2020 UW-Oshkosh Boat Decontamination Program Data Analysis

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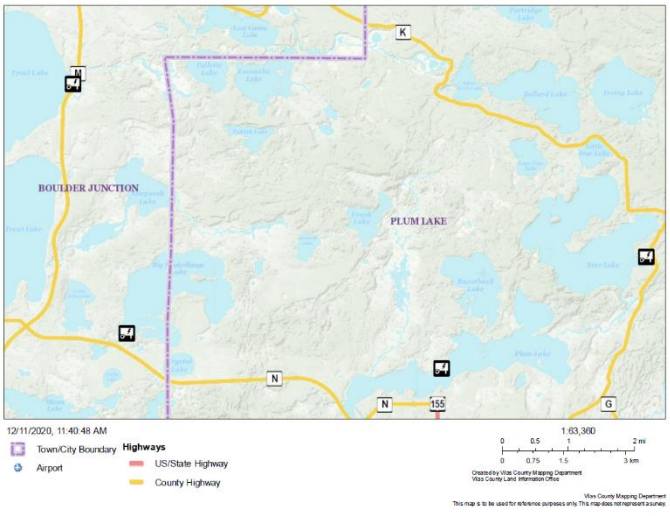
2020 UW-Oshkosh Boat Decontamination Program Overview

The 2020 UW-Oshkosh Boat Decontamination Program in Vilas County has been in place since 2018. UW-Oshkosh interns were stationed at four different boat launches between June-August 2020 to offer voluntary decontamination via hot pressure washing of boat & equipment to any willing boaters in an effort to further prevent the spread of small-bodied aquatic invasive species (AIS). In particular, the target species of this program are invasive spiny waterfleas, and to a slightly lesser degree zebra mussels. Most of Vilas County's lakes do not provide suitable habitat for zebra mussels, but do provide ample suitable habitat for spiny waterfleas (Spear et. al.). The single hot pressure washer is a 200 gallon mobile unit on a trailer.

Decontamination sites were predetermined from previous program years based on: proximity to other spiny waterflea infestations, location safety, ability for wash water to infiltrate vs. run off into surface waters, boater traffic rates, space available at the launch area, and willingness of launch owners to partner with the program. Target lakes in 2020 were Big Muskellunge Lake (3-12 miles away from the following three spiny waterflea verified lake landings); Plum Lake (verified spiny waterflea in 2019); Star Lake (verified spiny waterflea in 2013); Trout Lake (verified spiny waterflea in 2014). Boaters responding to surveys that used the decontamination services continue to be predominantly Fishing Boats (79%). Previous and planned future boater transiency within 5 days of the encounter with a boater was reported to be at 29%, which is lower than previous years (2019 = 41%). Some boaters take steps on their own beyond state requirements to prevent AIS spread. High pressure washing, low pressure washing, chemical treatments, or wiping down their boat on their own were reported in 34 of the 335 boaters encountered (10%). By asking boaters about lakes they took their boat to in the last five days, and where they plan to take their boat in the next 5 days, a lake list was made of potential exposure to spiny waterflea and zebra mussels. Eighteen lakes were potentially exposed to these AIS due to not decontaminating or taking extra steps, and 16 lakes were potentially

2020 UW-Oshkosh Boat Decontamination Sites



Boats were decontaminated at 4 boat landings on the Northern Highlands State Forest – 3 of the lakes have verified spiny waterfleas, and 1 does not.

protected from exposure to these AIS due to accepting decontamination services. Overall, boaters that decontaminated their boats with the UW-Oshkosh program and took a paper survey while the intern was washing their boat (57 respondents) had favorable perceptions of the program: 61% believe the staffed hot pressure washing method was very effective in preventing AIS spread; 79% indicate they are very likely to use the UW-Oshkosh boat decontamination services again; and 70% say they definitely would like to see the UW-Oshkosh boat decontamination services continue at strategic boat landings in Vilas County. Boaters who declined decontamination were asked to also complete a very brief verbal survey on why they chose to not decontaminate (54 respondents) and what might motivate them participate (42 participants). Not having enough time to participate accounted for 63% of reasons decontamination was declined. Similarly, 73% of respondents said they would decontaminate if they had more time to do so.

UW-Oshkosh Decontamination Program Data: 2018-2020 Comparison Table

Data sourced from UW-Oshkosh Decontamination Program Annual Reports

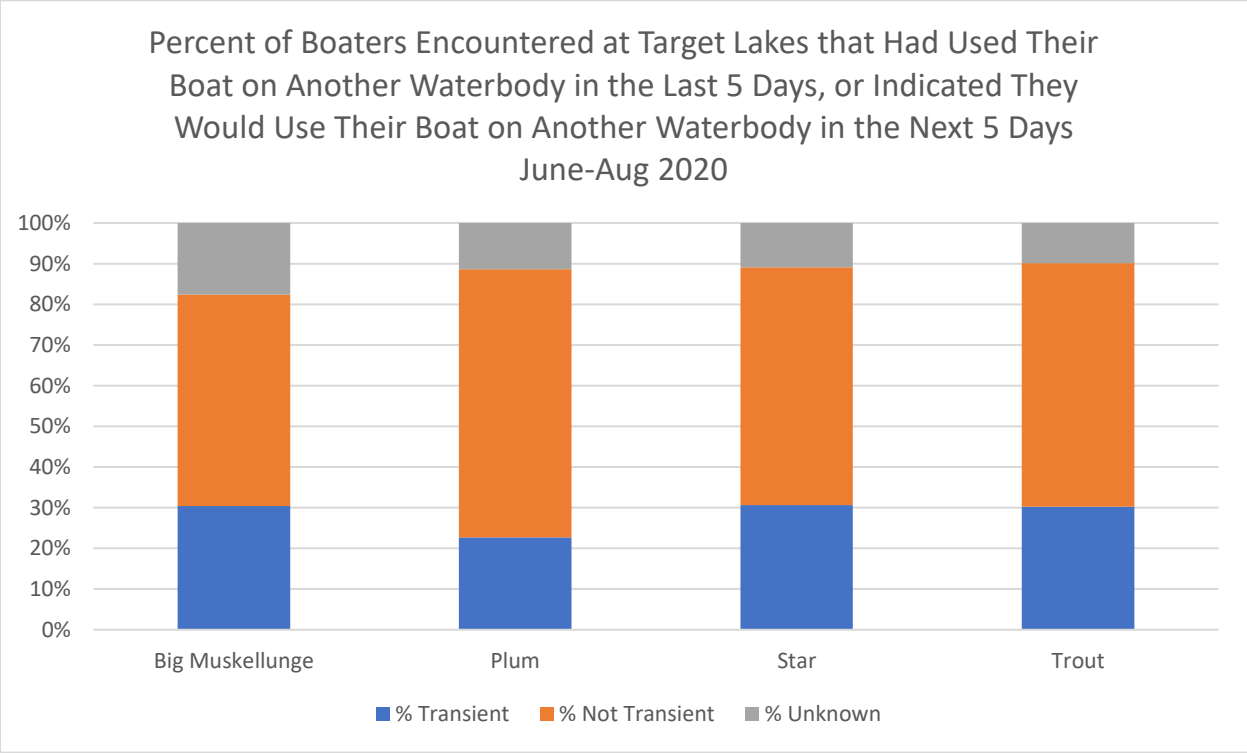
	2018	**2019**	**2020**
Number of Boats Decon'd	71	82	139
Number of Boats Encountered	245	234	335
% of Boats Decon'd	29%	35%	41%
% of boaters indicating past or planned transiency within 5 days	30%	41%	29%
% of boaters reporting self-initiated additional AIS prevention steps**	38%*	20%	10%
Number of lakes potentially protected from SWF/ZM exposure due to boater self-initiated additional AIS prevention steps**	0*	0	1
Number of lakes potentially protected from SWF/ZM exposure due to UWO decontamination	2*	7	16
Number of lakes potentially exposed to SWF/ZM due to not decontaminating/taking additional steps	2*	7	18
% survey respondents believe staffed hot pressure washing is "very effective" to prevent AIS spread	56%*	59%*	61%
% survey respondents who "definitely would" use decontamination services again	78%*	88%*	79%
% survey respondents who "definitely would" like to see decontamination continue at strategic boat launches in Vilas County	70%*	76%*	70%

*figures sourced from data with a very low number of survey respondents

**high or low pressure washing, chemical treatments, or wiping down

Boater Transiency

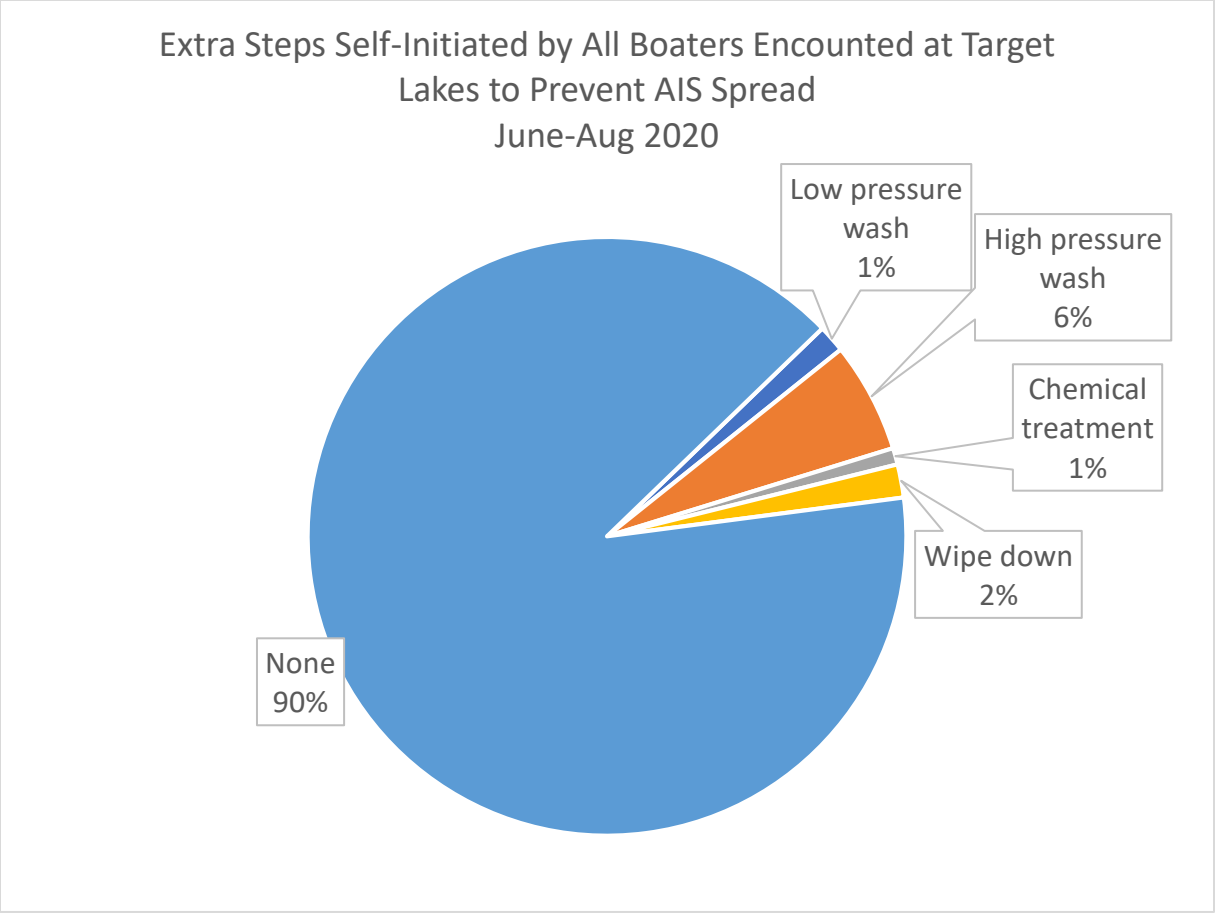
Boater transiency was measured on the "back-end" by asking boaters if they had used the boat in a different waterbody in the last five days. It was also measured on the "front-end" by asking where they plan to use their boat in the next five days. Boater transiency from all four target landings averaged 29%.



Boater transiency was fairly consistent at all 4 target landings in 2020.

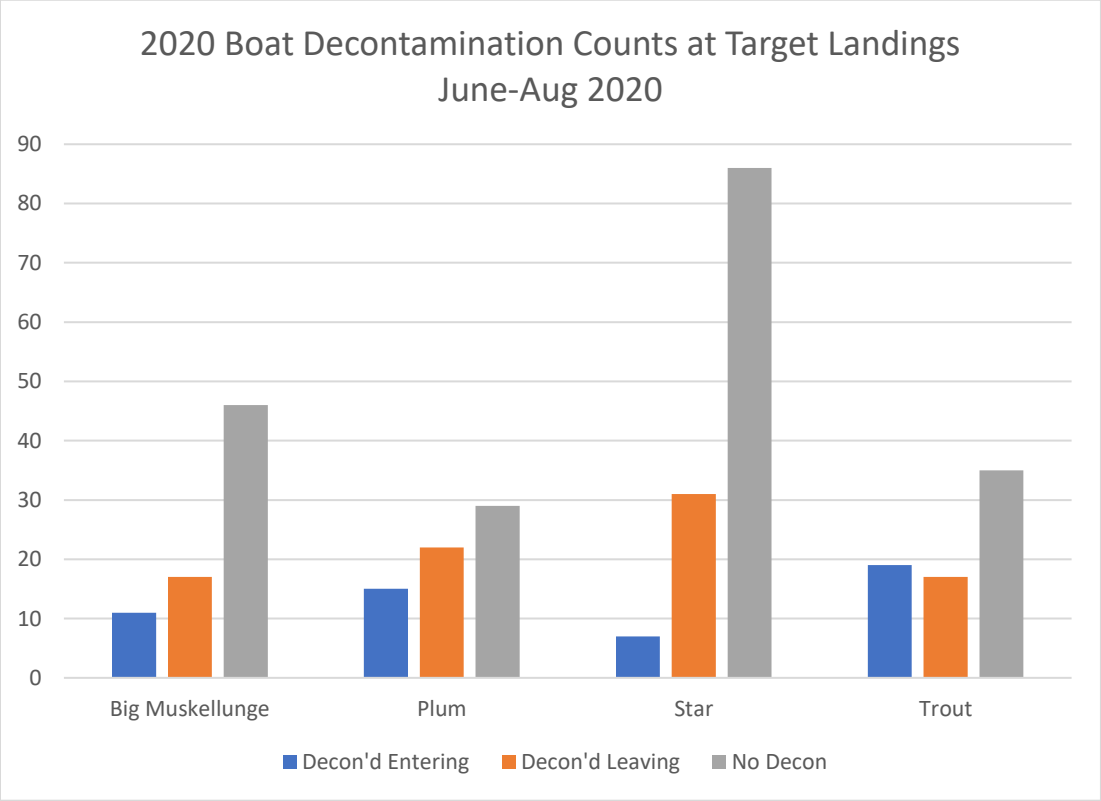
Additional Self-Initiated Steps Boaters Took

Some boaters take extra steps beyond the "inspect, remove, and never move" required steps. Among those reported are low pressure washing (such as a garden hose), high pressure washing (car wash/pressure washer), wiping down, chemical treatments, and drying for 5 or more days. This study focused on the transient boaters, so drying for 5 days was eliminated because for purposes of this report they would no longer be considered transient. Some reported picking weeds off their boat, but this is required by law and so is not considered here (Boat Transportation and Bait Laws).



Decontamination Per Targeted Landing

Similar to previous years, Star Lake had the most boat encounters. However, all four lakes had similar number of boaters accepting decontamination services. In Plum, Big Muskellunge, and Star Lakes boaters accepted decontamination services upon leaving the lake most often. In Trout Lake, boaters accepted decontamination services more often upon entering the lake. Since Trout Lake has spiny waterfleas, it would be preferred to see more boaters accepting decontamination services upon leaving the lake. Big Muskellunge Lake does not have verified spiny waterfleas, so it would be preferred to decontaminate before entering the lake.



Decontamination Program Efficacy

The decontamination program can be considered effective if it is preventing potential spiny waterflea and/or zebra mussel exposure in lakes. This analysis considers boater travel within 5 day previous and planned future 5 days as well as what AIS are already verified in the lake according to Wisconsin and Minnesota DNR publicly available data (*Aquatic Invasive Species* Locations and *Infested Waters List*). This analysis does not consider habitat suitability, however most lakes in Vilas County are considered suitable (Spear et. al.). If a boater reported taking any extra steps on their own (high pressure wash, low pressure wash, chemical treatment, or wiping down), it was assumed that decontamination did nothing extra to remove AIS and was not counted as having an impact. Each boat encounter was given two "travel paths" – travel from the previous lake up to 5 days prior to arriving at the point of contact; and planned travel to the next lake up to 5 days after arriving at the point of contact. Data was categorized into travel patterns based on whether the boater decontaminated, reported doing extra steps on their own, or did nothing extra. The travel path data was then categorized a second time to see if:

- Spiny waterfleas or zebra mussels were verified in the prior waterbody and not the next waterbody
- Both prior and next waterbodies had verified spiny waterfleas or zebra mussels
- Spiny waterfleas or zebra mussels were not verified in the prior waterbody
- There was no boater transiency within the 5 day period
- There was not enough data to accurately determine any of the above

From there, it was determined if the decontamination or extra steps boaters took had an impact on AIS prevention. If a lake was potentially exposed to an AIS, but that same AIS was already verified in that lake, it was assumed that further exposure to that AIS would not have impact.

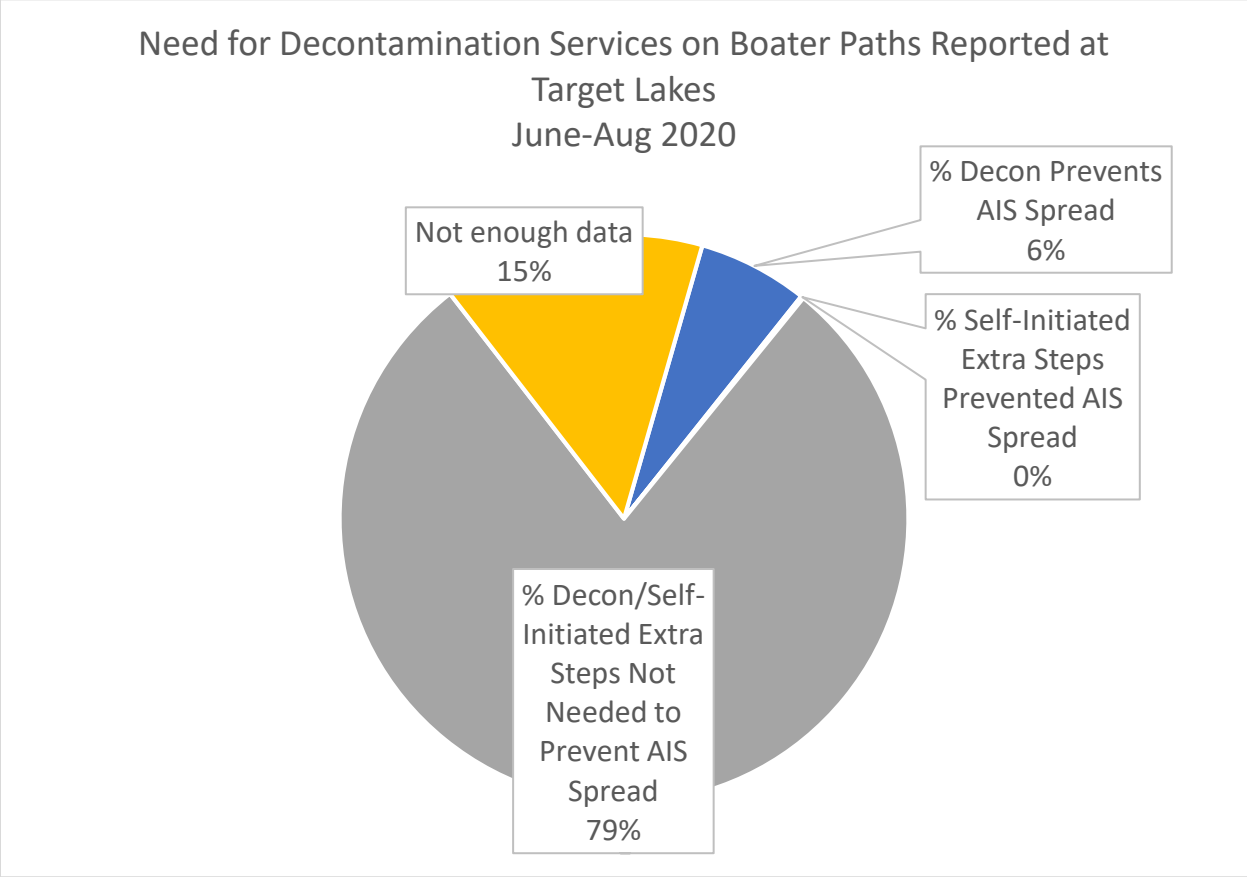
Impacts of Decontamination at Target Lakes
June-Aug 2020

		Count	%
Decontaminated Watercraft	**Prevented** spiny waterflea/zebra mussel potential exposure	19	2.84%
	Not needed to prevent potential spiny waterflea/zebra mussel exposure	104	15.52%
	Not enough data	16	2.39%
Self-initiated extra steps to prevent AIS spread: high pressure wash; low pressure wash; chemical treatment; or wiping down	**Prevented** spiny waterflea/zebra mussel potential exposure	1	0.15%
	Not needed to prevent potential spiny waterflea/zebra mussel exposure	25	3.73%
	Not enough data	1	0.15%
No Decontamination or extra steps	Potential **exposure** to spiny waterflea/zebra mussel documented	23	3.43%
	No decontamination and/or no extra steps was appropriate	398	59.40%
	Not enough data	83	12.39%
Total Travel Paths		**670**	

On 19 occasions, decontamination prevented spiny waterflea or zebra mussel spread – this accounts for 2.84% of the travel paths documented. In 104 occasions, boaters decontaminated but it would not have been necessary to do so to prevent AIS spread. On 23 occasions, the boater did not decontaminate or report any extra steps to prevent AIS spread and potential exposure to spiny waterflea or zebra mussels

was documented. For most boat travel paths, decontamination was determined to be not needed. This was because: the boater was not transient; the previous waterbody did not have verified spiny waterfleas or zebra mussels; or both the previous waterbody and next waterbody had either spiny waterfleas verified.

The above categories were further combined to show whether or not boat decontamination on a particular boat path would have been impactful to prevent AIS spread. On 6% of boater paths (34 individual paths), decontamination would have been further prevented potential AIS exposure. On 79% of boater paths (527 individual paths), decontamination would not be necessary to prevent potential spiny waterfleas or zebra mussel exposures. This is because the boaters were not transient; the previous lake did not have verified spiny waterfleas or zebra mussels; or both the previous lake and the next lake had verified spiny waterfleas or zebra mussels. In 15% of boater paths (100 paths), not enough data was collected to make this determination.



Lakes Where Potential Exposure to Spiny Waterflea/Zebra Mussel Was Prevented

The decontamination program protected 16 lakes, some on multiple occasions, from exposure to spiny waterfleas.

Lakes Where ZM/SWF Potential Exposure Was Prevented
June-Aug 2020

Lake Name Where Potential Exposure Was Prevented	County	WBIC	ZM or SWF	Previously Visited ZM/SWF Verified Lake	UWO Decon or Self-Initiated
Arrowhead Lake	Vilas	1541500	SWF	Plum Lake	Decon
Big Arbor Vitae	Vilas	1545600	SWF	Trout Lake	Decon
Big Bear Lake	Burnett	2705700	SWF	Star Lake	Decon
Big Lake	Vilas	unknown	SWF	Trout Lake	Decon
Big Muskellunge	Vilas	1835300	SWF	Plum Lake	Decon
Big Muskellunge	Vilas	1835300	SWF	Plum Lake	Decon
Big Muskellunge	Vilas	1835300	SWF	Plum Lake	Decon
Big Muskellunge	Vilas	1835300	SWF	Star Lake	Self-Initiated
Brandy Lake	Vilas	1541300	SWF	Trout Lake	Decon
Eagle River Chain	Vilas	n/a	SWF	Star Lake	Decon
High Lake	Vilas	2344000	SWF	Plum Lake	Decon
Lake Tomahawk	Oneida	1542700	SWF	Trout Lake	Decon
Little John Lake	Vilas	2332300	SWF	Trout Lake	Decon
Little John Lake	Vilas	2332300	SWF	Plum Lake	Decon
Manitowish Chain	Vilas	n/a	SWF	Plum Lake	Decon
Mayflower Lake	Marathon	310500	SWF	Plum Lake	Decon
North Twin Lake	Vilas	1623800	SWF	Star Lake	Decon
Upper Buckatabon	Vilas	1621800	SWF	Star Lake	Decon
Willow Flowage	Oneida	1528300	SWF	Star Lake	Decon
Wisconsin River	Vilas	117900	SWF	Trout Lake	Decon

Lakes Where Potential Exposure to Spiny Waterfleas or Zebra Mussels Was Not Prevented

Due to boaters not decontaminating or taking extra steps, 19 lakes were potentially exposed to spiny waterfleas or zebra mussels, some on multiple occasions.

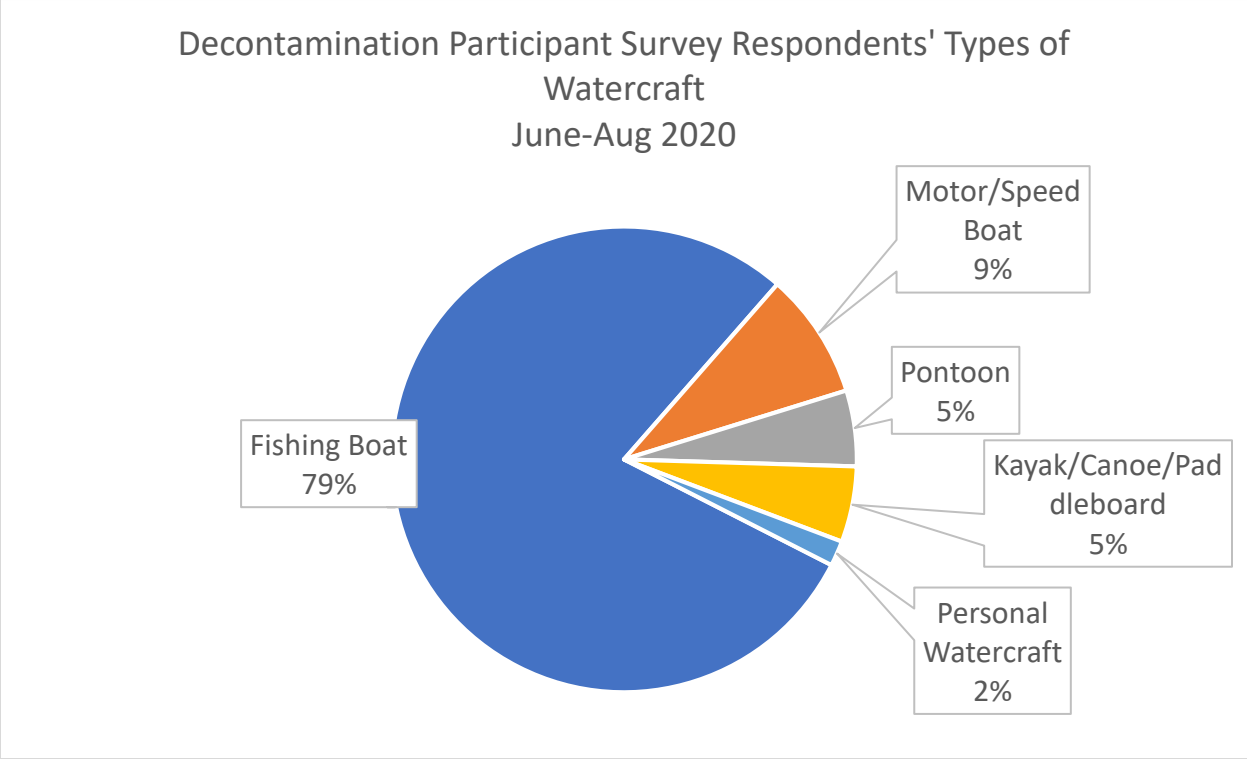
Lakes Where ZM/SWF Potential Exposure Was Documented
June-Aug 2020

Potentially Exposed Lake Name	County	WBIC	ZM or SWF	Potential Exposure from ZM/SWF Verified Lake
Allequash Lake	Vilas	2332400	SWF	Plum Lake
Ballard Lake	Vilas	2340700	SWF	Star Lake
Big Muskellunge Lake	Vilas	1835300	SWF	Star Lake
Big Muskellunge Lake	Vilas	1835300	SWF	Star Lake
Big Muskellunge Lake	Vilas	1835300	SWF	Stormy Lake
Big Muskellunge Lake	Vilas	1835300	SWF	Plum Lake
Boulder Lake	Vilas	2338300	SWF	Trout Lake
Cisco Chain	Vilas/Gogebic, MI	n/a	SWF	Star Lake
Crab Lake	Vilas	2953500	SWF	Star Lake
Eagle River Chain	Vilas	n/a	SWF	Trout Lake
Eagle River Chain	Vilas	n/a	SWF	Star Lake
Escanaba Lake	Vilas	2339900	SWF	Trout Lake
Found Lake	Vilas	1593800	SWF	Star Lake
Jag Lake	Vilas	1855900	SWF	Trout Lake
Lake Geneva	Walworth	758300	SWF	Star Lake
Lake Laura	Vilas	995200	SWF	Star Lake
Manitowish River	Vilas	2324400	SWF	Trout Lake
Minocqua Chain	Oneida	n/a	SWF	Trout Lake
Pelican Lake	Oneida	1579900	SWF	Star Lake
Plum Lake	Vilas	1592400	ZM	Gull Lake, MN
Razorback Lake	Vilas	1013800	SWF	Plum Lake
Snipe Lake	Vilas	1018500	SWF	Star Lake
White Sand Lake (Boulder Junction)	Vilas	2339100	SWF	Trout Lake

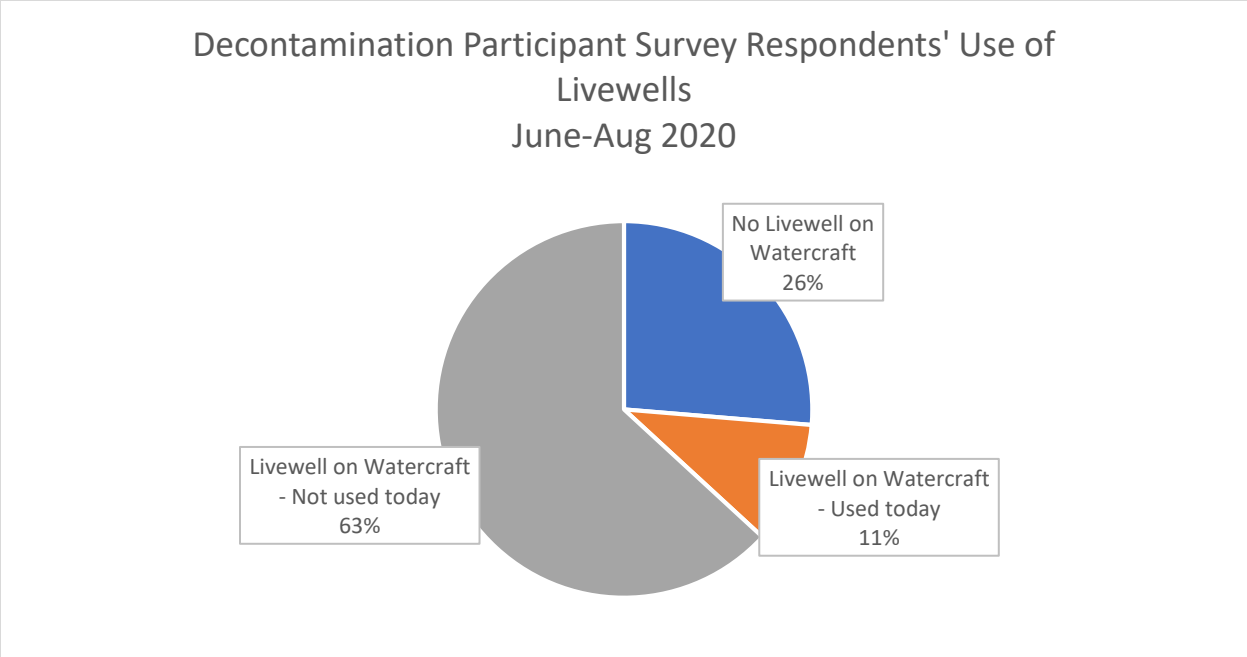
Boater Perceptions

Decontamination Participant Customer Survey

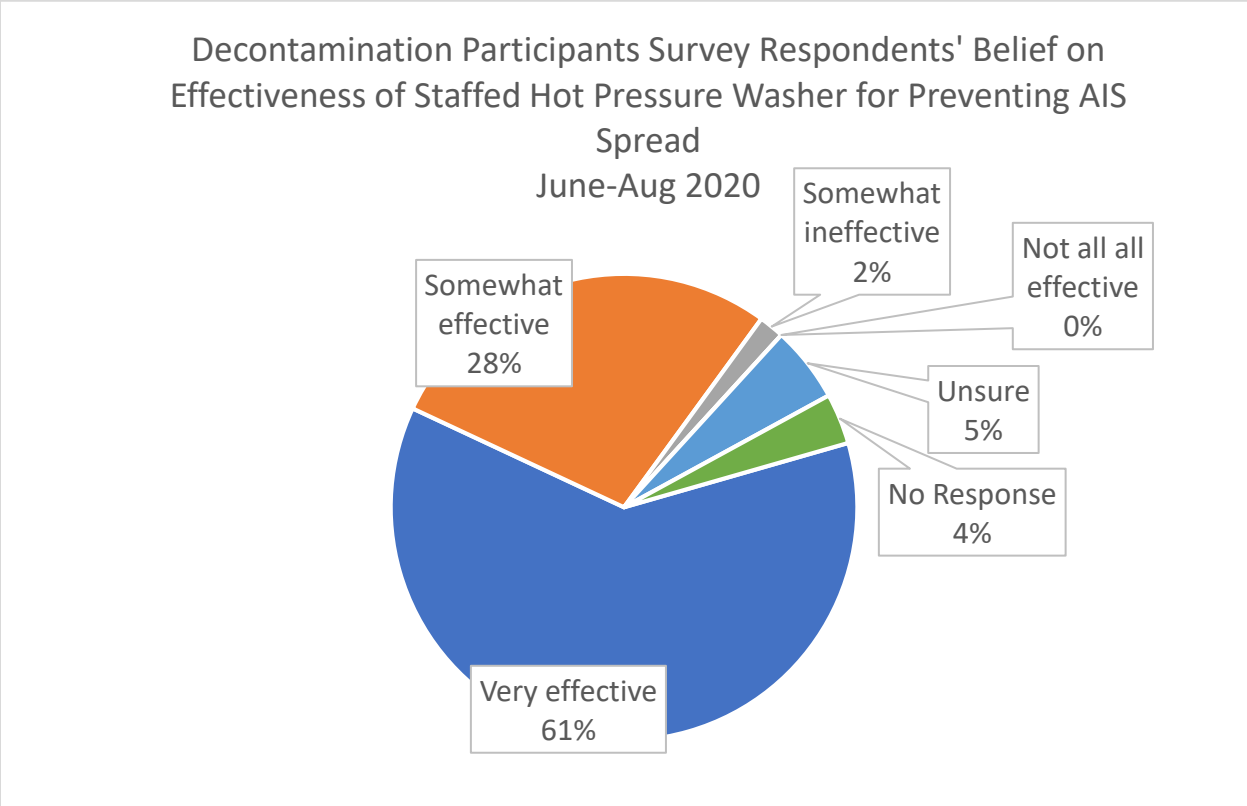
Of the 335 boaters encountered, 139 decontaminated their boats with the UW-Oshkosh Program. Of those 139 that experienced the decontamination process, 57 agreed to fill out a customer survey while they boat was being washed. 79% of respondents indicated they brought a fishing boat to be decontaminated.



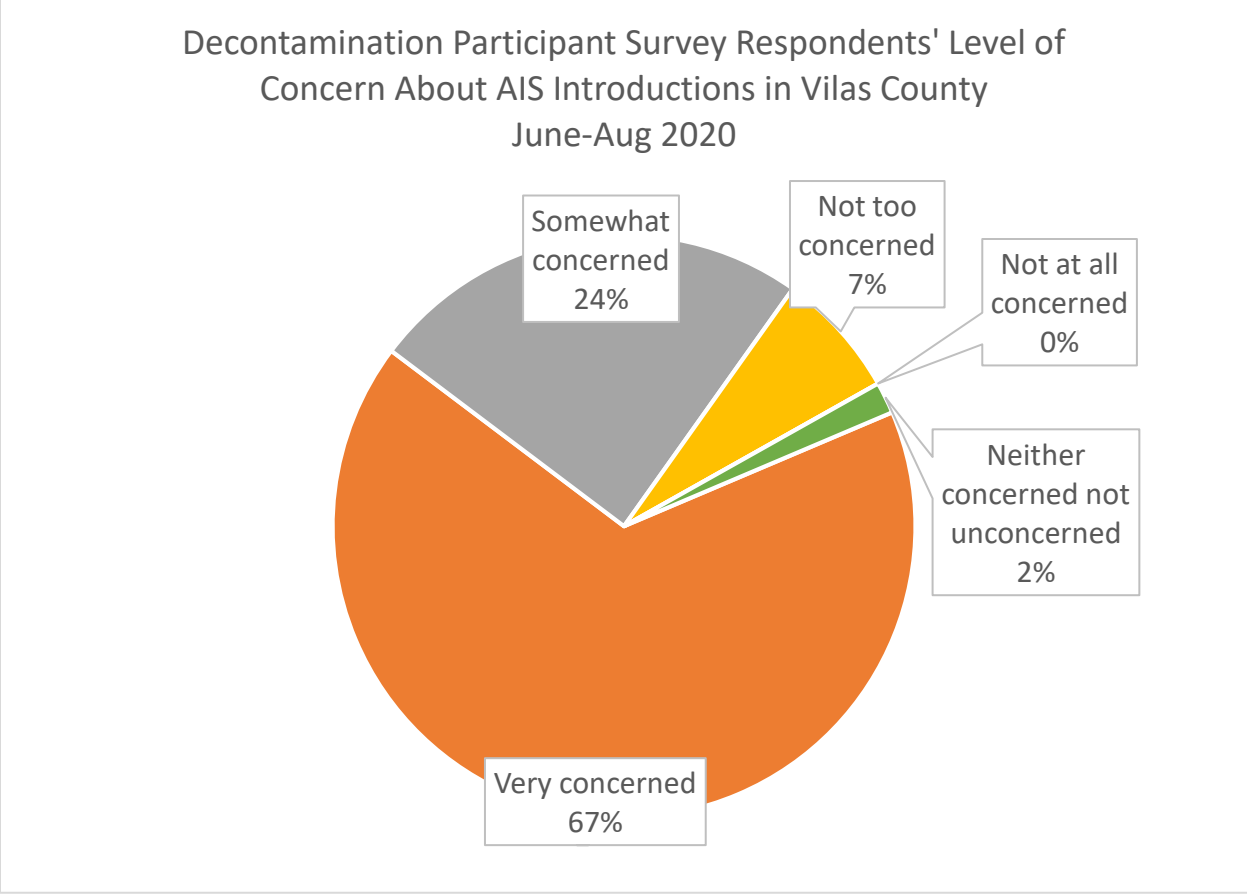
Respondents these respondents were also asked if their boat had a livewell, and if they used it. This question was developed from previous year due to the low number of boaters that allow decontamination interns/staff to flush livewells. It was not known what percent boaters tend to fill their livewells on a given trip with lake water. In 2020, only 11% of respondents indicated they used their livewell today.

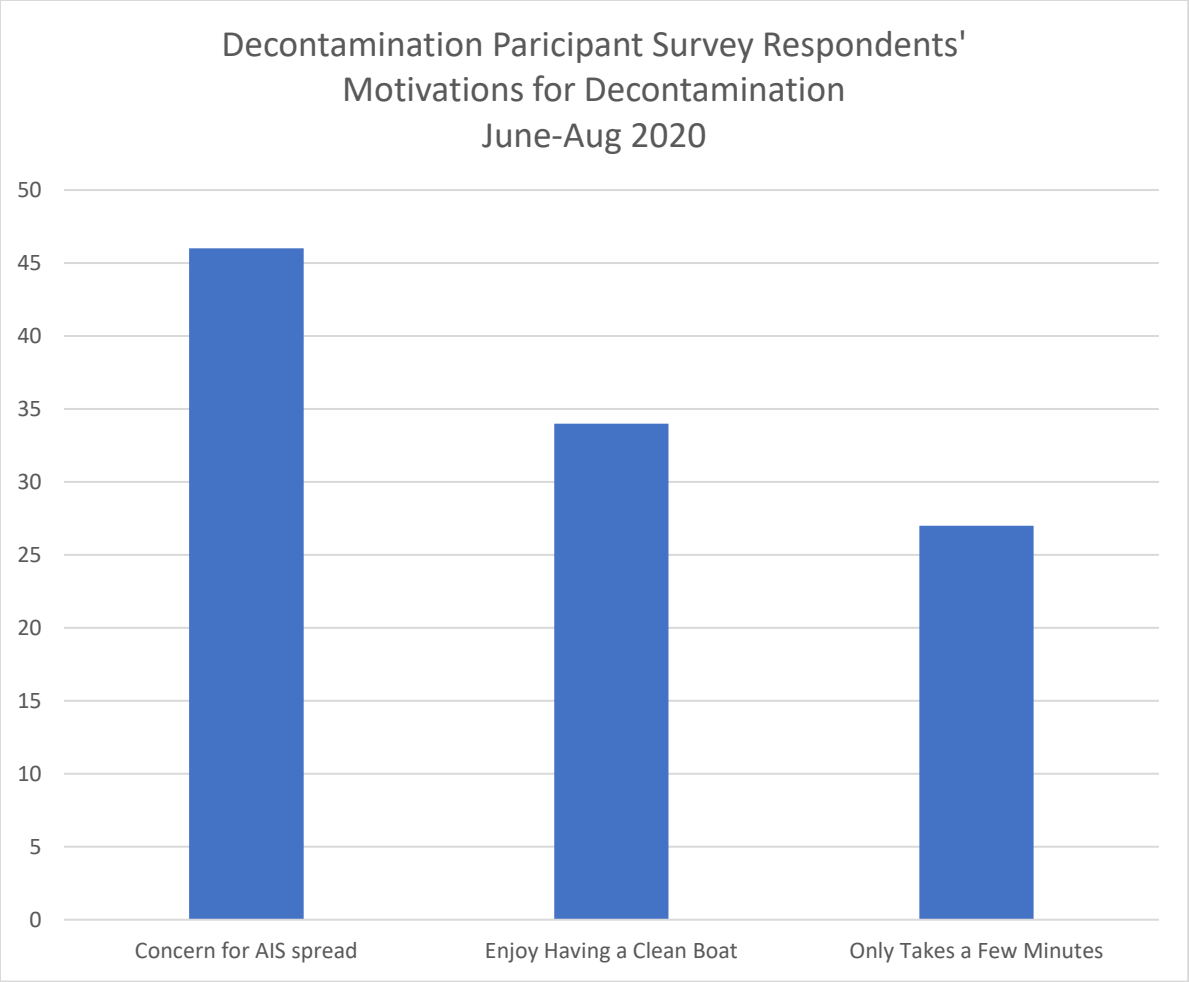


Respondents were asked if they felt that hot pressure washing was effective to prevent AIS spread. 89% responded Very Effective or Somewhat Effective.

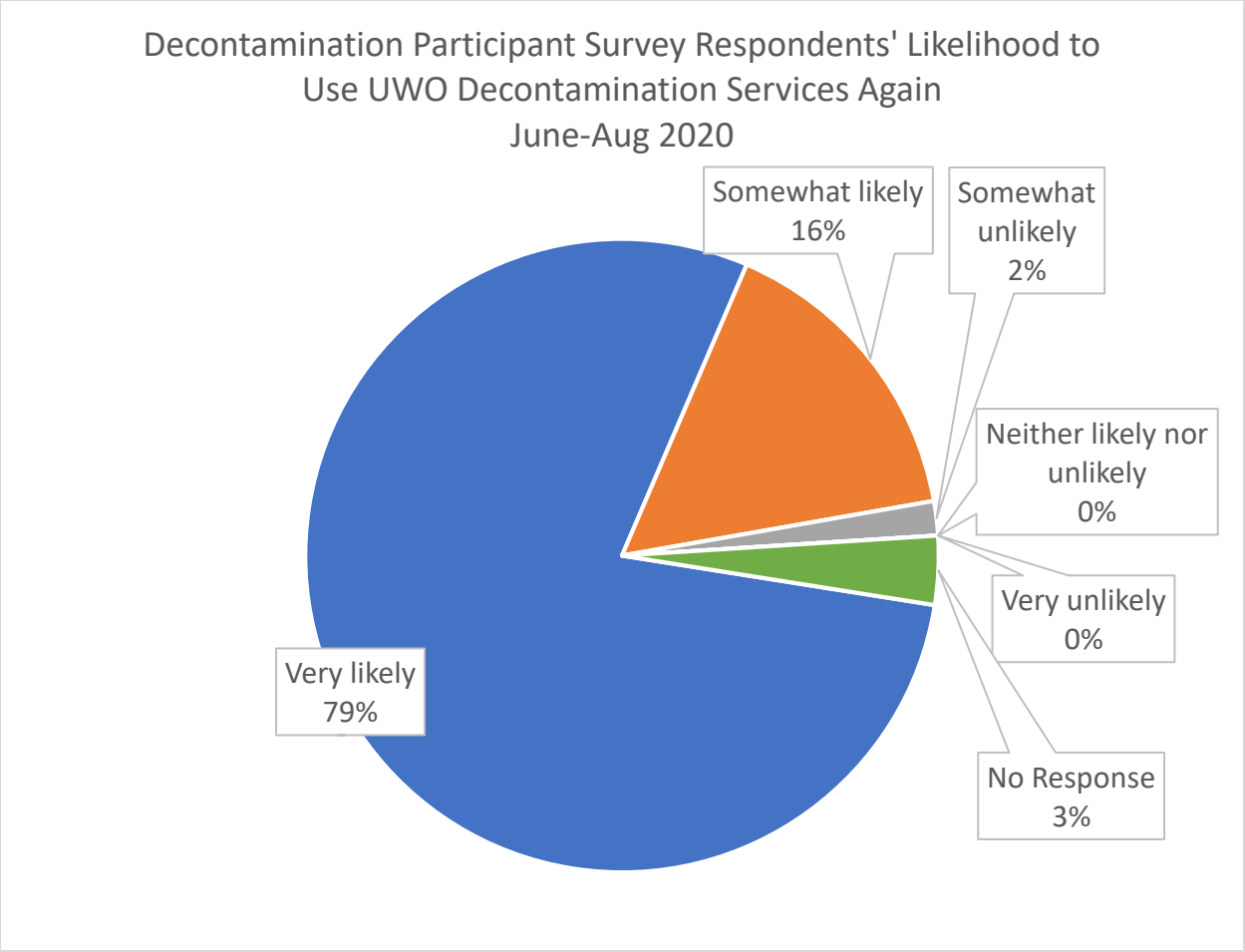


Respondents were asked about their level of concern for AIS spread and motivation for decontaminating. Respondents indicated their main motivator for using decontamination services is that they are concerned about AIS and that AIS prevention. Respondents were about to choose multiple motivators.

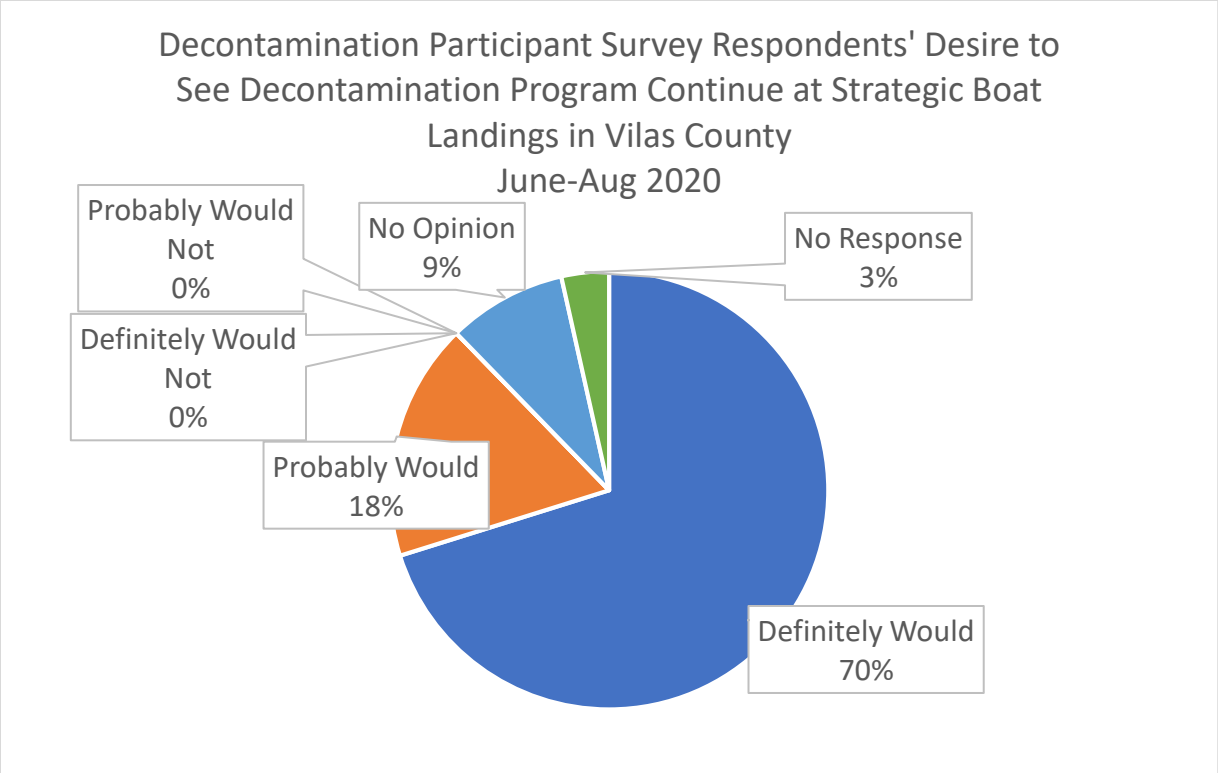




95% of respondents indicated they would use the decontamination services again.



88% of respondents gave favorable answers when asked if they would like to see the boat decontamination program continue to operate at strategic boat launches in Vilas County.



There was a space for further comments – all written comments received reflect positively on the program.

Survey for Boaters Declining Decontamination Services

Of the 335 boaters encountered, those that declined decontamination services were offered a brief 3 question verbal survey.

45 of the 54 respondents reported they had been on the lake before in the last 12 months, implying some kind of familiarity with the lake.

63% of respondents said the reason they did not decontaminate is that they do not have time. 33% they did not decontaminate because they were not transient.

Respondents were finally asked what would motivate them to decide to decontaminate their boat. 74% said having more time to do so would motivate them to participate. 14% said nothing would motivate them to participate. Other less popular responses were: having later decon schedule hours available; and if they were transient they would be motivated to decontaminate.

Discussion and Future Planning

Targeting Transient Boaters: The 2018 UW-Oshkosh Decontamination report mentioned that getting a 25-30% decontamination participation among boaters might be a realistic goal (Higley 2019). This is based on the data from Witzling indicating 56% boaters visit another waterbody within 5 days. Vilas County Land & Water interviewed transient boaters in 2017 and found that 72% of transient boater would be willing to decontaminate their boats (Higley 2017). This would suggest an ideal participation rate of 40% (72% of 56%), but once "real life" situations are factored in, a 25%-30% participation rate might be a more realistic goal. In 2020, 139 boats of 670 boater paths were decontaminated, equating to about 21% of boater paths. This figure falls a bit short of approaching the goal of 25%-30%. However, it appears more transient boaters (vs. non-transient boaters) are participating in decontamination. If the unknown data are removed, 55 of 194 transient boaters decontaminated their boats (28%). Of the 394 boats that were not transient, 68 decontaminated (17%). Overall, the bulk of the decontamination efforts are going to transient boaters, as is the intention of the program. It would be better to set goals that focus on transient boaters vs. all encountered boaters. A goal of increasing decontaminating among transient boaters in 2021 to 35% might be appropriate as the program is so far experiencing higher participation rates each year.

Livewells and boat components: There is a high percentage of fishing boats used (79%), implying perhaps a high use of livewells. However, when this question was directly asked of all boaters only 10.5% indicated they had used their livewells today. It may be that the risk of livewells being a significant vector has been inflated. Anecdotal accounts from local DNR Conservation Officer Tim Price suggest that the 10.5% may be too low (Price). It would be good to continue to collect data in 2021 on livewell use. If interns/staff could list which boat components they recommend to decontaminate vs. which boat components actually get decontaminated, it would offer a better window to how important of a vector livewells are, and what components boaters are willing to allow interns to decontaminate.

Encourage Decontamination Where Most Appropriate: Researchers admit there is a likely a significant lag time between spiny waterflea establishment and detection (Vander Zanden). This factor makes it important that the program not deny decontamination to a willing participant just because spiny waterfleas were not yet verified in their previous waterbody. However, when spiny waterfleas are not verified in a lake, such as Big Muskellunge Lake, it is possible they are truly not established and decontamination prior to entering should be highly encouraged for transient boaters. However, more boaters decontaminated after leaving Big Muskellunge. Operators might want to consider ways to encourage more participation prior to entry on Big Muskellunge Lake. When spiny waterfleas are verified in a lake, decontamination should be highly encouraged for transient boaters upon leaving. This seems to be the case on Plum and Star Lakes, however on Trout Lake more boats were decontaminating prior to entry. Operators may want to consider ways to encourage more participation after leaving Trout Lake.

Since lack of time was the reason that most survey respondents declined decontamination, perhaps a bleach solution option could be offered as an alternative. Contact time needed for this method is 10 minutes, and a clean water rinse would be recommended. This method is also not effective for spiny waterflea resting eggs at the recommended concentrations (500 ppm sodium hypochlorite) and contact times. However, this bleach method might save boaters roughly 5-10 minutes and would be effective in spiny waterflea adults (Wisconsin Department of Natural Resources).

Data collection: Many "unknowns" were reported in 2020 including type of watercraft and name of waterbody last visited. Operators should be able to clearly identify the type of watercraft, but so many unknowns were recorded (25%), it would not have made sense to draw conclusions from this data. Data used in this report on type of watercraft were sourced from the decontamination participant survey, which uses a much smaller sample. It is unclear whether boaters encountered were not interested in giving the name of the prior waterbody they visited, or if the question was not asked of transient boaters. Having these kinds of data will allow further improvements to the program. Program administrators should consider more thorough training of data to be collected, perhaps offer a "re-check" after the first week just to make sure all data is being collected properly.

Lines in the Water: Recent research from Don Branstrador, a spiny waterflea researcher, has indicated that spiny waterfleas most often adhere to lines in the water – primarily fishing line and anchor line. Branstrador proposes these can be wiped off, and offers compostable Swedish dish towels to boaters for this purpose (Branstrador). The decontamination program might want to consider handing out these towels to boaters frequenting spiny waterflea lakes so they can manually remove those attached to lines when a decontamination unit is not available.

Program continuation: The customer participation survey indicated that most (79%) of decontamination participants were "very likely" to decontaminate their boat again, and 70% of participants "definitely would" like to see the decontamination program continue to operate at strategic boat launches in Vilas County. This information, together with only 10% of boaters visiting the target lakes were taking any extra steps on their own to prevent spiny waterflea or zebra mussel spread makes a good case for continuing the decontamination program.

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