**EURASIAN WATER MILFOIL SURVEY**

 **on**

 **ELK AND SKEGEMOG LAKES AND TORCH RIVER**

 Prepared For the Elk-Skegemog Lakes Association

 by

 TIP OF THE MITT WATERSHED COUNCIL

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 INTRODUCTION

Elk and Skegemog Lakes and the Torch River are the lowermost waters in the Elk River Chain of Lakes. They are situated between Torch Lake and East Grand Traverse Bay. They are high quality water bodies of regional significance. The following paragraphs describe some important characteristics of these waters.

Elk Lake has a maximum length of nine miles and a maximum width of two miles. It has maximum and average depths of 192 and 67 feet. It covers 8,088 acres. Its overall watershed is about 505 square miles in size, but its immediate watershed (the area which drains to the lake without first flowing through an upstream lake) is only about 43 square miles. The lake has a shoreline length of approximately 26 miles.

Skegemog Lake has a maximum length of 3.7 miles and a maximum width of 1.8 miles. It has maximum and average depths of 29 and 11 feet. It covers 2,755 acres. Its overall watershed is about 462 square miles in size, and its immediate watershed (the area which drains to the lake without first flowing through an upstream lake) is about 187 square miles. The lake has a shoreline length of approximately 11 miles.

The Torch River is about 2.1 miles long. Because of some backwater areas, its shoreline length is about five miles. Its overall watershed is about 427 square miles in size, and its immediate watershed (the area which drains to the lake without first flowing through an upstream lake) is about 151 square miles.

In 1995, Clean Water Act funds were granted to eight organizations and agencies by the Michigan Department of Natural Resources for a three year project to protect water resources of the Elk River/Chain of Lakes Watershed. One of the project’s tasks was a shoreline water resource survey. The survey was intended to document basic information for educational purposes and as a basis for water resource management decisions. One of the water resource information categories was nearshore aquatic plants. Submerged rooted, emergent, and floating-leaved plants were noted in that area of the lake where the bottom was visible, along with type of algae called Chara which resembles a vascular plant. Plants were generally identified to genus. In some cases, plants were identified to species and relative abundance was noted (1=sparse, 2=moderate, 3=dense). The following types of plants were commonly found throughout the Chain of Lakes. Common species are denoted by an X.

 **PLANT CATEGORIES, CODES, AND FINDINGS**

**BR** Sparganum (burreed)

**BW** Utricularia (bladderwort)

**C** Chara (muskgrass)=**X**

**CN** Ceratophyllum (coontail)

**CT** Typha (cattail)

**D** Decodon (swamp loosestrife)

**E** Elodea (elodea or waterweed)

**HS** Scirpus acutus (hardstem bulrush**)=X**

**M** Myriophyllum (water milfoil)=**X**

**N** Najas (water naiad)

**P** Potamogeton (pondweeds)=**X**

**S** P. pectinatus (Sago pondweed)=**X**

**SG** Carex (sedge)

**SS** Scirpus validus (softstem bulrush)

**V** Valisneria (wild celery)

**WW** Nympheae (white water lily)

**YP** Nuphar (yellow pond lily)=**X**

**3S** Scirpus americanus (American three square)

Because of Elk Lake’s oligotrophic status and absence of soft sediments conducive to aquatic plant growth, aquatic plants were not common there. The most common plants in both lakes were Chara and sago pondweed, which were present at about 25% of properties. Ascending growths of water milfoil and pondweeds were most common in these waters at the mouth of the Torch River. One noteworthy finding was the absence of Eurasian water milfoil (Myriophyllum spicatum).

As its name implies, Eurasian water milfoil is native to Europe and Asia. It was introduced to North America in the late 1800's. It was first seen in Michigan in 1970. Since that time it has rapidly been colonizing inland lakes and streams. It is considered a problem species because it crowds out native vegetation and forms very dense beds. It reduces biodiversity and negatively affects fishing, navigation, aesthetic appearances, and other water-based recreation. It does not have as much ecological value to the aquatic community as native vegetation.

There are six other species of water milfoil in Michigan, all of which are native. Unlike any other species of water milfoil, Eurasian water milfoil has 14-20 pairs of leaflets per well-developed leaf and long spaghetti-like reddish stems which branch near the surface, creating a canopy of floating stems and foliage. As a result, it is fairly easy to identify with a little experience.

A number of different management strategies have been developed for controlling Eurasian water milfoil, including harvesting, herbicides, and a promising new biological control technique utilizing a native aquatic weevil. Eurasian water milfoil spreads easily by fragmentation. If detected early, containment and eradication may be possible.

The purpose of the survey was to provide early detection of Eurasian water milfoil by checking for its presence in specific locations where it is likely to gain an initial foothold--marina basins; depositional areas; and protected, productive embayments.

 METHODS

The survey was conducted October 29, 1998 (and partially repeated in 1999) in 15 locations throughout Elk and Skegemog Lakes and the Torch River. The survey was mostly conducted from a 12-foot aluminum boat. However, two marina basins were surveyed by walking along the docks, with permission. In many places, the calm, clear waters allowed viewing from the surface with the unaided eye. In some locations, underwater viewing was aided using an underwater viewing scope--kind of like a face mask at the end of a tube. When necessary, plant collections were made from water less than six feet deep using a 15-tooth bow rake (the common yard and garden variety). In deeper areas, a weighted plant grapple on a line was used.

Representative species of plants were placed in one gallon zip-lock plastic bags and placed in a refrigerated cooler for later identification. Notes were taken on species collected and relative abundance at various locations. Identifications were made by referring to several taxonomic references, including Hotchkiss (1967), Prescott (1969), Voss (1972, 1985), and Borman et. al. (1997). At each sampling point, information on water depth and sediment characteristics, and other noteworthy features was also recorded.

 RESULTS

Sixteen species of aquatic plants were collected. A list with a description of each follows:

1. Chara sp. (commonly called stonewart or muskgrass). This is a type of filamentous algae which resembles higher plants. It has a musky odor and gritty surface texture. It usually grows in low, dense mats.

2. Potamogeton sp (Unidentified pondweed). There are 29 species of pondweeds in Michigan. Their identification can be difficult. They all have alternate untoothed leaves (although some have serrated edges) with a noticeable mid-vein. Flowers are small greenish-brown spikes which protrude from the water. The fruit is a nutlet called an achene, which is an important waterfowl foods.

3. Potamogeton amplifolius (big-leaf pondweed). A tall rooted aquatic plant, with large, arched leaves which are sometimes reddish in appearance. It can also sometimes develops floating leaves.

4. Potamogeton pectinatus (Sago Pondweed). The leaves are very thin and long and resemble pine needles. It has many-forked branches spreading into a fan-like arrangement.

5. Potamogeton richardsonii (clasping-leaved or Richardson’s pondweed). This species has S-shaped stems with lance-shaped leaves which clasp the stem.

6. Potamogeton natans (floating-leaved pondweed). This species usually has both submersed leaves which are stalk-like and oval or heart-shaped floating leaves.

7. Potamogeton robbinsii (fern pondweed). A distinctive looking species with stiff leaves in two rows on opposite sides of the stem. It attains a maximum height of several feet.

8. (Potamogeton zosteriformes) (flatstem pondweed). The stems are strongly flattened and have an angled appearance. It has stiff, long (4-8 inches), narrow (1/4 inch or less) leaves with a prominent midvein and many fine parallel veins. It never develops floating leaves.

9. Vallisineria americana (tape grass, eel grass, or wild celery). This plant is characterized by long ribbon-like leaves. The central third of the leaf has a more net-like vein pattern than the outer third. It grows submerged, often times in deep water. It spreads by rhizomes. It also flowers and produces seeds atop a spiraled stalk. This plant is an important food for waterfowl

10&11.Two unidentified species of native water milfoil. These were probably Myriophyllum heterophyllum (two-leaved or variable water milfoil) and Myriophyllum exalbasens (spiked water milfoil). Water milfoils are primarily submerged plants with compound leaves in groups ringing the stem (whorls). The leaflets are thread-like and resemble a double-sided comb when examined closely. What was probably variable water milfoil was the more common of the two. As its common name implies, this species can vary in appearance within a lake. It usually has unbranched greenish-brownish stems and very dense foliage, and has been said to resemble green ropes under the water.

12. Elodea canadensis (elodea or waterweed). A very widespread aquatic plant. This plant has short green leaves arranged in closely spaced whorls.

13. Nuphar variegata (spatterdock or yellow pond lily). The leaves of this lily are heart-shaped and four to ten inches long. The flower has five to six yellow sepals, often with a dark red patch at the base.

14. Nymphaea odorata (white water lily). The leaves of this lily are round with a reddish-purple underside. The flowers have four green sepals and numerous white petals in a circular arrangement.

15. Sagittaria graminea (Grass-Leaved Arrowhead). Although most arrowheads have emergent arrowhead-shaped leaves, this species develops rosettes of submergent slender-shaped leaves. The leaves resembles wild celery (#8), but are generally wider and have a more uniform vein pattern.

16. Water naiad (Najas flexilis). The stems are finely branched and up to one meter long. The leaves are narrow with a broader base where they attach to the stem, paired, and have a finely serrated margin. It is weakly rooted. Sometimes it is a bushy, compact plant, and sometimes trailing and slender.

The findings for each of the 15 survey locations are as follows:

1. Elk River Marina

This area was surveyed from the marina docks, with permission. The area covered extended from the public access site (west end) to the piers closest to U.S. 31. Visual observations were made by walking out each finger pier and peering into the clam, clear waters. Water depths were generally six feet or less. A garden rake was used to collect specimens in a few spots. The bottom substrate was sand, with a mucky veneer in a few places. Woody debris was abundant. There was a moderate amount of litter. I observed five species of aquatic plants:

1. Wild celery (a.k.a. eel grass, or tape grass) (Valisneria americana)

2. Bigleaf pondweed (Potamogeton amplifolius)

3. & 4. Two species of native water milfoil (Myriophyllum sp.)

5. Muskgrass (a.k.a. stonewart) (Chara sp.)

The abundance was variable throughout the marina basin, from the absence of any vegetation in places to moderately abundance in others. No Eurasian water milfoil was observed.

2. Small Marshy Embayment--East Shore of Spencer Bay

This area was surveyed from a 12-foot boat. The area covered was about an acre in size. It was located north of a small island. The area is less than three feet deep. Vegetation was surveyed visually, and by collecting specimens using a garden rake. The substrate was mucky sand or muck. Woody debris in the form of logs and stumps was abundant. I observed five species of aquatic plants:

1. Common waterweed (Elodea canadensis)

2. Bigleaf pondweed (Potamogeton amplifolius)

3. Native water milfoil (Myriophyllum sp.)

4. Muskgrass (a.k.a. stonewart) (Chara sp.)

5. White pond lily (Nympheaea odorata)

The abundance was variable throughout this embayment, from absence of any vegetation in places to moderately abundant in others. Mostly light vegetation cover was present. No Eurasian water milfoil was observed.

3. Small Private Boat Basin--Northwest Tip of Elk Lake

This area was surveyed from a 12-foot boat. The area appears to be a dredged boatslip which was created many years ago. It is associated with a private residence. The area is about 25 X 50 feet in size and about three to six feet deep. Vegetation was assessed visually and with the aid of an underwater viewing scope. The substrate varied from sand at the entrance of the basin to muck at the west end of the basin. Woody debris in the form of logs and stumps were present in the lake near the entrance to the basin. Five species of aquatic plants were observed here:

1. Common waterweed (Elodea canadensis)

2. Bigleaf pondweed (Potamogeton amplifolius)

3. Richardson’s pondweed (Potamogeton richardsonii)

4. Muskgrass (a.k.a. stonewart) (Chara sp.)

5. Wild celery (a.k.a. eel grass, or tape grass) (Valisneria americana)

Vegetation density was moderate to abundant throughout the basin. No Eurasian water milfoil was observed.

4. Double Point

This area was surveyed from a 12-foot boat. This site consists of a protected area behind and north of the point, with a steep drop-off going from shoal water to about 20 feet deep. Vegetation was assessed using an underwater viewing tube and by dragging a plant grapple. The substrate was sand, although mucky or marly sediments may have also been present in the deeper areas. Two species of aquatic plants were observed:

1. Sago pondweed (Potamogeton pectinatus)

2. Muskgrass (a.k.a. stonewart) (Chara sp.)

The abundance was variable throughout this area, from an absence of any vegetation in places to light abundance. No Eurasian water milfoil was observed.

5. Kewadin Wetland

This area was surveyed from a 12-foot boat. This area is a stump-filled bay behind the point. Water depths range from one to six feet. Vegetation was assessed visually, using an underwater viewing tube, and with a rake. The substrate was muck or mucky sand. Four species of aquatic plants were observed:

1. Native water milfoil (Myriophyllum sp.)

2. Wild celery (a.k.a. eel grass, or tape grass) (Valisneria americana)

3. Muskgrass (a.k.a. stonewart) (Chara sp.)

4. Yellow pond lily (a.k.a. spatterdock) (Nuphar variegata)

The abundance was variable throughout this area, from an absence of any vegetation in places to moderate abundance. No Eurasian water milfoil was observed.

6. Harbor Lights Marina

This area was surveyed from a 12-foot boat. This site consists of a dredged marina basin in the extreme northeast end of Elk Lake. The basin is three to six feet deep. Vegetation was assessed visually and using an underwater viewing tube. A few specimens were collected using a garden rake. The substrate was muck. Eight species of aquatic plants were observed:

1. Wild celery (a.k.a. eel grass, or tape grass) (Valisneria americana)

2. Bigleaf pondweed (Potamogeton amplifolius)

3. Muskgrass (a.k.a. stonewart) (Chara sp.)

4. Native water milfoil (Myriophyllum sp.)

5. White water lily (Nympheaea odorata)

6. Richardson’s pondweed (Potamogeton richardsonii)

7. Unidentified pondweed (Potamogeton sp.)

8. Sago pondweed (Potamogeton pectinatus)

9. Floating-leaved pond weed (Potamogeton natans)

Plant density was variable throughout this area, from light to heavy. No Eurasian water milfoil was observed.

7. Shores of Palustra Embayment

October, 29, 1998

This area was surveyed from a 12-foot boat. This embayment is located on the west shore of Elk Lake, just south of Whitewater Township Park. A small stream enters the lake here. A concrete jetty is present at the south end. The jetty helps shelter the embayment. It appears that the area around the jetty was dredged at some time in the past. The embayment has a gradually sloping bottom, which drops to a depth of about 10 feet in the out portion. The bottom sediment is sand in the shallower areas changing to marly sand in the deeper areas. There is quite a bit of woody debris, including rooted stumps in areas less then five feet deep. Vegetation was assessed using an underwater viewing tube. A few specimens were collected using a plant grapple. Two species of aquatic plants were observed:

1. Muskgrass (a.k.a. stonewart) (Chara sp.)

2. Native water milfoil (Myriophyllum sp.)

Plant density was variable throughout this area, from absent to moderate. No Eurasian water milfoil was observed.

August 25, 1999

Survey conducted from Phil Richardson’s runabout. Vegetation was assessed by dragging a garden rake and a plant grapple behind the slowly drifting boat, twice, for 15-30 seconds. Vegetation was also assessed visually using an underwater viewing tube. One species was observed or collected:

1. Muskgrass (Chara sp.), moderate density

8. Miami Beach Sandsucker Holes

October, 29, 1998

This area was surveyed from a 12-foot boat. These holes, located at the southwestern corner of the lake, were created by hydraulic dredging. The holes drop abruptly to a depth of about ten feet, from the surrounding three-foot deep sandy nearshore shallows. Bottom sediments in the holes are sand. There is some accumulation of woody debris (or perhaps it was uncovered by the dredging). Litter in the form of golf balls was also observed in the holes. Vegetation was assessed using an underwater viewing tube and by towing a plant grapple behind the boat. Five species of aquatic plants were observed:

1. Bigleaf pondweed (Potamogeton amplifolius)

2. Muskgrass (a.k.a. stonewart) (Chara sp.)

3. Common waterweed (Elodea canadensis)

4. Native water milfoil (Myriophyllum sp.)

5. Richardson’s pondweed (Potamogeton richardsonii)

Plant density was variable throughout this area, from light to moderate. No Eurasian water milfoil was observed.

August 25, 1999

Survey conducted from Phil Richardson’s runabout. Vegetation was assessed by dragging a garden rake and a plant grapple behind the slowly drifting boat, once, for 15-30 seconds. Three species were collected, all had moderate density:

1. Flatstem pondweed (Potamogeton zosteriformes)

2. Native water milfoil (Myriophyllum exalbascens)

3. Richardson’s pondweed (Potamogeton richardsonii)

9. Lake Skegemog MDNR Public Access Site

This area was surveyed from the dock at the launch ramp. At the base of the concrete ramp is a dredged basin to facilitate boat launching. The depth of the dredging is about seven feet, surrounded by an area from two to five feet deep. The bottom sediment appeared to be sandy clay, with some woody debris. Vegetation was assessed visually. No aquatic plants were observed.

10. Lake Skegemog Behind North Skegemog Point

This area was surveyed from a 12-foot boat. The area behind the point is a maximum of about eight feet deep. There is quite a bit of woody debris, including some rooted stumps in water less than five feet deep. Bottom sediments are mucky sand. Vegetation was assessed using an underwater viewing tube and a plant grapple. Two species of aquatic plants were observed:

1. Bigleaf pondweed (Potamogeton amplifolius)

2. Wild celery (a.k.a. eel grass, or tape grass) (Valisneria americana)

Plant density was light throughout this area. No Eurasian water milfoil was observed.

11. Sandsucker Hole?--Elk Lake Side Of South Skegemog Point

This area was surveyed from a 12-foot boat. A distinct depression which is out-of-character with the surrounding sandy, gravelly littoral shallows, is present in Elk Lake just west of the tip of south Skegemog Point. It appears to have the same characteristics of known sand sucker holes located throughout lakes of the Chain. The depression is about ten feet deep and 20 feet in diameter. The surrounding shallows are about three to six feet deep. The bottom sediment in the hole was sand with a mucky veneer. There is quite a bit of woody debris, including rooted stumps in areas less then five feet deep. Vegetation was assessed using an underwater viewing tube. A few specimens were collected using a plant grapple. Two species of aquatic plants were observed:

1. Wild celery (a.k.a. eel grass, or tape grass) (Valisneria americana)

2. Muskgrass (a.k.a. stonewart) (Chara sp.)

3. Common waterweed (Elodea canadensis)

4. Native water milfoil (Myriophyllum sp.)

5. Richardson’s pondweed (Potamogeton richardsonii)

6. Unidentified Pondweed (Potamogeton sp.)

Plant density was moderate throughout this hole. No Eurasian water milfoil was observed.

12. Dropoff east of South Skegemog Point.

October, 29, 1998

This area was surveyed from a 12-foot boat. A distinct dropoff is present for a short distance in Lake Skegemog on the east side of South Skegemog Point. The depth drops off from several feet to about ten or 12 feet. Beds of aquatic plants can be seen growing up close to the surface along the dropoff. The bottom in this area changes from sand to mucky sand. Plant specimens were collected using a plant grapple. Six species of aquatic plants were observed:

1. Wild celery (a.k.a. eel grass, or tape grass) (Valisneria americana)

2. Muskgrass (a.k.a. stonewart) (Chara sp.)

3. Common waterweed (Elodea canadensis)

4. Native water milfoil (Myriophyllum sp.)

5. Richardson’s pondweed (Potamogeton richardsonii)

6. Unidentified Pondweed (Potamogeton sp.)

Plant density throughout this area was moderate. No Eurasian water milfoil was observed.

August 25, 1999

Survey conducted from Phil Richardson’s runabout. Vegetation was assessed by dragging a garden rake and a plant grapple behind the slowly drifting boat, twice, for 15-30 seconds. Three species were collected, all had moderate density:

1. Water naiad (Najas flexilis)

2. Muskgrass (a.k.a. stonewart) (Chara sp.)

3. Richardson’s pondweed (Potamogeton richardsonii)

The water naiad seemed to be the most abundant of the three. This was a new recording for the Elk-Skegemog System.

13. Lower Torch River

This area was surveyed from a 12-foot boat. The area surveyed was the navigable river channel from where it swings westward as it enters Lake Skegemog to the outer edge of the stump field. The depth of this area ranges from several feet at the edge of the channel to eight to ten feet in the deepest part of the channel. The bottom sediments vary from mucky sand to muck. There is some woody debris in the main channel, but not nearly as much as in the stump- and log-filled shallows which border the channel. Vegetation was assessed using an underwater viewing tube. A few specimens were collected using a plant grapple. Seven species of aquatic plants were observed:

1. Wild celery (a.k.a. eel grass, or tape grass) (Valisneria americana)

2. Muskgrass (a.k.a. stonewart) (Chara sp.)

3. Sago Pondweed (Potamogeton pectinatus)

4. Native water milfoil (Myriophyllum sp.)

5. White water lily (Nympheaea odorata)

6. Yellow Pond Lily (a.k.a. spatterdock) (Nuphar variegata)

7. Grass-Leaved Arrowhead (Sagittaria graminea)

Large numbers of minnows and the burrows of benthic invertebrates (mayfly larvae?) were observed in this area. Plant density was variable throughout this area, from light to abundant. No Eurasian water milfoil was observed.

14. Torch River Bayou

The Bayou is an approximately five acre backwater with only a small portion of the River’s current flowing through. In addition to the bayou, a small dredged inlet near the Sand Bar Shop was surveyed. These areas were surveyed from a 12-foot boat. The bottom of the bayou is mostly sandy, with muck and mucky sand in some places. Maximum depth is about ten feet. There is quite a bit of woody debris, including rooted stumps in areas less then five feet deep. The water is quite clear, so most areas could be assessed visually. Five species of aquatic plants were observed:

1. Wild celery (a.k.a. eel grass, or tape grass) (Valisneria americana)

2. Bigleaf pondweed (Potamogeton amplifolius)

3. Muskgrass (a.k.a. stonewart) (Chara sp.)

4. & 5. Two species of native water milfoil (Myriophyllum sp.)

Plant density was variable throughout this area, from absent to moderate. No Eurasian water milfoil was observed.

15. Torch River Marina

This area was surveyed from the marina docks, with permission. Visual observations were made by walking out each finger pier and peering into the clam, clear waters. Water depths were generally six feet or less. A garden rake was used to collect specimens in a few spots. The bottom substrate was sand, with a mucky veneer in a few places. Five species of aquatic plants were observed:

1. Wild celery (a.k.a. eel grass, or tape grass) (Valisneria americana)

2. Bigleaf pondweed (Potamogeton amplifolius)

3. & 4. Two species of native water milfoil (Myriophyllum sp.)

5. Muskgrass (a.k.a. stonewart) (Chara sp.)

The abundance was variable throughout the marina basin, from the absent of any vegetation in places to moderately abundance in others. No Eurasian water milfoil was observed.

RECOMMENDATIONS

**1. CONTINUING EDUCATION.** The Elk-Skegemog Lakes Association has a long history of providing educational information through its newsletter, meetings, and other activities. Publicizing the results of this report in the newsletter and other media sources could help raise awareness about the problem. Distribution of pamphlets or flyers about the problems with Eurasian water milfoil and other invasive exotic aquatic pests to marinas, sports shops, access sites, etc. may be another means of educating lake residents and users about ways to prevent the spread of Eurasian water milfoil.

**2. CONTINUED MONITORING.** On-going annual monitoring for Eurasian water milfoil is recommended. Although Watershed Council staff are available to perform the survey, it could also be easily accomplished by trained Lake Association volunteers. A volunteer training session was planned in conjunction with this survey, but unfortunately had to be canceled. Watershed Council staff are available to hold another training session (free of charge) in 1999, if there is enough interest.

 AQUATIC PLANT IDENTIFICATION REFERENCES

Borman, S., R. Korth, and J. Temte. 1997. Through The Looking Glass, A Field Guide to Aquatic Plants. Wisconsin Lakes Partnership 248 p.

Chadde, Steve W. 1998. A Great Lakes Wetland Flora. Pocketflora Press, Calumet, MI 569 p.

Hotchkiss, N. 1967. Underwater and Floating Leaved Plants of the United States and Canada. U.S. Fish and Wildlife Resource Publication #44. 124 p.

Prescott, G.W. 1969. How to Know the Aquatic Plants. Wm. C. Brown Company. 171 p.

Voss, E. G. 1985. Michigan Flora, Part I. Cranbrook Institute of Science Bulletin 55. 488 p.

Voss, E. G. 1985. Michigan Flora, Part II. Cranbrook Institute of Science Bulletin 59. 724 p.