What are the sturgeon feeding on this season?

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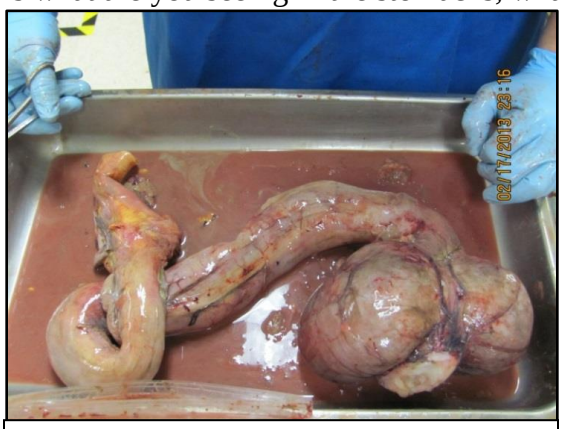
DNR staff working at registration stations are frequently asked questions from spearers about a wide array of topics. The standard questions are how many fish have you registered today, what was the biggest and how long will the season go this year. After the big three, there is a litany of other questions asked. One very common question is what are you seeing in the stomachs, what are the fish eating?



The foregut and gizzard of a sturgeon stomach sampled from a fish harvested during the 2013 spearing season.

The spear fishery provides a unique opportunity to remove stomachs from harvested fish to better identify foraging trends and address these questions. We typically target a combined 80-100 stomachs between Lake Winnebago and the Upriver Lakes for diet analysis each season. Lake sturgeon have a fairly primitive digestive system including a gizzard-like structure that functions to grind food and our sampling quantifies the amount of forage in the foregut of the sturgeon down to the gizzard (photo inset). Forage located in this part of the stomach is still readily identifiable, whereas it is much harder to identify forage further "downstream." Lake sturgeon are typically predating on a single prey source of gizzard shad, chironomid larvae (redworms), isopods, or zebra mussels during our sampling. Diet items from each stomach are separated by prey source and each prey source is weighed individually.

Coming into the season, we were anticipating seeing quite a few empty, or mostly empty, sturgeon stomachs as both staple food sources (gizzard shad and Chironomid lake fly larvae (redworms)) were in low abundance according to our standard sampling. Gizzard shad were plentiful throughout the system, but those shad are actually larger, now adult, shad from the 2016 year class (Figure 1). The shad in the system now are mostly 7-10" in length and larger than the 3-5" yearling shad that we

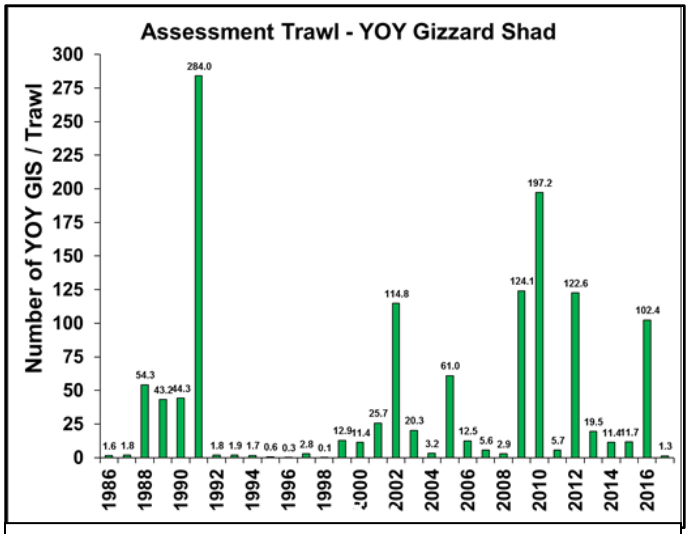


Figure 1. Year class strength of gizzard shad observed during fall bottom trawl assessments conducted on Lake Winnebago (1986-2017).

normally observe in sturgeon stomachs. Chironomid dredge sampling conducted in August of 2017 also indicated a low relative abundance of red worms in Lake Winnebago (a more detailed report about red worm sampling will be included in tomorrow's report). Stomachs from 91 fish (62 from Lake Winnebago and 29 from the Upriver Lakes) were sampled during the 2018 spearing season. As anticipated we did observe a high proportion of stomachs that were completely empty (35.5% from Lake Winnebago and 58.6% from the Upriver Lakes; Figure 2). We have been using these methods to evaluate diet of sturgeon since the 2013 spearing season and this was an unprecedented high percentage of empty stomachs for the Upriver Lakes. For Lake Winnebago, the proportion of empty stomachs is comparable only to the 2015 season, another season where sampling on Lake Winnebago indicated a low abundance of gizzard shad and Chironomid larvae.

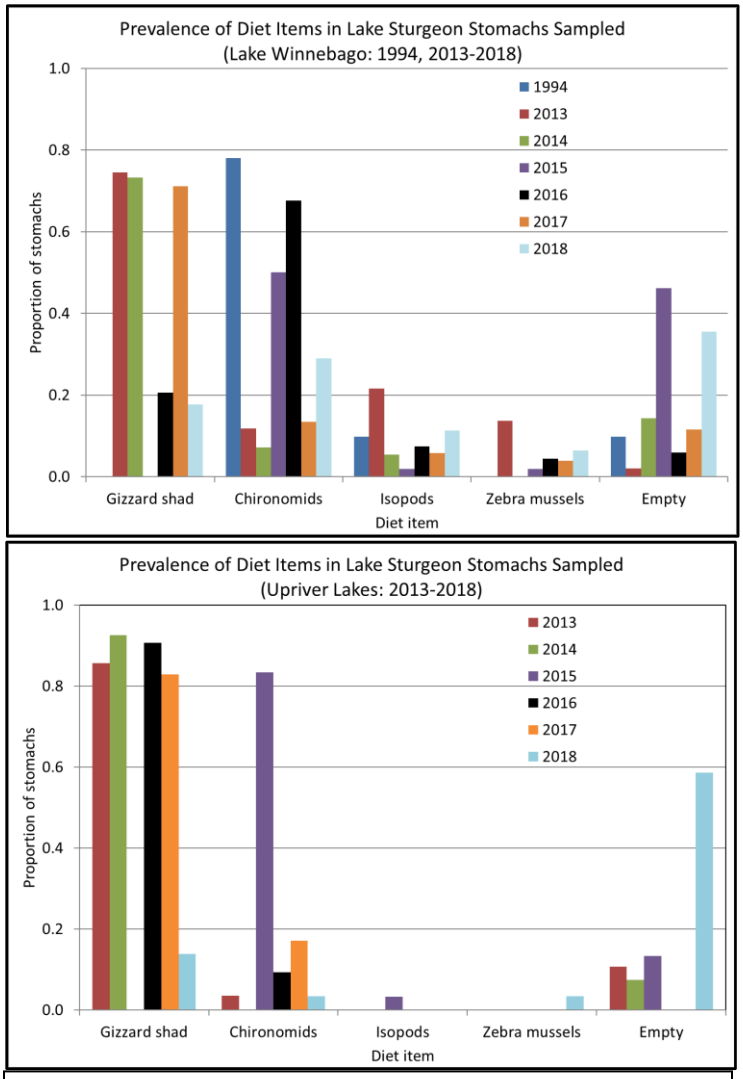


Figure 2. Proportion of sturgeon stomachs collected from Lake Winnebago (top) and the Upriver Lakes (bottom) containing gizzard shad, Chironomid larvae, isopods, zebra mussels, or empty (1994, 2013-2018).

Larger gizzard shad were observed in some of the sturgeon stomachs sampled from both Lake Winnebago (17.7%) and the Upriver Lakes (13.8%). However, in total we only observed 59 gizzard shad between the 91 stomachs sampled. In comparison, we observed 2,047 gizzard shad in the 87 stomachs sampled during the 2017 spearing season. Thus, there were some sturgeon feeding on gizzard shad, particularly on the southern end of Lake Winnebago, but it does not appear that the fish were keying in on these larger shad the way they do when smaller sized shad are abundant.

Chironomid larvae were observed in 29.0% of the stomachs sampled from Lake Winnebago and 3.4% of the stomachs sampled from Lake Winnebago. When Chironomids were observed, their total mass was low relative to years past. Isopods and zebra mussels were observed in stomachs sampled from both Lake Winnebago,

but with low frequency (Figure 2). There was a single stomach sampled from the Upriver Lakes that contained zebra mussels, but isopods were not observed in any of the 29 stomachs sampled.

Some stomachs sampled this season showed results that were a bit out of the ordinary. Typically, gizzard shad are the only fish that we observe in sturgeon stomachs. This year we had five stomachs that contained other non-shad fish species, most notably smaller freshwater drum (sheepshead), and another four stomachs that contained lesser amounts of unidentifiable fish. Stomachs sampled from the Upriver Lakes contained a higher proportion of non-shad fish than stomachs collected from Lake Winnebago.

There were some general trends observed in diet results between the 6 areas of Lake Winnebago (Figure 3). Chironomid larvae were the most prevalent forage item observed from stomachs sampled from areas 1, 2, and 4 of Lake Winnebago, while gizzard shad were most prevalent in areas 3, 5, and 6. Empty stomachs were most prevalent in areas 2 and 3 and the Upriver Lakes.

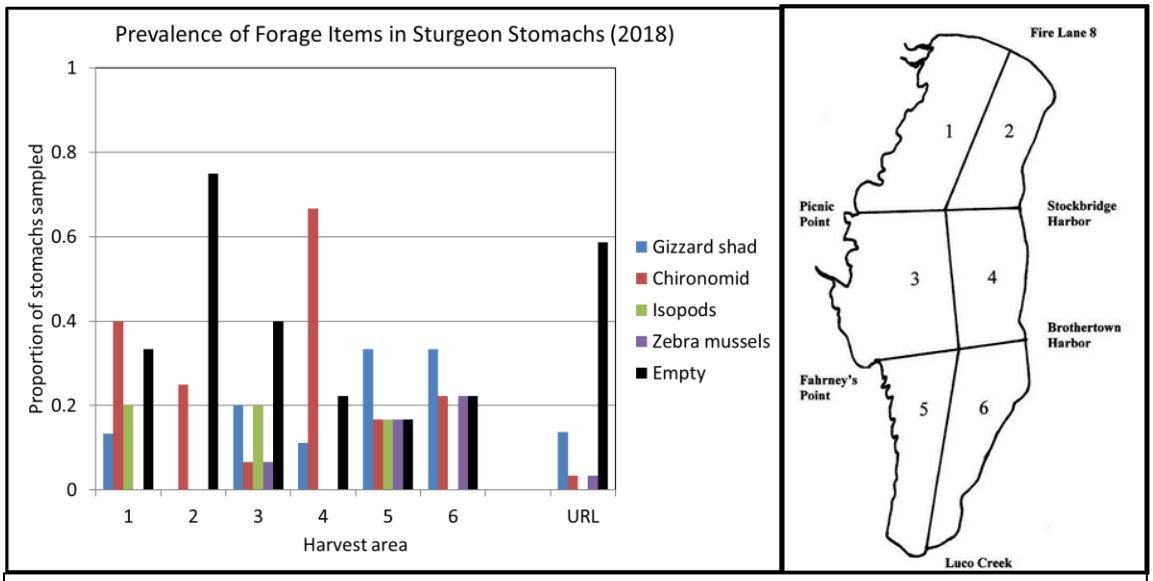


Figure 3. Prevalence of gizzard shad, Chironomid larvae (red worms), isopods, and zebra mussels in stomachs of lake sturgeon harvested from Lake Winnebago (areas 1-6) and the Upriver Lakes (Butte des Morts, Poygan, and Winneconne) during the 2018 spearing season.

In conclusion, the diet results observed this season jive with what we would have anticipated coming into the season. Bottom trawl and Chironomid dredge sampling conducted in 2017 indicated a weak year class of gizzard shad and a low abundance of Chironomid larvae. Thus, we were expecting to see a high proportion of empty stomachs, which has since been confirmed. We don't have the length-weight data entered for this season, but it will be interesting to see what the condition (plumpness) of fish in the harvest will be. Visually the fish sure seem to be a bit leaner this year than season's past. Further, some of the longer fish harvested this season could have easily been another 30+ pounds heavier had foraging conditions been better over the last year. Monitoring trends in forage abundance and diet preference is important when managing a robust sport fish population. Thus, I plan to continue assessing the forage base in the coming years to keep our fingers on the pulse of trends within the food web.