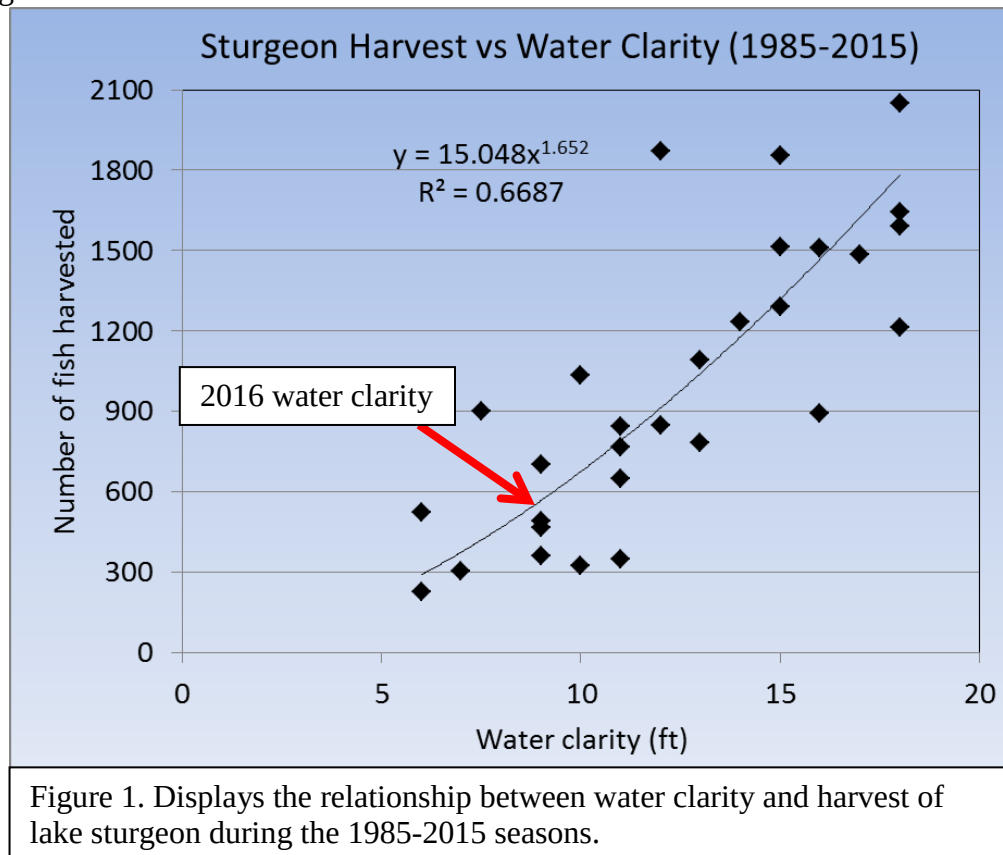


Where did all the fish go this season?

The 2016 sturgeon spearing season on Lake Winnebago has started slow, at least compared to the last couple of years. As a result, I've had numerous spearers ask me what's contributing to the down harvest and where are all the fish? My response has been that the water clarity is just not at a level conducive to an average to above average harvest. We checked water clarity throughout Lake Winnebago during the week leading up to the season and clarity was spotty, ranging from 7-10 feet (average 9'). As Figure 1 displays, seasons with water clarity at 11 feet or less typically have resulted in below average harvests over the last 30 seasons.



It is a foregone conclusion that this season will go the full 16 days on Lake Winnebago, as we are now 6 days into the season and we have yet to reach 15% of any of pre-set harvest caps. So I wanted to put the opening days from this season into perspective of other 16 day seasons, while also comparing to more successful seasons since the implementation of the 6-hour spearing day in 2002. I did most of this analysis before having harvest numbers from day 6, so I am only including harvest during the first five days. This season marks the 15th with a 6-hour spearing day and will be the 7th season that went the duration (2002, 2006, 2007, 2011, 2012, and 2013 are the others). This year's harvest of 209 fish through the first five days ranks 4th out of the 7 (Table 1). There were much higher harvests during the first 5 days of the 2002 and 2011 seasons, but both seasons had much clearer water. In fact, the 2011 season likely would not have been a full season had ice conditions not deteriorated between the first and second weekends of the season. The poorest water clarity during this time period was the 6 feet

of visibility observed in 2006. It's no coincidence that this season had the lowest harvest over the first five days of the spearing season. The 2007, 2011, and 2012 seasons all contained water clarity similar to this season (8-10'). The 2007 harvest was quite a bit higher through the first 5 days, but the 2016 harvest exceeded the 2012 and 2013 seasons by a pretty good margin. License sales did increase during this time period, but the success rate (percentage of license holders harvesting a fish) in 2016 was higher through the first 5 days than the 2006, 2012, and 2013 seasons (Table 1). I acknowledge that this season has definitely has not been as successful as seasons past, but I also want to remind folks that we are not plowing new ground here. The common factor between those seasons is the poor water clarity, it's that simple.

Table 1. Displays harvest on days 1-5, water clarity, license sales, and success rates for the 7 sturgeon spearing seasons that lasted 16 days since implementation of the 6-hour spearing day in 2002.

	Season						
Day	2002	2006	2007	2011	2012	2013	2016
Day 1 Harvest	228	39	192	281	39	41	84
Day 2 Harvest	143	24	162	208	28	19	63
Day 3 Harvest	92	7	84	139	22	9	24
Day 4 Harvest	54	5	66	102	17	7	11
Day 5 Harvest	44	7	56	74	17	15	27
Total Harvest (Days 1-5)	561	82	560	804	123	91	209
Water Clarity (ft)	12	6	10	13	10	8	9
Licenses	4828	8289	7895	11933	12182	11601	13190
Success Rate (Days 1-5)	11.62%	0.99%	7.09%	6.74%	1.01%	0.78%	1.58%

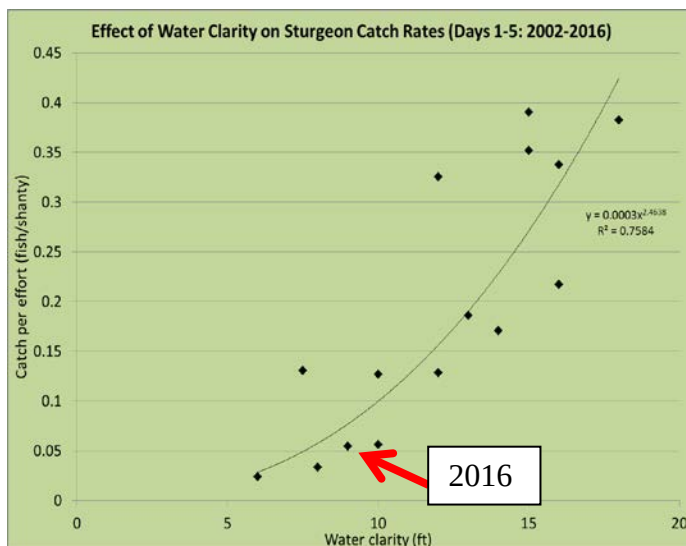


Figure 2. Displays the relationship between water clarity and catch rate of sturgeon (fish per shanty)

As I worked through the data from all seasons spanning 2002-2016 the impact of water clarity became even more evident. Figure 2 displays the relationship between water clarity and catch rate of sturgeon expressed through fish speared per shanty (as estimated on opening day) for the 2002-2016 seasons. The r^2 value of 0.76 indicates that water clarity explains 76% of the variation within the catch rate of sturgeon through the first 5 days of the spear fishery during this 15 year period, which is a strong relationship for a wild population.

Fortunately for spearers today, we have not been dealing with dirty water on an annual basis. Water clarity averaged 15' and 12' during the 2014 and 2015 seasons, which contributed to the shortened season for each. Spearers in the 1960s-1980s were

not quite as lucky. Water clarity was consistently worse during those decades, to the point that this time period is commonly referred to as the dark age for water clarity on Lake Winnebago. For example, there were only 6 fish harvested during the 22-day season of 1969 when clarity was 6'. The average harvest of 587 fish during that 30 year span is now dwarfed by the annual average harvest of 1,229 fish spanning the 1990-2015 seasons. The decades of dirty water protected fish and rebuilt the sturgeon population in the Winnebago System. The benefits were evident in the high harvests in the 1990s as the water began to clear. Those high harvest years were the basis for the 20+ regulations that have gone into place since then. You simply cannot overstate the impact of water clarity on spearing success. Lake Winnebago still boasts a robust lake sturgeon population and future seasons of clear water will reinforce that. Dirtier water years like this are just a year where the fish have the upper hand!