

Pennsylvania ANS Management Program

Progress Report for Fiscal Year 2021 Funding

ANS 2021 – F21AP02410

Grant Period: December 1, 2021 – December 31, 2023

Reporting Period: December 1, 2021 – December 31, 2023

Cooperative Agreement #4100090436 – Aquatic Invasive Species Management Plan Implementation – Pennsylvania 2021

1.0 Summary

The Pennsylvania Fish and Boat Commission has contracted with Penn State University/ Pennsylvania Sea Grant to support implementation of the Pennsylvania AIS Management Plan. Grant funding was used for four tasks carried out by Pennsylvania Sea Grant and one task implemented by the Pennsylvania Fish and Boat Commission:

- 1) Pennsylvania Sea Grant will participate in the Pennsylvania Invasive Species Council, which meets approximately four times per year, and brings together representatives from agencies, non-governmental organizations, and industry to communicate and coordinate on invasive species issues in Pennsylvania. Pennsylvania Sea Grant is leading or participating in at least three PISC subcommittees in the next year – rapid response, legislative, and PRISMs. Pennsylvania Sea Grant will participate in two regional AIS panels – the Great Lakes and Mid-Atlantic – to coordinate with regional partners, identify AIS efforts that could be replicated in Pennsylvania, and share examples from Pennsylvania. Each Panel meets twice per year or as needed. Pennsylvania Sea Grant will participate in national forums when possible, such as ANS Task Force meetings or regional or national conferences, as they also provide opportunities to collaborate and identify AIS efforts from other locations that would be beneficial to Pennsylvania and a chance to highlight Pennsylvania activities that may be applicable elsewhere. Pennsylvania Sea Grant will look for opportunities to facilitate participation by state agencies in the panels, as they present a tremendous opportunity for learning and coordination.
- 2) Pennsylvania Sea Grant will work with Pennsylvania Invasive Species Council members and other stakeholders (such as watershed associations, angling groups, boating organizations, water gardeners, field staff and researchers) to support programs and develop outreach materials to prevent the AIS introduction and spread, including AIS identification. PASG will conduct 6-8 presentations (guest talks, seminars, meetings, or staffing events) on AIS prevention. Most of the time each presentation is attended by new participants – so even when the event is the same (a summer camp or annual meeting), the attendees are new each year and the information may help change their behavior. These efforts will be coordinated with state agencies and organizations to implement a consistent, statewide message based on the national campaigns “Stop Aquatic Hitchhikers,” “Clean, Drain, Dry,” and “Habitattitude”, so that anyone visiting a water body in Pennsylvania will be better able to understand, remember, and take action to prevent the introduction and spread of AIS in Pennsylvania. Pennsylvania Sea Grant has included funding for one undergraduate internship for summer 2022 as a means to contribute to a diverse ocean/Great Lakes workforce that understands technical and social challenges facing coastal communities and the natural environment, and prepare undergraduate students for graduate school and careers in marine/Great Lakes/watershed science, policy, management, and outreach.

- 3) Funding is requested to work with boaters and anglers to understand how they make recreational decisions with regard to information about aquatic invasive species. The researchers will use economic experiments with boaters and anglers to understand how they make recreational decisions with regard to information about aquatic invasive species (AIS) and AIS management strategies. With this information we can estimate: (1) the economic impact of AIS on these recreational activities, (2) the economic value of increased information about AIS prevalence, and (3) the effectiveness of AIS management strategies. Approximately 1,000 boaters and anglers will be included in the experiments. Boaters and anglers will be identified through Pennsylvania Fish and Boat Commission licensing data.
- 4) Funding is requested to support the continued development and implementation of programs and materials to prevent AIS introduction and spread across Pennsylvania, specifically by providing operational costs to support a self-service AIS preventing boat cleaning station. The Pennsylvania Lake Management Society (PALMS) will work with county conservation districts, state agencies, non-profits, and other public access lakes throughout Pennsylvania to host the mobile unit and provide personnel for outreach and education. The plan is for the unit to be in 8-10 locations for 1-3 weeks in each location. Some adjustments may need to occur based on weather, transportation, and partner availability. Current partners committing personnel and resources include, but are not limited to, Bucks County Conservation District, Chester County Conservation District, Montgomery County Conservation District, the Southeastern Pennsylvania RC&D Council, Lake Wallenpaupack Watershed District, Pennsylvania Fish and Boat Commission, and Pennsylvania Department of Conservation and Natural Resources. PALMS will look for additional partners when planning meetings and coordination efforts begin. At each location, partners will provide educational AIS programs and demonstrations for the unit along with coordination of the unit's movement and use. The proposed statewide locations are frequented by day boaters and they represent the greatest risk of aquatic invasive species (AIS) spread into and out of the waterbodies of the Commonwealth.
- 5) Funding is requested to support the creation of Pennsylvania Control Plans for Dreissenid Mussels and Red-eared Sliders. Zebra Mussels (*Dreissena polymorpha*) and Quagga Mussels (*Dreissena bugensis*), known collectively as "Dreissenid Mussels" have been identified as among the most aggressive aquatic invasive species worldwide in terms of both spread and destructive impact and are listed among the top 100 World's Worst Invasive Alien Species. Invasive Dreissenid Mussels are known to have substantial impacts on aquatic ecosystem function via both the physical displacement of native species following population growth and the competition for/altering of planktonic food resources via filter feeding. Of particular concern in Pennsylvania are state or federally listed freshwater mussels which may be imperiled by competition with Dreissenid Mussels. Furthermore, the biofouling capabilities of these species contributes to substantial economic impacts, such as treatment or replacement costs for damaged infrastructure such as freshwater intake pipes, docks, marinas, boat hulls and motors, and beaches rendered unsuitable for recreation due to fouling with shells. Red-eared Sliders (*Trachemys scripta elegans*; hereafter "RES"), a common turtle species within the pet/aquarium trade, have been introduced in many parts of the world outside of their native range in the southeastern United States and are listed among the top 100 World's Worst Invasive Alien Species. RES are typically released illicitly into the wild as unwanted pets and may establish populations which impact native turtle species, such as the Pennsylvania threatened Eastern Red-bellied Turtle (*Pseudemys rubriventris*) via ecological competition and displacement. Within Pennsylvania, Dreissenid Mussels have been established for several decades within the Lake Erie basin, but more recent spread has occurred within other waters in the Commonwealth. Recent data from the Pennsylvania Amphibian and Reptile Survey project suggests RES have been released in at least 40 counties within the Commonwealth, with anecdotal evidence suggesting populations may have established in several major watersheds. Dreissenid Mussels and RES are considered high-priority aquatic invasive species in Pennsylvania; however, a major challenge to the management and

containment of their spread within the Commonwealth is that no specific control plans have been prepared by the state in order to organize and coordinate control efforts for these species. Therefore, our objective is to obtain funding for staff time to work toward a portion of Strategy 6B of the Pennsylvania AIS Management Plan by the creation of state-level Dreissenid Mussel and RES Control Plans.

2.0 Major Accomplishments

(P) To support statewide and regional AIS planning efforts, PASG staff participated in the following state and regional AIS meetings:

PISC quarterly meetings: June 7, 2022, September 8, 2022, and December 6, 2022. Currently serving on legislative, grant, rapid response, communications, and PRISM subcommittees.

Great Lakes AIS Panel Meeting: June 1-2, 2022, and November 1-3, 2022.

Mid Atlantic AIS Panel Meeting: December 14-15, 2022, and April 19-20, 2023.

(EO) PASG gave presentations and staffed exhibits targeting boaters, anglers, water gardeners, and other recreational water users to increase their awareness about the AIS issue and provide information on the steps they can take to prevent the introduction and spread of AIS (6-8 presentations):

June 29, 2022 – gave presentation on AIS issues and prevention as part of the Penn State Extension Water Cooler talk series. Approximately 110 people attended the virtual presentation.

July 8, 2022 – gave presentation on AIS issues and water quality at Farm Day in Warren, Pennsylvania. Approximately 10 people attended the presentation.

January 19, 2023 – gave presentation on AIS prevention and management issues at Asbury Woods Nature Center in Erie, Pennsylvania. Approximately 18 people attended.

February 9, 2023 – presented AIS prevention information to anglers at the Pennsylvania Steelhead Association in Erie, Pennsylvania. Approximately 35 people attended.

February 10, 2023 – shared AIS prevention information and an AIS outreach activity with a fourth grade class at the First District Elementary School in Meadville, Pennsylvania. Approximately 13 people attended.

February 24, 2023 – shared AIS prevention information and an AIS outreach activity with a fourth grade class at the First District Elementary School in Meadville, Pennsylvania. Approximately 10 people attended.

April 12, 2023 – shared AIS prevention information with 150 Pennsylvania master watershed stewards through a virtual presentation.

May 1, 2023 – shared AIS prevention information and an AIS outreach activity with 60 students in the Walnut Creek Middle School in Fairview, Pennsylvania. Approximately 60 people.

(EO) The Pennsylvania Lake Management Society will work with county conservation districts, state agencies, non-profits, and other public access lakes throughout Pennsylvania to host a self-service AIS preventing boat cleaning station mobile unit (CD3) and provide personnel for outreach and education.

During the winter season 2021-2022, a rotation schedule was drafted with partners and training began for the CD3 unit. In April 2022, the CD3 was uncovered and charged back up after its winterization and storage. The unit was trailered to a public dock at Lake Wallenpaupack to begin its rotation. During May the unit went to a sign shop to get an educational exterior wrap done before returning to the dock at Lake Wallenpaupack. In July, it was trailered down to Bucks County and rotated to 5 additional lakes including Lake Nockamixon, Core Creek, Lake Towhee, Galena, and Neshaminy.

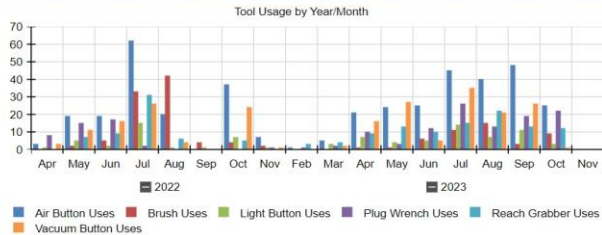


During the 2022-2023 winter season, a new rotation schedule was drafted with partners in Northwestern Pennsylvania and training began for the CD3 unit. In February 2023, the CD3 was towed to State College, PA, to be on display at the PALMS's Annual Lake Conference. PALMS was able to do in-person training before the unit left to Northwest PA. The unit was placed at a dock at Pymatuning State Park on March 1, 2023, to begin its seasonal use. During the spring and summer of 2023, the unit was stationed at multiple docks at Pymatuning State Park, it was stationed twice at the Shenango River for large paddling events, and also spent time at the docks of Maurice K. Goddard State Park and Conneaut Lake. In October 2023, the unit was on display at the North American Lake Management Society's Annual Symposium in Erie, PA. This international conference saw approximately 433 attendees.



The CD3 unit on display at the North American Lake Management Society's Annual Symposium in Erie, PA.

Sessions	2022																2023				Total
	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct		
Location	10	26	27	90	28	4	43	8	3	6	26	32	33	80	56	52	41				
Trailer																					
Total	10	26	27	90	28	4	43	8	3	6	26	32	33	80	56	52	41			565	
Percentage	2 %	5 %	5 %	16 %	5 %	1 %	8 %	1 %	1 %	1 %	5 %	6 %	6 %	14 %	10 %	9 %	7 %				



The above chart shows how many individual sessions of cleaning occurred during the entire project period. During the active periods, from April 2022 to November 2023, the unit was used for 565 different cleaning sessions.

(R) The researchers will use economic experiments with boaters and anglers to understand how they make recreational decisions with regard to information about aquatic invasive species (AIS) and AIS management strategies. With this information we can estimate: (1) the economic impact of AIS on these recreational activities, (2) the economic value of increased information about AIS prevalence, and (3) the effectiveness of AIS management strategies. Approximately 1,000 boaters and anglers will be included in the experiments.

Researchers contributed towards a new, comprehensive literature review on boater perception of and behavior towards aquatic invasive species. We identified that the majority of the literature

uses stated preference methods – primarily surveys, focus groups, and interviews – and that there was a gap regarding revealed preference or observed behavior outcomes. We compiled and analyzed a list of papers that had at least one behavioral outcome, notably the effects of education campaigns and message testing on boater knowledge, willingness to clean their boat, and use of boat washing stations, among others.

An economic experiment was also conducted to evaluate how different types of incentives affect boaters use of public boat washing stations. Two separate experiments were conducted over two three-week periods. In each experiment, the boat washing station had no incentive for using it for the first week. During the second and third weeks, a large decal with a boat image, description text, and QR code was affixed to the front of the boat washing station. Users of the boat washing station could scan the QR code to open a form that, upon submission of their name, email, and/or telephone number, would enter them into a sweepstakes.

Two different sweepstakes were conducted, one for each experiment. The first sweepstakes had a base prize of \$300 and the prize would increase by \$10 each time the boat washing station was used during the two-week period. At the end of the two-week period, one participant was selected at random to win the total prize pool. The second sweepstakes had the same prizing structure of a base pool of \$300 plus a \$10 increase per use. However, the randomly selected winner would instead choose, from a predetermined list, a conservancy organization that would receive the money. The available choices were:

- *Pennsylvania Lake Management Society*
- *Shenango River Watchers*
- *Pymatuning Lake Association*
- *Friends of MK Goddard*
- *Regional Science Consortium*
- *The Western Pennsylvania Consortium*

These experiments sought to answer two main questions regarding boater behavior. First, does any incentive increase the use of the public boat washing station, and if so, how much? Second, are boaters more motivated to use boat washing stations under personal monetary incentives or incentives that benefit the whole community? The results from these experiments would provide valuable information to state agencies considering investing in boat washing stations or other methods of AIS prevention.

After conducting these experiments, we unfortunately did not collect enough data to determine any meaningful results. Specifically, during the personal incentive experiment, only one person scanned the QR code and submitted the entry form. During the community incentive experiment, no one submitted the form. We checked multiple times during the time frame that the decal was still attached to the station and was clearly legible. In addition, we did find that the boat washing station was used, on average, 15 times a week. However, people were still choosing to not enter the sweepstakes. This impacted the project spending and, due to the low number of voluntary participants in this experiment, a significant amount of this project's estimated budget was unable to be used.

After the experiments, we went directly to the lake and conducted intercept interviews with boaters in an attempt to understand why the experiment failed. Feedback was provided by 48 boaters, with the most common answers being: (1) the boat washing station didn't have a source of water attached and thus they didn't want to use it; (2) boaters are aware of AIS, but prefer to clean their boats at other locations (or even with supplies they brought to the lake themselves);

(3) boaters who had visited the lake before the boat washing station arrived already had a routine to clean their boat and did not want to change that routine; (4) despite the fact that they did not use it, boaters were generally supportive of having a boat washing station at docks for those who would; and, (5) the majority of boaters were opposed to personal incentives but did support the community incentives.

Despite our experiment not turning out as hoped, we still obtained useful, revealed preference behavior information from boaters. We learned that boaters:

- 1) Require boat washing stations to have a source of water.
- 2) More frequently use permanent boat washing stations than temporary ones.
- 3) Are aware of AIS and do take preventative measures.
- 4) Value community incentives over personal ones.

We hope these findings help local agencies construct effective plans towards preventing the spread of AIS.

(CP) Creation of Pennsylvania Control Plans for Dreissenid Mussels and Red-eared Sliders.

Control Plans for Zebra/Quagga Mussels and the Red-eared Slider complex were drafted by the Pennsylvania Fish and Boat Commission (PFBC) Division of Environmental Services staff and completed during Spring 2022. Plans were written in a similar scope and formatting to existing Control Plans for other Aquatic Invasive Species previously prepared by the agency. Deliverables include the final plans, which are available for download at the links below. Both plans were posted on the agency's aquatic invasive species website.

The final control plan for Zebra/Quagga Mussels was finalized and posted on the agency website at the following link: <https://www.fishandboat.com/Conservation/Plans/Documents/ais-control-plan-zebra-quagga-mussels.pdf>

A control plan for the Red-eared slider complex ("Pond Slider") was finalized and posted on the agency website at the following link: <https://www.fishandboat.com/Conservation/Plans/Documents/ais-control-plan-pond-slider.pdf>

3.0 Program Expenditures

Invoice will be submitted separately.

¹ **P = Prevention; DM = Detection & Monitoring; CM = Control & Management; EO = Education & Outreach; R = Research; CP = AIS Control Plans**