

---

# Roles of Boating Facilities, Bait Dealers, and Angler and Boating Organizations in Preventing the Spread of Aquatic Invasive Species in the Lake Ontario Basin



**December 2014**

**HDRU Series No 14-12**

---

Prepared by:

Nancy A. Connelly, Ingrid Biedron, and T. Bruce Lauber  
Human Dimensions Research Unit  
Department of Natural Resources  
Cornell University

## HUMAN DIMENSIONS RESEARCH UNIT PUBLICATION SERIES

This publication is one of a series of reports resulting from investigations dealing with public issues in environmental and natural resources management. The Human Dimensions Research Unit (HDRU) in the Department of Natural Resources at Cornell University studies the social and economic aspects of natural resources and the environment and the application of social and economic insights in management planning and policy. A list of HDRU publications may be obtained by accessing our website at: <http://www2.dnr.cornell.edu/hdru/index-2.html>.



### TO CITE THIS REPORT

Connelly, N. A., I. Biedron, and T. B. Lauber. 2014. Roles of Boating Facilities, Bait Dealers, and Angler and Boating Organizations in Preventing the Spread of Aquatic Invasive Species in the Lake Ontario Basin. HDRU Publ. No. 14-12. Dept. of Nat. Resour., Coll. Agric. and Life Sci., Cornell Univ., Ithaca, N.Y. 44pp.

This report is available electronically at:  
<http://www2.dnr.cornell.edu/hdru/pubs/fishpubs.html#plan>

## EXECUTIVE SUMMARY

This report is one component of a larger project, the overall goal of which is to aid in reducing the spread of aquatic invasive species (AIS) in the Great Lakes basin through promotion of safe recreation and resource use. We are doing this by studying how government and nongovernmental organizations operating at the federal, state/provincial, and community level collectively influence the behavior of anglers and boaters with regard to actions that can control the spread of AIS. The objectives of the project are to: (1) characterize the outreach efforts of organizations to discourage behaviors by anglers and boaters that can lead to the spread of AIS; and (2) involve these organizations in activities to increase their capacity to engage in outreach efforts.

An earlier component of our research targeted representatives of organizations with an explicit focus on preventing the spread of AIS (Lauber et al. 2014). However, other types of organizations also have the potential to contribute to or influence the success of AIS prevention efforts, even though they do not have an explicit focus on preventing the spread of AIS or consider it a primary goal. In this study, we sought to learn more about these types of organizations and their current and future capacity to contribute to the success of AIS prevention efforts. The organizations of particular interest to us were bait dealers, marina operators, state and local parks with boating access sites, and state and regional boating and angler organizations.

These organizations have the potential to expand the capacity of AIS outreach in a number of ways. First, they have the ability to reach many anglers and boaters in the course of their business or organizational activities. Second, they may have resources they could bring to outreach efforts, such as equipment, labor, information or funding. Finally, they are likely concerned about the spread of AIS, which would provide motivation for engaging in outreach activities.

We surveyed these organizations, located in or serving recreational users in the U.S. portion of the Lake Ontario basin, using telephone and mail survey methods. The specific objectives of the survey instruments were to:

- Document actions by these organizations that could influence the behavior of recreational users in a way that could influence the spread of AIS.
- Categorize the behaviors these actions attempt to encourage or discourage and the manner used to influence these behaviors.
- Document characteristics of the organizations including funding, equipment, facilities, and level of concern about AIS that could contribute to their capacity to engage in AIS prevention efforts in the future.

Telephone interviews were used to survey boating facilities (i.e., marinas and state/county/town parks with boating access sites) and angler and boating organizations. Interviews were conducted between June 1, 2013 and August 16, 2013. Bait dealers were surveyed by mail as part of a pre-existing research project on a related topic (Connelly et al. 2014). Additional questions were added to the mail questionnaire to address the needs of this study. The mail survey was implemented in September 2013.

## **Boating Facilities**

Approximately 300 potential boating facilities were identified in the Lake Ontario Basin. Of those, we found 231 boating facilities with working telephone numbers and completed interviews with managers/owners at 49% of them.

Most boating facilities (88%) had seasonal slips and three-quarters had at least one boat launch ramp. Few facilities (11%) sold baitfish. We estimated there were approximately 18,000 slips in the Lake Ontario Basin representing at least 18,000 boaters who could be reached with information about how to prevent the spread of AIS.

In terms of resources available at boating facilities that could be used to help prevent the spread of AIS, fewer than half of the boating facilities we contacted had boat cleaning capabilities. Larger facilities (those with 60+ slips) were more likely than smaller facilities to have boat cleaning capabilities (61% vs. 27%). Just over one-third of all boating facilities indicated they had a way for boaters or anglers to dispose of mud, plants, or animals that might be on the equipment before transporting it.

Three-fifths of the boating facilities—representing an estimated 10,000 slips in the basin—are communicating in some way with their users about how to prevent the spread of AIS. The most commonly mentioned way they provide information is by talking directly with their users. The messages most often communicated were to “inspect boating and fishing equipment” and “remove any visible mud, plants, fish or animals before transporting equipment.” At least half of the facility managers thought it was very important to educate their users. Almost two-thirds of facility managers, representing an estimated 13,000 slips, would like to do more than what they are currently doing to prevent the spread of AIS. The primary actions they would like to take are to distribute materials (e.g., brochures or pamphlets) or post signs.

## **Angling and Boating Organizations**

We identified 19 angling or boating organizations in the Lake Ontario Basin. Of those, we found 15 organizations with working telephone numbers, and were able to complete interviews with six of them. Five of the organizations represented anglers. Each organization had a slightly different focus, but four of the six were involved in fishing tournaments and others participated in sportsman’s shows, youth education and AIS prevention activities, like pulling aquatic weeds. Organization membership ranged in size from small groups of 100 or fewer members to large groups with approximately 1,000 members. Assuming people did not belong to more than one organization, 3,700 people were represented by these organizations.

The angling and boating organizations we spoke with thought it important to educate their membership about AIS and how to prevent their spread. They communicated information on this topic with their members via personal contact and at organization meetings. Half of the organizations also used their website and newsletters. The messages they tended to focus on were what could be done to prevent the spread of AIS by treating boating or fishing equipment

(e.g., draining all water holding compartments, drying all equipment before use in another water body).

All organization representatives wanted to do more to educate their members and others about AIS and how to prevent their spread. They wanted to do this by having messages to share and by having more brochures or pamphlets to distribute. Five of the six representatives would be willing to allow others to communicate messages to their membership about preventing the spread of AIS.

### **Bait Dealers**

We identified 207 bait dealers in the Lake Ontario basin (including the Upper St. Lawrence River) based on records from the New York State Department of Environmental Conservation. Questionnaires were mailed to all of them. Thirteen were undeliverable, and 95 completed questionnaires were returned. The adjusted response rate was 49%. Three-quarters of respondents reported that their business sells bait at the retail level. Over 80% of bait dealers sell “certified” disease-free baitfish.

Almost all bait dealers had heard of AIS, and most had also heard of viral hemorrhagic septicemia (VHS). They were concerned about having AIS and fish diseases in the area, and believed VHS was a major threat to the health of fish populations in the Great Lakes region.

About half of the bait dealers indicated they talked one on one with their customers about what to do with unwanted baitfish and how to prevent the spread of AIS; fewer displayed signs or handed out materials. Just over half of the bait dealers used one or more methods for communicating with their customers, which leaves nearly half not communicating with their customers. The most frequently communicated message discussed what to do with unwanted baitfish, rather than how to remove AIS from fishing and boating equipment.

### **Summary of Capacity (Current and Potential)**

The three groups surveyed (boating facilities, bait dealers, and boating and angling organizations) all communicate to some extent with recreational users about AIS and fish diseases and how to prevent their spread. Many of them are concerned about the issue, and there appears to be the desire and willingness to do more to communicate with their customers or members. These groups have the opportunity to be in contact with many recreational users who might not be otherwise reached. For example, we found that of the estimated 18,000 users of slips at boating facilities, 10,000 were currently being reached with information and managers at facilities were willing to do more to reach 13,000 users of slips. (This estimate does not take into account the number of people using boat launch ramps.) From the angling and boating organizations that we interviewed, we found they represented 3,700 members, of which 3,600 were currently being reached with information and all organizations were willing to do more to reach their 3,700 members. Furthermore, based on data from a recently completed survey of anglers who use baitfish in New York (Connelly and Knuth 2014), we estimated that 124,750 anglers bought baitfish in the past year when they went fishing on major waters in the Lake Ontario Basin (i.e., Lake Ontario, Oneida Lake, and the Finger Lakes). Since just over half of the bait dealers indicated they communicated with their customers about what to do with

unwanted baitfish and how to prevent the spread of AIS, we estimated that 69,750 anglers were currently being reached with information. If a similar number of bait dealers as boating facility managers were willing to do more (62%), we estimated that 77,500 anglers could be reached with additional information. It seems that organizations whose primary focus is outreach on this topic could take greater advantage of the groups engaged in this study to increase the distribution of information. Signs that can be posted at businesses or launch facilities, and brochures that could be made available at the boating facilities and bait dealer shops seem the most likely to be welcomed and used. Specific recommendations for each group surveyed and the potential contribution each recommendation could make to the prevention of the spread of AIS in the Lake Ontario basin are discussed below.

## **Recommendations for Outreach**

- Many of the boating facility managers (representing an estimated 13,000 slips basin-wide) would like to do more to help prevent the spread of AIS, primarily by distributing materials or posting signs. Half of the facility managers were being held back because they didn't know who to contact for materials. This seems like an obvious bottleneck to reaching recreational users that could be easily addressed.
- The same was true for angling and boating organizations. The barriers to additional actions were primarily material in nature; organizations wanted more brochures and pamphlets to distribute, or lacked funds to acquire and distribute them. These organizations represent up to 3,700 people.
- Similarly, with just under half of the bait dealers not currently communicating messages about AIS and how to prevent their spread, the potential for increased communication with anglers through bait dealers remains great. We did not ask this group if they would be willing to do more to communicate with their users, but perhaps the impediment to doing more is similar to that faced by boating facilities where many were willing to do more but need materials, such as brochures or signs they can post. There is also potential for more material use among bait dealers who are currently talking to their customers but not posting or handing out materials.
- The messages being communicated by each group appear limited. Expanding to the full range of messages may require more detailed communication with facility managers and organization leaders. For example, while most bait dealers sell baitfish and therefore the emphasis on messages about what to do with unwanted baitfish seems appropriate, many businesses are also engaged in other activities, such as selling fishing equipment and marina operations. Consequently, providing bait dealers who serve a large number of anglers with more educational materials on how to prevent the spread of AIS might provide an additional opportunity for communicating those messages.
- Convincing facility managers to provide ways for users to clean their equipment will likely take substantial effort primarily because of the resources needed. Since many described their concerns about AIS in terms of an economic effect on them personally, outreach efforts could focus on the long-term economic benefits to facility managers of preventing the spread of AIS.

## **Recommendations for Research**

- Future research might be particularly instructive after the recently passed law in New York regarding preventing the spread of AIS is implemented to see how boating facilities and bait dealers have responded, and if the law had the desired effect on recreational users.
- Also useful could be an evaluation of the different methods of informing recreational users about AIS and the impact of the various methods on behavior. For example, is direct communication more likely to change behavior than distribution of brochures and posted signs? If so, is the increased cost of direct communication methods commensurate with the increased changes in behavior? Experimental work would be most valuable in measuring differences and informing the priorities for expending resources on different types of programs.

## **ACKNOWLEDGMENTS**

This study was funded by the U.S. Environmental Protection Agency (EPA) as part of the Great Lakes Restoration Initiative.

We thank Human Dimensions Research Unit (HDRU) staff member, Karlene Smith, who assisted with sample acquisition, mailings, and data entry. We thank Meghan Baumer for assisting with table preparation and report formatting, and Richard Stedman for reviewing the report.



## TABLE OF CONTENTS

Executive Summary .....	ii
Boating Facilities .....	iii
Angling and Boating Organizations.....	iii
Bait Dealers.....	iv
Summary of Capacity (Current and Potential).....	iv
Recommendations for Outreach .....	v
Recommendations for Research .....	vi
Acknowledgments.....	vii
Table of Contents.....	viii
List of Tables .....	ix
Introduction.....	1
Methods.....	2
Survey Audiences .....	2
Survey Methods .....	3
Questionnaire Design.....	3
Analysis.....	3
Results.....	4
Telephone Interview Survey Response.....	4
Boating Facilities .....	4
Boating Facility Characteristics .....	4
Resources Available to Recreational Users to Limit the Spread of AIS .....	5
Information Available to Recreational Users to Limit the Spread of AIS.....	6
Level of Concern and Importance of Taking Action to Limit the Spread of AIS .....	6
Opportunities for and Barriers to Increased Action.....	8
Angling and Boating Organizations Active in the Lake Ontario Basin.....	10
Characterizing Angling and Boating Organizations.....	10
Information Available to Members to Limit the Spread of AIS.....	11
Level of Concern and Importance of Taking Action to Limit the Spread of AIS .....	11
Opportunities for and Barriers to Increased Action.....	12
Bait Dealers.....	12
Characterizing Bait Dealers and Their Businesses .....	12
Awareness of and Concern about AIS and VHS .....	14
Awareness of the Regulations and Desire to Follow Them.....	16
Information Available from Bait Dealers about how to Limit the Spread of AIS.....	17
Opportunities for Increased Communication with Customers.....	18
Conclusions and Recommendations .....	19
Boating Facilities .....	20
Angling and Boating Organizations.....	21
Bait Dealers.....	21
Recommendations for Research .....	22
Literature Cited .....	23
Appendix A: Boating Facilities Telephone Interview Questions .....	24
Appendix B: Organizations Telephone Interview Questions .....	29
Appendix C: Bait Dealer Mail Questionnaire.....	34

## LIST OF TABLES

Table 1. Response rates for telephone interviews with boating facilities and boating and angling organizations. ....	4
Table 2. Percent of boating facilities having AIS-related resources.....	5
Table 3. Percent of boating facility managers engaging in various communication methods related to AIS. ....	6
Table 4. AIS of concern to boating facility managers. ....	7
Table 5. Percent of boating facilities providing AIS-related resources or communicating with users, by level of importance facility managers placed on educating recreational users. ....	8
Table 6. Boating facility managers' level of concern about AIS compared with the level of importance they place on educating users.* ....	8
Table 7. Percent of boating facilities indicating they would like to do more to educate users and if another organization helped, overall and by other significant variables. ....	9
Table 8. Of boating facilities indicating they would like to do more to educate users and if another organization helped, what they would like to do. ....	10
Table 9. Barriers boating facility managers identified to doing things they wanted to do to prevent spread of AIS. ....	10
Table 10. Socio-demographic characteristics of bait dealers.....	13
Table 11. Business characteristics of bait dealers.....	13
Table 12. Types of bait sold by bait dealers. ....	14
Table 13. Bait dealer awareness of aquatic invasive species and VHS. ....	14
Table 14. Bait dealer level of concern about aquatic invasive species and fish diseases in the Great Lakes region. ....	15
Table 15. Bait dealer beliefs concerning AIS and fish diseases. ....	15
Table 16. Bait dealers' familiarity with USDA and state regulations regarding the sale and transport of baitfish. ....	16
Table 17. Importance to bait dealers of following and trying to follow the USDA-APHIS and state regulations regarding transport and sale of baitfish.....	17
Table 18. Information distributed by bait dealers to inform customers about what to do with unwanted baitfish and how to prevent the spread of AIS. ....	18

## INTRODUCTION

It is by now well established that the actions of recreational resource users, such as anglers and boaters, can lead to the spread of invasive species between aquatic ecosystems. States and provinces in the Great Lakes region have developed regulations and educational campaigns to discourage anglers and boaters from taking actions that can lead to the spread of invasive species. These efforts focus on preventing the movement of fish between bodies of water, proper disposal of fish carcasses and byproducts, removal of mud, plants, and animals from gear, boats, motors, and trailers, and draining and disinfecting live wells, bilges, and bait tanks.

Promoting behavior change in resource users is a difficult task. Conventional models of compliance with fisheries regulations have focused on how the economic costs and benefits of violations influence compliance (e.g., Anderson & Lee 1986). More recent authors have pointed to the need to include additional considerations, such as values, social influences, and the legitimacy of regulations and authorities, in explanations of compliance (Hatcher et al. 2000; Sutinen & Kuperman 1999). Many of these factors are also relevant in studies of compliance with recommendations promoted through educational campaigns.

This report is one component of a larger project, the overall goal of which is to aid in reducing the spread of aquatic invasive species (AIS) in the Great Lakes basin through promotion of safe recreation and resource use. We are doing this by studying how government and nongovernmental organizations operating at the federal, state/provincial, and community level collectively influence the behavior of anglers and boaters with regard to actions that can control the spread of AIS. The objectives of the project are to: (1) characterize the outreach efforts of organizations to discourage behaviors by anglers and boaters that can lead to the spread of AIS; and (2) involve these organizations in activities to increase their capacity to engage in outreach efforts.

An earlier component of our research targeted representatives of organizations with an explicit focus on preventing the spread of AIS (Lauber et al. 2014). We found that many of the organizations were: (1) cooperating with each other; (2) providing largely consistent messages to recreational users; and (3) using a variety of methods to reach target audiences. However, the efforts of these outreach programs was constrained by funding and staffing. Further, although outreach messages were generally consistent, messages about more complex and effort-intensive behaviors, such as how to wash and dry recreational equipment, was varied. Lauber et al. (2014) recommended continuing to promote certain organizations as common sources of information for developing outreach materials to help improve this consistency.

Other types of organizations have the potential to contribute to or influence the success of AIS prevention efforts, even though they do not have an explicit focus on preventing the spread of AIS or consider it a primary purpose. In particular, certain organizations may have more frequent contact with recreational users than organizations focused specifically on AIS prevention. Whether they communicate any messages related to AIS prevention and what those messages are may have a considerable influence on the behavior of resource users.

These organizations have the potential to expand the capacity of AIS outreach in a number of ways. First as mentioned above, they have the ability to reach many anglers and boaters in the course of their business or organizational activities. Second, they may have resources they could bring to outreach efforts, such as equipment, labor, information or funding. Finally, they are likely concerned about the spread of AIS, which would provide motivation for engaging in outreach activities.

In this study, therefore, we sought to learn more about these types of organizations and their current and future capacity to contribute to the success of AIS prevention efforts.

The organizations of particular interest to us were bait dealers, marina operators, state and local parks with boating access sites, and state and regional boating and angler organizations. We surveyed these organizations, located in or serving recreational users in the U.S. portion of the Lake Ontario basin, using telephone and mail survey methods.

The specific objectives of the survey instruments were to:

- Document actions by these organizations that could influence the behavior of recreational users in a way that could influence the spread of AIS.
- Categorize the behaviors these actions attempt to encourage or discourage and the manner used to influence these behaviors.
- Document characteristics of the organizations including funding, equipment, facilities, and level of concern about AIS that could contribute to their capacity to engage in AIS prevention efforts in the future.

## **METHODS**

### **Survey Audiences**

The organizations we surveyed included bait dealers, marina operators, state, county, and town parks with boating access sites, and state and regional boating and angler organizations in the U.S. portion of the Lake Ontario basin (including the Upper St. Lawrence River). We attempted to contact a representative (i.e., owner, manager, president, officer) from each of these organizations.

The organizations were identified by several means.

- A list of bait dealers operating in New York State was obtained from the New York State Department of Environmental Conservation.
- Marina operators in the study region were identified from a past inventory (Connelly et al. 2002) and internet searches. Search strategies utilized county chambers of commerce, manta.com, marinas.com, and greatlakesdestinations.com.
- State parks with boating access sites in the study region were identified through the New York State Office of Parks, Recreation, and Historic Preservation.
- County and town parks with boating access sites were identified through county and town web sites.

- Boating and angler organizations were identified through contacts with New York Sea Grant and the New York State Department of Environmental Conservation, and internet searches.

## **Survey Methods**

Telephone interviews were used to survey boating facilities (i.e., marinas and state/county/town parks with boating access sites) and angler and boating organizations. Interviews were conducted between June 1, 2013 and August 16, 2013. We attempted to contact each facility or organization identified a minimum of four times.

All bait dealers in the Lake Ontario basin were surveyed by mail as part of a pre-existing research project on a related topic (Connelly et al. 2014). Additional questions were added to mail questionnaire to address the needs of this study. The mail survey was implemented in September 2013. We used a standard 4-wave mailing of the survey (Dillman 1978, Brown et al. 1989). The initial mail questionnaire was sent with a cover letter encouraging recipients to respond. Up to three reminder letters were sent to non-respondents at 7- to 10-day intervals. The second reminder letter included an additional copy of the questionnaire.

## **Questionnaire Design**

Questions included in both the telephone interviews and mail questionnaire were designed to:

- Document any actions by these organizations that could influence the behavior of recreational users in a way that could influence the spread of AIS. These actions included (for example) distributing information, and providing resources that can aid compliance with regulations and recommendations (such as facilities for cleaning boats).
- Categorize the behaviors these actions attempt to encourage or discourage and the manner used to influence these behaviors.
- Document the characteristics of the organizations that could potentially contribute to future AIS prevention efforts including:
  - Power – funding, equipment, facilities, information, labor, or other types of resources.
  - Legitimacy – organizational missions, legal authority to take certain types of actions, connections and/or credibility with recreational users.
  - Urgency – degree of attention devoted to AIS prevention, or level of concern about AIS prevention efforts.

The specific questions asked can be found in Appendix A for boating facilities, Appendix B for boating and angler organizations, and Appendix C for bait dealers.

## **Analysis**

Data from completed interviews and returned questionnaires were entered into a computerized data file and analysis was conducted using SPSS (IBM SPSS Statistics 20). Pearson's chi-square test (adjusted for small population sizes) was used (for comparisons between two

nominal/ordinal variables), t-tests and Scheffe’s test (for comparisons between two or more categories on a nominal or ordinal independent variable and a continuous dependent variable) were used to test for statistically significant differences between groups on key variables.

## RESULTS

Results are presented separately for boating facilities, angler and boating organizations, and bait dealers.

### Telephone Interview Survey Response

Approximately 300 potential boating facilities and 19 angling or boating organizations were identified in the Lake Ontario Basin (Table 1). Of those, we found 231 boating facilities and 15 organizations with working telephone numbers. We made numerous attempts to reach everyone with working telephone numbers and completed interviews with about half of the boating facilities and six of the organizations.

**Table 1.** Response rates for telephone interviews with boating facilities and boating and angling organizations.

	Initial # identified	# with working telephone	# refused	# interviewed	Adjusted response rate (%)
Boating facilities	302	231	25	113	48.9
Boating and angling organizations	19	15	0	6	40.0

### Boating Facilities

#### Boating Facility Characteristics

Most boating facilities (88%) had seasonal slips. The number of slips ranged from zero to over 400. Facilities also had transient berths that ranged from zero to 150. Combining these into a single measure of boat capacity, we found boating facilities had between zero and 535 slips, with a median of 60 slips. We divided facilities into large (60+ slips) and small (<60 slips) based on the median number of slips. The facilities we interviewed had 8,776 slips. If we assume the population of boating facilities in the Lake Ontario Basin is the 231 facilities we identified with working telephone numbers, and we expand the number of slips in our sample to the population, then we would estimate approximately 18,000 slips in the Basin. Comparison with the Connelly et al. (2002) inventory of marinas in New York’s Great Lakes suggests that 18,000 is a reasonable number of slips for the area.

Most boating facilities (75%) had a boat launch ramp. Sixty percent of facilities had one ramp, and 15% had more than one ramp, up to a max of eight ramps at one facility. We classified facilities grouping them by whether they had any boat launch ramps (i.e., no ramps versus at least one ramp).

Few facilities (11%) sold baitfish. All of them indicated they knew where their baitfish had come from. Most (71%) indicated the baitfish had come from the Lake Ontario Basin.

### **Resources Available to Recreational Users to Limit the Spread of AIS**

Fewer than half of the boating facilities we contacted had boat cleaning capabilities (Table 2). Larger facilities (those with 60+ slips) were more likely than smaller facilities to have boat cleaning capabilities (61% vs. 27%). Of those with boat cleaning, two-thirds had power washing services, but only one-quarter had hot water available and none had disinfectant available. Using these resources are all recommended ways to reduce the spread of AIS.

Just over one-third of boating facilities indicated they had a way for boaters or anglers to dispose of mud, plants, or animals that might be on the equipment before transporting it (Table 2). Those with boat launch ramps were more likely than those without ramps to have facilities (42% vs. 24%). The most frequently mentioned place for the disposed items was a dumpster or trash can. A few people mentioned disposal on dry land, dry out mats or filtration beds. Fewer than 10% of boating facilities reported providing a means for disposal of unwanted baitfish (Table 2); typically these were dumpsters and trash cans.<sup>1</sup>

**Table 2.** Percent of boating facilities having AIS-related resources.

AIS-related resources	Percent having resource
Boat cleaning	44.4
Among those with boat cleaning:	
Have power washing services	62.5
Have hot water	25.0
Have disinfectant available	0.0
Means for disposing of mud, plants, animals	38.8
Means for disposing of unwanted baitfish	8.3

<sup>1</sup> Other facilities might have trash cans that someone might use for disposal of baitfish, but interviewees did not indicate this when asked about disposal options.

### **Information Available to Recreational Users to Limit the Spread of AIS**

Interviewees were asked if they had any information available for their users or spoke with them about AIS and how to prevent their spread. Three-fifths (62%) communicated with their users in at least one of the ways listed in Table 3. This represents approximately 10,000 of the 18,000 slip users in the basin potentially being reached with some type of message about AIS. The most commonly mentioned communication method was talking with their users, undertaken by 43% of interviewees or their staff. Respondents from smaller boating facilities were more likely to talk to their users than respondents at larger facilities (49% vs. 35%). Some of the recommendations they were most likely to provide were “inspect boating and fishing equipment” and “remove any visible mud, plants, fish or animals before transporting equipment.” About one-third of respondents had brochures or pamphlets available. One-third also had posted signs at their facility. Those with boat launch ramps were more likely to have posted signs than those with no launch ramps (34% vs. 17%). Many could not recall the source of the brochures or signs, but among those who could, the New York State Department of Environmental Conservation and Cooperative Extension were mentioned most often as the source. Ten percent of interviewees had watercraft stewards working at their facilities. State parks were more likely to post signs and have watercraft stewards than private marinas and county/town parks; they were less likely to have brochures or pamphlets available than private marinas and county/town parks.

Two-thirds of interviewees (64%) had heard the phrase “Stop Aquatic Hitchhikers.” Facilities with boat launch ramps were more likely than those without ramps to have heard the phrase (70% versus 43%).

**Table 3.** Percent of boating facility managers engaging in various communication methods related to AIS.

Communication methods	Percent
Talk with recreational users	42.9
Have brochures or pamphlets available	31.8
Post signs	29.4
Have watercraft stewards	10.2

### **Level of Concern and Importance of Taking Action to Limit the Spread of AIS**

Two-fifths of interviewees (42%) were very concerned about having AIS in the Lake Ontario Basin. One-third were moderately concerned (32%), with the remainder being slightly (18%) or not at all (8%) concerned. However, level of concern was not correlated with providing resources or communicating with users about how to prevent the spread of AIS. There was one exception in which 51% of those who were very or moderately concerned talked with their users about preventing the spread of AIS compared with 22% of those who were not at all or slightly concerned.

Most interviewees (78%) were concerned about at least one specific AIS. Interviewees were more likely to be concerned about was zebra or quagga mussels (63%) than any other species



(Table 4). However, many respondents believed that zebra mussels were less of a problem now than in the past. One-third of interviewees were concerned about round gobies or Eurasian watermilfoil, and one-quarter were concerned about hydrilla or water chestnut. Very few interviewees mentioned any species other than these six.

**Table 4.** AIS of concern to boating facility managers.

Potential AIS	Percent concerned
Zebra or quagga mussels	63.3
Round gobies	32.9
Eurasian watermilfoil	31.6
Hydrilla	25.3
Water chestnut	21.5
Didymo	10.1
Blue green algae	7.6
Asian carp	6.3

When asked to describe their primary concerns with AIS, many mentioned concerns about how AIS negatively affected their business. For example, some reported that they had to remove weeds growing in their transient or seasonal slip areas. Others described round gobies negatively affecting fishing that in turn resulted in fewer anglers and less business for them. While they talked mostly about impacts of AIS to them personally, impacts to larger groups (boaters and anglers) were implied and sometimes mentioned explicitly – e.g., “customers don’t like weeds” or “boat intakes get clogged with zebra mussels.” Concerns about the environmental impacts of AIS were mentioned less frequently and included the spread of AIS, new species entering the basin, and the impact of AIS on the aquatic food chain.

About half (52%) of interviewees thought it was very important to educate their users about what they can do to prevent the spread of AIS. Similar percentages thought it was moderately (17%) or slightly (21%) important; few thought it was not at all important (10%). State park managers were more likely to think it was important to educate their users compared with private marina operators and county/town park managers. There was no difference based on the size of the boating facility or presence of a boat launch ramp. We grouped respondents by whether they thought it was very or moderately important versus slightly or not at all important, and found that those who thought educating users was very/moderately important were more likely to have talked with their users, posted signs, have brochures available, and have boat cleaning available at their facility (Table 5).

The level of importance respondents placed on communicating with their users generally reflected their level of concern regarding AIS (Table 6). Most people who were very concerned about AIS thought it was very important to educate recreational users. Similarly two-thirds of those who were not at all concerned about AIS did not think it was important to educate recreational users.

**Table 5.** Percent of boating facilities providing AIS-related resources or communicating with users, by level of importance facility managers placed on educating recreational users.

AIS-related resources or communication methods	Importance of Educating Recreational Users	
	Very or moderately important	Not at all or slightly important
	Percent having resource	
Have boat cleaning capability*	49.3	33.3
Have means of disposing of mud/plants/animals	41.2	33.3
Have means of disposing of unwanted baitfish	9.1	0.0
Talk with recreational users about preventing AIS spread*	49.3	30.0
Have brochures or pamphlets available*	39.1	16.1
Post signs*	35.2	9.7
Have watercraft stewards	11.3	9.5

\*Statistically significant difference in percentage having resource based on level of importance at P = 0.05 using chi-square test.

**Table 6.** Boating facility managers' level of concern about AIS compared with the level of importance they place on educating users.\*

Level of concern about AIS	Level of importance placed on educating users				Total
	Very important	Moderately important	Slightly important	Not at all important	
	Percent				
Very concerned	83.3	9.5	7.1	0.0	100.0
Moderately concerned	35.3	32.4	23.5	8.8	100.0
Slightly concerned	20.0	15.0	50.0	15.0	100.0
Not at all concerned	16.7	0.0	16.7	66.7	100.0

\*Statically significant difference between level of concern and level of importance at P = 0.05 using chi-square test.

### Opportunities for and Barriers to Increased Action

Many interviewees (62%) said they would like to do more to educate users of their facility about AIS or help them prevent their spread. Thus, approximately 13,000 of the 18,000 slips in the basin are in facilities where managers would like to do more. Three-quarters of interviewees (74%) would like to do more if another organization could help them with materials, volunteers, etc. Among those who said they did not want to do more, 76% were already taking some type of action to communicate with or provide facilities for their users. Only 6% of respondents are currently taking no actions to communicate with their users or help them by providing facilities, and do not want to take any actions in the future, even if another organization helped. These respondents all own private marinas, most of which have less than 60 slips.

Those who are concerned about having AIS in the Lake Ontario Basin, and those who think it is important to educate recreational users are almost twice as likely to want to do more to educate users than their counterparts (Table 7, column 2). Almost all respondents from larger boating facilities were willing to do more, if they got help from another organization. All state, county, and town parks we interviewed and 70% of private marinas were willing to do more, if they got help from another organization.

**Table 7.** Percent of boating facilities indicating they would like to do more to educate users and if another organization helped, overall and by other significant variables.

	Percent	
	Would like to do more	If another organization helped, would like to do more
Overall	61.5	73.6
Level of concern about AIS		
Moderately or very	70.0*	81.2**
Not at all or slightly	35.7	51.7
Importance of educating users about AIS		
Moderately or very	72.5*	78.3
Not at all or slightly important	40.6	64.5
Facility size		
Small boating facilities	54.2*	67.3**
Large boating facilities	69.6	83.6

\*Statistically significant difference between those who would like to do more and level of concern, importance of educating users, and facility size at P = 0.05 using chi-square test.

\*\*Statistically significant difference between those who would like to do more if another organization helped and level of concern, and facility size at P = 0.05 using chi-square test.

Of those who wanted to do more to educate users of their facility, over three-quarters wanted to have brochures or pamphlets available or post signs (Table 8). An additional 10% wanted educational materials but they did not specify the type of material. The facilities who specifically wanted brochures or pamphlets represent approximately 9,000 slips. Similarly, the facilities who wanted posted signs represent approximately 9,500 slips. Approximately one-quarter of the facilities (representing approximately 3,000 slips) wanted watercraft stewards, and a few (representing 1,500 slips) wanted to add boat washing capabilities. When asked what other organizations could do to help, many of the respondents mentioned these same activities. Some respondents spoke more generally about other organizations disseminating information to a broader audience than just at their facility. A few also suggested that these other organizations could try to do more to stop the spread of AIS by weed removal. Some interviewees also felt their independent actions to prevent the spread of AIS would be ineffective or meaningless without increased regulation of disposal of ballast water into the Lake Ontario Basin by large, commercial ships coming into the Great Lakes through the St. Lawrence Seaway and other waterways. Other organizations could do more by lobbying for these types of regulations.

**Table 8.** Of boating facilities indicating they would like to do more to educate users and if another organization helped, what they would like to do.

What they would like to do	Percent	
	Would like to do more	If another organization helped, would like to do more
Have brochures or pamphlets available	82.3	69.3
Post signs	77.4	64.0
Have watercraft stewards	22.6	18.7
Have boat washing capabilities	12.9	14.7
Have educational materials (type not specified)	9.7	13.3
Other	14.5	24.0

Interviewees were asked what was holding them back from doing the things they wanted to do, and the most frequent response, voiced by half of the interviewees, was that they did not know whom to contact for materials (Table 9). Other barriers included lack of funds, lack of staff time, and lack of personal knowledge about AIS, but these were mentioned by far fewer people.

**Table 9.** Barriers boating facility managers identified to doing things they wanted to do to prevent spread of AIS.

Barriers to doing things they want to do to prevent spread of AIS	Percent
Don't know who to contact for materials	50.6
Money in general	19.0
Money for signs, brochures	15.2
Money for staff	12.7
Money for facilities, like boat washing or bait disposal	12.7
Lack of time or lower priority	13.9
Don't know enough about invasive species	13.9
Don't have space for boat washing capabilities	1.3

## Angling and Boating Organizations Active in the Lake Ontario Basin

### Characterizing Angling and Boating Organizations

We identified 15 boating and angling organizations with working telephone numbers who likely had memberships in the Lake Ontario basin, and therefore, might be concerned about AIS and willing to communicate with their members about AIS and how to prevent their spread. We attempted to reach all of the organizations, and completed interviews with six of them. Five of the six organizations were angler organizations. Each organization had a slightly different focus, but four of the six were involved in fishing tournaments and others participated in sportsman's shows, youth education and AIS prevention activities, like pulling aquatic weeds.

Organization membership ranged in size from small groups of 100 or fewer members to large groups with approximately 1,000 members. Assuming people did not belong to more than one of these organizations, they represent about 3,700 individuals. Interviewees estimated that at least 75% of the members of their organization lived in New York State full-time, so these were local, not national organizations.

The organizations communicated with their members mainly using their website (5 of 6 organizations), email (4 of 6), meetings (3 of 6), and print material (i.e., newsletter, magazine) (3 of 6). Few used Facebook (2 of 6) or Twitter (1 of 6).

### **Information Available to Members to Limit the Spread of AIS**

Five of the six organizations indicated they communicated to their members messages about how to prevent the spread of AIS. These messages tended to focus on what could be done to prevent the spread of AIS by treating boating or fishing equipment (e.g., draining all water holding compartments, drying all equipment before use in another water body). The messages that were communicated by fewer organizations (2 of 6 organizations) were those having to do with proper disposal of plants, fish or animals, including unwanted baitfish.

Five of the six organizations communicated these messages to members via personal contact and at organization meetings. Several organizations (3 of 6 organizations) also indicated they used their website and newsletters to communicate the messages. Five of the six organization representatives we spoke with had heard the phrase “Stop Aquatic Hitchhikers.”

### **Level of Concern and Importance of Taking Action to Limit the Spread of AIS**

Five of the six organization representatives we spoke with were very concerned about having AIS in the Lake Ontario Basin. The specific species they were most concerned about were round gobies, hydrilla, and water chestnut. Given that most of the organizations represented anglers their primary concern was the impacts of AIS on fishing. These concerns were generally expressed in environmental (e.g., effects on the ecosystem, fish habitat), rather than economic terms (e.g., impacts on fishing-related businesses).

Five of six organization representatives thought that almost everyone in their organization had heard about AIS in the Lake Ontario Basin. Half of the organizations thought most of their members were concerned about AIS in the basin and the role they personally played in the spread of AIS. The other half of the organizations thought only about half of their members were concerned about AIS in the Basin and the role they personally played in the spread of AIS.

All organization representatives thought it was very important to educate their members about what they can do to prevent the spread of AIS.

## **Opportunities for and Barriers to Increased Action**

All organization representatives wanted to do more to educate their members and others about AIS and how to prevent their spread. They wanted to do this by having messages to share and by having more brochures or pamphlets to distribute. Five of the six representatives were willing to allow others to communicate messages to their membership about preventing the spread of AIS.

The barriers to additional actions were primarily material in nature; they wanted more brochures and pamphlets to distribute, or lacked funds to acquire and distribute them. Four of the six also indicated they wanted to do more but could not find the time to do it. In general, lack of time can be interpreted as AIS being a lower priority than other objectives of the organization, although they all stated they wanted to do more.

### **Bait Dealers**

Of the questionnaires mailed to the 207 bait dealers in the Lake Ontario basin (including the Upper St. Lawrence River), 13 were undeliverable, and 95 completed questionnaires were returned. The adjusted response rate was 49%.

In a recently completed study of anglers who use baitfish in New York (Connelly and Knuth 2014), we estimated that 290,100 anglers fished with baitfish in New York in the year preceding the survey (Oct. 1, 2012 – Sept. 30, 2013). Using data from the study we estimated that 124,750 anglers bought baitfish in the past year when they went fishing on major waters in the Lake Ontario Basin (i.e., Lake Ontario, Oneida Lake, and the Finger Lakes), presumably from the bait dealers we surveyed for this report.

### **Characterizing Bait Dealers and Their Businesses**

Over 80% of bait dealers were men (Table 10). The majority of bait dealers had no more than a high school diploma or some type of college or technical school training; fewer than 20% had a college degree. The average age of bait dealers was 58.

Three-quarters of respondents reported that their business sells bait at the retail level; fewer than 20% sell bait wholesale (Table 11). Approximately 10% of bait dealers collect baitfish from public waters. Fewer than 5% of bait dealers raised baitfish. Bait dealers have had a bait dealer license for an average of 14 years. The sale of bait makes up a third of gross revenue on average for these businesses.

All bait dealers indicated they knew the source of their baitfish (Table 11). Other dealers were a source of baitfish for three-quarters of the respondents. Fewer than 20% of bait dealers obtained bait from private ponds; fewer obtained them from public waters or other sources.

Over 80% of bait dealers sell “certified” disease-free baitfish (Table 11). Fewer than 5% of bait dealers were unsure about whether they sold “certified” baitfish.

**Table 10.** Socio-demographic characteristics of bait dealers.

Socio-demographic Characteristics	Percent
<b>Gender</b>	
Male	81.5
Female	18.5
<b>Education</b>	
Less than high school	12.0
High school diploma/G.E.D.	32.6
Some college or technical school	26.1
Associate's degree	14.1
College degree	10.9
Graduate degree	4.3
	<u>Mean</u>
Age	58.1

**Table 11.** Business characteristics of bait dealers.

Business Characteristics	Percent
<b>Type of Bait Business:</b>	
Sell bait retail	76.4
Sell bait wholesale	15.7
Collect baitfish from public waters	10.1
Raise Baitfish	2.2
<b>Source of Baitfish:</b>	
Other dealers	73.3
Public waters/wild	11.1
Private ponds/farm-raised	18.9
Other sources	14.4
Don't know	0.0
<b>Sell "certified" disease free baitfish</b>	
No	9.4
Yes	85.9
Don't know	4.7
	<u>Mean</u>
Years having a bait dealer license	13.8
% of business's gross revenue attributable to sale of bait	36.2

Fathead minnows were sold by three-quarters of the bait dealers, and they were the species sold most often by almost half of the bait dealers (Table 12). Golden shiners, emerald shiners, and suckers were also sold by 30-60% of bait dealers. Crayfish were sold by over half of the bait dealers in the Lake Ontario basin.

**Table 12.** Types of bait sold by bait dealers.

Type of bait	Percent	
	Sold	Sold most often
Fathead Minnows	77.8	43.9
Golden Shiners	58.9	24.6
Emerald Shiners	45.6	5.3
Other species of Minnows or Shiners	11.1	0.0
Suckers	30.0	1.8
Herring (includes alewife)	3.3	3.3
Other fish	3.3	1.8
Crayfish	62.2	7.0
Frogs	0.0	0.0
Other bait	35.6	12.3

### Awareness of and Concern about AIS and VHS

Almost all bait dealers had heard of AIS, and three-quarters felt they knew something about them (Table 13). Almost 90% had also heard of the fish disease called VHS (viral hemorrhagic septicemia), and three-quarters felt they knew something about it.

**Table 13.** Bait dealer awareness of aquatic invasive species and VHS.

	Percent
Ever heard of aquatic invasive species	
No	3.7
Yes, but don't know much	24.7
Yes, and know something about them	71.6
Ever heard of fish disease called VHS	
No	12.7
Yes, but don't know much	11.4
Yes, and know something about it	75.9



Almost all bait dealers were concerned to some degree about having AIS and fish diseases in the Great Lakes region<sup>2</sup> (Table 14). Two-thirds were very concerned and about one-third were moderately concerned.

Over 80% of bait dealers believe that fish diseases are bad for their business and they want to do all they can to prevent their spread (Table 15). About two-thirds believe VHS is a major threat to the health of fish populations in the Great Lakes region. Fewer, but still over half, think they have a good understanding of the issues related to AIS.

**Table 14.** Bait dealer level of concern about aquatic invasive species and fish diseases in the Great Lakes region.

	Percent
Concern about aquatic invasive species	
Not at all concerned	1.2
Slightly concerned	3.5
Moderately concerned	28.2
Very concerned	67.1
Concern about fish diseases	
Not at all concerned	1.2
Slightly concerned	5.9
Moderately concerned	30.6
Very concerned	62.3

**Table 15.** Bait dealer beliefs concerning AIS and fish diseases.

	Percent					
	Strongly agree	Agree	Neutral	Disagree	Strongly disagree	Don't know
The spread of fish diseases is bad for my business	64.6	20.7	12.2	0.0	0.0	2.4
I want to do all I can to prevent the spread of fish diseases	43.9	50.0	2.4	1.2	0.0	2.4
VHS is a major threat to the health of fish populations in the Great Lakes region	35.8	32.1	14.8	6.2	0.0	11.1
I have a good understanding of issues related to aquatic invasive species	11.1	46.9	24.7	4.9	1.2	11.1

<sup>2</sup> Recall the study area for the bait dealer survey was broader than the Lake Ontario basin.

### Awareness of the Regulations and Desire to Follow Them

Just over half of the bait dealers were moderately or very familiar with the USDA-APHIS regulations restricting the movement of live bait into the U.S. and between states (Table 16). Far more bait dealers were moderately or very familiar with New York’s regulations about the sale and transport of baitfish, with two-thirds indicating they were very familiar with the regulations.

Bait dealers were asked how important it was to them to follow the regulations of USDA-APHIS and their state regarding transport and sale of baitfish, and 80% of the bait dealers said it was very important (Table 17). Bait dealers were also asked if they were trying to follow the USDA-APHIS and their state regulations. One-quarter of the bait dealers did not think the USDA-APHIS regulations applied to them, perhaps because they were not obtaining live bait from outside New York. Only a few bait dealers (6%) did not think New York’s regulations applied to them. Among those who felt the USDA-APHIS regulations applied to them, over 80% indicated they were trying to follow the regulations all of the time. Similarly, among those who thought the state regulations applied, almost all said they tried to follow them all of the time.

**Table 16.** Bait dealers’ familiarity with USDA and state regulations regarding the sale and transport of baitfish.

	Percent
<hr/>	
USDA-APHIS regulations regarding the movement of live bait into the U.S. and between states	
Not at all familiar	25.0
Slightly familiar	22.6
Moderately familiar	23.8
Very familiar	28.6
<hr/>	
State/province regulations about the sale and transport of baitfish	
Not at all familiar	5.9
Slightly familiar	10.6
Moderately familiar	17.6
Very familiar	65.9

**Table 17.** Importance to bait dealers of following and trying to follow the USDA-APHIS and state regulations regarding transport and sale of baitfish.

	Percent
<b>Importance of following USDA-APHIS and state regulations</b>	
Not at all important	2.5
Slightly important	3.8
Moderately important	13.9
Very important	79.8
<b>Trying to follow USDA-APHIS regulations</b>	
Some of the time	3.6
Most of the time	8.3
All of the time	61.9
Not applicable	26.2
<b>Trying to follow state regulations</b>	
Some of the time	1.2
Most of the time	4.7
All of the time	88.2
Not applicable	5.9

### **Information Available from Bait Dealers about how to Limit the Spread of AIS**

We asked bait dealers about a variety of communication methods they used to educate their customers about what to do with unwanted baitfish and how to prevent the spread of AIS. About half of the bait dealers indicated they talked one on one with their customers; about one-quarter displayed signs or handed out materials (Table 18). Just over half of the bait dealers used one or more methods for communicating with their customers. We estimated that 69,750 anglers were currently being reached with information based on the earlier referenced study on anglers who use baitfish (Connelly and Knuth 2014). Most bait dealers used just one method to communicate with their customers, but 28% used two methods and 13% used all three methods we asked about. However, nearly half of the bait dealers are not communicating with their customers about what to do with unwanted baitfish and how to prevent the spread of AIS.

If we expand our results to the population of bait dealers in the Lake Ontario basin, we estimate that 108 of the 194 businesses communicated by one or more method with their customers. The most common method was talking one on one with customers. An estimated 98 businesses did this. Fewer businesses displayed signs or posters (an estimated 41 businesses), or handed out informational materials (an estimated 48 businesses). Among those who communicated with their customers, business owners or their staff talked to an average of 114 customers, handed out 89 brochures or other informational materials, and displayed 3 signs or posters (Table 18).

For those who communicated with their customers, the information most often communicated was what to do with unwanted baitfish; about half of the bait dealers communicated this information (Table 18). Information about how to clean boating or fishing equipment was less likely to be communicated.

Over half of the bait dealers recalled the source of the information that they communicated (Table 18). Almost all of these recalled the source as being the New York State Department of Environmental Conservation.

**Table 18.** Information distributed by bait dealers to inform customers about what to do with unwanted baitfish and how to prevent the spread of AIS.

	Percent
<u>Methods of communication</u>	
Display signs or posters	21.2
Average # displayed (range)	2.9 (1-6)
Hand out informational materials	24.7
Average # distributed (range)	89 (10-500)
Talk one on one to customers	50.6
Average # contacted (range)	114 (5 – 500)
% using one or more method	55.8
For those who communicate:	
Type of information communicated	
What to do with unwanted baitfish	48.8
How to clean fishing equipment to remove AIS	20.0
How to clean boats and boating equipment to remove AIS	27.5
Recall source of information	
No	39.6
Yes	60.4

### **Opportunities for Increased Communication with Customers**

Bait dealers' level of concern about AIS and fish diseases was not correlated with whether or not they communicated with their customers about what to do with unwanted baitfish and how to prevent the spread of AIS. Also there were no relationships found between bait dealers' beliefs about the threat VHS poses, their understanding of the issues, or their willingness to take action and whether or not they communicated with their customers. Perhaps the impediment to doing more is similar to that experienced by boating facilities where many were willing to do more but need materials. If that were the case and 62% of bait dealers were willing to do more, an estimated 77,500 anglers could be reached with additional information. Boating facility managers wanted more brochures or pamphlets available and posted signs. We estimated that at least 86 bait dealers in the region were not currently doing anything to communicate with their customers, but if their capacity is similar to bait dealers who are communicating with their customers, they might be able to post an additional 250 signs and hand out 7,650 brochures or pamphlets. There is also potential for more material use among bait dealers who are currently

talking to their customers but not posting or handing out materials. An additional 195 signs might be used and 5,340 brochures or pamphlets. These maximum estimates are unlikely to be realized because not all businesses would participate in every method, even if materials were available.

## **CONCLUSIONS AND RECOMMENDATIONS**

The three groups surveyed (boating facilities, bait dealers, and boating and angling organizations) all communicate to some extent with recreational users about AIS and fish diseases and how to prevent their spread. Many of them are concerned about the issue, and there appears to be the desire and willingness to do more to communicate with their customers or members. These groups have the opportunity to be in contact with many recreational users who might not be otherwise reached. For example, we found that of the estimated 18,000 users of slips at boating facilities, 10,000 were currently being reached with information and managers at facilities were willing to do more to reach 13,000 users of slips. (This estimate does not take into account the number of people using boat launch ramps.) From the angling and boating organizations that we interviewed, we found they represented 3,700 members, of which 3,600 were currently being reached with information and all organizations were willing to do more to reach their 3,700 members. Furthermore, based on data from a recently completed survey of anglers who use baitfish in New York (Connelly and Knuth 2014), we estimated that 124,750 anglers bought baitfish in the past year when they went fishing on major waters in the Lake Ontario Basin (i.e., Lake Ontario, Oneida Lake, and the Finger Lakes). Since just over half of the bait dealers indicated they communicated with their customers about what to do with unwanted baitfish and how to prevent the spread of AIS, we estimated that 69,750 anglers were currently being reached with information. If a similar number of bait dealers as boating facility managers were willing to do more (62%), we estimated that 77,500 anglers could be reached with additional information.

In a recent report by Lauber et al. (2014) that examined outreach efforts by organizations, who had as a primary goal prevention of the spread of AIS, found that those organizations saw funding and staff limitations impacting their ability to provide programs. They, like the angling and boating organizations we interviewed, felt that recreational users were aware of and concerned about AIS. Making use of the organizations, facilities, and businesses surveyed in this report seems a realistic option for multiplying the outreach efforts of the organizations interviewed by Lauber et al. and therefore reaching more recreational users.

Specific recommendations for each group surveyed and the potential contribution each recommendation could make to the prevention of the spread of AIS in the Lake Ontario basin are discussed below.

## **Boating Facilities**

Many boating facilities are contributing to the prevention of the spread of IS, primarily by providing information to their users. Three-fifths (62%) of the boating facilities representing an estimated 10,000 slips basin-wide are communicating in some way with their users. The most commonly mentioned way they provide information is by talking directly with them. The messages most often communicated were to “inspect boating and fishing equipment” and “remove any visible mud, plants, fish or animals before transporting equipment.” Fewer facilities are providing the means to implement some of the recommendations. For example, fewer than half of the facilities had boat cleaning capabilities (many of which were larger facilities with 60+ slips) and very few had all the necessary ingredients to allow their users to follow the recommendations to reduce the spread of AIS (e.g., hot water; disinfectant; way to dispose of mud, plants, or animals).

Two-fifths (38%) of the facilities—representing an estimated 8,000 slips—are not providing information to their users. There are fewer than 10% that are not taking any actions and are not willing to do so in the future. Many of the remainder are willing to do more in the future. In fact, facility operators representing an estimated 13,000 slips would like to do more than what they are currently doing. The primary actions they would like to take are to distribute materials or post signs. Signs are currently more popular among state park managers and brochures are more popular among private marinas and county/town parks. However, half of the facility managers were being held back because they didn’t know who to contact for materials. This seems like an obvious bottleneck to reaching recreational users that could be easily addressed.

At least half of the facility managers thought it was very important to educate their users. However, the messages being communicated appear limited. Expanding to the full range of messages including cleaning and drying recommendations may require more detailed communication with facility managers, who appear to have some basic knowledge and most are at least moderately concerned about AIS.

Since few boating facilities that we interviewed sold baitfish, they are generally not a good venue for communication efforts about how to prevent the spread of fish diseases and AIS via baitfish and the water baitfish are in. Bait dealers, discussed later, seem the more obvious choice.

Providing information is a relatively low cost, easy to implement action for boating facilities to undertake. Providing ways for users to dispose of potential AIS might also be relatively low cost and easy to implement. However, to convince facility managers to provide ways for users to clean their equipment (e.g., boat cleaning stations) will likely take more substantial outreach efforts. Since most are at least moderately concerned about AIS and many described their concerns in terms of an economic effect on them personally, outreach efforts could focus on the long-term economic benefits to facility managers of preventing the spread of AIS. However, increasing the capacity of boating facilities to provide boat washing capabilities likely will be very expensive. Managers did not indicate this as something they would be interested in doing even if another organization helped, so this makes it even more unlikely to happen. It is possible that interviewees did not think the help from other organizations would include financial or material assistance sufficient for such an undertaking, but without further discussions with facility managers we can’t be sure. One marina operator suggested that since more boats move in

and out of the water at the public launches than at the marinas, where boats are often kept in the water for the entire season and power washed by the marina operators at the end of the season, efforts to build boat washing capabilities should prioritize public boat launches.

The new law in New York regarding preventing the spread of AIS will put new regulations in place for activities, including removal of plant and animal material and draining all water holding compartments, which thus far have been just recommended actions. These regulations will particularly impact boating facilities. If funding or material assistance did become available as a result of this law, more facilities might be willing to consider adding these capabilities.

One caveat in our estimates of the capacity for additional outreach efforts: We estimated the number of slips, and therefore potential number of users, based on the assumption that facilities we could reach were similar to the ones we could not reach. Since the overall number of slips we estimated was similar to prior research (Connelly et al. 2002) this assumption is likely valid.

### **Angling and Boating Organizations**

The angling and boating organizations we spoke with thought it important to educate their membership about AIS and how to prevent their spread. They communicated information about AIS with their members via personal contact and at organization meetings. Half of the organizations also used their website and newsletters. The messages they tended to focus on were what could be done to prevent the spread by boating or fishing equipment (e.g., drain all water holding compartments, dry all equipment before use in another water body).

All organization representatives wanted to do more to educate their members and others about AIS and how to prevent their spread. They wanted to do this by having communication messages to share and by having more brochures or pamphlets to distribute. Five of the six representatives would be willing to allow others to communicate messages to their membership about preventing the spread of AIS.

The barriers to additional actions were primarily material in nature; they wanted more brochures and pamphlets to distribute, or lacked funds to acquire and distribute them. Four of the six also indicated they wanted to do more but could not find the time to do it. In general, lack of time can be interpreted as AIS being a lower priority than other objectives of the organization, although they all stated they wanted to do more.

Overall we found it difficult to reach organizations to conduct interviews. Once we found a working telephone number, we were often unable to speak with anyone. Perhaps this was because some of the organizations were small or the leadership was transient. Almost all of the representatives we spoke with were from angling organizations. This suggests that it may be challenging to establish ongoing communication to reach anglers through organizations.

### **Bait Dealers**

About half of the bait dealers indicated they talked one on one with their customers about what to do with unwanted baitfish and how to prevent the spread of AIS; fewer displayed signs or

handed out materials. Just over half of the bait dealers used one or more methods for communicating with their customers, which leaves less than half not communicating with their customers. The most frequently communicated message discussed what to do with unwanted baitfish, rather than how to remove AIS from fishing and boating equipment.

Almost all bait dealers had heard of AIS, and most had also heard of VHS. They were concerned about having AIS and fish diseases in the area, and believed VHS was a major threat to the health of fish populations in the Great Lakes region. This degree of concern is likely correlated with their willingness to try to follow the regulations regarding the sale and transport of baitfish. However, it was not correlated with their actions to educate their customers about what to do with unwanted baitfish and how to prevent the spread of AIS.

With just under half of the bait dealers not currently communicating messages about AIS and how to prevent their spread, the potential for increased communication with anglers through bait dealers remains great in this region. We did not ask this group if they would be willing to do more to communicate with their users, but perhaps the impediment to doing more is similar to boating facilities where many were willing to do more but need materials, such as brochures or signs they can post.

While most bait dealers sell baitfish and therefore the emphasis on messages about what to do with unwanted baitfish seems appropriate, many businesses are also engaged in other activities, such as selling fishing equipment and marina operations. Consequently, providing bait dealers who serve a large number of anglers with more educational materials on how to prevent the spread of AIS might provide an additional opportunity for communicating those messages with anglers. For example, a recent study of baitfish anglers in New York found that over half of them got information about baitfish regulations from bait dealers (Connelly and Knuth 2014).

### **Recommendations for Research**

Future research might be particularly instructive after the new law in New York is implemented to see how boating facilities and bait dealers have responded and if the law had the desired effect on recreational users. Also useful could be an evaluation of the different methods of informing recreational users about AIS and the impact of the various methods on behavior. For example, is direct communication more likely to change behavior than distribution of brochures and posted signs? If so, is the increased cost of direct communication methods commensurate with the increased changes in behavior? Experimental work would be most valuable in measuring differences and informing the priorities for expending resources on different types of programs.



## LITERATURE CITED

- Anderson, L. C., and D. R. Lee. 1986. Optimal governing instrument, operation level, and enforcement in natural resource regulation: the case of the fishery. *American Journal of Agricultural Economics* 68:678-690.
- Brown, T. L., D. J. Decker, and N. A. Connelly. 1989. Response to mail surveys on resource-based recreation topics: a behavioral model and an empirical analysis. *Leisure Sciences* 11(2):99-110.
- Connelly, N. A., K. M. Guerrero, and T. L. Brown. 2002. New York State inventory of Great Lakes' marinas and yacht clubs - 2002. HDRU Publ. No. 02-04. Dept. of Nat. Resour., N.Y.S. Coll. Agric. and Life Sci., Cornell Univ., Ithaca, N.Y. 30pp.
- Connelly, N.A. and B.A. Knuth. 2014. Anglers Who Use Baitfish in New York and Their Views on Recent Regulation Changes. HDRU Publ. No. 14-03. Dept of Nat. Resour., Coll. Agric. and Life Sci., Cornell Univ., Ithaca, N.Y. 40 pp.
- Connelly, N.A., T.B. Lauber, and R.C. Stedman. 2014. Reducing the Spread of Aquatic Invasive Species and Fish Pathogens in the Great Lakes: The Role of Bait Dealers. HDRU Publ. No. 14-8. Dept of Nat. Resour., Coll. Agric. and Life Sci., Cornell Univ., Ithaca, N.Y. 41pp.
- Dillman, D. A. 1978. Mail and telephone surveys: The total design method. Wiley; New York.
- Hatcher, A., S. Jaffry, and O. Thebaud. 2000. Normative and social influences affecting compliance with fishery regulations. *Land Economics* 76:448-461.
- Lauber, T.B., N.A. Connelly, and R.C. Stedman. 2014. Aquatic invasive species outreach to boaters and anglers in the Lake Ontario basin. HDRU Publ. No. 14-5. Dept. of Nat. Resour., Coll. Agric. and Life Sci., Cornell Univ., Ithaca, N.Y. 59 pp.
- Sutinen, J. G., and K. Kuperman. 1999. A socio-economic theory of regulatory compliance. *International Journal of Social Economics* 26:174-193.

**APPENDIX A: BOATING FACILITIES TELEPHONE INTERVIEW QUESTIONS**

A1. So first off, I'd like to know a little about your facility.

How many boat launch ramps do you have? \_\_\_\_\_

How many seasonal slips do you have? \_\_\_\_\_

How many transient (temporary) berths? Or average # of boats that could be accommodated in transient space? \_\_\_\_\_

Do you have boat cleaning facilities? \_\_\_No \_\_\_Yes

If yes, do you have:

Hot water? \_\_\_No \_\_\_Yes

Power washing facilities? \_\_\_No \_\_\_Yes

Disinfectant available? \_\_\_No \_\_\_Yes

Where does the water go (after being used to wash the boat)?

\_\_\_\_\_  
(From open-ended answer trying to determine if:

\_\_\_\_\_ Water goes directly back into lake/river

\_\_\_\_\_ Water goes into some type of sewer/dry well/ filtration system)

Do you have a way for people to dispose of mud, plants or animals (including insects and mussels) that might be on their boating or fishing equipment before they transport the equipment?

\_\_\_No

\_\_\_Yes -> Where do they put it? \_\_\_\_\_

Do you have a way for people to dispose of unwanted baitfish?

\_\_\_No

\_\_\_Yes -> Where do they put it? \_\_\_\_\_

Do you sell baitfish? \_\_\_No \_\_\_Yes

If yes, did you catch them in the Lake Ontario Basin or the St. Lawrence River or buy them from someone who caught them in the Lake Ontario Basin or the St. Lawrence River? \_\_\_No \_\_\_Yes \_\_\_\_\_Don't know where they come from

(if asked: defined as water below Niagara Falls, Lake Ontario itself, all waters connecting to Lake Ontario [including the Finger Lakes, Oneida Lake, portions of the Erie Canal, the Oswego,

Genesee, and Seneca Rivers, etc.], and the Upper St. Lawrence River as far downstream as Crossover Is.)

A2. How concerned are you about having aquatic invasive species in the Lake Ontario Basin and the Upper St. Lawrence River? Again when I talk about aquatic invasive species, I mean non-native plants and animals such as hydrilla, water chestnut, zebra mussels, and round gobies.

- Very concerned
- Moderately concerned
- Slightly concerned
- Not at all concerned

A3. Are you concerned about any specific aquatic invasive species that might be in, or get into the Lake Ontario Basin or the Upper St. Lawrence River?

- No
- Yes -> Which ones? (Don't read list, but check off those mentioned and inquire about those not mentioned)

Plants

- Didymo
- Eurasian watermilfoil
- Hydrilla
- Water chestnut

Animals

- Asian clam
- Round gobies
- Water fleas
- Zebra or quagga mussels

Others

\_\_\_\_\_ (list ones concerned about)

What are your primary concerns with these species? (Later may try to group answers by whether the concerns are personal vs. to a larger group, whether the concerns are economic, environmental, etc.)

---

---

A4. Do you have any signs posted at your facility telling people who boat or fish what actions they can take to prevent the spread of aquatic invasive species?

- No
- Yes -> How many? \_\_\_\_\_

Did you develop the signs or do you remember what organization you got the signs from?

Developed themselves

\_\_\_\_\_ (name of organization)

Don't recall

A5. Do you have any brochures or pamphlets available at your facility telling people who boat or fish what actions they can take to prevent the spread of aquatic invasive species?

No

Yes -> About how many do you distribute in a year? \_\_\_\_\_

What percent of people using your facility for boating or fishing do you think pick up the material? \_\_\_\_\_%

Do you remember what organization you got the literature from?

\_\_\_\_\_ (name)  Don't recall

A6. Do you or your staff talk to users who boat or fish about how to prevent the spread of aquatic invasive species?

No

Yes -> There are lots of messages out there about how to prevent the spread. Are any of these messages the ones you tell people? (Read list and check things they say they do)

Inspect boating and fishing equipment

Remove any visible mud, plants, fish or animals before transporting equipment.

Where to dispose of any material taken off equipment

Where to dispose of unwanted baitfish

Drain all water holding compartments including live wells, bait wells and bilge areas

Dry boats, trailers and all equipment before use in another waterbody.

Disinfect or rinse with hot water anything that came into contact with water, if it cannot be dried before reuse.

Never release plants, fish or animals into a body of water unless they came out of that body of water.

How many people who are boating or fishing do you think you or your staff talk to each year? \_\_\_\_\_

What % of those who are boating or fishing from your facility do you think that is? \_\_\_\_\_

A7. Do you have “watercraft (launch, boat) stewards” work at your facility? (If they ask what this means say it is a person who tries to look at boats with their owners and educate them about transporting aquatic invasive species.)

\_\_\_\_\_ No

\_\_\_\_\_ Yes -> What organization arranges for them to come to your facility?

\_\_\_\_\_

What type of activities do they engage in? (e.g., talk to boaters, hand out brochures, help wash boats) \_\_\_\_\_

\_\_\_\_\_

A8. Have you ever heard the phrase “Stop Aquatic Hitchhikers?”

\_\_\_\_\_ No

\_\_\_\_\_ Yes

A9. Given all of the activities that you have to do at your facility, how important is it that you and your staff educate your users about what they can do to prevent the spread of aquatic invasive species?

\_\_\_\_\_ Very important

\_\_\_\_\_ Moderately important

\_\_\_\_\_ Slightly important

\_\_\_\_\_ Not at all important

A10. How important do you think it is for people who boat or fish to learn about the things they can do to prevent the spread of aquatic invasive species?

\_\_\_\_\_ Very important

\_\_\_\_\_ Moderately important

\_\_\_\_\_ Slightly important

\_\_\_\_\_ Not at all important

A11. Given all the activities that you have to do at your facility, would you like to do more at your facility to educate users about aquatic invasive species or help them prevent the spread of aquatic invasive species?

No

Yes ->What would you like to do? (Check things mentioned, but do not read list)

Have (or have more) signs

Have (or have more) brochures or pamphlets to distribute

Have (or have more) boat washing facilities

Have (or have more) watercraft stewards

Other things: \_\_\_\_\_

A12. If another organization were able to provide volunteers, materials, or equipment, would you like to do more at your facility to educate users about aquatic invasive species or help them prevent the spread of aquatic invasive species?

No (IF THEY SAID NO TO A11 and A12, END INTERVIEW)

Yes ->What could others do for you? (Check things mentioned, but do not read list)

Put up signs

Bring/give me brochures to hand out

Provide funding to help me build boat washing facilities

Provide watercraft stewards

Other things: \_\_\_\_\_

A13. What do you think is holding you back from doing the things you'd like to do? (Check things mentioned, but do not read list)

Money

for staff

for signs, brochures

for facilities, like boat washing or bait disposal

Time (lower priority compared to other things)

Don't know enough about invasive species

Don't know who to contact for materials

Don't have space for boat washing facilities

Other reasons: \_\_\_\_\_  
\_\_\_\_\_

**APPENDIX B: ORGANIZATIONS TELEPHONE INTERVIEW QUESTIONS**

B1. So first off, I'd like to know a little more about your organization.

How many members do you have in your organization? \_\_\_\_\_

What percent do you think live in New York State full-time? \_\_\_\_\_%

For boating organizations, are you involved in:

- \_\_\_\_\_ Boat shows
- \_\_\_\_\_ Boating or sailing regattas, races, poker runs
- \_\_\_\_\_ Any other activities? \_\_\_\_\_

For fishing organizations, are you involved in:

- \_\_\_\_\_ Sportsman's shows or expos
- \_\_\_\_\_ Fishing tournaments
- \_\_\_\_\_ Fishing demonstrations
- \_\_\_\_\_ Any other activities? \_\_\_\_\_

How do you communicate with your members? (Don't read list, but check off methods mentioned and inquire about those not mentioned)

- \_\_\_\_\_ Newsletter
- \_\_\_\_\_ Website
- \_\_\_\_\_ Direct mailings
- \_\_\_\_\_ Workshops
- \_\_\_\_\_ Meetings of the organization members
- \_\_\_\_\_ Facebook
- \_\_\_\_\_ Twitter
- \_\_\_\_\_ Other: \_\_\_\_\_

B2. How concerned is your organization about having aquatic invasive species in the Lake Ontario Basin and the Upper St. Lawrence River? Again when I talk about aquatic invasive species, I mean non-native plants and animals such as hydrilla, water chestnut, zebra mussels, and round gobies.

- Very concerned
- Moderately concerned
- Slightly concerned
- Not at all concerned

B3. Is your organization concerned about any specific aquatic invasive species that might be in, or get into the Lake Ontario Basin or the Upper St. Lawrence River?

- No
- Yes -> Which one(s)? (Don't read list, but check off those mentioned and inquire about those not mentioned)

Plants

- Didymo
- Eurasian watermilfoil
- Hydrilla
- Water chestnut

Animals

- Asian clam
- Round gobies
- Water fleas
- Zebra or quagga mussels

Others

\_\_\_\_\_ (list ones concerned about)

What are your primary concerns with these species? (Later may try to group answers by whether the concerns are personal vs. to a larger group, whether the concerns are economic, environmental, etc.)

---

---



B4. Does your organization communicate to your members any messages about how to prevent the spread of aquatic invasive species?

No

Yes -> There are lots of messages out there about how to prevent the spread. Are any of these messages the ones you communicate? (Read list and check things they say they do)

Inspect boating and fishing equipment

Remove any visible mud, plants, fish or animals before transporting equipment.

Where to dispose of any material taken off equipment

Where to dispose of unwanted baitfish

Drain all water holding compartments including live wells, bait wells and bilge areas

Dry boats, trailers and all equipment before use in another waterbody.

Disinfect or rinse with hot water anything that came into contact with water, if it cannot be dried before reuse.

Never release plants, fish or animals into a body of water unless they came out of that body of water.

What method(s) do you use to communicate those messages? (Check all that are mentioned. Clarify subcategories, if needed.)

Newsletter

with information that you wrote

with information taken from another source

Website

with the information on your website

With the link to another website that has the information

Direct mailings

with information that you wrote

with information taken from another source

Workshops

using information that you wrote

using information taken from another source

Meetings of the organization members

using information that you wrote

using information taken from another source

Personal contact with members

Other: \_\_\_\_\_

B5. Have you ever heard the phrase “Stop Aquatic Hitchhikers?”

No

Yes

B6. What proportion of your membership do you think have ever heard of aquatic invasive species getting into the Lake Ontario Basin and the Upper St. Lawrence River?

- Almost Everyone
- Most members
- About half
- Some members
- Very few or none (SKIP TO Question B9)

B7. Of those who have heard about aquatic invasive species, what proportion do you think are concerned about having aquatic invasive species in the Lake Ontario Basin and the Upper St. Lawrence River?

- Almost Everyone
- Most members
- At least half
- Some members
- Very few or none

B8. Of those who have heard about aquatic invasive species, what proportion do you think are concerned about their personal role in the spread of aquatic invasive species?

- Almost Everyone
- Most members
- At least half
- Some members
- Very few or none

B9. Given all of the activities your organization is involved in, how important is it that your organization educates its members about what they can do to prevent the spread of aquatic invasive species?

- Very important
- Moderately important
- Slightly important
- Not at all important

B10. How important does your organization think it is for your members to learn about the things they can do to prevent the spread of aquatic invasive species?

- Very important
- Moderately important
- Slightly important
- Not at all important

B11. Given all of the activities your organization is involved in, would you like to do more to educate your members or other organizations about aquatic invasive species or help them prevent the spread of aquatic invasive species?

No -> (SKIP TO B13)

Yes ->What would you like to do? (Check things mentioned, but do not read list)

Have (or have more) communication messages to share with our members

Have (or have more) brochures or pamphlets to distribute to our members

Have (or have more) communication messages to share with others

Have (or have more) brochures or pamphlets to distribute to others

Hold public educational events/workshops

Other things: \_\_\_\_\_

B12. What do you think is holding you back from doing those things? (Check things mentioned, but do not read list)

Money

for staff

for signs, brochures

Time (lower priority compared to other things)

Don't know enough about invasive species

Don't know who to contact for materials or workshop presentations

Not everyone in leadership positions shares my concerns about aquatic invasive species

Other reasons: \_\_\_\_\_

B13. Would you be willing to allow others to communicate messages to your membership about preventing the spread of aquatic invasive species?

No

Yes

# A SURVEY OF BAIT DEALERS IN THE GREAT LAKES REGION



Cornell University  
Human Dimensions Research Unit

## A SURVEY OF BAIT DEALERS IN THE GREAT LAKES REGION

Research funded by the  
Great Lakes Fishery Commission

Research conducted by the  
Human Dimensions Research Unit  
Department of Natural Resources  
Cornell University

Cornell University is conducting this survey, funded by the Great Lakes Fishery Commission, to learn about the concerns bait dealers may have regarding fish diseases and aquatic invasive species. We also want to know about the impacts of USDA-APHIS and state regulations on your bait business. The Commission, state agencies, and other organizations will use the results of this survey to better understand the concerns of bait dealers, how best to reach them with new information about fish diseases and aquatic invasive species, and how best to respond to new species and diseases.

Your business was selected from the list of licensed bait dealers in your state. Your participation in this survey is voluntary, but we sincerely hope you will take just a few minutes to answer our questions. We do not seek any financial information from you. Your identity will be kept confidential and the information you give us will never be associated with your name.

Please complete this questionnaire as soon as you can, seal it with the white re-sealable label provided, and drop it in any mailbox; return postage has been paid.

**THANK YOU FOR YOUR HELP!**

**1. How many years has your business had a bait dealer license?**

\_\_\_\_\_ years

**2. What type of bait business do you operate? (Check all that apply.)**

- Sell bait wholesale
- Sell bait retail
- Raise baitfish
- Collect baitfish from public waters

**3a. Which of the following types of bait do you sell? (Check all that apply.)**

- Emerald Shiners
- Golden Shiners
- Fathead Minnows
- Other species of Minnows or Shiners
- Herring (includes alewife)
- Suckers
- Other fish
- Crayfish
- Frogs
- Other bait

**3b. In the list above, please circle the type of bait you sell the most.**

**4. Some baitfish are “certified” disease-free. Do you sell any “certified” disease-free baitfish?**

- No
- Yes
- Don't know

**5. Where do you get your baitfish? (Check all that apply.)**

- Public waters / Wild
- Private ponds / Farm-raised
- Other dealers
- Other sources (Please list: \_\_\_\_\_)
- Don't know

**6. Approximately what percentage of your business's gross revenue is attributable to the sale of bait?**

\_\_\_\_\_ %

**7. Do you think any of the bait you sell is used by anglers fishing in Great Lakes waters?** (When we say "Great Lakes waters," we mean the 5 Great Lakes and rivers or streams that run into them or connect them, like the St. Mary's River, Niagara River, or St. Lawrence River. See map on front cover.)

- No, none
- Yes, some
- Yes, most or all
- Don't know

**8. Have you ever heard of the fish disease called VHS (viral hemorrhagic septicemia)?**

- No
- Yes, recognize the name but don't know much about it
- Yes, recognize the name and know something about it

**If yes, do you:** (Check all that apply.)

- Buy baitfish that have been tested for the disease
- Have baitfish that you catch tested for the disease

**9. Have you ever heard of aquatic invasive species?** (By aquatic invasive species, we mean non-native plants and animals such as Eurasian water milfoil, zebra mussels, Asian carp, and round gobies.)

- No
- Yes, but I don't know much about them
- Yes, I am familiar with them

**If yes, do you try to tell if aquatic invasive species are present in baitfish you collect before selling them?**

- No
- Yes
- Not applicable, because I don't collect my own baitfish

**10. How strongly do you agree or disagree with the following statements? (Check one box for each statement.)**

	Strongly agree	Agree	Neutral	Disagree	Strongly disagree	Don't know
The spread of <u>fish diseases</u> is bad for my business	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Fish diseases can hurt the species of fish anglers like to fish for	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Fish diseases can harm people	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
VHS is a major threat to the health of fish populations in the Great Lakes Region.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
The spread of fish diseases is inevitable	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
I want to do all I can to prevent the spread of fish diseases	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
<u>Aquatic invasive species</u> can harm native fish populations	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Aquatic invasive species can reduce the number of fish available for anglers to catch	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
The spread of aquatic invasive species is inevitable	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Aquatic invasive species can damage boats or fishing equipment	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Aquatic invasive species can prevent use of some areas for boating or swimming	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
I have a good understanding of issues related to aquatic invasive species	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>



**11. Some states and organizations provide information to bait dealers that they can share with their customers about what to do with unwanted baitfish and how to prevent the spread of aquatic invasive species. Do you share this type of information with your customers in any of the following ways? (Check all that apply.)**

Display signs or posters

→ How many did you have up over the past year? \_\_\_\_\_

Hand out informational materials

→ About how many do you distribute in a year? \_\_\_\_\_

Talk one on one to customers

→ About how many do you talk to in a year? \_\_\_\_\_

*If you don't share information, skip to Question 14.*

**12. What does the information focus on? (Check all that apply.)**

What to do with unwanted baitfish

How to clean fishing equipment to remove aquatic invasive species

How to clean boats and boating equipment to remove aquatic invasive species

**13. Do you recall the source(s) of this information?**

No

Yes → Please list: \_\_\_\_\_

\_\_\_\_\_

**14. How concerned are you about having fish diseases in the Great Lakes Region?**

Very concerned

Moderately concerned

Slightly concerned

Not at all concerned

**15. How concerned are you about having aquatic invasive species in the Great Lakes Region?**

Very concerned

Moderately concerned

Slightly concerned

Not at all concerned

**16. The USDA-APHIS (U.S. Department of Agriculture Animal and Plant Health Inspection Service) regulates the movement of live bait into the U.S. and between states. How familiar are you with USDA-APHIS regulations about bait movement?**

- Very familiar
- Moderately familiar
- Slightly familiar
- Not at all familiar

**17. I try to follow the USDA-APHIS regulations:**

- All of the time
- Most of the time
- Some of the time
- Not applicable

**18. Some states have regulations about the sale and transport of baitfish to prevent the spread of aquatic invasive species and fish diseases. How familiar are you with the regulations in your state?**

- Very familiar
- Moderately familiar
- Slightly familiar
- Not at all familiar

**19. I try to follow my state's regulations about the sale and transport of baitfish:**

- All of the time
- Most of the time
- Some of the time
- Not applicable

**20. Has your business ever participated in a training program called AIS-HACCP (Aquatic Invasive Species – Hazard Analysis and Critical Control Point)?**

- No
- Yes
- Don't know

**21. Please indicate the sources from which you have received information about regulations intended to prevent the spread of fish diseases and aquatic invasive species. Also, please indicate how trustworthy you think these sources are. (Check all that apply.)**

Information Sources	Did you get information from this source? (Check all that apply.)	Trustworthiness of source (Rate each source)		
		Not at all Trustworthy	Somewhat Trustworthy	Very Trustworthy
USDA-APHIS	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
My state's fish and wildlife agency	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Other government agencies	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Sea Grant	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Other bait dealers	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Educational institutions (e.g., Universities)	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Other (please specify): _____	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>

**22. What are the best ways to reach you with information about new regulations? (Check all that apply.)**

- Direct mailing from my state's fish and wildlife agency
- As part of my bait dealer license form
- Web site of my state's fish and wildlife agency
- Web site of USDA-APHIS
- Conference or workshop
- iPhone/Smartphone apps
- Other (please specify): \_\_\_\_\_

**23. How strongly do you agree or disagree with the following statements about the regulations of USDA-APHIS and your state regarding the sale and transport of baitfish?** (Check one box for each statement.)

	Strongly agree	Agree	Neutral	Disagree	Strongly disagree	Don't know
Regulations about the transport of baitfish are needed to keep fish diseases from spreading	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Bait dealers weren't asked for their opinions before current regulations were put in place	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
The cost of baitfish has gone up as a direct result of the regulations	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
The cost of baitfish has nothing to do with the regulations	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
I sell fewer baitfish because of the regulations	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
USDA-APHIS regulations are too complex	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
My state's regulations are too complex	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
The regulations are not effective at preventing the spread of fish diseases	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
The regulations are unnecessary	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
I don't think opinions of bait dealers were seriously considered before current regulations were put in place	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>

**24. How important is it to you that you follow the regulations of USDA-APHIS and your state regarding transport and sale of baitfish?**

- Very important
- Moderately important
- Slightly important
- Not at all important

**25. How strongly do you agree or disagree with the following statements about the regulations of USDA-APHIS and your state regarding the sale and transport of baitfish?** (Check one box for each statement.)

	Strongly agree	Agree	Neutral	Disagree	Strongly disagree	Don't know
It is easy for me to follow the regulations	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
It takes too much time to follow the regulations	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
It costs too much to follow the regulations	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
I don't know enough about the regulations to follow them	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Most bait dealers think it is important for us to follow the regulations	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Most bait dealers follow the regulations	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
I trust the opinions of other bait dealers about the importance of following the regulations	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
I trust my state natural resource agency when it comes to the importance of following the regulations	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
If I follow the regulations, that will help limit the spread of fish diseases	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
I have a hard time complying with USDA-APHIS regulations	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
I have a hard time complying with my state's regulations	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
I don't think USDA-APHIS knows enough about fish diseases and how they are spread	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
I don't have the equipment or facilities to follow all the regulations	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
I think the regulations unfairly burden baitfish dealers	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>

### BACKGROUND INFORMATION

**26. Are you male or female?** (Check one.)  Male  Female

**27. In what year were you born?** 19\_\_\_\_\_

**28. What is the highest level of education you have completed?**

*(Check one.)*

- Less than high school
- High school diploma / G.E.D.
- Some college or technical school
- Associate's degree
- College undergraduate degree (e.g., B.A., B.S.)
- Graduate or professional degree (e.g., M.S., Ph.D., M.D., J.D.)

**Please use the space below for any comments you wish to make.**

**Thank you for your time and effort!**

To return this questionnaire, simply seal it with the white removable seal, and drop it in the mail (return postage has been paid).