

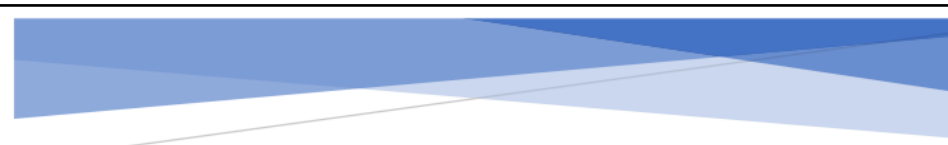
Badger Mill Creek Stakeholder Group



Badger Mill Creek outfall



December 13, 2023



Possible enhancements
pg. 23-24

Final Alternatives Assessment for Phosphorus
Compliance
Badger Mill Creek, Outfall 005
Madison Metropolitan Sewerage District

Madison Metropolitan Sewerage District
April 2023

- **Streambank and channel**
 - Dane Co. / City of Verona Project
- **Habitat**
 - Dane Co. / City of Verona Project
- **Flow**
 - Goose Lake Study
 - Stormwater Retrofits / Green Infrastructure
- **Temperature**
 - Stormwater Retrofits / Green Infrastructure
- **Further nutrient removal**
- **Removal or modification of obstructions**
- **Community organization initiatives**
 - USRWA Habitat Assessment

Improvement of Trout Streams
in Wisconsin by Augmenting
Low Flows With Ground Water

By R. P. NOVITZKI

GEOLOGICAL SURVEY WATER-SUPPLY PAPER 2017

*Prepared in cooperation with Wisconsin
Department of Natural Resources*



UNITED STATES GOVERNMENT PRINTING OFFICE, WASHINGTON : 1973

- USGS / WDNR Study
- The purpose of this study was to evaluate the possibility of improving trout streams by augmenting low flows with pumped ground water.
- Approximately 2 cfs (1.3 MGD) of augmenting flow was introduced into the Little Plover River and Black Earth Creek and the responses of various stream parameters to the increased flow were observed.

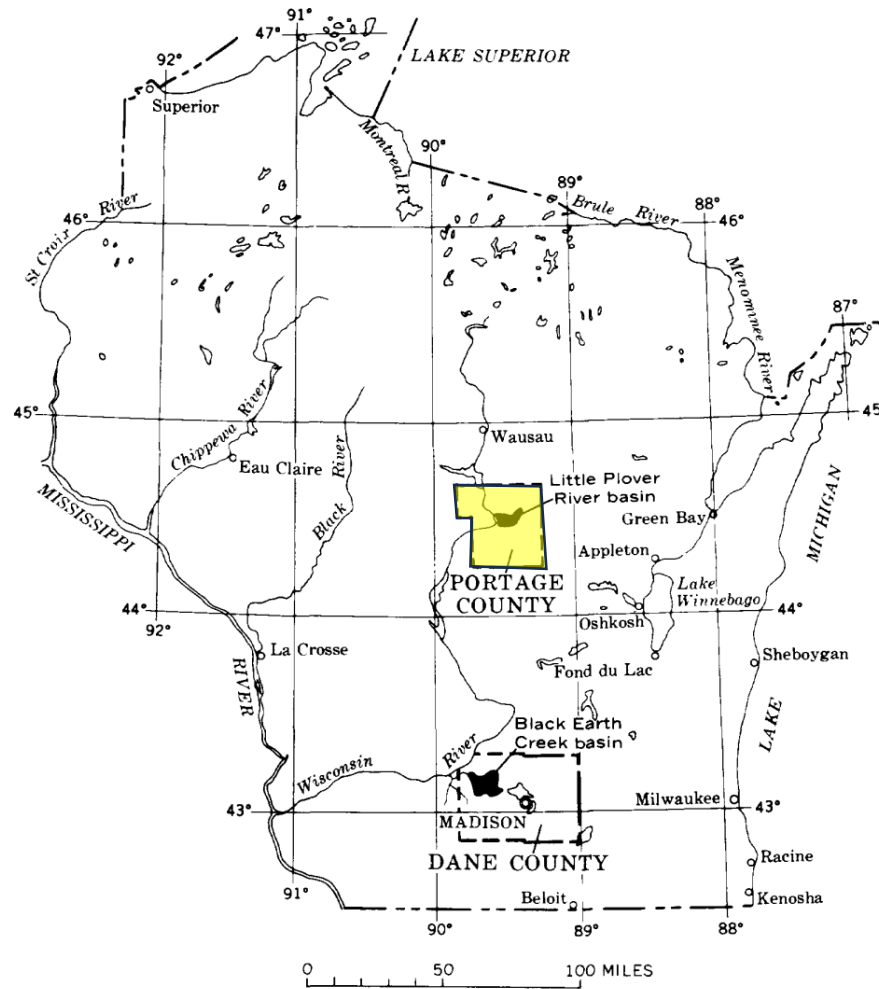


FIGURE 1.—Location of study areas.

- Natural streamflow ranged from 3 to 4 cfs.
- Approximately 2 cfs of ground water were introduced into the Little Plover River
- Source: Irrigation well ~ 1 mi away discharged via irrigation pipe
- These augmentation flows were retained undiminished through the 2-mile reach of stream monitored.

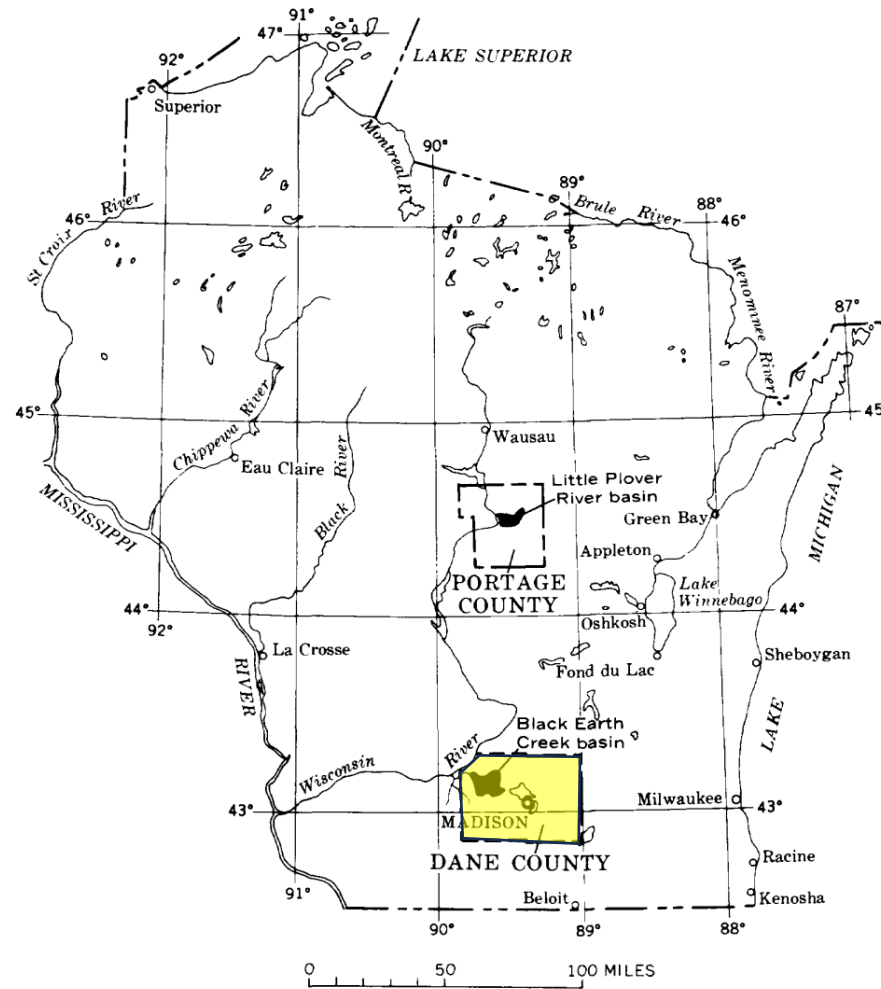


FIGURE 1.—Location of study areas.

- Natural streamflow ranged from 1 to 2 cfs at the augmentation site.
- Approximately 2.5 cfs of ground water were introduced into the headwaters of Black Earth Creek
- Source: Water from the gravel pits was discharged into a stream channel tributary
- These augmentation flows were retained undiminished through the 8-mile reach of stream monitored.

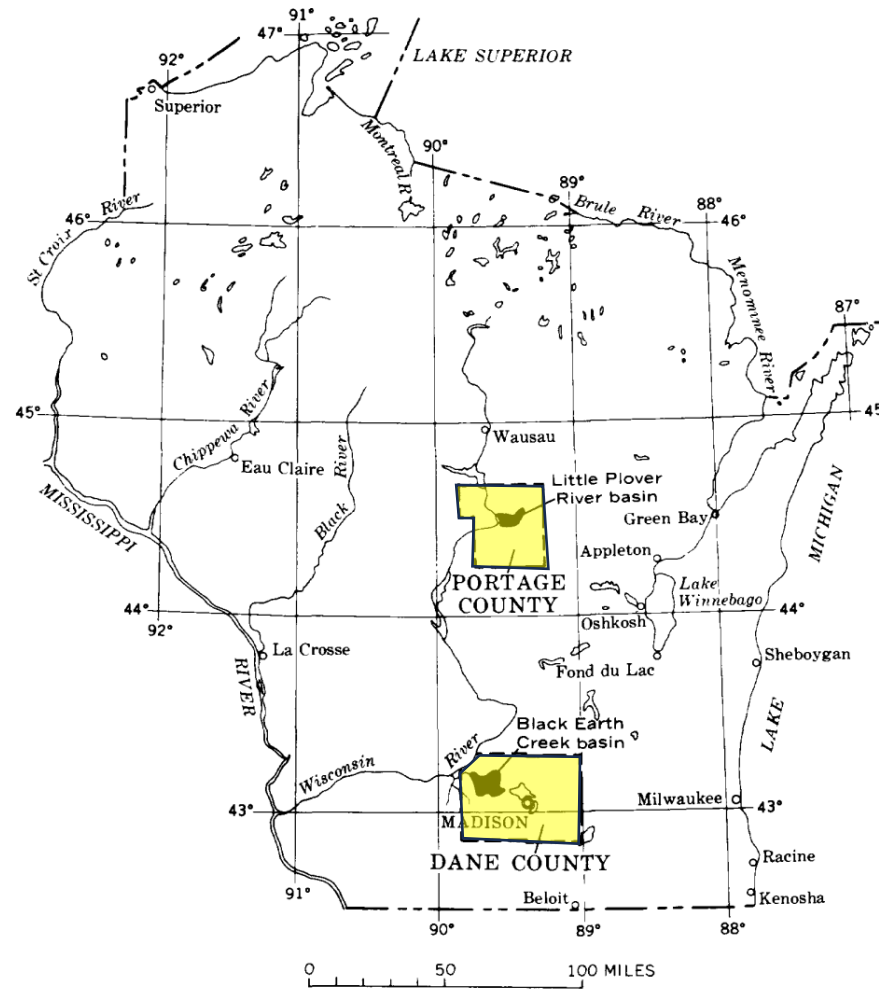


FIGURE 1.—Location of study areas.

- Significant habitat improvement through streamflow augmentation may be obtained in many trout streams throughout Wisconsin.
- Extreme temperatures and DO levels, which may result in fish kills, might be kept within tolerable limits.
- Near-critical stream levels, which may eliminate trout from a stream reach, may also be improved by augmentation.
- Some trout streams may have their fishery length extended by improving temperatures where ground-water runoff is inadequate.

Considerations:

- Modification of existing high-capacity wells vs new well for augmentation
- Well location (proximity to Badger Mill Creek)
- Well depth (shallow vs deep aquifer)
- Water quality

Questions:

- What is the estimated streamflow depletion from the current water withdrawals?
- What are the impacts of the shallow aquifer withdrawals on the stream versus the deep aquifer withdrawals?
- Can we benefit surface waters in the BMC / Sugar River basin by switching from shallow to deep aquifer ground water sources if all effluent will be discharged to Yahara?

WISCONSIN GEOLOGICAL AND NATURAL HISTORY SURVEY

The 2016 Groundwater Flow Model for Dane County, Wisconsin



Bulletin 110 • 2016

Michael J. Parsen
Kenneth R. Bradbury
Randall J. Hunt
Daniel T. Feinstein

UW
Extension
University of Wisconsin-Extension

- Developed by WGNHS & USGS
- Quantify the relationships between groundwater and surface water
- Decision-support tool that can be used to site new wells

Figure 4. Major hydrologic features in Dane County.

Major hydrologic features

