



# **LAKE BELLAIRE SHORELINE SURVEY SUMMARY REPORT**

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August 30, 2008





**Developed Lake Bellaire Shoreline**



**Undeveloped Lake Bellaire Shoreline**





**Landscaped region of Lake Bellaire Shoreline**



**Natural region of Lake Bellaire Shoreline**

## **Lake Bellaire Shoreline Survey Summary Report**

### **PURPOSE**

The purpose of the shoreline greenbelt survey was to evaluate the condition of the natural greenbelt buffer along the shoreline of Lake Bellaire in Antrim County, Michigan. Greenbelt buffers are extremely important to maintain high quality water and a healthy fishery. This survey provides a baseline of knowledge about the condition of the shoreline and points the direction toward its improvement. It is important for property owners to be aware of what constitutes a healthy shoreline. This report aims to encourage good stewardship of lakeshore properties.

The value of a greenbelt buffer is to provide a habitat for both animals and plants and reduce the impact of human activities on the lake. This buffer also forms a layer of protection to keep manmade chemicals and nutrients from entering the water. A key nutrient in our lakes produced by humans is phosphorus. The amount of phosphorus in a lake can make a huge difference on its health. Living organisms need phosphorus to live, but too much of this element can also be a problem. Some sources of phosphorus are lawn and farm fertilizers, decaying plants, runoff, and sewage. Runoff not only dissolves phosphorus from soils but also carries sediment rapidly into the lake. In areas with no greenbelt buffer the nutrients are carried directly into the lake. In extreme cases this can cause massive algal and aquatic plant growth. A greenbelt buffer is one of the best ways to protect the lake from both nutrients and sediment and native plants typically require less upkeep than invasives.

### **BACKGROUND**

The boundary between the water and the land is important. When riparians alter this boundary the result can cause problems in maintaining a natural balance for aquatic life. Seawalls and riprap do not provide the natural habitat for aquatic creatures. A better solution would be to stabilize the shoreline with bushes and other plants. The deeper this buffer region the better, but this survey has concentrated on the region within 40' of the shoreline.

Septic systems are commonly used in all residential building construction. Septic systems are regulated by the Northwest Michigan Community Health Agency Unified Sanitary Code. Revised in 2007 the code regulates new septic systems by requiring setbacks from surface water (lake or stream): 100'- absorption fields, 50'- septic tanks and 175'- toe of a mound system. A primary purpose of septic systems is to destroy pathogens. However, septic systems are not as efficient at removing nutrients from the waste stream. Municipal sewage systems, on the other hand, have a separate step to remove phosphorus and other nutrients. So, a significant portion of nutrients pass through the septic, enter the groundwater, and eventually enter the lake. Nutrients from fertilizers and septic systems are currently unregulated in the watershed. Besides a properly sited and maintained septic system and a minimal use of phosphorus containing

domestic waste, greenbelts and area plantings can reduce the amount of phosphorus than enters the groundwater.

According to the Grand Traverse Bay Watershed Protection Plan, the major threats to high water quality within the watershed are *sediments* from erosion and stormwater runoff and *nutrients* from fertilizers, stormwater runoff, and sewer and septic systems. *Sediments* are regulated by the Michigan Department of Environmental Quality. Antrim County is adopting a Soil Erosion, Sedimentation, and Stormwater Runoff Control Ordinance. Erosion is influenced by four factors: precipitation, soil type, slope, and vegetation. This survey looks at two of these our factors: slope and vegetation. According to the US Department of Agriculture General Soil Survey of Antrim County, Michigan (1978) the shoreline soil of Lake Bellaire is Tawas-Ensley-Roscommon. This soil is characterized by very poorly drained and poorly drained, mucky, loamy, and sandy soil.

### **SURVEY METHODS AND PARTNERS**

During the summer of 2008, Three Lakes Association conducted a survey of the greenbelt buffer along the entire 10.6 mile shoreline zone of Lake Bellaire. The shoreline of Lake Bellaire is located in three townships: Custer, Forest Home, and Kearney. This survey was carried out by Three Lakes Association with high school interns from Elk Rapids, Central Lake, and Bellaire.

In all 293 properties were surveyed. For the purposes of this survey the shoreline zone extends 25 feet inland from the ordinary high water mark. Data was recorded on a survey sheet by trained observers. A survey form was completed and a photograph was taken of each property.

The survey method was modified from a method used by Tip of the Mitt Watershed Council on Walloon Lake and a more recent survey of Torch Lake done by the Watershed Center and White Pines Associates sponsored by the Michigan Department of Environmental Quality. Several volunteers from Three Lakes Association provided valuable field assistance.

# Shoreline Greenbelt Survey

Lake: \_\_\_\_\_ Date: Month \_\_\_\_\_ Day \_\_\_\_\_ Year \_\_\_\_\_

## Location Information:

Parcel Owner: \_\_\_\_\_ GPS Reading: N45. \_\_\_\_\_ W085. \_\_\_\_\_

House Description: Stories: 1 1.5 2 3  
 \_\_\_\_\_ Color \_\_\_\_\_ Trim \_\_\_\_\_ Roof \_\_\_\_\_ Shutters \_\_\_\_\_

B. House/Id Number: \_\_\_\_\_ C. Street: \_\_\_\_\_

D. City: \_\_\_\_\_ E. Waterfront Footage: \_\_\_\_\_ feet

F. Township: \_\_\_\_\_ G. Map Number: \_\_\_\_\_

## Shoreline Information:

H. Shoreline Description: \_\_\_ Sandy Shore \_\_\_ Rocky Shore \_\_\_ Grassy Shore \_\_\_ Steep Shore

I. Slope Description: \_\_\_ Flat Slope (0-5%) \_\_\_ Gentle Slope (5-10%)  
 \_\_\_ Somewhat steep (10-15%) \_\_\_ Very Steep (15%+)

J. Shoreline Condition: \_\_\_ Natural \_\_\_ Landscaped

K. Shoreline Development: \_\_\_ Developed \_\_\_ Undeveloped

L. Shoreline Access- Stairway: \_\_\_ Yes \_\_\_ No

M. Shoreline Access- Ramp: \_\_\_ Yes \_\_\_ No

N. Shoreline Access- Ramp Materials: \_\_\_ Cement \_\_\_ Grass \_\_\_ Sand \_\_\_ Gravel

O. Shoreline Structures: \_\_\_ None

\_\_\_ Deck \_\_\_ Patio \_\_\_ Gazebo \_\_\_ Other

\_\_\_ Boat house \_\_\_ Pump house \_\_\_ Water Intake \_\_\_ Water Outflow \_\_\_ Road Drain

## Observations:

**Greenbelt Information:**

**P. Greenbelt Length:** \_\_\_ None \_\_\_ <10% \_\_\_ 10-25% \_\_\_ 25-75% \_\_\_ >75%  
**Score** 0 1 2 3 4

**Q. Greenbelt Depth:** \_\_\_ None \_\_\_ <10' \_\_\_ 10-40' \_\_\_ >40'  
**Score** 0 1 2 3

**R. Vertical Structure:** \_\_\_ All \_\_\_ Ground Cover \_\_\_ Understory \_\_\_ Overstory  
**S. Score** 3 1 1 1

**T. Turf:** \_\_\_ (0%) \_\_\_ <10% \_\_\_ 10-25% \_\_\_ 25-75% \_\_\_ >75%  
**Score** 0 -1 -2 -3 -4

**U. Density:** \_\_\_ None \_\_\_ Sparse \_\_\_ Medium \_\_\_ Dense  
**Score** 0 1 2 3

**V. Species Diversity:** \_\_\_ None \_\_\_ Uniform \_\_\_ Several Species \_\_\_ Many Species  
**W. Score** 0 1 2 3

**Erosion Information:**

**X. Erosion:** \_\_\_ None \_\_\_ Minor \_\_\_ Severe  
**Y. Score** 0 -1 -2

**Z. Erosion Structures:** \_\_\_ None \_\_\_ Biotechnical \_\_\_ Riprap \_\_\_ Sea Wall  
**AA. Score** 0 -1 -2 -3

**AB. Emergent Vegetation:** \_\_\_ Present \_\_\_ Absent

**Observations:**

**Greenbelt Quality Definition:** Quality Score = P+Q+S+T+W+Y+AA

|           |          |
|-----------|----------|
| Very Poor | -9 to 0  |
| Poor      | 1 to 4   |
| Good      | 5 to 9   |
| Very Good | 10 to 14 |
| Excellent | 15 to 16 |



**RESULTS**

The results of the Lake Bellaire Shoreline Greenbelt Survey were compiled into a series of Excel spreadsheets for each Township. The following graphs highlight the results and summarize some of the data included in the tables.

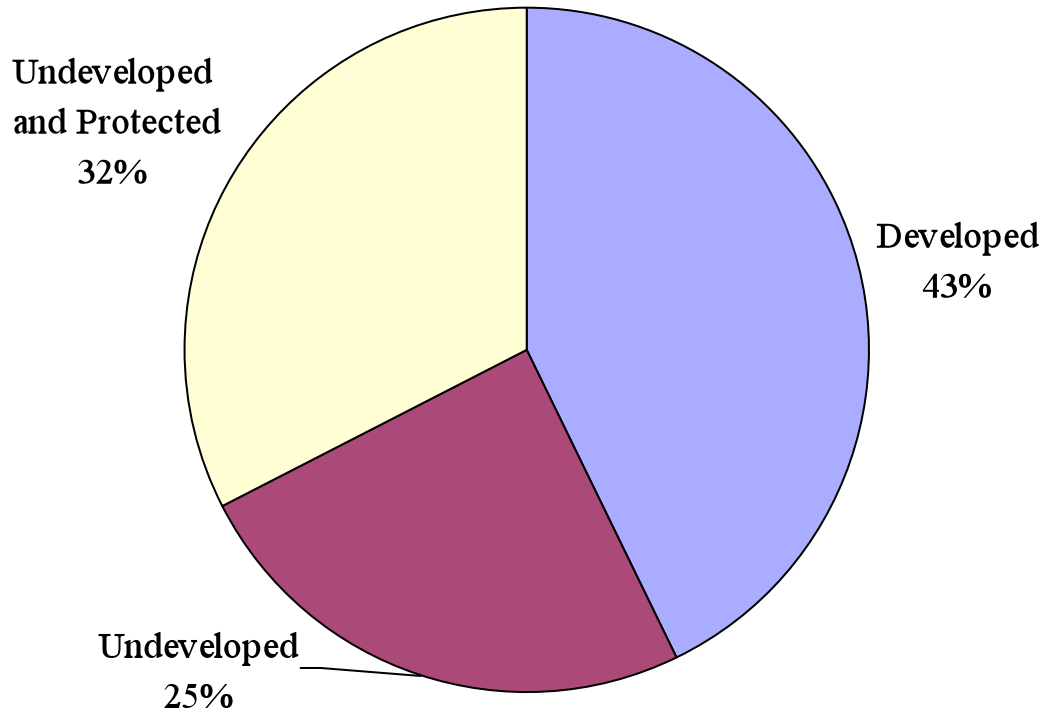
**Graphs:**

- Graph #1 - Lake Bellaire Shoreline Development: Developed and Undeveloped.
- Graph #2 - Lake Bellaire Shoreline Condition: Natural and Landscaped.
- Graph #3 - Lake Bellaire Shoreline Quality
- Graph #4 - Lake Bellaire Shoreline Erosion

**Tables:**

- Table #1 - Lake Bellaire Shoreline Development: Developed and Undeveloped
- Table #2 - Lake Bellaire Shoreline Condition: Natural and Landscaped
- Table #3 - Lake Bellaire Shoreline Quality
- Table #4 - Lake Bellaire Shore Erosion
- Table #5 – Lake Bellaire Greenbelt Length
- Table #6 – Lake Bellaire Greenbelt Depth
- Table #7 – Lake Bellaire Vertical Structures
- Table #8 – Lake Bellaire Turf
- Table #9 – Lake Bellaire Plant Density
- Table #10 – Lake Bellaire Species Diversity
- Table #11 – Lake Bellaire Emergent Vegetation
- Table #12 – Lake Bellaire Erosion Structures

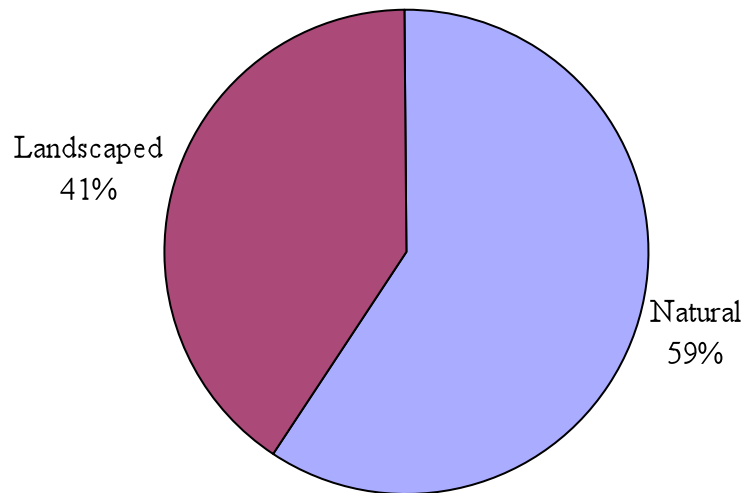


**Graph #1 - Lake Bellaire Shoreline Development****Table #1**

**Lake Bellaire Shoreline Development  
by Township**

|             | Devel.  |        |         | Prot.and Undevel. |        |         | Undevel |        |         |          |
|-------------|---------|--------|---------|-------------------|--------|---------|---------|--------|---------|----------|
|             | Parcels | Feet   | Percent | Parcels           | Feet   | Percent | Parcels | Feet   | Percent | Tot. Ft. |
| Forest Home | 157     | 19,076 | 39%     | 13                | 16,662 | 34%     | 71      | 12,764 | 26%     | 48,502   |
| Kearney     | 29      | 3,136  | 74%     | 2                 | 970    | 23%     | 3       | 133    | 26%     | 3,269    |
| Custer      | 12      | 1,590  | 57%     | 0                 | 0      | 0%      | 6       | 1,185  | 50%     | 2,774    |
| Total       | 198     | 23,802 |         | 15                | 17,632 |         | 80      | 14,082 |         | 54,545   |

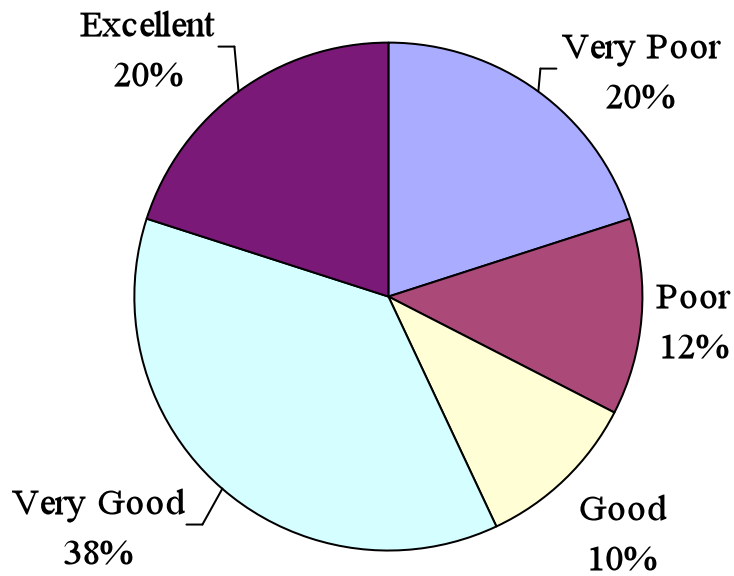
**Graph #2 - Lake Bellaire Shoreline Condition  
Landscaped or Natural**



**Table #2**

**Lake Bellaire Shoreline Condition  
by Township**

|             | Landscaped |               |            | Natural |               |            |            |
|-------------|------------|---------------|------------|---------|---------------|------------|------------|
|             | Parcels    | Frontage Feet | Percentage | Parcels | Frontage Feet | Percentage | Total Feet |
| Forest Home | 146        | 17,364        | 36%        | 95      | 31,139        | 64%        | 48,502     |
| Kearney     | 30         | 3,362         | 79%        | 4       | 877           | 21%        | 4,239      |
| Custer      | 13         | 2,110         | 66%        | 5       | 1,085         | 34%        | 3,194      |
| Total       | 189        | 22,835        | 41%        | 104     | 33,100        | 59%        | 55,936     |

**Graph #3 - Lake Bellaire Shoreline Quality****Table #3**

**Lake Bellaire Shoreline Quality  
by Township**

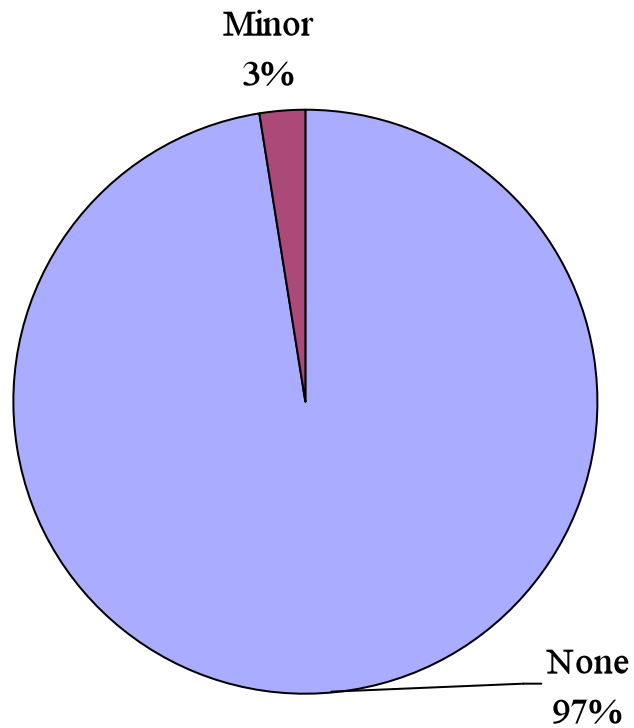
|             | Very Poor |               |            | Poor    |               |            |
|-------------|-----------|---------------|------------|---------|---------------|------------|
|             | Parcels   | Frontage Feet | Percentage | Parcels | Frontage Feet | Percentage |
| Forest Home | 62        | 7,774         | 16%        | 45      | 5,930         | 12%        |
| Kearney     | 20        | 2,217         | 52%        | 6       | 689           | 16%        |
| Custer      | 7         | 1,218         | 38%        | 3       | 368           | 12%        |
| Total       | 89        | 11,209        | 20%        | 54      | 6,988         | 12%        |

|             | Good    |               |            | Very Good |               |            |
|-------------|---------|---------------|------------|-----------|---------------|------------|
|             | Parcels | Frontage Feet | Percentage | Parcels   | Frontage Feet | Percentage |
| Forest Home | 42      | 4,981         | 10%        | 56        | 19,468        | 40%        |
| Kearney     | 3       | 312           | 7%         | 4         | 920           | 22%        |
| Custer      | 3       | 546           | 17%        | 3         | 395           | 12%        |
| Total       | 48      | 5,839         | 10%        | 63        | 20,783        | 38%        |

|             | Excellent |               |            |
|-------------|-----------|---------------|------------|
|             | Parcels   | Frontage Feet | Percentage |
| Forest Home | 36        | 10,349        | 21%        |
| Kearney     | 1         | 100           | 2%         |
| Custer      | 2         | 667           | 21%        |

|       |    |        |     |
|-------|----|--------|-----|
| 14    |    |        |     |
| Total | 39 | 11,116 | 20% |

**Graph #4 - Lake Bellaire Shoreline Erosion**



**Table #4**

**Lake Bellaire Shoreline Erosion  
by Township**

|             | No Erosion |               |            | Mild Erosion |               |            |
|-------------|------------|---------------|------------|--------------|---------------|------------|
|             | Parcels    | Frontage Feet | Percentage | Parcels      | Frontage Feet | Percentage |
| Forest Home | 232        | 47,245        | 97%        | 9            | 1,258         | 3%         |
| Kearney     | 33         | 4,065         | 96%        | 1            | 174           | 4%         |
| Custer      | 18         | 3,194         | 100%       | 0            | 0             | 0%         |
|             | 283        | 54,504        |            | 10           | 1,431         |            |



**Table #5****Lake Bellaire Greenbelt Length by Township**

|             | Very Poor |               |         | Poor    |               |         |
|-------------|-----------|---------------|---------|---------|---------------|---------|
|             | Parcels   | Frontage Feet | Percent | Parcels | Frontage Feet | Percent |
| Forest Home | 62        | 299           | 1%      | 45      | 2,359         | 5%      |
| Kearney     | 21        | 44            | 1%      | 5       | 195           | 5%      |
| Custer      | 7         | 10            | 0%      | 3       | 119           | 4%      |
| Total       | 90        | 353           |         | 53      | 2,673         |         |

|             | Good    |               |         | Very Good |               |         |
|-------------|---------|---------------|---------|-----------|---------------|---------|
|             | Parcels | Frontage Feet | Percent | Parcels   | Frontage Feet | Percent |
| Forest Home | 42      | 3,335         | 7%      | 56        | 16,813        | 35%     |
| Kearney     | 3       | 91            | 2%      | 4         | 805           | 19%     |
| Custer      | 3       | 319           | 12%     | 3         | 346           | 12%     |
| Total       | 48      | 3,745         |         | 63        | 17,964        |         |

|             | Excellent |               |         |
|-------------|-----------|---------------|---------|
|             | Parcels   | Frontage Feet | Percent |
| Forest Home | 36        | 9,056         | 19%     |
| Kearney     | 1         | 88            | 2%      |
| Custer      | 2         | 584           | 21%     |
| Total       | 39        | 9,728         |         |

**Table #6****Lake Bellaire Greenbelt Depth by Township**

|             | None    |               |         | Depth<10' |               |         |
|-------------|---------|---------------|---------|-----------|---------------|---------|
|             | Parcels | Frontage Feet | Percent | Parcels   | Frontage Feet | Percent |
| Forest Home | 54      | 7,287         | 15%     | 47        | 5,529         | 11%     |
| Kearney     | 17      | 1,923         | 45%     | 8         | 909           | 21%     |
| Custer      | 7       | 796           | 29%     | 2         | 201           | 7%      |
| Total       | 78      | 10,006        |         | 57        | 6,639         |         |

|             | Depth 10'-40' |               |         | Depth>40' |               |         |
|-------------|---------------|---------------|---------|-----------|---------------|---------|
|             | Parcels       | Frontage Feet | Percent | Parcels   | Frontage Feet | Percent |
| Forest Home | 79            | 13,077        | 27%     | 61        | 22,610        | 47%     |
| Kearney     | 6             | 587           | 14%     | 3         | 820           | 19%     |
| Custer      | 2             | 268           | 10%     | 7         | 1,509         | 54%     |
| Total       | 87            | 13,932        |         | 71        | 24,939        |         |



**Table #7 Lake Bellaire Vertical Structures by Township**

|             | All     |               |         | Ground Cover |               |         |
|-------------|---------|---------------|---------|--------------|---------------|---------|
|             | Parcels | Frontage Feet | Percent | Parcels      | Frontage Feet | Percent |
| Forest Home | 76      | 22,336        | 46%     | 70           | 15,072        | 31%     |
| Kearney     | 5       | 1,020         | 24%     | 3            | 909           | 21%     |
| Custer      | 6       | 1,286         | 8%      | 2            | 224           | 8%      |
| Total       | 87      | 24,642        |         | 75           | 16,205        |         |

|             | Understory |               |         | Overstory |               |         |
|-------------|------------|---------------|---------|-----------|---------------|---------|
|             | Parcels    | Frontage Feet | Percent | Parcels   | Frontage Feet | Percent |
| Forest Home | 19         | 1,564         | 3%      | 50        | 6,514         | 13%     |
| Kearney     | 2          | 212           | 5%      | 20        | 2,253         | 53%     |
| Custer      | xx         | xx            | xx      | 100       | 1,264         | 46%     |
| Total       | 21         | 1,776         |         | 170       | 10,031        |         |

|             | None    |               |         |
|-------------|---------|---------------|---------|
|             | Parcels | Frontage Feet | Percent |
| Forest Home | 26      | 3,017         | 6%      |
| Kearney     | 4       | 405           | 10%     |
| Custer      | xx      | xx            | xx      |
| Total       | 30      | 3,422         |         |

**Table #8 Lake Bellaire Turf by Township**

|             | >75%    |               |         | 25-75%  |               |         |
|-------------|---------|---------------|---------|---------|---------------|---------|
|             | Parcels | Frontage Feet | Percent | Parcels | Frontage Feet | Percent |
| Forest Home | 94      | 19,665        | 41%     | 30      | 3,802         | 8%      |
| Kearney     | 18      | 2,042         | 48%     | 4       | 449           | 11%     |
| Custer      | 4       | 496           | 18%     | 3       | 369           | 13%     |
| Total       | 116     | 22,203        |         | 37      | 4,620         |         |

|             | 10-25%  |               |         | <10%    |               |         |
|-------------|---------|---------------|---------|---------|---------------|---------|
|             | Parcels | Frontage Feet | Percent | Parcels | Frontage Feet | Percent |
| Forest Home | 10      | 1,268         | 3%      | 3       | 359           | 1%      |
| Kearney     | 1       | 112           | 3%      | 3       | 343           | 8%      |
| Custer      | 2       | 222           | 8%      | 3       | 524           | 19%     |
| Total       | 13      | 1,602         |         | 9       | 1,226         |         |

|             | 0%      |               |         |
|-------------|---------|---------------|---------|
|             | Parcels | Frontage Feet | Percent |
| Forest Home | 104     | 23,409        | 48%     |
| Kearney     | 8       | 1,293         | 31%     |
| Custer      | 6       | 1,162         | 42%     |
| Total       | 118     | 25,864        |         |

**Table #9****Lake Bellaire Plant Density by Township**

|             | None    |               |         | Sparse  |               |         |
|-------------|---------|---------------|---------|---------|---------------|---------|
|             | Parcels | Frontage Feet | Percent | Parcels | Frontage Feet | Percent |
| Forest Home | 41      | 4,916         | 10%     | 72      | 8,566         | 18%     |
| Kearney     | 9       | 896           | 21%     | 13      | 1,613         | 38%     |
| Custer      | 2       | 220           | 8%      | 6       | 677           | 24%     |
| Total       | 52      | 6,032         |         | 91      | 10,856        |         |

|             | Medium  |               |         | Dense   |               |         |
|-------------|---------|---------------|---------|---------|---------------|---------|
|             | Parcels | Frontage Feet | Percent | Parcels | Frontage Feet | Percent |
| Forest Home | 70      | 12,784        | 26%     | 58      | 896           | 21%     |
| Kearney     | 10      | 959           | 23%     | 2       | 770           | 18%     |
| Custer      | 7       | 1,115         | 40%     | 3       | 762           | 27%     |
| Total       | 87      | 14,858        |         | 63      | 2,428         |         |

**Table #10****Lake Bellaire Species Diversity by Township**

|             | None    |               |         | Uniform |               |         |
|-------------|---------|---------------|---------|---------|---------------|---------|
|             | Parcels | Frontage Feet | Percent | Parcels | Frontage Feet | Percent |
| Forest Home | 46      | 5,654         | 12%     | 85      | 10,039        | 18%     |
| Kearney     | 11      | 1,503         | 35%     | 10      | 915           | 38%     |
| Custer      | 2       | 220           | 8%      | 6       | 746           | 24%     |
| Total       | 59      | 7,377         |         | 101     | 11,700        |         |

|             | Several Species |               |         | Many Species |               |         |
|-------------|-----------------|---------------|---------|--------------|---------------|---------|
|             | Parcels         | Frontage Feet | Percent | Parcels      | Frontage Feet | Percent |
| Forest Home | 50              | 6,733         | 14%     | 60           | 26,077        | 54%     |
| Kearney     | 10              | 907           | 21%     | 3            | 913           | 22%     |
| Custer      | 7               | 1,046         | 38%     | 3            | 762           | 27%     |
| Total       | 67              | 8,686         |         | 66           | 27,752        |         |

**Table # 11****Lake Bellaire Erosion Structures by Township**

|             | None    |               |         | Biotechnical |               |         |
|-------------|---------|---------------|---------|--------------|---------------|---------|
|             | Parcels | Frontage Feet | Percent | Parcels      | Frontage Feet | Percent |
| Forest Home | 108     | 33,593        | 1%      | 0            | 0             | 0%      |
| Kearney     | 10      | 1,268         | 30%     | 0            | 0             | 0%      |
| Custer      | 4       | 967           | 35%     | 0            | 0             | 0%      |
| Total       | 122     | 35,828        |         | 0            | 0             |         |

|             | Riprap  |               |         | Sea Wall |               |         |
|-------------|---------|---------------|---------|----------|---------------|---------|
|             | Parcels | Frontage Feet | Percent | Parcels  | Frontage Feet | Percent |
| Forest Home | 125     | 13,972        | 23%     | 8        | 938           | 2%      |
| Kearney     | 16      | 2,256         | 53%     | 8        | 715           | 17%     |
| Custer      | 7       | 724           | 26%     | 7        | 1,082         | 39%     |
| Total       | 148     | 16,952        |         | 23       | 2,735         |         |

**Table #12****Lake Bellaire Emergent Vegetation by Township**

|             | Absent  |               |         | Present |               |         |
|-------------|---------|---------------|---------|---------|---------------|---------|
|             | Parcels | Frontage Feet | Percent | Parcels | Frontage Feet | Percent |
| Forest Home | 112     | 1,443         | 30%     | 129     | 34,060        | 70%     |
| Kearney     | 34      | 4,239         | 100%    | 0       | 0             | 0%      |
| Custer      | 10      | 1,385         | 50%     | 8       | 1,389         | 50%     |
| Total       | 156     | 7,067         |         | 137     | 35,449        |         |

## **CONCLUSIONS**

- The perimeter of Lake Bellaire is 10.5 miles
- About 42% of the perimeter is developed, and 58% is undeveloped
- 48% of the shoreline's greenbelt satisfies the criteria for very good or excellent condition
- 59% of the Lake Bellaire shoreline exists in a natural condition, and 41% is landscaped
- 30% of the shoreline is owned by the public or by Grass River Natural Area. These parcels are protected from residential development.
- 93% of Lake Bellaire has either a flat or gentle slope, 7% is steep or very steep
- 30 parcels or about  $\frac{3}{4}$  of a mile of the Lake Bellaire shoreline could be drastically improved
- There were only ten mild erosion sites on Lake Bellaire.

## **DISCUSSION**

43% of Lake Bellaire shoreline is *developed* (parcels with dwellings) compared to 86% on Torch Lake. 58% of the Lake Bellaire shoreline is in Very Good or Excellent condition compared to 32% of the shoreline on Torch Lake. 33% of Lake Bellaire shoreline is permanently protected from development and 58% is undeveloped. So, a significant portion of Lake Bellaire has a natural greenbelt.

Developed properties are less likely to have a greenbelt. This is why greenbelts are more a priority on developed property than undeveloped. In developed areas there are opportunities for improvement. Some already have good greenbelt regions, but many areas have turf that extends up to the shoreline and others have riprap or seawalls at the water's edge. This could be improved with greenbelt plantings. Public access areas have minimal greenbelts and some erosion.

Extensive use of boats and docks can disrupt habitat for aquatic wildlife but is not part of the survey as it presently exists.

## **RECOMMENDATIONS**

1. Because much of the shoreline of Lake Bellaire has been developed, property owners should be encouraged to plant vegetative greenbelts and reduce the use of fertilizer and pesticides. In fact phosphorus free fertilizers are widely available, and if appropriate should be used. In order to determine how the appropriate nutrients needed for particular areas Michigan State Extension Service offers soil testing services. Simply not mowing grass near the shoreline is a good way to begin a greenbelt.
2. Some residents can protect the existing natural shoreline with deed restrictions and conservation easements.



3. Public and private property owners should restore erosion sites.
4. Because the Northwest Michigan Community Health Agency Unified Sanitary Code does not regulate failing septic systems, a Point of Sale Inspection Ordinance for all septic systems around the lake should be created.
5. There needs to be an educational program to inform property owners about the best practices for protecting water quality.

### **SOLUTIONS**

The magnitude of these problems on Lake Bellaire with 293 parcels and 10.5 miles of shoreline requires a systematic, long-term, collaborative approach. The selected activities must be sustainable by local organizations and governments.

Two major goals have been identified:

- Restore the shore so it functions like a natural shoreline to protect water quality and the rural character of the landscape
- Promote shoreline stewardship to reduce stormwater runoff, soil erosion, and non-point source pollution.

#### *Recommended Activities:*

To raise awareness about this survey, its findings, and the importance of shoreline greenbelts, a letter and greenbelt brochure will be mailed to all property owners. Greenbelt displays, greenbelt garden designs and presentations will be made available to township officials, lake associations and civic groups. To encourage behavior change, The Watershed Center will work with local governments and install greenbelt demonstration projects on public property around the lake in 2008 and 2009.



## **Bibliography:**

Antrim County Soil Erosion, Sedimentation, and Stormwater Runoff Control Ordinance DRAFT 2006. [www.antrimcounty.org](http://www.antrimcounty.org).

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