Hydrilla Management Actions in Deep Creek Lake

Hydrilla verticillata (*Hydrilla*) is a listed noxious weed (Federal Noxious Weed Act) defined as any plant designated by a Federal, State or county government as injurious to public health, agriculture, recreation, wildlife or property. *Hydrilla* is a rooted submersed perennial monocot, native to Asia (Haller, 2009). The monoecious biotype found in Maryland was introduced to the United States in the 1970s.

Hydrilla's competitive edge vs. native species

Hydrilla grows under lower light conditions than nearly any other species (only one percent of sunlight), allowing it to grow up underneath other plants and to survive at greater depths (Langenland, 1996). It has several dispersal strategies: Vegetative fragmentation, production of turions on the stems, tuber production under the sediment and sexual reproduction. A single tuber can lead to the production of several hundred others in the course of one growing season. It can grow very rapidly, doubling its biomass every two weeks in summer conditions. *Hydrilla* was introduced into the United States, so it is without any natural enemies that evolved with it, such as insects and diseases specialized for attacking it.

Reasons for Concern in Deep Creek Lake

Hydrilla has adapted to grow under low light conditions, which gives it the ability to colonize deeper water. Submerged aquatic vegetation (SAV) is typically found along the margins of the lake where shallower depth allows greater light penetration. *Hydrilla* can compete with native plants in the shallow areas but has the potential to grow much deeper without competition. This unique adaptation extends the possible habitat to a much greater portion of the lake. *Hydrilla* can create a surface canopy in the upper two feet of the water column, thus limiting the available light to lower growing native species. Further, this dense growth at the water surface can create changes in water temperature, wave action, oxygen production and pH, which reduced the suitability of infested waterways for use by aquatic fauna (Holler, 2009). In addition to impacts on native vegetation, dense surface canopies interfere with water flow, boat traffic and fishing. Dense surface canopies also radically change the habitat quality for fish. Plant beds provide a place for small forage fish to hide and reduce the ability of predatory fish such as bass and northern pike to see their prey. This tends to lead to a large number of small forage fishes and poor production of game fishes (Dibble, 2009). Water can become stagnant under dense canopies and suppress or prevent oxygen recirculation. The amount of dissolved oxygen under dense plant canopies maybe insufficient to support desirable fish species and may result in fish kills (Madsen, 2009). DCL currently has nineteen species of SAV and is considered a healthy vibrant plant community. *Hydrilla* can establish and then displace native aquatic plant species such as Pondweeds and Vallisneria (Langenland, 1996). Invasive plants reduce the diversity of native plant communities, which leads to reduction in the diversity of both fishes and aquatic insects. Therefore invasive plants are harmful to the diversity and function of aquatic ecosystems and can have an adverse impact on water resources (Madsen, 2009).

In Fall, 2013, DNR biologists discovered *Hydrilla* in the southern portion of Deep Creek Lake with multiple patches of the plant covering ~6.5 acres of the lake surface comprising 550 surface acres (~9,900 acre-ft). In response to this discovery, the Department convened a nation-wide panel of *Hydrilla* experts. A thorough evaluation of all potential *Hydrilla* control strategies was conducted, including lake drawdown, biological, mechanical, chemical and no action. Below are the panel recommendations.

- Prior to treatment, water quality and *Hydrilla* tuber monitoring will take place in the proposed treatment areas. Tubers are reproductive structures found in the sediment, and their decline or absence will be the best indicator of herbicide effectiveness. DNR will monitor the tuber population during the course of the management plan to track the success of the herbicide treatment.
- DNR will contact homeowners and other lake users in coves where treatment will occur, informing them of the treatment dates, details and any restrictions that might be placed on use of the water. This outreach will include, but not be limited to, press releases, mailings, signage and buoys.
- DNR will use a variety of systemic and contact herbicides that have produced successful results in projects conducted by our expert panel.

    - Fluridone (Trade name Sonar®) will be used for the majority of the block treatments. It is absorbed by plant shoots and from hydrosoil by the roots. *Hydrilla* is very sensitive to low doses of fluridone. –
    - Diquat (Trade name Reward®) is a non-volatile herbicidal chemical for use in aquatic areas. Absorption is rapid with visible effects in a few days.
    - Flumioxazin (Trade name Clipper®) is a broad spectrum herbicide for control of invasive/noxious weeds in water bodies with limited outflow.
    - Komeen® or Komeen® Crystal granular and Stingray® liquid forrumations were added for 2015 to allow for a broader spectrum of contact herbicide for treatment.

Phase 1 of treatment plan

- When RAS divers determine growth has begun in most of the areas, treatment with granular Sonar® will begin (Early May)
- Contractors would treat every three weeks until the end of August. A FasTEST® assay will be collected by RAS field staff weekly between each Sonar® treatment to ensure the proper dosage rate. If the herbicide levels drop below the desired treatment rate, the schedule will be modified or additional herbicide will be used to maintain proper dosage.
- Sonar® treatment would continue through the summer so that plants emerging from the sediment would immediately uptake the herbicide and destroy the plants from within the vascular tissue.
- It is a slow process that requires the proper amount of herbicide over an extended period of time to be effective.

Phase 2 of treatment plan

- Re-growth can occur, so follow-up treatments of contact herbicide may be necessary throughout the summer.
- During routine tuber collection and water quality testing, RAS staff will survey the treatment areas to ensure no *Hydrilla* is present.
- Licensed applicators from DNR Fisheries staff will work with the RAS crew to mark off the smaller infestations with buoys and treat each area with a sub-surface injector that will inject the contact herbicide down to plant level. The expert panel suggests using DiQuat™ or Clipper® liquid on smaller patches as they can effectively kill plants within hours.

Risk associated with treatment

Once the herbicide is in the water column, it dilutes immediately and poses little risk to humans. Both Sonar® (fluridone) and Clipper® (flumioxazine) are broad spectrum herbicides for control of *Hydrilla* and have no restrictions for drinking, swimming and or eating fish post treatment at label application rates. Treated water may be used for irrigation 5 days (Clipper®) or 30 days (Sonar®) after treatment. For diquat, there are no restrictions on swimming or eating fish after treatment, but water should not be used for drinking for up to 3 days or irrigation for up to 5 days. Aquatic organisms will have only limited exposure to fluoridone in the water as a result of dispersion, dilution and microbial degradation of the chemical into carbon, hydrogen, oxygen and organic acids, even during an extended application period. No adverse impacts have been identified which are expected to result from the presence of fluridone at or below the New York State (NYS) acceptable residual level of 50 ppb and the EPA acceptable residual level of 150 ppb for potable water (NYSDEC, 1994). Flumioxazine and diquat have been found to be slightly to moderately toxic to some species of fish and moderately to highly toxic to some invertebrates in the laboratory. However, field studies have not identified short- or long-term impacts to fish and other aquatic organisms. Fluridone, flumioxazine and diquat applied at the approved concentration rates have not been found to be toxic to waterfowl and wildlife. Laboratory animals (mice, rats, dogs) fed with fluridone in their diets showed little signs of toxicity even when fed levels which far exceed potential human exposure from the use of Sonar®. Fluridone is not considered to be a carcinogen or mutagen and is not associated with reproductive or developmental effects in test animals (WSDOH, 2000).

References

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