

A Potential Breakthrough in Milfoil Control Technology
Report to the CVRD, January 9, 2019
An Initiative of the Shawnigan Basin Society
presented by Dr. Bruce Fraser

Milfoil has been in the lake for a number of years, but in the last few it has exploded to most of the available habitat. It is now a permanent fixture with growing consequences to water, recreation and lake safety, symptomatic of a suite of favourable conditions.

The Story of Vectors

As with familiar stories of the malaria parasite, dengue fever, African Sleeping Sickness, Zika virus and West Nile virus, the disease causing organisms are carried by biting insects, mainly mosquitoes and flies. These carriers are known as transmission vectors.

Milfoil too has a vector. It is us. Humans are the main carriers of milfoil among water bodies, on boats, trailers and dumped from aquariums. We, as it happens, go well beyond merely being a transmission vector. We also create the siltation and nutrient accumulation conditions that favour the explosive growth of the milfoil once it has been introduced. We have also created the emerging climatic conditions that will favour its continued success.

Control Methods

There is now a long worldwide history of attempts to control milfoil once it has been established in a water body. They include attacking the organism directly, modifying the organisms environment, employing predators and attacking the vectors:

Restricting Milfoil Introduction: mainly by promoting the washing of boats and trailers moving among lakes – largely ineffective due to lack of monitoring and enforcement of compliance and absence of facilities at launching sites

Poisoning with herbicides: drastic, effective in small ponds, but not appropriate for a drinking water or major fish bearing lake

Biological Controls: milfoil weevils have been deployed with limited success, local crayfish are said to be natural predators but they have been depleted by predation from introduced small mouth bass

Shading with plastic sheeting: cutting off the light necessary for photosynthesis, requiring placement in the Spring and subsequent removal to allow native species to recover – effective but limited in application to small local areas and needing annual applications and handling of waste plastic

Weed Eating: mowing the milfoil plants by machinery and disposing of the material on land: effective in dealing with appearance in suitable shore areas but expensive and must be continued indefinitely– has the potential to expand milfoil through escaped fragments (Okanagan Basin system)

Rototilling: digging up the plants by bottom rototilling in winter so that fragments die in the cold water – again a continuous commitment, expensive and suitable only where shoreline conditions allow for the use of machinery over extensive areas (Okanagan Basin system)

Divers: scuba divers hand picking individual plants, uprooting them and placing them in mesh bags to limit the escape of fragments: effective, but very expensive, dangerous and requires annual efforts (Christina Lake system)

Suction Dredging: using modified gold dredges to uproot milfoil plants, including roots and piping into large mesh bags for dewatering and removal to a landfill – effective but disruptive of bottom surfaces (experimental system in Shawnigan)

Limitations of Existing Methods: Labour Intensity, operational safety, cost of ongoing repetition, restricted location suitability, ecological side effects, dangers of introducing other species as controls, and limited effectiveness

A New Technology: Oxygen Nanobubbles

The technology employs water pumps attached to an oxygen nanobubble creating machine. The unit scavenges oxygen from the air while eliminating nitrogen that can feed algae and cyanobacteria. Nanobubbles introduced into the water are so small that they remain suspended in the water, and do not escape into the atmosphere, and are therefore available for an extended duration.

The system is inexpensive, parsimonious of energy, capable of being mounted on a shoreline or dock and can be used anywhere. Installation is straightforward enough to be handled by a local landowner without specialized expertise.

The technology has been widely employed in the US, initially to deal with algal problems but has been recently found to kill milfoil plants. After a two week application of nanobubbles in a test location in Lake Ida Anne in Langford, milfoil plants died and floated to the surface where they could be easily mechanically collected for transport to composting facilities. Similar success was achieved after a one week application in Spider Lake at Spider Lake Springs Resort north of Qualicum. How it works is that it appears to affect nutrient uptake by milfoil roots from lake sediments and may also limit the availability of carbon dioxide that is displaced from the highly oxygenated lake water, thus starving the plants.

Partners

The nanobubble system is a patented technology created by a BC company called Gaia Water Ltd, located in Victoria and further partnered with Gaia USA. Gaia USA has licensed it to Homeport Water Solutions, a large US company that tested competing systems and found the Gaia model to be the most effective and cost efficient – no chemicals, low power consumption, reliability and low visual impact. Homeport has developed the physical units and provided them further to the largest lake remediation company in the US – SOLitude Lake Management. Operating systems are ISO and EPA certified.

Gaia, Homeport and SOLitude have expressed an interest in working with the Basin Society to conduct scientific field trials of the technology in Shawnigan Lake in 2019. They are working with us to develop the trial methodology and are willing to supply instruments to us initially at a discounted cost.

The Society will hold a series of public meetings in Shawnigan, January 23, February 20 and March 20, each at 7pm., at our village office to discuss the field trial process, locations and funding with the community prior to commencement in April. In the meantime the Society is working on a federal Eco-action Grant to expand the trial effort beyond the smaller means available through the SBS annual budget which in 2019 can extend to one or two units.

Other partners in the process from whom written commitments have been received to date include:

Timberwest, the actual owners of the lake bottom in which milfoil is rooted

DFO, which is concerned with the health of the lake from a fisheries perspective

CVRD Environment, which is launching a major watershed health function

Mill Bay and District Conservation Society, which is responsible for annual introduction of Coho stocks to the Shawnigan system as a backup to the Goldstream and other locally threatened stocks

Additional engagement is actively being sought from:

The Shawnigan Research Group who have been invited to participate in the design and technical assessment of the field trial

Cowichan Tribes and the Malahat First Nation

Ministries of Environment, FLNRORD for regulatory approvals and scientific support

The Invasive Species Council of BC and The Coast Invasive Species Committee – given the wider potential applications for Vancouver Island and the province

Discovery of the Gaia enterprise was made by our own perennial Shawnigan Lake Advocate, Bill Savage and the detail work with our local partners and the convening of the Gaia associates has been managed by Kelly Musselwhite, the Basin Society's Executive Director.