



Pennsylvania Fish and Boat Commission

Communications and Outreach Plan

for

Aquatic Invasive Species (AIS)



(Image credits: U.S. Geological Survey and Pennsylvania Fish and Boat Commission)

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This plan is a living document that will be updated periodically, as needed, to address current education and outreach needs for Aquatic Invasive Species in Pennsylvania by the Pennsylvania Fish and Boat Commission.

Introduction:

Aquatic Invasive Species (AIS) are non-native aquatic organisms such as fish, invertebrates, and plants which have been introduced into ecosystems where they do not naturally occur and cause ecological, economic, and/or harm to human health. For example, Zebra Mussels are thumbnail-sized aquatic mollusks which can attach to docks, boats, freshwater intake pipes, and other infrastructure causing significant economic damages. In addition, Zebra Mussels are known to impact sport fish by the disruption of aquatic food chains and can cause algal blooms that may be harmful to human health. In some cases, AIS may also carry pathogens which cause illness in other species, for example Northern Snakehead are known to be carriers of the Largemouth Bass Virus.

Pennsylvania has nearly 200 documented introduced aquatic species and of these, approximately 40-50 species are considered as potential major threats to the Commonwealth's natural freshwater resources. However, it should be noted that introduced or non-native aquatic species may not always meet the criteria of "invasive" as defined above (causing significant economic, ecological, and/or harm to human health). For example, certain species, such as Bluegill and Largemouth Bass, are native to western Pennsylvania but were historically introduced into eastern Pennsylvania. These species are considered "naturalized" as they have integrated into ecosystems where they have been introduced and do not presently cause major harm.

Some prominent examples of species which are considered AIS and present in Pennsylvania include the Round Goby, Northern Snakehead, Flathead Catfish, Zebra Mussel, New Zealand Mudsnail, Rusty Crayfish, Red Swamp Crayfish, and aquatic plants such as Hydrilla and European Water Chestnut. Many AIS in Pennsylvania are native to other continents or regions. For example, the Northern Snakehead is native to Asia, and Rusty Crayfish are native to parts of the midwestern United States. However, some AIS may originate "closer to home." For instance, the Flathead Catfish, a large predator, is native to the Allegheny/Ohio basin in western Pennsylvania. However, this species was relatively recently introduced into the Susquehanna and Delaware basins of eastern and central Pennsylvania. Introduced Flathead Catfish are considered invasive in these basins as they cause ecological harm to native and naturalized species in these river systems.

AIS are typically introduced and spread by a number of human pathways. Often, AIS such as Zebra Mussels, New Zealand Mudsnails, and aquatic plants may "hitchhike" from an infested body of water to new waters on boats, boat trailers, fishing gear, waders, or other materials that come in contact with the infested water body and are not properly cleaned prior to use in another location. Other species, such as small fish (like the Round Goby) or invasive crayfish may be spread by the use of these organisms as bait if they escape or are discarded in a waterbody. A third major pathway for the introduction of AIS is when organisms either escape from aquaculture or are illicitly released into freshwater ecosystems, such as dumping unwanted aquarium pets.

Unfortunately, the damages AIS can cause to ecosystems and the recreational services they provide are costly. Controlling AIS once they are established is often enormously expensive or

unfeasible. Therefore, educational communication and outreach focused on preventing the spread of AIS are critical tools used by natural resource management agencies and partners as “an ounce of prevention is worth a pound of cure.”

The Pennsylvania Fish and Boat Commission (PFBC) is charged with ensuring the protection, propagation, and distribution of game fish, fish bait, baitfish, amphibians, reptiles, and aquatic organisms and managing recreational boating and fishing in the Commonwealth of Pennsylvania. The agency’s legislatively mandated jurisdiction over aquatic organisms includes most AIS, which are considered a major threat to the aquatic resources of Pennsylvania. The PFBC is committed to its role in AIS management in Pennsylvania and a key component of this role is communications and outreach to prevent the spread of AIS. The aim of this plan is to outline AIS communication strategies and objectives for the agency to pursue in fulfillment of the agency’s 2020-2023 Strategic Plan Goal 15d: Develop a comprehensive AIS communications and outreach plan to prevent the spread of AIS.

Key AIS messaging audiences in Pennsylvania:

- 1) Recreational anglers and boaters. These groups pose the greatest risk of spreading AIS from boating or fishing activities (see introduction above). It should be emphasized that AIS will harm the resources anglers and boaters use. Additionally, these groups are also most likely to notice new introductions of AIS and report them to the agency. Therefore, messaging should emphasize 1) awareness of AIS, 2) preventing the spread of AIS by changes in behavior (such as cleaning gear), 3) reporting observations of AIS to the agency, and 4) regulations related to AIS.
- 2) Pet owners, particularly aquarium hobbyists and/or those who keep reptiles and amphibians. When unwanted pets are released, they may become AIS. For example, Red-eared Slider turtles are common in the pet trade and illicit release has led to introductions and potential populations in some Pennsylvania counties, which may impact native turtles (Pennsylvania Fish and Boat Commission 2022). Messages to this group should include the ecological risks of releasing non-native aquatic species into Commonwealth waters (such as competition with native species and potential disease transfer) as well as legal consequences. Messaging could also include alternative options for aquarium pet release (such as surrendering to a shelter or humane euthanasia).
- 3) Stakeholders for freshwater resources in the Commonwealth, which may be degraded by introductions of AIS. Specific interests of this group are largely unknown and so messaging strategies are also. As a first step, the PFBC should work with partners on sociological surveys to understand interests and messaging that would resonate with this group.

Evaluation of AIS Outreach methods: What approaches work?

Objective evaluation of successful strategies related to AIS outreach appears to be a newly emerging field with only a few published studies. A few recent studies may help guide future efforts in Pennsylvania. Sociological studies and surveys suggest effective AIS outreach is science based (i.e., people respond best to scientifically based content). For example, posters with facts about the biology and impacts of Zebra Mussels were better received by the public than posters with “evil” Zebra Mussels in one survey (Shaw et al. 2021). Surveys also suggest that the public responds to “peer pressure” in signs/outreach; for example: other people clean their gear to prevent the spread of AIS, so why don’t you? (K. Zipp, pers. comm.). Other studies show that local approaches are most effective, i.e., preventing AIS will help protect your favorite lake, this lake, etc., rather than generalizations on the impact of AIS (Golebie et al. 2021). In a Pennsylvania survey, messaging emphasizing impacts to sport fisheries and regulatory penalties related to AIS generated the highest motivations for adopting behavioral change among Pennsylvania anglers (Pennsylvania Coastal Zone Management Program 2010). Additional, up-to-date and more robust survey efforts should be conducted in Pennsylvania regarding angler and boater perceptions of AIS to guide and refine future messaging. For example, some current AIS messaging by the PFBC, such as signs (see Appendix), are heavily based on command style instructions (what to do) but lack an emphasis on rational and sociological relatability (why actions should be taken).

Strategies for Leading by Example:

As the lead natural resource agency with regulatory jurisdiction over aquatic invasive species, PFBC staff must continue to lead by example by vigilant awareness of AIS during agency field operations and following up-to-date protocols for disinfecting boats and gear to prevent spread of AIS. It is crucial that established, mandated agency biosecurity protocols and standard operating procedures are regularly updated. Communication/awareness of the risks of AIS and their spread should continue to be emphasized among agency staff and enhanced where applicable. Additionally, effort should be made to further emphasize and publicly communicate actions the PFBC and partners are taking to address AIS issues in the Commonwealth including staff biosecurity, important research, monitoring, or conservation-driven management actions by the agency related to AIS. Strategies for the PFBC to continue to lead by example and enhance internal AIS awareness/biosecurity amongst staff include the following:

- Strategy A1: As needed, based on emerging AIS threats and new information on biosecurity for AIS, update mandated agency biosecurity protocols. The most recent version to date is SOP 401, Biosecurity Measures for Commission Operations, Facilities, and Equipment, from 2019.
- Strategy A2: Ensure that all field staff, managers, and agency leadership are aware of SOP 401 and any subsequent updates by reminder communications and/or brief trainings

as needed and as time allows. Communicate updates as appropriate in a prompt manner to agency leadership (e.g., Bureau Directors) to disseminate to appropriate staff.

- Strategy A3: Continue and enhance staff awareness of AIS by communications, particularly when new introductions of notable AIS occur in the Commonwealth.
- Strategy A4: Initiate outreach showcasing the work that PFBC staff do regarding AIS for conservation, including biological research, monitoring, and conservation-driven management activities. Use website/social media resources, video, print media, and blog posts to showcase these activities. Focus on prominent species or case studies, such as the New Zealand Mudsnaill.

AIS Outreach Objectives:

In addition to “leading by example” the PFBC can follow objectives to enhance current activities related to AIS outreach, as well as take on new initiatives. Such activities are detailed below:

A) Agency AIS Website:

Survey results suggest that the PFBC’s webpage on AIS is the most preferred resource the public will go to for information on AIS in Pennsylvania (Pennsylvania Coastal Zone Management Program 2010). Currently, this webpage has a brief, general introductory message on AIS, a specific summary on cleaning gear, and a specific summary on the invasive Northern Snakehead and New Zealand Mudsnaill. It also has links to an online web form which the public can use to report AIS to the agency’s AIS Coordinator. The website also includes Control Plans for certain high priority AIS that the Division of Environmental Services has completed (e.g., Rusty Crayfish, Didymo, Northern Snakehead). Objectives for AIS webpage enhancement includes the following:

- Objective A1: Work to ensure information on the agency’s AIS webpage is updated and enhanced as needed. Work to include additional external links, images, and videos on the website relevant to AIS. For instance, Pennsylvania Sea Grant has produced AIS educational materials that could be linked to or showcased on the agency’s website to help amplify the message. Consider also linking to invasive species content produced by the Pennsylvania Governor’s Invasive Species Council.
- Objective A2: Continue to modernize website content so that it is more interesting, visually appealing, and engaging. Examples might include producing video clips of how to properly clean gear or short videos highlighting specific AIS or concern.
- Objective A3: Provide detailed, educational content on the agency website defining what invasive species are to better address confusion between AIS and naturalized or non-native aquatic species.

- Objective A4: Update AIS regulatory information on the website as applicable when regulatory changes occur and enhance information about regulations to relatable examples and explanations of regulations to the public.
- Objective A5: Enhance the website to highlight the open propagation and introduction list, gear cleaning, issues with bait bucket introductions, and exotic pet release. Better address all main pathways for AIS introduction through educational content on the website.
- Objective A6: Feature specific, high-priority AIS in brief web pages, similar to the current Northern Snakehead page and New Zealand Mudsail page. AIS with completed agency technical Control Plans could be prioritized for this.
- Objective A7: Advertise and enhance online reporting of AIS sightings to the agency by the online AIS reporting webform, and the Pennsylvania Governor's Invasive Species Council invasive species call-in hotline (AIS reports from both are sent to the PFBC's AIS Coordinator for follow up). Emphasize resources on identification are available, such as Pennsylvania Sea Grant's (2022) Aquatic Invasive Species Field Guide for Pennsylvania.

B) Agency Social Media Presence:

Objectives to continue and enhance AIS messaging on social media platforms include the following:

- Objective B1: Participate with partners in posting or sharing social media outreach on AIS during social media campaign events related to invasive species. These may include, but are not limited to, National Invasive Species Week (typically one week in late February) and the Great Lakes Commission AIS Landing Blitz (typically one week in early July) and campaigns by other Commonwealth agencies or stakeholder groups (e.g., The Pennsylvania Governor's Invasive Species Council, Pennsylvania Sea Grant, and the Pennsylvania Department of Conservation and Natural Resources).
- Objective B2: Consider leading/initiating other AIS social media campaign events outside of those mentioned above, with a particular focus on fishing and boating specific messaging.
- Objective B3: Create and share short educational video clips on AIS for posting on social media. These might include short video clips on cleaning gear, features on high priority AIS, or how to report suspected AIS to the agency.

- Objective B4: Use social media as a platform to emphasize other online resources about AIS, such as the agency’s web reporting form, AIS website, and materials on partner websites (e.g., AIS Fact Sheets prepared by Pennsylvania Sea Grant, AIS Distributions in Pennsylvania within Pennsylvania iMap Invasives and U.S. Geological Survey Nonindigenous Aquatic Species websites, etc.).
- Objective B5: Develop social media outreach on AIS that can easily be shared by partners to significantly amplify the message.

C) Press Releases:

Press releases coordinated by the agency’s Communication Director in collaboration with other relevant staff can be an effective means of distributing information to the public regarding notable AIS events such as the introduction of AIS into a novel waterbody in the Commonwealth. Objectives related to press releases and AIS include the following:

- Objective C1: Use press releases to communicate significant introductions or range expansions of AIS into Commonwealth waters, as determined appropriate by agency leadership. These should only be issued after official verification of the presence of the AIS by agency biologists. Important information to include consists of the status of the AIS, potential impacts toward environmental resources, fishing, and boating, and how to mitigate further spread. Recent examples include a March 2021 press release communicating the detection of Zebra Mussels for the first time in Raystown Lake, or a July 2022 press release communicating a Silver Carp environmental DNA detection in Presque Isle Bay.
- Objective C2: Consider using press releases (as determined appropriate by agency leadership) to communicate other significant AIS topics. For instance, a press release could be issued as part of an outreach strategy to communicate a newly installed AIS cleaning station at a marina or to help “kick off” an event such as the agency’s participation in events like the Great Lakes AIS Landing Blitz or Pennsylvania’s Native Species Day.
- Objective C3: Consider expanding media outreach beyond a specific press release, such as inviting media for a demonstration to see and learn about AIS, their impacts, and management.

D) Aquatic Invasive Species Signs:

Survey results in Pennsylvania indicate that the public considers signs about AIS posted at boat launches and fishing accesses to be the most preferred method for communicating

awareness of AIS (Pennsylvania Coastal Zone Management Program 2010). In the past 10-15 years, the agency and partners have developed or used several different types of signs posted at access areas to inform the public about AIS. All (or nearly all) agency owned access areas previously had large metal “Stop Aquatic Hitchhiker” style signs posted which are consistent in design with the national campaign. These signs have different general messaging for boaters and anglers on AIS (see Figures 1 and 2 in the Appendix) and were provided in partnership with Pennsylvania Sea Grant. They are posted statewide for anglers and boaters as reminders about AIS, regardless of the known presence of AIS at the location. In addition, the agency has produced signs (in many cases in collaboration with partners such as Pennsylvania Sea Grant) to address specific AIS issues. Objectives to maintain and enhance agency AIS signage are summarized below:

- Objective D1: Prioritize the locations, messages, and types of signage to be used, considering branding and best practices in the update or development of new signs. Identify and assign staff to inventory and replace worn, damaged or stolen signs, as needed.
- Objective D2: As needs arise, develop additional signage to address specific AIS issues (e.g., signs analogous to the Northern Snakehead awareness and identification signs, see Figure 3 in Appendix).
- Objective D3: Update or create signage to reflect AIS regulations as needed or when regulations change.
- Objective D4: Coordinate signage with other agencies and partner groups for consistent messaging, provide to others as needed.
- Objective D5: Consider updating signage to reflect messaging strategies identified by sociological studies on AIS and other up-to-date environmental messaging strategies (more details in Evaluation of AIS Outreach methods: What approaches work? Section above).
- Objective D6: Collaboratively develop AIS signs to communicate pertinent messaging to non-English speaking communities for posting in priority regions (for example: signs translated into Spanish).

E) Outreach Presentations:

Although less preferred than online resources and signs or information at boat ramps and fishing accesses (Pennsylvania Coastal Zone Management Program 2010), in-person or

virtual presentations to groups are still effective means of communicating information about AIS to the public. Currently, the PFBC has limited staff to provide regular presentations on AIS to interested public groups; however, additional outreach can be done as staff are available, or could be embedded within other educational topics presented by agency staff (e.g., angler instruction courses). It should also be noted that Pennsylvania Sea Grant regularly does AIS outreach by presentations supported by federal grant funding. Objectives to further and enhance AIS outreach presentations include the following:

- Objective E1: Collaborate internally among relevant agency Bureaus involved in education work and/or AIS (e.g., Fisheries; Outreach, Education, and Marketing; Law Enforcement; and Boating) to enhance or include AIS education in ongoing educational presentations or outreach staff provide, such as angler instruction courses or boating safety.
- Objective E2: As funding and/or capacity is available, dedicate additional staff time to public outreach presentations on AIS utilizing presentations developed by agency staff and/or partners.
- Objective E3: Consider producing virtual/online presentation content geared toward the public on AIS as staff capacity allows.
- Objective E4: Continue collaborating on AIS outreach presentations and other educational activities with partners such as Pennsylvania Sea Grant, the Pennsylvania Governor's Invasive Species Council, the Pennsylvania Department of Conservation and Natural Resources, and conservation/sportsman's associations such as Trout Unlimited.
- Objective E5: Consider important regional messages while doing outreach activities, based on the known geographic distribution of AIS in the Commonwealth. For example, messaging in regions with fewer records of AIS may focus on early detection and reporting, whereas regions with more prevalent AIS may benefit from more targeted messaging on being aware of AIS already present. For instance, as Northern Snakehead are primarily established in southeastern Pennsylvania, messaging in this region may focus on encouraging angler harvest, while messaging in other regions where this species is not yet established may focus on identification and reporting. However, important statewide AIS messages should also be emphasized (e.g., cleaning gear).

F) Physical and digital AIS education materials/handouts:

Currently, a wide variety of print/digital materials are available on AIS through groups such as Pennsylvania Sea Grant (e.g., field guides, pamphlets, fact sheets) and groups

such as Wildlife Forever (e.g., pamphlets, trinkets such as keychains with AIS messaging, etc.). Given these materials are already available for Pennsylvania, a primary focus should be distributing materials available rather than the creation of additional materials. Objectives should include the following:

- **Objective F1:** The PFBC's Fishing Summary Book and Boating Handbook provide excellent opportunities for AIS summary information outreach directly to anglers and boaters in the Commonwealth. Focus should be given to making sure this information is up to date and presented in the best way possible.
- **Objective F2:** Pursue strategies to better communicate and disseminate digital copies of AIS awareness materials available through the agency, Pennsylvania Sea Grant, and other partners.
- **Objective F3:** When funding is available, obtain additional print copies of AIS materials to distribute among relevant PFBC staff for public dissemination (e.g., provide to Waterways Conservation Officers since they often engage with the public).
- **Objective F4:** Collaboratively develop physical or digital AIS education materials to communicate pertinent messaging to non-English speaking communities (for example: materials translated into Spanish).
- **Objective F5:** Consider using email marketing to communicate important AIS messages, such as sending content to email lists on file to HuntFish.pa.gov customers (i.e., purchasers of fishing licenses, boat registrations, launch permits, and/or merchandise).

G) AIS Identification and reporting for the public:

Because agency biologists and other staff or partners are limited in the ground that they can cover for AIS monitoring, it is often members of the public who first notice a new infestation of AIS within a waterbody. Therefore, it is crucial to give the public resources they need to both recognize and report AIS to the PFBC and other relevant entities. In recent years, streamlined resources have become available to facilitate the recognition of novel infestations of AIS by the public and report suspected AIS to the PFBC. Pennsylvania Sea Grant has produced a *Pennsylvania Field Guide to Aquatic Invasive Species* which contains a wealth of information on AIS identification for the public and is now available in an App version for mobile devices. Hence, public information on AIS identification should direct the public to this and other resources for Pennsylvania (e.g., information on the PFBC website). There are several ways in which the public may report AIS to the agency (all paths eventually lead to the agency's AIS Coordinator for review and follow up, as applicable). The PFBC has developed an online web form for reporting AIS on the agency's AIS webpage. Additionally, members of the public may

also report AIS through a reporting feature in the *Pennsylvania Field Guide to Aquatic Invasive Species mobile application* or call the Pennsylvania Governor's Invasive Species Council invasive species reporting hotline (1-833-INVASIV). Objectives to enhance reporting of suspected AIS by the public to the PFBC are outlined below:

- Objective G1: Emphasize available resources for AIS identification to the public in outreach materials and strategies and continue to develop signs or online resources as needs arise during any AIS outreach initiatives.
- Objective G2: Emphasize the importance of public reporting of AIS to the agency through the agency's web form, the Pennsylvania Invasive Species Council invasive species reporting hotline, and/or the Pennsylvania Field Guide to Aquatic Invasive Species mobile application, when possible, during any AIS outreach initiatives.

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Appendix: Select examples of Aquatic Invasive Species signs currently posted by the PFBC in Pennsylvania.

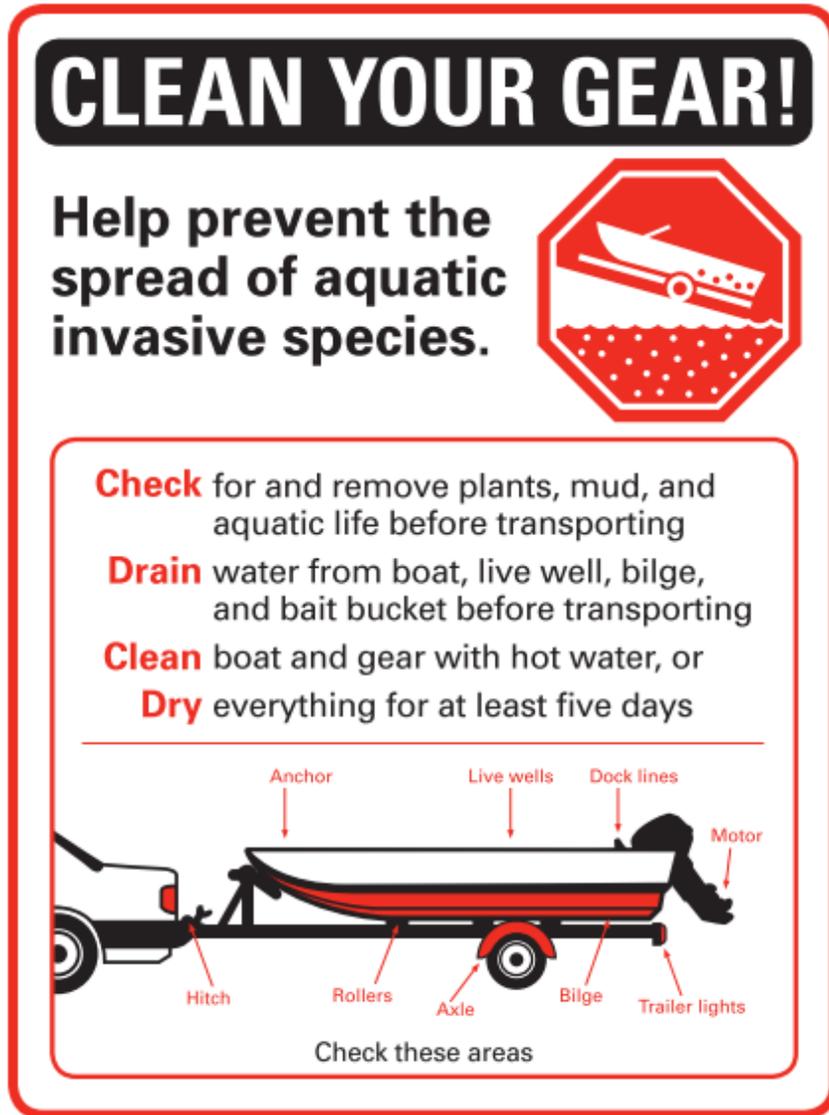


Figure 1. Stop Aquatic Hitchhiker Campaign sign targeted towards boaters. These signs are posted at most PFBC managed boat launches.



Figure 2. Stop Aquatic Hitchhiker Campaign sign targeted towards anglers. These signs are posted at most PFBC managed fishing access areas.

**DO NOT RELEASE
NORTHERN SNAKEHEAD**

Snakeheads are voracious predators that threaten Pennsylvania's native species and popular bass and panfish fisheries. It is unlawful to transport, purchase, possess, or sell live snakeheads in Pennsylvania. If you catch a snakehead, do not release it. Kill it upon capture. Do not dispose of carcass on site.

Do you know the difference?

Aquatic Invasive Species: Northern Snakehead



Native Species: Bowfin



Pennsylvania Fish & Boat Commission
Report Aquatic Invasive Species:
www.fishandboat.com/ais-reporting.htm

Figure 3. Northern Snakehead awareness sign, instructing anglers to harvest Northern Snakehead and how to distinguish from the native Bowfin. These signs are posted at most Commonwealth waters in which Northern Snakehead are known to occur (primarily southeastern Pennsylvania).

Aquatic Invasive Species Alert New Zealand Mudsnail

New Zealand mudsnail (NZM) is in this waterway. The snails are very small, measuring less than ¼ inch, with a dark, narrow, coiled shell with deep grooves. Like other Aquatic Invasive Species (AIS), NZM disrupt ecosystems by rapidly multiplying and competing with native species for space and food. NZM have the potential to decrease the food supply for fish in this stream. The snails are found on rocks and vegetation and can attach to fishing gear, boats, and other equipment, where NZM can easily go unseen. **Anglers, boaters, swimmers, and tubers can unknowingly spread NZM!**



Help Stop the Spread of NZM. Clean Your Gear!

Check these areas



New Zealand mudsnail requires specialized disinfection measures:

- Visually inspect gear and remove and dispose of any clinging matter in the trash. Do not move mud, organic matter, or NZM from this area!
- To kill NZM, three methods are effective:
 - ✓ Freeze gear for a minimum of 6 hours
 - ✓ Soak gear in hot water (120°F to 140°F) for 5 minutes. This method is not recommended for GOR-TEX®
 - ✓ Soak gear for 5 minutes in a 1 to 1 solution of *Formula 409® Cleaner Degreaser Disinfectant* and water. After soaking, thoroughly rinse the gear with plain water. **Simply spraying gear with the disinfectant or the mixture does not work.** Also, general cleaners (including other 409 products) have not been shown to be effective against NZM.



STOP AQUATIC HITCHHIKERS!™

For more information about New Zealand mudsnail, visit
seagrant.psu.edu/section/fact-sheets-brochures.



Figure 4. New Zealand Mudsnail sign for angler awareness, detailing specific gear disinfection techniques for this species. These signs are posted along Commonwealth waters in which New Zealand Mudsnails are known to occur (primarily locations in southeastern and southcentral Pennsylvania).