

Response to 2019 fish kill on Garvin Brook, Winona County

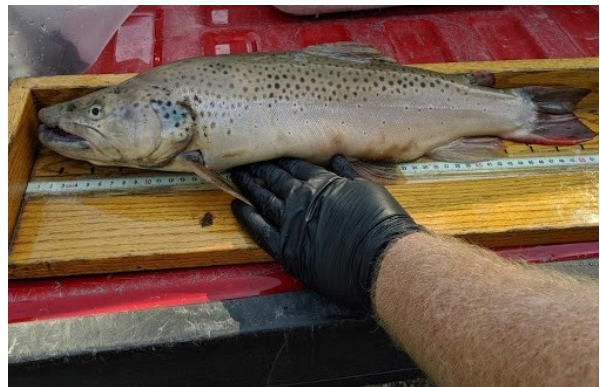
Summary

After a citizen reported a fish kill on Garvin Brook in Winona County on September 26, 2019, three state agencies responded by surveying the extent of the kill, taking water samples, walking the stream and tributaries, and talking with landowners. The investigation team met several times to discuss the lab analysis of water samples and other information. The agencies were not able to determine the exact cause of the kill because of the time lapse between the kill occurring and being reported. However, the agencies agreed that the fish kill likely occurred because of heavy rains leading to contaminated runoff that caused short-term toxic conditions for fish.

First report and initial response

On September 26, 2019, the Minnesota State Duty Officer received a citizen's report of a fish kill on Garvin Brook at Farmers Community Park near Lewiston, Minnesota. The State Duty Officer notified Winona County and the following state agencies:

- Minnesota Department of Natural Resources (DNR)
- Minnesota Pollution Control Agency (MPCA)
- Minnesota Department of Agriculture (MDA)



DNR crews take fish measurements as part of the response to the fish kill on Garvin Brook.

The State Duty Officer report did not identify a cause associated with the kill. Two DNR conservation officers responded to the scene immediately upon receiving the report, confirming a significant number of fish killed in Garvin Brook, from where flow begins to its confluence with Peterson Creek, a distance of about 1.3 miles. DNR Fisheries staff responded soon thereafter to initiate a fish kill survey.

Agencies inspected the surrounding area and collected water samples the following day, September 27. The DNR, MPCA, and MDA coordinate on fish kill responses as part of an agreement in the Interagency Fish Kill Guidance Document. In this joint investigation, agencies responded and took action according to their respective authority. State and county specialists in water quality, watershed management, feedlots, fisheries, and laboratory analyses worked together to explore possible causes of the fish kill.

Fish kill occurred in sensitive area

The driftless area of Minnesota, noted for its karst topography, extends eastward from an agricultural plateau to a rim of rugged hills leading to the Mississippi bottomlands. The affected area of Garvin Brook is at the transition between the agricultural plateau and the hills. Common karst features include fractured and dissolved limestone at or near the surface of the land and sinkholes; both of which connect the surface of the land to deeper groundwater systems and springs. Springs serve as an important cold water source for Garvin Brook and other trout streams in the area.

Impact of heavy rains

Along with abundant snowfall in the spring of 2019, rainfall amounts continued above average during the summer into fall, with the annual average precipitation amount for the area reached by September 11. By late September, precipitation reached 42 inches, creating an area of saturated soils with high runoff potential. The fish kill occurred following this very wet September, including rainfall events on September 19-20 and September 24-25. Based on timing, the runoff generated by these events is implicated in the fish kill.

Fish kill not from natural causes

Combined DNR and MPCA surveys estimated 1,500 dead fish, including 1,300 Brown Trout, 200 Slimy Sculpin, and less than 10 Brook Trout. DNR fish necropsies at the scene indicated fish losses were not due to disease or physical trauma. Evidence showed that fish died rapidly with no age, sex, size, or species discrimination. The DNR concluded that the fish kill was not natural, but rather caused by a water quality issue, with short-duration toxic conditions implicated.

Water quality testing and sampling in Garvin Brook conducted on September 27 by the MPCA and MDA did not identify elevated levels of pesticides or contaminants of concern, likely because of the time that elapsed between the fish kill, the observation and reporting of the dead fish, and the water sampling.

However, water sampled and tested immediately after a subsequent rainfall event did show organically-rich runoff parameters to be elevated. This provides an indication that runoff from surrounding cropland during the rainfall events that occurred just prior to the fish kill may have been contaminated enough to contribute to the kill. Pesticide applications this time of year to the crop types in the area are uncommon. Areas in the watershed with recent manure land application, and a manure stockpile, were identified as part of the investigation. It is important to note that any runoff from the stockpile would have entered Garvin Brook downstream of where most of the dead fish were found. This would indicate that the stockpile may have contributed to pollutant loading to Garvin Brook, but would likely not have been a significant contributing factor to the kill.

Manure land application and stockpiling are common practices in southeastern Minnesota, whereas fish kills of this extent and magnitude are infrequent. Furthermore, these practices observed in the Garvin Brook Watershed were not out of the ordinary. Thus, to the extent that manure runoff may have played a role in this fish kill, weather and environmental conditions likely also placed a role in how the runoff occurred. For example, short-duration, high-intensity precipitation focused on the Garvin Brook Watershed might have produced undiluted, organically rich runoff to Garvin Brook. The karst conditions may have accelerated runoff from the land surface through direct subsurface pathways to springs that feed Garvin Brook, though groundwater pathways are uncertain.



State agencies deployed equipment to measure water quality parameters, such as dissolved oxygen levels, as part of the response to the fish kill on Gavin Brook.

Difficult to determine cause of fish kills because of several factors

Determination of the cause of a fish kill is difficult in riverine systems due to the dilution effect of flowing water flushing causal agent(s) downstream before dead fish are discovered. Real time automated water-monitoring equipment is necessary to isolate the cause. Physical evidence of a contamination flow path might be visible during some events. It is also impossible to rule out some type of illegal dumping or release of a toxin in the watershed. In general, the earliest possible notification and response aids in fish kill investigations.

The University of Minnesota estimates that 500 fish kills occur in Minnesota every year, but few are reported (www.maisrc.umn.edu/news/fish-kills). Runoff, disease, and low oxygen levels are the most common causes. The University also reports that fish kills often occur when multiple factors happen at the same time.

Fish populations recover

As is almost always the case with fish kills, fish have and will continue to return to the section of stream where the kill occurred. Fish populations in Garvin Brook have been assessed by the DNR each fall since 1977 showing a trend in the fish community transitioning from sensitive Brook Trout to more tolerant Brown Trout species. Beyond this particular fish kill, the long-term fish survey results suggest chronic or recurring water quality issues in Garvin Brook which also need attention. Surveys will continue in 2020, as Garvin Brook will remain a part of the DNR Fisheries long-term monitoring program in southeast Minnesota. The MPCA will also be conducting biological monitoring on Garvin Brook in 2020. These efforts will help characterize Garvin Brook's recovery from the fish kill.

Lessons learned

One important lesson learned from this incident was the need to engage the Minnesota Department of Health earlier in the response to certain fish kills. While agencies already work with local government units on public health issues, the Minnesota Department of Health can provide additional guidance and coordination. Potential human contact with the contaminated water is a concern and the public may need to be warned to stay out of the water.

In a setting such as the Garvin Brook Watershed, where there is clear interaction between surface water and groundwater, there are legitimate concerns about wells being contaminated by the same agent that caused the fish kill. Interagency fish kill response guidance will be updated to include more details on potential public health issues. These events provide an opportunity to remind residents the importance of actively managing and testing their wells. A non-governmental group, the Minnesota Well Owners Organization, provided such a reminder in an October 30 letter to the Winona Post newspaper. The group also sponsored a well water testing clinic on November 21.

Continued outreach

The MPCA feedlot program will continue its efforts to educate producers on implementing best management practices (BMPS) to prevent runoff. Current rules require producers to follow setbacks from water and karst features when applying manure.

The MPCA, DNR and MDA also work to educate all landowners on BMPS to reduce stormwater runoff.

In addition, the agencies will continue their efforts to educate the public about the importance of reporting fish kills by calling the State Duty Officer at 1-800-422-0798. Outreach efforts include:

- Distribution of a postcard at the Minnesota State Fair and other events
- Social media posts
- Requests to media to publish information

For more information

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