

References

- Baker, J.P., H. Olem, C.S. Creager, M.D. Marcus, and B.R. Parkhurst. 1993. Fish and Fisheries Management in Lakes and Reservoirs. EPA 841-R-93-002. Terrene Inst. U.S. Environ. Prot. Agency, Washington, DC.
- Conesus Lake Association, 2002. The Conesus Lake dockside/near shore lake weed and algae treatment guide. Lakeville, NY.
- Cooke, G.D., et al. 1993. Restoration and Management of Lakes and Reservoirs. Lewis Publishers, Boca Raton, FL.
- Cooke, G. D. and R. H. Kennedy. 1989. Water quality management for reservoirs and tailwaters. Report I. In-lake reservoir water quality management techniques. Tech. Rep. E-89-I. U.S. Army Corps Eng., Vicksburg, MS.
- Creed, R. 1998. A biogeographic perspective on Eurasian watermilfoil declines: Additional evidence for the role of herbivorous insects in promoting declines? *J. Aquat. Plant Manage.* 36: 16-22.
- Crowe, G.E. and C.B. Hellquist. 2000. Aquatic and wetland plants of northeastern North America: a revised and enlarged edition of Norman C. Fassett's *A manual of aquatic plants*. University of Wisconsin press.
- Darrin Freshwater Institute. 1991. Hand harvesting Eurasian watermilfoil in Lake George. DFWI Rep. 91-7. Rensselaer Polytechnic Institute, Troy, NY.
- Eichler, L.W. et al. 1995. Recolonization of the littoral zone by macrophytes following the removal of benthic barrier material. *J Aquat Plant Manage.* 33: 51-54
- Engel, S. 1984. Evaluating stationary blankets and removable screens for macrophyte control in lakes. *J. Aquat. Plant Manage.* 22:43-48.
- Holdren, C., W. Jones, and J. Taggart. 2001. *Managing Lakes and Reservoirs*. N. Am. Lake Manage. Soc. and Terrene Inst., in coop. With Off. Water Assess. Watershed Prot. Div. U.S. Environ. Prot. Agency, Madison, WI.
- Johnson, R. 2002. Personal communications. Ithaca, NY.
- Lord, P.H., R. L. Johnson and K.Wagner. 2005. Effective aquatic plant monitoring: data and issues from Waneta Lake. Presentation at the Northeast Aquatic Plant Management Society annual meeting, Saratoga Springs, NY
- McComas, S. 1993. *Lake Smarts: The First Lake Management Handbook*. Terrene Inst., U.S. Environ. Prot. Agency, Washington D.C.
- Newroth, P. and R. Soar. 1986. Eurasian watermilfoil management using newly developed technologies. *Lake Reserv. Manage.* 2: 252-57
- NYSDEC, 2002. *New York State Water Quality 2002*. Albany, NY.

Perkins, M.A., H.L. Boston, and E.F. Curren. 1980. The use of fiberglass screens for control of Eurasian watermilfoil. *J. Aquat. Plant Manage.* 18:13-19

Sheldon, S. and L. O'Bryan. 1996. The life history of the weevil, *Euhrychiopsis lecontei*, a potential biological control agent of Eurasian watermilfoil. *Entomolog. News* 107: 16-22.

Solarz, S. and R. Newman. 1996. Oviposition specificity and behavior of the watermilfoil specialist *Euhrychiopsis lecontei*. *Oecologia* 106: 337-44.

Westerdahl, H.E. and K.D. Getsinger, eds. 1998. Aquatic plant identification and herbicide use guide. Vol. 2. Aquatic plants and susceptibility to herbicides. Waterways Experiment Station. U.S. Army Corps Eng., Vicksburg, MS.

Definitions

Emergent plants grow primarily above the water surface, although the plant may be rooted in the water. Cattails, purple loosestrife, and phragmites are examples of emergent plants

Exotic species- not native to a lake, and usually not native to a larger geographic region (the Adirondacks, New York, North America...), at the time of European settlement. Usually refers to plants or animals accidentally or purposefully introduced to an area outside of its historic range. Also referred to as non-native, alien, or introduced species.

Floating plants may or may not be rooted underwater, but the majority of the plant is associated with a floating leaf. Water lilies, watershield, duckweed, and watermeal are examples of floating plants

Invasive Species- plants or animals that rapidly reproduce and displace native species. Also referred to as noxious species.

Macrophytes- large plants (macro meaning large, and phyte meaning plant)- most of the aquatic plants found in New York State can be referred to as macrophytes

Meristems- the growing tips of aquatic plants- these are preyed on by herbivorous insects, and are often the most conspicuous part of an underwater plant

Monoculture- a single, homogeneous culture without diversity, such as a plant bed comprised solely of a single aquatic plant

Native Species- native or indigenous to a region at the time of European settlement

Naturalized- introduced from another region and persisting without cultivation; for example, aquatic plants or animals that might not be truly native but were long ago introduced and have adapted to a lake environment

Nuisance Species- plants or animals interferes with human activities. Also referred to as weeds.

Submergent plants grow primarily underwater, although small floating leaves or fruiting structures may sit on or above the lake surface. Water milfoil, pondweeds, coontail, and bladderwort are examples of submergent plants.

Veligers- a larval stage of a mollusk, such as a zebra mussel

Appendix A: Elements of an Aquatic Plant Management Plan

- Problem Statement
 - **Map(s) Indicating Areas of Plant Growth**
 - **Identification of Aquatic Plants on the Map, Including Invasive/Target Species** (indicate how target species identification was verified- professional? Applicator? Part of monitoring program?....)
 - **History of Invasive Weed Growth**- include year of introduction if known, indicate if invasive weed populations are increasing, stable, or decreasing
 - **Uses Impaired**- identify only major uses affected by weeds and whether these are designated lake uses, including impact of target plants/ exotics on native plants and lake ecology (aquatic life impacts)
 - **Known Occurrences of Rare/Endangered Species of Concern?**- list (reference NYS Protected Plant list as needed)

- Management History
 - **Description of Previous Management Efforts** (one paragraph per control strategy used).
 - **Evaluation of Successes and Failures**- did previous management successfully control problem?
 - **Lessons Learned**- did it work?, use of specific control methods, whether limitations existing on the use of particular techniques at this lake
 - **Does Overall Lake Management Plan Exist?** (does it address plant control?)
 - **Context of Aquatic Plant Management versus other lake management objectives** (is aquatic plant control compatible with other lake management objectives, such as swimming, potable water intake, irrigation water, etc.?)
 - **Description of Public Involvement in Management Efforts**- Lake Association? Local Government? Adoption of Prior Management Plans?

- Management Objectives
 - **Extent of Preferred Management**- summarize in one paragraph
 - Partial vs. whole lake management
 - Seasonal (short-term) vs. year-round
 - Immediate vs. long-term or persistent
 - Selective control vs. removing all plants in targeted area
 - **Expected Use Benefits**- one paragraph summary
 - **Critical Areas to Protect** (re: fisheries, wetlands, water intake)

- Management Alternatives- include information on “practical” use of these alternatives at this lake (what factors affect choice of preferred management alternatives- including bathymetry, flushing rate, outflow/groundwater seepage)- In other words, identify why each management alternative is (or is not) appropriate
 - **Local Control**- hand harvesting, benthic mats, herbicides- one paragraph for all methods

- **Lakewide Control**
 - Physical/Mechanical control- drawdown, mechanical harvesting, shading- one paragraph for all methods
 - Biological control- grass carp, herbivorous insects- one paragraph for all methods
 - Chemical control- herbicides- one paragraph for all methods
- **No Action Alternative-** one paragraph summary
- **Preferred Alternative(s)-** one paragraph summary
- **Integrated Management-** one paragraph summary of whether integrated approach (multiple techniques) is appropriate
- Pre-, During- and Post Treatment Actions Planned
 - **Monitoring-**
 - **Aquatic plant-** describe on-going and future monitoring to support aquatic plant management plan
 - Method (rake toss? point intercept? transects?)
 - Frequency of monitoring? (monthly, annually,...?)
 - Conducted by? (professional or volunteer)?
 - Results reported by maps? Data tables? Presence/absence?
 - **Water Quality-** describe on-going and future monitoring to support aquatic plant management plan
 - Water clarity and/or chlorophyll to evaluate shift from macrophyte-dominated to algae-dominated?
 - Dissolved oxygen measurements to evaluate potential for fish kills during and after treatment?
 - Frequency of monitoring?
 - Professional or volunteer?
 - **Early Response-** describe planned activities- one paragraph each:
 - Hand pulling or benthic mats as individual plants or small beds of reinfested target species
 - Frequency/schedule?
 - Prompted by?
 - Identifications through monitoring program?
 - Reports from lake residents?
 - Educational program re: exotics and vectors of transport
 - **Source Management-** describe planned activities- one paragraph
 - Signage/pamphlets at local launches
 - Boat/prop inspections
 - Strategies for reducing sediment/fertilizer load to lake (list and brief description of proposed strategies)- if not, indicate why this would not be efficient use of resources/effort (not contributing to invasive plant problem, etc)- will the lake resident try to identify sources of pollutants to the lake and start to address this loading
 - **Evaluation of Efficacy (Did it work?)-** brief (one paragraph summary)- timeframes; will this information will be reported to the DEC?
 - Did it control the target plants?
 - Will fisheries impacts be evaluated and how?
 - User surveys planned? (did people think it was successful)