

2011 Nebraska Aquatic Invasive Species Boater Survey



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Executive Summary

We conducted a survey of registered boaters in Nebraska in the fall of 2011 to gauge the level of awareness of aquatic invasive species (AIS) and steps that are currently taken to prevent their spread. In addition, the survey allowed us to evaluate the effectiveness of our outreach campaign and to identify which locations are at high-risk for aquatic invasive species introductions. A total of 832 surveys were completed online or returned via mail (estimated 27% response rate). The Mississippi River Basin Panel on Aquatic Nuisance Species encouraged and partially funded this project. The objectives of this project are outlined below:

Objectives:

1. Gauge level of awareness and attitude of registered boat owners towards aquatic invasive species and assess prevention practices.
2. Identify the most efficient method for distributing aquatic invasive species information to registered boat owners.
3. Identify current aquatic invasive species prevention efforts.
4. Examine inter- and intra-state movement of registered boat owners to identify potential aquatic invasive species introduction pathways.

1) Most respondents had some knowledge of zebra mussels (due to a recent infestation in an urban lake in Omaha) and Asian carp as well as white perch (likely due to the national and regional media attention these species have received). There was an obvious lack of awareness for AIS plants and VHS. Those that were well aware of AIS felt a strong need to prevent their spread. Approximately half of the respondents currently took *some* action to prevent the spread of AIS; however, most of them were likely to take precautions in the future. Nearly 87% were willing to spend at least \$1 (ranging \$1 - >\$10) towards AIS prevention efforts.

2) The best sources of AIS information reported by respondents included signs at boat ramps, information provided in fishing/boating regulations, information provided by the state agency, newspaper articles, and TV. Less important sources included information via internet websites, as well as conferences/events. Boaters generally were motivated to prevent the spread of AIS because of their personal responsibility to keep AIS out of waterbodies. Other measures that led survey participants to take preventative actions included signs at boat ramps, brochures handed out in person, boat inspections, and regulations preventing the transport of AIS (including enforcement and fines, checks and laws).

3) Approximately half of the respondents currently took *some* action to prevent the spread of AIS; however, the majority was likely to take precautions in the future. Common prevention actions included inspecting watercraft for AIS, drying, and draining watercraft. Few flushed the motor or rinsed their watercraft regularly.

4) The majority of boaters visited 2-5 different waterbodies during the 2011 boating season and over 1/3 visited waterbodies in other states (primarily KS, IA, SD, MO, CO). Most respondents traveled over 100 miles on average and the majority of boaters removed their boats from water for at least 5 days (ranging 5 – 30 days) before re-launching.

Overall, AIS awareness in Nebraska needs to be increased, particularly related to boater prevention methods. Funding should target outreach efforts in areas identified by boaters to be most effective. A similar survey should be performed in 2014 to determine if knowledge and prevention have increased as a result of improved outreach and education efforts.

Introduction

Invasive species are a source of significant ecological and socio-economic problems throughout North America and are considered one of the most important threats to global biological diversity (Vitousek et al. 1996). Invasive species have colonized virtually every ecosystem type on Earth subsequently affecting the native biota (Vitousek et al. 1997), and causing economic hardships to the citizens of the invaded regions. Dr. David Pimentel and colleagues (2005) estimate that there are over 50,000 plant, animal and microbe invasive species in the United States, costing more than \$120 billion annually.

A group of invasive species that often go undetected are those that are hidden below water, aquatic invasive species (AIS). The U.S. Geological Survey has identified over 100 non-native aquatic species in Nebraska representing plant, animal, and microbe groups (USGS 2009). Although some non-native species present no readily discernible threat to the economy or environment, several of the species present have already become major problems in Nebraska or in neighboring states, costing millions of dollars in damages (e.g., *Phragmites*). Two of the most detrimental aquatic invasive species are zebra and quagga mussels. These species produce high-density colonies and filter out food from the water which greatly reduces the availability of food for other fish species, including young sport fish. Zebra and quagga mussels also threaten the availability and quality of water as they are notorious for clogging water intake pipes, irrigation pipes and intake lines of power plants.

Nebraskan's rely on limited water resources for a number of activities such as agriculture, sport fishing, recreation, and consumption. Nebraska's aquatic ecosystems have already been invaded by AIS such as Asian carp, white perch, and *Phragmites*, among others. Carp and white perch invade and their populations quickly increase, eventually dominating the waters. These species and others have led to the rehabilitation of a number of lakes in the last 10 years, costing the state millions of dollars. The environmental and socio-economic costs resulting from AIS infestations will continue to rise with further introductions and invasions, making the costs associated with managing AIS a big concern for Nebraska, because funding for eradication and control is extremely limited. The future of Nebraska's aquatic resources requires a concerted and directed response to the threat posed by aquatic invasive species.

An important vector of aquatic invasive species dispersal is through transport of watercraft and boating equipment from an infested waterbody to an uninfested one. Because boaters play such a large role in preventing the spread of aquatic invasive species, we recently developed outreach campaigns to help educate boaters on the impacts of aquatic invasive species, and how to prevent their spread. This survey will serve to evaluate the effectiveness of our outreach campaign and will provide important information about which campaign methods should be continued. In addition, this survey will allow us to identify which locations are at high-risk for aquatic invasive species introductions.

Methods

For the past several years, the Mississippi River Basin Aquatic Nuisance Species Panel (MRBP) has provided \$5,000 to states to help offset the costs of conducting an extensive mail survey in order to gauge the knowledge level of and precautions taken by stakeholders that utilize waters-of-the-state. These existing surveys were utilized to develop Nebraska's Aquatic Invasive Species Boater Survey. Some variations occur to better reflect Nebraska's concerns and management goals; however, sufficient similarities exist to assist in comparison between states. We distributed 3,100 surveys to registered boaters using addresses obtained from the Nebraska County Treasurers Office and emails were sent to approximately 350 individuals with a link to an online version of the survey. Survey responses were entered into a Microsoft Access Database as they were returned and analyzed using SPSS 19.0. Student employees at the University of Nebraska assisted in the dissemination, collection, data entry, and analyses of the surveys.

Results

A total of 832 surveys were completed and returned from November 15 - December 31, 2011 giving us a response rate of 27%. Overall, these respondents represented 81 (of the 93) counties in Nebraska. Approximately 37% of the respondents indicated their primary boating activity was for angling while 31% were boating primarily for recreation (non-angling) and 32% indicated both.

Objectives:

1. Gauge level of awareness and attitude of registered boat owners towards aquatic invasive species and prevention practices.

The respondents were asked if they had heard of a variety of invasive species, including silver carp, snakehead, Phragmites, mysterysnail, zebra/quagga mussels, and Viral Hemorrhagic Septicemia (VHS) (among others) and how important they thought it is for boaters to prevent the spread of these species. The results show that overall most people ranked stopping invasive species as very important, even if they had not heard of those species before. This shows relatively high awareness and concern about invasive species by many in the state. The species that most respondents had heard of, for example the zebra/quagga mussel (88% boaters said they had heard of them) was also ranked as very important for prevention (83%). In contrast, those species that most respondents had not heard of, for example VHS (6% said they heard of it) only 61% of boaters ranked its prevention as very important. It is not surprising most people in Nebraska recognized the threat posed by zebra/quagga mussels because they have been well publicized especially in Eastern Nebraska after the infestation in an urban lake in Omaha (Zorinsky Lake) in October 2010. Also boaters in the Western Nebraska had relatively high awareness of AIS, likely due to the strong prevention/inspection program in . This suggests that with education people understand the dangers of these aquatic invasive species and realize how big a threat they are to the ecosystem. Boaters were also asked how much of an increase in boating registration would they support if the additional money was used to fund aquatic invasive species prevention activities. They were given the option of \$0, \$1, \$2, etc. up to more than \$10. Most boaters supported an increase if it were to fund AIS prevention with the percentages spread widely

across the board. Only 27% said they would not support an increase (\$0) while 25% said they would support a \$4 to \$5 increase. See tables below for further details. *Percentages representative of those responded (excluded no response).

Have you heard of these invasive species?*			How important do you think it is for boaters to help prevent the spread of these species?*			
	Yes	No	Very Important	Somewhat Important	Not Important	Don't Know
Silver carp	52%	48%	72%	10%	2%	16%
Bighead carp	54%	46%	72%	10%	2%	16%
Grass carp	75%	25%	69%	13%	4%	14%
Rudd	9%	91%	63%	10%	1%	26%
Snakehead	42%	58%	71%	9%	1%	19%
White perch	64%	36%	68%	13%	3%	16%
Eurasian watermilfoil	22%	78%	64%	9%	2%	25%
Purple loosestrife	29%	71%	65%	9%	1%	25%
Curly leaf pondweed	16%	84%	63%	9%	2%	26%
Phragmites (common reed)	35%	65%	66%	12%	2%	20%
Yellow floating heart	3%	97%	62%	8%	1%	29%
Mystery snail	8%	92%	62%	8%	2%	28%
Asian Clam	13%	87%	65%	9%	1%	25%
Zebra/quagga mussel	88%	12%	83%	8%	1%	8%
Rusty Crayfish	22%	78%	62%	11%	2%	25%
VHS	6%	94%	61%	8%	1%	30%

How much of an increase in boating registration would you support if the additional money was used to fund aquatic invasive species prevention activities?

\$0	27%
\$1	14%
\$2	12%
\$3	5%
\$4 to \$5	25%
\$6 to \$10	10%
More than \$10	7%

Objective 2. Identify the most efficient method for distributing aquatic invasive species information to registered boat owners.

The respondents were asked where they had heard about aquatic invasive species and given the choice of Newspaper/magazine (the highest at 67%), Television, Nebraska Game and Parks publication, Books, etc. and told to check all that apply. The results show that the most effective communications to boaters about aquatic invasive species were through Newspaper/magazines, Television, Nebraska Game and Parks publications, Signs at marina or boat ramp, Bait/boat shops, and Fishing/boating regulations. Boaters were also asked how effective particular messaging would be in getting them to take steps to prevent the spread of aquatic invasive species. Choices included: friends/relatives, enforcement checks, 100th Meridian, etc. Boaters indicated that the most effective ways would be the ‘desire to keep aquatic invasive species out of Nebraska’, ‘a sense of personal responsibility’, ‘concern over Nebraska’s natural resources’, and desire to prevent damage to boat. Out of these 4 options, 87% of boaters said yes, that Personal responsibility already led them to take action and 83% of respondents said that the Desire to keep aquatic invasive species out of Nebraska led them to take action. Boaters did indicate that Laws or regulations to prevent the transport of invasive species, Enforcement checks, and Fines would be also effective: 51% of boaters indicated that Laws and regulations would be very effective, 48% thought Enforcement checks would be very effective, and 46% believe that Fines would be very effective at preventing the spread of aquatic invasive species. See tables below for further details. *Percentages representative of those responded (excluded no response).

Where have you heard about aquatic invasive species? (check all that apply)

Newspaper/magazine	67%
Television	56%
Radio	27%
Billboards	13%
Internet web sites	20%
Nebraska Game and Parks publication	64%

Conference/meeting	6%
Fishing/boating contests	8%
Booth at event	7%
Club/organization	8%
Other boaters	26%
Signs at marina or boat ramp	64%
Bait/boat shop	61%
Fishing/boating regulations	54%
Boat registration	23%
Boating safety course	5%
Creel survey or boat inspection program	10%
Brochures, flyers	27%
Books	7%
Educational videos	2%
Other	5%
Nowhere	2%

How effective would the following be in getting you to take steps to prevent the spread of aquatic invasive species? In the last column, please indicate which ones already led you to take action.

	Very effective	Somewhat effective	Not effective	Led me to take action:	
				YES	NO
Friends/relatives	43%	44%	13%	50%	50%
Sense of personal responsibility	80%	19%	1%	87%	13%
Desire to keep aquatic invasive species out of Nebraska	81%	18%	1%	83%	17%
Concern over Nebraska's natural resources	79%	20%	1%	81%	19%
Desire to prevent damage to my boat	63%	26%	11%	68%	32%
Laws or regulations to prevent the transport	51%	36%	13%	57%	43%
Enforcement checks	48%	35%	17%	42%	58%

Fines	46%	32%	22%	31%	69%
Media (newspaper, magazines, radio, TV)	38%	50%	12%	53%	47%
Billboards	25%	51%	24%	39%	61%
Internet web sites	22%	49%	29%	34%	66%
Conferences/workshops	16%	44%	40%	23%	77%
Brochures and other printed material	33%	55%	12%	63%	37%
Videos/presentation at boat, lake, sporting association	24%	48%	28%	27%	73%
100th Meridian Initiative information	13%	40%	47%	13%	87%
Signs at marina or boat ramp	67%	31%	2%	73%	27%
Inspection programs at boat ramp	57%	33%	10%	48%	52%

Objective 3. Identify current aquatic invasive species prevention efforts.

Boaters were asked if they took steps to prevent the transport of aquatic invasive species; 49% responded that they took prevention steps and 51% responded that they did not. Those boaters that checked no were asked for a reason as to why they did not take any action. Out of those boaters that responded 'no,' 51% said they did not boat on infested waters. 3% said they did not believe it will prevent the spread and only 1% said they did not have the time. Boaters were also asked how often they did specific preventative actions after removing boat from the water: Visually inspect boat and equipment, Drain water from boat (bilge, live well, etc.), Rinse boat with high pressure and/or hot water, Allow boat to dry for at least 5 days, etc. Most boaters (84%) said they almost always visually inspect boat and equipment. In addition, 91% said they almost always drain water from their boat and 81% said they almost always remove plants/animals from boat and equipment.. Though boaters said they do not usually flush the motor or rinse their boat with high pressure, 73% said they almost always allow the boat to dry for at least 5 days and 22% said they do this sometimes. Finally, boaters were asked how likely they would be to take precautions in the future if they boated in infested waters. 73% of boaters said they were very likely to take precautions while only 1% said they were not at all likely (14% said they never boat in infested waters).

See tables below for further details. *Percentages representative of those responded (excluded no response).

Did you take any steps to prevent the transport of aquatic invasive species? If no, please check reason.

Yes 49%	No 51%
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Don't believe it will prevent the spread of aquatic invasive species	3%
It's inconvenient, don't have the time	1%
I don't know what I'm supposed to do	19%
I didn't boat in infested waters	51%
I don't believe aquatic invasive species are a problem	1%
Boat decontamination equipment is not readily available	7%
Other	18%

After removing boats from the water, how often do you do the following?

	Almost always	Sometimes	Never
Visually inspect boat and equipment	84%	13%	3%
Drain water from boat (bilge, live well, etc)	91%	5%	4%
Remove plants/animals from boat and equipment	81%	11%	8%
Flush motor with tap water	14%	28%	58%
Rinse boat with high pressure and/or hot water	24%	33%	43%
Allow boat to dry for at least 5 days	73%	22%	5%
Release leftover baitfish into water	13%	15%	72%
Other (please explain)	69%	8%	23%

If you boat in infested waters, how likely is it that you will take precautions in the future to prevent the spread of aquatic invasive species?

Very likely	73%
Somewhat likely	11%
Not very likely	1%
Not at all likely	1%
I never boat in infested waters	14%

Objective 4. Examine inter- and intra-state movement of registered boat owners to identify potential aquatic invasive species introduction pathways.

Boaters were asked how many different waterbodies they visited with their boat. Approximately 45% of boaters said they visited only 1 waterbody in 2011, 48% said 2-5, 6% said 6-10, and only 1% said they visited more than 10. When asked if they transported their boat outside of Nebraska 68% of boaters said no and 32% said yes.. The majority of those boats travelling to other states went to South Dakota, Kansas, and Iowa. Respondents were asked on average how far apart the different waterbodies they visited were. Approximately 41% said they never moved the boat, 22% said they went 101 to 500 miles, and only 2% said greater than 500 miles. When boaters were asked what was the furthest they transported their boat, 30% said they never moved boat and 29% said 101 to 500 miles. Boaters were asked how long their boat was in the water before it was moved to a different waterbody; 39% of boaters said they never moved their boat, another 39% said 1 day or less, and 14% said 2 to 4 days. When asked how long their boat was out of the water before was being moved to a different waterbody, 39% said they never moved their boat, 25% said 5 to 14 days, and 16% said 15 to 30 days.

See tables below for further details. *Percentages representative of those responded (excluded no response).

How many different waterbodies did you visit with your boat?

Only 1	45%
2-5	48%
6-10	6%
More than 10	1%

Did you transport your boat OUTSIDE Nebraska?

Yes...	32%
Which state(s)?	SD: 26%
	KS: 23%
	IA: 12%
No	68%

On average, how far apart were the different waterbodies you visited?

I never moved the boat	41%
Less than 10 miles	3%
11 to 50 miles	15%
51 to 100 miles	17%
101 to 500 miles	22%
More than 500 miles	2%

What was the furthest you transported your boat?

I never moved the boat	30%
Less than 10 miles	4%
11 to 50 miles	15%
51 to 100 miles	16%
101 to 500 miles	29%
More than 500 miles	6%

On average, how long was your boat IN the water before being moved to a different waterbody?

I never moved the boat	39%
One day or less	39%
2 to 4 days	14%
5 to 14 days	6%
15 to 30 days	1%
More than 30 days	1%

On average, how long was your boat OUT of the water before being moved to a different waterbody?

I never moved the boat	39%
One day or less	3%
2 to 4 days	4%
5 to 14 days	25%
15 to 30 days	16%
More than 30 days	13%

The following questions were included to meet the needs of Nebraska’s prevention program, but did not align with any of our objectives under the funding proposal. By asking the boater the primary purpose we could distinguish what most Nebraskans prefer to do with their boats. The relationship between whether or not anglers take invasive species more seriously than non-angling boaters will help us better direct our efforts in the future. The type of boat used by individuals is also important as we can determine what kind of boats we are most likely to see in the field and determine which ones pose a higher risk of transporting invasive species. Boat type could also affect reservoir selection e.g. bigger boats bigger reservoirs and can be used to help predict high-risk reservoirs.

Additional Questions in Survey:

Did you use a boat in 2011?

Yes	85%
No	15%

What was the primary purpose for your boat use?

Angling	38%
Recreation	31%
Both	31%

What type of boat(s) did you use (check all that apply)?

Houseboat	0%
Pontoon	11%
Sailboat	1%
Airboat	1%
Wakeboat	2%
Powerboat greater than 26 ft	1%

Powerboat 16ft-26ft	66%
Powerboat less than 16ft	9%
Jet ski	5%
Canoe. Kayak	1%
Drift boat	1%
Other	2%

Did you boat on waters that were infested with invasive species? If yes, please check how you knew.

Yes: 22%	No: 78%	Don't Know
Sign at marina or boat ramp	75%	
Brochure, fact sheet, etc	3%	
Fishing/boating pamphlet	3%	
Internet web site	1%	
Watercraft educator/inspector	1%	
Media (newspaper, radio, TV)	6%	
Friend/relative	6%	
Other	5%	

How likely are you to support legislation that would establish rules and regulations to better manage aquatic invasive species?

Very likely	54%
Somewhat likely	33%
Not very likely	8%
Not at all likely	5%

Did aquatic invasive species cause problems for you or affect your recreational experience in 2011?

Yes	6%
No	94%