

What are the sturgeon feeding on this season?

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The winter spear fishery provides a unique opportunity to remove stomachs from harvested sturgeon to better evaluate foraging trends. Each season, the DNR removes stomachs from 80-100 sturgeon that are harvested from the Winnebago System with roughly 30 of those stomachs coming from the Upriver Lakes fishery and the rest from the Lake Winnebago fishery. Lake sturgeon have a primitive digestive system including a gizzard-like structure that functions to grind food and our sampling quantifies the forage present in the foregut of the sturgeon down to the gizzard (photo inset). Forage located in this part of the stomach is readily identifiable, whereas prey items located in the hindgut are harder to identify. Lake sturgeon residing in Lake Winnebago and the Upriver Lakes predominantly feed on either chironomid lake fly larvae (redworms), gizzard shad, or isopods. Diet items from each stomach are separated by prey source and weighed. Typically, sturgeon are actively feeding on a single prey source, which makes it easier for our analysis.



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

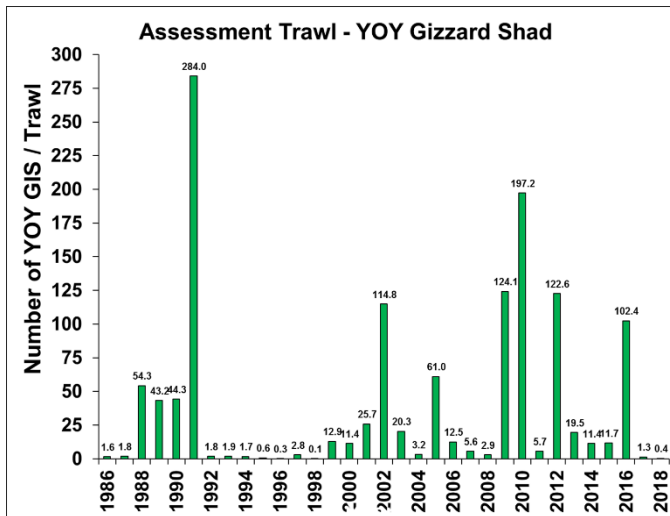


Figure 1. Catch per effort of gizzard shad observed during August-October bottom trawl surveys conducted on Lake Winnebago (1986-2018).

Our crew conducts sampling each season to assess the relative abundance of gizzard shad and chironomid lake fly larvae within Lake Winnebago. Gizzard shad hatch strength is assessed during our fall bottom trawl assessment, while we assess relative abundance of chironomid larvae by sampling 33 sites on Lake Winnebago with an Eckman dredge. Each of the past two years we have also conducted some chironomid sampling at 50 locations throughout the Upriver Lakes. Catch rates of young of year gizzard shad were very low during the 2018 bottom trawl

assessment indicating a weak shad hatch (Figure 1). Conversely, our catch rates of chironomid lake fly larvae were higher than recent years indicating an increase in availability of redworms (stay tuned for more information about the chironomid sampling in a future vignette). From these data, we predicted that sturgeon would predominantly be feeding on chironomid larvae this season and that spearers would have better luck in the northern ½ of Lake Winnebago where redworm densities are usually higher.

Stomachs from 87 fish (58 from Lake Winnebago and 29 from the Upriver Lakes) were sampled during the 2019 spearing season. Roughly half of these stomachs were collected during day 2 of the spearing season, while the remaining samples were collected during days 8-9. As expected, we observed a high proportion of stomachs that contained chironomid larvae (77.6% from Lake Winnebago and 69.0% from the Upriver Lakes). The results from lake Winnebago were very comparable to data from the 1994 and 2015 seasons, while the data from fish harvested from the Upriver Lakes were similar to 2015 season (Figure 2).

We did not observe a single gizzard shad in any of the stomachs sampled from either fishery (Figure 2). This season is only the 2nd time in 8 years of sampling on Lake Winnebago and 7 years of sampling on the Upriver Lakes that no shad were observed in any of the stomachs sampled. The 2015 season was the only other year that shad were not observed.

Isopods were present in 19.0% of the stomachs collected from Lake Winnebago and 1 stomach (3.4%) collected from the Upriver Lakes (Figure 2). The prevalence of isopods in sturgeon stomachs from the Lake Winnebago harvest was the 2nd highest observed during the 8 seasons we have data for. The only season with a higher prevalence of isopods was 2013 when 21.6% of the stomachs collected contained isopods. Isopods were represented in stomachs collected from fish that were harvested in areas 1, 3, 5 and 6 (Figure 3). Sturgeon are normally feeding on isopods over the

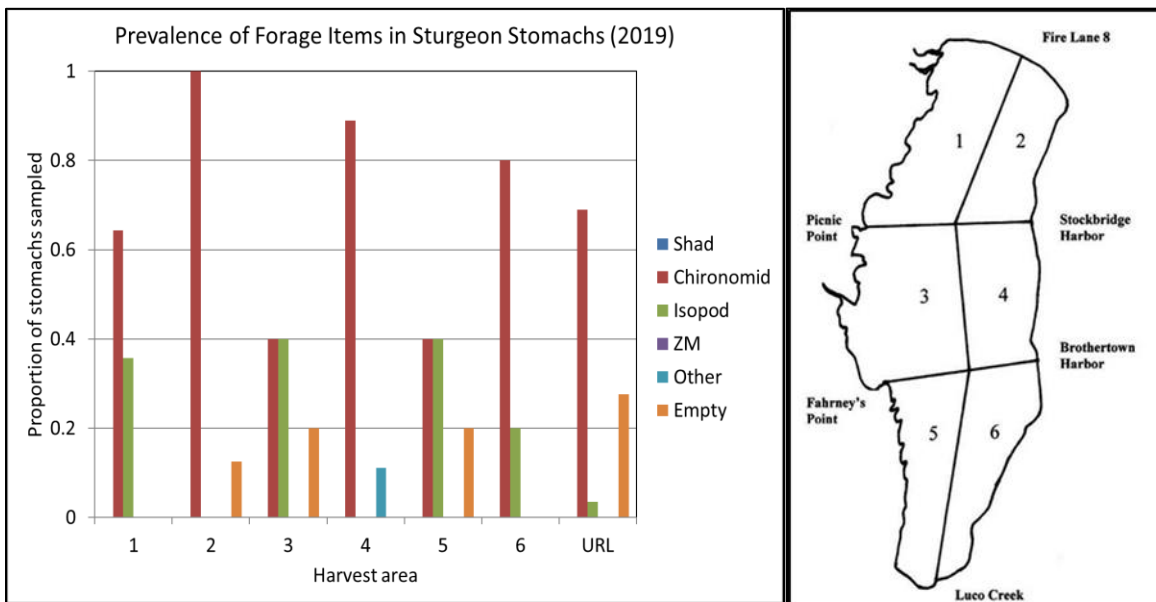


Figure 3. Prevalence of gizzard shad, Chironomid larvae (red worms), isopods, and zebra mussels observed in stomachs of sturgeon harvested from Lake Winnebago (areas 1-6) and the Upriver Lakes (Butte des Morts, Poygan, and Winneconne) during the 2019 spearing season.

rock/reef habitats within the lakes, so it's not surprising to observe isopods more represented in stomachs of sturgeon harvested on the west and south ends of Lake Winnebago as those lake areas contain the most hard substrate. The stomach collected from the Upriver Lakes that contained isopods represents only the 2nd sturgeon stomach collected from the Upriver Lakes fishery that has contained isopods since 2013.

Zebra mussels were not observed in any of the stomachs collected from sturgeon harvested from either fishery. We did observe a few dead zebra mussel shells in some of the stomachs containing isopods, but these were shells from dead zebra mussels that were inadvertently ingested as fish were feeding on isopods. There was one stomach collected from a sturgeon that was harvested from area 3 that contained small bivalves, but they were not zebra mussels.

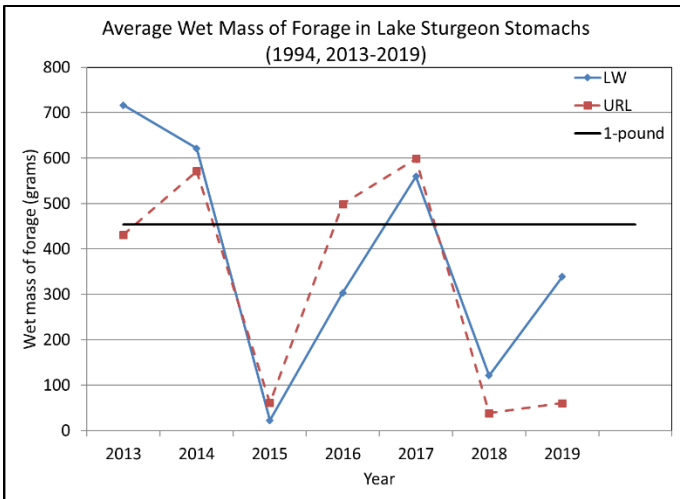


Figure 4. Average wet mass of forage observed in stomachs of lake sturgeon sampled from Lake Winnebago (1994, 2013-2019 seasons) and the Upriver Lakes (2013-2017 seasons) (Reference there are 454 grams to a pound).

The stomachs removed from sturgeon harvested in the Upriver Lakes fishery were more prone to being empty relative to Lake Winnebago (27.6% on Upriver Lakes vs 3.4% on Lake Winnebago) (Figure 2). Further, stomachs collected from the Upriver Lakes fishery had a substantially lower wet mass relative to Lake Winnebago (Figure 4). Regardless, of whether the fish was feeding on chironomid larvae or isopods, stomachs removed from sturgeon harvested in the Lake Winnebago fishery were flush with food. In fact, we observed numerous stomachs that contained more than 1.5 pounds of chironomid larvae

(redworms), highlighted by a 59.5" (58.4 pound) male sturgeon that was registered at Waverly Beach and had 2.3 pounds of chironomid larvae in its stomach (photo inset). The average wet mass of prey items observed in sturgeon stomachs in 2019 was higher than most non-shad years (2018 and 2015), but still reduced from seasons where gizzard shad was the primary food source for sturgeon (2013, 2014 and 2017). Prey items observed in sturgeon stomachs removed from fish harvested in the Upriver Lakes fishery were normally more sparse relative to Lake Winnebago.

In conclusion, the diet results observed this season jive with what we would have anticipated coming into the season. Gizzard shad are in very low abundance, but chironomid larvae are readily



available and are currently serving as the primary forage item for sturgeon. From my visual observation, it seems that sturgeon condition is extremely variable from fish to fish this season. However, the fish in the population as a whole seem to be in better condition than last season. We will better evaluate condition once the length-weight data from this season are entered and analyzed, but the increase in redworm numbers is a good thing for the sturgeon population in the Winnebago System. Assessing the availability of forage for sturgeon is an important component of our management program. Thus, we plan to continue assessing the forage base in the coming years to keep our fingers on the pulse of what's transpiring within the food web.

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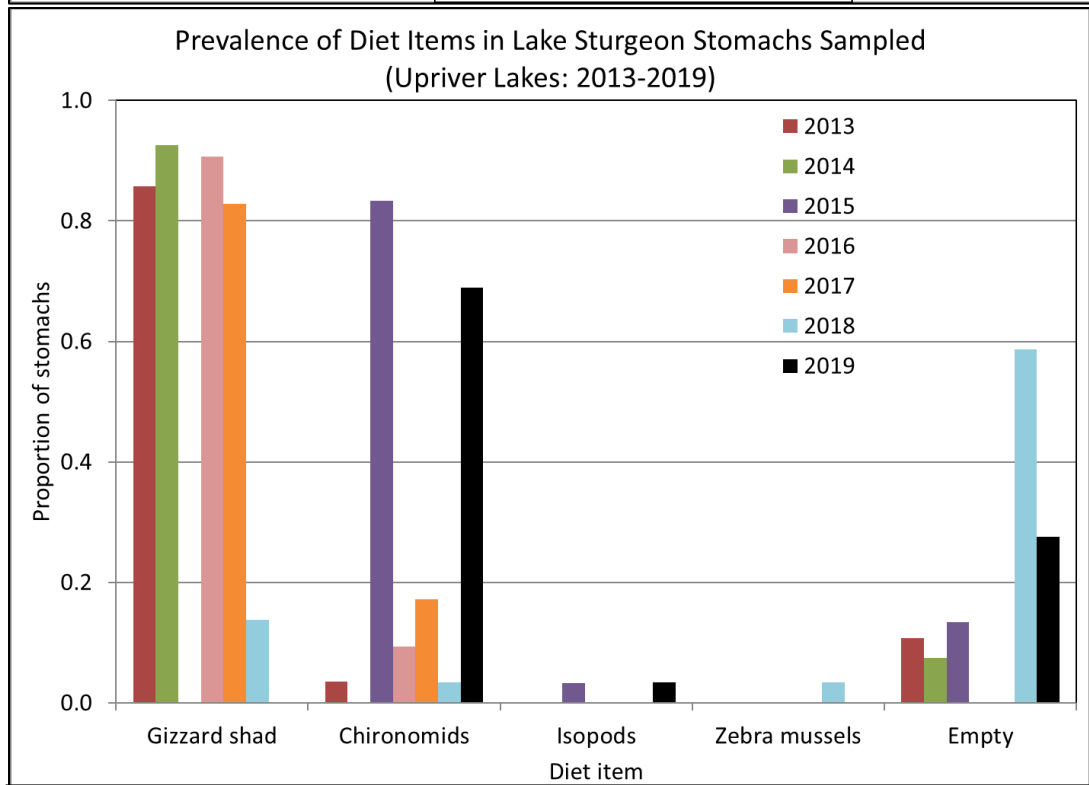
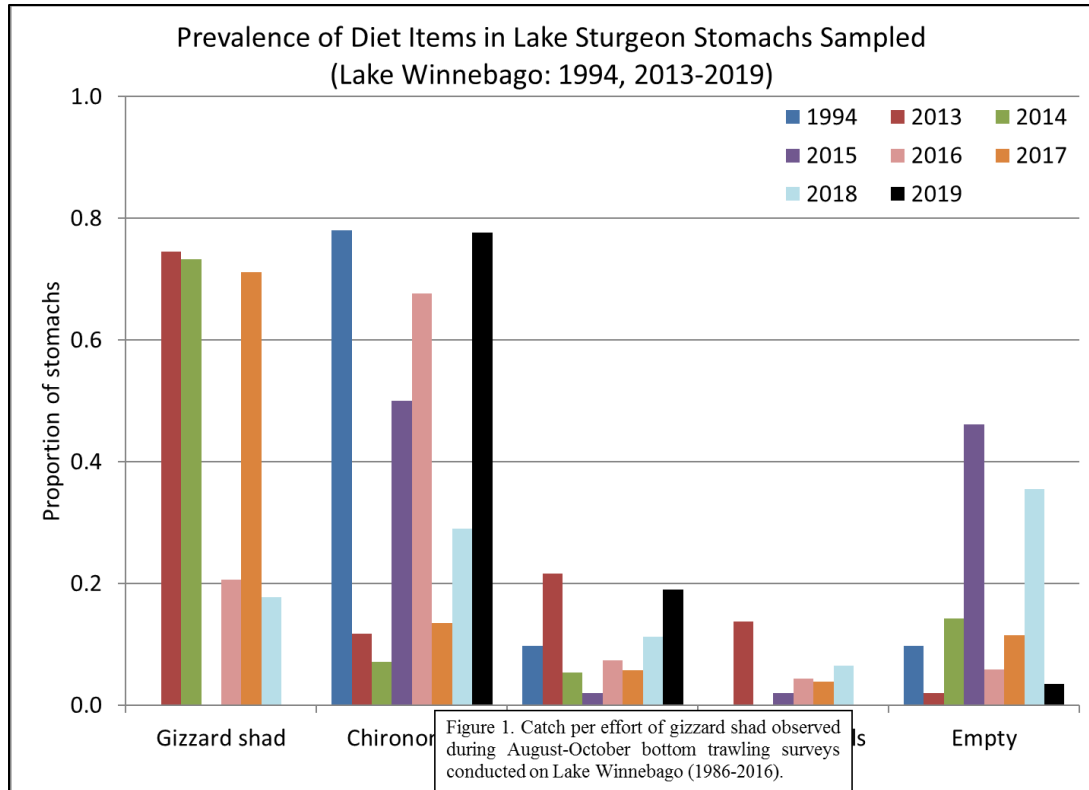


Figure 2. Proportion of sturgeon stomachs collected from Lake Winnebago (top) and the Upriver Lakes (bottom) containing gizzard shad, Chironomid larvae, isopods, zebra mussels, or empty (1994, 2013-2019).