

Brice Prairie Channel: A Case Study of Water Quality and Fisheries Habitat Decline

Shawn Giblin

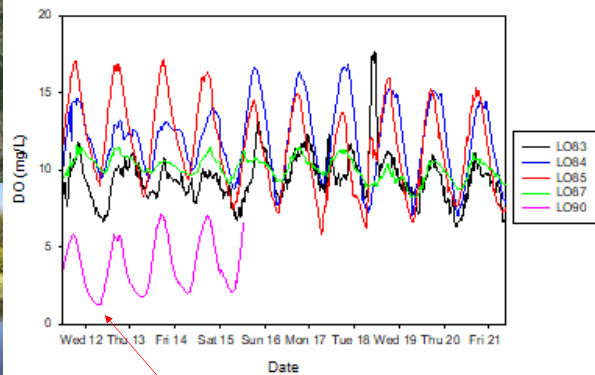
WI DNR

Wisconsin DNR was approached by the Lake Onalaska Protection and Rehabilitation District in 2020 to conduct water quality evaluations related to excessive mats of filamentous algae and duckweed on the lake. As part of this evaluation, continuous water temperature/dissolved oxygen sensors (taking a measurement every 15 minutes) were placed at various locations throughout the lake. One of the most compelling observations among these data was that Brice Prairie Channel (Blackdeer Channel) was experiencing low dissolved oxygen concentration during the overnight hours in August 2020 (dissolved oxygen < 2 mg/L).

Focus Area: Blackdeer Channel (Brice Prairie Channel)

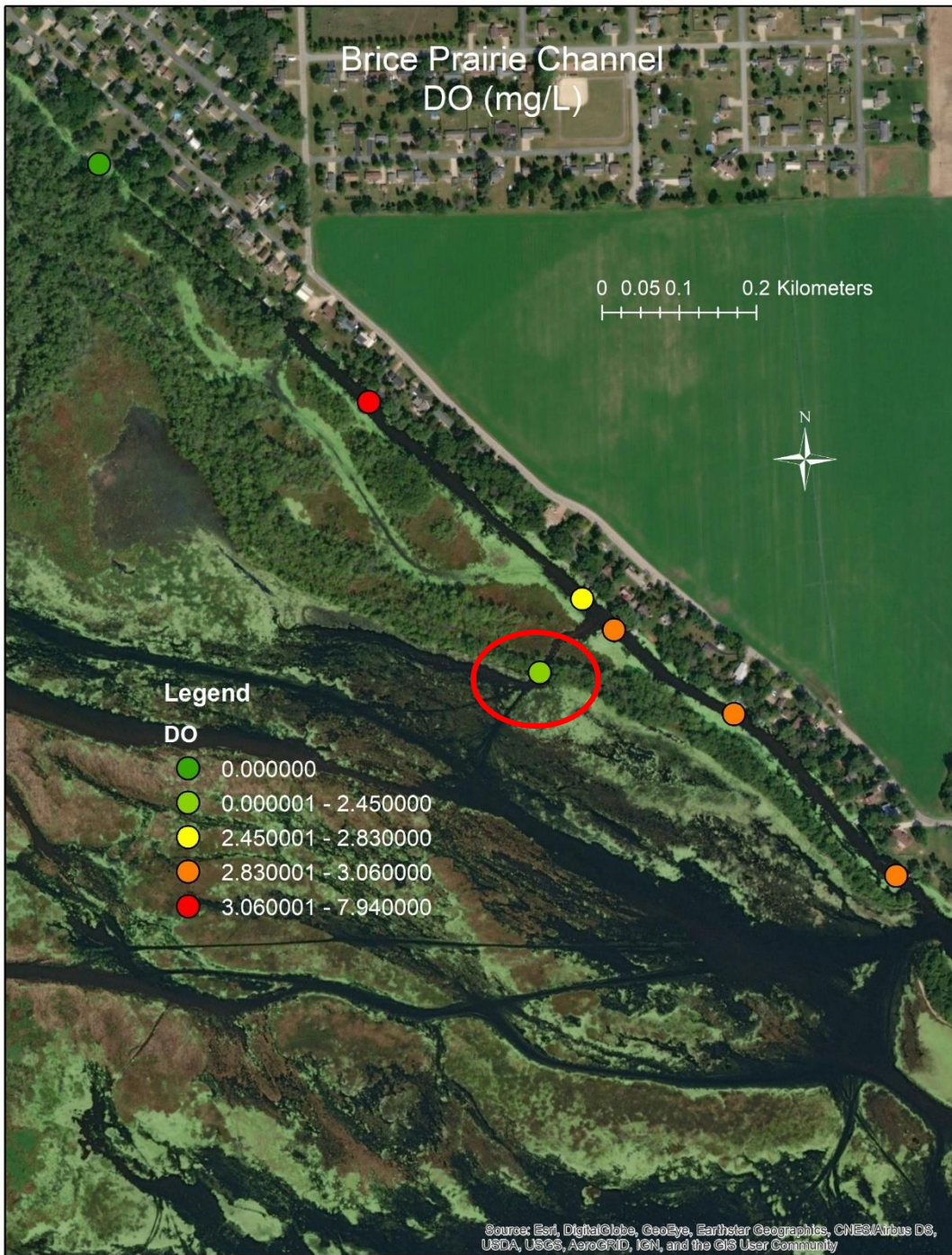


August 2020



Low Oxygen (< 2 mg/L) in Blackdeer Channel

This observation compelled WI DNR to initiate a more detailed water quality evaluation of Brice Prairie Channel. This round of sampling (in August 2020) showed that water moving into Brice Prairie Channel from the “stump fields” was quite low in dissolved oxygen (2.45 mg/L). Biologists generally want to see dissolved oxygen >5 mg/L- we become concerned when dissolved oxygen is <3 mg/L; and ~1 mg/L fish kills become likely if fish can’t vacate the area.



Further evaluation of conditions within Brice Prairie Channel revealed the quantity of water moving into Blackdeer Channel was also poor. A general rule of thumb for winter backwater fish habitat is to target water residence time (the time in days it takes to flush completely new water into a backwater complex) of 12.1 days. If a backwater flushes faster than 12.1 days (<12.1 days), too much cold channel water cools the water in the backwater colder than what overwintering fishes can tolerate (overwintering backwater fish typically require water temperature >1° C). Typical flowing channel water in the winter months is 0.1-0.2° C. If a

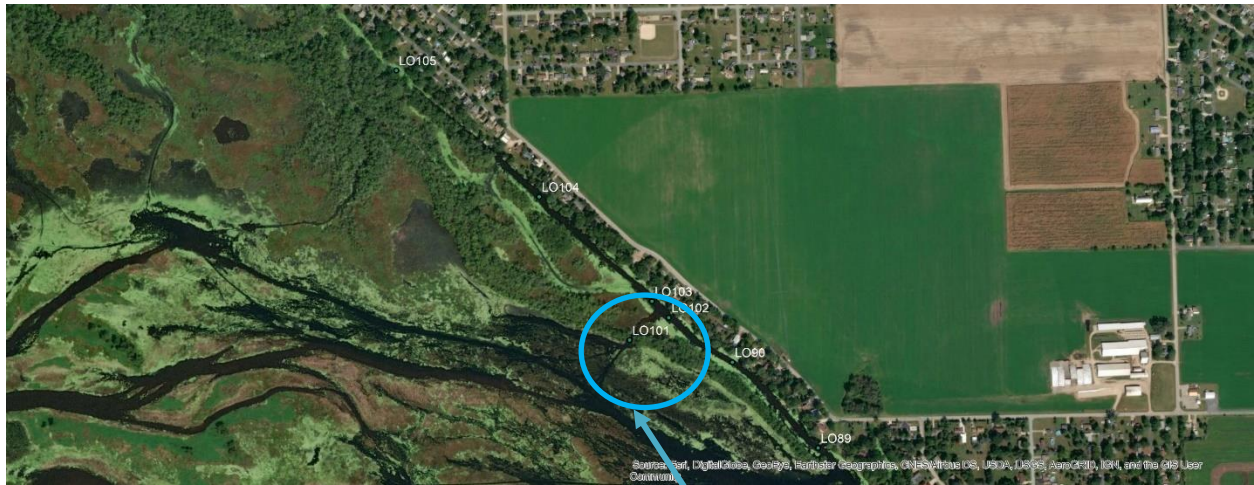
backwater flushes slower than 12.1 days (>12.1 days), low oxygen conditions frequently develop. 12.1 days water residence time is frequently referred to as the “Goldilocks Zone” where optimal winter fisheries habitat quality is achieved (water is sufficiently warm and exhibits adequate dissolved oxygen). Our findings showed that Brice Prairie Channel had a water residence time of 0.34 days (~35x too much inflow for optimal winter water quality). This confirmed my personal suspicions regarding how and why the winter fishery had declined in Brice Prairie Channel so precipitously. I grew up on Brice Prairie and the ice fishing in Brice Prairie Channel (Blackdeer Channel) was very good in the 1980s and into the 1990s. Almost no one would regard Brice Prairie Channel as a high-quality ice fishery in recent years. It was formerly notable as an ice fishery for two reasons: 1. The fishing was very good. 2. It was essentially a “sight fishing” ice fishing experience where anglers would look down the hole into clear water and attempt to move the bait away from smaller fish (principally bluegill) and in front of larger fish- a game we used to refer to as “keep away”. This made for very exciting ice fishing outings due to the visual element of the fishing. Under current conditions, the influx of turbid water from the “stump fields” eliminates the “sight fishing” ice fishing opportunities. Typical water visibility of the water in winter is ~1.5 feet under the current degraded condition.



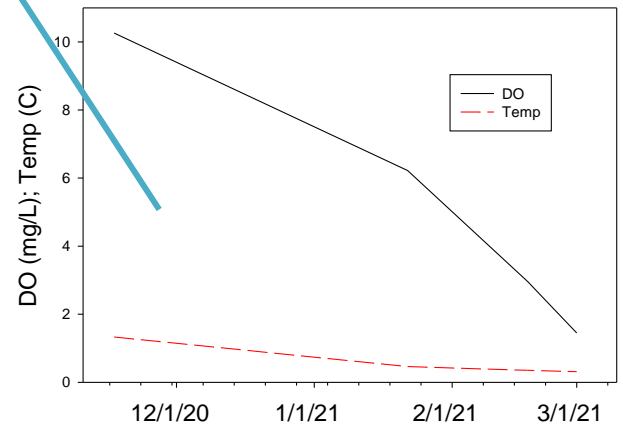
Realizing that far too much water was moving through the notch in Brice Prairie Channel (and with the winter months coming)- the WI DNR, Fish and Wildlife Service and Brice Prairie Conservation Club conducted a brush bundling project (in October 2020) to reduce the heavy water inflow from the stump fields into Brice Prairie Channel.



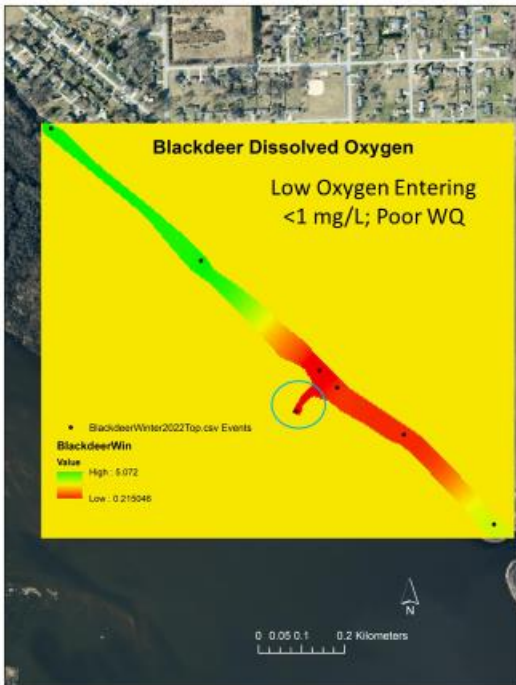
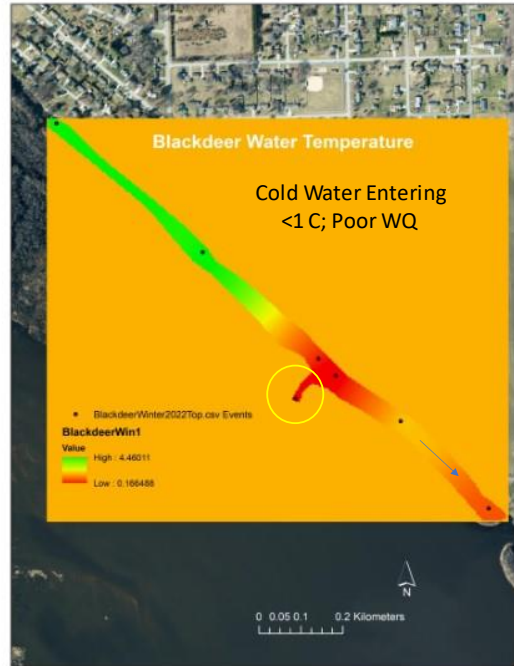
Water quality monitoring in Brice Prairie Channel over the winter of 2020-2021 revealed a steady decline in dissolved oxygen of the water entering Brice Prairie Channel as the winter progressed. Dissolved oxygen of the water entering Brice Prairie Channel steadily declined as the winter progressed- ~ 10 mg/L in November and <2 mg-L by early-March.



WQ at LO101 (Notch)



Further data collection in January of 2022 revealed that the water entering Brice Prairie Channel from the stump fields was a rare trifecta of poor water quality (cold, low oxygen and turbid). The water entering Brice Prairie Channel was too cold ($<1^{\circ}\text{C}$), low in dissolved oxygen ($<1\text{ mg/L}$; low enough to expect fish kills or fish vacating the habitat), and turbid (low visibility). It's quite rare for winter water quality to exhibit all three of these negative characteristics. For example, cold water ($<1^{\circ}\text{C}$) in the winter is typically high in oxygen. Seeing this rare trifecta of poor water quality in the winter explains the long-term decline of Brice Prairie Channel in terms of winter fishing opportunities.

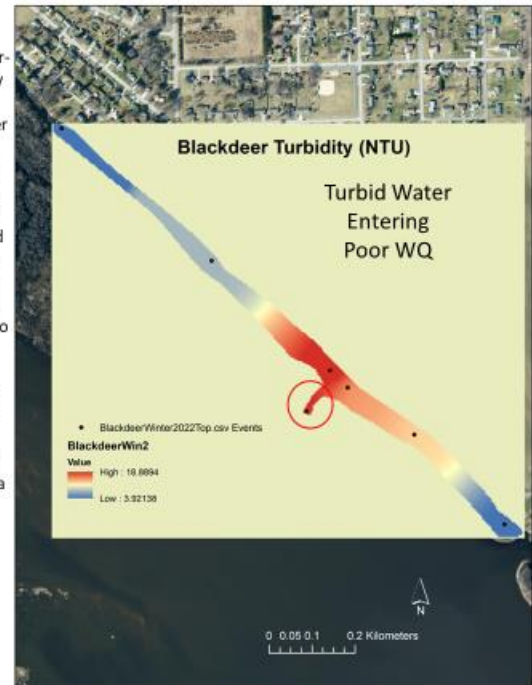


Water Entering Blackdeer- Rare Poor Water Quality Triecta of Cold, Low Oxygen and Turbid Water

WI DNR re-evaluated Blackdeer Channel in January 2023 and again observed water too cold for overwintering fishes and with little oxygen 1.14 mg/L the highest observed. Water was also quite turbid.

Extremely Poor winter fish habitat currently!

This area will never be productive fisheries area again without intervention.



Follow up water quality investigations in January 2023 again showed water that was excessively cold, low in oxygen and turbid entering Brice Prairie Channel from the “stump fields”. Brice Prairie Channel will never again be a high-quality ice fishery without habitat intervention. A simple habitat project to reduce winter flow into the complex (ideally coupled with dredging of accumulated sediments) would restore this important habitat as high-quality recreational fishery.