Inventory of the Seaweeds of Lake Montauk (41.0601 N -71.9206 W)
Montauk, East Hampton Town
Suffolk County, New York
Final Report
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The purpose of this study was to assess the diversity of seaweeds in Lake Montauk as part of the Lake Montauk Project of the East Hampton Town Natural Resources Department. Seaweeds were collected monthly by wading at low tide at five locations starting 10 October 2009 until 23 October 2010. Initial dredging for specimens was useful only for obtaining floating mat organisms.

Specimens were pressed and dried on herbarium paper using the facilities of the East Hampton Town Shellfish Hatchery Laboratory in Montauk. No chemical preservatives were used in the preparation of the herbarium specimens. The dried specimens represent a permanent record of the inventory for East Hampton Town. They were also optically scanned and saved in Portable Document Format (PDF) and are a digital archive of the collection. Such images have sufficient detail necessary to make initial identifications. The PDF images are available on the East Hampton Town website.

The rich flora includes many of the characteristic species of the northeast coast of North America. The inventory corroborates our assumption that it would. However, certain species that are part of the northern flora are absent at both Montauk Point and in Lake Montauk. All species found in Lake Montauk are found at Montauk Point, the most characteristic northern marine habitat of Long Island. Good examples are the large brown kelps which are considered to be cold water species. They grow on solid substrate in the high subtidal in Lake Montauk. Species such as *Saccharina latissima (Laminaria saccharina)* (Fig. 1), *Laminaria digitata* and *Haplosiphon tomentosus* (Fig. 2) were all observed at the eastern side of the inlet in Lake Montauk. Also, the drift seaweeds exhibit a rich subtidal flora, especially of red algae (Fig. 3). Conspicuously absent is the only calcified red algae, *Corallina officinalis*, which is abundant at Montauk Point.

Figure 1. Digital scan of *Saccharina latissima (*ex-*Laminaria saccharina*).

Figure 2. Digital scan of *Haplosiphon tomentosus.*

scale 1cm = 18cm

Figure 3. Digital scan of *Gloiosiphonia capillaris.*

Scale 1cm = 18 cm

Lake Montauk (Latitude: 41° 4.4' N Longitude: 71° 56.1' W) is a 900-acre (360 ha) embayment that is home to the largest commercial and sporting fish fleets in the state of New York. It is of particular interest because it was once the largest freshwater lake in Long Island more than double the size of Lake Ronkonkoma (Penny, 2010). A map from 1779 (Fig. 4) refers to it as the Great Lake as do later maps from 1839, 1892 and 1902 (Figs. 5, 6, 7).

Figure 4. A chart from 1779 includes the Great Lake.

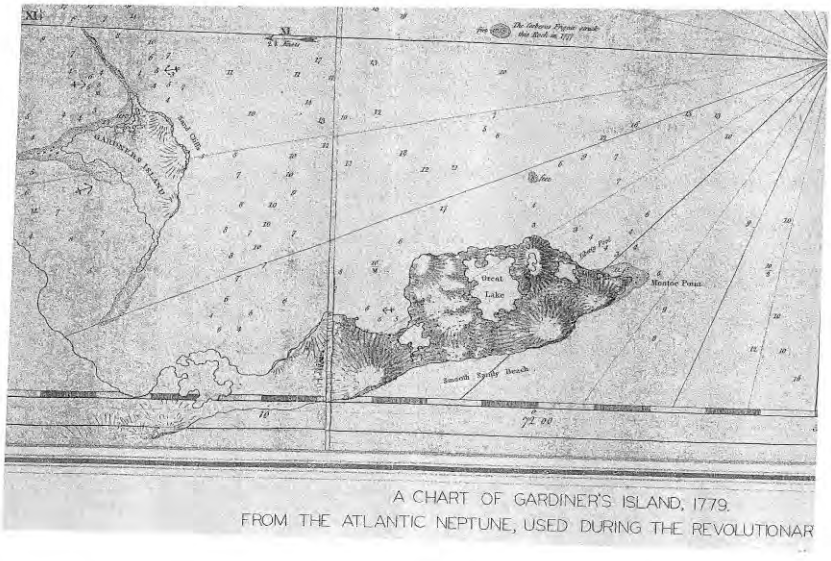


Figure 5. 1839.

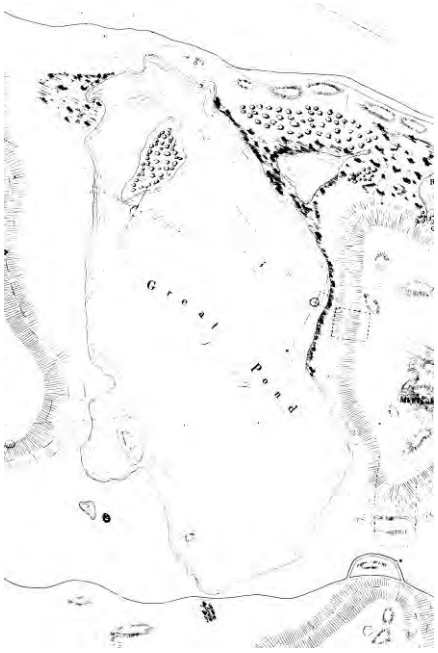


Figure 6. 1892.

Figure 7.

According to these maps and as far as is known, the lake was never opened naturally to Block Island Sound. It was later referred to as Lake Wyandanch and commonly referred to as the "Great Lake". It was opened to Block Island Sound and the open waters of the Atlantic Ocean by an inlet blasted through on the Northern shore in 1927 by developer Carl Fisher (Figs. 8, 9).

Figure 8. A development map.

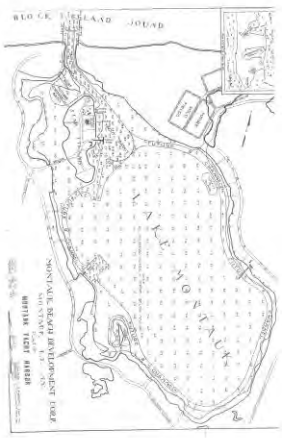
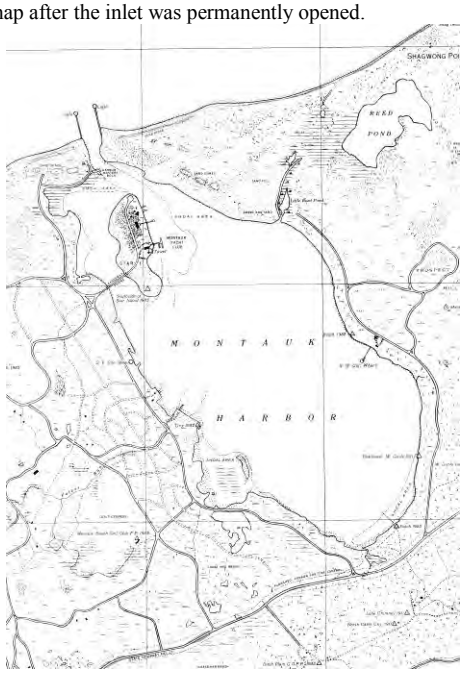


Figure 9. A map after the inlet was permanently opened.



Early immigrants refer to the entire region as abundant in fish and shellfish. The lake was undoubtedly an important resource for the Montauket Indians. Carl Fisher decided that Lake Montauk would make an ideal protected port and hoped to establish a "Miami style" resort in the area. His considerable financial resources were lost in the stockmarket crash of 1929, so his dream was dashed. The inlet was opened, a marina was established and the lake became a marine embayment.

Scientific and environmental studies of the freshwater lake don't seem to be in the published literature although there have been recent studies of *Zostera marina* (eel grass) distribution and fauna. However, there is no evidence of a previous study of the seaweeds. The East Hampton Town initiative attempts to fulfill the goal of documenting the entire flora and fauna.

Our year round study has revealed the patterns of seasonal and introduced species. Temperature and photoperiod are critical for timing the complex life histories of some seaweed (Bold and Wynne 1985). During the collecting period the water temperatures dropped from 20° C in early October to 6°C in January and the day length from 12L:12D to 9L:15D. During the period of short days, low light intensity and low temperature, the winter blade forms, the sexual stages, of *Petalonia* (Fig. 9) and *Scytosiphon* (Fig. 10) appeared and with each collection the specimens became larger. By January no truly large specimens had been observed. However, by March, large, fully mature specimens were collected and persisted for several months, therefore presumably producing the essential sexual reproductive cells through the spring season.

Two introduced species well known to the Western Atlantic were found. The giant unicellular green alga, *Codium fragile* (Fig. 11), which was introduced to the Northeast coast and first observed in Greenport, 13 January 1957 (Bouck & Morgan, 1957), is superabundant in Lake Montauk. It is a winter survivor, with heaps of it washed upon the shore and in the shallow subtidal in January. However in the intertidal *Codium* fronds are essentially absent in mid-winter. Also the Asian foliose red alga, *Grateloupia*

turuturu (syn. *G. doryphora*) (Fig. 12), reportedly introduced to Rhode Island from France in 1994 (Villard-Bohnsack & Harlin 1997) and first observed at Montauk Point in 2003 (personal observation), is now a perennial, seasonal well-established part of the flora in Lake Montauk. It was not observed at certain expected locations as the water temperatures decreased and was absent in late winter in the intertidal and no drift specimens were found in the spring. But smaller attached specimens were collected even during the winter.

Figure 10. Digital scan of *Petalonia fascia.*

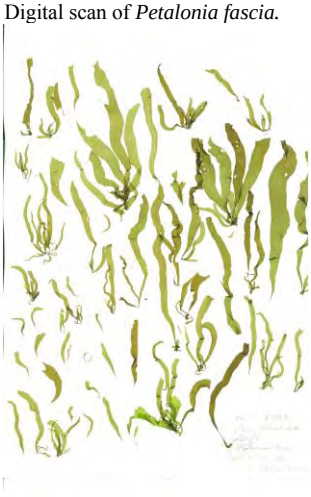


Figure 11. Digital scan of *Scytosiphon lomentaria.*

scale 1cm = 18 cm

Figure 12. Digital scan of *Codium fragile.*

Figure 13. Digital scan of *Grateloupia turuturu* (syn. *doryphora*)

scale 1 cm = 18 cm

A total of 43 species of seaweed were identified. However, clearly more species are present. For example, some genera include multiple species which are either difficult to identify without further study or are under study by specialists. Taxonomic studies of marine algae using DNA (desoxyribonucleic acid) sequencing is a very active field at the present time. In our study identification of the specimens has been made by morphological features not DNA sequencing. However, dried herbarium specimens are suitable for further detailed taxonomic studies using molecular techniques (Goff and Moon, 2004). Tissues can be rehydrated and the stable nucleic acid molecules can be

studied. M. Bohnsack (2003) and W. R. Taylor (1957) were the sources for morphological identifications.

The following is a list of the species collected organized according to phylum and class.

Brown Algae, Phylum Heterkontophyta or Phaeophyta, Class Phaeophyceae

Ascophyllum nodosum
Desmarestia aculeate
Desmarestia viridis
Dictyosiphon foeniculaceus
Ectocarpus siliculosus
Fucus vesiculosus
Fucus distichus
Fucus edentatus
Haplosiphon tomentosus
Laminaria digitata
Leathesis difformis
Petalonia fascia
Petalonia zosterofolia
Punctaria plataginea
Saccharina latissima (Laminaria saccharina)
Sargassum filipendula
Scytosiphon lomentaria

Green Algae, Phylum Chlorophyta

Blidingia marginata
Codium fragile
Ulva intestinalis
Ulva lactuca
Ulva prolifera

Red Algae, Phylum Rhodophyta

Agardhiella subulata
Agardhiella tenera
Ahnfeltia plicata
Ceramium sp.
Callithamnion baileyi
Champia parvula
Chondrus crispus
Coccotylus truncatus (reproductive)
Cystoclonium purpureum
Gracilaria foliifera
Gracilaria tivahiae

Grateloupia turuturu (doryphora)
Grinellia Americana
Neosiphonia harveyi
Palmaria palmata
Polysiphonia nigra
Polysiphonia stricta
Polysiphonia spp. (several)
Porphyra umbilicalis
Spermothamnion repens
Trailiella intricata

References

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Bouck, G. B. and E. Morgan. 1957. *The Occurrence of* Codium *in Long Island Waters.* Bull. Torrey Botanical Club. 84 (5) (Sept.):384-387.

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