

**Knickerbocker Lake
2016 Aquatic Plant Screening Survey**

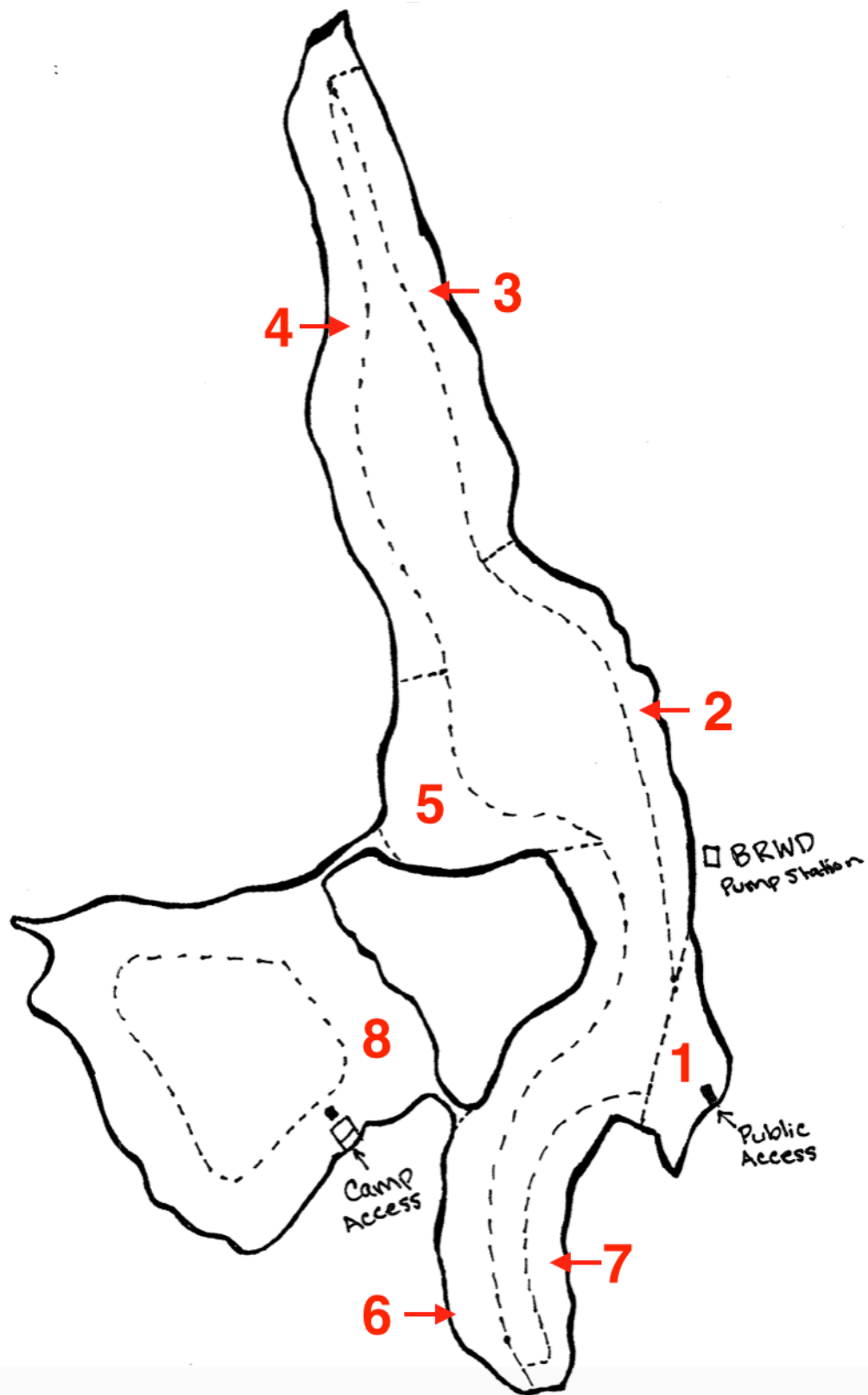


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Figure 1. Knickerbocker Lake sample zones.



Background:

Knickerbocker Lake is one of two water bodies that provide public drinking water for the towns of Boothbay, Boothbay Harbor, and Southport. Adams Pond is the primary public water supply source. Annual withdrawals from Knickerbocker Lake are currently limited to 51,500,000 gallons and occur primarily in late summer months. A town public access is located on the southeastern side of the lake and YMCA Camp Knickerbocker is located along the southern shore. There is no public boat launch, but a small floatplane is moored at a waterfront residence on the lake. Motor boats are limited to less than 10 horsepower engines.

Purpose:

The National Invasive Species Council defines an invasive species as “an alien species whose introduction does or is likely to cause economic harm, environmental harm or harm to human health.” Invasive species come from an outside region. When transplanted to a new lake where the environmental and ecological checks and balances previously keeping the invader from outperforming native species are absent, these species are able to completely take over an area in a short amount of time. This could result in the loss of aquatic animal habitat, a mono-cultured water body and over vegetation that could eventually lead to anoxic conditions. The decline in a lake’s health could not only lead to environmental hazards, but also an economic decline in house values surrounding the lake. The best way to prevent these consequences from occurring is to monitor a water body for invasive species and remove an invader as soon as it is found.

The 2016 invasive survey for Knickerbocker Lake is the first ever conducted and will provide a baseline of the occurrence and extent of existing aquatic native species. This baseline will make it easier in the future for to locate, and eradicate, any invasive species that may establish in the lake. It will also make the identification of invasive and native plants more accessible to local residents by introducing a starting point, reference, and contact if a suspicious plant is found.

Monitoring Methods:

Maine’s Volunteer Lake Monitoring Program (VLMP) defines a Level 3 screening survey as a survey that covers the entire shoreline area and littoral zone of a water body. The Level 3 invasive aquatic plant screening survey of Knickerbocker Lake began on August 24, 2016 and ended on August 26, 2016. Eight sections on Knickerbocker Lake were mapped out prior to monitoring. A kayak was used to cover the entirety of the littoral zone of the lake. A glass-bottomed bucket was used to view submerged vegetation. Samples of aquatic species were identified.

Results:

No invasive aquatic species were found during the survey. The survey resulted in 14 native aquatic species being identified and mapped, including: pickerelweed, American burr-reed, cattails, fragrant water lily, water target, little floating heart, spatterdock, variable leaf pondweed, large purple bladderwort, common bladderwort, floating bladderwort, low water milfoil, slender pondweed, and pipewort. Pickerelweed, fragrant water lily and pipewort were the most common aquatic species found. Low water milfoil, common water weed, variable pondweed and spatterdock were only found in section 8, most likely due to the fact that section 8 encompasses Little Knickerbocker lake which is connected to Knickerbocker lake by a narrow channel that may dry up in periods with little rain, allowing for limited species migration between lakes. The survey started in section one where invasive aquatic plants were most likely to be found due to the public boat access. Boats that have previously been in contact with other lakes could possibly contain fragments of species foreign to Knickerbocker Lake and have the potential to create an invasive species problem for both Knickerbocker Lake and West Harbor Pond (a pond that is connected by Campbell Creek, downstream of Knickerbocker). Section one contained only species common and native to the region.

The following are the species found in each section of Knickerbocker Lake. Next to each plant name is a corresponding page number leading to a description and photo of the plants. Further information for identification can be found on Maine's Volunteer Lake Monitoring Programs website: <http://www.mainevlmp.org/>

Aquatic Plant Species in Section 1:

Fragrant water lily	<i>Nymphaea odorata</i>
Pickerelweed	<i>Pontederia cordata</i>
Water target	<i>Brasenia schreberi</i>
Large Purple Bladderwort	<i>Utricularia purpurea</i>
Slender Pondweed	<i>Potamogeton pusillus</i>
Common bladderwort	<i>Utricularia macrorhiza</i>
Little floating heart.	<i>Nymphoides cordata</i>
Pipewort	<i>Eriocaulon aquaticum</i>
American Burr-reed	<i>Sparganium americanum</i>

Aquatic Plant Species in Section 2:

Pickerelweed	<i>Pontederia cordata</i>
Fragrant water lily	<i>Nymphaea odorata</i>
Large Purple Bladderwort	<i>Utricularia purpurea</i>
American Burr-reed	<i>Sparganium americanum</i>
Pipewort	<i>Eriocaulon aquaticum</i>

Aquatic Plant Species in Section 3:

Fragrant water lily	<i>Nymphaea odorata</i>
Pickerel weed	<i>Pontederia cordata</i>
Pipewort	<i>Eriocaulon aquaticum</i>
Large purple bladderwort	<i>Utricularia purpurea</i>
Slender Pondweed	<i>Potamogeton pusillus</i>
Cattail	<i>Typha latifolia</i>

Aquatic Plant Species in Section 4:

Variable pondweed	<i>Potamogeton gramineus</i>
Water target	<i>Brasenia schreberi</i>
American Burr-reed	<i>Sparganium americanum</i>
Little Floating Heart	<i>Nymphoides cordata</i>
Cattails Cattail	<i>Typha latifolia</i>
Pickerel weed	<i>Pontederia cordata</i>
Pipewort	<i>Eriocaulon aquaticum</i>
Fragrant water lily	<i>Nymphaea odorata</i>

Aquatic Plant Species in Section 5:

American Burr-reed	<i>Sparganium americanum</i>
Little floating heart	<i>Nymphoides cordata</i>

Water target	<i>Braseni schreberi</i>
Fragrant water lily	<i>Nymphaea odorata</i>
Large purple bladderwort	<i>Utricularia purpurea</i>
Pipewort	<i>Eriocaulon aquaticum</i>
Pickerel weed	<i>Pontederia cordata</i>

Aquatic Plant Species in Section 6:

Slender pondweed	<i>Potamogeton pusillus</i>
Pickerel weed	<i>Pontederia cordata</i>
Fragrant water lily	<i>Nymphaea odorata</i>
American Burr-reed	<i>Sparganium americanum</i>
Water target	<i>Braseni schreberi</i>
Little floating heart	<i>Nymphoides cordata</i>
Large purple bladderwort	<i>Utricularia purpurea</i>
Pipewort	<i>Eriocaulon aquaticum</i>
Cattails	<i>Typha latifolia</i>

Aquatic Plant Species in Section 7:

Slender pondweed	<i>Potamogeton pusillus</i>
Variable pondweed	<i>Potamogeton gramineus</i>
Large purple bladderwort	<i>Utricularia purpurea</i>
Floating bladderwort	<i>Utricularia radiata</i>
Common bladderwort	<i>Utricularia macrorhiza</i>
Water target	<i>Braseni schreberi</i>
American Burr-reed	<i>Sparganium americanum</i>
Pipewort	<i>Eriocaulon aquaticum</i>
Pickerel weed	<i>Pontederia cordata</i>
Fragrant water lily	<i>Nymphaea odorata</i>

Aquatic Plant Species in Section 8:

Pickerel weed	<i>Pontederia cordata</i>
Floating bladderwort	<i>Utricularia radiata</i>
Large purple bladderwort	<i>Utricularia purpurea</i>
Fragrant water lily	<i>Nymphaea odorata</i>
American Burr-reed	<i>Sparganium americanum</i>
Little floating heart	<i>Nymphoides cordata</i>
Common waterweed	<i>Elodea canadensis</i>
Low water milfoil	<i>Myriophyllum humile</i>
Variable pondweed	<i>Potamogeton gramineus</i>
Spatterdock	<i>Nuphar variegata</i>
Common bladderwort	<i>Utricularia macrorhiza</i>
Slender pondweed	<i>Potamogeton pusillus</i>
Water target	<i>Braseni schreberi</i>
Pipewort	<i>Eriocaulon aquaticum</i>

Native Aquatic Plants Present in Knickerbocker Lake and Descriptions:

Pickerelweed:

Pickerelweed can be found along the shallow edges of the lake. It has an arrow shaped leaf, thick stem, and purple flower. Found in all sections.



American Burr-reed:

American Burr-reed can be found along the shallow edges of the lake. It has a thick stalky grass with burrs. Found in sections 1,2,4,5,6,7, and 8.



Cattails:

Cattails grow along the shallow edges of the lake. They are typically 3-6 feet tall and have brown “clubs” called catkins. Found in sections 3, 4 and 6.



Fragrant water lily:

A floating leaf plant with lobed leaves. The pads are round with a narrow notch dissecting the two lobes. The tops of the pads are green and the bottom a reddish-purple. The flowers are highly fragrant and have white petals radiating around a center of yellow stamens. Found in all sections.



Water Target:

Water targets have an oval pad and no notch. The stem is connected to the center of the underside of the pad. The plants have a slimy coating covering the stems and undersides of the pad. The flowers are small, less than 3cm wide, with a maroon color. Found in sections 1, 4, 5, 6, 7, and 8.



Little Floating Heart:

Little floating heart has small heart shaped leaves on long stems. Each stem produces a single leaf. Tuberos roots that look like bananas are commonly attached to the stems below the surface. Found in sections 1, 4, 5, 6, and 8.



Spatterdock:

Spatterdock has large elongated heart shaped leaves with thick stems. The flowers look like a yellow ball with 5 to 6 petals around a yellow-green disk. Found in section 8.



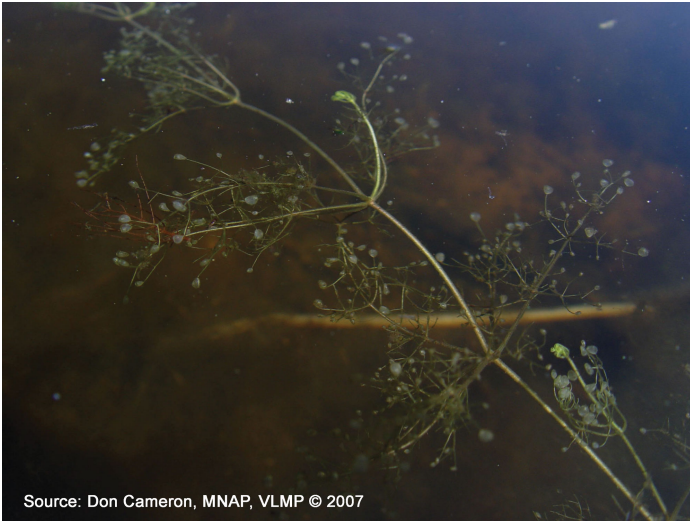
Variable Leaf Pondweed:

Variable pondweed has two distinct leaf types. The floating leaves are elliptical or oval and generally 2-5 cm long. The submerged leaves are variable in size and are alternately arranged and more elongate than the floating leaves. The flowers grow among the floating leaves and grow in a dense cylindrical spike. Found in sections 4, 7 and 8.



Large Purple Bladderwort:

Purple bladderwort can be found throughout the littoral zone of the lake. The leaves are arranged in strict whorls of six that are openly spaced along the stem. Transparent bladders are attached to the tips of the leaves. A small purple flower emerges from the water later in the summer season. Found in sections 1, 2, 3, 5, 6, 7, and 8.



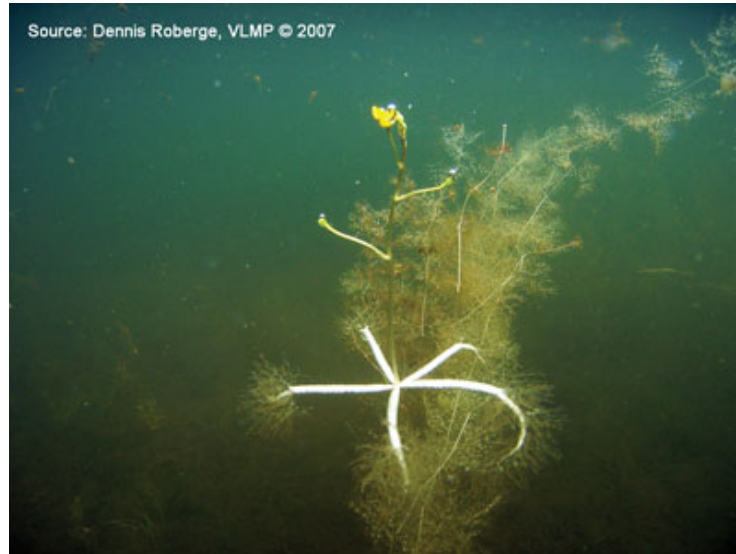
Common Bladderwort:

Common bladderwort can be found in the entire littoral zone of the lake. It has an alternate leaf arrangement and is often divided in a way that makes it look like alternately arranged pairs of leaves or lopsided whorls. Bladders are attached to divided leaves. The young bladders near the tip of the plant are transparent or a light green where the bladders closer to the root of the plant will be darker. Found in sections 1, 7, and 8.



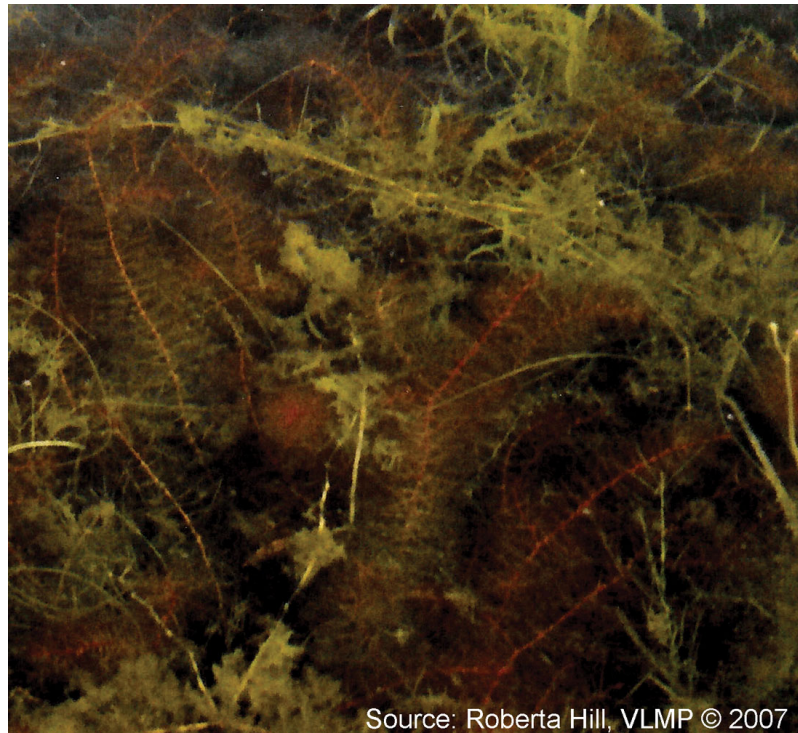
Floating Bladderwort:

Floating bladderwort appears to be more delicate than common and large purple bladderwort. The leaves are arranged alternatively but may appear to be in pairs or lopsided whorls. Delicate and transparent or pale green bladders are attached along the edges of divided leaves. Flowers grow from a whorl of floating branches as seen in the figure below. Found in sections 7 and 8.



Low water milfoil:

Low water milfoil typically has a red-brown stem. The leaves are fine and feather divided. Found in section 8.



Slender Pondweed:

Slender pondweed is an immersed plant that can be found in depths up to 3 meters. The stem branches randomly and the leaves are arranged alternately in a spiral. Found in sections 1, 6, 7, and 8.



Pipewort:

Pipewort stems are thin and pale green with a white ball at the top emerging from the water. The stems are attached to a small green “tuft” of grass rooted to the lake bottom. Found in all sections.



Invasive Species that may be found in Maine lakes:

European Frog-Bit	<i>Hydrocharis morsus-ranae</i>
Water Chestnut	<i>Trapa natans</i>
Yellow Floating Heart	<i>Nymphoides peltata</i>
Fanwort	<i>Cabomba caroliniana</i>
Eurasian Water-Milfoil	<i>Myriophyllum spicatum</i>
Variable Water-Milfoil	<i>Myriophyllum heterophyllum</i>
Invasive Variable Water Milfoil Hybrid	<i>Myriophyllum heterophyllum x Myriophyllum laxum</i>
Parrot Feather	<i>Myriophyllum aquaticum</i>
Brazilian Waterweed	<i>Egeria densa</i>
Curly- Leaf Pondweed	<i>Potamogeton crispus</i>
European Naiad	<i>Najas minor</i>
Hydrilla	<i>Hydrilla verticillata</i>

More information about identifying species can be found at Maine's Volunteer Lake Monitoring Program's Website: <http://www.mainevlmp.org/>.

If you believe you have found one of the twelve invasive species, be careful not to fragment the plant and contact the Boothbay Region Water District.

References:

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