

# Aquatic Invasive Species Community- Based Social Marketing Project



Jay Cooke State Park. (Courtesy of the Minnesota DNR via mprnews.org)

## Moving Forward Report

November 1, 2019 – Updated February 13, 2020



This document is part of the Minnesota Department of Natural Resources (DNR) Invasive Species Program's Community-Based Social Marketing (CBSM) project. The project aims to better promote the adoption of desirable aquatic invasive species (AIS) prevention behaviors and create positive social norms around AIS prevention in Minnesota.

**Tina Fitzgerald**

Minnesota DNR Project Manager

[tina.fitzgerald@state.mn.us](mailto:tina.fitzgerald@state.mn.us)

651-259-5146

**Ken Donnelly**

Consultant Team Lead

[ken@beyondattitude.com](mailto:ken@beyondattitude.com)

902-223-6123



Developed for the Minnesota DNR Invasive Species Program: Moving Forward Report

# Table of Contents

<b>INTRODUCTION</b>	<b>4</b>
ABOUT THE PROJECT	4
ABOUT THE PROJECT TEAM	5
<b>PART 1: AIS PATHWAYS AND BEHAVIORS</b>	<b>6</b>
PART 1.1: IDENTIFYING AIS PATHWAYS	6
<i>Recreational Watercraft</i>	7
<i>Live Bait</i>	8
<i>Gear and Equipment</i>	8
<i>Aquarium Trade</i>	9
<i>Retail Plant Trade</i>	9
PART 1.2: IDENTIFYING BEHAVIORS	9
PART 1.3: VETTING BEHAVIORS	10
PART 1.4: ANALYZING IMPACTS	10
<i>Use and Disposal of Live Bait</i>	11
<i>Docks, Lifts, and Related Equipment</i>	12
<i>Aquarium and Aquatic Plant Retail Trade</i>	12
<b>PART 2: FURTHER RESEARCH IN SELECTED PATHWAYS</b>	<b>15</b>
PART 2.1: SURVEY OF ANGLERS	15
<i>Research Summary</i>	16
<i>Barriers and Benefits</i>	17
<i>Potential Strategies</i>	18
PART 2.2: SURVEY OF SHORELINE RESIDENTS	23
<i>Research Summary</i>	23
<i>Barriers and Benefits</i>	24
<i>Potential Strategies</i>	26
PART 2.3: AQUARIUM AND AQUATIC PLANT RETAILERS WORKING SESSION	29
<i>Research Summary</i>	30
<i>Barriers and Benefits</i>	31
<i>Potential Strategies</i>	32
<b>PART 2B: BUILDING CAPACITY IN LOCAL AGENCIES</b>	<b>35</b>
<b>RECOMMENDATIONS: MOVING FORWARD</b>	<b>36</b>
OVERARCHING TECHNIQUES FOR BEHAVIOR CHANGE	37
<i>CBSM Strategies</i>	37
STATEWIDE BRANDING AND COMMUNICATIONS	39
NEXT STEPS FOR MINNESOTA DNR'S CBSM PROGRAM	41
<i>Next Steps</i>	43
<i>Continued Leadership from Minnesota DNR</i>	44
CONCLUSION	45
<b>APPENDIX A: SUPPORTING DOCUMENTS</b>	<b>46</b>

# Introduction

## About the Project

The Minnesota Department of Natural Resources (DNR) delivers the Invasive Species Program with the goals of preventing introductions of new invasive species into Minnesota, preventing the spread of invasive species within Minnesota, and reducing the impacts caused by invasive species to Minnesota's environment, society, and economy.

In August 2018, the partnership of AZENTIVE, LLC and Beyond Attitude Consulting was awarded a contract to deliver the Aquatic Invasive Species (AIS) Community-Based Social Marketing (CBSM) project for the DNR. The purpose of the project is to apply behavioral psychology techniques to address human behaviors that contribute to the introduction and spread of AIS in Minnesota waters.

The project was delivered in two parts: the first part focused on the identification and prioritization of pathways and behaviors relevant to Minnesota's AIS concerns. The second part involved primary research on selected AIS pathways and on the identification of barriers and benefits of target behaviors. The second part also included developing and delivering a CBSM workshop for local organizations, DNR staff and statewide partners. The workshop is designed to tap into the knowledge and creativity of local AIS program managers and build their capacity to support the development and implementation of CBSM projects.

**Figure 1: AIS CBSM Project Parts and Tasks**

Part 1				Part 2				Part 2B
Identify AIS Pathways	Identify Behaviors	Vet Behaviors w/ Expert Panel	Analyze Impact of Behaviors	Select Pathways for Further Research	Survey Anglers and Shoreline Residents	Working Session w/ Aquarium & Aquatic Plant Trade	Review Research Findings w/ Expert Panel	Capacity-Building Workshop
●	●	●	●	●	●	●	●	●

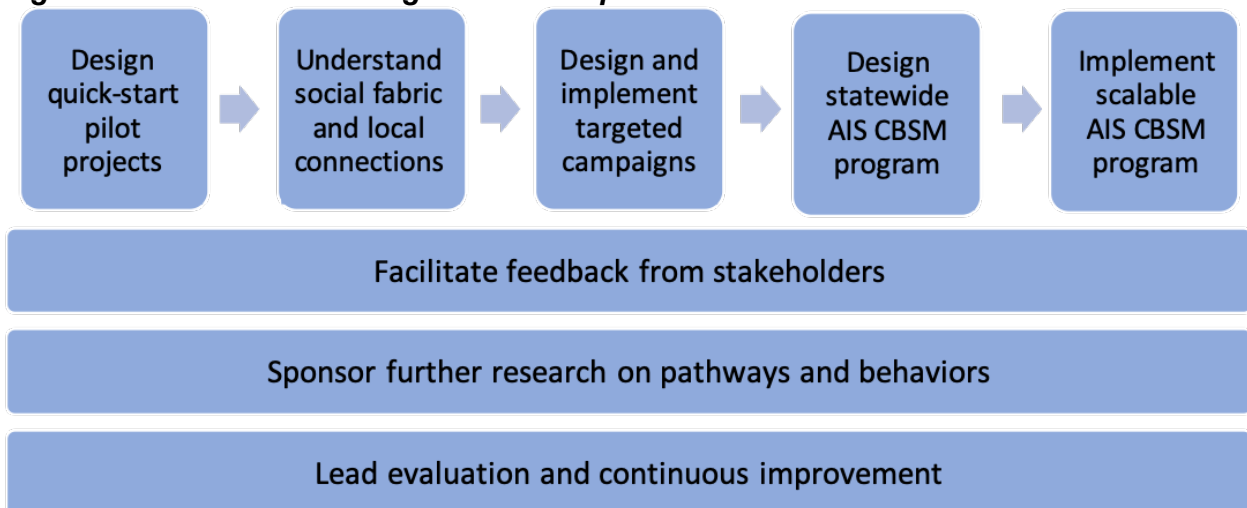
The DNR will use the results of this project to promote adoption of desirable AIS prevention behaviors and create positive social norms around AIS prevention. This report summarizes the outcomes of the research conducted on AIS pathways and behaviors. It also includes recommendations on how to move forward with the next steps to develop, test, and refine pilot projects that can be scaled into replicable programs throughout the state.



The culmination of the project is to outline the next steps for developing and deploying behavior-based strategies to foster target behaviors that aim to prevent the introduction and spread of AIS in Minnesota. These next steps will guide future work to be led by the DNR, in partnership with local agencies and organizations, industry stakeholders, statewide partners, CBSM and AIS experts, and the residents/visitors of the state.

The project team recommends that the DNR leads and facilitates the next steps shown in Figure 2 for developing and implementing a prioritized, scalable and replicable system of behavior-change approaches that consistently encourage social norms and adoption of desired behaviors to prevent the introduction and spread of AIS.

**Figure 2: AIS Prevention Program Next Steps for the Minnesota DNR**



## About the Project Team

The consultant team working on the project is made up of AZENTIVE, LLC and Beyond Attitude Consulting Inc. The two companies have provided leadership in the design, delivery, and evaluation of successful community-based sustainability plans and programs for more than 25 years. Together and separately, both companies have focused on driving culture change through community engagement and action. The team has worked with local, provincial/state, and national government agencies to achieve environmental goals, using CBSM as one very effective tool.

AZENTIVE (formerly Empower Efficiency) is nationally recognized for designing, implementing, and evaluating community-based programs that have lasting results in homes, businesses, and communities. AZENTIVE has designed, implemented, and evaluated CBSM programs in more than 21 cities throughout the United States. AZENTIVE's test-learn-adapt approach has applied and refined the research, design, and implementation methods originally pioneered by Doug McKenzie-Mohr. The team has incorporated their deep knowledge of individual and social psychology, system dynamics, and network/diffusion science.



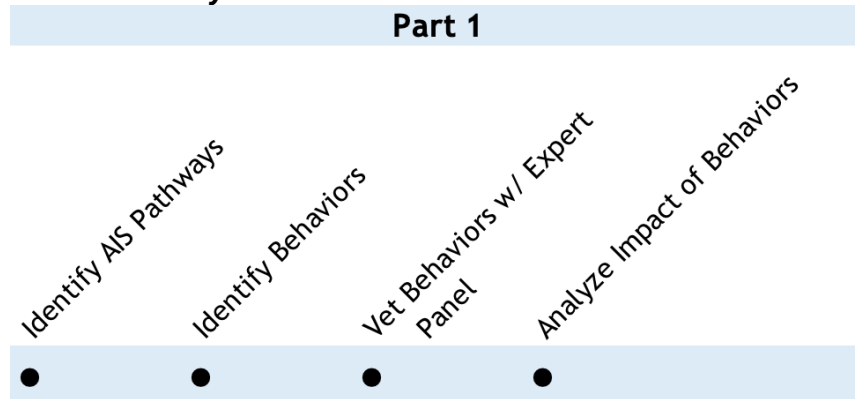
Beyond Attitude Consulting Inc. has focused on community engagement, communications, research (opinion surveys, focus groups, literature reviews), public policy and behavior change for more than 25 years. This includes almost 10 years specifically applying behavior change solutions to invasive species programming. Beyond Attitude Consulting works with clients in government, business, and non-governmental organizations. In addition, Beyond Attitude's principle, Ken Donnelly, conducts trainings in behavior change.

## Part 1: AIS Pathways and Behaviors

Developing an effective behavior change program begins with selecting the right behavior(s) and the right audience to target. This was the focus on the first part of this project:

1. Identify AIS pathways and a long list of behaviors from a literature review,
2. Vet the list of behaviors with experts, and
3. Analyze the impact of behaviors to prioritize certain AIS pathways for Part 2.

**Figure 3: Part 1: AIS Pathways and Behaviors**



### Part 1.1: Identifying AIS Pathways

For the purposes of this work, “pathway” refers to the mode of transport for an AIS to spread and “sector” refers to the group or audience that contributes to the spread of AIS via a pathway. Pathways may have more than one sector than can introduce or spread AIS.

A review of available literature was conducted to explore:

1. Human sources of AIS relevant to Minnesota;
2. Key pathways that could contribute to the spread of invasive species;
3. The range of potential sectors (i.e. target audiences); and
4. Interventions undertaken locally and elsewhere.

The project team scanned more than 150 published academic and grey literature, case studies, and technical reports, and summarized the 93 most relevant sources to determine the most important AIS Pathways that could be addressed by a CBSM effort in Minnesota (see Appendix A).

Findings from the literature review indicated that the majority of research on human pathways for the introduction and spread of AIS relevant to Minnesota can be grouped into five primary pathways (Table 1). The literature also uncovered pathways with significantly less available information, including docks/lifts, aquarium trade and retail plant trade. Major global pathways such as shipping and canal building were excluded from the literature review. Five pathways are discussed in the section below, including a brief description and notable literature review findings for each.

**Table 1: Five Primary Pathways for AIS in Minnesota**

<b>Pathway</b>	<b>Main Mode of Transport</b>	<b>Sectors (i.e. target audiences)</b>
Recreational Watercraft	Within and between waters on boats	Boaters Paddlers Anglers
Live Bait	Release of bait, bait packaging, and bait water	Anglers Commercial Trade (Shops, Dealers, Harvesters)
Gear and Equipment	Within and between waters on gear and equipment	Hunters Anglers Divers Lake service providers Shoreline property owners Researchers/academics Other recreationalists
Aquarium Trade	Intentional and unintentional release/escape of aquatic animals	Aquarium Owners Commercial Trade (Retail, Wholesaler, Maintenance, Biological Supply)
Aquatic Plant Trade	Intentional and unintentional release/escape of aquatic plants	Aquarium Owners Water Garden Owners Commercial Trade (Retail, Wholesaler, Maintenance, Biological Supply)

There may be other potential pathways and sectors about which literature may not yet exist or it may not be readily available. The absence of literature does not necessarily mean that a pathway or sector does not present risk.

### *Recreational Watercraft*

Numerous research studies indicate that recreational boating is a major pathway for spread of AIS. This pathway can generally be categorized into:

- Overland transport of boat from waterway to waterway or home, and
- Waterway-based movement (i.e., within a waterway).

Within this pathway, there are a number of sub-pathways including:

- Hull fouling,
- Bilge water,
- Livewells,



- Trailers, and
- Other standing water.

Sectors include anglers, recreational boat owners and operators, and commercial boat owners and operators.

Notable additional findings from the literature review include:

- Some research documents the spread of AIS on non-motorized watercraft that are more likely to be moved between multiple lakes (e.g. canoes, kayaks).
- Research has also looked at boating activities contributing to the spread of AIS between connected waterways and using frequent draining of standing water to prevent spread.
- There is significant qualitative research on target behaviors related to this pathway (surveys, interviews, etc.).
- Behaviors related to boaters also seem relevant to activities of Lake Service Providers, such as movement and storage of boats and other equipment.

### *Live Bait*

Research shows the main pathways include:

- Release of live bait, contaminated bait, and packaging for worms, as well as
- Bait water release.

Sectors associated with live bait can be categorized into angler activity (primarily recreational anglers) and commercial trade (bait shops, dealers, and harvesters).

Notable additional findings from the literature review include:

- There is significant research on target behaviors related to this pathway.
- Some research has also identified disposal of worms on shorelines contributing to spread of invasive species.
- Angler equipment is also a sub-pathway, offering the opportunity to address anglers with bait and boating behaviors together.

### *Gear and Equipment*

Across many of the sectors reviewed in the literature, a common pathway for the spread of AIS is through various gear and equipment. AIS attaches to gear and equipment, transporting from one area to another, either overland or within bodies of water. Sectors include hunters, anglers, divers, shoreline property owners, lake service providers, researchers/academics, and other recreationalists.

Notable additional findings from the literature scan include:

- Gear and equipment is often a sub-pathway associated with spread through other pathways.
- The need to diligently inspect and clean gear and equipment is a common behavioral approach for this pathway.

Docks, lifts, rafts, and associated equipment is a subset of the Gear and Equipment pathway. Minnesota is a leader in addressing docks, lifts, and rafts as a pathway. The Lake Service



Provider program has potential to address this type of equipment, which requires training and a permit for people working with shoreline equipment.

There is little research available on this type of equipment as a pathway or Lake Service Providers as a sector. Nonetheless, it is intuitively obvious that equipment situated in a lake can potentially harbor invasive species and moving the equipment can move the species as well. Although there is little information available on behaviors, we can learn more by speaking with service providers and shoreline owners and studying similarities with behaviors for watercraft owners.

### *Aquarium Trade*

The aquarium trade is one of the top pathways for AIS identified globally. Research documented AIS being sold through online vendors, as well as in a large number of stores in numerous jurisdictions in the Great Lakes region, including Minnesota. This pathway would include addressing behaviors of aquarium shop owners/workers and consumers' decision-making and purchases.

Notable additional findings from the literature scan include:

- Industry regulation poses a challenge for addressing this pathway.
- Limited research is available on behaviors related to managing spread of AIS through the aquarium trade.
- Most research related to aquarium industry related behaviors seems to focus on education (shops, consumers) and labeling.

### *Retail Plant Trade*

Research documented invasive aquatic plants readily sold in stores and available for purchase online, as well as other issues such as mislabeling of plants. The live plant trade includes aquarium plants and water garden or ornamental plants. Limited research is available on behaviors associated with preventing the spread of invasive aquatic plants through the aquarium and live plant trade.

## **Part 1.2: Identifying Behaviors**

A list of desirable AIS prevention behaviors was developed based on the literature review, DNR team insights, and project team experience (See Appendix A). The list included behaviors organized into one of the five pathways that emerged from the literature review. In some cases, there are several behaviors that can accomplish the same outcome. Often each has its own set of barriers and benefits, where some behaviors are easier to promote than others.

The purpose of the long list of behaviors is to systematically outline:

- The AIS pathway,
- The sector(s) contributing to this pathway and how, and
- How to potentially eliminate or minimize the risk of AIS introduction or spread.

This list was the basis for selecting pathways and behaviors to begin further research in Part 2 of the project.



## Part 1.3: Vetting Behaviors

An Expert Panel was convened to review the long list of potential behaviors. The panel was asked to provide feedback on the list, and to score each behavior for impact, uptake, and market potential.

Online meetings were held with Expert Panel members on November 28 and 30, as well as December 7, 2018. Each member attended one meeting. In each of the sessions, expert panelists reviewed and discussed the list of behaviors together, following up after each meeting to submit their scoring worksheets.

From the discussions, no behaviors were removed from the list. The following additional behaviors were added at the suggestion of panelists:

- Drain ballast tanks in motorized watercrafts.
- Include pets as a pathway, and add two behaviors: removing material attached to their fur, and bathe pets after swimming.
- Split the behavior of rinsing watercraft into two behaviors, hot water rinsing and cold-water rinsing.
- Add unintentional release through restocking programs for the live bait pathway.
- Differentiate between online and in-store sales of aquarium and water garden species.

With those changes made, Expert Panel members were asked to rank each behavior for its effectiveness in preventing the spread, the likelihood of the behavior being adopted, and the opportunity for increasing the number of people performing it.

## Part 1.4: Analyzing Impacts

The results of the Expert Panel rankings were aggregated to support an Impact-Probability Analysis performed by the consultant team to prioritize pathways and behaviors, as well as to direct Part 2 work. The results of the analysis are summarized in *Minnesota AIS CBSM Project Expert Panel Session - Final Report with Appendices* (See Appendix A).

The analysis looked at Impact, Uptake, and Market Potential, where:

- **Impact** represents how beneficial the action described would be at preventing the spread of aquatic invasive species.
- **Uptake** represents how likely it is that people would take up the action listed. For example, behaviors that are considered time-consuming, costly, or requiring special equipment are likely to be scored lower than those that are convenient, easy, and inexpensive.
- **Market Potential** is an indication of how many people are not yet taking action. If the behavior has already been adopted by many people and there is little room for increasing the number of people engaged in it, then the score will be low. However, if it is a new behavior that is just being introduced, then the market potential will score high.

Based on the Impact Analysis, project team experience and expertise, and the DNR team's guidance, three pathways were selected for further research:

- Live Bait;
- Gear and Equipment (especially Docks/Lifts/Rafts); and
- Retail Aquatic Plant Trade and Retail Aquarium Trade.

The impact analysis results for each of these pathways is described below.

### *Use and Disposal of Live Bait*

The project team identified the use and disposal of live bait as a pathway that needs to be better understood based on the Impact Analysis results. Live bait behaviors were generally ranked highly by the Panel members across all three criteria. They felt that it was important to ensure invasive species were not sold or purchased as bait, and that bait is disposed of properly. The rankings for the impact of these behaviors indicate that the Expert Panel believes that bait is a very risky pathway. All three factors for the live bait pathway were generally ranked higher than the mean for all behavior rankings.

**Table 2: Live Bait Pathway Impact Ranking**

<b>AIS Source</b>	<b>Desired Behavior</b>	<b>Sector</b>	<b>Overall Score</b>
Intentional release of live fish bait	Dispose of unused live bait in garbage	Anglers	51.0
Disposal of live worms and packaging on shorelines or in water	Dispose of live bait and packaging in garbage	Anglers	47.7
Sale of invasive species (intentional and unintentional)	Visually inspect bait stocks received for resale	Industry	45.5
Sale of invasive species (intentional and unintentional)	Return to bait shop and retailer dispose in garbage	Anglers, Industry	44.7
Sale of invasive species (intentional and unintentional)	Sell only non-invasive species	Industry	42.9
Dumping of bait bucket water in or near body of water	Dispose of bait water on land	Anglers	42.2
Use of invasive species as live bait (intentional and unintentional)	Purchase only non/low-risk species	Anglers	35.2
Sale of invasive species (intentional and unintentional)	Implement labelling practices	Industry	32.6
Unintentional release through restocking programs	Follow best practices to control unwanted species	Anglers	30.2
Contaminated bait packaging	Identify and remove contamination before selling	Industry	23.8

AIS Source	Desired Behavior	Sector	Overall Score
Sale of invasive species (intentional and unintentional)	Conduct environmental DNA surveillance	Industry	19.9
Contaminated bait packaging	Switch to alternative packaging	Industry	17.0

Angler behaviors were selected for further research to provide insight into the live bait pathway. They were also selected due to overlap in recreational boaters' behaviors, another important pathway for AIS introduction and spread.

### *Docks, Lifts, and Related Equipment*

The movement of docks, lifts, rafts and associated equipment was also prioritized for further research due to the lack of detailed research available on this pathway and the results of the Impact Analysis. All behaviors associated with heavy equipment such as docks, lifts and rafts were ranked highly with relatively high values for all three factors. Like other pathways, removing visible debris was ranked high, but letting the equipment air dry was even higher, based mostly on the feeling that few people were doing that now.

Shoreline resident behaviors were selected for further research to provide insight on the movement of equipment pathway.

**Table 3: Docks, Lifts, and Related Equipment Impact Scoring**

AIS Source	Desired Behavior	Sector	Overall Score
Attachment to and movement of docks, lifts, rafts, anchors, and associated equipment	Air dry for at least 21 days	Service Providers, Residents	53.6
Attachment to and movement of docks, lifts, rafts, anchors, and associated equipment	Remove visible debris	Service Providers, Residents	47.7
Attachment to and movement of docks, lifts, rafts, anchors, and associated equipment	Wash with high pressure	Service Providers, Residents	44.0

### *Aquarium and Aquatic Plant Retail Trade*

The behaviors and activities of aquarium and aquatic plant retailers is the third pathway selected for further research. The project team selected aquarium and aquatic plant retail for further investigation due to the significance of the pathway for AIS and the acknowledgement of gaps in the available research.

Almost all related behaviors were ranked high for Impact, Uptake, and Market Potential. The behaviors for disposing of unwanted animals is a complex problem. Though these behaviors (euthanize and dispose of, take back to the retailer, and re-home) are considered to have a high impact, the uptake was not highly ranked. There are also several sectors, from hobbyists to teachers conducting school science projects, so the barriers could be very diverse.

The project team determined that engaging retailers and representatives of the retail trade was a necessary first step in gathering information on these pathways.

**Table 4: Retail Aquarium Trade Impact Scoring**

<b>AIS Source</b>	<b>Desired Behavior</b>	<b>Sector</b>	<b>Overall Score</b>
Release of unwanted aquatic and terrestrial species	Dispose of unwanted plants in the garbage	Enthusiasts, School science programs, Classroom aquariums	54.2
Release of unwanted aquatic and terrestrial species	Recognize and purchase only non/low-risk species	Enthusiasts, School science programs, Classroom aquariums	52.7
Sale of high-risk species in stores	Accurately identify and only sell non/low-risk species	Industry	50.9
Sale of high-risk species in stores	Return and dispose of invasive species	Industry, Consumers	44.8
Sale of high-risk species online	Accurately identify and only sell non/low-risk species	Industry	44.3
Release of unwanted aquatic and terrestrial species	Return unwanted animals to pet stores	Enthusiasts, School science programs, Classroom aquariums	41.6
Sale of high-risk species in stores	Visually inspect products for contamination	Industry	39.4
Sale of high-risk species online	Return and dispose of invasive species	Industry, Consumers	38.1
Release of unwanted aquatic and terrestrial species	Re-home unwanted species	Enthusiasts, School science programs, Classroom aquariums	36.9
Sale of high-risk species online	Visually inspect products for contamination	Industry	36.7
Release of unwanted aquatic and terrestrial species	Euthanize and dispose of unwanted animals	Enthusiasts, School science programs, Classroom aquariums	36.0

<b>AIS Source</b>	<b>Desired Behavior</b>	<b>Sector</b>	<b>Overall Score</b>
Unintentional escape from private ponds and water gardens	Follow maintenance best practices	Enthusiasts	29.2
Unintentional escape from private ponds and water gardens	Follow design and installation best practices	Enthusiasts	28.0
Unintentional release through aquarium and equipment cleaning	Dispose of cleaning water and fish waste on lawn or garden	Enthusiasts, School science programs, Classroom aquariums	23.1

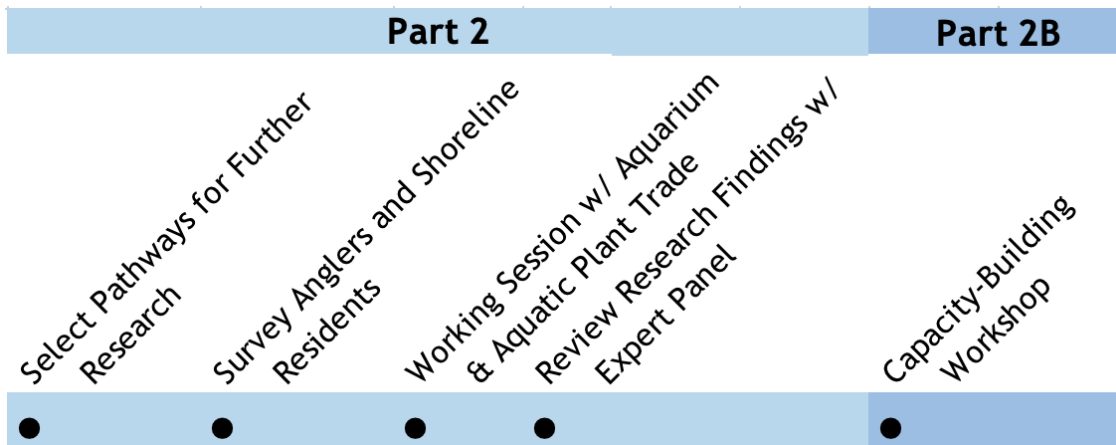
**Table 5: Retail Plant Trade Impact Scoring**

<b>AIS Source</b>	<b>Desired Behavior</b>	<b>Sector</b>	<b>Overall Score</b>
Planting of high-risk plants (intentional or unintentional)	Accurately identify and only sell non/low-risk species	Industry	56.3
Unintentional escape from private ponds and water gardens	Recognize and install only non/low-risk species	Industry	53.0
Planting of high-risk plants (intentional or unintentional)	Recognize and purchase of only non/low-risk species	Enthusiasts, Service providers	52.3
Intentional dumping of unwanted high-risk plants	Identify high risk species and dispose of in garbage	Enthusiasts	52.2
Planting of high-risk plants (intentional or unintentional)	Check purchases and recognize invasive species and unwanted hitchhikers and dispose of in garbage	Enthusiasts	45.4
Unintentional escape from private ponds and water gardens	Follow design and installation best practices (distance from natural waterways/flood areas, closed system, planting in containers, etc.)	Enthusiasts	41.0
Unintentional escape from private ponds and water gardens	Follow maintenance best practices	Industry	37.7

## Part 2: Further Research in Selected Pathways

The results of Part 1 of the project were used to select pathways for further research. Three pathways were selected:

- Live Bait
- Docks and Lifts
- Aquarium and Aquatic Plant Trade



### Part 2.1: Survey of Anglers

Based on the behavior analysis and Expert Panel recommendations, primary research was conducted with Minnesota anglers. A baseline survey was delivered to recreational anglers with fishing licenses in Minnesota to better understand the perceptions, behaviors, barriers and motivators of anglers related to aquatic invasive species movement in Minnesota. The survey explicitly explored current practices, barriers, and benefits associated with the use and disposal of unused live bait and cleaning, draining, and drying recreational watercraft.

With further research on this pathway, the team sought to:

- Understand and establish a baseline of current behaviors related to the use and disposal of live bait and cleaning and draining of angler equipment (including boats);
- Gauge attitudes and awareness levels related to aquatic invasive species, their movement, and prevention steps;
- Identify actual and perceived barriers to engaging in desired behaviors (i.e. proper disposal and cleaning practices);
- Gauge willingness or acceptance of modifying behaviors to reduce the spread of invasive species;
- Understand incentives and motivators to foster desired behaviors that reduce the risk of spreading aquatic invasive species; and
- Understand communication and engagement preferences.

The anonymous, voluntary survey was conducted in May and June of 2019. It was offered online and distributed by email to a random sample of approximately 40,000 of the over 168,000 licensed anglers in Minnesota that had email addresses on record. The survey was open to any licensed angler that was 18 or over and that has fished (excluding ice fishing) in Minnesota within the last two years. A total of 1,965 respondents completed the survey.

## *Research Summary*

### **Attitudes and Awareness**

Reported awareness and knowledge of AIS issues were high and reported attitudes towards managing them were positive. These are encouraging indicators that most anglers have the desired attitude towards AIS, and the efforts required to manage their spread.

Key findings on attitude and awareness include:

- Anglers are well aware of AIS and the risks associated with them and are confident in their knowledge;
- Information is readily available and communication efforts have had a good market reach but more people need to become familiar with the necessary actions to prevent the spread of AIS; and
- Anglers have the desired attitude towards AIS and the efforts required to manage their spread, however; there is a gap between having the preferred attitude and doing the right thing.

### **Use of Live Bait**

Use of live bait for angling is commonplace in Minnesota. In general, people seem to want to do, and believe they are doing, the right thing; however, appropriate live bait handling behaviors are not being practiced consistently. Almost one-third of anglers report releasing live bait at least some of the time. Live bait is released with good intentions, primarily driven by emotions.

Improper disposal techniques for unused live bait are also being practiced. Respondents report mixed knowledge and practices around proper disposal techniques and for transfer/disposal of bait water. On the positive side, barriers to proper disposal behaviors are not strong. Anglers could benefit from behavioral nudges to encourage the desired behaviors. The strongest motivator to encourage proper disposal of unused live bait is knowing that responsible action can help prevent the spread of AIS.

### **Use of Boats**

Use of boats for fishing is very common amongst anglers. Uptake of the desired AIS prevention behaviors can be improved. While anglers report inspecting and removing visible debris from boats and trailers and proper draining activities frequently, they are not performing other cleaning activities nearly as frequently, either before or after launching or removing their boat.

Barriers to engaging in the right behaviors are not strong, however; lack of access to running water, tools/equipment, and cleaning space is preventing some anglers from engaging in desired cleaning activities. Improved access to these things would make it easier for anglers to clean their watercraft.





## Communication Preferences

A strong preference was expressed to receive information at physical locations, such as bait shops, boat launches, and piers and access points. An advantage of these locations is that some are at points of key decisions which helps prompt the correct behavior, and others require interaction with someone, providing opportunities for face-to-face interactions, which are an opportunity to collect commitments. The DNR is the most trusted source of information on invasive species.

## Barriers and Benefits

An essential component of developing an effective behavior change program is to identify the barriers and benefits associated with the targeted behavior change. Drawing on the survey findings and insights of the Expert Panel, the following are the key barriers and benefits identified for the target angler behaviors. While all respondents reported benefits, only half reported barriers – the other half reported nothing would prevent them from engaging in the desired behaviors.

**Table 6: Barriers and Benefits for Angler Use of Live Bait**

Behavior	Barriers	Benefits
<b>Proper disposal of unused live bait (general)</b>	<ul style="list-style-type: none"> <li>• Limited knowledge               <ul style="list-style-type: none"> <li>○ Not understanding that bait can be invasive (48%)</li> <li>○ No clear reason to properly dispose</li> </ul> </li> <li>• Desire to feed other fish (38%)</li> <li>• Desire to not waste (37%)</li> <li>• Moral concern with killing bait (22%)</li> <li>• Perceived level of effort</li> <li>• Misunderstanding of risks               <ul style="list-style-type: none"> <li>○ Release in same body of water</li> <li>○ Confidence that the bait is not invasive</li> </ul> </li> <li>• Skepticism of risks</li> </ul>	<ul style="list-style-type: none"> <li>• Making a difference through action               <ul style="list-style-type: none"> <li>○ Preventing AIS spread (71%)</li> <li>○ Positive impact on community and environment (61%)</li> </ul> </li> <li>• Compliance with Minnesota law (54%)</li> <li>• Having information/signage posted (40%)</li> <li>• Avoidance of consequences (fines) (39%)</li> </ul>
<b>Dispose of unused live bait in the garbage</b>	<ul style="list-style-type: none"> <li>• No access to on-site disposal amenities</li> </ul>	<ul style="list-style-type: none"> <li>• Same as above, and</li> <li>• Easier to dispose of on-site than taking home</li> </ul>
<b>Take unused live bait and packaging home for proper disposal</b>	<ul style="list-style-type: none"> <li>• Nothing (53%)</li> <li>• Concern about odor (39%) and attracting animals (18%)</li> <li>• Impractical due to long travel time</li> <li>• Preference for disposal alternatives (before leaving or on way home)</li> </ul>	<ul style="list-style-type: none"> <li>• Same as above, and</li> <li>• Use for fertilizer or compost</li> </ul>

Behavior	Barriers	Benefits
<b>Take unused live bait home for future reuse</b>	<ul style="list-style-type: none"> <li>Limited knowledge on proper practices</li> </ul>	<ul style="list-style-type: none"> <li>Save for future use</li> <li>Avoid future purchasing</li> <li>Not wasting bait</li> <li>Not killing bait</li> </ul>

**Table 7: Barriers and Benefits for Angler Use of Boats**

Behavior	Barriers	Benefits
<b>Clean and drain boats and trailers</b>	<ul style="list-style-type: none"> <li>Nothing (49%)</li> <li>Lack equipment/tools (27%)</li> <li>Busy boat launches/high traffic (25%)</li> <li>Space constraints at launches (22%)</li> <li>No perceived need (4%) / other (16%) <ul style="list-style-type: none"> <li>Stays in water on lift</li> <li>Only used in one body of water</li> </ul> </li> </ul>	<ul style="list-style-type: none"> <li>Having access to running water (63%)</li> <li>Making a difference through action <ul style="list-style-type: none"> <li>Preventing AIS spread (60%)</li> <li>Positive impact on community and environment (50%)</li> </ul> </li> <li>Having a staffed decontamination unit (hot water, high pressure) available (52%)</li> <li>Having cleaning tools available (44%)</li> <li>Compliance with Minnesota law (38%)</li> <li>Good maintenance practices (36%)</li> <li>Avoidance of consequences (fines) (34%)</li> </ul>

### Potential Strategies

Strong attitudes and awareness are a solid foundation for a successful behavior change program; however, they are insufficient on their own to drive change. Applying behavioral change strategies can leverage a good foundation to foster the desired behaviors, achieving desired action more consistently and by more people.

Based on the findings of the research conducted, opportunities have been identified to apply behavioral change principles to prevent AIS spread by anglers. The following are suggested approaches to encouraging behavior change and strengthening social norms related to live bait use and boat cleaning practices.

Any organization considering strategy implementation should first investigate real-world feasibility in greater detail for each strategy of interest (e.g. existing efforts, regulations, capacity, practicality, partnerships, etc.). Strategies should be prioritized and implemented as part of a comprehensive approach to AIS prevention (see the “Next Steps for Minnesota DNR’s CBSM Program” section of this report).

### Foster Partnerships with Visible and Trusted Sources

Anglers trust the Minnesota DNR, local municipalities, and local clubs/organizations more than other information sources. They also prefer to receive information at boat launches and bait shops. This provides an opportunity for the DNR and local municipalities and organizations to



establish partnerships that can engage with anglers through trusted sources. The following are potential opportunities to be explored. Partnerships can be critical delivery channels for many of the other strategies outlined below.

- **Partner with Bait Retailers to Jointly Deliver Programs** – Bait retailers are many anglers' source of live bait. They are an interaction point typically very close to the start of a fishing trip and because of this they can be an extremely important and influential point of contact for anglers as they purchase live bait. Bait retailers offer face-to-face engagement opportunities with anglers at an important decision-point as they purchase bait. Bait retailers can be trained on AIS, appropriate practices, and in delivering components of a behavior change program (e.g. seeking commitments), as well as utilize point of purchase educational materials and prompts. Retailers could be identified as "AIS-Aware".
- **Partner with Fishing Clubs and Lake Associations** – Similar to bait retailers, fishing clubs/organizations and lake associations are well known, and many can reach local residents effectively through established communication channels.
- **Leverage the DNR as a Trusted Source of Information.** Minnesota DNR was identified as the most trusted source of information related to invasive species. The DNR can continue to lead as a trusted source by communicating directly with Minnesota anglers about invasive species. This could be done through direct email information to registered anglers, the DNR website, newsletters, and other communication channels. Importantly, DNR can add credibility to AIS information by including their name and also add credibility to AIS initiatives by partnering with others. For instance, the Expert Panel suggested that anglers should have guidance on how much live bait to purchase to reduce the amount that may need to be disposed of at the end of a fishing trip. The DNR could support this in partnership with bait shops and fishing clubs.

### **Improve Knowledge on Proper Practices**

While attitudes towards AIS are positive and awareness is high, proper practices to help prevent the spread of AIS are not fully understood by all anglers. The following are potential opportunities to strengthen knowledge of the proper practices.

- **Develop Clear Guidelines on Disposal and Preservation Techniques** – There is no clear preference amongst anglers on how to dispose or preserve unused live bait; one solution does not fit all. Some confusion also exists around handling of bait water and transferring unused live bait for transport. Clear guidelines should communicate options to dispose of or preserve bait that are simple and easy to understand. Guidelines should be clearly communicated by the DNR, partner organizations, and other partners, such as bait shops and marinas. The guidelines, and penalties for not meeting them, should also be presented at boat launches and other popular fishing spots through highly visible signage.
- **Use Vivid Communication to Address Moral Concern of Killing Bait** – Many people express moral concern about killing live bait and misguidedly release live bait with the good intentions of saving them. Messaging should focus on the detrimental impacts of live bait release on the ecosystem and other fish, articulating that saving one bait fish

could be killing many more. Anglers want to do the right thing and feel that they are doing good; this should be leveraged to reinforce proper practices.

- **Direct and Personal Interactions** – People respond well to one-on-one and tailored information. Where possible, onsite and face-to-face interactions should take place. This can be facilitated through interactions with bait shop or marina staff, and watercraft inspectors. Similarly, there are opportunities to provide one-on-one and tailored interactions with residents at outreach events to tailor information, put a face to conservation staff, and build trust.
- **Continue Delivering Boat Decontamination Station Demonstrations** – Generally, people learn better by doing. Targeted boat decontamination stations (high pressure, hot water) should continue to be offered at high traffic or other strategic boat launch areas. Decontamination stations in Minnesota are operated by trained and authorized staff; however, the addition of community champions can add a peer-to-peer learning element and opportunities to collect commitments. Demonstration allows anglers (and other recreational boat users) to experience decontamination activities first-hand on their boats, make use of the necessary equipment, and interact one-on-one with informed staff. Having a captive audience at demonstrations also allows for an opportunity to engage anglers on bait practices on a one-on-one basis. Demonstrations located around Minnesota reach a larger audience on a rotational basis.

### **Use Nudges and Prompts to Encourage Consistent Behavior**

Opportunities to use prompts and nudges related to live bait include:

- **Bait Disposal Bags and Bait Return Bags** – Provide bait disposal bags at time of bait purchase or make available at boat launches/fishing access points with messages to anglers that tell them that unused live bait needs to be disposed of properly. Bags filled with tap water can also be provided at bait shops for anglers that may want to reuse or return unused live bait, along with an explanation of the process to transfer. The “transport” water could also contain an additive such as a minnow holding formula as an extra cue/incentive to swap at the end of the trip. The offer of an extra bag for disposal or for return/reuse is also an opportunity to seek commitments to do either of the desired behaviors.
- **Designated Bait and Bait Water Disposal Zones** – As a visible cue that unused bait and bait water needs to be disposed of properly, designated areas in highly visible spots around boat launches and other fishing locations can be identified. The zones could be just marked areas or include composters. It also provides a location for signage with AIS information, and in particular, the guideline on proper disposal and preservation techniques. These could be implemented in partnership with lake associations, marinas, and other private boat launches.
- **Clean, Drain, Dry All the Time** – Messaging should focus on good maintenance practices for your boat – cleaning, draining, and drying should be a good maintenance habit. Clear descriptions should be provided on how each step kills/removes AIS and how to perform each step properly. Engaging in these practices regularly as a habit helps reinforce them as the social norm for how to care for your boat. Useful prompts to

remind people could include trailer stickers, keychain floats, and signage reiterating the key message of “clean, drain, dry all the time”, or “care for your boat; care for Minnesota lakes.”

- **Boat Cleaning Area with Tools and Equipment** – One of the biggest barriers to cleaning, draining, and drying is lack of readily available equipment. Providing simple equipment, such as brushes, scrapers, and grabbing tools would remove that barrier. Tools could be provided at boat launch sites where cleaning behaviors occur. Tools could also be given away by a local program or sold at marinas, bait shops, and outfitting stores so that boaters have them wherever they go. Additionally, clearly delineated an area for taking AIS prevention actions at boat launches can remove the barrier to engaging in the cleaning practices. Markings on paved areas and signage could direct drivers from the ramp to the boat cleaning area.

### **Use Incentives to Motivate Anglers**

Incentives are an important tool and can be used to encourage the desired behavior change.

- **Re-BAIT Programs** – Explore partnerships with bait retailers to deliver a return program for unused live bait. An incentive could be provided for anglers that return unused live bait in the form of a refund, store credit, exchange for another product, or a loyalty reward (e.g. after five returns, receive next batch of bait for free).

### **Use Commitment Strategies to Reinforce Proper Practices**

Each time contact is made with anglers (at bait shops, boat launches, events, by email, etc.) there is an opportunity to seek out a verbal, written and/or public commitment from them. The following are potential commitment strategies that can be applied to reinforcing proper practices:

- **Verbal Commitments** – A Verbal commitment can be gained by having ambassadors (e.g. bait retail staff, watercraft inspectors, conservation staff, etc.) ask as part of any interaction with anglers if they can be counted on to properly dispose/preserve of bait, clean, drain, dry, etc. The question can be quite simple, such as “So, now that you know more about the risks and what to do to help prevent the spread of AIS, can we count on you to do x?”
- **Written Commitments** – Written commitments can be gained immediately after obtaining verbal commitments by having the ambassador member say he or she is collecting a list of people who have agreed to take action to help prevent the spread of AIS, and asking people to add their name to the list. By asking for people to sign a list resembling a petition, the verbal commitment can be turned into a written commitment as the person signs his or her name and provides contact information. A social pressure is also felt when someone sees the names of all the other people that have also made a commitment. Note: program implementers need to consider and follow requirements regarding collection of personally identifiable information, if applicable.
- **Public Commitments** – Public commitments can be obtained by adding a check-box to the above sign-up commitment sheet that grants permission for the person’s name to be included on local partner websites with the intention of showing the number of people making the commitment to take action. A list of names of those anglers that made a

commitment can then be posted on the website and each person sent an email thanking them and telling them that they can see their name on the long list of people making a difference. When they see that their commitment is posted there for all to see, it is much more likely that they will follow through with the behavior to fulfil their commitment. This long list of people committed to stewardship also shows that many people are committed and helps to create a social norm around stewardship and encourage others to take action. Alternatively, or in addition, provide stickers for boat windshields or trailers that publicly declare their commitment.

- **Online Commitments** – Online commitments can also be made by allowing people to sign up online. This can be accomplished simply by developing a web form, storing the submitted information in a database and then outputting the information on another page of the website, or on a scrolling marquee.

### **Use Recognition to Reinforce and Strengthen Social Norms**

The following are suggestions to help strengthen the culture of stewardship and to use that culture to influence others to think about their role.

- **Show that People Take Action** – Messaging related to proper practices can leverage survey statistics to demonstrate that the practices are commonplace. For example, messaging on cleaning boat can indicate that “9 out of 10 Minnesota anglers inspect their boats and trailers and remove visible debris” or messaging on disposing can indicate “95% of Minnesota anglers dispose of unwanted bait in the garbage”.
- **Profiling Anglers** – Profiling of champion anglers, perhaps someone in the Minnesota Fishing Hall of Fame as a spokesperson, as well as conservation staff, is important to add a personal element to AIS prevention initiatives. Learning about angler experiences, what motivated them and their outcomes can influence other anglers. Similarly, knowing the DNR and other local conservation staff and their roles as conservation champions helps build trust. Sharing profiles can happen through many different channels, including blogs, video series, Twitter/Facebook series, stories in newsletters, etc.
- **Campaigns** – Short-term campaigns that resonate with anglers personally in an interesting way that they can interact with have been very successful in spreading quickly (social diffusion) and engaging people. Social media offers a good platform for these types of campaigns. Campaign ideas include Facebook daily photo, photo contest, “love our waters” or love letters to the lake campaigns, photo sharing of favorite lake or fishing spots in Minnesota.
- **Sharing Actions** – As part of education and outreach activities, cards (perhaps in the shape of fish) can be used to capture actions that residents take to help reduce the spread of AIS. These can be posted up in highly visible areas and at events to demonstrate that many people are taking action to make a difference.

## Part 2.2: Survey of Shoreline Residents

Primary research was conducted amongst Minnesota shoreline residents on the movement of docks, lifts, and other equipment. A survey was delivered to better understand the perceptions, behaviors, barriers and motivators related to the movement of AIS in Minnesota. Previously-owned water-related equipment that could harbor AIS can be sold, traded, or given from one owner to another. If the equipment is moved from a waterbody that contains AIS without following cleaning best practices, it might introduce the unwanted species into another waterbody. Specifically, the survey explored the current practices, barriers, and motivators of cleaning and drying equipment especially when moving from one location to another.

With further research on this pathway, the team sought to:

- Understand behaviors related to the movement of docks, lifts, and associated equipment;
- Gauge attitudes and awareness levels related to aquatic invasive species, their movement, and prevention steps;
- Identify actual and perceived barriers to engaging in desired behaviors (i.e. drying docks/lifts for 21 days);
- Gauge willingness or acceptance of modifying behaviors to reduce the spread of invasive species;
- Understand incentives and motivators to foster desired behaviors that reduce the risk of spreading aquatic invasive species; and
- Understand communication and engagement preferences.

The anonymous, voluntary survey was conducted in May and June of 2019 online, targeting shoreline property residents with direct water access. The survey was open to anyone that owns or rents shoreline property over the age of 18. A survey link was distributed by the Minnesota Lakes and Rivers Advocates via email to more than 500 lake and river associations which includes approximately 25,000 shoreline residents across Minnesota. The assistance of the many people and organizations that distributed the survey is greatly appreciated. A total of 1,737 respondents completed the survey.

### *Research Summary*

#### **Attitudes and Awareness**

Awareness and attitude regarding AIS is strong among shoreline residents, regardless of whether AIS are present or not in the lakes and rivers they border. Awareness of regulations and steps to prevent AIS spread is good, but there is room for improvement. For instance, only 60% were aware of the permitted Lake Service Provider program and only 49% were aware of the 21-day dry law. Increasing awareness of regulations could foster increased adoption of best practices. Shoreline residents are concerned about the risks associated with AIS and understand that there is a link between human behavior and the spread of AIS. They also understand that people can and should prevent the spread of AIS.

#### **Previously Owned Water-Related Equipment**

There is a significant amount of trade in previously-owned water-related equipment such as docks, lifts and swim platforms. More than 25% of respondents have previously-owned water-related equipment, however some respondents stated that it was bought with the property and



has not moved since. When equipment is bought and sold, most of it is traded through informal relationships, such as between friends and people who have listed equipment for sale on Craigslist, Facebook or EBay. There is little incidence of previously-owned equipment being acquired from a Lake Service Provider (LSP).

When previously-owned water-related equipment is moved, about one third (37%) of the time it is by a third party rather than the seller or buyer, and in almost half (49%) of those cases the third party is an LSP.

### **Adoption of Preferred Behaviors**

Shoreline residents indicate they are very willing to perform the inspecting, cleaning, and drying actions to help prevent the spread of AIS; however, many of those who described actual transactions often reported that those same actions were not taken. The difference in intention and action is consistent with behavior change theory, which describes the gap between attitude and behavior. The survey results indicate that shoreline residents have the preferred attitude, but it too often does not transfer to performing the relevant behavior.

When asked what may prevent them from performing the preferred behavior, respondents most often cited not having the tools necessary (such as no access to a pressure washer or hot water) or difficulty in doing so (reaching under heavy equipment like a dock).

Motivation for performing the preferred behavior included environmental protection, preventing AIS spread, and abiding by regulations (and not being fined). Other motivators included keeping equipment well-maintained.

### **Communication Preferences**

Shoreline residents have a strong preference of receiving information from lake/home owner associations. Information at public boat landings and fishing access points are also highly rated, although local residents probably want this in place for the education of visitors more than for themselves. Watercraft inspectors provide a good communications vehicle as the DNR and local municipalities are a trusted source of information on AIS, they visit public landings, and they could be trained to engage people, remove barriers, gather commitments and foster social norms. While social media has the ability to reach many people, it is preferred by only one in four shoreline residents as a source. Social media can continue to be part of communications, but existing networks and face-to-face communications is preferred.

### *Barriers and Benefits*

Drawing on the survey findings and insights of the Expert Panel, the following are the key barriers and benefits identified for the target shoreline resident behaviors. All respondents reported benefits. Approximately one in three respondents reported at least one thing would prevent them from engaging in the desired behaviors.



**Table 8: Barriers and Benefits for Shoreline Residents and Movement of Water-Related Equipment**

Behavior	Barriers	Benefits
<b>Remove visible debris</b>	<ul style="list-style-type: none"> <li>• Nothing (71%)</li> <li>• Lack equipment/tools (10%)</li> <li>• Difficult               <ul style="list-style-type: none"> <li>○ Challenging to maneuver/access (13%)</li> <li>○ Strenuous activity</li> <li>○ Physically unable (8%)</li> </ul> </li> <li>• No perceived need (2%) / other (4%)               <ul style="list-style-type: none"> <li>○ Stays on same body of water</li> <li>○ Originating body of water does not have AIS</li> </ul> </li> <li>• Assumption that seller has removed visible debris</li> </ul>	<p><i>What would motivate you to remove visible debris, wash with high pressure, rinse with hot water, and/or air-dry equipment?</i></p> <ul style="list-style-type: none"> <li>• Making a difference through action               <ul style="list-style-type: none"> <li>○ Preventing AIS spread (90%)</li> <li>○ Positive impact on community and environment (72%)</li> </ul> </li> <li>• Compliance with Minnesota law (68%)</li> <li>• Avoidance of consequences (fines) (57%)</li> <li>• Good maintenance practice (47%)</li> <li>• Knowing LSPs can provide this service (38%)</li> <li>• Knowing that others do it (23%)</li> </ul>
<b>Wash with high pressure</b>	<ul style="list-style-type: none"> <li>• Nothing (64%)</li> <li>• Lack equipment/tools (27%)</li> <li>• Difficult to maneuver/access (8%)</li> <li>• No perceived need (2%) / other (4%)               <ul style="list-style-type: none"> <li>○ Stays on same body of water</li> <li>○ Originating body of water does not have AIS</li> </ul> </li> </ul>	<ul style="list-style-type: none"> <li>• Same as above</li> </ul>
<b>Rinse with hot water</b>	<ul style="list-style-type: none"> <li>• Nothing (44%)</li> <li>• Lack equipment/tools (37%)</li> <li>• No access to hot water at the shoreline</li> <li>• Difficult               <ul style="list-style-type: none"> <li>○ Challenging to maneuver/access (8%)</li> <li>○ Strenuous activity</li> </ul> </li> <li>• No perceived need (3%)/ other (7%)               <ul style="list-style-type: none"> <li>○ Belief that air drying will address the problem</li> <li>○ Disbelief that hot water will address the problem</li> </ul> </li> <li>• Perception that it is the buyers' responsibility</li> </ul>	<ul style="list-style-type: none"> <li>• Same as above</li> </ul>

Behavior	Barriers	Benefits
<b>Air dry for 21 days</b>	<ul style="list-style-type: none"> <li>• Nothing (72%)</li> <li>• Time pressure during transaction <ul style="list-style-type: none"> <li>○ Seller wants it gone</li> <li>○ Buyers eager to receive</li> </ul> </li> <li>• Challenging time commitment <ul style="list-style-type: none"> <li>○ Long time period (7%)</li> <li>○ Buyers want to use right away (15%)</li> </ul> </li> <li>• Lack of storage space (7%)</li> <li>• No perceived need (2%) / other (4%)</li> </ul>	<ul style="list-style-type: none"> <li>• Same as above</li> </ul>

### *Potential Strategies*

Shoreline residents are willing to perform the inspecting, cleaning, and drying actions; but at the same time report not actually following the proper practices. This difference between intention and action provides opportunity to apply behavior change principles to foster the desired behaviors. The following are suggested approaches geared towards encouraging performance of the desired behaviors to help prevent the spread of AIS through the movement of docks, lifts, rafts and associated equipment.

Any organization considering strategy implementation should first investigate real-world feasibility in greater detail for each strategy of interest (e.g. existing efforts, regulations, capacity, practicality, partnerships, etc.). Strategies should be prioritized and implemented as part of a comprehensive approach to AIS prevention (see the “Next Steps for Minnesota DNR’s CBSM Program” section of this report).

### **Increase Awareness of Risk and Knowledge of Proper Practices**

While attitudes towards AIS are positive and awareness is high, the need for cleaning and drying of equipment is not clear to many and practices are not well known. This is compounded by the infrequent nature of moving equipment. The following are potential opportunities to strengthen understanding of what must be done and why:

- **Develop Clear Rules and Guidelines on the Cleaning and Moving Process for Previously-Owned Equipment** – Rules and guidelines on proper techniques for cleaning and moving equipment such as when action is required, what to do and how, and who should do it and when is complicated and varies from one situation to another. For instance, many shoreline residents believe action is not required because the equipment is not infested – but in fact, the equipment must be dried for 21 days before being placed in another water body. . Some also believe action is not required because the equipment is not moving to a different body of water, but is being moved by road – but in fact, the equipment must be cleaned before it is moved on the roadway. Similarly, there is some disbelief in the value of some practices and generally ambiguity on who is responsible for the cleaning and drying of used equipment (e.g. buyers, sellers, third-party movers). Difficulty with cleaning is also a barrier. Clear rules and guidance is

needed, including messaging on alternative ways to remove debris that are practical and allowable by law.

- **Partner with Lake Associations to Communicate with Residents** – Lake associations are the highest trusted sources of information for shoreline residents and have established communication channels with residents about their lakes and water issues. These channels can be leveraged to inform residents of the importance of why cleaning and drying equipment is important to the lake and point them to the rules and guidelines. Residents likely do not move equipment often, so occasional reminders through newsletters (e.g. annually) can help them remember that something is needed to be done if they buy or sell equipment.
- **Partner with Lake Associations to Provide Education and Training** – Lake associations are well positioned to host or co-host educational workshops and training on dock and other equipment maintenance, with a component focused on the movement of equipment and associated AIS prevention laws and best practices. However, it is important to ensure that the information is correct. Conservation staff could be tapped to help present this information correctly.
- **Establish a Lakeshore Ambassador Program** – This could be shoreline residents that agree to engage with their fellow neighbors to discuss good property practices, invasive species, and other stewardship related initiatives. People respond well to messages from their peers and benefit from hearing about their experiences. The Ambassadors would be volunteers that actively try to engage with their neighbors and friends to promote programs (e.g. establish a target of informally talking to four other residents per year).
- **Facilitate Peer-Led Engagement Events** – As an extension of an Ambassador Program, residents could be supported in hosting learning and sharing events on their properties where other residents could be invited. They could be framed as a social gathering (e.g. garden party, BBQ) where people can meet each other, tour and discuss property issues and practices to help prevent the spread of AIS.
- **Leverage the DNR as a Trusted Source of Information.** The Minnesota DNR was identified as the second most trusted source of information related to invasive species. The DNR can continue to lead as a trusted source by communicating directly with Minnesota shoreline residents about invasive species. This could be done through direct email information to shoreline residents, the DNR website, newsletters, and other communication channels. Importantly, the DNR can add credibility to AIS information by including their name and also add credibility to AIS initiatives by partnering with others.

### **Facilitate Connections to Lake Service Providers to Remove Barriers to Cleaning**

About a third of equipment movements reported in the survey were conducted by a third party and only about half of those were certified Lake Service Providers. One potential strategy is:

- **Identify and Promote Credible LSPs** – Encourage lake associations to establish promotional partnerships with local certified LSPs that can help move docks and other equipment. The LSP services address the barrier of not having the necessary tools or ability to clean the visible debris on the equipment. Having an LSP clean the equipment

also provides the motivations of doing the right thing and avoiding the fine if invasive species are transported. Through regular communication the list of recommended LSPs could be shared with shoreline residents.

### **Use Prompts as a Reminder**

Movement of docks and other equipment can be an infrequent activity. Prompts remind individuals to perform a particular action and work best if they are located as close to where behavior takes place as possible. Opportunities to use prompts include:

- **Placards on Docks and Equipment** – Work with dock and water equipment retailers to affix placards or water-resistant stickers on new equipment and pre-owned equipment that provides instructions on what to do when moving the equipment (i.e. cleaning and drying); also work with lake associations and other organizations to distribute (and ideally apply) placards to equipment. The placards could be a simple reminder with a list of actions or could also include space to write a date and name for actions completed, acting as a written commitment. If someone decides to move a piece of equipment, the placard would act as a reminder.

### **Use Incentives to Motivate**

Incentives are an important tool and can be used to encourage the desired behavior change. Incentive opportunities include:

- **Direct Cash Incentive** – Exploration of providing a cash incentive for registering transfer of a dock and demonstrating that it has been air dried for at least 21 days.

### **Use Commitment Strategies to Reinforce Proper Practices**

Each time contact is made with shoreline residents (at workshops, events, by email, etc.) there is an opportunity to seek out a verbal, written and/or public commitment from them. Behavior change is more likely if someone makes a moral commitment to do something they have a personal connection with, or if they have made a public commitment to others in their community. Public and group commitments should be sought wherever possible. The following are potential commitment strategies that can be applied to reinforcing proper practices:

- **Verbal Commitments** – A verbal commitment can be gained by having presenters at the end of a presentation or workshop ask if they can be counted on to follow all the practices if they were to move a dock or other equipment. The question can be quite simple, such as “So, now that you know what is involved with moving a dock or other equipment, can we count on you to do it?” A simple request for a show of hands can be enough. Verbal commitments should also be sought when attending events and engaging one-on-one with residents in the community.
- **Written Commitments** – Written commitments can be gained immediately after the activity above by having the staff member say he or she is collecting a list of people who have agreed to take action on their property and asking people to add their name to the list. By asking for people to sign a list resembling a petition, the verbal commitment can be turned into a written commitment as the person signs his or her name and provides contact information. A social pressure is also felt when someone sees the names of all the other people that have also made a commitment. Note: program implementers need

to consider and follow requirements regarding collection of personally identifiable information, if applicable.

- **Public Commitments** – Public commitments can be obtained along with the written commitments. A list of names of those residents that made a commitment can then be posted on lake associations websites and newsletters. When they see that their commitment is posted there for all to see, it is much more likely that they will follow through with the behavior to fulfil their commitment. This long list of people committed to stewardship also shows that many people are committed and helps to create a social norm around stewardship and encourage others to take action.

### **Use Recognition to Reinforce and Strengthen Social Norms**

The following are potential strategies to help strengthen the culture of shoreline stewardship and influence others to think about their role.

- **Establish a Good Stewards Group** – This group could be an informal collection of shoreline residents who have made a commitment to stewardship behaviors. Having a collection of people committed to protecting the ecosystems in Minnesota strengthens the public commitment and gives people a sense of belonging by being part of something bigger than just the actions they take on their own properties. The total number of people that have made a commitment to a stewardship action should be displayed to encourage others to take stewardship actions. This could be a running total on an organization's website and used in publications, such as newsletters or social media updates. A tagline could be established for the people that have committed to be stewards, such as "I Protect Our State Waters" or "Committed to Protecting Minnesota Lakes". As a resident committed to protecting the State's waters, residents could receive educational information, program updates, coupons, information on events, free workshops, tours, invitations to speaker series, opportunities to host "garden parties", etc.
- **Property Signage** – As an extension of making a commitment to stewardship, signage could be placed on the residents' property to 1) Make their commitment public; 2) Recognize them for their efforts; and 3) Inform others that their neighbors are taking action, which will help establish a social norm.
- **Sharing Success Stories** – Profiling of successful movement of equipment by following all the right steps can be done to help increase knowledge and awareness and bring real people into the story. It is important to note that when a success story is shared, the resident is also being publicly recognized for their efforts, making a public commitment, and influencing others. This all helps to build social norms.

## **Part 2.3: Aquarium and Aquatic Plant Retailers Working Session**

The project team selected aquarium and aquatic plant retail for further investigation due to the significance of the pathway for AIS and the acknowledgement of gaps in the available research. The project team determined that engaging retailers and representatives of the retail trade was a necessary first step in gathering useful information on these pathways.



## *Research Summary*

On July 16, 2019, the Minnesota DNR Invasive Species Program staff hosted a meeting with 13 stakeholders from the aquarium and aquatic plant retail trade, including representatives from the Minnesota Water Garden Society (2), Minnesota Aquarium Society (1), Minnesota Nursery and Landscape Association (2), Pet Industry Joint Advisory Council (1), and aquatic plant and animal suppliers (7). Aquatic plant and animal suppliers included aquarium wholesalers (1), classroom and laboratory suppliers (4), aquarium maintenance providers (1), and aquarium retailers (1). In this report, this group is referred to as the aquarium and aquatic plant industry, or the industry for short.

With further research on this pathway, the team sought to:

- Better understand the practices, perspectives, and motivators of the industry related to aquatic invasive species movement in Minnesota;
- Understand the policies, practices, and education/information dissemination necessary to guide industry social norms; and
- Build connections with and support from retail trade stakeholders to initiate partnerships with the DNR on AIS programs.

The session covered the following key discussion questions:

1. What do you see that the industry is doing now to prevent the spread of aquatic invasive species? Not doing? Can you help us understand what is currently happening?
2. From the retail perspective, what is getting in your way of preventing the spread of AIS?
3. What are your thoughts on AIS programs and regulations in Minnesota? How are the programs and regulations working/not working to prevent the spread of AIS?
4. What can be done to reduce the sale of AIS through plant and aquarium retail outlets?
5. What can industry do to help their customers prevent the spread of AIS?

The following overarching themes were identified based on the input from stakeholders that attended the session. Due to the small sample size, further research on this pathway may be needed to validate these observations.

### **Current Practices:**

- Stakeholder participants share the DNR's goal of preventing the spread of AIS and are enthusiastic about future collaboration.
- Many stakeholders in the retail trade pathway are aware of and seem concerned about AIS, though a few also noted some level of indifference in a mature industry such as this one.
- The public is generally aware of successful DNR programs for other AIS pathways, but not for the aquarium and plant trade.

### **Barriers and Motivators:**

- For both sellers and customers, there is a lack of clear, accessible information that clearly defines and depicts AIS and non-invasive alternatives.
- There are supply-side issues, such as out of state and internet sales that don't provide information about AIS to buyers, as well as the lack of the supply of desirable alternative species.



**Policy Issues:**

- Industry stakeholders appear to need clarity on regulations with participants expressing the need for a simplified approach and an easy to follow resource toolkit.
- Lack of enforcement may result in lower compliance.

**Information Dissemination:**

- Sellers and customers need at least two kinds of education: what is best to buy, and how to properly dispose of AIS.
- Sellers do not have the resources to create customer-facing materials needed to educate their customers on these issues at the point of sale.

The working session outcomes support that CBSM is a recommended approach for creating culture change around AIS prevention behaviors. There is no one solution that will address all of the barriers and issues related to preventing the introduction and spread of AIS through this (or any) pathway. Diverse, behavior-based, measurable approaches could be developed for actors all along the aquarium and plant trade pathway.

*Barriers and Benefits*

Drawing on the feedback from the stakeholder session and insights of the Expert Panel, some barriers for the target behaviors were identified. Because the working session did not explore barriers and benefits in great detail, additional research on barrier and benefits is recommended. The following section offers some potential strategies based on this *preliminary* understanding of barriers.

**Table 9: Barriers for Aquarium and Aquatic Plant Retailers**

Behavior	Barriers
<b>Accurately identify and only sell non/low-risk species</b>	<ul style="list-style-type: none"><li>● Industries are fragmented with diverse interests, which makes it difficult to have a unified approach to AIS prevention</li><li>● Limited knowledge due to:<ul style="list-style-type: none"><li>○ Lack of general awareness concerning AIS issues</li><li>○ Lack of clarity on best practices for compliance</li><li>○ Lack of options for alternatives</li><li>○ Inadequate training</li></ul></li><li>● Regulation challenges surrounding:<ul style="list-style-type: none"><li>○ Access and interpretation of information</li><li>○ Complexity of rules</li><li>○ Out-of-state compliance</li><li>○ Online retailer awareness and compliance</li><li>○ Lack of enforcement</li></ul></li><li>● Difficulty identifying AIS</li><li>● Tag-alongs (aka contamination/hitchhikers)</li><li>● Limited sources of alternatives</li></ul>
<b>Accept unwanted animals to rehome or dispose of</b>	<ul style="list-style-type: none"><li>● Not practical for all retailers</li></ul>

**Table 10: Barriers for Aquarium and Aquatic Plant Trade Suppliers to Retail Outlets**

Behavior	Barriers
<b>Accurately identify and only sell non/low-risk species</b>	<ul style="list-style-type: none"> <li>• Out-of-state sources                             <ul style="list-style-type: none"> <li>○ Challenging to understand regulatory requirements for multiple states</li> <li>○ Burdensome to ensure compliance</li> </ul> </li> </ul>

**Table 11: Barriers for Aquarium and Aquatic Plant Customers**

Behavior	Barriers
<b>Recognize and purchase of only non/low-risk species</b>	<ul style="list-style-type: none"> <li>• Assume species is legal if it is available for purchase</li> <li>• Limited knowledge surrounding:                             <ul style="list-style-type: none"> <li>○ Understanding of AIS issues</li> <li>○ Awareness of regulations</li> <li>○ Options for alternatives</li> </ul> </li> <li>• Not concerned</li> <li>• Difficulty identifying AIS</li> <li>• Desire certain prohibited species because they are:                             <ul style="list-style-type: none"> <li>○ Interesting plants/animals</li> <li>○ Available (e.g. online, out-of-state retailers, etc.)</li> </ul> </li> <li>• Conduct personal exchanges (e.g. between friends, private sales, etc.)</li> </ul>
<b>Euthanize and dispose of unwanted animals</b>	<ul style="list-style-type: none"> <li>• Proper disposal techniques are not well understood</li> <li>• Moral concerns with euthanizing</li> </ul>
<b>Return unwanted animals to pet stores</b>	<ul style="list-style-type: none"> <li>• Limited retailers that accept unwanted pets</li> </ul>

*Potential Strategies*

The aquarium and aquatic plant industry is fragmented with no unified approach to managing AIS. Based on observations from the working session with trade representatives, a number of potential strategies have been identified to help prevent AIS introduction and spread through the aquarium and plant trade. Because the working session did not focus on detailed barriers and benefits research, additional research may be needed before designing and implementing behavior change strategies for this pathway.

The following are suggested approaches geared towards supporting desired behaviors related to the selling and purchasing of aquatic plants and animals.

Any organization considering strategy implementation should first investigate real-world feasibility in greater detail for each strategy of interest (e.g. existing efforts, regulations, capacity, practicality, partnerships, etc.). Strategies should be prioritized and implemented as part of a comprehensive approach to AIS prevention (see the “Next Steps for Minnesota DNR’s CBSM Program” section of this report).





### **Foster Partnerships with the Aquarium and Aquatic Plant Industry**

The aquarium and aquatic plant industry is supportive of improved efforts to manage AIS in Minnesota and is willing to participate. This provides an opportunity for the DNR and local municipalities and organizations to establish partnerships with the industry that can help advance AIS prevention in this sector. Partnerships with industry have worked well in reducing the spread of invasive species in other jurisdictions. The following are potential opportunities to be explored. Partnerships can be critical delivery channels for many of the strategies outlined below.

- **Continue Engagement with Industry to Establish a Common Position on Preventing AIS Introduction and Spread** – Continue efforts to better understand the industry and explore opportunities to align on priorities. This includes refinement of key messages, outreach and education across the industry, and a consistent approach.
- **Partner with Retailers to Jointly Deliver Programs** – Retailers are many enthusiasts' access point to aquatic plants and animals. They are an interaction point that is influential to customer decisions and because of this they can be leveraged. Retailers offer face-to-face engagement opportunities at an important decision-point as they purchase products. Retailers can be trained on AIS, appropriate disposal practices, and in delivering components of a behavior change program (e.g. seeking commitments). Retailers can distribute point of purchase educational materials and prompts.

### **Increase Awareness of AIS and Knowledge of Proper Practices**

AIS in the aquarium and aquatic plant trade has not received as much public attention as other pathways like anglers and boaters and therefore awareness of the risks and what can be done to reduce risks is not as high. Based on the research conducted on anglers and shoreline residents, it is likely that positive attitudes towards AIS prevention is common amongst Minnesota residents. This is a solid foundation for increasing awareness and building knowledge on good prevention practices in the aquarium and aquatic plant sector. The following are potential strategies to increase knowledge and awareness:

- **Campaign with Memorable Marketing Materials** – Develop an awareness campaign that includes a recognizable visual identity, interesting slogan and/or tag lines, and key messages focused on selecting non-invasive species and appropriate take-back or disposal. Additional research may be required amongst enthusiasts to determine messaging that resonates. Campaign materials can be applied broadly through public awareness campaigns and utilized in retail stores.
- **Retailer Training and Resources on Plant Identification** – Training programs targeted at retail staff focused on AIS, the risks, regulations, how to identify invasive species, and how to engage with customers on the topics, including alternative species to recommend. Training could take the form of workshops hosted by the DNR or other partners, self-guided online modules, or a training kit to be delivered in stores by other staff (i.e. train-the-trainer approach). Resource material for retailers could also include clear articulation of Minnesota law, a visual list of aquatic invasive species (including a compilation of common nomenclature), and visual list of alternatives. Information and

resources should be shared regularly with retailers through industry communication channels.

- **Guidelines for Euthanizing Aquatic Animals** – Partner with a credible source, such as the American Veterinary Medical Association, to develop and clearly articulate humane methods to euthanize aquatic animals. Explore partnerships to expand the messaging and communication material to a broader audience beyond Minnesota.

### **Use Nudges and Prompts to Encourage Consistent Behavior**

Prompts and nudges are important tools to influence peoples' aquatic plant and animal purchasing decisions. Working with retailers, there are a number of potential options to encourage the appropriate behaviors.

- **Point of Purchase Communication** – Identify “Non-Invasive Species in Minnesota” in stores with signage in certain sections or other communication tools (e.g. shelf labels). These would be prompts that assure customers that the items are not on the Minnesota invasive species list. Further work is required to determine how to verify labeling and to conduct risk assessment of species available in retail for current and future invasive risk.
- **Foster Rehoming/Take-Back Programs** – Establish relationships between retailers and nonprofits who are doing rehoming/take-back work (e.g. Habitattitude). Partner to promote the rehome programs that some retailers already offer. Other retailers that do not accept takeback of aquarium animals can direct people to nearby rehome programs.
- **Aquarium Stickers** – Develop and distribute stickers that remind people not to release pets into the wild. This message may be combined with other information about proper care of aquatic pets. Stickers can be attached on the back of aquariums or to other equipment.

### **Use Commitment Strategies to Reinforce Proper Practices**

Similar to commitment opportunities with bait shops for anglers, retail outlets offer a key engagement point with enthusiasts and can be leveraged to seek commitments. Each time contact is made with purchasers of aquatic plants and animals in stores, there is an opportunity to seek out a verbal, written and/or public commitment from them. The following are potential commitment strategies that can be applied to reinforcing proper practices:

- **Verbal Commitments** – Verbal commitments can be obtained at aquarium and plant retail stores by staff as customers make purchases. Staff can provide a brief overview of proper care and what to do with unwanted aquatic animals – either rehome or euthanize. Once it is explained, they can ask if the person can be counted on to never release into the environment.
- **Written and Public Pledges** – Following verbal commitments in stores, customers can be asked to make a written pledge and if they agree, add their name to pledge card. Pledge cards can be designed in an interesting way (e.g. shape of a fish) and have a simple pledge statement (e.g. “I pledge to do my part to help stop the spread of invasive species”) and include a place for their name to be added. Completed pledge cards be

placed in visible places as a public commitment and also as a social norming initiative to inform others that many people are committed to action.

### **Use Recognition to Reinforce and Strengthen Social Norms**

The following are potential strategies to help support the other suggested behavioral change strategies and strengthen a culture of aquatic plant and animal stewardship.

- **Voluntary Retail Certification Program** – Establish a voluntary certification program for retailers (e.g. “invasives aware”) that can be communicated to customers. Certification could indicate that staff have received training, stores are only offering products that are not listed as invasive in Minnesota, and that stores commit to educating customers on AIS. Further work is required to assess risk of species available at retailers.
- **AIS Awareness Month** – Enhanced education and awareness efforts and promotions for a specific month as a short-term campaign approach. Building on the pledge strategy, completed fish cards with commitments can be posted throughout stores or in windows to recognize customer commitments and demonstrate to others that the commitments are commonplace.

## **Part 2B: Building Capacity in Local Agencies**

The final task in Part 2 of the project was an in-person two-day Aquatic Invasive Species Behavior Change Design Workshop for DNR staff, local government staff, and associated local and statewide partners involved in implementing AIS programs in Minnesota. This workshop was designed to build on earlier CBSM training that the DNR sponsored in 2017 and to give participants a learning experience that would help them put CBSM theory into practice.

The objectives of the workshop were to:

- Review CBSM and behavior change theories;
- Inform participants on the results of Part 1 and Part 2 of this project;
- Use research results from Part 1 and Part 2 to collaboratively brainstorm behavior change strategies for target audiences and behaviors; and
- Leverage participants’ knowledge and expertise, especially of challenges and opportunities in local jurisdictions.

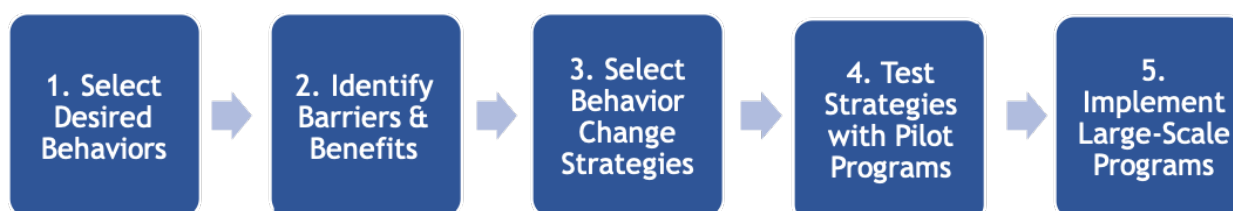
The desired outcomes of the workshop were to:

- Have a shared understanding of behavior change strategies and CBSM principles;
- Provide baseline data (Part 1 and Part 2 results) to local partners that they can immediately use to inform their programs;
- Build capacity of individuals and organizations by providing an opportunity to put CBSM theory into practice using real-time data; and
- Generate initial ideas that could subsequently be fleshed out into implementable behavior changes strategies for AIS prevention at various scales throughout the state.

The workshop was held on October 22 and 23, 2019 in St. Cloud, Minnesota with 67 attendees including 44 people from 33 counties, 7 statewide partners and 16 DNR staff. The outputs of the workshop were consolidated in *AIS Behavior Change Design Workshop Summary* (See Appendix A).

## Recommendations: Moving Forward

The development of a CBSM strategy generally involves five key steps:



This project focused on the first two:

- **STEP 1: *Select Desired Behavior(s)***  
Developing an effective behavior change program begins with selecting the right behavior(s) and right audience to target.
- **STEP 2: *Identify Barriers and Benefits***  
The identification of actual and perceived barriers and benefits within each community through research is crucial to effectively promoting sustainable behavior. Once the reasons for everyday behavior(s) are understood, strategies are developed to minimize the barriers and maximize the benefits of each selected behavior.

The next phase of this project should focus on building out Steps 3 and 4. The following section of this report was written to present the Minnesota DNR, in partnership with agencies and organizations at the local level, with a model to move forward with these two steps:

- **STEP 3: *Select Behavior Change Strategies***  
Once the barriers and benefits of the specific community are identified, tools to change behavior are selected. Strategies often involve a combination of tools including social norms, vivid communications, commitment, reward and recognition, and social diffusion.
- **STEP 4: *Test Strategies with Pilot Programs***  
Pilot programs test the strategy design with a smaller segment of the community. This allows fine-tuning of the behavior change strategy to ensure it will be highly effective.

After gaining experience to understand the efficacy of approaches for individual behaviors for each target audience and invasive species pathway, the fifth step of CBSM can be implemented:

- **STEP 5: *Implement Large-Scale Programs***  
Once the pilot has proven successful, the strategy can be replicated and scaled out on a community-wide scale.

## Overarching Techniques for Behavior Change

Changing behaviors using CBSM and other behavioral psychology approaches is based on the understanding that almost all of our decisions are ruled by social, cultural, and emotional factors. Strategies that tap into motivations and abilities at both the social and individual levels are more likely to succeed in changing behaviors, as well as establishing new social norms of the desired actions.

From a social perspective, humans are communal animals and respond to the influence of their peers and trusted advisors. It is most important to establish social norms around the desired behaviors, as well as to tap into channels of trusted advisors in a social community. For example, sending messages through a trusted network of connected individuals (for example, lake association members) takes advantage of established rapport and credibility to spread the message effectively and quickly.

At the individual level, we all have core values that influence our decision-making and need a reason to care about the cause. When programs tap into values and beliefs, it is easier to hit the target market's "What's in It for Me" factor. An emotional response is a powerful motivator.

People begin to believe that something is a social norm when they hear it from multiple sources. A critical part of CBSM is to go where people are already going, do what they're already doing, and do it with people they're already doing it with. For this reason, a multi-pronged approach of CBSM strategies is needed, including both multiple customer touch points and multiple trusted messenger channels.

The more behavioral strategies used at once, the more people adopt the desired behavior. Research shows that hitting the right combination of social and individual strategies can increase success rates exponentially.

CBSM provides a simple framework for a complex system of multiple messages and touchpoints. Using the right strategy and the right message is critical to achieving the desired results. Language, tone, and timing of behavioral messages matter, and even a small change in wording can change the whole effect. For this reason, consulting with experts in behavior change, individual psychology, and social sciences is important in crafting CBSM strategies that work.

### *CBSM Strategies*

In the CBSM process, several strategies have demonstrated effectiveness at promoting behavior changes. These strategies are most effective when used in combination to:

- Remove barriers,
- Motivate people to do desired behaviors, and
- Establish new social norms.

The following types of CBSM strategies have been shown to work well to achieve these outcomes. Specific examples of how to apply these strategies to the selected pathways are discussed in the next section of this report.

### *Foster Partnerships with Visible and Trusted Sources*

Partnering with community organizations, local leaders, and influential citizens helps overcome barriers to change and creates a large base of supporters and champions for the cause. Program partners can quickly spread the word to their networks, mobilize champions, and establish common ground among participants.

Influential partnerships are often visible and vocal civic leaders, prominent community organizations, and active volunteers. However, sometimes trusted sources and influencers are less prominent members of the community. A research process called Community Asset Mapping (discussed in the Next Steps section of this report) can be used to identify and assess local resources and uncover valuable partnerships that will dramatically impact uptake of desired behaviors.

### *Improve Knowledge and Awareness*

Awareness alone does not typically motivate a person to change a behavior, but without knowledge of a problem or awareness of more appropriate actions, behavior change is unlikely. Successful CBSM programs include elements of education and awareness building as a strategy to ensure people know what the desired behaviors are and how to perform them.

### *Use Nudges and Prompts to Encourage Consistent Behavior*

Prompts are a visual or auditory aid that reminds people to engage in a desired behavior. Nudges provide positive reinforcement and indirect suggestions to influence a decision that leads to the desired behavior. The purpose of a prompt is to remind individuals to perform a particular action. They also work well to support commitments. The prompts may be in the form of a sticker, memo card, or tag in appropriate locations that provide a visual reminder to engage in certain behavior. Other prompts include signs, verbal reminders, and associated visual cues. Prompts work best if they are located as close to where a behavior takes place as possible.

### *Use Commitment Strategies to Reinforce Proper Practices*

Research has found that when people make a commitment, such as a pledge or an agreement, they are more likely to follow through with it than if they had made no specific commitment to do so. When the first commitment is to do a small activity, they are also more likely to agree to more difficult future commitments (even when asked for back to back commitments). This is referred to as climbing the commitment ladder.

Common forms of commitment take written or verbal forms. Public commitments are made in such a way that others can observe the commitment that was made. They invoke a sense of accountability because those who witness the commitment will expect it to be fulfilled. For this reason, public commitments are stronger than written or verbal commitments that are not shared publicly.

Commitment strategies should always try to take the best advantage of this commitment hierarchy. In general, people are not driven by outright social pressure or pressure from authorities to conduct a particular behavior. What is more likely to encourage behavior change

is if someone makes a moral commitment to do something they have a personal connection with, or if they have made a public commitment to others in their community.

#### *Offer Incentives, Disincentives, Rewards, and Recognition*

These types of strategies are effective at both promoting desired behaviors and discouraging undesired behaviors. They can be used to motivate people to take a certain action or to add more barriers to an undesired action. Incentives and disincentives are particularly useful when motivation to engage in action is low or people are not doing the activity as effectively as they could. Incentives can be offered for doing the "right thing" such as providing recognition, awards, leveling up, tax breaks, contest prizes, etc. Conversely, disincentives can be implemented, such as fines, citations, leveling down, etc., for doing the "wrong thing." Incentives for doing the wrong thing can also be removed, such as limiting the number of free parking spaces to reduce the number of cars on the road.

#### *Reinforce and Strengthen Social Norms*

Once a social norm is established it is very hard to break. Importantly, people are influenced by what other people are doing, what is highly visible, and the knowledge that others can observe your actions. Programs and materials should focus on the social motivators identified to be the most effective in this survey, the literature, and behavioral science in general:

- The injunctive norm that "it's the right thing to do" (which was identified as the top motivators in the angler and shoreline resident surveys), and
- The descriptive norm that everyone else is doing it (which survey respondents reported is happening most of the time).

#### *Feedback*

People are more likely to stick with a behavior change for a longer period of time (and potentially help motivate others to change) if they see that they are making a difference in their community, their health, the environment, or their individualized core value. Feedback can be in the form of program achievement information at boat launches, advertising in local fishing magazines, promotional emails or literature, special events, presentations, awards, badges, or other such activities. In addition to traditional feedback approaches that communicate the total percentage of people conducting a behavior, recent studies suggest showing an increase in the percentage of people conducting a desired behavior is also an effective motivator.

## **Statewide Branding and Communications**

Effective communications is a key element of CBSM programs that work. The following are recommendations to the Minnesota DNR to ensure an effective statewide brand and communications strategy.

#### *An Overarching Statewide Brand*

It is important to establish an overarching statewide brand that will identify all communications materials as being part of the effort to protect Minnesota against aquatic invasive species (AIS). The brand should resonate for all audiences, pathways and behaviors. That means the brand



should be as relevant to anglers being asked to dispose of their bait as it is to aquarium enthusiasts being told not to release species into the wild.

Along with consistent colors and typefaces, an effective brand benefits from an effective logo. An effective logo includes three components: An icon (the graphic image), the logotype (a unique or distinctive typeface) and a tagline. The logotype can stand alone as a “wordmark.” An example is the familiar Coca-Cola logotype/wordmark, with a tagline that is updated regularly (“Things Go Better With Coke,” “It’s the Real Thing,” “Coke Adds Life,” “Coke is It,” “Taste the Feeling,” etc.). For brands with limited advertising/promotional budgets, maintaining one icon and tagline for longer periods of time and targeting audiences specifically can help compensate for the lack of ubiquity.

The overarching statewide brand should be created by the Minnesota DNR and be applicable to all AIS work done by, and funded by, the Minnesota DNR. Ideally all organizations conducting any AIS prevention efforts in Minnesota would utilize the brand as well. Based on the results of this project, messaging should focus on taking personal responsibility to protect Minnesota waters from AIS. Whenever possible, communication messages should explicitly reference the behavior(s) the target audience(s) should be practicing. They should be positive messages focused on positive actions, rather than negative “Don’t...” or “Stop...” messages. While there is merit in considering a brand that would cover all of DNR’s invasive species efforts, including Play Clean Go, it is beyond the scope of this study.

Statewide branding in Minnesota may be unique to the state, but it should be developed to be compatible with branding and messaging from nearby states, federal agencies and associations. Compatibility will build on messaging that people are seeing from other sources and minimize confusion among visitors from other areas.

#### *Sub-Brands and Communications*

Under the overarching statewide brand, there can be sub-brands for specific audiences and pathways. Some regional and national campaigns already exist, such as:

- “Stop Aquatic Hitchhikers,” “Be a Hero, Transport Zero,” “Don’t Move a Mussel,” and variations on Clean Drain Dry/Dispose for boaters.
- “Habitattitude” for aquarium and water garden sellers and hobbyists.
- “Play Clean Go” for outdoor recreationists.

Similarly, communications messaging can be specific to a pathway, audience and/or area where a program is being implemented. Local messaging and references may resonate better with people in a particular area. However, any local message should still carry the overarching statewide brand (once established) to identify the initiative as part of the larger statewide effort.

#### *Market Testing*

During development by the DNR, the overarching statewide brand should be tested to ensure it resonates with target audiences and organizations/partners that would be utilizing it. Ideally this will result in a clear and consistent statewide brand that anyone can use, instead of isolated campaigns/efforts that may compete with one another.



## *Consistency*

The overarching statewide brand should be placed prominently on all promotional materials, reports, and communications, so that people will immediately recognize that the information within is about AIS. Once the statewide brand is established, it should be a requirement that all DNR AIS programming, and AIS programs funded by DNR, carry the brand on all communications materials.

## *CBSM Benefits of Consistency*

Two measures of effectiveness of marketing campaigns are number of impressions and recall. That is, the number of times a person sees the messaging, and the ability to recall seeing it, are indicators of the reach of a traditional messaging campaign. To gauge campaign effectiveness, measurable performance or behavioral benchmarks should be established at inception and monitored throughout a campaign.

For CBSM programs, there are other benefits as well. In particular, branding can foster new commitments to new behaviors when similar behaviors have been adopted by an individual previously. For example, a boater who has made a commitment to remove visible debris from their watercraft and trailer is more likely to adopt the behavior of cleaning their waders and hunting gear if they see that those behaviors also prevent the spread of AIS. That is because committing to and adopting the first behavior changes their self-perception, so they see themselves as a person who takes action to stop AIS. When they see another behavior that does the same thing, they are more likely to adopt that behavior as well. By extension, creating and demonstrating broader communities of practice and highlighting recognizable individual “influencers” strongly encourages buy-in and participation.

## **Next Steps for Minnesota DNR’s CBSM Program**

The recommended next steps described below draw on the findings of this research project and the consultant team’s years of experience in CBSM program design, implementation, and evaluation in many cities and communities in the U.S. and Canada. These best practices are recommended for all CBSM programs in general.

A successful CBSM program requires a systems approach to designing, testing, and continuously improving behavior-change strategies to shift culture and create new social norms. It is vital that local agencies play a role in implementing and monitoring CBSM program elements. The local agencies offer their on-the-ground insight into their communities and their own AIS knowledge and programmatic resources.

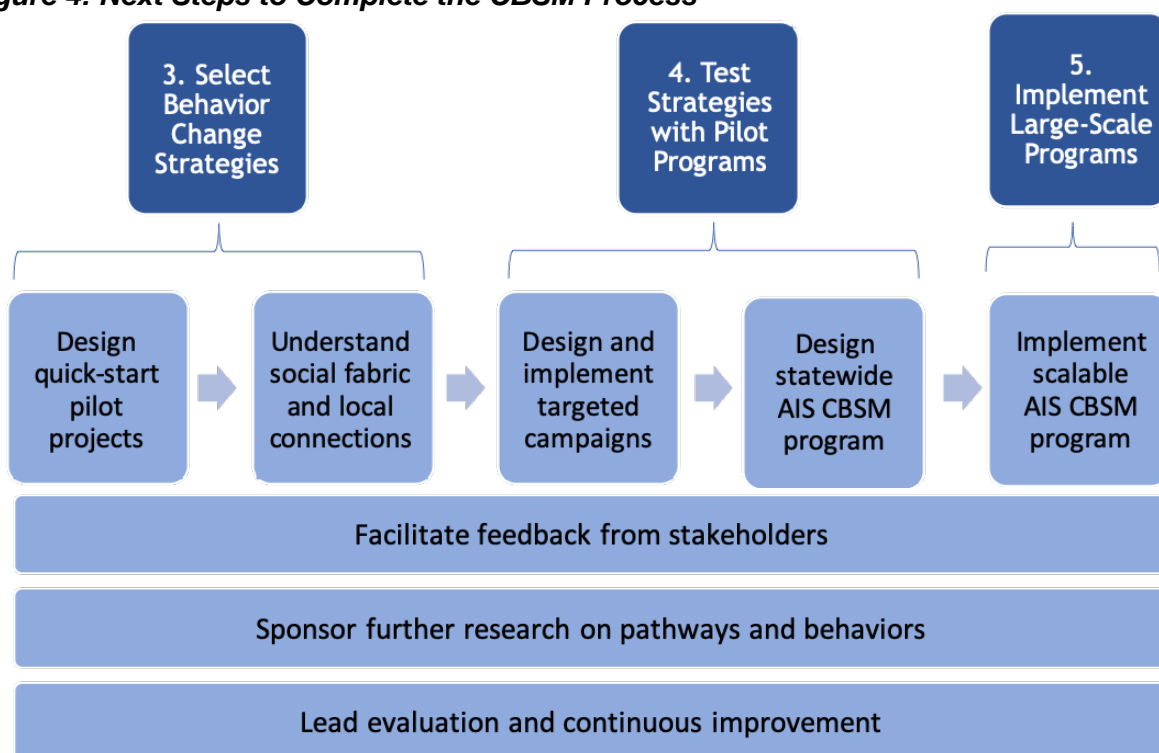
It is equally important that the DNR provide unifying leadership and direction for a statewide CBSM program so that efforts at the local level follow CBSM best practices and are connected to the larger program as a whole. This centralized leadership and diffusion of resources for implementation allows for effective testing of program elements and scalability across the state. CBSM is a long-term commitment that requires iteration, collaboration, and patience. It may take some time for CBSM strategies to take hold, but when they do, the changes in behaviors become long-standing social norms that will bring positive benefit for years to come.



The next phase of implementing a statewide AIS CBSM program should focus on building out program design pilots with an aim toward large-scale application. To ensure efficient use of limited resources, strategies should be prioritized so that efforts are focused on where the state and local organizations could have the biggest impact. The activities and initiatives of the next phase will enable the DNR and local agencies to work together to launch and test CBSM programs, addressing the pathways and behaviors identified in the research. Further, additional research on other important pathways and behaviors could then be incorporated into the program. Finally, the next phase should enable program design that is replicable, scalable, and implementable across Minnesota.

To complete steps three through five in the CBSM process and move forward in developing an AIS CBSM program in Minnesota, the following next steps are needed:

**Figure 4: Next Steps to Complete the CBSM Process**



- **Design quick-start pilot projects** to leverage existing resources and enthusiasm from local agencies.
- **Understand social fabric and local connections** across the counties and state to identify champions and test outreach tactics.
- **Design and implement targeted campaigns** statewide to test selected tactics and build momentum.
- **Design a statewide CBSM program** that replicates pilot successes to achieve long-term social change.
- **Implement a scalable AIS CBSM program** incorporating lessons learned, additional research, and new opportunities that arise over time.

Concurrently with the steps above, the DNR must continue to provide leadership, foster collaboration, and champion continuous improvement of all aspects of the CBSM program by:

- **Facilitating feedback from stakeholders** and collaborating with local agencies and organizations, industry stakeholders, and AIS and CBSM experts;
- **Sponsoring further research on additional pathways and behaviors** that can be incorporated into the CBSM Program; and
- **Leading the evaluation and continuous improvement** of all aspects of the CBSM program so that lessons learned are used to improve the outcomes of the program.

### *Next Steps*

1. **Quick-Start Pilots: Identify and test “low-hanging fruit” strategies that can be tested immediately.** The research tasks completed in this project have uncovered many behavior-change strategies that can be easily designed and tested. These low-hanging fruit strategies can be used to gather quick feedback and create momentum with stakeholders.

Some potential statewide projects for the DNR include:

- Incorporate commitment strategies (collecting and recording) into training materials and procedures for watercraft inspectors.
  - Continue working with aquarium and aquatic plant trade representatives to further understand barriers and benefits and to deepen relationships with these program stakeholders and champions.
  - Improve the AIS Program web pages and other materials with behavioral language and enhanced resources for each of the identified pathways.
2. **Understand Specific Local Conditions: Assess local resources that will be critical to the success of a community-based initiative.** Using a process called Community Asset Mapping (CAM), research and outreach are combined to document community structures and institutions. The CAM provides insight into the values and motivators of the community, gauges potential alignment with program scopes; and identifies and recruits opinion leaders and influencers who will be critical program champions. The outcome of a CAM assessment would help focus pilot efforts based on local needs and opportunities.

Some of the project tasks to date have provided information on local issues and needs. The survey responses can be further reviewed by zip code to uncover hyper-local issues and potential strategies. The workshop outputs also provide localized views into the challenges and possible solutions. These insights, along with supplemental research and outreach, will create a clearer picture of where and how to engage at the local level and can help identify potential champions.

3. **Design and Implement Pilots: Select target behaviors and design turnkey pilots to be implemented in multiple jurisdictions.** Using the outputs of the research completed to date, referencing the results produced from the workshop, and the findings

from the CAM process, the next steps are to decide which behaviors to address and which strategies and tools will best support their desired behavior change outcomes.

Then complete pilot designs can be developed as learning experiments with:

- Clear program structure, timeline and measurable goals.
- Baseline data that can be compared to post-pilot results.
- Complete program toolkits that can be used by local agencies to conduct pilots (including messaging guidance and marketing materials).
- Implementation and evaluation plans that support a “test, learn, adapt” approach to continuous improvement.
- A mechanism for information sharing and opportunities for collaboration among the DNR, local jurisdictions and other stakeholders.

4. **Scale-Up into Programs: Refine pilot designs and rollout to more jurisdictions across the state.** After completing a pilot project, the DNR can work with local agencies to scale up into larger unified initiatives that draw on lessons learned in the pilot phase.

### *Continued Leadership from Minnesota DNR*

The DNR has shown tremendous leadership in AIS programming for behavior change by:

- Fielding programs to gather baseline data and address AIS spread related to a number of target behaviors and pathways;
- Modeling collaboration by engaging with industry stakeholders and experts on AIS and CBSM; and
- Investing in building capacity at the local level to use CBSM to prevent the introduction and spread of AIS in Minnesota.

These actions have created an excellent foundation for a CBSM Program. The DNR can capitalize on these investments by:

- Prioritizing behavior change strategies to be implemented so that efforts are focused on where the state and local organizations could have the biggest impact.
- Continuously improving AIS program resources based on the CBSM research conducted and CBSM principles;
- Developing consistent messaging (through completed research, new research, and/or pilots) specific to priority target audiences and behaviors so that partners throughout the state are presenting a unified message.
- Providing funding support to local agencies for design and implementation of high-impact CBSM pilots and future scaled-up programs;
- Coordinating involvement of industry and trade representatives; and
- Facilitating communication to encourage collaboration, sharing resources, and sharing lessons learned.

As pilot projects are completed, evaluated, and refined, the DNR will have a better view into future development and planning for CBSM programs and to continue to support local organizations in the continuous improvement of programs. From this vantage point, the DNR can develop a long-term plan for CBSM initiatives which would include:

- Continuous evaluation and improvement of programs;



- Developing case studies and showcasing success to discover and promote best practices; and
- Sponsoring and/or co-funding further research and subsequent development of programs to address next-tier pathways and behaviors also noted in this research.

## **Conclusion**

The next steps for a behavior-based approach to AIS prevention in Minnesota will be taken on firm ground. The research conducted to date will inform the development of effective programs, and DNR staff and partners have had training on developing strategies to implement programs. Everything is in place to develop strategic approaches to preventing the spread of AIS through human behavior, including the creativity that will be needed to meet the unique challenges that are sure to arise in different parts of the state.

The recommended framework for managing a large number of demonstration projects, and evaluating them and continuously improving them, will result in the development of best practices that can spread across the state and beyond.

The path has been prepared. It is time to commit to taking the next step.

# Appendix A: Supporting Documents

A summary of this project along with all supporting documents can be found on the Minnesota DNR webpage "[Preventing Aquatic Invasive Species through Behavior Change](https://www.dnr.state.mn.us/invasives/ais/prevention/behavior-change.html)" (<https://www.dnr.state.mn.us/invasives/ais/prevention/behavior-change.html>).

The following reports provide additional detail on the project findings and outcomes.

## [Literature Scan Summary](#)

Summarizes the 93 most relevant publications (out of 150+ that were scanned) that were reviewed to determine the most important AIS pathways that could be addressed by a CBSM effort in Minnesota.

## [Long List of AIS Behaviors](#)

A comprehensive list of the pathways and behaviors that were found in the research and reviewed by the project team and Expert Panel.

## [Expert Panel Session - Final Report with Appendices](#)

Summarizes the impact analysis that was developed with input from the Expert Panel.

## [Anglers Survey Summary Report](#)

Summarizes results of the baseline survey conducted amongst recreational anglers to better understand the perceptions, behaviors, and motivators of anglers related to AIS movement in Minnesota.

## [Shoreline Residents Survey Report](#)

Summarizes results of the baseline survey conducted amongst shoreline residents to better understand the perceptions, behaviors, and motivators of shoreline residents related to the movement of used/pre-owned water-related equipment that could harbor AIS.

## [Aquarium and Aquatic Plant Trade Working Session Report](#)

Summarizes results of a working session held for representatives of the aquarium and aquatic plant retail trade to better understand practices, perspectives and motivators related to AIS movement in Minnesota.

## [Barrier and Benefit Matrix](#)

Summarizes the barriers and benefits associated with the target behaviors, as reported by participants in the quantitative and qualitative research conducted. Possible strategies are also identified.

## [AIS Behavior Change Design Workshop Summary](#)

Summarizes the workshop process and the ideas generated for each of the selected AIS behaviors.