Long-Term Monitoring of Southeast Minnesota's Driftless Area Streams: An Overview of Site Selection and Sampling Procedures

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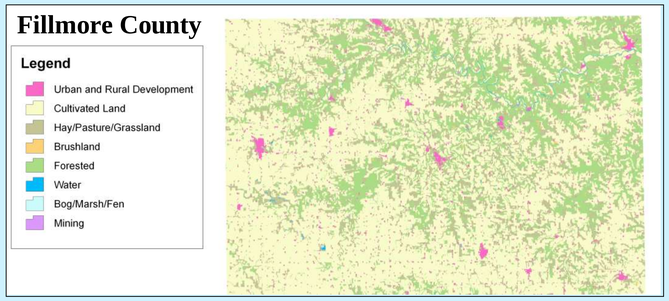
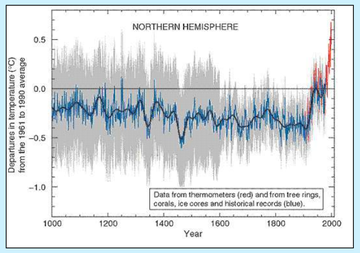
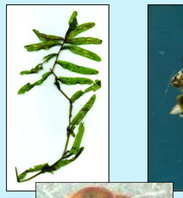
JUSTIFICATION

Historical shifts in landscape cover from forest and prairie to urbanization and agriculture have had pronounced impacts on associated streams. Sediment and nutrient loads into streams have increased substantially, stream temperatures are predicted to increase, and stream morphology, hydrology, and instream vegetative composition have been altered.



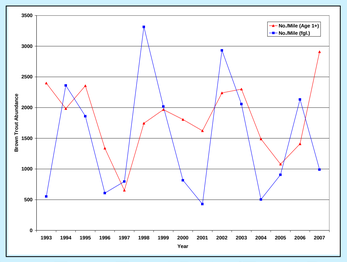
Additional anthropogenic disturbances are anticipated to have similarly negative effects. Climate change is predicted to alter thermal and hydrological cycles (IPCC 2001), and the increasing frequency of exotic species introductions continues to stress native aquatic communities (Fuller et al. 1999). Stream fauna are influenced by five primary components: hydrology, geomorphology/fish habitat, biology, water quality, and connectivity (Annear et al. 2004). Therefore, differing changes in landscape, climate, and aquatic community structure can influence one or more of these five components and ultimately affect native stream invertebrates and fishes.



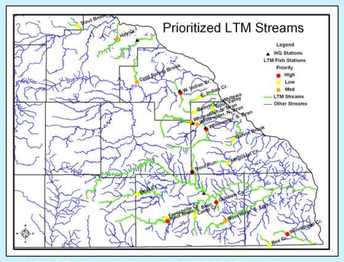


Exotic Species

There are 23 long-term monitoring (LTM) stations in SEMN that are being sampled annually for fish abundance (Table 1). Some of these stations have been sampled for over 20 years (Table 2). Over time, the fish populations appear to be cyclic in nature (see below), but little is known about why. Some of the objectives of this study are to: determine baseline variability, identify temporal trends, help determine factors driving trends, assess anthropogenic effects, and evaluate specific management strategies. To complete these we need to monitor other variables long-term, which are potentially influencing fish abundance.



Long-Term Trout Data (Trout Run)



23 Prioritized LTM Stations

LONG-TERM MONITORING (LTM) SITES

Table 1: Priority ranking of LTM streams and an example schedule of sampling intensity

Stream Name	County	Priority	Fishery Evaluation	Invertebrates	Discharge	Channel Morphology	Vegetation	Water Quality	WQ Station
Gribben Creek	Fillmore	High	Annually	Annually	Annually	Annually	Annually	Annually	
Root River, S. Branch	Fillmore	High	Annually	Annually	Annually	Annually	Annually	Annually	
Trout Run Creek	Fillmore	High	Annually	Annually	Annually	Annually	Annually	Annually	X
West Indian Creek	Wabasha	High	Annually	Annually	Annually	Annually	Annually	Annually	X
Whitewater, S. Branch	Winona	High	Annually	Annually	Annually	Annually	Annually	Annually	X
Winnebago Creek	Houston	High	Annually	Annually	Annually	Annually	Annually	Annually	
Bear Creek	Fillmore	Med	Annually	Even	2012	2012	2012	Surveys only	
Beaver Cr., Whitewater	Winona	Med	Annually	Even	2011	2011	2011	Surveys only	
Camp Creek	Fillmore	Med	Annually	Odd	2010	2010	2010	Surveys only	
Cold Spring Brook	Wabasha	Med	Annually	Odd	2012	2012	2012	Surveys only	
East Indian Creek	Wabasha	Med	Annually	Even	2010	2010	2010	Surveys only	
Ferguson Creek	Winona	Med	Annually	Odd	2011	2011	2011	Surveys only	
Forestville Creek	Fillmore	Med	Annually	Even	2012	2012	2012	Surveys only	
Garvin Brook	Winona	Med	Annually	Odd	2010	2010	2010	Surveys only	
Pine Creek (N.H.)	Houston	Med	Annually	Odd	2011	2011	2011	Surveys only	
Wells Creek	Goodhue	Med	Annually	Even	2012	2012	2012	Surveys only	X
Whitewater, N. Branch	Winona	Med	Annually	Even	2010	2010	2010	Surveys only	X
Bee Creek	Houston	Low	Annually	Odd	2010	2010	2010	Surveys only	
Hay Creek	Goodhue	Low	Annually	Even	2011	2011	2011	Surveys only	
Root River, N. Branch	Fillmore	Low	Annually	Even	2012	2012	2012	Surveys only	X
Root River, S. Fork	Fillmore	Low	Annually	Even	2010	2010	2010	Surveys only	
Trout Brook	Dakota	Low	Annually	Odd	2011	2011	2011	Surveys only	
Trout Valley Creek	Winona	Low	Annually	Odd	2012	2012	2012	Surveys only	

Root River, South Branch

BNT

Winnebago Creek (flood 2008)

Table 2: LTM station locations and number of years sampled

Stream Name	Kittle	Stream Mile	Length (ft)	Years	N	Season	Species of Interest
Gribben Creek	M-09-24	1.9	700	1993-2008	16	Fall	BNT
Root River, S. Branch	M-09-25	31.5	1,000	1991-2008	17	Fall	BNT
Trout Run Creek	M-09-29	8.6	954	1993-2008	16	Fall	BNT
West Indian Creek	M-34-17	5.4	975	1981-2008	16	Fall	BNT
Whitewater, S. Branch	M-31-17	3.5	2,260	1981-2008	24	Spring	BNT
Winnebago Creek	M-01	14.5	1,075	1997-2008	8	Spring	BNT
Bear Creek	M-09-33-08	20.2	1,000	1996-2008	13	Fall	SMB
Beaver Cr., Whitewater	M-31-06	3.5	1,078	1971-2008	30	Fall	BNT
Camp Creek	M-09-25-03	2.7	900	1997-2008	12	Spring	BNT
Cold Spring Brook	M-34-48	0.5	1,170	1998-2008	11	Fall	BNT,BKT
East Indian Creek	M-32	7.0	660	2003-2008	6	Fall	BNT,BKT
Ferguson Creek	M-09-17-12	0.1	540	1990-2008	19	Fall	BNT
Forestville Creek	M-09-25-09	2.2	1,200	1993-2008	16	Fall	BNT
Garvin Brook	M-26-01	2.8	830	1985-2008	24	Fall	BNT
Pine Creek (N.H.)	M-11	18.6	910	2007-2008	2	Fall	BNT,BKT
Wells Creek	M-43	9.0	-	New	-	Fall	BNT
Whitewater, N. Branch	M-31-18	1.2	1,750	1990-2008	14	Fall	BNT
Bee Creek	I-06	0.2	1,350	2005-2008	4	Spring	BNT
Hay Creek	M-46	6.1	975	2005-2008	4	Fall	BNT
Root River, N. Branch	-	-	-	-	-	-	SMB
Root River, S. Fork	M-09-10	35.3	1,200	1993-2008	10	Spring	BNT,BKT,RBT
Trout Brook	M-48-07	2.6	910	2005-2008	4	Fall	BKT
Trout Valley Creek	M-31-01	5.3	912	2003-2008	6	Fall	BNT,BKT

Some criteria for choosing streams:

- Importance of fisheries (blue ribbon streams)
- Existing water quality equipment and data
- Sympatric populations (brook/brown trout)
- Good representation of stream classes
- Streams with marginal fisheries (if climate change is an issue, they would be the first to go)
- Spatial distribution

Whitewater, South Branch

BKT

SMB

Trout Run Creek

SAMPLING PARAMETERS

Each of these parameters will be sampled annually in HIGH priority streams. After the pilot years of collecting data, importance of each will be assessed.

Fish

Temperature (air & water)

Geomorphology

Water Quality

Substrate

Aquatic Plants

Discharge

Habitat

FUTURE WORK & NEEDS

- Continue long-term monitoring of trout populations annually
- Sample each parameter in the HIGH priority streams annually to assess the required workload
- Continue to build working relationships with other offices and agencies to make expansion of the project possible
- Determine equipment needs at various stations
- Finalize who is doing what (establish teams or work groups)
- Create a methods manual specific for the LTM program
- Finalize the proposal after pilot study years
- Develop a brochure advertising the program and its specific needs for future funding and collaboration
- Continue to present monitoring plans and results at meetings