

A Greenbelt Shoreline Survey in Resort Township on Walloon Lake, 2005

By Tip of the Mitt Watershed Council

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SUMMARY

A shoreline greenbelt survey, funded by Resort Township and performed by the Tip of the Mitt Watershed Council, was conducted on Walloon Lake during the summer of 2005. The Resort Township Zoning Ordinance contains waterfront regulations that are designed to protect greenbelts (i.e., shoreline vegetation). The Watershed Council's documentation of greenbelt conditions will improve the Township's ability to enforce the zoning ordinance.

During the months of September and October, Watershed Council staff members surveyed the shoreline of Walloon Lake within Resort Township in small watercraft to document greenbelt conditions. Greenbelt data sheets were filled out, photographs taken and GPS information collected at every parcel on the shoreline. Data from data sheets were inputted into a database and parcels were scored based on the eight criteria included on the form. Spatial data (GPS) was inputted into a GIS (Geographical Information System) to develop hard-copy maps displaying results of the survey. Photographs were linked to spatial data in the GIS, which allows users to review photographs pertaining to individual parcels by simply clicking on parcel polygons.

Results from the survey show that the greenbelts on the surveyed shoreline of Walloon Lake are in good shape. Nearly 90% of parcels had some amount of greenbelt and over half of these had greenbelts covering >75% of the shoreline. Average greenbelt depths were greater than 10 feet at 66% of parcels and greater than 40 feet at ~34% of parcels. The vertical structure, plant density and species diversity all rated high; from 70-87% of parcels depending on the parameter. Over 30% of the parcels surveyed were in a natural state (no erosion control structures). Approximately 58% of parcels scored in the top two tiers of the rating system, while only 11% of parcels scored in the lowest (negative) tier.

Two parameters surveyed, turf grass and erosion control structures, potentially degrade water quality. Turf grass was present along the shoreline at over half of parcels surveyed and covered more than 75% of the shoreline on ~26% of parcels. Over 50% of parcels had shoreline erosion control structures that negatively impact lake ecosystems.

Survey results should be shared with shoreline property owners and the general public to help raise awareness of the greenbelt ordinance and measures being taken to enforce it as well as educate the public regarding the importance of greenbelts. The information from the survey should also be shared with other local governments to encourage further protection of greenbelts in the region. An information and education campaign by Resort Township could result in a net greenbelt gain, going beyond the ordinance's function of protecting greenbelts and encouraging the creation of new and improvement of existing greenbelts. More useful information could be developed from the data collected from this survey. Changes to the greenbelt ordinance language are recommended as it is not clear to all who read it. The survey should be repeated every 3- 5 years to keep information current and therefore, improving ordinance enforcement.

INTRODUCTION

Background:

Greenbelts, in the context of this survey, refer to the vegetated areas along the shoreline of lakes, ponds, rivers and streams. Greenbelts may start at the water's edge and extend inland for hundreds of feet. A greenbelt may have a landscaped appearance, consisting of a few select species, or it may have a natural look with a random mix of many different species and sizes of plants.

Shoreline greenbelts are essential for maintaining a healthy, diverse aquatic ecosystem. A greenbelt consisting of a variety of native woody and herbaceous plant species provides habitat for near-shore aquatic organisms as well as terrestrial organisms such as birds. Greenbelts function as erosion control devices, stabilizing the shoreline with the plants' root structures to protect against wave action and ice. The canopy of the greenbelt provides shade to near-shore areas, which is particularly important for lakes with cold-water fisheries. In addition, greenbelts provide a mechanism to reduce overland surface flow and absorb pollutants carried by the flow during rainstorms and snowmelt.

Facing increased development pressure on Walloon Lake and recognizing the importance of greenbelts in protecting and preserving the lake's high quality waters, the Resort Township government adopted waterfront regulations to limit impacts to shoreline vegetation. The township zoning ordinance (Section 1808) requires the establishment and maintenance of a 40-foot wide greenbelt along the edge of surface waters. According to the ordinance, said greenbelts are to be preserved in a natural state. There are a few exceptions that allow for removing or thinning vegetation, but tree thinning is limited to 30% of the total trees and open views cannot be wider than 30 feet for each 100 feet of shoreline frontage. In addition, thinning require approval of the zoning administrator.

In order to enforce the ordinance, Resort Township contracted with Tip of the Mitt Watershed Council to perform a greenbelt survey on Walloon Lake. Watershed Council staff surveyed greenbelts on every parcel on the Walloon Lake shoreline falling within

Resort Township; documenting existing conditions by filling out greenbelt rating forms, taking photographs, and collecting GPS data. The methods used in performing the survey as well as results and a brief discussion are contained within this report.

Study area:

Walloon Lake is located in the northern Lower Peninsula of Michigan on the border between Emmet and Charlevoix Counties. Portions of the lake fall within Resort and Bear Creek Townships in Emmet County and Melrose, Evangeline, and Bay Townships in Charlevoix County. Records indicate that a lake association has existed on the lake since 1910, but the Walloon Lake Association did not become officially incorporated until 1960.

There are five major basins in Walloon Lake, which are referred to as the North Arm, the Foot Basin, Wildwood Basin, the West Arm and Mud Basin (Figure 1). The deepest point in the lake is found in the West Arm and measures 100 feet. Based upon polygons developed from 2004 aerial photographs, the surface area of Walloon Lake covers approximately 4600 acres and the shoreline distance totals 32 miles. The section of the lake falling within Resort Township touches upon all five basins and extends across almost all of the northern shore. The Walloon Lake shoreline distance within Resort Township measures ~13.6 miles. Its irregular shoreline results in a high shoreline development factor (3.4), which is the ratio of shoreline length to lake surface area. This means the lake is more susceptible to pollution from shoreline activity (development, erosion, fertilizer use, etc.) than a lake that is rounder.

Walloon Lake is largely groundwater fed, but there are a number of small inlet streams, the largest of which are Schoofs Creek in the North Arm and South Arm Creek in the Foot Basin. The only outlet is in the east end of the Foot Basin, which forms the Bear River.

Walloon Lake has a small watershed in relation to the lake's surface area, measuring approximately 21,900 acres (does not include lake area). The watershed area to lake surface area ratio is 4.8:1, which is relatively low (e.g., Black Lake in Cheboygan County has a ratio of 34:1). Due to the small watershed size the water

quality of Walloon Lake is less susceptible to changes in watershed land cover. According to land cover statistics from a 2000 land cover analysis (NOAA, 2003), the majority of the watershed is forested and there is a limited amount of urban/residential, but there is a substantial agricultural land cover in the watershed (Table 1).

Table 1. Walloon Lake watershed land cover.

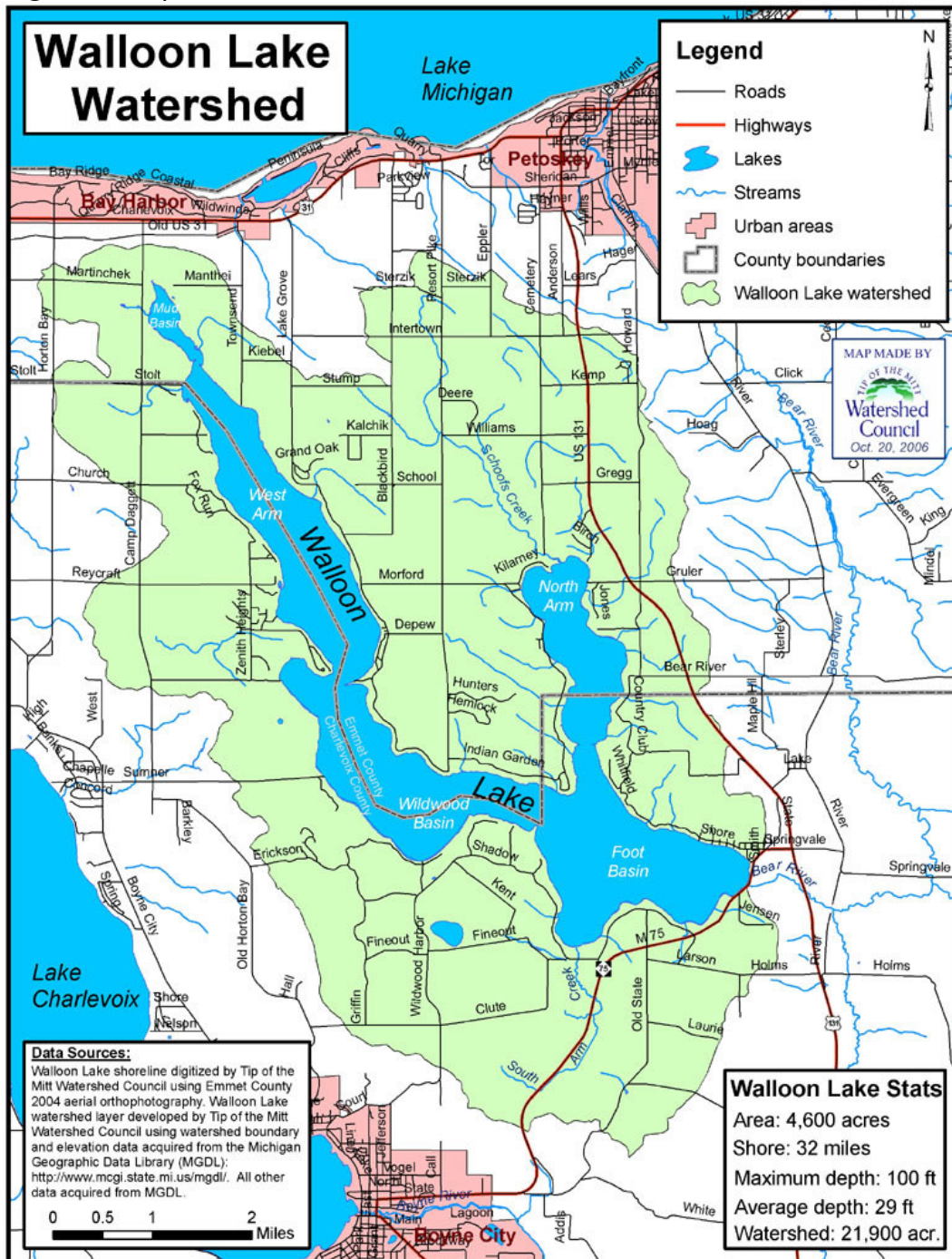
Land Cover Type	Acres	Percent
Agriculture	5499.14	20.74
Barren	34.71	0.13
Forested	10100.97	38.10
Grassland	3162.54	11.93
Scrub/Shrub	521.03	1.97
Urban/residential	691.33	2.61
Wetland	1788.91	6.75
Water	4711.44	17.77

Walloon Lake is generally considered to have a healthy ecosystem with high-quality water. The lake supports populations of walleye, small mouth bass, northern pike, bluegill, rock bass, perch, and stocked rainbow and brown trout. Based on data collected as part of the Watershed Council’s Volunteer Lake Monitoring Program, Walloon is classified as an oligotrophic lake. Oligotrophic lakes are characteristically deep, clear, nutrient-poor water bodies. Phosphorus data from the Watershed Council’s Comprehensive Water Quality Monitoring Program (CWQM) support this characterization as concentrations have typically been less than 10 parts per billion and have been dropping since monitoring began in 1992.

Despite all the data attesting to excellent water quality, Walloon Lake is not without problems. Human activity and landscape development are apparent in chloride data collected as part of the CWQM program. Chloride, a component of salt and thus, a good indicator of human activity, has been steadily increasing in Walloon Lake. Dissolved oxygen deficits in deeper waters are evidenced in data collected by the Little Traverse Bay Bands of Odawa Indians. Although many large oligotrophic lakes in the region have abundant dissolved oxygen throughout the water column all year long, the hypolimnetic (deep water) dissolved oxygen concentrations in Walloon Lake have been found to be below State of Michigan standards, and on several occasions nearly

depleted, during late summer months. In addition, non-native aquatic species, including zebra mussels, Eurasian watermilfoil, and purple loosestrife, have invaded the lake and are impacting the ecosystem.

Figure1. Map of the Walloon Lake watershed.



METHODS

Field data collection:

Watershed Council staff began the field portion of the Walloon Lake greenbelt survey on 9/12/2005 and finished on 10/11/2005. A total of 403 individual parcels in Resort Township were surveyed, starting at the boundary with Bear Creek Township at the top of the North Arm and ending at the boundary with Bay Township at Stolt Road in the northwest corner of the West Basin. The survey was conducted by traveling in kayak or canoe along the shoreline.

At each parcel staff took digital photographs of the shoreline property, collected GPS (Global Positioning System) readings, and completed a data sheet describing the greenbelt. From one to eight digital photographs were taken per parcel, depending upon size, to provide visual proof of greenbelt conditions and to help match survey information to Emmet County equalization records. GPS data were collected with a Trimble GeoExplorer3 (accuracy = 1- 3 meters) or with a Ricoh Pro G3 GPS camera (accuracy = 3-10 meters) to match survey information to Emmet County GIS data. Data sheets were filled out to gather information about the property and greenbelt (sample data sheet in Appendix A).

During the project development phase of this survey, methods used by other organizations to perform similar surveys were researched, but little information was uncovered and thus, necessitated the creation of appropriate data sheets. Watershed Council staff developed a datasheet to efficiently collect the information deemed most relevant for documenting and rating greenbelts. Descriptions of attributes included on the data sheet are presented below.

Greenbelt data sheet parameters:

Developed vs. Undeveloped: For the purposes of this survey, developed means the presence of buildings or other significant permanent structures. Included are roadways, boat launching sites, and recreational properties (such as parks with pavilions and parking lots). Properties with only mowed or cleared areas, seasonal structures (such as docks or travel trailers), or unpaved pathways were not considered developed.

Additionally, relatively large parcels which may have development in an area far from the water's edge were not considered developed.

House description: The database field containing the property description contains a sometimes cryptic descriptive phrase up to 50 characters long. For example, *Red 2 sty, brn rf, wht trm, fldstn chim, lg pine* means that the property has a red two-story house with a brown roof, white trim, fieldstone chimney, and a large pine tree in the yard.

Greenbelt length: The percentage of the shoreline for a given property that has a greenbelt of any size (depth). Turf grass is not considered to be greenbelt.

Greenbelt average depth: The distance that the greenbelt extends from the water's edge landward. The minimum and maximum greenbelt depth was also be noted as this parameter can vary widely within a single parcel.

Turf: The percent of shoreline with turf grass (which is typically mowed).

Vertical Structure: The different types of plants contained within the property's greenbelt. Ground cover refers to herbaceous plant species, such as sedges and goldenrods. Understory refers to shrub species, such as ground juniper, dogwoods and alders. Overstory refers to trees, such as willows, maples and pines.

Density: This parameter is somewhat subjective, rating the growth density of the greenbelt, which can vary over the length and depth of the property. Try to determine the average density of the shoreline vegetation. Sparse growth would be easy to see through and walk through, whereas dense growth would be difficult to walk and see through.

Species diversity: The diversity of plant species within a greenbelt. Uniform means a greenbelt with just one plant species, per given area of greenbelt (i.e., 50% of greenbelt could be planted with juniper only and the other 50% with only maple trees and still be considered uniform even though there were two species). Several species would indicate 2-4 species mixed together within the green belt. Many species refers to 5 or more species mixed together.

Emergent vegetation: Emergent vegetation includes aquatic plants that live in near-shore environments, such as cattails or bulrush. Noted as either present or absent.

Structures: Human-made structures along the shoreline to prevent erosion by waves and ice. Seawalls are vertical concrete, wood, or metal structures. Biotechnical structures are a mix of fabrics, small stones and vegetation. Riprap is large stone or boulders. A line is provided for descriptions of other structure types not included in the list.

Notes: Any other notes regarding the parameters listed above or other relevant information regarding the property and its greenbelt. For example, a parcel with greenbelt species diversity that is uniform for 90% of the shoreline and many species for 10% of the shoreline would be appropriately noted here.

Scoring system:

Individual parcels were assigned a score based on attribute data collected in the field. All information from the data sheet was inputted into a Microsoft® Excel database (Appendix B). After entering field data from data sheets, scores were calculated for the following criteria: length, depth, turf, vertical structure, density, species diversity, and structures. Scores for length, depth, vertical structure, density, and species diversity ranged from zero to four. Scores for turf and structures ranged from zero to negative three.

Parcel identification system and map development:

A numbering system developed by the Watershed Council during past shoreline surveys on Walloon Lake was applied to this survey. Shoreline parcels around the entire lake are numbered sequentially starting at the Gruler Road boat launch and moving around the lake in a counter-clockwise direction. The Watershed Council parcel identification numbers within Resort Township range from 12 at the Bear Creek Township boundary to 415 at the Bay Township boundary.

Both paper and digital maps were developed to display results of the survey using a GIS (ArcMap version 9.1 from Environmental Systems Research Institute). Spatial data with parcel attribute information was acquired from the Emmet County GIS department. The county GIS parcel data was used to develop a new GIS data layer that included only parcels on the Walloon Lake shoreline. Shoreline parcels were numbered using the Watershed Council identification system and this numbering system was subsequently used to label and thus, reference parcels on all maps. The database storing data from the field data sheets was joined to the GIS shoreline parcel data and exported to create the final GIS data layer. The final layer contains Emmet County equalization data, Tip of the Mitt Watershed Council identification numbers, and greenbelt characteristics data for all shoreline parcels.

Digital photographs taken during the survey were renamed using the Watershed Council parcel identification numbering system. For example two photographs were taken for parcel #226 and thus, named: WalloonGreenbelt_226_01.jpg and WalloonGreenbelt_226_02.jpg. Photographs were then linked to digital parcel data in a GIS (Geographical Information System). An attribute was added to the GIS parcel data layer to provide a hyperlink file path. The attribute column was populated with file paths to digital photographs to allow review of greenbelt pictures by simply clicking on the parcel polygon.

RESULTS

This survey documented the status of greenbelts at 403 properties on the Walloon Lake shoreline. The shoreline was developed at approximately 350 of these locations (87%). A total of 361 parcels possessed greenbelts along some portion of the shoreline.

Nearly 90% of parcels surveyed on Walloon Lake had a greenbelt and over half of the parcels had a greenbelt along more than 75% of the shoreline (Table 2). The average greenbelt depth exceeded 10 feet in over 65% of the parcels. Almost 50% of parcels did not have turf grass on the shoreline, but over 25% had turf grass along more than 75% of the shore. The vertical structure (groundcover, understory, and overstory) of greenbelts consisted of two or more levels at ~87% of parcels. Greenbelt plant density was medium to dense at over 70% of parcels and species diversity included several to many species at ~84% of parcels.

Table 2. Statistics for greenbelts and other shoreline features.

Greenbelt length (% of shore)	Percent of parcels	Greenbelt Average Depth	Percent of parcels	Turf Grass (% of shore)	Percent of parcels	Erosion Control Structures	Percent of parcels
0%	10.42	0 ft	10.42	0%	47.15	None	31.76
<10%	10.92	<10 ft	23.57	<10%	7.20	Sea wall	3.47
10-25%	8.44	10-40 ft	31.51	10-25%	5.46	Biotechnical	11.17
25-75%	19.35	>40 ft	34.49	25-75%	14.39	Riprap	49.63
>75%	50.87			>75%	25.81	Other	3.72
Emergent Vegetation	Percent of parcels	Vertical structure	Percent of parcels	Plant Density	Percent of parcels	Species Diversity	Percent of parcels
Absent	77.00	NA	5.46*	NA	5.46*	NA	6.95*
Present	23.00	1 level	6.95	Sparse	23.82	Uniform	8.93
		2 levels	44.17	Medium	30.77	Several spp	37.47
		3 levels	43.42	Dense	39.95	Many spp.	46.65

*The percent of "NA" for vertical structure, plant density, and species diversity does not correspond to percent of parcels without greenbelts because parcels with solitary trees on the shoreline were considered to have no greenbelt, but were still scored for other attributes.

Erosion control structures were absent at ~32% of the parcels and where present, was dominated by riprap (documented at ~50% of parcels). Emergent vegetation was noted in near-shore waters at 23% of parcels.

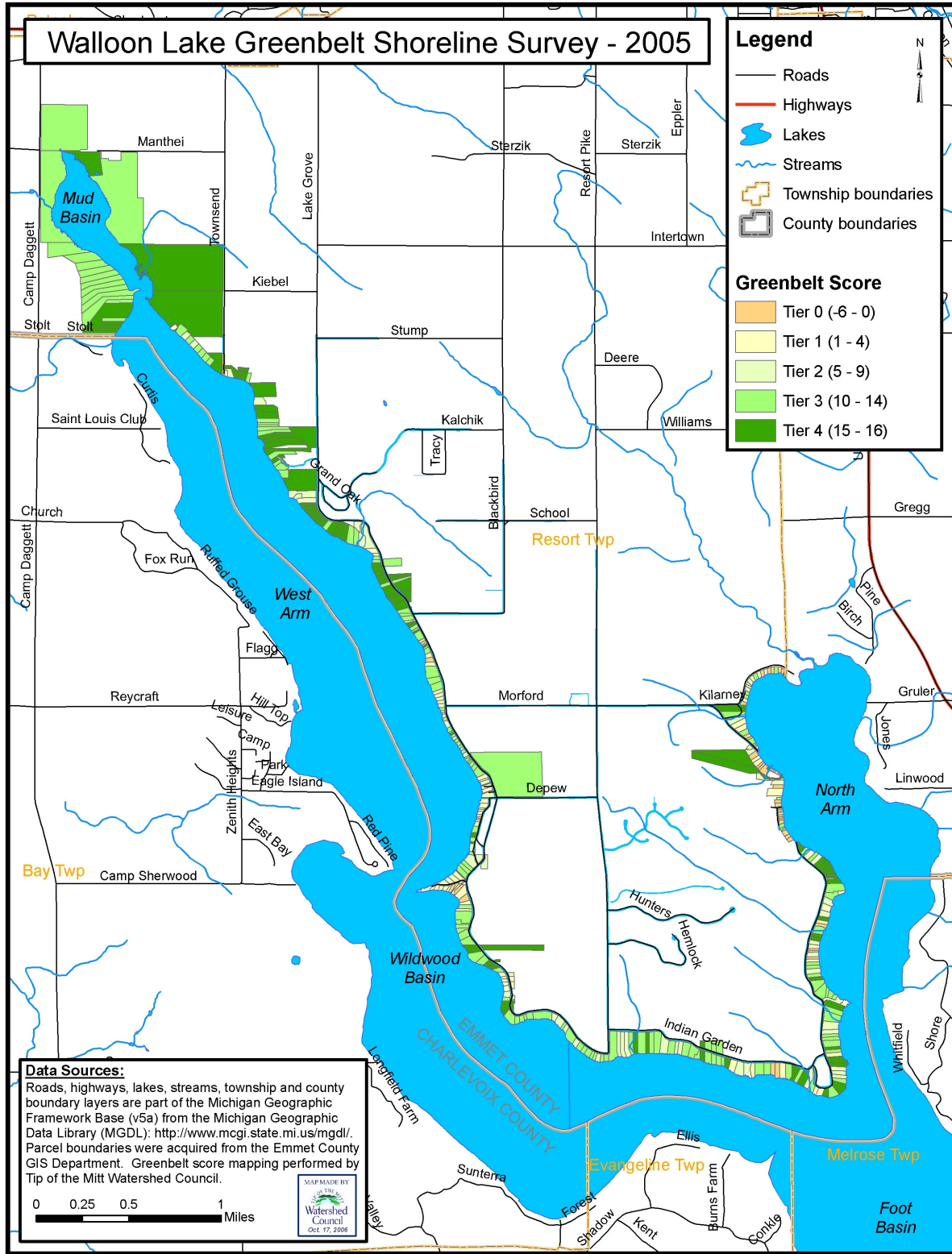
Greenbelt scores for individual parcels ranged from -6 (worst) to 16 (best). The lowest tier, which were parcels scored at zero or below due to features detracting from greenbelt quality such as turf grass and shoreline structures, accounted for only 11 percent of parcels (Table 2). Approximately 58% of parcels scored high (>10: tiers three and four), indicating that the shoreline surveyed possessed many high-quality greenbelts. Spatial variation in greenbelt score tiers are presented graphically in a lake/parcel map (Figure 2).

Table 3. Greenbelt score tiers.

Greenbelt Score	No. of parcels	% of parcels
Tier 0 (-6 to 0 = worst)	44	11
Tier 1 (1 to 4)	49	12
Tier 2 (5 to 9)	76	19
Tier 3 (10 to 14)	150	37
Tier 4 (15 to 16 = best)	84	21

Final products of the survey include a shoreline parcel map labeled using the Watershed Council identification system, corresponding digital photographs, a database containing all information gathered on data sheets (Appendix B), and GIS files that allow for an interactive map. Greenbelt conditions in the fall of 2005 can be reviewed by locating the parcel on the labeled map and then searching for corresponding photographs and data sheets using the Watershed Council’s identification system. If using current GIS software from ESRI, version 8.3 or higher, an interactive map can be opened that allows users to click on points in front of lakeshore parcels to view photographs pertaining to that site.

Figure 2. Map of Walloon Lake greenbelt shoreline survey scores.



DISCUSSION

The shoreline greenbelts of Walloon Lake within Resort Township appear to be in good shape. Nearly 90% of parcels have some form of greenbelt and most of these (~57%) have extensive greenbelts that vegetate more than 75% of the shoreline. The majority of parcels surveyed have deep greenbelts that extend, on average, more than 10 feet from the shoreline landward and approximately 34% of the greenbelts were found to exceed 40 feet in average depth. In addition, vertical structure of the greenbelt was complex, greenbelt vegetation was dense, and the variety of species in the greenbelt was, at least, somewhat diverse in 70-87% of parcels (depending on the parameter). Finally, it was found that over 30% of shorelines were in a natural state, i.e., without erosion control structures such as seawalls. All of the data gathered shows that greenbelts are healthy and largely intact on the shoreline that was surveyed.

The greenbelt survey was conducted at the parcel level and did not survey according to the length of shoreline. Therefore, statistics were not computed for shoreline distance on the lake that possessed greenbelts nor for any of the other criteria. Many large parcels surveyed had largely natural shorelines with very healthy greenbelts, such that the generation of distance statistics would likely further support the assertion that the greenbelts on the Walloon Lake shoreline within Resort Township are in good shape.

The fact that so many parcels possess high-quality greenbelts gives greater justification for the passing and enforcement of the Township's greenbelt ordinance. The ordinance was designed to preserve existing greenbelts as opposed to create new greenbelts. Approximately 30% of parcels might be considered to be in poor condition (e.g., <25% of the shore with greenbelts or average greenbelt depth of less than 10 feet or receiving a score of 5 or less). Therefore, greenbelts on roughly 70% of parcels can be preserved through enforcement of the ordinance, which will serve to protect the high-quality waters of Walloon Lake.

Turf grass dominated the shoreline of many parcels surveyed and has the potential to negatively impact the lake ecosystem. Results of the survey show that over

25% of parcels have turf grass along over 75% of the shoreline and that another ~15% have turf grass along 25-75% of the shoreline. Although some consider turf grass to be greenbelt as it is vegetation along the shoreline, it does not provide the same benefits as diverse, dense greenbelts and in fact, has the potential to degrade water quality. Turf grasses have short roots and thus, do not have the same capacity as larger plants, shrubs and trees to filter contaminants from stormwater runoff. Due to the limited root system, turf grasses do not have nearly the same capacity as larger plants with extensive root systems to stabilize shorelines against erosion. In addition, maintaining aesthetically-pleasing, monoculture turf grass generally requires the addition of fertilizers and herbicides, which invariably wash into the lake. Due to these factors, the turf grass documented on more than half of the parcels surveyed is undoubtedly having negative impacts on the Walloon Lake ecosystem, which will worsen if it increases.

Erosion control structures, particularly seawalls and large riprap, also have negative impacts on the lake ecosystem and were found to be prevalent along the surveyed shoreline of Walloon Lake. The complex root structures and fallen debris in near-shore areas along natural shorelines have a natural ability to prevent erosion. The vegetation along the shoreline and associated debris in the water also provides important habitat for both aquatic and terrestrial organisms. When natural shorelines are developed and vegetation/debris removed, there are often subsequent problems with erosion from waves, currents and ice. Almost 50% of the parcels surveyed had large riprap structures and another 3% had seawalls. The limited amount of seawalls encountered in the survey is a very positive statistic for the lake ecosystem as seawalls provide very little habitat and often lead to erosion in adjacent shorelines as they do not absorb wave and ice energy, but rather reflect and divert it to other areas. Even though riprap provides more habitat due to the spaces in the rocks, it is still limited compared with native vegetation. In addition, neither type of structure provides the stormwater filtration or shading benefits of natural vegetation. There remains a substantial portion of the natural shoreline in the area surveyed, which merits protection due to the benefits provided to the ecosystem. The lake ecosystem will further benefit through the conversion of seawalls and large riprap to a more natural state using biotechnical

erosion control techniques.

Aquatic vegetation provides numerous benefits to the lake ecosystem and emergent types were included in the survey to document the current status. Although generally not included as part of the greenbelt, emergent aquatic plants provide many of the same benefits as riparian vegetation. Emergent plants help absorb wave and current energy, provide valuable habitat for aquatic organisms, and act as a food source for aquatic and terrestrial wildlife. Emergent vegetation was absent on the shorelines of 77% of parcels surveyed, but it is unknown as to whether vegetation naturally occurs along these shoreline areas. Regardless of presence or absence of emergent vegetation, parcels can now be tracked to determine changes occurring over time.

Recommendations

Historically, most shoreline surveys in this part of Michigan have been conducted at the request of lake associations or as components of watershed management plans and therefore, include a comprehensive list of recommendations. Although this greenbelt survey was sponsored by a township government with a specific goal of documenting conditions to aid ordinance enforcement, the Watershed Council believes that a number of recommendations still warrant inclusion in the report. The following are recommended actions to both help with ordinance enforcement and to protect and improve the water quality of Walloon Lake as well as other water resources in the area. The Watershed Council can assist the Resort Township government to implement most recommendations.

1. **Broadcast results of the survey.** The results of the survey should be shared with the public, and in particular lakeshore property owners, to the greatest extent possible to both aid understanding and enforcement of the greenbelt ordinance and to preserve greenbelts on lake and stream shorelines. Sharing results with the Walloon lake shoreline property owners should increase awareness and understanding of the ordinance, alert people to measures being taken to enforce it, and hopefully result in greater compliance. Sharing results

with the general public has the potential to increase understanding of the ecological value of greenbelts and the need to protect them and thereby lead to greater stewardship of greenbelts throughout the region. There are many ways to share survey results including local media (newspapers, radio shows, etc.), the internet, and mailings.

2. **Get other local governments on board.** Promote your success at developing a greenbelt ordinance and documenting conditions for enforcement with other local governments. Other local governments that take your lead and institute greenbelt ordinances will further protect and improve the region's water resources while at the same time giving greater credence to your own ordinance.
3. **Conduct an information and education campaign.** Collaborate with the Watershed Council, Walloon Lake Association, and others to plan and implement an information and education campaign to promote stewardship of existing greenbelts and creation of new greenbelts by highlighting information gathered in study. This endeavor should encourage shoreline property owners to maintain or create healthy greenbelts along as much shoreline as possible and to the greatest depth possible, but also include complex vertical structure, high plant density and great species diversity. Discourage shoreline alterations such as seawalls, large riprap and sand beaches and promote natural shorelines and biotechnical erosion control techniques. Also, discourage the use of turf grass on the shoreline and the removal of aquatic vegetation. A successful I & E campaign could result in a net greenbelt gain, going beyond the ordinance's function of protecting greenbelts and resulting in the improvement of existing greenbelts and the creation of new greenbelts.
4. **Review the zoning ordinance and address potential problems.** Upon reviewing the waterfront regulations in Section 1808 of the Resort Township Zoning Ordinance Watershed Council staff discovered two potential problems that could limit the ordinance's ability to protect greenbelts in the township. Under Part 1. MINIMUM WATERFRONT SETBACKS, protected water bodies are limited to those identifiable on U.S. Geological Survey Maps of Resort

Township. Some important water features may not be included in the USGS maps and thus, would be exempt from the waterfront regulations. Emmet County is currently updating its master plan and may try to address this issue (current suggested language alteration is “Any property which borders on or contains **or is connected to** a natural river...”). We recommend that the Township observe how the County deals with this issue and, where appropriate, make changes to the Resort Township Zoning Ordinance so that greenbelts along all important water features are protected. The other potential problem found in the waterfront regulations is part 1.c, which addresses ground decking and patios. The ordinance states that decks and patios can be located within 25 feet of the shoreline, which is within the area designated for greenbelt protection.

Furthermore, there is no limit on deck length. Thus, it appears that a property owner could build a deck or patio within the protected greenbelt area and throughout the entire length of the shoreline. We recommend reviewing this part of the zoning ordinance and altering the language to prohibit deck and patio construction within the greenbelt or limiting the shoreline length of the deck/patio.

5. **Develop more information with existing data.** Although all data collected and developed during the survey is included with this report, there are opportunities to generate additional statistics using the existing data. One such example mentioned in the report is statistics for the length of shoreline (distance) with greenbelts. This information was not gathered during the survey, but fairly accurate figures could be generated using GIS data layers and survey data. Such information could be useful for use in reports, to determine changes over time, and to make comparisons with other areas.
6. **Repeat survey every 3-5 years.** Lake shorelines change continually, both in terms of physical characteristics and land ownership. Therefore, it is recommended that a greenbelt shoreline survey be conducted at a minimum of every 3-5 years. Repeating the survey at regular intervals will ensure that information used to enforce the ordinance is current and will also help detect ordinance violations.

CONCLUSION

Walloon Lake, like most lakes throughout the region, continues to face development pressure along its shoreline. As shorelines are developed and redeveloped greenbelt vegetation, the critical interface between land and water that provides a myriad of benefits to the aquatic ecosystem, is often impacted, reduced in size, or removed altogether. Relatively little undeveloped shoreline remains on Walloon Lake, but there are many developed parcels with intact, healthy greenbelts that also need protection. Resort Township took the lead in establishing the regulatory framework for protecting these greenbelts by including waterfront regulations in its zoning ordinance. Documentation of existing conditions, a necessity for enforcing the ordinance, did not exist, so the township contracted with the Tip of the Mitt Watershed Council to conduct a greenbelt shoreline survey. The information collected during the survey provides a mechanism to enforce the ordinance, but also provides great insight into the status of greenbelts along many miles of the Walloon Lake shoreline. Furthermore, sharing results from this survey and educating the public regarding the importance of greenbelts has the potential to improve greenbelts in the township and protect and improve greenbelts throughout the region.

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Appendix A. Sample greenbelt data sheet.

Tip of the Mitt Watershed Council-Shoreline Greenbelt Survey
Note: Surveying should be done from the Ordinary High Water Mark (OHWM)

Date : _____ Lake: _____

TOMWC Parcel ID #: _____ Parcel ID #: _____

Check one: Developed Undeveloped

House description: _____

Greenbelt length (of total shoreline):
 None (0%) <10% 10-25% 25-75% >75%

Greenbelt average depth: <10 ft. 10-40 ft. >40 ft.
Max. _____ ft. Min. _____ ft.

Turf (percent of total shoreline):
 None (0%) <10% 10-25% 25-75% >75%

Vertical Structure (check all that apply):
 Ground cover Understory Overstory

Density (check one):
 Sparse Medium Dense

Species diversity (check one):
 Uniform Several spp. Many spp.

Emergent vegetation: Present Absent

Structures (check all that apply):
 Sea wall Biotechnical XXL Riprap Other

Notes: _____

Appendix B. Greenbelt characteristic data from database.

PID	TOM_ID	DEVEL	LENG	DEP	TURF	VERTIC	DENS	DIVERS	EMERG	STRUCT	SCORE
13-18-25-476-008	12	Yes	4	3	0	GUO	D	M	A	O	15
13-18-25-476-006	13	Yes	4	3	0	GUO	D	M	A	O	15
13-18-25-476-004	14	Yes	1	1	4	O	S	U	A	R	0
13-18-25-476-003	15	Yes	0	0	4	NA	NA	NA	A	R	-5
13-18-25-476-001	16	Yes	4	1	0	GU	M	S	P	O	10
13-18-25-476-002	17	Yes	0	0	4	NA	NA	NA	P	B	-4
13-18-25-476-005	18	Yes	0	0	4	NA	NA	NA	P	R	-5
13-18-25-476-007	19	Yes	3	1	2	GUO	M	S	P	N	9
13-18-25-476-009	20	Yes	0	0	4	NA	NA	NA	P	R	-5
13-18-25-476-010	21	No	3	1	3	GUO	M	S	A	N	8
13-18-25-476-020	22	Yes	4	1	0	GU	M	S	P	N	11
13-18-25-476-021	23	Yes	1	1	0	GU	D	U	P	N	8
13-18-25-476-012	24	Yes	4	1	1	G	S	S	A	N	8
13-18-25-476-013	25	Yes	2	1	3	GU	D	M	A	R	7
13-18-25-476-014	26	Yes	2	1	3	GU	D	M	A	R	7
13-18-25-476-015	27	Yes	1	1	2	GUO	S	S	A	R	5
13-18-25-476-016	28	No	4	3	0	GUO	M	S	A	R	13
13-18-25-476-017	29	Yes	4	1	0	GO	M	S	A	R	10
13-18-25-476-018	30	Yes	4	1	3	O	S	U	A	R	4
13-18-25-476-019	31	Yes	1	1	4	O	S	U	A	R	0
13-18-36-200-004	32	No	4	3	0	GUO	D	M	A	N	16
13-18-36-200-005	33	Yes	4	1	0	GUO	S	S	P	N	11
13-18-36-200-006	34	Yes	2	2	3	UO	D	S	A	R	7
13-18-36-200-007	35	Yes	2	1	3	GO	S	S	P	R	4
13-18-36-200-008	36	Yes	1	1	3	GO	S	U	P	S	1
13-18-36-200-011	37	Yes	2	3	3	GUO	D	M	P	N	11
13-18-36-200-013	38	Yes	0	0	4	O	S	NA	P	R	-3
13-18-36-200-018	39	Yes	0	0	4	O	S	NA	P	R	-3
13-18-36-200-019	40	Yes	4	3	0	GO	M	S	A	N	13
13-18-36-200-020	41	No	4	2	0	GUO	M	M	P	N	14
13-18-36-200-021	42	Yes	2	2	4	GUO	D	M	P	N	9
13-18-36-200-023	43	Yes	2	2	4	GUO	D	M	P	N	9
13-18-36-200-024	44	Yes	0	0	4	NA	NA	NA	P	N	-4
13-18-36-200-025	45	Yes	1	1	4	G	S	S	P	N	2
13-18-36-200-026	46	Yes	1	1	4	G	S	S	P	N	2
13-18-36-200-027	47	Yes	0	0	4	NA	NA	NA	P	R	-5
13-18-36-200-028	48	Yes	0	0	4	NA	NA	NA	P	R	-5
13-18-36-200-029	49	Yes	0	0	4	NA	NA	NA	P	R	-5
13-18-36-200-030	50	Yes	4	3	0	GUO	D	M	A	N	16
13-18-36-200-031	51	Yes	0	0	4	NA	NA	NA	A	S	-6
13-18-36-200-032	52	Yes	0	0	4	O	S	NA	A	S	-4
13-18-36-200-033	53	Yes	0	0	4	O	S	NA	A	R	-3
13-18-36-200-035	54	Yes	0	0	4	O	S	NA	A	S	-4
13-18-36-200-036	55	Yes	0	0	4	O	S	NA	A	N	-2

PID	TOM_ID	DEVEL	LENG	DEP	TURF	VERTIC	DENS	DIVERS	EMERG	STRUCT	SCORE
13-18-36-200-037	56	Yes	0	0	4	O	S	NA	A	N	-2
13-18-36-200-048	57	No	4	3	0	GUO	D	M	A	N	16
13-18-36-200-050	58	No	4	3	0	GUO	D	M	A	N	16
13-18-36-200-055	59	No	1	1	4	GUO	D	M	P	R	6
13-18-36-200-038	60	Yes	3	1	3	GUO	M	S	P	R	7
13-18-36-200-039	61	Yes	0	0	4	NA	NA	NA	A	R	-5
13-18-36-200-052	62	Yes	1	1	4	GUO	M	S	P	R	4
13-18-36-400-004	64	Yes	4	1	0	GU	M	S	P	N	11
13-18-36-400-008	65	Yes	0	0	4	NA	NA	NA	A	N	-4
13-18-36-400-006	66	Yes	0	0	4	O	S	U	A	R	-2
13-18-36-426-001	67	Yes	4	2	0	GU	D	S	A	B	13
13-18-36-426-003	68	Yes	0	0	4	NA	NA	NA	A	R	-5
13-18-36-426-004	69	Yes	4	1	0	GU	S	S	A	R	9
13-18-36-426-005	70	Yes	1	1	3	G	S	S	A	R	2
13-18-36-426-007	71	Yes	0	0	4	NA	NA	NA	A	R	-5
13-18-36-426-008	72	Yes	0	0	4	NA	NA	NA	A	R	-5
13-18-36-426-010	73	Yes	0	0	4	NA	S	S	P	R	-2
13-18-36-426-012	74	Yes	0	0	4	NA	NA	NA	P	N	-4
13-18-36-426-014	75	Yes	3	1	0	GUO	M	S	P	N	11
13-18-36-426-015	76	Yes	3	1	0	GUO	M	S	P	O	10
13-18-36-426-016	77	Yes	3	1	0	GUO	M	S	P	O	10
13-18-36-426-017	78	Yes	0	0	4	NA	NA	NA	A	N	-4
13-18-36-426-018	79	Yes	0	0	4	NA	NA	NA	A	N	-4
13-18-36-426-019	80	Yes	0	0	4	NA	NA	NA	A	R	-5
13-19-31-300-002	81	Yes	4	2	0	GUO	D	M	A	N	15
13-19-31-300-020	82	Yes	4	2	0	GUO	M	M	A	N	14
13-19-31-300-015	83	Yes	2	1	3	O	M	U	A	R	3
13-19-31-300-003	84	Yes	4	2	0	GUO	D	S	A	R	13
13-19-31-300-004	85	Yes	3	1	2	GUO	M	S	A	N	9
13-19-31-300-014	86	Yes	4	2	0	GUO	D	M	A	N	15
13-19-31-300-005	87	Yes	4	3	0	GUO	D	M	A	N	16
13-19-31-300-010	88	Yes	4	3	0	GUO	D	M	A	N	16
13-19-31-300-008	89	Yes	4	3	0	GUO	M	M	A	N	15
13-19-31-300-012	90	Yes	4	3	0	GUO	M	M	A	N	15
13-19-31-300-017	91	No	4	3	0	GUO	D	M	A	N	16
13-22-06-100-015	92	Yes	4	2	0	GUO	D	M	A	N	15
13-22-06-100-013	93	Yes	4	2	1	GUO	D	M	A	S	12
13-22-06-100-005	94	Yes	1	1	4	UO	S	S	A	R	2
13-22-06-100-008	95	Yes	3	3	3	GUO	M	M	A	R	10
13-22-06-151-001	96	Yes	3	2	3	GUO	M	S	A	R	8
13-22-06-151-002	97	Yes	1	1	4	UO	D	S	A	R	4
13-22-06-151-003	98	Yes	3	1	3	GUO	M	M	P	BR	8
13-22-06-151-004	99	Yes	4	2	0	GUO	D	M	A	N	15
13-22-06-151-005	100	Yes	1	1	4	UO	S	U	A	RO	1
13-22-06-151-006	101	Yes	0	0	4	NA	NA	NA	A	RO	-5
13-22-06-151-007	102	Yes	4	2	1	GUO	D	M	A	N	14

PID	TOM_ID	DEVEL	LENG	DEP	TURF	VERTIC	DENS	DIVERS	EMERG	STRUCT	SCORE
13-22-06-151-019	103	No	4	3	0	GUO	D	M	A	N	16
13-22-06-151-020	104	Yes	4	3	0	GUO	D	M	P	N	16
13-22-06-151-009	105	Yes	3	1	3	GO	M	S	P	RO	6
13-22-06-151-010	106	Yes	3	1	3	GO	S	U	A	RO	4
13-22-06-151-011	107	Yes	0	0	4	NA	NA	NA	A	RO	-5
13-22-06-151-012	108	Yes	1	1	4	G	S	U	A	RO	0
13-22-06-151-013	109	Yes	2	2	1	G	M	S	A	R	7
13-22-06-151-014	110	Yes	0	0	4	G	S	U	P	R	-2
13-22-06-151-015	111	Yes	1	1	3	GO	S	S	A	R	3
13-22-06-151-016	112	Yes	4	2	0	GO	S	S	P	O	10
13-22-06-151-017	113	Yes	3	2	2	GUO	M	M	P	RO	10
13-22-06-151-018	114	Yes	2	2	3	GO	D	S	P	N	8
13-22-06-300-002	115	Yes	3	2	3	GUO	D	M	P	N	11
13-22-06-300-003	116	No	4	3	0	UO	D	M	A	N	15
13-22-06-300-019	117	Yes	4	3	0	UO	MD	M	P	R	13
13-22-06-300-020	118	No	4	3	0	GUO	M	S	A	R	13
13-22-06-176-001	119	Yes	4	3	0	UO	D	M	A	R	14
13-22-06-176-002	120	Yes	4	3	0	UO	D	M	A	O	14
13-22-06-176-003	121	Yes	4	3	1	GUO	MD	M	A	R	13
13-22-06-176-004	122	Yes	3	2	3	GUO	D	S	A	R	9
13-22-06-176-005	123	Yes	2	1	4	GO	S	S	P	R	3
13-22-06-300-004	124	No	4	3	0	UO	D	M	A	N	15
13-22-06-300-005	125	Yes	4	2	0	GUO	S	M	P	R	12
13-22-06-300-021	126	Yes	4	3	0	UO	D	M	A	R	14
13-22-06-300-022	127	Yes	3	2	4	GO	S	S	A	R	5
13-22-06-300-009	128	Yes	3	2	3	GO	M	S	A	S	6
13-22-06-300-010	129	Yes	4	2	0	GUO	M	S	A	B	13
13-22-06-300-011	130	Yes	4	2	0	GUO	M	M	P	B	14
13-22-06-300-012	131	Yes	4	3	2	UO	D	M	A	B	13
13-22-06-300-013	132	Yes	4	3	0	UO	D	M	A	B	15
13-22-06-300-014	133	Yes	4	3	0	UO	MD	S	A	B	13
13-22-06-300-016	134	Yes	2	1	3	G	S	S	A	O	3
13-22-06-300-017	135	Yes	4	3	1	GUO	D	M	A	N	15
13-22-07-151-001	136	Yes	4	3	0	UO	D	M	P	N	15
13-22-07-151-002	137	Yes	2	2	3	GUO	D	S	A	N	9
13-22-07-151-003	138	Yes	2	2	3	GO	SD	S	A	N	7
13-22-07-151-004	139	Yes	2	2	3	GO	D	M	A	R	8
13-22-07-151-005	140	Yes	4	2	1	GUO	M	M	P	B	13
13-22-07-100-008	141	Yes	4	3	1	GUO	D	M	P	B	15
13-22-07-100-009	142	Yes	4	3	0	GUO	D	S	A	R	14
13-22-07-100-012	143	Yes	4	3	0	GUO	D	M	A	B	16
13-22-07-100-011	144	Yes	1	1	4	GO	D	U	P	N	4
13-22-07-100-010	145	Yes	0	0	0	O	S	U	A	R	2
13-22-07-100-007	146	Yes	3	2	2	GUO	D	M	P	B	12
13-22-07-100-006	147	Yes	1	2	4	G	D	S	A	R	4
13-22-07-100-005	148	Yes	4	3	0	UO	D	M	A	B	15

PID	TOM_ID	DEVEL	LENG	DEP	TURF	VERTIC	DENS	DIVERS	EMERG	STRUCT	SCORE
13-22-07-100-004	149	Yes	3	2	0	UO	M	S	A	R	10
13-22-07-100-003	150	Yes	4	3	0	UO	D	M	P	B	15
13-21-12-200-011	151	Yes	4	3	0	UO	MD	M	A	R	13
13-21-12-200-010	152	Yes	1	2	4	GO	S	S	A	R	3
13-21-12-200-009	153	Yes	0	0	4	GO	S	US	A	R	0
13-21-12-200-008	154	Yes	0	0	4	GO	S	US	A	R	0
13-21-12-200-007	155	Yes	4	2	0	GUO	M	M	P	R	13
13-21-12-200-006	156	Yes	4	2	1	UO	SD	S	A	B	11
13-21-12-200-013	157	Yes	1	2	4	GO	D	M	A	R	6
13-21-12-200-012	158	Yes	4	2	3	GUO	S	S	A	R	8
13-21-12-200-004	159	Yes	3	2	3	GUO	SM	S	A	R	8
13-21-12-200-003	160	Yes	1	1	4	GO	S	S	P	R	2
13-21-12-200-002	161	Yes	4	3	0	UO	D	M	A	BO	15
13-21-12-200-001	162	Yes	3	2	1	GUO	M	S	A	R	10
13-21-01-400-008	163	Yes	4	3	0	UO	M	S	A	R	12
13-21-01-400-007	164	Yes	3	2	0	UO	M	S	A	R	10
13-21-01-400-006	165	Yes	4	2	0	GUO	S	US	A	R	11
13-21-01-400-004	166	Yes	4	3	0	UO	D	M	A	BO	15
13-21-01-376-007	167	Yes	4	2	0	UO	D	M	A	B	14
13-21-01-376-006	168	Yes	4	2	0	UO	D	M	A	R	13
13-21-01-376-005	169	Yes	4	2	0	UO	D	M	P	O	13
13-21-01-376-004	170	Yes	2	2	3	GUO	SM	S	P	R	7
13-21-01-376-003	171	Yes	3	2	3	GO	M	S	A	B	8
13-21-01-376-002	172	Yes	3	3	2	GUO	MD	M	P	R	11
13-21-01-376-001	173	Yes	3	2	3	GO	M	S	P	B	8
13-21-01-351-006	174	Yes	4	2	0	UO	D	M	P	B	14
13-21-01-351-005	175	Yes	4	2	0	UO	M	S	A	B	12
13-21-01-351-015	176	No	4	3	0	UO	D	M	A	N	15
13-21-01-351-014	177	Yes	4	2	0	UO	M	M	P	SB	11
13-21-01-351-011	178	No	4	3	0	UO	D	M	P	B	15
13-21-01-351-010	179	Yes	4	2	0	UO	MD	S	A	R	11
13-21-01-351-003	180	Yes	2	1	3	GO	M	S	A	R	5
13-21-01-351-013	181	Yes	2	1	3	GUO	S	S	A	RO	5
13-21-01-351-012	182	Yes	3	1	3	GUO	S	S	A	R	6
13-21-01-351-001	183	Yes	4	3	0	UO	D	M	A	SBO	14
13-21-02-476-010	184	Yes	4	3	0	UO	MD	M	A	B	14
13-21-02-476-009	185	Yes	4	3	0	UO	M	S	A	BR	12
13-21-02-476-008	186	Yes	3	1	3	GUO	S	S	A	O	6
13-21-02-476-007	187	Yes	4	2	1	GUO	M	S	A	B	12
13-21-02-476-006	188	Yes	3	2	0	UO	S	S	A	B	10
13-21-02-476-005	189	Yes	3	2	0	GUO	M	S	A	SRO	10
13-21-02-476-004	190	Yes	4	2	0	GUO	M	S	A	RO	12
13-21-02-476-003	191	Yes	4	3	0	UO	M	S	A	RO	12
13-21-02-476-002	192	Yes	2	1	0	GU	S	U	A	B	7
13-21-02-476-012	193	Yes	3	2	0	UO	D	M	A	B	13
13-21-02-476-011	194	No	2	2	2	GUO	SD	S	A	R	8

PID	TOM_ID	DEVEL	LENG	DEP	TURF	VERTIC	DENS	DIVERS	EMERG	STRUCT	SCORE
13-21-02-326-014	195	Yes	4	3	0	UO	D	M	A	R	14
13-21-02-326-013	196	Yes	3	2	2	GO	D	S	A	S	8
13-21-02-326-012	197	Yes	3	2	0	GO	M	U	A	R	9
13-21-02-326-018	198	Yes	4	3	0	UO	D	M	A	R	14
13-21-02-326-015	199	Yes	4	2	0	UO	SD	S	P	N	12
13-21-02-326-010	200	Yes	3	2	0	UO	MD	M	P	B	12
13-21-02-326-009	201	Yes	3	2	0	UO	MD	S	A	R	10
13-21-02-326-008	202	Yes	3	2	0	UO	SM	S	A	R	10
13-21-02-300-004	203	Yes	4	2	0	UO	MD	M	P	B	13
13-21-02-300-003	204	Yes	4	3	0	UO	D	M	A	B	15
13-21-02-300-002	205	Yes	4	3	0	UO	D	M	A	B	15
13-21-02-326-007	206	Yes	4	3	0	UO	MD	M	A	R	13
13-21-02-326-006	207	Yes	3	2	2	GUO	M	S	A	R	9
13-21-02-326-005	208	Yes	1	1	4	GO	S	S	A	N	3
13-21-02-326-004	209	Yes	1	1	4	GO	S	S	A	N	3
13-21-02-326-003	210	Yes	1	1	4	GUO	S	US	A	O	3
13-21-02-326-002	211	Yes	1	1	4	GO	S	U	A	R	1
13-21-02-326-001	212	Yes	3	2	3	GUO	M	S	A	R	8
13-21-02-100-019	213	Yes	3	2	0	UO	S	S	A	B	10
13-21-02-100-018	214	No	4	3	0	UO	D	M	A	B	15
13-21-02-100-025	215	No	4	3	0	UO	D	M	A	B	15
13-21-02-100-023	216	Yes	3	2	0	UO	D	M	A	R	12
13-21-02-100-028	217	Yes	4	2	0	UO	D	M	P	R	13
13-21-02-100-012	218	Yes	4	3	0	UO	D	M	A	BO	15
13-21-02-100-011	219	Yes	3	3	0	UO	D	M	A	SR	12
13-21-02-100-010	220	Yes	3	3	0	UO	D	M	A	RO	13
13-21-02-100-008	221	Yes	4	3	0	UO	D	M	A	RO	14
13-21-02-100-007	222	Yes	4	3	0	UO	D	M	A	R	14
13-21-02-100-006	223	No	4	3	0	UO	D	M	A	RO	14
13-21-02-100-005	224	Yes	4	3	0	UO	D	M	A	R	14
13-21-02-100-004	225	Yes	3	1	3	GO	S	S	P	B	6
13-21-02-100-003	226	Yes	3	2	0	GO	S	S	A	B	10
13-21-02-100-033	227	Yes	1	1	4	GO	S	U	P	R	1
13-21-02-100-032	228	Yes	0	0	4	GO	S	U	A	N	0
13-21-02-100-030	229	Yes	1	2	4	GO	S	S	P	N	4
13-21-02-100-021	230	Yes	0	0	4	GO	S	U	A	N	0
13-21-02-101-002	231	Yes	1	1	4	GO	S	U	A	N	2
13-21-02-101-003	232	Yes	0	0	4	GO	S	U	A	N	0
13-21-02-101-004	233	Yes	0	0	4	GO	S	U	A	N	0
13-21-02-101-005	234	Yes	2	2	4	GO	S	S	A	N	5
13-21-02-101-006	235	Yes	1	1	4	GO	S	S	A	R	2
13-21-02-101-008	236	Yes	1	1	4	GO	S	U	A	R	1
13-21-02-101-009	237	Yes	1	1	4	GO	S	U	A	R	1
13-21-02-101-010	238	Yes	2	1	4	GO	S	S	A	R	3
13-21-02-101-013	239	Yes	3	1	0	GO	S	S	A	R	8
13-18-35-353-004	240	Yes	3	1	2	GO	M	S	A	R	7

PID	TOM_ID	DEVEL	LENG	DEP	TURF	VERTIC	DENS	DIVERS	EMERG	STRUCT	SCORE
13-18-35-353-003	241	Yes	3	1	2	GO	M	S	A	R	7
13-18-35-353-002	242	Yes	3	1	0	UO	S	S	A	RO	8
13-18-35-353-007	243	Yes	2	1	3	GO	M	U	A	R	4
13-18-35-352-005	244	Yes	4	2	1	UO	M	M	A	R	11
13-18-35-352-004	245	Yes	4	2	1	UO	M	M	A	R	11
13-18-35-352-003	246	Yes	3	2	2	GUO	SD	M	A	BO	10
13-18-35-352-002	247	No	3	2	0	UO	D	M	A	RO	12
13-18-35-352-006	248	Yes	3	2	1	UO	MD	S	A	R	9
13-18-35-301-015	249	Yes	3	2	1	GUO	MD	S	A	O	10
13-18-35-301-013	250	Yes	3	2	3	GUO	MD	M	A	BRO	9
13-18-35-301-012	251	No	4	3	0	UO	D	M	A	BO	15
13-18-35-301-011	252	Yes	3	2	0	UO	M	S	A	R	10
13-18-35-301-010	253	Yes	4	3	0	UO	D	M	A	BO	15
13-18-35-301-009	254	Yes	4	3	0	UO	SD	M	A	R	13
13-18-35-301-008	255	Yes	3	2	3	GUO	M	S	A	RO	8
13-18-35-301-007	256	Yes	1	1	4	GO	S	U	A	R	1
13-18-35-301-006	257	Yes	0	0	4	GO	S	U	A	R	-1
13-18-35-301-005	258	Yes	0	0	4	GO	S	U	A	R	-1
13-18-35-301-004	259	Yes	1	1	4	GO	S	U	A	R	1
13-18-35-301-003	260	Yes	3	1	3	GUO	M	S	A	R	7
13-18-35-301-002	261	Yes	3	1	2	GUO	M	S	A	RO	8
13-18-35-301-001	262	Yes	3	1	1	UO	M	S	A	SR	7
13-18-35-300-002	263	Yes	2	2	4	GO	S	S	A	BR	4
13-18-35-300-001	264	Yes	1	2	4	GO	S	S	A	BR	3
13-18-35-176-013	265	Yes	3	1	3	GO	M	S	A	R	6
13-18-35-176-015	266	Yes	3	1	2	GUO	M	S	A	R	8
13-18-35-176-010	267	Yes	1	2	4	GO	S	S	A	R	3
13-18-35-176-009	268	Yes	1	2	4	GO	S	S	A	R	3
13-18-35-176-014	269	Yes	2	2	4	GUO	SM	S	A	R	6
13-18-35-176-006	270	Yes	1	1	4	GO	S	U	A	R	1
13-18-35-176-004	271	Yes	1	1	4	GO	S	U	A	RO	1
13-18-35-100-028	272	Yes	4	2	1	GUO	MD	M	A	B	13
13-18-35-100-031	273	Yes	4	2	1	GUO	M	M	A	BO	13
13-18-35-176-003	274	Yes	4	2	0	GUO	M	M	A	BO	14
13-18-35-176-002	275	Yes	4	3	0	UO	D	M	A	R	14
13-18-35-176-001	276	Yes	4	3	0	UO	D	M	A	R	14
13-18-35-100-030	277	Yes	4	2	0	UO	D	M	A	B	14
13-18-35-100-029	278	Yes	4	1	0	UO	M	S	A	RO	10
13-18-35-100-027	279	Yes	4	2	2	UO	M	S	A	RO	9
13-18-35-100-026	280	Yes	3	2	2	GUO	M	M	A	R	10
13-18-35-100-025	281	Yes	1	2	3	GUO	S	S	A	R	5
13-18-35-100-024	282	Yes	4	2	0	UO	D	M	A	O	13
13-18-35-100-023	283	Yes	4	2	0	UO	S	S	A	RO	10
13-18-35-100-034	284	Yes	3	2	2	GUO	M	M	A	BO	11
13-18-35-100-020	285	Yes	2	2	2	GO	M	S	A	SR	6

PID	TOM_ID	DEVEL	LENG	DEP	TURF	VERTIC	DENS	DIVERS	EMERG	STRUCT	SCORE
13-18-35-100-019	286	Yes	3	2	3	GUO	D	M	A	R	10
13-18-35-100-018	287	Yes	4	3	0	UO	D	M	A	BRO	15
13-18-35-100-017	288	No	4	3	0	UO	D	M	A	RO	14
13-18-35-100-014	289	Yes	4	3	1	GUO	D	M	A	R	14
13-18-35-100-012	290	Yes	2	1	4	GUO	SM	S	A	R	5
13-18-35-100-011	291	Yes	4	2	0	UO	D	S	A	R	12
13-18-35-100-010	292	Yes	2	1	4	GUO	S	S	A	RO	4
13-18-35-100-008	293	Yes	3	1	3	GUO	S	S	A	R	6
13-18-35-100-007	294	No	1	1	4	GO	S	S	A	BR	2
13-18-35-100-001	295	Yes	4	2	0	UO	MD	M	A	R	12
13-18-26-300-026	296	Yes	1	1	0	GO	S	S	A	RO	6
13-18-26-300-025	297	Yes	3	1	3	GUO	M	S	A	R	7
13-18-26-300-024	298	Yes	1	1	4	GUO	S	S	A	R	3
13-18-26-300-023	299	Yes	4	1	1	UO	S	S	A	R	8
13-18-26-300-022	300	Yes	3	1	3	GUO	SM	S	P	RO	7
13-18-26-300-021	301	Yes	4	3	0	UO	D	M	P	RO	14
13-18-26-300-019	302	Yes	4	2	1	UO	D	M	A	BRO	12
13-18-26-300-018	303	Yes	4	2	0	UO	M	S	A	RO	11
13-18-26-300-032	304	Yes	3	1	3	GUO	D	S	A	R	8
13-18-26-300-031	305	Yes	0	0	4	GO	S	U	A	R	-1
13-18-26-300-030	306	Yes	1	1	4	GUO	S	S	A	R	3
13-18-26-300-029	307	Yes	4	2	0	GO	S	S	A	BR	10
13-18-26-300-011	308	Yes	3	2	0	GO	M	S	A	RO	10
13-18-26-300-010	309	Yes	4	2	0	GUO	D	M	A	N	15
13-18-26-300-009	310	Yes	4	2	0	GO	M	M	A	R	12
13-18-26-300-008	311	Yes	2	1	4	GUO	S	S	A	RO	4
13-18-26-300-007	312	Yes	0	0	4	G	S	U	A	R	-2
13-18-26-300-006	313	Yes	4	2	1	GUO	D	M	A	N	14
13-18-26-300-005	314	Yes	4	3	0	GUO	D	M	A	N	16
13-18-26-300-004	315	Yes	4	3	0	GO	M	M	A	N	14
13-18-26-300-003	316	Yes	4	3	0	GU	D	S	A	R	14
13-18-27-400-005	317	Yes	4	3	0	GUO	D	M	A	N	16
13-18-27-400-004	318	Yes	4	3	0	GUO	D	M	A	N	16
13-18-27-400-003	319	Yes	2	1	4	GUO	M	S	A	N	6
13-18-27-400-002	320	Yes	3	3	3	GUO	M	M	A	R	10
13-18-27-400-001	321	Yes	4	2	0	GUO	M	SM	A	R	12
13-18-27-200-019	322	Yes	4	2	2	GUO	M	M	A	N	12
13-18-27-200-030	323	Yes	4	3	0	GUO	M	M	A	N	15
13-18-27-200-029	324	Yes	4	3	0	GUO	D	M	A	N	16
13-18-27-200-023	325	Yes	4	3	0	GUO	D	M	A	N	16
13-18-27-200-015	326	Yes	4	3	0	GUO	D	M	A	N	16
13-18-27-200-014	327	Yes	3	2	0	UO	M	M	A	RO	11
13-18-27-200-013	328	Yes	4	3	0	GUO	M	M	A	N	15
13-18-27-200-012	329	Yes	4	3	0	GUO	D	M	A	R	15
13-18-27-200-011	330	Yes	4	3	0	GUO	D	M	A	N	16

PID	TOM_ID	DEVEL	LENG	DEP	TURF	VERTIC	DENS	DIVERS	EMERG	STRUCT	SCORE
13-18-27-200-010	331	Yes	4	3	0	GUO	D	M	A	N	16
13-18-27-200-021	332	Yes	4	3	0	GUO	D	M	A	R	15
13-18-27-200-027	333	Yes	3	3	3	GUO	M	M	A	R	10
13-18-27-200-008	334	Yes	3	2	3	GUO	M	M	P	N	10
13-18-27-200-007	335	Yes	1	1	4	GO	S	S	A	R	2
13-18-27-200-005	336	Yes	1	1	4	O	S	S	A	R	1
13-18-27-200-025	337	Yes	3	1	3	GO	S	S	A	O	5
13-18-27-200-026	338	Yes	3	2	3	GUO	M	M	P	RO	9
13-18-27-200-004	339	Yes	3	3	2	GUO	M	M	P	N	12
13-18-27-201-008	340	Yes	4	2	0	GUO	M	M	A	N	14
13-18-27-201-010	341	Yes	4	3	0	GUO	D	M	A	N	16
13-18-27-201-005	342	Yes	4	3	0	GUO	D	M	A	N	16
13-18-27-201-004	343	Yes	4	3	0	GUO	D	M	A	N	16
13-18-27-201-009	344	Yes	4	3	0	GUO	D	M	A	N	16
13-18-27-201-001	345	Yes	4	3	0	GO	S	S	A	R	11
13-18-22-377-009	346	No	4	3	0	GUO	D	M	A	R	15
13-18-22-377-008	347	Yes	4	3	0	GUO	D	M	A	R	15
13-18-22-377-007	348	Yes	4	3	0	GUO	D	M	A	N	16
13-18-22-377-006	349	No	4	3	0	GUO	D	M	A	N	16
13-18-22-377-005	350	Yes	4	3	0	GUO	M	M	A	N	15
13-18-22-377-004	351	No	4	3	0	GUO	D	M	A	N	16
13-18-22-377-003	352	Yes	4	3	0	GUO	D	M	A	N	16
13-18-22-377-002	353	Yes	4	3	0	GUO	M	M	A	N	15
13-18-22-377-001	354	No	4	3	0	GUO	D	M	A	N	16
13-18-22-300-009	355	Yes	2	1	4	GUO	D	M	A	R	7
13-18-22-300-008	356	Yes	2	2	3	GO	M	S	A	N	7
13-18-22-376-001	357	Yes	3	1	3	GO	S	S	A	N	6
13-18-22-300-034	358	Yes	4	3	0	GUO	D	M	A	N	16
13-18-22-300-033	359	Yes	4	3	0	GO	M	M	A	R	13
13-18-22-300-035	360	Yes	4	3	0	GUO	M	M	A	R	14
13-18-22-300-031	361	Yes	4	3	0	GO	M	S	A	N	13
13-18-22-300-030	362	Yes	4	3	0	GUO	M	M	A	N	15
13-18-22-300-016	363	Yes	4	3	0	GO	M	S	A	N	13
13-18-22-300-024	364	No	4	3	0	GUO	D	M	A	N	16
13-18-22-300-036	365	No	4	3	0	GUO	D	M	A	N	16
13-18-22-300-022	366	No	4	3	0	GUO	D	M	A	N	16
13-18-22-100-024	367	No	4	3	0	GUO	D	M	A	R	15
13-18-22-300-021	368	Yes	4	2	0	UO	M	S	A	R	11
13-18-22-100-023	369	Yes	4	2	0	GO	S	S	A	R	10
13-18-22-100-026	370	No	4	2	0	O	M	S	A	R	10
13-18-22-100-025	371	No	4	2	0	O	M	S	A	R	10
13-18-22-100-018	372	Yes	4	3	0	GO	M	S	A	R	12
13-18-22-100-014	373	Yes	4	3	0	UO	D	M	A	N	15
13-18-22-100-028	374	No	4	3	0	GUO	D	M	A	N	16
13-18-22-100-029	375	Yes	3	2	3	GO	M	S	P	R	7

PID	TOM_ID	DEVEL	LENG	DEP	TURF	VERTIC	DENS	DIVERS	EMERG	STRUCT	SCORE
13-18-22-100-011	376	Yes	4	3	1	GUO	D	M	P	N	15
13-18-22-100-009	377	Yes	4	2	1	GO	M	S	A	R	10
13-18-22-100-006	378	Yes	4	3	1	GUO	D	M	P	N	15
13-18-22-100-005	379	Yes	4	3	1	GUO	D	M	P	N	15
13-18-22-100-004	380	No	4	3	0	GUO	D	M	A	N	16
13-18-22-100-007	381	Yes	3	1	3	GO	M	S	P	R	6
13-18-22-100-008	382	Yes	3	1	3	O	S	U	P	N	4
	383	No	0	0	0	NA	NA	NA			0
13-18-21-200-003	384	Yes	4	3	0	GUO	D	M	A	R	15
13-18-21-200-004	385	Yes	4	2	0	GUO	M	M	A	N	14
13-18-21-200-012	386	Yes	4	2	0	GUO	M	M	A	N	14
13-18-21-200-011	387	Yes	4	2	0	GUO	M	S	A	R	12
13-18-21-200-009	388	Yes	4	2	1	GUO	D	M	A	R	13
13-18-21-200-007	389	Yes	4	1	2	GO	S	S	A	N	8
13-18-21-200-005	390	Yes	4	1	0	GU	D	S	A	R	11
13-18-16-400-006	391	Yes	2	2	3	GUO	M	S	A	R	7
13-18-16-400-004	392	Yes	4	2	1	GUO	D	M	A	O	13
13-18-16-400-003	393	Yes	2	1	4	GUO	S	S	A	SRO	3
13-18-16-400-002	394	No	4	3	0	GUO	D	M	P	N	16
13-18-16-400-001	395	No	4	3	0	GUO	D	M	P	N	16
13-18-16-100-005	396	Yes	4	3	1	GUO	D	M	P	RO	14
13-18-16-100-002	397	Yes	4	3	0	GUO	D	M	P	N	16
13-18-09-300-009	398	No	4	3	4	GUO	D	M	P	N	12
13-18-16-100-001	399	No	4	3	4	GUO	D	M	P	N	12
13-18-16-300-019	400	No	4	3	4	GUO	D	M	P	N	12
13-18-16-300-020	401	No	4	3	4	GUO	D	M	P	N	12
13-18-16-300-021	402	No	4	3	4	GUO	D	M	P	N	12
13-18-16-300-022	403	No	4	3	4	GUO	D	M	P	N	12
13-18-16-300-023	404	No	4	3	4	GUO	D	M	P	N	12
13-18-16-300-024	405	No	4	3	4	GUO	D	M	P	N	12
13-18-16-300-025	406	No	4	3	4	GUO	D	M	P	N	12
13-18-16-300-026	407	No	4	3	4	GUO	D	M	P	N	12
13-18-16-300-027	408	No	4	3	4	GUO	D	M	P	N	12
13-18-16-300-028	409	No	4	3	4	GUO	D	M	P	N	12
13-18-16-300-012	410	No	4	3	4	GUO	D	M	P	N	12
13-18-16-300-013	411	Yes	4	3	0	GUO	D	M	A	N	16
13-18-16-300-014	412	Yes	4	2	0	O	M	S	A	R	10
13-18-16-300-015	413	No	4	3	0	GUO	D	M	A	N	16
13-18-16-300-016	414	No	4	3	0	GUO	D	M	A	N	16
13-18-16-300-029	415	No	4	3	0	GUO	D	M	A	N	16

PID=Parcel identification number, TOM_ID=Tip of the Mitt Watershed Council identification number, DEVEL=Developed parcel, LENG=Greenbelt length (0: 0% of shoreline, 1: <10%, 2: 10-25%, 3: 25-75%, 4: >75%), DEP=Greenbelt depth (0: no greenbelt, 1: <10', 2: 10-40', 3: >40'), TURF=Turf grass (0: 0% of shoreline, 1: <10%, 2: 10-25%, 3: 25-75%, 4: >75%),VERTIC=Vertical structure of greenbelt (G: groundcover, U: understory, O: overstory), DENS=Greenbelt density (S: sparse, M: Medium, D: Dense), DIVERS=Species diversity (U: Uniform, S: Several species, M: Many species), EMERG=Emergent vegetation (P: present, A: Absent), STRUCT=Shoreline structures (S: Seawall, R: Riprap, B: biotechnical, O=Other), SCORE=Total greenbelt score.