

FINAL REPORT
PALMS Lake BMP Mini-Grant Program – 2022
Lake Towhee Invasive Plant Management Project

Project Description.

This project continued work initiated by a 2018 Growing Greener grant awarded to control the spread of the aquatic invasive, *Trapa natans* or water chestnut. Significant progress was made in the first three years of management, and it was critical that the work continue towards the goal of eradicating water chestnut from Lake Towhee.

A continuation of the control and eradication of water chestnut would serve several goals. First, eradication would eliminate a source population that threatens the county's largest reservoir, Lake Nockamixon.

Next, invasive species control would improve habitat quality by restoring a light regime that would release native plant communities, resume biogeochemical processes that remove excess nutrients, all the while improving structural habitat for aquatic organisms.

Finally, gaining control of the invasive aquatic plants would enhance recreational benefits by creating more open water for paddling, improving angling experience, and slowly remove the hazard associated with abundant and dangerously spiny seedpods.

The Paddle with a Purpose volunteer hand-pulling event supplemented chemical management by physically removing plant material while increasing public awareness of the detrimental effects of aquatic invasive plants. Volunteer recruitment and event promotion included an article in a local newspaper plus multiple social media postings. The event drew 40 volunteers and a dozen BCCD staff who contributed a combined 348 hand-pulling hours.

Project Activities

The District contracted Aqua Link to-

1. Obtain permits – the activities conducted under this project were covered by a jointly issued permit from Department of Environmental Protection Southeast Regional Office and the Pennsylvania Fish & Boat Commission to the Bucks County Department of Parks and Recreation. The permit was issued on June 10, 2019 and has no expiration date.
2. Survey and Assess 2022 conditions – In May 2022, Aqua Link surveyed the site and developed a plan that would preserve oxygen profiles throughout the growing season by spatially and temporally separating treatment areas to prevent mass die off events. Access routes through native spatterdock to infested areas were identified for maintenance or expansion.
3. Conduct four treatments - A modified V hull aluminum boat outfitted with a longtail air-cooled mud motor allowed for access to shallow areas. Unlike an airboat for shallow water work, this configuration also aids in the retention of surface applied herbicide since leaves and liquids are not blown over or off leaf surfaces. Herbicides were selected based on the target species application method and include Rodeo, Habitat, Clipper, and Tribune. For surface applications, Tactic surfactant was used while Cide Kick II was used for subsurface applications. Table 1 summarizes the 2022 management of Lake Towhee.



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Table 1 2022 Lake Towhee Invasive Plant Management – Summary

Date	Target Species	Pesticide Used	Application	Area	Post Application result, subjective
May 25	Water Chestnut	Rodeo & Habitat	Surface – hand spray gun	10 ac	Successful, opened access routes
June 10	Hydrilla	Clipper & Tribune	Sub-surface – dropper hose	10 ac	Successful, Hydrilla and water chestnut reduces, plus other problematic species.
July 20-22	Water Chestnut	none	Hand-pulling Event	~4 ac	Approximately 22 m ² removed and disposed
July 27	Hydrilla	Clipper & Tribune	Sub-surface – dropper hose	10 ac	Successful, Hydrilla and water chestnut reduces, plus other problematic species.
August 30	Water Chestnut	Rodeo & Habitat	Surface – hand spray gun	10 ac	Very successful, water chestnut reduction

Project Benefits:

This project, through the creation of open water habitat, release of native submerged aquatic species from shading conditions, and improvements to habitat structure will improve overall water quality by promoting a more balanced ecosystem. A plant community where native plants are the foundation, will better support the larger system of macroinvertebrates, fish, arthropod, reptiles, amphibians, birds, and mammals.

Specifically, an estimated volume of 22m² of invasive water chestnut plants were physically removed from the lake. The shading effect of those plants, where 30% coverage can block 74% of light penetration, lowers oxygen concentrations due to reduced photosynthesis with depth which is compounded by decay of the shaded plants. When plants are removed, increased photosynthesis and oxygen levels promote the biogeochemical processes that remove Total Nitrogen and Phosphorus from the water column (Changbo, Y. et. Al, 2021). Since these plants were disposed of, they will not contribute to oxygen consumption through decay.

A larger volume of plants was killed and prevented from reproducing, but the plant material would decay and be returned to nutrient cycling. Long term, the improved light conditions will produce water quality benefits as larger populations of submerged macrophytes will contribute to those biogeochemical processes that remove excess nutrients.

This project restored an estimated 2 to 3 acres of open water habitat. This area, as depicted in 2021 aerial imagery, was infested by water chestnut. Looking back to initiation of chemical treatment of Lake Towhee, the area restored to open water approaches 18 acres – more than doubling since 2019.



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Successes and Challenges

A noteworthy success of the 2022 project was a marked improvement in access to hard-to-reach shallow areas. Careful pre-treatment assessment and planning expanded the area available for treatment.

The shared Clean, Drain, Dry, Dispose (CD3) trailer was stationed at Lake Towhee during the hand-pulling event. It was useful to volunteer paddlers using their own craft and informative for passers-by.

Extremely dry conditions in the summer of 2022 created lower than normal lake levels. Increased areas of even shallower waters slowed hand-pulling and created access challenges for the late July and August treatments. The July Paddle with a Purpose event saw average high temperatures of 93° F for each of the three successive days.

Overall, the invasive species management efforts at Lake Towhee, while not eliminating the problem, may be gradually alleviating the threat to Lake Nockamixon. June 2022 surveys conducted with PA DCNR and Watershed Coalition of the Lehigh Valley identified less than 200 individual plants with none observed where Kimples creek enters the lake. Volunteers hand pulled plants in Lake Nockamixon under the direction of the Coalition.

Project financing and budgeting aligned well for this project. The grant value of \$20,950.00 fully covered the contractor's total charges of \$20,940.00. The proposed match of \$1,400.00 for Paddle with a Purpose supplies and food costs was just short of actual costs while in kind service match proposed at \$6,400.00 was exceeded by approximately \$1,845.00.

Continued, regular, chemical treatment will be necessary to manage germinations from the extensive water chestnut seed bank in Lake Towhee. The District is challenged to secure funding for an ongoing maintenance effort. The District will present project results to Bucks County administrators while recommending an annual budget line item for aquatic invasives management in county owned lakes.

Project Summary

Bucks County Conservation District administered an integrated approach to invasive aquatic species management at Lake Towhee. Chemical treatment applications (n=4) were contracted and a three-day, volunteer hand-pulling event was conducted. A marked reduction in stands of water chestnut and hydrilla were observed and ancillary reductions in coontail and curly-leaved pondweed were achieved. Open water-habitat was increased by 9% compared to 2021 conditions, capping a 4-year start to finish increase of 150%.

References:

Changbo, Y. et al. July 2021. *Long-term Effects of the Harvesting of *Trapa natans* on Local Water Quality and Aquatic Macrophyte Community in Lake Erhai, China*. *Frontiers in Environmental Science – Freshwater Science Section*. 09 July 2021. Accessed November 28, 2022 from <https://doi.org/10.3389/fenvs.2021.706746>

Molesky, Edward. November 2022. *Lake Towhee Aquatic Macrophyte Treatment Report ALI Project No. 1005-27*.



PALMS Mini-grant Report Lake Towhee Invasive Plant Management

Photographs



PALMS Mini-grant Report Lake Towhee Invasive Plant Management





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Upper Lake
7/2/19

Upper Lake
10/11/22



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7/20/2022
Infested area showing evidence of prior herbicide application.



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7/20/2022
Hand-pulling Water chestnut amidst native spatterdock



7/20/2022
Pre-pulling instruction



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7/20/2022
Open water at boat launch.



7/20/2022
Volunteers clean their kayaks at the CD3 trailer.

Loading pickup with pulled water chestnut.



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