIS). While this was the best visual representation available to date, boundaries, ownership, and evolving roll numbers were difficult to verify and resolve.

In 2005, GIS parcel mapping was obtained through data sharing agreements with the Ministry of Natural Resources. In Ontario, parcels are owned, mapped and registered with a property identification number (PIN). The GIS parcel mapping enabled UTRCA staff to reconcile lists of parcel descriptions and historic tax roll numbers with current boundaries and identifiers.

As part of the Property Assessment Project, every acquisition deed and disposition document was geographically located, providing a better understanding of the historical acquisitions that make up a current UTRCA property management unit. Previously, these documents were lumped together by region without being specifically located on maps. Some historical mapping was used for the parks, but the majority of these records were pulled by hand and located on the GIS parcel boundaries. Many of the errors and anomalies in the database were resolved by visiting the land registry offices and obtaining any missing deeds and surveys.

Presently, the property database contains those land parcels owned by the UTRCA and those parcels not owned by the UTRCA. The UTRCA properties consist of 744 document entries and 301 mapped boundaries, and are current to September 2008 (Map 6). Only a few anomalies are unresolved, most of which are GIS mapping errors in the provincial GIS property mapping source. Changes to the UTRCA parcel boundary layers were made to reflect current records while formal property title searches are needed to resolve any outstanding items with the Province.

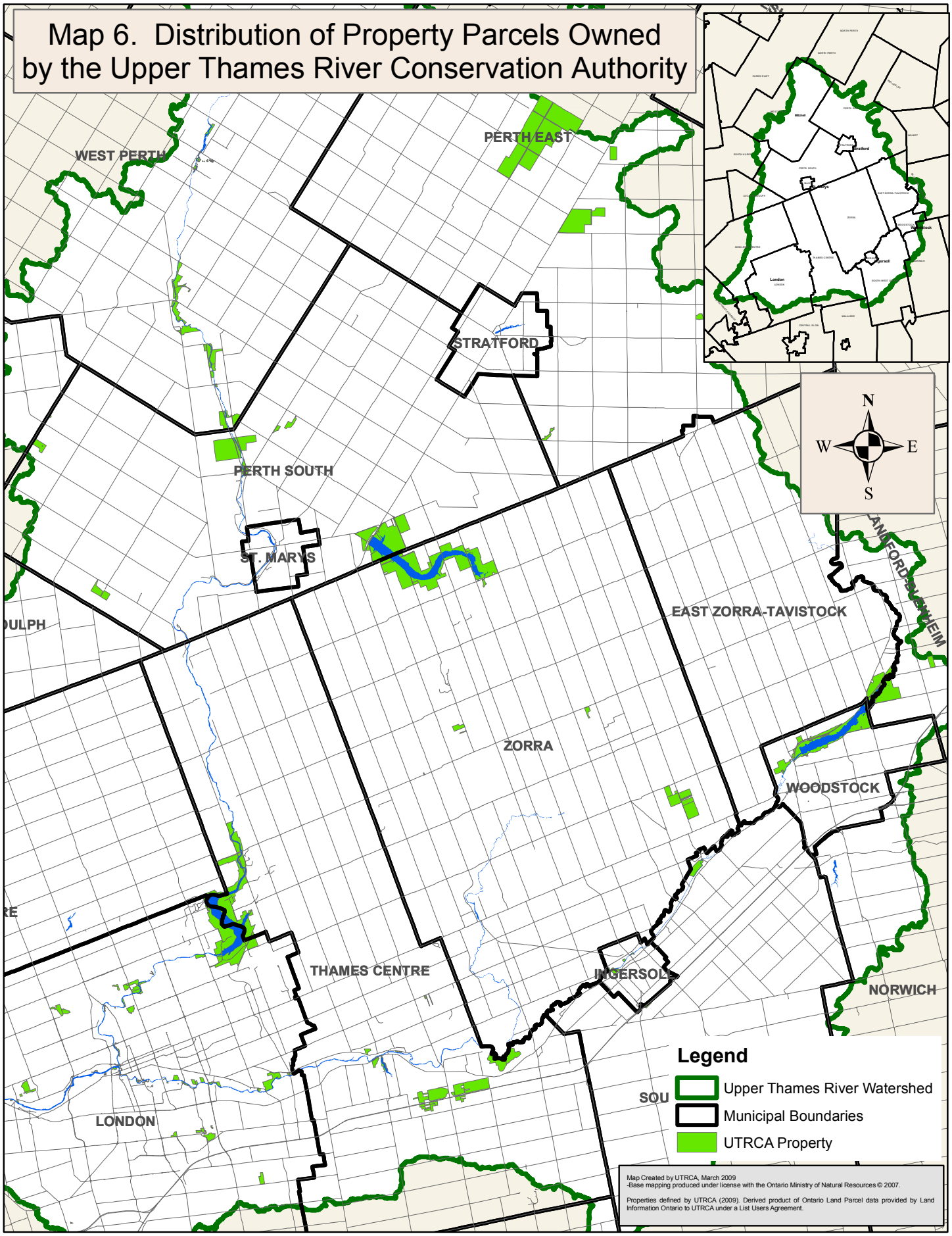
The GIS modeling component of the Property Assessment Project has been designed to easily incorporate changing parcel boundary mapping layers, the results of which can then be linked back to the property database and boundary mapping layer. Ongoing maintenance of the database will serve a variety of users at the UTRCA (e.g., accounting for tax purposes, land management).

3.2 Develop Landscape Criteria (Step 2)

3.2.1 Principles of Landscape Ecology

Recently, a growing recognition has emerged of the need for action at the ecosystem and landscape levels. Part of the reason is the decline in detailed site inventories on private and public lands. Permission to survey private lands is often difficult to obtain, and there has been a decline in natural area inventories and data collection on public lands in the past decade. Other than regulated parks and particular biota such as breeding birds, herpetofauna, and Species at Risk, there are often information gaps in digital data for conservation lands such as county forests, provincial and municipal public lands, and land trust properties. As a result, many site inventories are considerably out of date.

Emphasis has changed from assessments and inventories of specific areas to the design of natural heritage systems (e.g., cores, corridors and other connecting links). Landscape ecology is the study of the relationship between the geometry (structure and arrangement) of habitat patches/ features, and species diversity. It is concerned primarily with the role of the spatial


Map 6. Distribution of Property Parcels Owned by the Upper Thames River Conservation Authority
WEST PERTH
PERTH EAST
STRATFORD
PERTH SOUTH
ST. MARYS
EAST ZORRA-TAVISTOCK
ZORRA
WOODSTOCK
THAMES CENTRE
INGERSOLL
NORWICH
LONDON
N
W
E
S
Legend
Upper Thames River Watershed
Municipal Boundaries
UTRCA Property
Map Created by UTRCA, March 2009
-Base mapping produced under license with the Ontario Ministry of Natural Resources © 2007.
Properties defined by UTRCA (2009). Derived product of Ontario Land Parcel data provided by Land Information Ontario to UTRCA under a List Users Agreement.

configuration of patches, corridors (linear landscape elements) and the structure of the landscape (matrix) in affecting the distribution of species, nutrients, and energy among and between the patches (Schreiber 1990, Forman and Godron 1981). Conserving lands based on a landscape approach, to ensure connectivity and ecosystem functioning at all scales, is emerging in Canada as a restoration approach for many highly degraded ecosystems, such as those found in the Carolinian Forest (Natural Resources Canada 2005).

Criteria based on principles of landscape ecology were developed for all five management categories (Appendix A). The criteria had to be measurable, available for the entire watershed, and associated with the land parcel fabric. Some criteria were applied only to boundaries of natural heritage patches, while others were applied directly to the parcel boundaries (Appendix B). For criteria applied to natural heritage patches, the parcel fabric was overlayed on top of the patch and each criterion then became a descriptive piece of information associated with the parcel fabric.

A natural heritage patch is the outermost boundary of vegetation community polygons. For this project, a vegetation community polygon consists of woodlands, swamps, marshes, plantations and thickets. It does not include riparian meadow or prairies. The natural heritage patch is the outside boundary of all vegetation community polygons greater than 0.5 ha (the minimal mappable size visible on a 1:10,000 air photo) that touch each other. A patch may include parts of several property parcels, or may be contained within one parcel.

3.2.2 GIS Modeling

In order to deal with the volume and complexity of modeling each individual criteria in GIS, an efficient method of creating, running, and rerunning these models was developed. The UTRCA's GIS software contains a modeling canvas whereby tools and functions can be connected together and reused. Technically referred to as a geoprocessing model, it is a graphic representation of a computer programming script or series of steps required to complete specific tasks (Figure 2). The modeling results for each criteria are automatically added to one large data table that can then be linked to the GIS parcel mapping layer and, if necessary, the property ownership database.

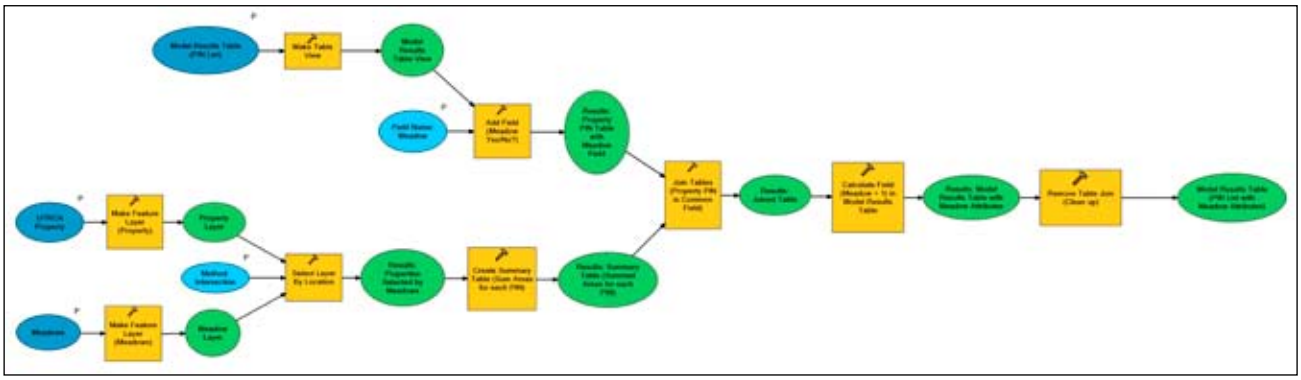


Figure 2. Example of modeling one criteria ("property contains meadows") in GIS
Once built, these models can be reused by substituting different inputs (meadows, wetlands, flood plain etc). Following from left to right, blue indicates input data (GIS layer), yellow indicates a process (GIS tool), and green indicates results.

3.3 Evaluate UTRCA Land Parcels (Step 3)

3.3.1 Objective 1: Identify Core Conservation Lands Parcels of Importance to the UTRCA (Maps 7a-d)

The first objective was to differentiate parcels that are core conservation lands of importance to the UTRCA from parcels that will require more analysis to determine their importance to the UTRCA. The Property Assessment Team identified the Ecosystems Category (Terrestrial and Aquatic) and the Hazards Category as the two most important management categories.

Four landscape criteria were developed to identify land parcels that meet these categories:

- Contains a natural heritage patch
- Contains a rare species occurrence
- Contains riverine flooding hazards
- Contains riverine erosion hazards

A parcel-by-parcel evaluation involving desktop analysis GIS was used to prioritize the UTRCA parcels. Out of the 301 land parcels that the UTRCA currently owns, 261 parcels (87%) were classified as core conservation parcels of importance to the UTRCA and 41 parcels (13%) were classified as parcels needing more analysis according to how much of each parcel was covered by the combination of the four criteria:

Core conservation land parcels of importance to the UTRCA:

- greater than 80% of the parcel is covered by a combination of either a natural heritage feature, a riverine flooding hazard or a riverine erosion hazard, and there is no evidence of high human disturbance,
  or
- the land parcel contains a rare species occurrence.

Land parcels needing further analysis to determine importance:

- less than 80% of the parcel is covered by any combination of a natural heritage feature, a riverine flooding hazard or a riverine erosion hazard,
  or
- there is evidence of high human disturbance.

3.3.2 Objective 2: Land Parcels Needing Further Analysis (Maps 7a-d, 8a-d)

The next objective was to apply the remaining 34 landscape criteria developed for the five management categories to all 301 parcels to provide extra support to the core conservation lands identified in Objective 1 and to further refine the 41 parcels needing further analysis identified in Maps 7a-d. Appendix B outlines the 19 landscape criteria that were applied to the natural heritage patches, and the 15 landscape criteria that were applied to the parcel boundary:

19 Natural heritage patch criteria:

- 31 of the 41 parcels requiring more analysis contained a natural heritage patch. The 19 patch criteria were applied to these features. If the patch met the criterion, then any parcel containing that patch met the criterion.

15 Parcel criteria:

- The 15 parcel criteria were applied to all 41 parcels needing further analysis, whether they contained a natural heritage patch or not.

Figure 3 shows the number of UTRCA parcels that met each criterion. As expected, there are not many parcels that contain prairie habitat (Criterion 2.1.3), that have natural heritage patches greater than 200 ha (Criterion 2.2.3), that are far from roads/railroads (Criterion 2.5.1), or that have Clean Water Program or Reforestation projects on them (Criterion 2.6.2). Figure 4 shows the number of parcels and the number of criteria met. Maps 8a-d show the parcels needing further analysis, including reference labels to individual parcel maps and tables in Appendix D.

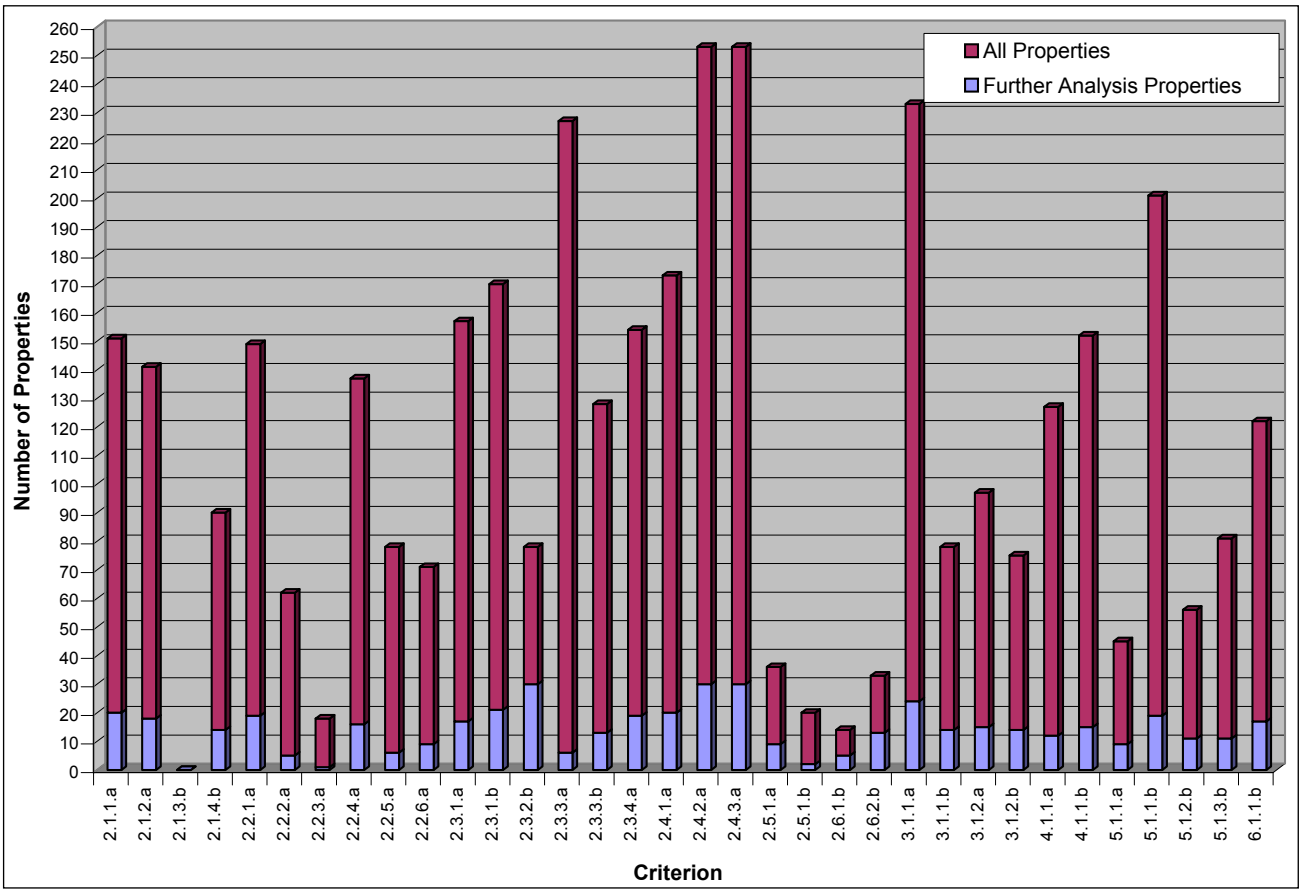


Figure 3. Number of UTRCA property parcels that met each criterion

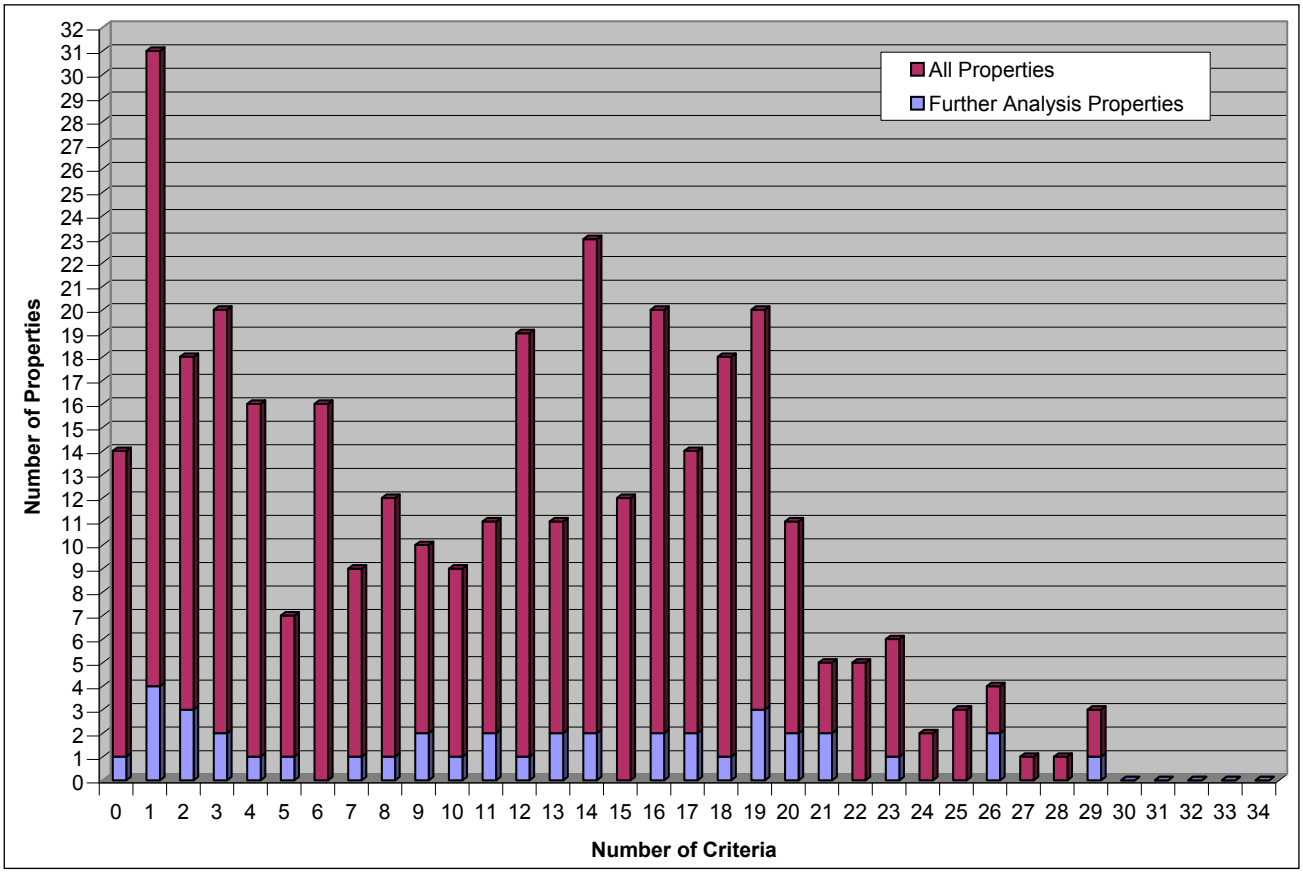


Figure 4. Number of UTRCA property parcels that met between 0 to 34 criteria

A total of 25% of all UTRCA parcels meet 0 - 4 criteria, 25% meet 17 - 30 criteria, and 50% meet 5 - 16 criteria. Appendix C shows which parcel and which patch criteria were met by each of the 41 parcels needing further analysis.

This review was most important in the evaluation of the 41 parcels needing further analysis. When identifying the core conservation lands in Objective 1, property management units were considered as separate parcels and the amount of natural heritage on each parcel determined their classification. For the further analysis properties, a combination of the amount of natural heritage and the number of landscape criteria was considered, in addition to how the properties are managed. This process required a detailed review of each of the 41 parcels.

Review of the 41 UTRCA parcels was done according to natural heritage patch boundary guidelines developed in the Oxford Natural Heritage Study (County of Oxford 2006). Given that parcel boundaries are man-made constructs and do not follow natural heritage patch boundaries, adjacent parcels were evaluated as a single unit (Figure 5) if:

- the parcels were owned or managed by the UTRCA as a property management unit, and
- the parcel boundaries were adjacent (i.e., less than 20 metres apart), and
- the parcels were not separated by roads or railroads, and
- the parcels shared a natural heritage feature.

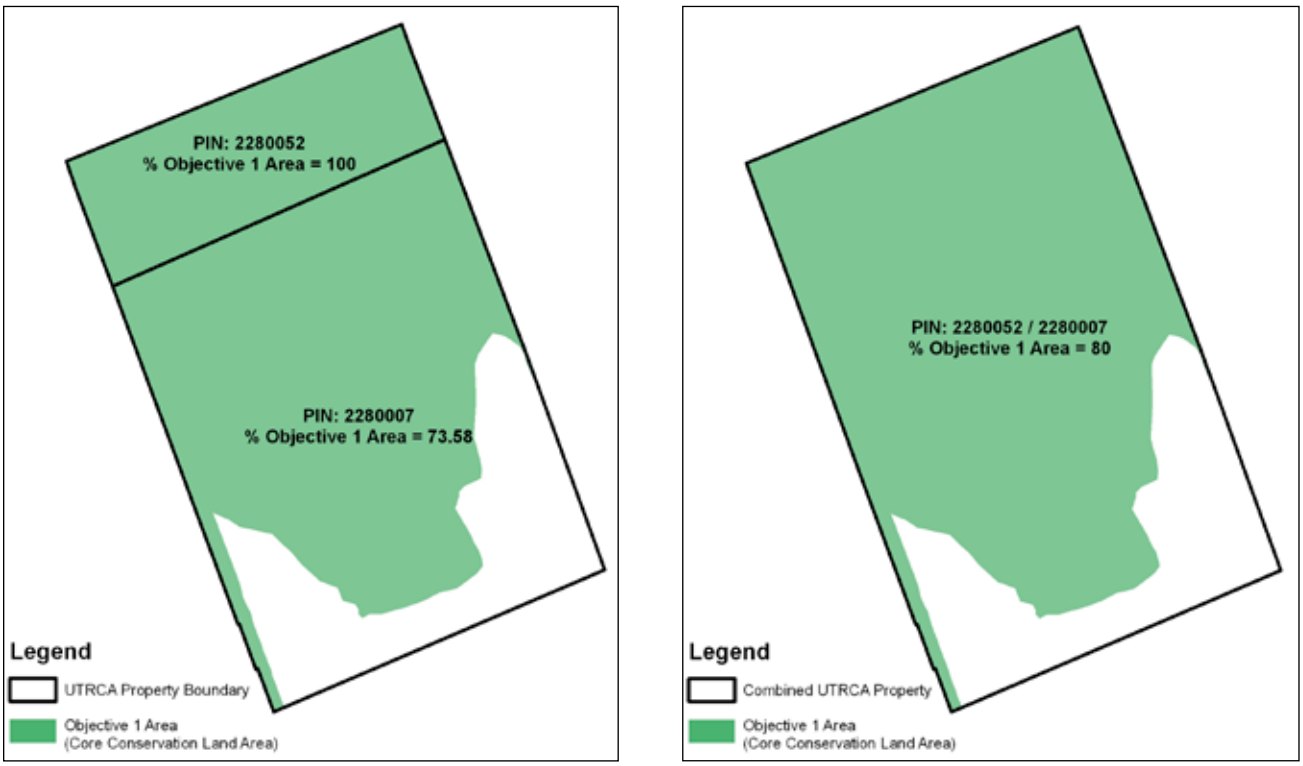


Figure 5. Adjacent Parcel Example – Golspie Swamp (portion)
The UTRCA property management unit known as Golspie Swamp is comprised of eight separate parcel units. Seven of these parcels were immediately classified using GIS analysis as core conservation lands. One parcel (PIN 228007) did not initially meet the criteria for core conservation land until considered cumulatively with an adjacent parcel as per the natural heritage patch boundary guideline identified above (ONHS 2006).

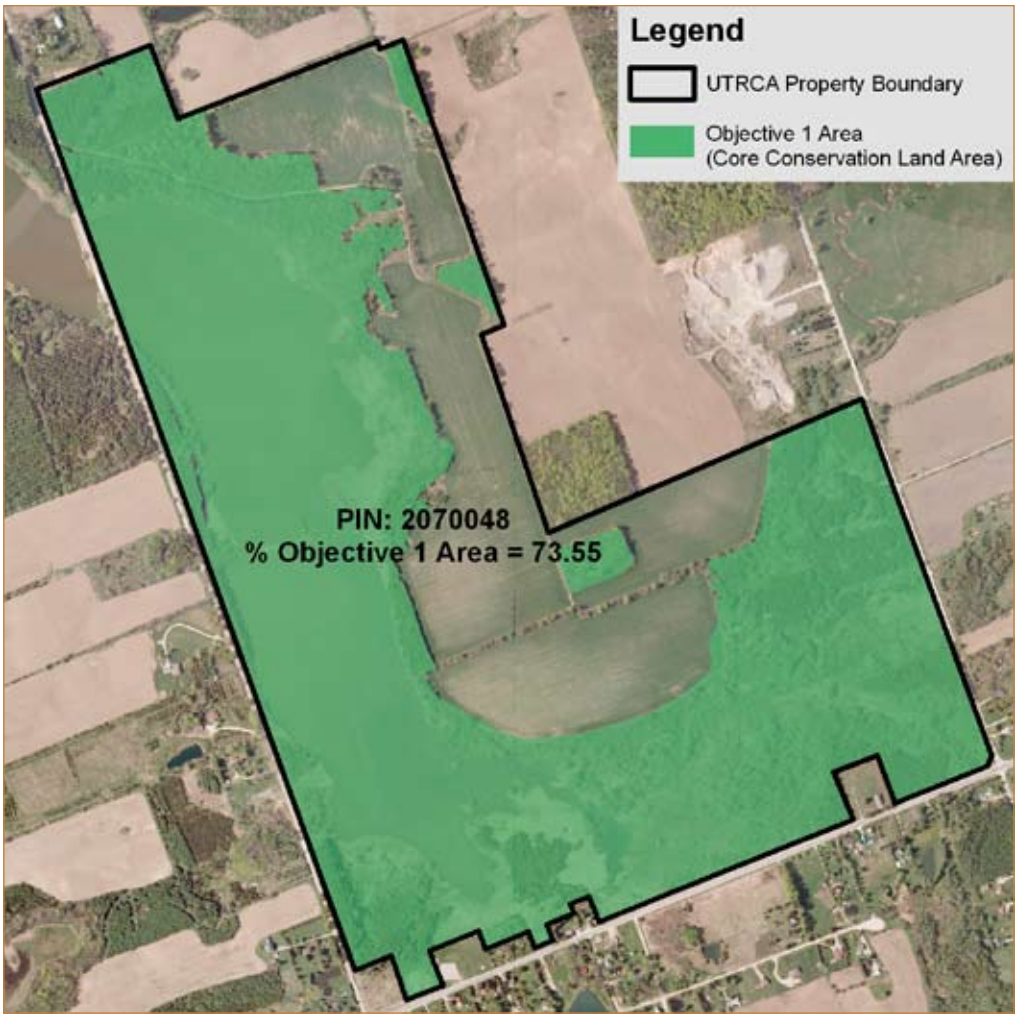


Figure 6. Parcel Criteria / Percent Core Conservation Land Area Review Example – Wildwood Conservation Area (portion near Harrington)

Figure 6 Notes – This UTRCA property management unit is a portion of Wildwood Conservation Area near the Village of Harrington. The initial review of UTRCA properties using GIS analysis did not identify this parcel as core conservation land given it does not meet the 80% coverage criteria. This parcel has been reclassified based on the detailed property specific review given it has approximately 74% coverage of natural heritage (% objective 1 area) and meets 26 property and patch criteria (including presence of wetlands and upland forest).

This review is documented for each of the 41 parcels in Appendix D including recommendations. Eleven of the 41 further analysis parcels were considered cumulatively with adjacent parcels when the ONHS guideline was applied. The remaining 30 were considered individually since they did not meet the ONHS guidelines. Out of 41 further analysis land parcels, 18 were reclassified as core conservation lands since they either had relatively high percent natural heritage cover (> 60%) when considered cumulatively (Figure 5), or they met a high number of property or patch criteria (Figure 6). This is documented in the individual parcel data / fact sheets in Appendix D and is shown on Maps 9a-d.

Overall this detailed review of parcels results in 278 parcels (260 + 18) land parcels out of the 301 UTRCA land parcels (92%) being identified as core conservation parcels of importance to the UTRCA. As for the remaining 23 parcels, additional site specific information will need to be accumulated to determine how they meet the UTRCA's conservation objectives.