# Minnesota Department of Natural Resources Aquatic Invasive Species Community-Based Social Marketing Project

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

## Shoreline Survey Summary Report

August 12, 2019

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.

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# Executive Summary

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.

DNR is undertaking an Aquatic Invasive Species (AIS) Community-Based Social Marketing (CBSM) project to apply behavioral psychology techniques to address the human behaviors that contribute to the introduction and spread of AIS in Minnesota waters. As part of the project, a survey was conducted with shoreline residents to better understanding the perceptions, behaviors, and motivators related to the movement of used/pre-owned water-related equipment that could harbor AIS. These items 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.

The survey was distributed online through the Minnesota Lakes and Rivers Advocates via email to more than 500 Lakes and Rivers Associations. A total of 1,737 respondents completed the survey.

### 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 which 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 much of it has not moved from one body of water to another. 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 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 were 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 CBSM theory, which describes the gap between attitude and behavior. The survey results indicate that shoreline residents have the correct attitude, but it too often does not transfer to performing the relevant behavior.

When asked what may prevent them from performing the correct 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 correct behavior included environmental protection, preventing AIS spread, and abiding by regulations (and not being fined). Other motivators included keeping equipment well-maintained and that others maintained their equipment.

### 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 DNR is a trusted source, and they do visit public landings, and they could also be trained to 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 continue to be part of communications, but existing networks and face-to-face communications is preferred.

### Next Steps

Strong attitudes and awareness are a solid foundation for a successful behavior change program because they are often the hardest elements to foster. Still, strong positive attitudes and awareness are not sufficient on their own to drive change. Applying behavioral change strategies can leverage a strong foundation to target the desired behaviors, achieving action more consistently and by more people.

The second phase of this project will focus on development of strategies to foster target behaviors, as well as implementation and evaluation of those strategies. The DNR will use the results to promote adoption of desirable AIS prevention behaviors and create positive social norms around aquatic invasive species prevention in Minnesota.

# Introduction

## 1.1. 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, AZENTIVE, LLC and Beyond Attitude Consulting were 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 the human behaviors that contribute to the introduction and spread of AIS in Minnesota waters.

The project is being delivered in two phases: the first phase is focused on the identification and prioritization of behaviors to target to most effectively manage AIS in Minnesota, and on the identification of the barriers and benefits to one or more of those target behaviors. The second phase will focus on development of strategies to foster target behaviors, and the implementation and evaluation of those strategies. The DNR will use the results to promote adoption of desirable AIS prevention behaviors and create positive social norms around AIS prevention.

## 1.2. Purpose of the Shoreline Residents Survey

The shoreline residents survey was conducted to gather information that will inform the development of a CBSM strategy to nurture behaviors that will prevent the introduction and spread of aquatic invasive species. The behaviors are related to the movement of used/pre-owned water-related equipment that could harbor AIS. Water-related equipment refers to docks, lifts, swim platforms and other equipment that typically stay in the water through the spring, summer, and fall. These items 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.

An international panel of AIS experts was convened to provide advice on the risks associated with moving water-related equipment, as well as to identify the most effective behaviors shoreline residents could take to interrupt AIS pathways related to the movement of equipment in Minnesota lakes and rivers. The behaviors the expert panel identified, and also corroborated by the project literature review, are to:

- Look for and remove visible debris on the equipment.
- Pressure-wash the equipment.

- Rinse the equipment with hot water.
- Air dry the equipment for 21 days.

In particular, the survey research is intended to:

- Build an understanding and establish a baseline of current behaviors related to purchasing, selling, or moving shoreline equipment.
- Gauge awareness and attitudes levels of shoreline residents related to AIS, their movement, and prevention steps, as well as of risks, responsibilities, and regulations.
- Identify actual and perceived barriers to engaging in desired behaviors.
- Gauge willingness or acceptance of modifying behaviors to reduce the spread of AIS.
- Understand incentives and motivators to foster desired behaviors that reduce the risk of spreading AIS.
- Understand communication and engagement preferences including both preferred communication channels and trusted messengers.

## 1.3. Research Method

The 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 Lakes and Rivers 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 surveys from start to finish.

If this was a random sample determined through a random telephone number dialing system, the survey results would have a confidence interval of +/-2.3 at a confidence level of 95%. In other words, if this survey was administered to a random sample 20 times, 19 of those surveys would have results within plus or minus 2.3% of the responses to this survey. Since it was an online survey distributed by numerous associations, the statistical significance cannot be accurately calculated, and the numbers above are for guidance only.

Several survey design methods were used to reduce bias in the data gathered. To encourage respondents to be comfortable taking the survey, the survey avoided sensitive questions that they might not want to answer. In addition, shoreline residents were told the importance of the survey in helping to inform the design of a program that would help protect their lake or river. Participants were also assured that the survey software was protecting anonymity by not collecting any personal data such as location that could identify them. To assist in the ability of respondents to accurately recall information, the participants were asked to think about the 2018 calendar year when formulating their responses.

## 1.4. Purpose of the Summary Report

This report provides a summary of survey responses, including frequency charts, analysis of findings, and highlights of interesting data arising from the analysis. In particular, CBSM-related findings are reported, including barriers, motivators and predictors, level of knowledge and awareness, communication channels, and reported behavior, as a baseline.

# Awareness and Attitudes

## 1.5. Overview

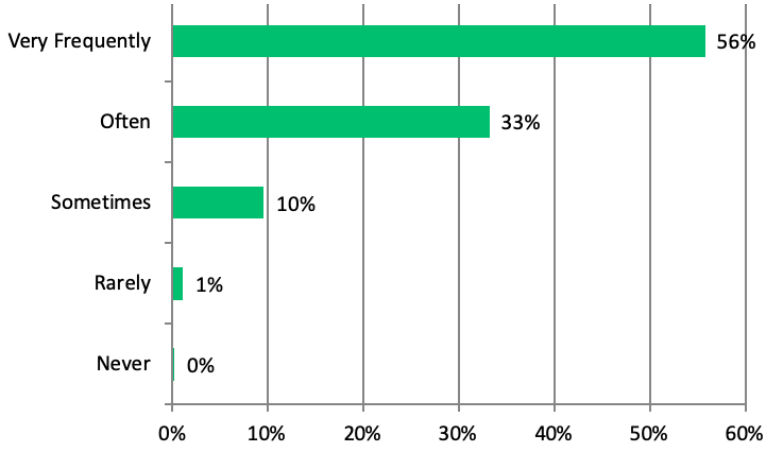
While CBSM teaches us that awareness and attitude does not translate into behavior, it is still important that people have a strong awareness of issues and the appropriate attitude about it. For shoreline residents, it is important that they understand the risks presented by AIS and the laws and regulations that apply. They should also believe that it is important that they not take actions that could introduce or spread invasive species, and that they should make efforts to prevent the introduction and spread. The behavioral psychology that is employed through CBSM is much more likely to be effective if shoreline residents have the desired mindset about AIS and are ready to take action.

## 1.6. Awareness and Attitude Findings

The survey tested awareness and attitudes by asking respondents about how often they have seen information on AIS, how knowledgeable they were about relevant laws and regulations, and their attitudes to a series of AIS related issues.

Almost all respondents have heard or read about AIS, with 89% reporting they had heard about it often or very frequently (Q3). This is an encouraging finding as it shows that people already know about the issue, and that past and current communications efforts are reaching the target audience.

*Figure 1: Q3. Prior to taking this survey, how often have you heard, seen, or read information about aquatic invasive species?*




A majority of respondents (55%) report being only moderately knowledgeable, somewhat knowledgeable, or not at all knowledgeable about their responsibilities related to AIS regulations (Q6). While it is encouraging that 46% indicated they were either very or extremely knowledgeable, there is room for improvement in education about legal requirements. This is especially true considering that knowing that it is illegal to transport AIS and knowing there is a fine associated with doing so were identified as significant motivators for taking proper action to prevent the spread of AIS *(FIGURE 13: Q27. WHAT WOULD MOTIVATE YOU TO REMOVE VISIBLE DEBRIS, WASH WITH HIGH PRESSURE, RINSE WITH HOT WATER, AND/OR AIR-DRY EQUIPMENT?)*

To further explore reported knowledge levels on activities that can contribute to the spread of aquatic invasive species, respondents completed a knowledge testing quiz. In the table below, green behaviors (the top 5) contribute to the spread of aquatic invasive species while orange (the bottom 3) do not.

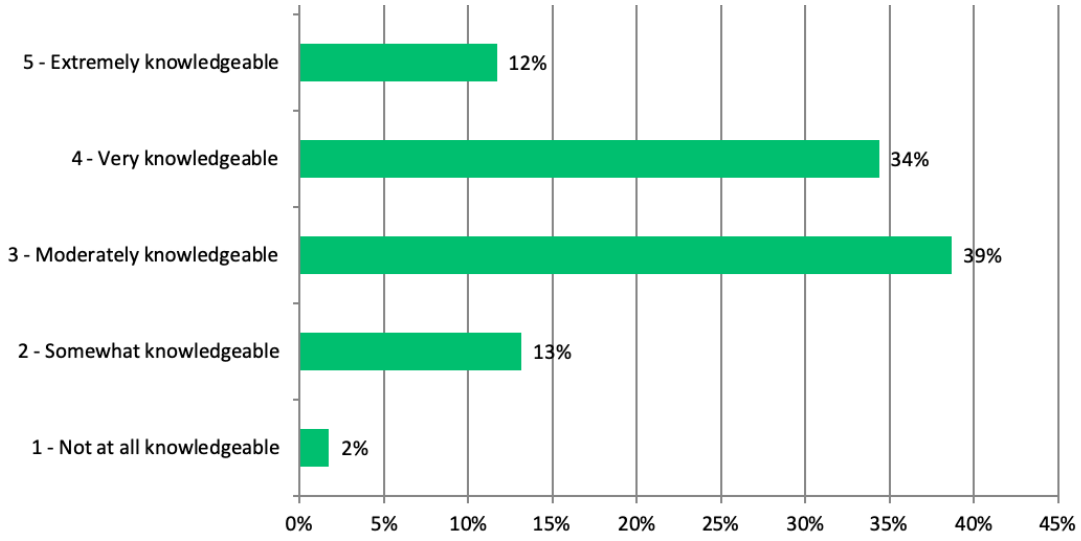
Respondents were asked to identify which of eight provided activities contribute to the spread of aquatic invasive species. The highest correct responses are associated with the movement of boats from one body of water to another (98% correct) and the movement of docks, boat lifts, and other equipment from one body of water to another (94% correct).

Only 61% of respondents indicated that using fishing gear and equipment in more than one body of water could contribute to the spread of invasive species, and 67% understood that releasing unwanted aquarium fish into lakes and rivers was a risk. Similarly, pets and other animals swimming in waters with aquatic invasive species, score low (15% selected) as a perceived contributor to invasive species.

*Table 1: Q7. Which of the following activities do you think contribute to the spread of aquatic invasive species?*

| Answer Choice | Correct Answer | Responses |
|---|---|---|
| Moving boats from one body of water to another | True | 98% |
| Moving docks, boat lifts, or other equipment from one body of water to another | True | 94% |
| Releasing unused live bait when fishing | True | 67% |
| Releasing unwanted aquarium fish into lakes or rivers | True | 74% |
| Using fishing gear and equipment (e.g. tackle, waders, etc.) in more than one body of water | True | 61% |
| Pets and other animals swimming in waters that contain aquatic invasive species | False | 19% |
| Keeping a boat in the water when not in use | False | 15% |
| People swimming in waters that contain invasive species | False | 7% |

*Figure 2: Q6. How knowledgeable are you about the laws and regulations related to aquatic invasive species?*




The knowledge test shows that there is a gap between respondents' perceived expertise and application of knowledge. This may be related to how heavily specific behaviors have been promoted. Ideally, 100% of respondents would select the green choices and 0% would select the orange responses. Since that did not happen, there is room for improvement on communicating how invasive species spread.

Increasing the awareness of shoreline residents regarding their legal requirements should be a goal of communications efforts, as it is likely to foster greater adoption of actions to prevent the spread of AIS.

Six out of 10 respondents (60%) indicated that there are invasive species in the lake or river that borders their property (Q4). One in three respondents (33%) indicated that there were no invasive species in the lake or river where they lived. This may indicate a bias whereby people who are concerned about invasive species that are present in their waterbody were more likely to take the survey.

*Table 2: Q4. Are aquatic invasive species present in the lake or river where you own or rent property?*

| Answer Choices | Responses |
|---|---|
| Yes | 60% |
| No | 33% |
| Don't know | 8% |

A cross-reference analysis was conducted to determine if there was a difference in the attitude and awareness between people with invasive species present at their properties and those who did not. In other words, did the presence of invasive species result in people being more aware of AIS and have an effect on their attitude? The analysis indicates there is little difference. This may be because knowledge about the risks and impacts of AIS is so high that people who don't have them are just as concerned about the prospect of their introduction as those who are concerned about the current impact where they are present.

## 1.7. Human Behavior and AIS

Shoreline residents report being concerned about AIS and clearly associate human activity with the risk of spreading AIS. They also report that taking action to prevent the spread is the right thing to do. Less than 5% of respondents disagree.

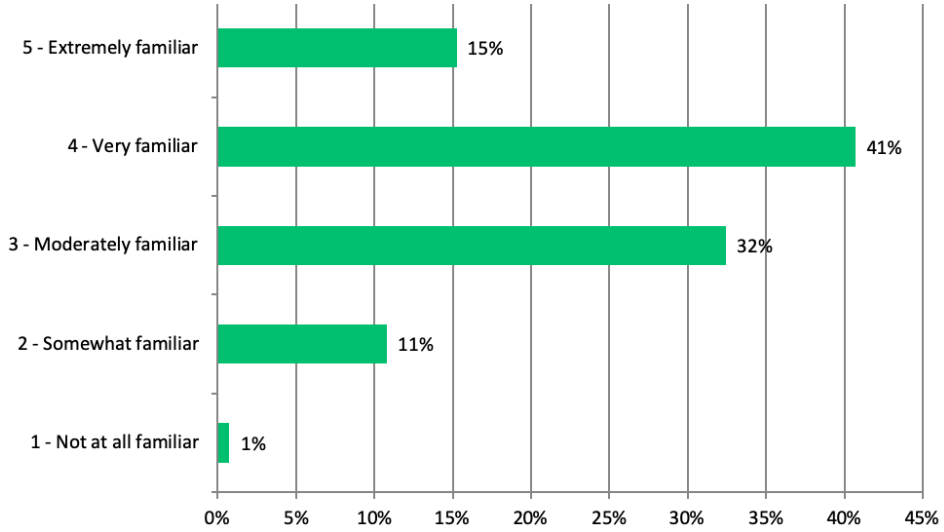
*Table 3: Q5. How strongly do you agree with each of the following statements?*

| Answer Choices | 1 Strongly Disagree | 2 Disagree | 3 Neither Disagree or Agree | 4 Agree | 5 Strongly Agree | N/A |
|---|---|---|---|---|---|---|
| I am concerned about aquatic invasive species in Minnesota | 3% | 0% | 1% | 13% | 83% | 0% |
| Individuals are contributing to the spread of aquatic invasive species | 3% | 0% | 2% | 22% | 73% | 0% |
| Individuals have a role to play in preventing the spread of aquatic invasive species | 2% | 0% | 1% | 15% | 81% | 0% |
| People I know are helping to prevent the spread of aquatic invasive species | 2% | 3% | 11% | 32% | 50% | 2% |
| Preventing the spread of aquatic invasive species is the right thing to do | 2% | 0% | 1% | 10% | 86% | 1% |

The fact that shoreline residents readily link human behavior to both the problem (i.e. the spread of AIS) and the solution (i.e. taking action to prevent the spread of AIS) creates an opportunity. Current communication efforts have been effective in establishing this link among survey respondents, providing a fertile ground for a CBSM program to foster preventative measures and solidify the necessary social norms to prevent further spread of AIS through shoreline resident behaviors.

Still, Figure 4 below indicates that there is room for improvement on awareness of the exact preventive measures for shoreline residents to take.

*Figure 3: Q8. How familiar are you with actions you can take to prevent the spread of aquatic invasive species?*




## 1.8. Awareness and Attitude Findings

A majority of shoreline residents report high awareness and attitude levels, a strong foundation for a behavior change program. However, there is room for improvement on awareness of the actions that can be taken to stop the spread of invasive species, with 44% of respondents indicating that they are only moderately or somewhat familiar with what they can do. There is also room for improvement on knowing the legal implications of not following best practices and transporting AIS.

The findings in this section, based on the answers of the respondents, indicate that:

1. Shoreline residents are well-aware of invasive species and the risks associated with them.
2. Shoreline residents believe that human activity can spread invasive species, and people have a role in preventing the spread.
3. More people need to become familiar with the necessary actions to stop the spread of invasive species.
4. Shoreline residents may be more motivated to take appropriate action if they knew more about relevant regulations.

# Lake Service Providers

Lake Service Providers are people and organizations in Minnesota that provide service related to equipment and structures related to water. The following definition is from the Minnesota Department of Natural Resources website:

A Service Provider is:
(1) an individual who or entity that: decontaminates, installs, or removes water-related equipment or structures into or from waters of the state for hire or as a service provided as a benefit of membership in a yacht club, boat club, marina, or similar organization; or

(2) an individual who or entity that: rents or leases water-related equipment that will be used in, placed into, or removed from waters of the state. Service provider does not include a person working under the supervision of an individual with a valid service provider permit issued under section Minn. Stat. § 84D.108.

Water-related equipment
Water-related equipment - as defined in state law means a motor vehicle, boat, watercraft, dock, boat lift, raft, vessel, trailer, tool, implement, device, or any other associated equipment or container, including but not limited to portable bait containers, live wells, ballast tanks (except those with a Minnesota Pollution Control Agency permit), bilge areas, and water-hauling equipment that is capable of containing or transporting AIS, aquatic macrophytes (plants), or water.

Lake Service Providers (LSPs) can and do play an important role in stopping the spread of invasive species in Minnesota waters. For instance:

- Many are knowledgeable about risks of invasive species and how to mitigate their spread;
- They are trained on best practices to prevent the spread of AIS and decontaminate water-related equipment, including AIS laws and best practices; and
- Some have the necessary equipment to provide hot-water, high-pressure decontamination of water-related equipment.

LSPs can provide a way for shoreline residents to overcome the barriers they face in removing invasive species from equipment.

While most (60%) of survey respondents indicated they were aware that LSPs were trained and certified by the Minnesota DNR, 40% were unaware or unsure (Q9). The survey provided context for respondents prior to asking Q9:

"Minnesota has a training and permitting program to help Lake Service Provider Businesses prevent the spread of invasive species. Lake Service Providers are businesses that:
1) Decontaminate, install, or remove water-related equipment or structures in or from waters of the state, or
2) Rent/lease water-related equipment that will be used in, placed into, or removed from waters of the state."

*Table 4: Q9. Prior to taking this survey, were you aware that Lake Service Providers must be trained and permitted in Minnesota?*

| Answer Choices | Responses |
|---|---|
| Yes | 60% |
| No | 35% |
| Don't know | 6% |

As can be seen in *FIGURE 2: Q6. HOW KNOWLEDGEABLE ARE YOU ABOUT THE LAWS AND REGULATIONS RELATED TO AQUATIC INVASIVE SPECIES?* more than half of respondents feel they are moderately knowledgeable or less about invasive species regulations. Further, as demonstrated in *FIGURE 4: Q8. HOW FAMILIAR ARE YOU WITH ACTIONS YOU CAN TAKE TO PREVENT THE SPREAD OF AQUATIC INVASIVE SPECIES?*, 44% are moderately familiar or less with the actions they can take to prevent the spread of AIS.

The findings in this section based on the answers of the respondents indicate that:

- For the LSP program to be most effective, it is important that shoreline residents are aware of the LSPs and understand the services that LSPs provide.
- Knowing that LSPs are required to complete AIS training and obtain a permit and that a list of permitted LSPs is available on the DNR website, may convince more shoreline residents to hire permitted businesses or to check with their LSP to make sure they are permitted.
- Knowing that LSPs have undergone AIS training and have a permit from DNR may convince more shoreline residents to hire them more often. Therefore, shoreline residents who report uncertainty about their obligations or abilities may feel more at ease with the assistance and knowledge of LSPs when moving water-related equipment.

# Water-Related Equipment

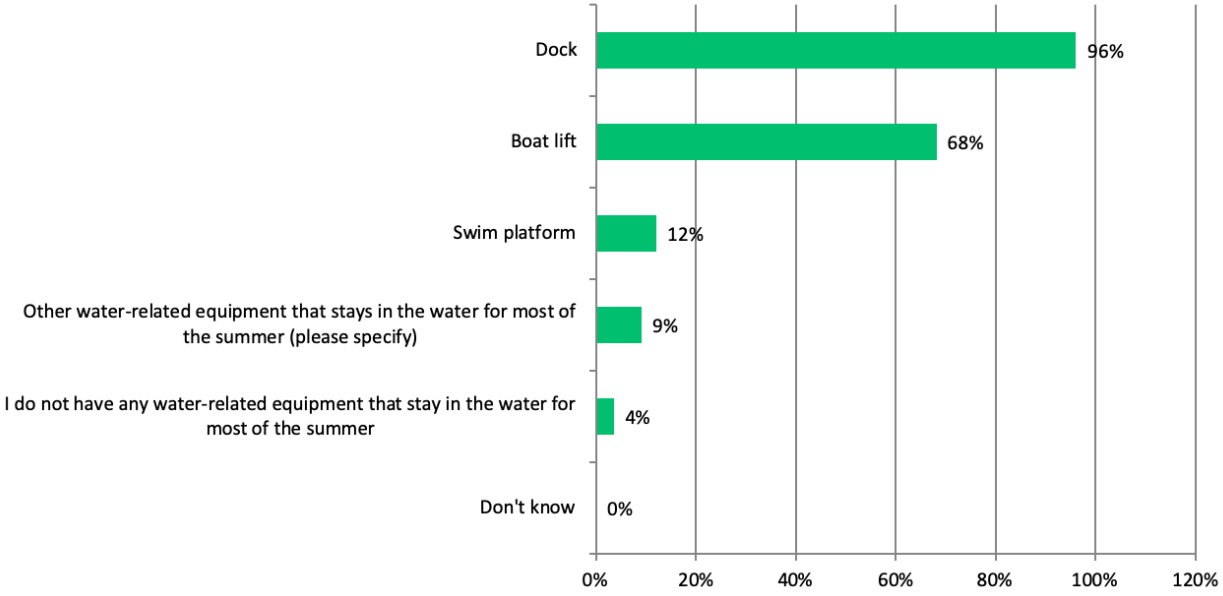
The survey sought to determine the water-related equipment that shoreline residents have on their properties, and what activities surrounded the buying and selling of the equipment. Of particular interest was how buyers and sellers came to know each other, how the equipment was transferred, and what actions were taken to prevent the spread of AIS.

## 1.9. Presence of Water-Related Equipment

By far, docks and boat lifts were identified most often by respondents. Almost all (96%) own docks and 68% own boat lifts. Swim platforms were owned by 12% of respondents. Under the other category, most entries were a type of boat (although the question excluded boats), but several people pointed out that they had weed rollers and pumps in the lake all summer. Each

are potential pathways for the movement of AIS if they are transferred from one lake to another.

*Figure 4: Q10. What water-related equipment (boats not included) at your property stays in the water for most of the summer?*




## 1.10. Trade in Water-Related Equipment

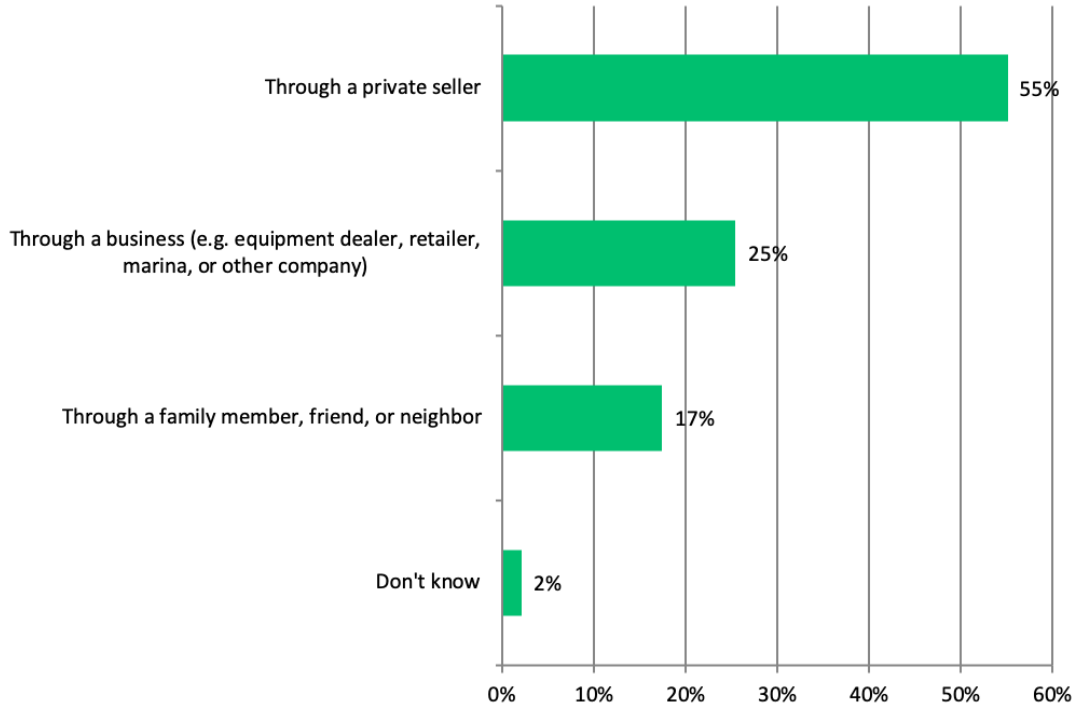
Of those people reporting at least one piece of water-related equipment (1674 of 1737), 28% indicated that they owned equipment that had been previously owned by someone else (Q11). Much of that equipment was purchased with the property, and many of those purchases were made many years ago. There is more detail on transactions in the section on reported AIS prevention behaviors taken.

*Table 5: Q11. Was any of the water-related equipment in the previous question owned by someone else before you owned it?*

| Answer Choices | Responses |
|---|---|
| Yes | 28% |
| No | 71% |
| Don't know | 1% |

Respondents were asked from where they acquired the equipment (Q12). More than half (55%) were from a private seller, 25% was acquired through a business, and 17% indicated it was from a family member.

*Figure 5: Q12. Where did you acquire the pre-owned dock, lift, and/or other equipment?*




In only 3% of the cases, the buyer reported knowing that the seller was an LSP (Q13). In the majority of cases (78% of the time), the buyer reported that the person they were dealing with was not an LSP. The results indicate that sellers of previously-owned water-related equipment are usually not an LSP.

*Table 6: Q13. Was the person you acquired the equipment from a permitted Lake Service Provider?*

| Answer Choices | Responses |
|---|---|
| Yes | 3% |
| No | 78% |
| Don't know | 19% |

Of the 123 buyers surveyed, they report knowing their sellers personally (29%), responding to a print ad (19%) or an online ad such as Craigslist or Facebook (11%), and finding it through a roadside "for sale" sign (7%) (Q14). The other categories included 23% (n=28) that reported buying from a marina or business.

These results suggest that the transaction in which previously-owned equipment is acquired does not include an LSP most of the time. However, there is still an opportunity for LSPs to be contracted to move the equipment and/or to decontaminate it when required.

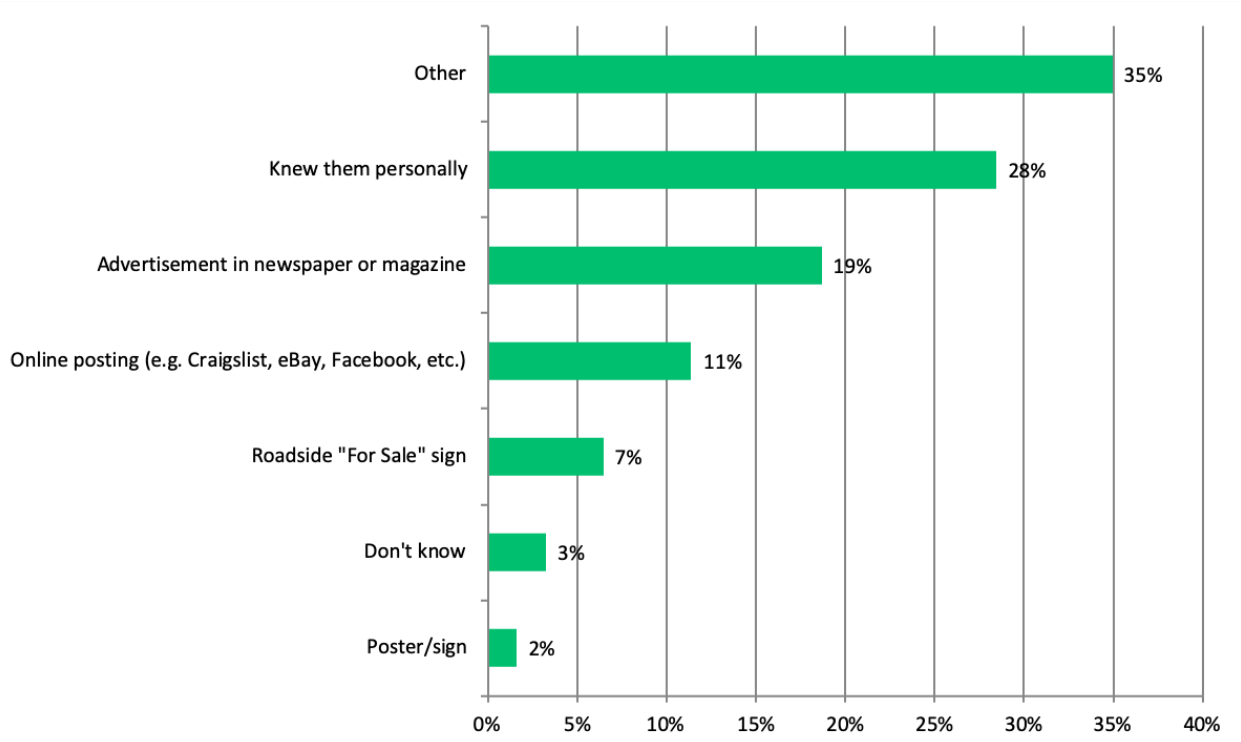



*Figure 6: Q14. Where did you find the person from whom you acquired the dock, lift, and/or other equipment from?*

## 1.11. LSP Services for Moving/Decontaminating Equipment

In more than one-third (38%) of the cases where people acquired a pre-owned piece of equipment, a third-party was enlisted to move it (Q15). In half (47%) of those instances, the third party was a permitted LSP (Q16).

*Table 7: Q15. Did you use the assistance of a third party (e.g. business, private individual) to move the dock, lift, and/or other equipment?*

| Answer Choices | Responses |
|---|---|
| Yes | 37% |
| No | 62% |
| Don't know | 1% |

*Table 8: Q16. Was the third party a permitted Lake Service Provider?*

| Answer Choices | Responses |
|---|---|
| Yes | 48% |
| No | 16% |
| Don't know | 36% |

There are many possible scenarios whereby people could be moving water-related equipment around that does not include an LSP. They could be moving equipment within a body of water, perhaps between neighbors or friends, without even taking it out of the water. In other cases, people could be transporting equipment themselves or with the help of a friend with a truck. They could have hired the services of someone who is not an LSP or that they were not aware was an LSP. However, the movement of the equipment is done, there is a potential gap in preventing the spread of AIS when people are moving equipment from one body of water to another.

The findings in this section based on the answers of the respondents indicate that:

- Most people report that they do not have a strong knowledge of regulations *FIGURE 2: Q6. HOW KNOWLEDGEABLE ARE YOU ABOUT THE LAWS AND REGULATIONS RELATED TO AQUATIC INVASIVE SPECIES?,* and therefore may not understand the requirement to remove attached AIS (sometimes through decontamination) and to let the equipment dry for 21 days before putting in a new body of water.
- Most previously-owned equipment transactions and movements do not include an LSP.

This does not mean that all equipment is being moved around from lake to lake without being cleaned and dried. People could be taking the proper steps themselves to prevent the spread of AIS. And in many cases the transfer of equipment to one owner to another does not involve moving the equipment between lakes. However, there is a risk that people are not taking the necessary steps to clean and dry equipment when they should be, and as a result are acting as a conduit for AIS.

To assess this potential pathway, the survey sought to determine which preventative actions were taken and by whom. The results are included in the next section.

# Behaviors

Respondents purchasing water-related equipment were asked if particular actions to prevent the spread of AIS were taken when they acquired water-related equipment from a third-party.

The particular actions to prevent the spread of AIS were identified by an expert panel as the most effective measures people can take to prevent the spread of AIS when moving water-related equipment (and corroborated in the literature review). The survey asked if a buyer, seller, or third-party took each of the following actions:

- Inspecting and removing visible debris (required by law);
- Rinsing with hot water;
- Scraping the equipment to remove visible debris;
- Washing with high pressure water; and,
- Allowing the equipment to air dry for 21 days (required by law).

Almost 3 in 4 respondents (73%) indicated that visible debris was removed from equipment they acquired, with the majority (53%) indicating that they did it themselves. And 71% indicated that the equipment was allowed to dry for 21 days, usually by themselves (43%) or by the seller (23%).

Other recommended best practices were not taken up as often. Hot water was known to be used to rinse the equipment only 16% of the time. The equipment was scraped to remove AIS and visible debris less than half the time (45%), and only 28% of the time was the equipment known to be pressure washed. The survey only addressed whether or not the washing/scraping behaviors were reported to occur, it did not address whether or not washing/scraping was necessary. Sometimes inspecting/removing and drying actions are sufficient to remove/kill AIS and in those cases, washing/scraping behaviors are recommended as a precaution.

*Table 9: Q17. When you purchased the dock, lift, and/or other equipment, which of the following steps were taken? Please indicate who took which steps.*

| Answer Choices | I did it | The seller did it | A third party did it | It was not done | I don't know if it was done |
|---|---|---|---|---|---|
| Inspected and removed any visible debris | 53% | 15% | 5% | 9% | 18% |
| Rinsed with hot water | 9% | 5% | 2% | 46% | 38% |
| Scraped to remove any attached aquatic invasive species and visible debris | 33% | 9% | 3% | 27% | 29% |
| Pressure washed to remove any attached aquatic invasive species and visible debris | 19% | 7% | 3% | 39% | 33% |

| Answer Choices | I did it | The seller did it | A third party did it | It was not done | I don't know if it was done |
|---|---|---|---|---|---|
| Air dried for at least 21 days | 43% | 23% | 4% | 13% | 16% |

For each of these actions, a considerable number of respondents – approximately one third – indicated that they did not know if the preventative actions were taken, meaning that the actions may or may not have been taken.

In the comments section, 29 respondents indicated that it was not necessary to take the actions that were listed because the equipment came with the property they purchased, or they purchased it from someone who had it in the same lake. Several others indicated that they bought it many years ago (12 or more) before AIS were present. A small number of commenters also pointed out that equipment was purchased after it sat out of the water all winter.

The high rate of not knowing if AIS prevention actions were taken when purchasing water-related equipment provides a potential pathway for AIS movement. People placing equipment in the water should know if the proper procedures have been taken to ensure the equipment is free of invasive species. The findings in this section based on the answers of the respondents indicate that there is room for further awareness, engagement at the point of private sale, and reinforcement of the proper actions.

# Barriers and Motivators

To assess the barriers and benefits related to the movement of equipment, respondents were asked how likely they would take the actions (Q22) of:

- Inspecting and removing visible debris.
- Rinsing with hot water.
- Scraping the equipment to remove visible debris.
- Washing with high pressure water.
- Allowing the equipment to air dry for 21 days.

For each of the actions above, respondents were also asked what would prevent them from taking the actions, and what would motivate them (Q23).

As can be seen in Table 4 below, respondents reported a general willingness to undertake each of the actions listed to prevent the spread of AIS. In fact, other than rinsing with hot water, about 95% of respondents reported they were willing to take each of the actions. In the case of rinsing with hot water, 84% were willing. It is likely that these figures are inflated

as respondents know that these are actions, they should be taking. In addition, respondents have been primed to the right actions to take in the previous survey questions.

*Table 10: Q22.If you were going to move used/pre-owned equipment (a dock, boat lift, and/or other piece of equipment that stays in the water) to your property from another property, please indicate how willing you would be to do each of the following.*

| Answer Choices | Not at all willing | Hardly willing | Somewhat willing | Very willing | Extremely willing | N/A |
|---|---|---|---|---|---|---|
| Inspect and remove visible debris | 0% | 0% | 1% | 18% | 79% | 1% |
| Rinse with hot water | 6% | 10% | 19% | 16% | 44% | 4% |
| Scrape to remove visible debris | 1% | 2% | 9% | 24% | 63% | 2% |
| Wash with high pressure | 2% | 3% | 13% | 20% | 60% | 2% |
| Air dry for 21 days | 2% | 3% | 11% | 16% | 65% | 2% |

## 1.12. Remove Visible Debris

In addition to being reported as the behavior taken most often, the expert panel categorized removing visible debris as the simplest behavior recommended for water-related equipment. It involves looking at the equipment and removing anything attached to it that shouldn't be attached.

Most respondents (71%) reported no barriers to removing visible debris (Q23). However, lack of tools/equipment was cited by 11% of respondents. Difficulty in maneuvering or accessing the equipment was mentioned by 13%, where 7% said it was difficult and 8% reported they were physically unable to do it. For heavy equipment like a dock, it may indeed be difficult for anybody to get to some of the debris underneath it. Those respondents who chose other often reworded one of the listed responses, such as "I would do it" or "the marina would do it" (i.e., nothing), or "I am unable to reach some areas" or "too heavy" (i.e., It is difficult to do) consistent with the selected barriers.

Only 2% felt it was unnecessary to remove visible debris, which confirms the findings that respondents are aware of concerned about spreading AIS. In the other category, respondents indicated that keeping the dock on the same lake would not require pressure washing or that the equipment has been air dried for 21 days or more. Some also noted in the other category that they would not buy equipment from an infested lake, or that their lake is not infested.

*Table 11: Q23. What would prevent you from removing visible debris before selling or installing used/pre-owned equipment?*

| Answer Choices | Responses |
|---|---|
| Nothing | 71% |
| It is difficult to maneuver or access under the equipment | 13% |
| I don't have the tools/equipment I need | 10% |
| I am not physically able | 8% |
| It is difficult to do so | 7% |
| Other | 4% |
| It takes too much time | 3% |
| I don't know how | 3% |
| I don't think there is a need to | 2% |

## 1.13. Washing with High Pressure

This recommended action involves using a pressure washer to remove material attached to the water-related equipment. Washing with high pressure water can remove more firmly attached AIS like zebra mussels, which will not likely be easily removed by picking visible debris off by hand.

Most respondents (64%) reported nothing would prevent them from washing equipment with high pressure (Q24). This is down slightly from when the question was asked about removing visible debris. The main barrier reported was not having the necessary tools to pressure wash, which was cited by 27% of respondents. Similar to the responses regarding moving visible debris, 8% of respondents said it was difficult to maneuver the equipment to pressure wash underneath it.

The responses in the other category were very similar to the responses to the removing visible debris action above.

*Table 12: Q24. What would prevent you from washing with high pressure before selling or installing used/pre-owned equipment? Please select all that apply.*

| Answer Choices | Responses |
|---|---|
| Nothing | 64% |

| Answer Choices | Responses |
|---|---|
| I don't have the equipment I need | 27% |
| It is difficult to maneuver or access under the equipment | 8% |
| Other (please specify) | 4% |
| It is difficult to do so | 4% |
| I don't know how | 2% |
| I don't think there is a need to | 2% |
| It takes too much time | 1% |
| I do not have the space | 1% |
| It would damage my equipment | 0% |

## 1.14. Rinsing with Hot Water

This recommended procedure involves using hot water to rinse the water-related equipment. The hot water will kill many invasive species that may not be removed by hand picking and pressure washing alone.

Respondents were much more likely to identify barriers to rinsing with hot water than other behaviors (Q25). Less than half (44%) reported nothing would prevent them from taking this action, and 37% reported they did not have the tools necessary to rinse with hot water. Again, respondents reported it was too difficult (14%), and 8% indicated it was difficult to maneuver under the equipment.

The other categories include numerous responses that there is no access to hot water at the shoreline. Another theme was that air drying for 21 days "kills the little critters", rendering hot water rinse unnecessary. Finally, several respondents noted that washing with hot water doesn't stop the spread of AIS, and some even said it was wasteful. One interesting comment was that the buyer was responsible to take the action, not the seller.

*Table 13: Q25. What would prevent you from rinsing used/pre-owned equipment with hot water before selling or installing it?*

| Answer Choices | Responses |
|---|---|
| Nothing | 44% |
| I don't have the equipment I need | 37% |

| Answer Choices | Responses |
|---|---|
| It is difficult to do so | 14% |
| It is difficult to maneuver or access under the equipment | 8% |
| Other | 7% |
| I don't think there is a need to | 3% |
| It takes too much time | 2% |
| I don't know how | 2% |
| I do not have the space | 1% |
| It would damage my equipment | 0% |

## 1.15. Air Drying for 21 Days

It is recommended by the expert panel, and required by law, that used/pre-owned water-related equipment be allowed to air dry for 21 days before being placed in another body of water. The drying will kill many of the invasive species that could be on the equipment.

Many respondents (72%) said nothing would stop them from allowing equipment to dry for 21 days. However, 7% said it took too long and 7% said they did not have the space to store it for 21 days (Q25).

Time pressure that could be part of a transaction was cited as a barrier, as 15% of respondents said the buyer wanting it right away would be an issue and 9% said they would want to use it right away if they were acquiring it.

The comments in the other category were similar to the previous two questions with a small portion reporting this an unnecessary step (sometimes because they are moving equipment within the same lake).

*Table 14 - Q26. What would prevent you from air drying for 21 days before selling or installing used/pre-owned equipment?*

| Answer Choices | Responses |
|---|---|
| Nothing | 72% |
| My buyer wanting it right away | 15% |
| I want to use it right away | 8% |

| Answer Choices | Responses |
|---|---|
| It takes too much time | 7% |
| I do not have a location to store for 21 days | 7% |
| Other | 4% |
| I don’t think there is a need to | 2% |
| I don't know how | 1% |
| It is too difficult to do so | 1% |

Many are not aware of the 21-day drying requirement, with slightly less than half reporting that they were (Q28). That is a significant barrier to performing the action.

*Table 15: Q28. Did you know that Minnesota law requires docks and boat lifts to be out of the water for at least 21 days before putting them in another lake or river?*

| Answer Choices | Responses |
|---|---|
| Yes | 49% |
| No | 46% |
| Unsure | 5% |

## 1.16. Motivators

Respondents were asked what would motivate them to take the preventative actions detailed in the barriers section (Q27).

Knowing they were doing the right thing, by preventing the spread of AIS (89%) and knowing they were making a positive impact on their community and the environment (72%) were the most common reported motivators.

Deterrence was a large factor, with 67% stating that they would take proper action because it was illegal to transport AIS and 57% saying it was because they could be fined.

Knowing that LSPs can provide the service was cited by 37% of respondents. Other motivators were that it is good maintenance for their equipment (46%) and knowing that other people clean and dry their equipment (23%). The latter is an example of the effect of social norms, where people feel they should take action because their peers are.

*Table 16: Q27. What would motivate you to remove visible debris, wash with high pressure, rinse with hot water, and/or air-dry equipment?*

| Answer Choices | Responses |
|---|---|
| Knowing that I am helping to prevent the spread of aquatic invasive species | 90% |
| Knowing that I am making a positive impact on my community and the environment | 72% |
| Knowing that it is illegal to transport or spread aquatic invasive species in Minnesota | 68% |
| Knowing that I could receive a fine for transporting aquatic invasive species | 57% |
| Knowing that it is a good maintenance practice for my equipment | 47% |
| Knowing that some permitted Lake Service Providers can provide this service | 38% |
| Knowing that others clean and dry their equipment | 23% |
| Other | 3% |
| Nothing would motivate me | 2% |

The motivators listed in the responses in the other category include the following common themes:

- Having the right equipment available;
- Not wanting to "be the one" to introduce AIS;
- Concerned about other users introducing AIS;
- Stated misconceptions about how AIS spread;
- Urge that everyone should go above and beyond by conducting all best practices every time; and
- Don't see a need because of infestation status or because the equipment was purchased with the property.

## 1.17. Motivator Findings

Minnesotans have a reputation for doing the right thing for their communities, and it shows up in the motivator findings, with the largest reasons for taking actions being to prevent the spread of AIS and to protect the local community and environment. However, a strong

motivator is also to avoid fines by being compliant with regulations. And, as researchers have found in other jurisdictions, a strong motivator for cleaning equipment is to maintain it properly.

# Sources of Information

Respondents were asked questions that were designed to determine:

- Their current and past sources of information
- How they would prefer to receive information
- Who they trust for information

The information gathered provides insight into which communications channels are currently reaching the most people. More importantly, it provides information on which channels people prefer, which can indicate how best to reach them. Finally, we asked which organizations respondents trust most as sources for information.
With this information, communications efforts can be designed to be most effective for the target audience, using trusted sources of information delivered through preferred communications channels.

## 1.18. Current Communication Channels

Respondents were asked to identify their current sources of information on AIS (Q29).
Lake/home owners associations were by far the most frequently cited source for information (86%). However, the survey was distributed by such organizations to their members, so the result is not surprising. Still, it does indicate that the at least some of the associations are communicating to their members effectively. The large number of associations and the survey anonymity combine to make it difficult to ascertain which responses came from which association's shoreline residents.
Traditional communications channels were also frequently identified as sources of information, including:

- Newspapers/magazines – 63%
- Television news – 56%
- Pamphlets – 56%
- Billboards – 41%

While the internet was identified by 46% of people as a source, social media channels like Twitter and Facebook were cited by 25%. This may be related to the demographics of the target audience, which was 89% 50 years old and greater, or it may be that AIS communications has not penetrated the most effective social media channels.

Interestingly, retail providers are cited by 1 in 5, including bait shops and Lake Service Providers at 20% each. Some have heard about AIS on radio news shows (17%), and a smaller

number hear about it from fishing clubs or organizations (16%). These results may indicate less involvement in these communication channels, or there may be potential to increase communications about AIS, especially through social organizations where trusted messengers can share the right actions to take.

Several commented in the other category about other messengers, such as:

- State and local government agency emails/newsletters
- Universities
- Non-profit organizations

*Table 17: Q29. Over the past year, where have you seen or heard information about aquatic invasive species? Please select all that apply.*

| Answer Choices | Responses |
|---|---|
| From lake/homeowner associations or lake improvement districts | 86% |
| In a newspaper or magazine | 63% |
| In television news stories | 56% |
| In informational pamphlets or resources | 56% |
| On the internet | 46% |
| On billboards | 41% |
| At the lake or river where you fish or boat | 40% |
| In television public service announcements or advertisements | 39% |
| From family, friends, or neighbors | 38% |
| At events (state or local fairs, sport shows) | 26% |
| On social media (Facebook, Twitter, etc.) | 25% |
| On radio news shows | 21% |
| At bait shops | 20% |
| From my Lake Service Provider | 20% |
| On radio advertisements or public service announcements | 17% |
| From fishing clubs or organizations | 16% |
| Other | 5% |

| Answer Choices | Responses |
|---|---|
| I have not seen or heard information about aquatic invasive species | 1% |

## 1.19. Preferred Communication Channels

When asked how they would prefer to receive information, respondents' answers differed only slightly from the current channels (Q30). Lake/home owners associations ranked at the top at 79%, and traditional communications sources like television (39%) and newspapers (37%) were also ranked highly, along with newsletters at 41%.

Interestingly, many people feel information at boat launches (37%), fishing piers and fishing access points (25%) is a preference. This is likely related to shoreline residents that reported wanting to ensure that boaters accessing public launches and anglers accessing public shorelines are taking proper actions to prevent the introduction of AIS into local waters. Social media is preferred by 1 in 4 residents (23%). While social media advertising provides a cost-effective way to gain many impressions, it does not have the reach that would allow it to be the predominate communications channels. It should be part of a mix of communications efforts, but not the only communication effort.

*Table 18: Q30. How do you prefer to receive information?*

| Answer Choices | Responses |
|---|---|
| From lake/homeowner associations or lake improvement districts | 79% |
| Newsletters | 41% |
| Television | 39% |
| Newspaper | 37% |
| At boat launches | 37% |
| Internet search | 32% |
| Direct mail | 26% |
| Radio | 26% |
| At fishing piers and fishing access points | 25% |
| From family, friends, and neighbors | 24% |
| Social media (Facebook, Twitter, etc.) | 23% |
| At bait shops | 21% |
| From my Lake Service Provider | 18% |

| Answer Choices | Responses |
|---|---|
| From fishing clubs or organizations | 12% |
| Other | 4% |
| Library search | 4% |

## 1.20. Trusted Sources on Property and Equipment

Respondents were asked who they trusted for information on property issues like maintenance and equipment (Q31). Again, Lake/home owners associations ranked very high at 91%. Local municipalities and LSPs were also found to be trusted messengers, although by far fewer people.

It is interesting that Lake Service Providers are trusted but are not a current source or preferred source by many most respondents, indicating that most shoreline residents have less contact with LSPs. The other comments often mentioned the DNR, Minnesota AIS Research Center (MAISRC), and local county staff.

*Table 19: Q31. Who do you trust for information about your property, maintenance, and equipment? Please select all that apply.*

| Answer Choices | Responses |
|---|---|
| Lake associations, homeowner associations, or lake improvement districts | 91% |
| My local municipality (county, parks, cities, townships) | 59% |
| Lake Service Providers | 47% |
| Family, friends, or neighbors | 41% |
| Businesses that manufacture and/or sell equipment | 31% |
| Property maintenance companies | 12% |
| Other | 5% |

## 1.21. Trusted Sources on Natural Areas, Water and Invasive Species

When it comes to information on environment, water and invasive species, lake/home owner associations are still most often cited as a trusted source (88%), followed closely behind by Minnesota DNR at 86%. Environmental organizations, local municipalities and universities were also cited by at least half of respondents. The other comments closely matched the current

other comments in Q30 how do you prefer to receive information. MAISRC came up often in the comments.

*Table 20: Q32. Who do you trust for information about natural areas, water, and invasive species? Please select all that apply.*

| Answer Choices | Responses |
|---|---|
| Lake/homeowner associations or lake improvement districts | 88% |
| Minnesota Department of Natural Resources | 86% |
| Environmental organizations | 57% |
| My local municipality (counties, parks, cities, townships) | 52% |
| Universities (including Extension staff) | 50% |
| Lake Service Providers | 34% |
| Family, friends, or neighbors | 32% |
| Federal agencies | 31% |
| Tourism organizations | 9% |
| Other | 3% |

## 1.22. Communications Findings

There are several communications channels that people prefer and trust, in particular the lake/home owner associations, Minnesota DNR, local municipalities, and universities. A collaborative effort with consistent information from the trusted sources delivered through the preferred channels would be the best approach to reaching people and providing the information they need.

From a CBSM perspective, there is an opportunity to gather commitments and develop social norms by combining trusted sources with communications channels that involve face-to-face communications. So as an example, DNR Watercraft Inspectors are in a very good position to not only disseminate information, but to also remove barriers and obtain commitments from shoreline residents and others they may meet when at landings. Similarly, training members of lake associations in behavior change could allow them to be even more effective than they already are. Peer-to-peer relationships are usually very effective in gathering commitments and developing social norms.

# About the Respondents

Over 90% of the shoreline residents responding to the survey are over 50 years old, with approximately one in three being 70 or over (35%) (Q35). Almost two-thirds (64%) of respondents are male. They report owning their property 99% of the time (Q33). Almost all live there full-time (42%), part-time (27%), or visit frequently (24%) (Q34).

*Figure 7: Q35. Which of the following age group would you classify yourself as?*

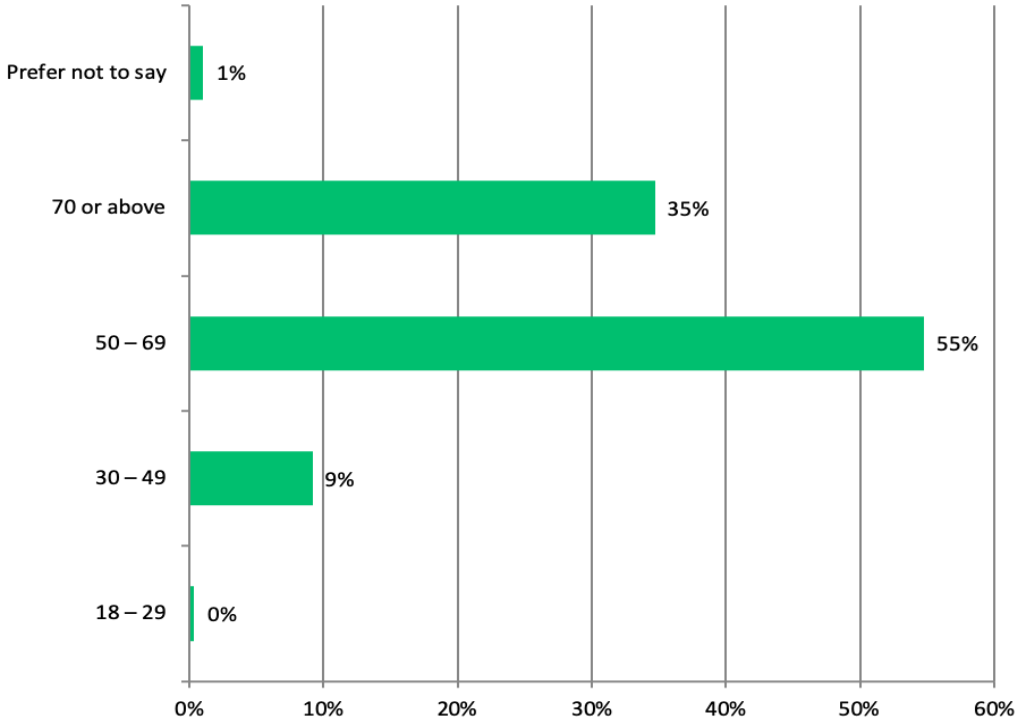



*Table 21: Q34. How much time per year do you spend at the property?*

| Answer Choices | Responses |
|---|---|
| I live there full-time | 42% |
| I live there part-time/seasonally | 27% |
| I visit frequently (10 or more times per year) | 24% |
| I visit occasionally (3 – 9 times per year) | 6% |
| I visit rarely (2 or less times per year) | 1% |
| Other | 1% |

# Key Findings Summary

The following is a summary of key research findings.

## 1.23. Awareness and Attitude

- 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 which could foster increased adoption of best practices.
- Shoreline residents are concerned about the risks associated with AIS.
- Shoreline residents 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.

## 1.24. Trade in 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.
- Most of the equipment 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 equipment being acquired from an LSP.

## 1.25. Moving Previously Owned Water-Related Equipment

- When previously-owned water-related equipment is moved, about 1/3 (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.

## 1.26. Adoption of Preferred Behaviors

- Shoreline residents indicated they were very willing to perform the actions recommended by the expert panel (see *TABLE 10: Q22.IF YOU WERE GOING TO MOVE USED/PRE-OWNED EQUIPMENT (A DOCK, BOAT LIFT, AND/OR OTHER PIECE OF EQUIPMENT THAT STAYS IN THE WATER) TO YOUR PROPERTY FROM ANOTHER PROPERTY, PLEASE INDICATE HOW WILLING YOU WOULD BE TO DO EACH OF THE FOLLOWING.***)**
- However, many of those who described actual transactions, often reported that those same actions were not taken (see *TABLE 9: Q17. WHEN YOU PURCHASED THE DOCK, LIFT, AND/OR OTHER EQUIPMENT, WHICH OF THE FOLLOWING STEPS WERE TAKEN? PLEASE INDICATE WHO TOOK WHICH STEPS.).*

- The difference in intention and action is consistent with CBSM theory, which describes the gap between attitude and behavior. The survey results indicate that shoreline residents have the correct attitude, but it too often does not transfer to performing the relevant behavior.
- When asked what may prevent them from performing the correct 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 correct behavior included environmental protection, preventing AIS spread, and abiding by regulations (and not being fined).
- Other motivators included keeping equipment well-maintained and that others maintained their equipment.

## 1.27. Communications

- 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 DNR is a trusted source, and they do visit public landings, and they could also be trained to 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. It should be part of communications, but existing networks and face-to-face communications is preferred.

# Conclusion

The purpose of the survey was to build an understanding of the perceptions, behaviors, and motivators of shoreline residents related to aquatic invasive species movement in Minnesota. The second phase of this project will focus on development of strategies to foster target behaviors, as well as implementation and evaluation of those strategies. The DNR will use the results to promote adoption of desirable AIS prevention behaviors and create positive social norms around aquatic invasive species prevention in Minnesota.