Nuisance SAV Control Options Table - December 2024

Options	Explanation	Pros	Cons	Information Source	Use at DCL?
Chemical Control					
Aquatic Herbicides	Aquatic Herbicides are chemicals that are applied to kill or control nuisance plants	1. Efficient. 2. Can be used to directly target species and avoid the introduction of a new species. 3. Different species are impacted by different concentration amounts. 4. Rapid results. 5. Site specific.	1. Any use of chemicals must be carefully considered due to potential impacts on fisheries. 2. Over use of herbicides can affect native plants and wildlife.	NORTH CAROLINA AQUATIC NUISANCE SPECIES MANAGEMENT PLAN by the NC Aquatic Nuisance Species Management Plan Committee, Oct 2016 https://edocs.deq.nc.gov/WaterResources/DocView.aspx?dbid=0&id=2731219&cr=1	Already used at DCL for Hydrilla control
Shading Chemicals	Blocks UV from penetrating the water column, Aquashade is the most popular brand	Seems to have little impact on phytoplankton, water quality or fish. Does not impact Turbidity. Effectively removes Hydrilla.	1. Expensive and would require repeat applications = not a viable option 2. Seems to have little impact on Naiads 3. Non-selective, and would impact all SAV, not just nuisance SAV	Ludwig, G.M., Perschbacher, P. and Edziyie, R. (2010), The Effect of the Dye Aquashade® on Water Quality, Phytoplankton, Zooplankton, and Sunshine Bass, Morone chrysops×M. saxatilis, Fingerling Production in Fertilized Culture Ponds. Journal of the World Aquaculture Society, 41: 40-48. https://doi.org/10.1111/j.1749-7345.2009.00331.x John D. Madsen , Kurt D. Getsinger , R. Michael Stewart , John G. Skogerboe , David R. Honnell & Chetta S. Owens (1999) Evaluation of Transparency and Light Attenuation by Aquashade™, Lake and Reservoir Management, 15:2, 142-147, DOI: 10.1080/07438149909353958	
Other?					
Biological Control					

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Options	Explanation	Pros	Cons	Information Source	Use at DCL?
Grass Carp	Grass Carp are effective at eradicating aquatic weeds as they consume most aquatic vegetation	1. Sterilized Grass Carp can be introduced so they can feed on vegetation without reproducing and outcompeting native fishes. After a few years, the sterile carp will die out and allow for the native species to continue to flourish as native vegetation returns in place of the invasive weeds.	1. IT IS ILLEGAL to introduce grass carp into Maryland waters. In addition, DNR does NOT recommend introducing one species to control another 2. Only for use in lakes or ponds 3. Non selective	NORTH CAROLINA AQUATIC NUISANCE SPECIES MANAGEMENT PLAN by the NC Aquatic Nuisance Species Management Plan Committee, Oct 2016 https://edocs.deq.nc.gov/WaterResources/DocView.aspx?dbid=0&id=2731219&cr=1	
Herbivorous Insects	Salvinia Weevils and Alligatorweed Beetles are often used at treatment sites as a more natural and site-specific control method. Unlike Grass Carp, these insects tend to only consume the intended target plant.	1. The population of these insects can grow exponentially due to their short life cycles and increase the rate of control over time.	1. NOT RECOMMENDED, DNR does NOT recommend introducing one species to control another 2. Species do not always survive the winter	NORTH CAROLINA AQUATIC NUISANCE SPECIES MANAGEMENT PLAN by the NC Aquatic Nuisance Species Management Plan Committee, Oct 2016 https://edocs.deq.nc.gov/WaterResources/DocView.aspx?dbid=0&id=2731219&cr=1	
Other?					
Physical Control					

Nuisance SAV Control Options Table - December 2024

Options	Explanation	Pros	Cons	Information Source	Use at DCL?
Drawdown	An inexpensive method of large scale control of some species in which lake water level is decreased in order to expose and kill the nuisance plant reproductive structures. The lowering of the water impacts plant growth and/or destroys seeds by exposure to drying or freezing conditions. It's recommended to do every three years to discourage the establishment of resistant plant species.	1. Once established, no other actions necessary. 2. Species Specific - Must know which species are present and if this method is appropriate for those species = viable option if species present are susceptible. Must do surveys prior to drawdown to identify species present at location. Drawdown decreases milfoil, nuphar, utricularia, and coontail. 3. Best for species that reproduce by fragmentation or rhizomes. 4. Simple, inexpensive. 5. With the proper lake slope, can still provide water for other plants and wildlife and only impact near shore areas 6. Simultaneously allows for other lake management activities such as shoreline clean-up, dock or retaining wall repair, and erosion control structure maintenance	1. Impact spawning and nursery areas for fish - potential for fishkills with oxygen depletion in the winter. 2. Difficulty working with companies that control water levels. 3. May cause mercury (Hg) to become bioavailable. Nutrient release may increase algal blooms. 4. May select for invasive species, or for resistant species may stimulate growth. Drawdown increases most pondweeds and naiads. 5. May impact more SAV outside of problem areas since water levels need to be quite low to be effective. 6. Dependent on deep frosts occurring in the winter and is only viable in lakes with some method of water level control. 7. Potential for increase in turbidity. 8. The faunal density and composition in the littoral zone may change: density may increase but biodiversity might decrease.	1. DNR FABS -Matt Sell, John Mullican 3. Andrew Heyes - CBL (Hg Bioavailable) Multiple local examples (New Germany drawdown 2008, Greenbriar Lake drawdown 2023, U of California literature review 2022) Lake Level Drawdown as a Macrophyte Control Technique written by G.D. Cooke, 1980, and published in Water Resources Bulletin 16(2): 317-322. A Primer on Aquatic Plant Management in New York State by the New York State Department of Environmental Conservation (NYSDEC), Division of Water, April 2005 http://www.dec.ny.gov/docs/water_pdf/ch6apr05.pdf Cooke, GD and ME Gorman (was in press in 1980). Effectiveness of DuPont Typar Sheeting in Controlling Macrophyte Regrowth after Over-winter Drawdown. Water Resource Bulletin. Black Lake Eurasian Watermilfoil Management Plan Prepared for: Black Lake Invasive Weeds Committee, Hammond, NY Prepared by: Quantitative Environmental Analysis, LLC, Liverpool, NY July 14, 2008 Cooke, G.D. 1980. Lake Level Drawdown as a Macrophyte Control Technique. Water Resources Bulletin 16(2): 317-322. Wegener, W and V Williams, 1974. Fish Population Responses to Improved Lake	

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Benthic Barriers	Use of a barrier to physically prevent plant growth	1. A benthic screen provides a physical barrier to plant growth and will last for several years if properly maintained = a viable option in small areas 2. Among the safest and most ecologically sound in-lake physical control techniques 3. Effectively used in a wide range of locations, conditions, and for wide range of nuisance vegetation 4. Doesn't impact recreational activities	1. Can be expensive to build and install these structures so typically limited to small areas (typically swimming areas). 2. Requires manual labor to remove problem species before installation. If plants are not removed prior to installation, the decomposition of plants below the barrier will lead to gas production and the ballooning up of the barrier at which point it becomes a navigational or recreational hazard. 3. Requires regular cleaning of structure underwater to ensure no regrowth occurs.	A Primer on Aquatic Plant Management in New York State by the New York State Department of Environmental Conservation (NYSDEC), Division of Water, April 2005 http://www.dec.ny.gov/docs/water_pdf/ch6apr05.pdf	Already proved in-effective at DCL
Hand Harvesting	Selective removal of plants by hand	1. Great for small areas. 2. Simple. 3. Most effective harvesting strategy for removing a target species.	1. Labor intensive and time consuming, has to be done repeatedly 2. If the entirety of the plant is not removed, the plant will return	A Primer on Aquatic Plant Management in New York State by the New York State Department of Environmental Conservation (NYSDEC), Division of Water, April 2005 http://www.dec.ny.gov/docs/water_pdf/ch6apr05.pdf NORTH CAROLINA AQUATIC NUISANCE SPECIES MANAGEMENT PLAN by the NC Aquatic Nuisance Species Management Plan Committee, Oct 2016 https://edocs.deq.nc.gov/WaterResources/DocView.aspx?dbid=0&id=2731219&cr=1	Not realistic for scale of issue at DCL

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Options	Explanation	Pros	Cons	Information Source	Use at DCL?
Suction Harvesting	Semi-selective removal of plants using a large suction tube attached to a barge at the surface.	1. Effective. 2. Particularly effective for Eurasian Watermilfoil. 3. Best for extreme cases, then other less intense options can be used to control the population in smaller areas.	1. A loss of desirable benthic fauna is unavoidable which may affect fishery productivity, MDE permit required = not a viable option; 2. Requires the use of a lot of equipment, a barge is needed, as well as scuba equipment. 3. Needs to be done annually, does not remove target species in a single season 4. Not practical in extremely shallow water.	Eichler, L. W., Bombard, R. T., & Boylen, C. W. (1991). Final report on Lake George suction harvest monitoring: a component of the US EPA Clean Lakes Phase II Project.	
Mechanical Harvesting	Similar to mowing a lawn, helps expedite the manual process of harvesting with the use of machinery.	1. The control mechanism is highly effective for controlling vegetation. 2. Also removes trash. 3. Only trims the upper portion of SAV. 4. Does not kill the SAV.	1. Results are temporary; requires a mechanical harvester, which are expensive. 2. Time consuming to move from site to site 3. Cannot selectively remove target species from weed infestations.	Patil, R., Itnare, R., Ahirrao, S., Jadhav, A., & Dhumal, A. (2016, March). Study of river harvesting & trash cleaning machine. In International Conference on Emerging Trends in Engineering and Management Research (pp. 884-894).	
Dredging	A large scale removal of plant and sediment matter in all or part of the lake	1. Dredging can increase species diversity afterwards. 2. Removes problem species, but is highly disruptive to the benthic community.	1. If not done properly can create a significantly bigger problem. 2. Requires an MDE permit, a site to dump dredge material, transportation of dredge material, equipment to perform actual dredging. 3. Loss of fishery and all plant biodiversity, at least temporary loss of ecological value of the lake = extremely expensive. 4. Dredging sites are susceptible to invasives moving in first.	Stępień, E., Zawal, A., Buczyński, P., Buczyńska, E., & Szenejko, M. (2019). Effects of dredging on the vegetation in a small lowland river. PeerJ, 7, e6282.	

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Rotovating/Hydroraking	Similar to roto-tilling your garden, rotovating/hydroraking loosen and break up soil with rotating blades.	1. Works for a short period of time. 2. Rakes can be used to remove a large number of plants.	1. Must have the proper machinery; greatly disturbs the lake bottom and creates extensive turbidity; results are not long-lived = not a viable option. Must be at a very specific depth, still able to reach while floating but not too shallow. 2. Rakes may not remove the entirety of the plants, if roots are left the plants will return. 3. Effective but cannot only remove the target species, meaning other plants and wildlife can will be impacted. 4. Disturbs bottom sediment - requires MDE permit.	A Primer on Aquatic Plant Management in New York State by the New York State Department of Environmental Conservation (NYSDEC), Division of Water, April 2005 http://www.dec.ny.gov/docs/water_pdf/ch6apr05.pdf Patil, R., Itnare, R., Ahirrao, S., Jadhav, A., & Dhumal, A. (2016, March). Study of river harvesting & trash cleaning machine. In International Conference on Emerging Trends in Engineering and Management Research (pp. 884-894).	