Spiny Naiad - Weed Management
Pros/Cons

Big Island Pond Corporation - Weed Management Task Force

Introduction:

Big Island Pond (BIP) has a new invasive weed called Spiny or Brittle Naiad. This plant in Big Island Pond regrows every year from seeds and flowers roughly in July, producing more seeds. These seeds spread in the water column and reseed in the lakebed. It falls apart and spreads like a dandelion when disturbed. Spiny Naiad seeds are extremely small which adds to the challenges of controlling the spread of this invasive weed.

Unlike other nearby lakes where a few Spiny Naiad plants appear and disappear, we are not as fortunate as it is rapidly flourishing in our lake. We are one of two lakes in the State of New Hampshire where Spiny Naiad is rapidly growing and must be managed. In 2019, AB Aquatics unsuccessfully attempted to remove the plants. Alternatively, last year AB Aquatics laid down some benthic barriers on the lakebed in a heavily infested area which proved ineffective as well. A 2020-year survey has already identified BIP with up to 50 acres of potential Spiny Naiad infestation. DASH (Diver Assisted Suction Harvesting) is only effective in removing individual Spiny Naiad plants or small areas of infestation. It takes five weeks of diving/DASH to remove ONE acre of Spiny Naiad, and the 2020 survey has identified 10 areas of BIP (about 50 acres) where spiny naiad has been found. Unfortunately, there is only one dive company that has the capability of diving/DASH for Spiny Naiad and they have chosen to not engage with BIP for 2021.

The purpose of this document is to provide an unbiased overview of the available weed management techniques available to BIP. The information was gathered and organized by a task force of volunteers that live on the lake and have expertise in their respective fields. The information was gathered from public domain sources and vetted against other sources (vendor information, peer reviewed reports, etc).

The team is comprised of the current head of the Weed Management Committee and the prior head of the Weed Management Committee, a doctorate in biochemistry that worked in pharmaceutical development for 40 years, a career long engineer, a PhD botanist in molecular biology who works with molecular genetics in plants, and a PhD plant physiologist who was the head of a university plant sciences department with strength in weed science.

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Please refer all concerns and questions to your BIPC Area Director, or send an email directly to the task force at weeds@bipc.us. Responses from the taskforce will be published on the BIPC Facebook page and website bigislandpond.org. Please check both for more information as it becomes available.

weeds@bipc.us

Disclaimer:

The information contained in this document is provided for informational purposes only, and should not be construed as legal or technical advice on any subject matter. You should not act or refrain from acting on the basis of any content included in this document without doing your own due diligence or seeking other professional advice.

Definitions:

Ecosystem - The community of living organisms in and surrounding or lake, living and nonliving components of the environment, composed of plants, animals and microorganisms. For the purposes of this effort, we also include humans, pets, and shoreline as part of the BIP ecosystem.

DASH - Diver Assisted Suction Harvesting - Is a method of harvesting underwater plants. Divers identify unwanted non-native or invasive plants that need to be removed, pull them out by the roots and feed them into a suction tube that transports the plants to a boat to be hauled away. The results are immediate,chemical-free, long-lasting with ongoing maintenance. BIPC has been using DASH harvesting for over a decade to manage milfoil.

Benthic Barriers - A benthic barrier is a piece of material (film, sheet, BIPC has used tarps) that lays on the Benthos layer of a water body (bottom layer of water and the uppermost layer of sediment) to keep sunlight from getting to the nutrient-rich soil. Benthic Barriers are cost effective and functional for small areas. The material is typically heavier than water which allows it to settle firmly on the lake's bottom, but in most cases, additional weight is needed to keep the material in place. Gases of decomposition forming under the material can be a problem and must be maintained by divers "venting" the gas by slitting the material.

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Dredging - Dredging is the act of removing silt and other material from the bottom of bodies of water. It does a fairly complete job of clearing an area of all but the substrate material (earth), it will also remove or at least disturb the entire ecosystem of silt, biomass, living organisms, etc.in the dredged area, impacting the ecosystem.

Monitor and Observe - This is the act of monitoring the concerned areas without immediate action. Inspecting for plant growth from the surface or with divers in order to see how a plant grows, propagates, survives the seasons, and its impact on the overall ecosystem.

Herbicides - Aquatic Herbicides are formulated to control a wide variety of aquatic weeds and are approved for use within a water body by state and federal organizations. Aquatic herbicides come in liquid or granular form to control and, in some treatments, prevent weed growth. Herbicides come in various forms and brands and each has different active properties. Herbicides must be applied by vendors that the state of NH has permitted to do so. .

Bioaccumulation - The tendency for a chemical to remain in animal tissue and accumulate in top predators (bass, otters, snapping turtles, people).

Tactic	Pros	Cons
DASH (Diving)	➢ Environmental impact limited to targeted areas and species. ➢ Can inspect while diving.	➢ There is only one vendor certified for DASH work in NH that currently dives for spiny naiad and they are not able to work with us. ➢ Can trigger fragmentation and seed disbursement. ➢ Experienced naiad divers stated that a “team” requires 5 weeks to harvest one acre of spiny naiad. ➢ There is a short window – must be done between growth periods when plants are large enough to be identified, yet before bloom. ➢ Expensive. ➢ Temporarily effective = requires annual maintenance.

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Benthic Barriers	➢ Environmentally does not introduce harm to humans. It may impact the subterranean ecosystem. ➢ Effective for small areas prior to the bloom.	➢ **NH DES will not approve the use of benthic barriers for treatment of 50 acres.** ➢ Impacts the ecosystem it covers, must be removed over time. ➢ Must be maintained for gasses and then removed. ➢ Silt on top of barriers could allow for plants to grow on top of barriers if not maintained. ➢ Repeated use is likely needed. ➢ Activity (boating, swimming, fishing) can be impaired and may damage barriers. ➢ The cost of materials, building and placement is significant, and prohibitive for large areas.
Dredging	➢ Environmentally does not introduce harm to humans or long term to animal species if shallow dredging. ➢ Useful for creating/clearing navigation channels. ➢ Could remove seeds/sprouts if done early in the season.	➢ **NH DES does not approve the use of dredging.** ➢ Environmentally removes ecosystems and will remove some animal species (primarily invertebrates) in the short term. ➢ Can possibly disturb silt and release toxins into the water body and alter water nutrients. ➢ Channels alter the original ecosystem. ➢ Expensive (operations and if permitting is approved).
Monitor and Observe	➢ Does no short-term harm to humans, animals or native plants. ➢ Allows time for evaluation of impact and controls. ➢ Naiad may not reappear year after year. Observation allows for understanding this. ➢ Little to no cost.	➢ May result in overgrowth in some areas ➢ Native plants may be crowded out, which may impact desirable animals, algae and plants. ➢ The past two years was mostly a monitor and observe strategy and naiad has spread dramatically.

Questions to weeds@bipc.us

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Chemical/ Herbicide (general section. Details below)	***Applicable to all chemicals below:*** ➢ Cost effective compared to most alternatives. ➢ Approved by the EPA for control of aquatic invasive plants. ➢ Registered in the state of NH for use in treating spiny naiad as well as other aquatic invasive plants. ➢ Chemicals below do not exhibit bioaccumulation.	➢ There may be an impact to non-target plants, algae and animals. ➢ Likely to need repeated applications and ongoing yearly maintenance. ➢ Weed species often develop resistance to chemical treatment. ➢ May affect aquatic animal and plant distribution in treated areas.. ➢ Per NH Department of Agriculture, all herbicides applications will have a 1 day swimming and fishing restriction in treated areas. ➢ Wells within 50 feet of treated areas may need to be tested following herbicide treatment. ➢ Water should not be drawn from treated areas for lawn or plant watering for a period determined by post treatment sampling.
Individual Chemicals		
Diquat	➢ Leaves water in 1-35 days by light degradation or binding to sediment particles. ➢ More likely to stay localized to application areas. ➢ No bioaccumulation. ➢ Commonly used. ➢ an inexpensive and effective option. ➢ Fast acting, and possibly just one application. ➢ Preferred by NH Department of Agriculture as more specific for naiad at levels used over other herbicides.	➢ Broad spectrum – may kill non-target plant life in treated areas. ➢ Is potentially more toxic to animals and humans than other alternatives below that specifically target plants. ➢ Indefinitely bound in the sediment and eventually locked in the clays. ➢ Can contain trace contaminants that are carcinogenic that will degrade over time.

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	➢ Vendor recommends diquat or fluridone.	
Endothall	➢ No bioaccumulation. ➢ Less toxic than diquat.	➢ Complete degradation 30-60 days, but most gone in less than two weeks. ➢ Broad spectrum – may kill non-target plant life in treated areas. ➢ Vendor states that this is not used often for naiad. NH Department of Agriculture was not aware of any uses for naiad.
Fluridone (carotenoid Inhibitors)	➢ Considered to be the least toxic option. ➢ Less broad spectrum, so impacts the ecosystem less than other chemical alternatives. ➢ Intermediate expense. ➢ Available in pellet form, which concentrates the chemical at the point of treatment. ➢ Vendor recommends diquat or fluridone.	➢ Takes longer to act than other herbicides. ➢ Degradation is between 4 - 97 days. ➢ No effect on fish, affects only plant proteins.
Copper complex *(Applicable to both Komeen Crystal/ Harpoon Granular)*		➢ Requires longer treatment time. ➢ Does not degrade. Will accumulate in sediments where it can be released if disturbed. ➢ May be toxic to fish and invertebrates at application levels. Will kill algae. ➢ May be most expensive herbicide depending upon the form used. ➢ Neither vendor or NH Department of Agriculture are supportive of use due to lack of specificity for naiad.