

A Database on a Dime

Latonnell Conference

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**Hamilton
Conservation
Authority**

A Healthy Watershed for Everyone

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The Problem

- ▶ Natural heritage (NH) data from HCA + external data spread over multiple databases (NAI/NH, ELC, EMAN)
- ▶ Over 20 years of data
- ▶ NH database in Access too large to download into Excel and export at end of year
 - ▶ ~102,000 records
- ▶ Difficult to update without missing/duplicating data
- ▶ In need of QAQC due to multiple users over a long period of time

The Solution

- ▶ Compile and append data from all sources into a single database
- ▶ Extensive QAQC
- ▶ Georeferenced to either NAI areas, ELC sites and polygons, or EMAN sites depending on type of data
- ▶ Stores all data in the back-end in SQL Server, while using QGIS as a front-end interface

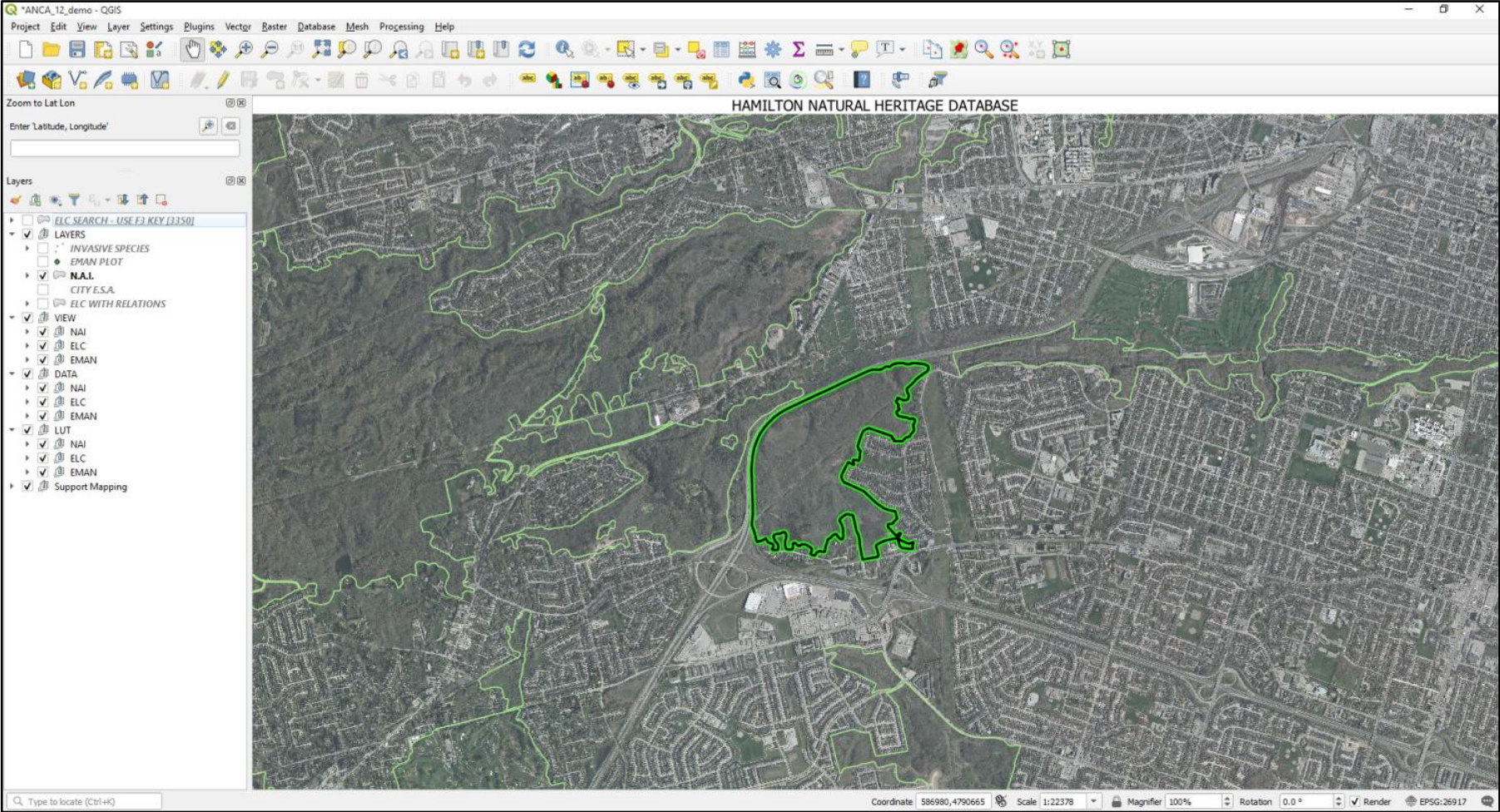
The New HNH Database

- ▶ Main components:
 - ▶ Map layers (NAI, ELC, EMAN)
 - ▶ Main data tables
 - ▶ Lookup tables (LUTs)
 - ▶ Views
- ▶ Main functions:
 - ▶ View/copy NAI and ELC data
 - ▶ Run pre-set queries
 - ▶ Tabular
 - ▶ Spatial

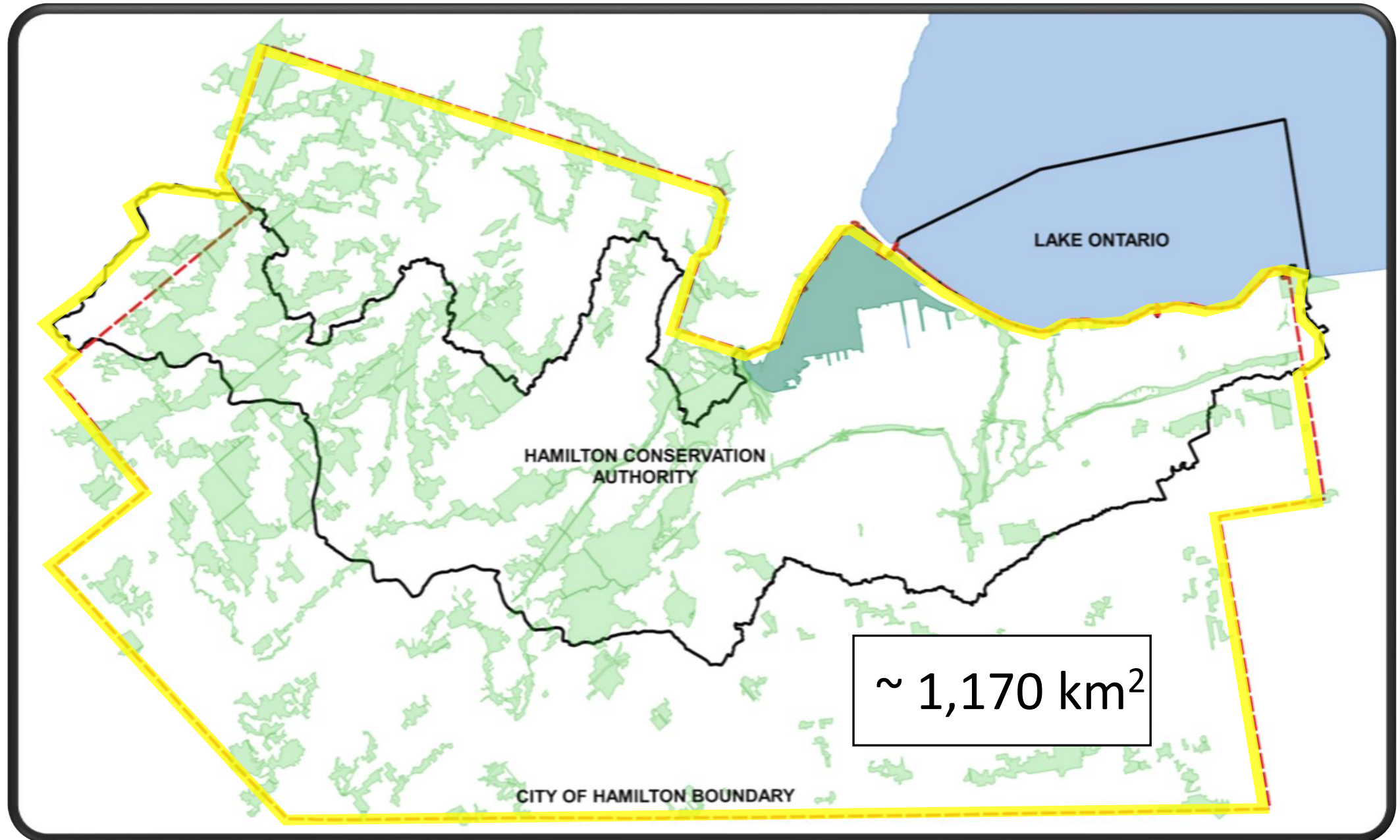
Lessons Learned?

- ▶ Importance of restrictions on data that is entered to reduce effort spent on QAQC
- ▶ Difficulties of separating data that has been combined without proper documentation
- ▶ The need to develop a polygon/site naming system that reflects the variability of ELC, as polygon shapes/sizes and even locations can change based on who is surveying and the year of the survey
- ▶ The need to establish a standard set of species codes to account for changes in scientific/common names over-time

Database Demonstration



PROJECT STUDY AREA



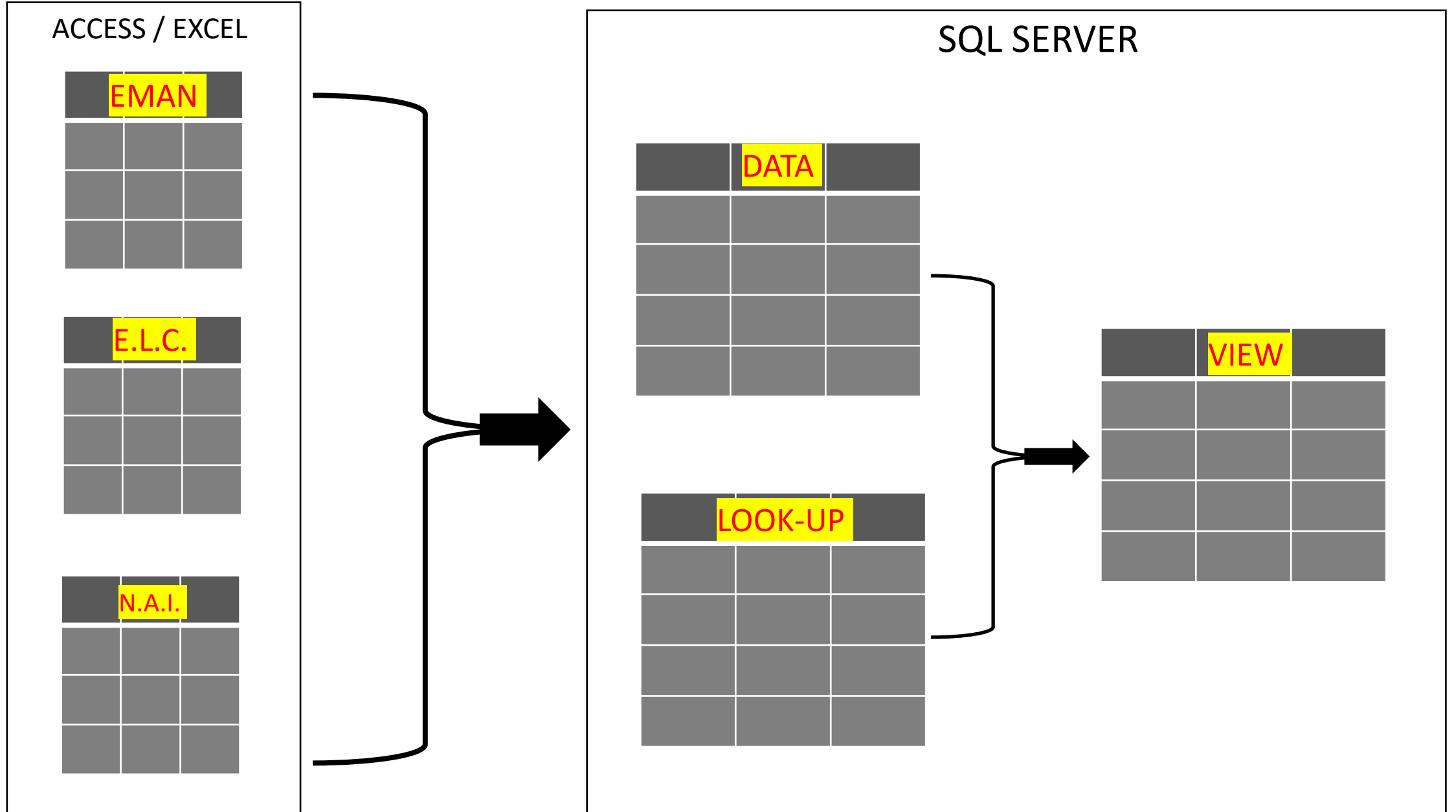
TWO MAIN RESOURCES

MS SQL Server – Standard Edition Licence

... can be Budget Friendly
(charity pricing)

QGIS – Open Source GIS Application

METHODOLOGY



METHODOLOGY

SQL SERVER

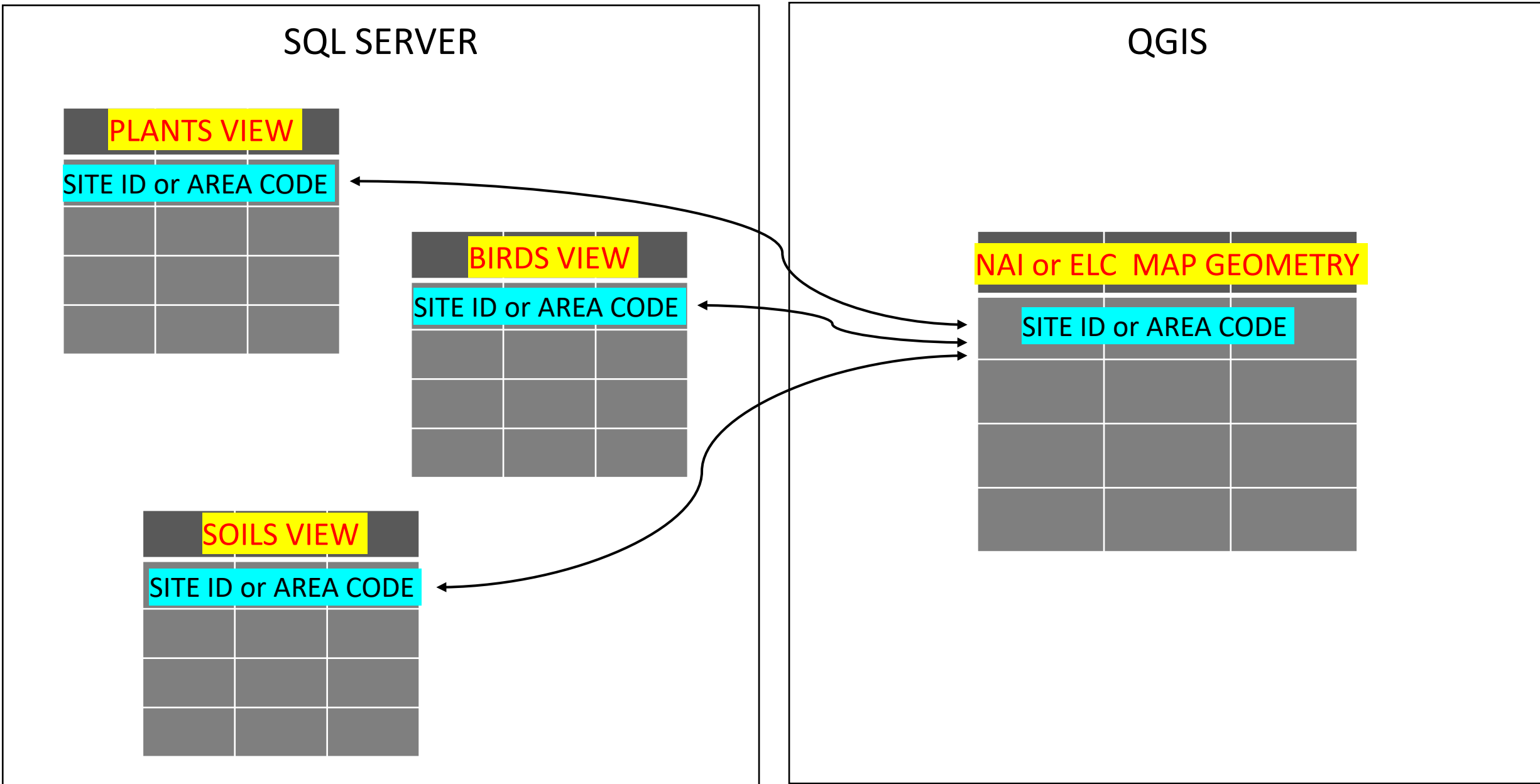
PLANTS VIEW		
SITE ID or AREA CODE		

BIRDS VIEW		
SITE ID or AREA CODE		

SOILS VIEW		
SITE ID or AREA CODE		

QGIS

NAI or ELC MAP GEOMETRY		
SITE ID or AREA CODE		



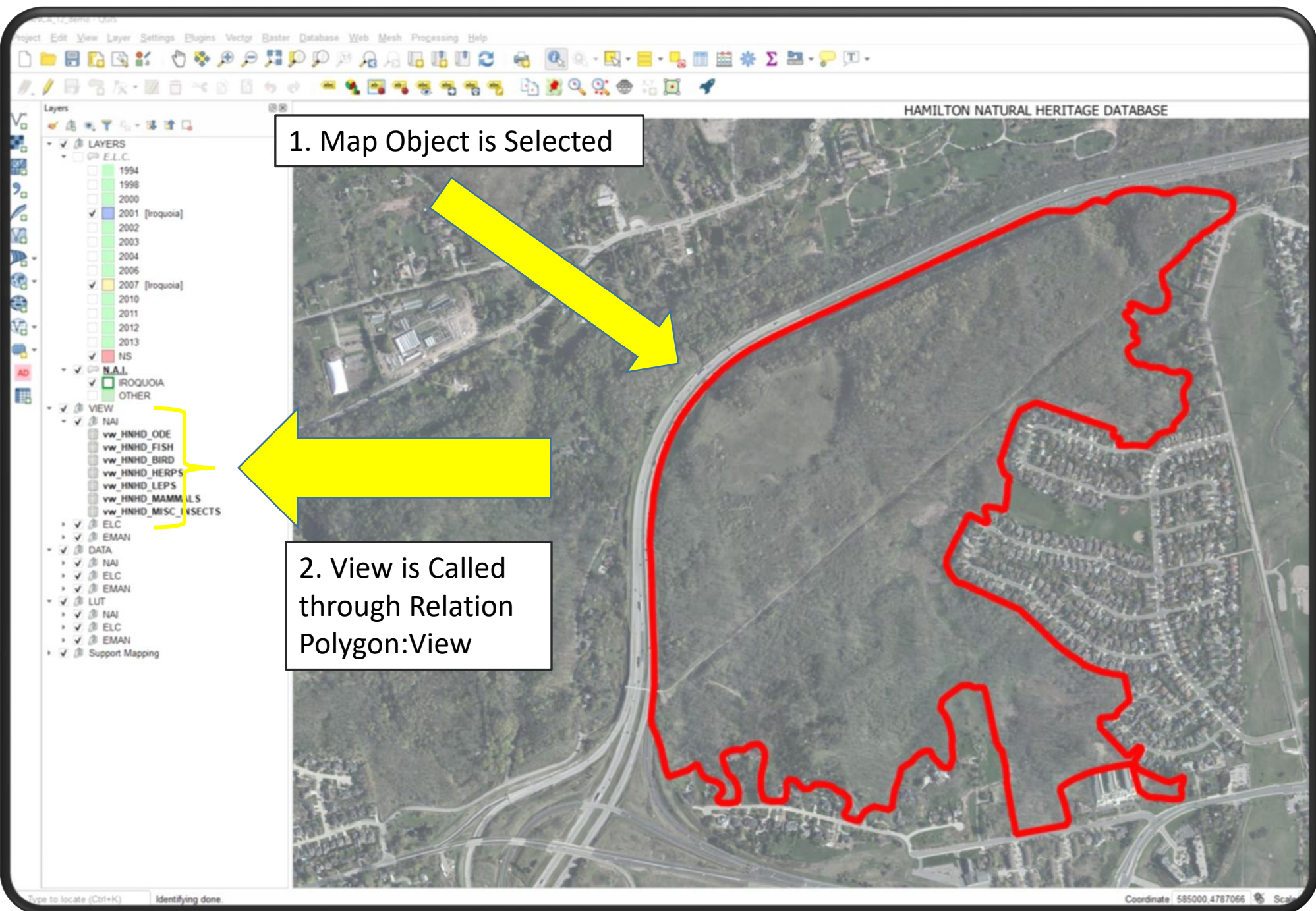


Layers

- LAYERS
 - E.L.C.
 - 1994
 - 1998
 - 2000
 - 2001 [Iroquoia]
 - 2002
 - 2003
 - 2004
 - 2006
 - 2007 [Iroquoia]
 - 2010
 - 2011
 - 2012
 - 2013
 - NS
- NAI
 - IROQUOIA
 - OTHER
- VIEW
 - NAI
 - ELC
 - EMAN
- DATA
 - NAI
 - ELC
 - EMAN
- LUT
 - NAI
 - ELC
 - EMAN
- Support Mapping

HAMILTON NATURAL HERITAGE DATABASE





1. Map Object is Selected

2. View is Called through Relation Polygon:View

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 - NS
- N.A.I.
 - IROQUOIA
 - OTHER
- VIEW
 - NAI
 - vw_HNHD_ODE
 - vw_HNHD_FISH
 - vw_HNHD_BIRD
 - vw_HNHD_HERPS
 - vw_HNHD_LEPS
 - vw_HNHD_MAMMALS
 - vw_HNHD_MISC_INSECTS
- ELC
- EMAN
- DATA
 - NAI
 - ELC
 - EMAN
- LUT
 - NAI
 - ELC
 - EMAN
- Support Mapping

DESCRIPTION & CLASSIFICATION		START:	END:
POLYGON DESCRIPTION			
SYSTEM	SUBSTRATE	TOPOGRAPHIC FEATURE	
<input type="checkbox"/> TERRESTRIAL	<input type="checkbox"/> ORGANIC	<input type="checkbox"/> LAQUSTRINE	<input type="checkbox"/> NA
<input type="checkbox"/> WETLAND	<input type="checkbox"/> MINERAL SOL.	<input type="checkbox"/> RIVERINE	<input type="checkbox"/> CU
<input type="checkbox"/> AQUATIC	<input type="checkbox"/> PARENT MIN.	<input type="checkbox"/> BOTTOMLAND	<input type="checkbox"/> CU
		<input type="checkbox"/> TERRACE	
SITE			
<input type="checkbox"/> OPEN WATER			
<input type="checkbox"/> SHALLOW WATER			
<input type="checkbox"/> SURFICIAL DEP.			
<input type="checkbox"/> BEDROCK			
STAND DESCRIPTION			
LAYER			
1	CANOPY		
2	SUB-CANOPY		
3	UNDERSTOREY		
4	GRD. LAYER		
HT CODES:			
CVR CODES:			
STAND COMPOSITION			
SIZE CLASS ANALY			
STANDING SNAGS:			
DEADFALL / LOGS:			
ABUNDANCE CODES:			
COMM. AGE:			
SOIL ANALYSIS:			
TEXTURE:			
MOISTURE:			
HOMOGENEOUS /			
COMMUNITY CLASS			
COMMUNITY CLASS			
COMMUNITY SERIES			
ECOSITE: DRY PE			
VEGETATION TYPE:			
INCLUSION			
COMPLEX			
Notes:			

▶ NAI - BIRD

▶ NAI - HERP

▶ NAI - LEP

▶ NAI - MAMMAL

▶ NAI - MISC INSECTS

▶ NAI - ODE



▼ NAI - BIRD



Σ COALESCE("COMMON_NAME_OFO", '<NULL>')

- American Robin
- American Robin
- American Woodcock
- American Woodcock
- American Woodcock
- Baltimore Oriole
- Baltimore Oriole
- Baltimore Oriole
- Baltimore Oriole
- Baltimore Oriole
- Baltimore Oriole
- Baltimore Oriole
- Baltimore Oriole
- Baltimore Oriole
- Baltimore Oriole
- Baltimore Oriole
- Baltimore Oriole
- Baltimore Oriole
- Bank Swallow
- Barn Swallow
- Black-capped Chickadee

AC_ID	12
SITE_ID	no data
DATE	no data
YEAR	2001
SPECIES_CODE	B-BAOR
SCIENTIFIC_NAME_OFO	Icterus galbula
COMMON_NAME_OFO	Baltimore Oriole
TALLY	2
EVIDENCE_CODE	ND
EVIDENCE_DESC	no data
NATIVE_STATUS	N
INTERIOR_STATUS	no data
COH_STATUS	no data

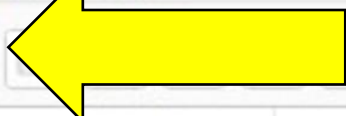
Expanded View (Bird)

Form Display Mode
(single record)

Table Display Mode – All Records

PD_ID	AC_ID	SITE_ID	DATE	YEAR	SPECIES_CODE	NTIFIC_NAME_I	MON_NAME_N	CANOPY	SUB_CANOPY	UNDERSTORY	GROUND	COLLECTED	FF_CONSERVA	OEFF_WETNES	EFF_WEEDINE	NATIVE_STATUS	COH_STATUS	G_RANK
28	1	12	no data	1991	P-ACESASA	Acer sacchar...	Sugar Maple	no data	no data	no data	no data	no data	4	3	no data	N	no data	G5
29	1,186	12 ANCA																
30	1,198	12 ANCA																
31	1,218	12 ANCA																
32	1,367	12 ANCA																
33	153	12																
34	154	12																
35	911	12 ANCA																
36	1,120	12 ANCA																

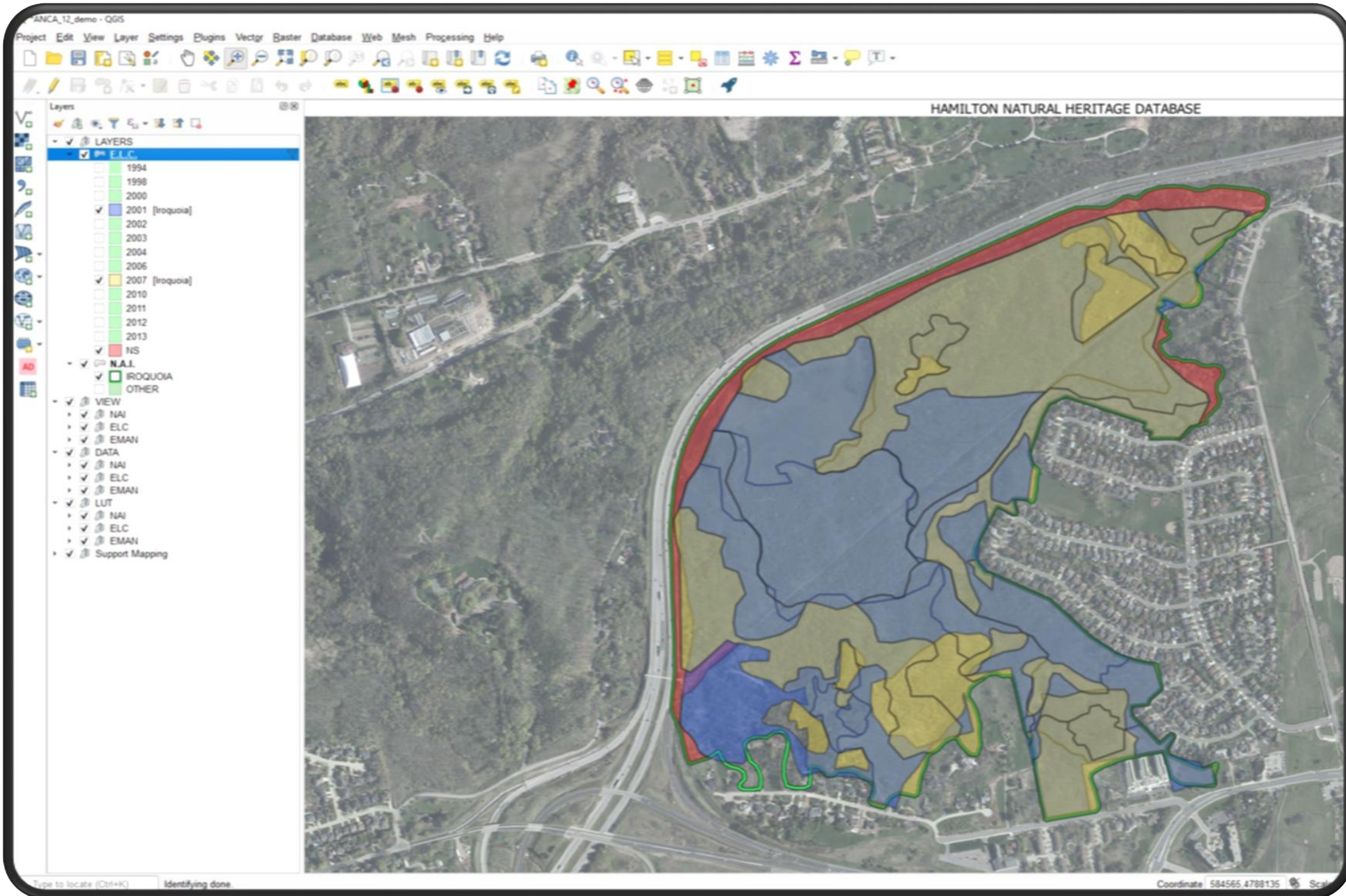
NAI - PLANT



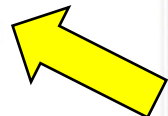
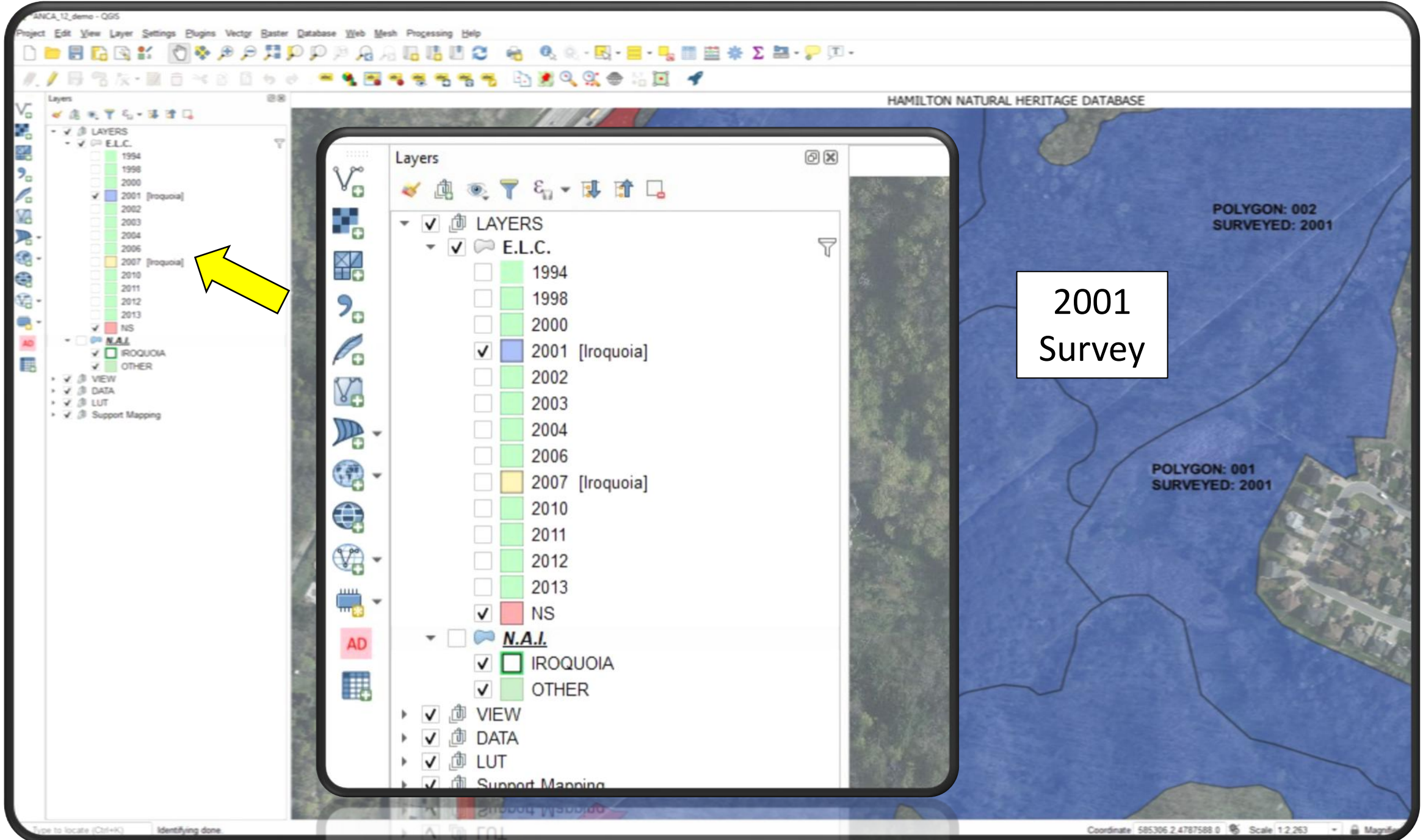
Toggle Edit Mode to change records (add , delete, edit)

PD_ID	AC_ID	SITE_ID	DATE	YEAR	SPECIES_CODE	NTIFIC_NAME_I	MON
28	1	12	no data	1991	P-ACESASA	Acer sacchar...	Sug
29	1,186	12 ANCA-12-006...	01-Jun-07	2007	P-ACESASA	Acer sacchar...	Sug
30	1,198	12 ANCA-12-006...	08-Jun-07	2007	P-ACESASA	Acer sacchar...	Sug
31	1,218	12 ANCA-12-007...	14-Jul-07	2007	P-ACESASA	Acer sacchar...	Sug
32	1,367	12 ANCA-12-002...	25-May-01	2001	P-ACESASA	Acer sacchar...	Sug
33	153	12	no data	2001	P-ACESASA	Acer sacchar...	Sug
34	154	12	no data	2001	P-ACESASA	Acer sacchar...	Sug
35	911	12 ANCA-12-010...	06-Jul-07	2007	P-ACESASA	Acer sacchar...	Sug
36	1,120	12 ANCA-12-006...	01-Jun-07	2007	P-ACESASA	Acer sacchar...	Sug

2007



Similar
Capabilities at
E.L.C. Level



2001
Survey

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- LUT
- Support Mapping

HAMILTON NATURAL HERITAGE DATABASE

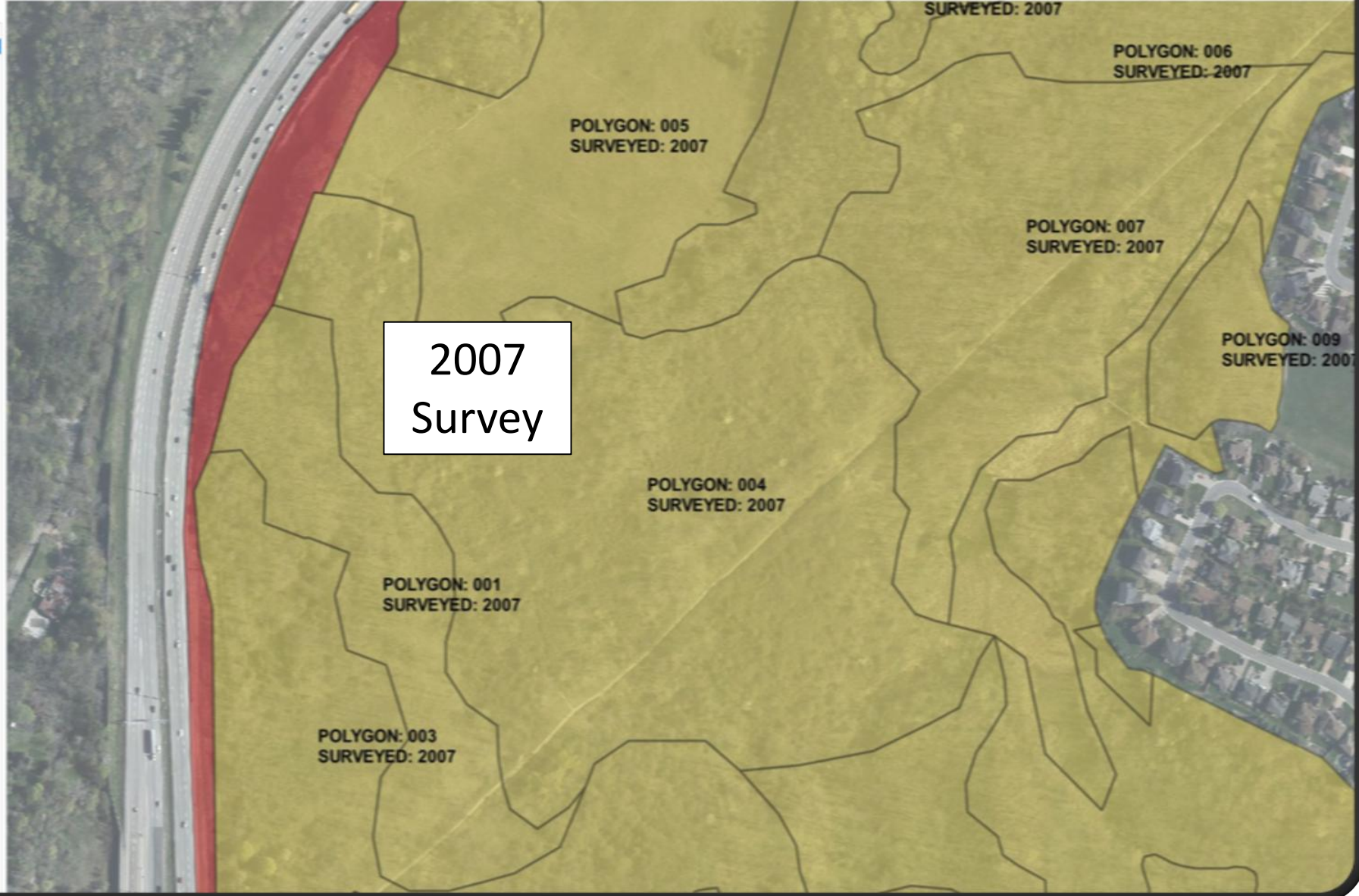
POLYGON: 002
SURVEYED: 2001

POLYGON: 001
SURVEYED: 2001



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2007
Survey

QUERY THE DATA

USING QGIS DB MANAGER

- TABULAR
- SPATIAL

DB Manager

Database

Import Layer/File... Export to File...

Providers

- GeoPackage
- Oracle Spatial
- PostGIS
- Spatialite
- Virtual Layers
- Project layers

Info Table Preview S RANK (Project layers) X

```
1 SELECT *
2 FROM "vw_ANCA-12_PLANT"
3 WHERE "vw_ANCA-12_PLANT"."S_RANK" LIKE 'S4'
```

Select All Records from the 'PLANT' View
Where 'S-RANK' IS LIKE 'S4'

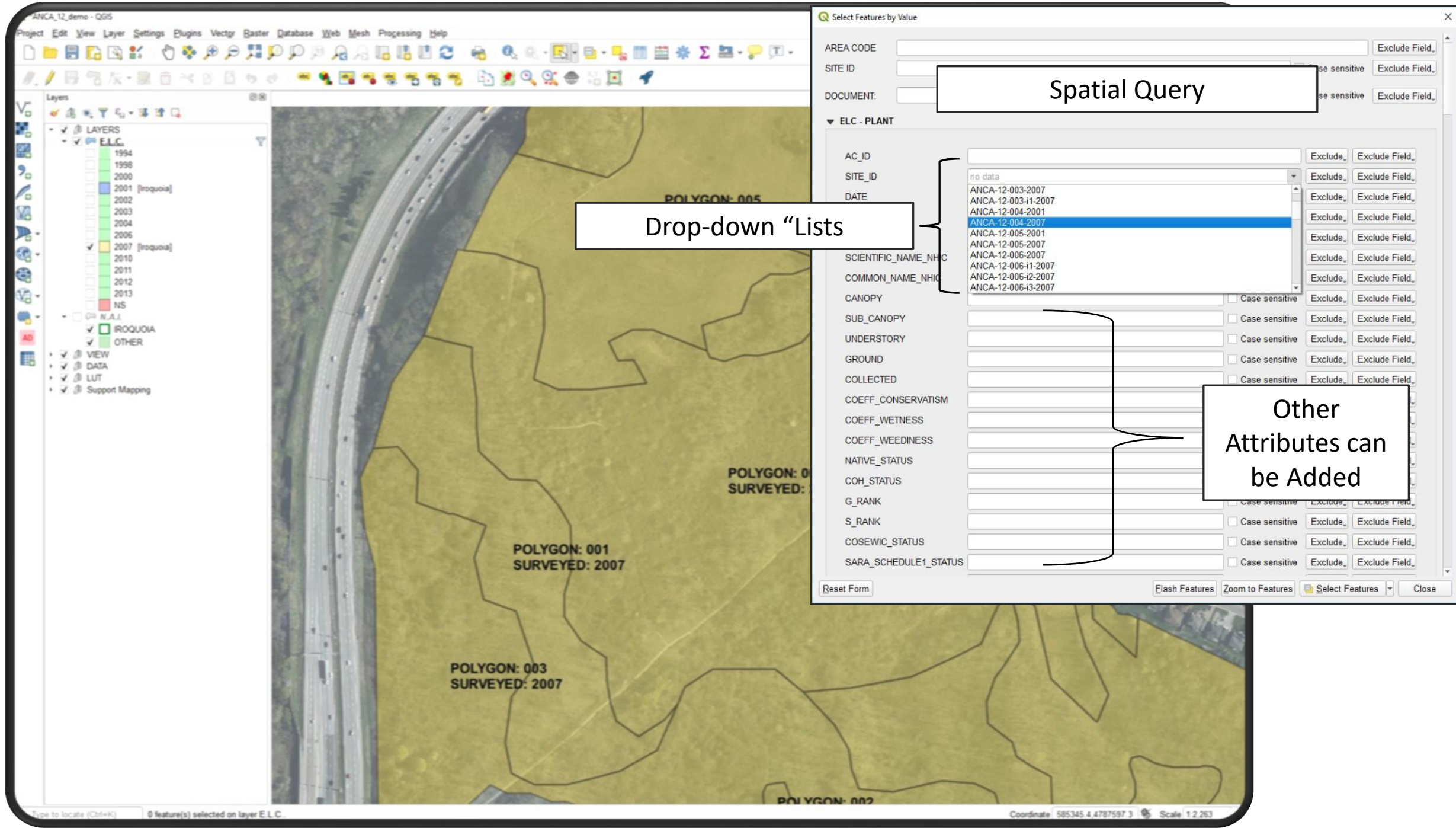
Results – Can be Copied and Pasted into Excel

Execute 177 rows, 0.000 seconds Clear Query History

JUND	COLLECTED	EFF_CONSERVATI	COEFF_WETNESS	COEFF_WEEDINES	NATIVE_STATUS	COH_STATUS	G_RANK	S_RANK	COSEWIC_STATUS	SCHEDULE1_ST	SARO_STATUS	EXOTIC_STATUS	NAI_F
64	N	3	-3	no data	N	no data	G5	S4	no data	no data	no data	no data	Fraxinus pe
65	no data	3	-3	no data	N	no data	G5	S4	no data	no data	no data	no data	Fraxinus pe
66	no data	6	3	no data	N	no data	G5	S4S5	no data	no data	no data	no data	Hamameli
67	no data	6	3	no data	N	no data	G5	S4S5	no data	no data	no data	no data	Hamameli
68	no data	6	3	no data	N	no data	G5	S4S5	no data	no data	no data	no data	Hamameli
69	no data	6	3	no data	N	no data	G5	S4S5	no data	no data	no data	no data	Hamameli
70	N	6	3	no data	N	no data	G5	S4S5	no data	no data	no data	no data	Hamameli

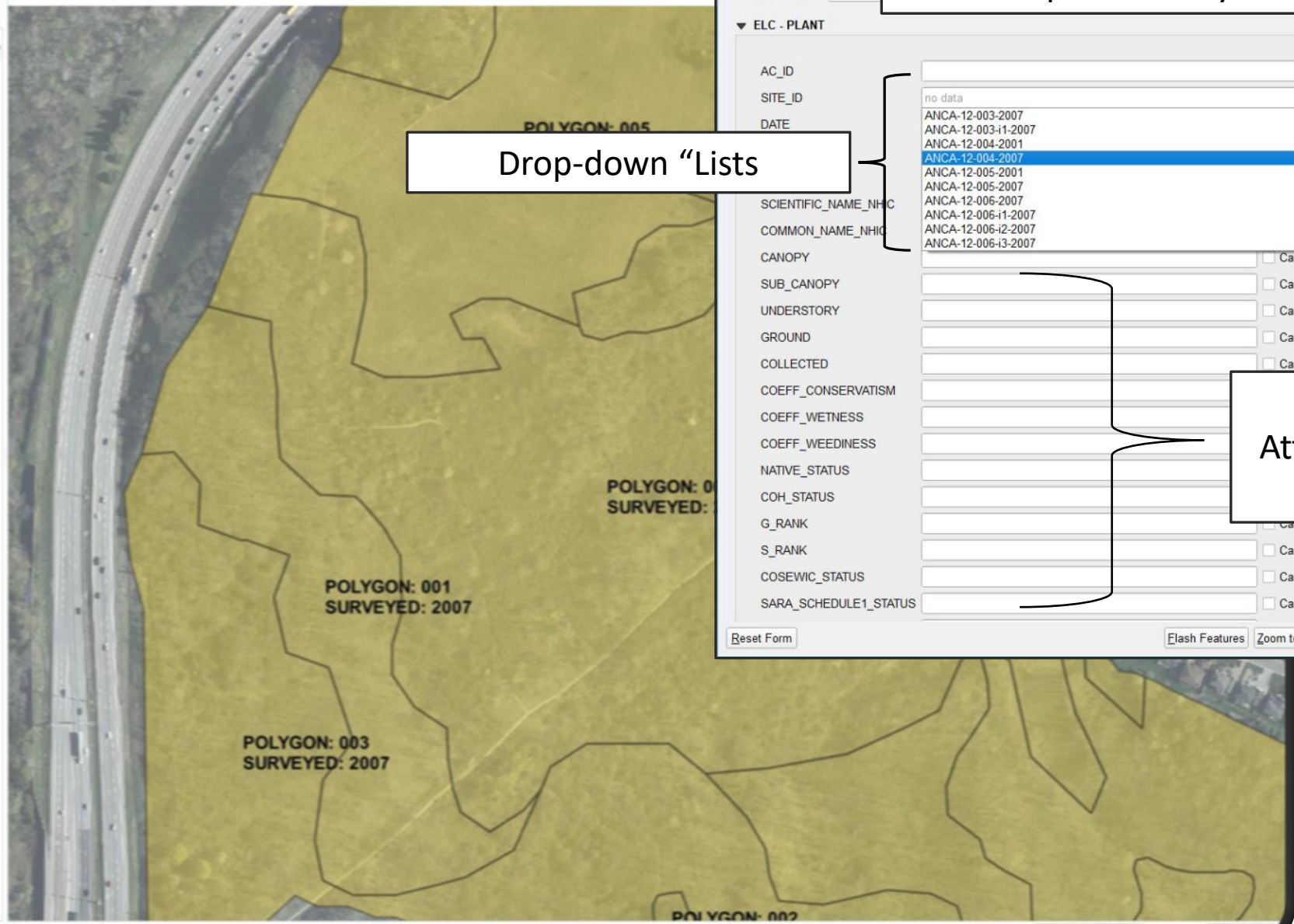
Load as new layer

Cancel



Layers

- LAYERS
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 - 1998
 - 2000
 - 2001 [troquoia]
 - 2002
 - 2003
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 - 2007 [troquoia]
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Select Features by Value

AREA CODE: Exclude Field_

SITE ID: Exclude Field_

DOCUMENT: Exclude Field_

▼ ELC - PLANT

AC_ID: Exclude_ Exclude Field_

SITE_ID: Exclude_ Exclude Field_

DATE: Exclude_ Exclude Field_

SCIENTIFIC_NAME_NHIC: Exclude_ Exclude Field_

COMMON_NAME_NHIC: Exclude_ Exclude Field_

CANOPY: Case sensitive Exclude_ Exclude Field_

SUB_CANOPY: Case sensitive Exclude_ Exclude Field_

UNDERSTORY: Case sensitive Exclude_ Exclude Field_

GROUND: Case sensitive Exclude_ Exclude Field_

COLLECTED: Case sensitive Exclude_ Exclude Field_

COEFF_CONSERVATISM:

COEFF_WETNESS:

COEFF_WEEDINESS:

NATIVE_STATUS:

COH_STATUS:

G_RANK: Case sensitive Exclude_ Exclude Field_

S_RANK: Case sensitive Exclude_ Exclude Field_

COSEWIC_STATUS: Case sensitive Exclude_ Exclude Field_

SARA_SCHEDULE1_STATUS: Case sensitive Exclude_ Exclude Field_

Reset Form Flash Features Zoom to Features Select Features Close

Spatial Query

Drop-down "Lists"

Other Attributes can be Added

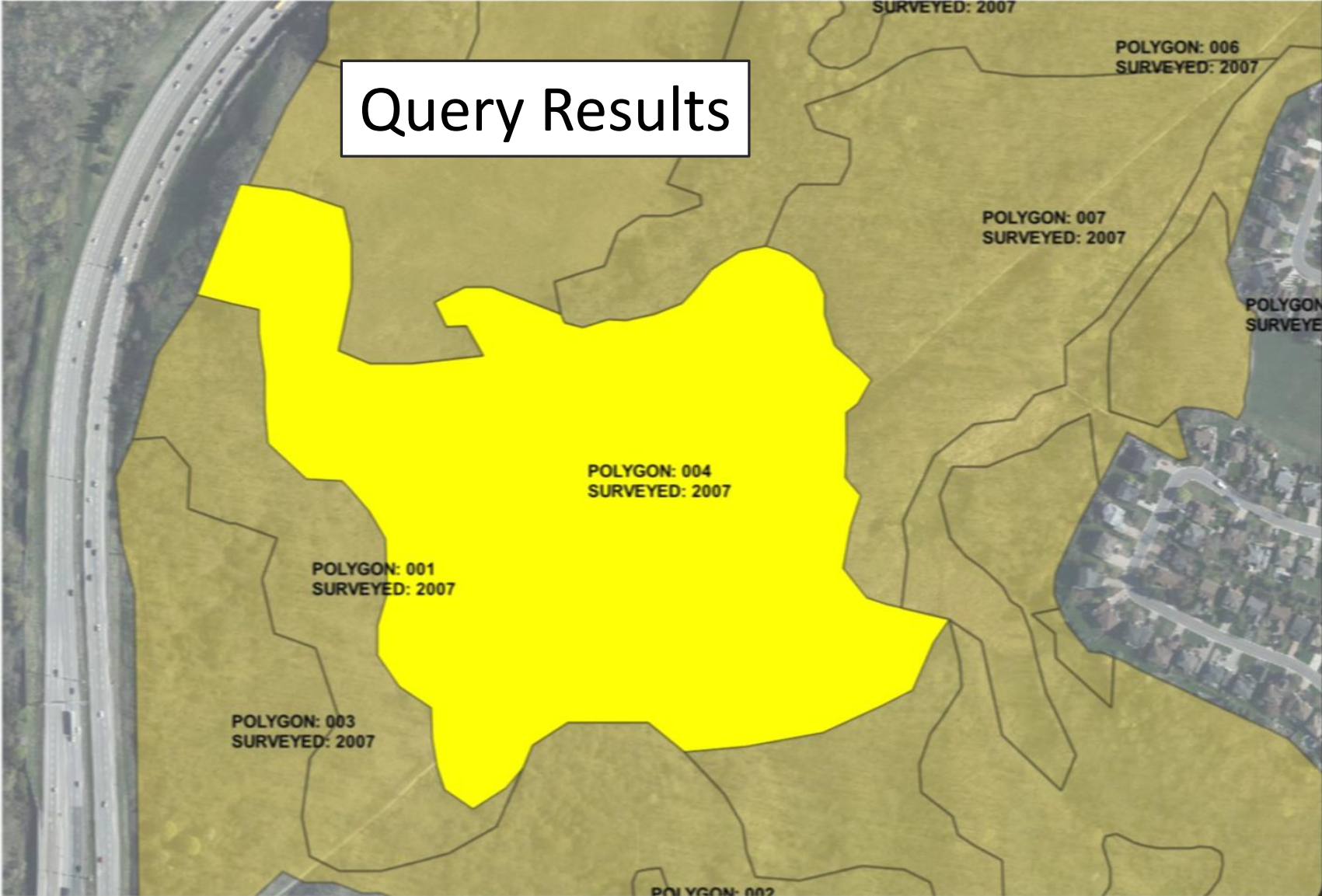


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HAMILTON NATURAL HERITAGE DATABASE
SURVEYED: 2007

Query Results



Thank you

Contact: Lesley - Lesley.mcdonell@conservationhamilton.ca
Rick - Richard.woodworth@conservationhamilton.ca