

## Background

One of the most comprehensive methods for assessing water quality conditions is evaluating the benthic macroinvertebrate community (i.e., bottom-dwelling animals that lack a backbone) and fish community. The IN Department of Environmental Management (IDEM) evaluates streams by using macroinvertebrate community data to calculate the Macroinvertebrate Index of Biotic Integrity (mIBI) and fish community data to calculate the Index of Biotic Integrity (IBI), which are developed specifically for IN streams. The mIBI and IBI calculate a score (0-60) that is used to assign a rating based on the size and location of the stream. Ratings are (in order of decreasing stream health): Excellent, Good, Fair, Poor, and Very Poor.

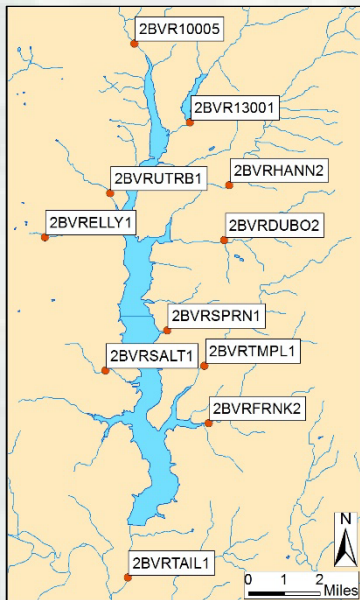


Figure 1. Map of site locations for the Brookville Lake watershed.

# Brookville Lake Watershed 2017 Biological Study

Site	Stream	Macroinvertebrate					Fish					
		mIBI	Rating	Taxa Richness	EPT Richness	QHEI	IBI	Rating	Taxa Richness	Sensitive Species Richness	% Tolerant	QHEI
2BVR10005	East Fork Whitewater River	36	Fair	27	7	68.5	42	Fair	17	8	33.33	69
2BVR13001	Silver Creek	30	Poor	11	0	56.5	44	Fair	10	4	5.4	59
2BVRDUBO2	Dubois Creek	40	Fair	21	12	77.5	48	Good	22	10	21.58	65
2BVRRELY1	Ellys Creek	38	Fair	30	9	57.5	40	Fair	4	0	99	53
2BVRFRNK2	Franklin Creek	36	Fair	22	8	70.5	42	Fair	13	7	12.09	60
2BVRHANN2	Hanna Creek	38	Fair	24	8	73.5	52	Good	17	9	1.28	70.5
2BVRFRNK2	Salt Well Creek	40	Fair	20	8	55.5	44	Fair	14	3	65.51	49
2BVRSPRN1	Spring Creek	40	Fair	21	12	58	42	Fair	13	4	69.23	57
2BVRTAIL1	East Fork Whitewater River (tailwater)	24	Poor	18	0	67	34	Poor	15	4	6.25	54
2BVRTMPL1	Templeton Creek	38	Fair	22	9	65	42	Fair	14	6	46.61	71.5
2BVRUTRB1	Unknown tributary	38	Fair	17	6	54.5	44	Fair	12	2	46.02	57.5
<b>Average</b>	--	36.2	--	21.2	7.2	64.0	43.1	--	13.7	5.2	36.9	60.5
<b>Min</b>	--	24	--	11	0	54.5	34	--	4	0	1.3	49.0
<b>Max</b>	--	40	--	30	12	77.5	52	--	22	10	99.0	71.5

Table 1. Results of mIBI and IBI scores, ratings, and other metrics.



Figure 4. Rainbow Darter (*Etheostoma caeruleum*) from Franklin Creek (2BVRFRNK2).

## Results

Table 1 and Figures 2-3 show that all of the mIBI ratings were either Fair (82%) or Poor (18%) and IBI ratings were either Good (18%), Fair (73%), or Poor (9%). The tailwater (2BVRTAIL1) was the only site to have Poor ratings for both macroinvertebrates and fish. The average mIBI was 36.2 (range: 24-40) and the average IBI was 43.1 (range: 34-52), which would both have a rating of Fair.

## Conclusions

The high proportion of Fair mIBI and IBI ratings (and average ratings of Fair) suggest the watershed has some level of impact from human disturbance but still has fair stream health, with the exception of the tailwater (2BVRTAIL1). The tailwater had the lowest score for mIBI and IBI and was the only location with two Poor ratings, indicating poor stream health. Assessment of dam discharge data suggests that flow could have played a role on the composition of the macroinvertebrate and fish communities, with notable discharge events near the time of sample collection. Future studies will require increased monitoring of discharge data to better account for these impacts. Dubois Creek and Hanna Creek appear to be the healthiest streams, with most of the other inflows in the fair/moderate range of health. Fair ratings do not indicate severe impacts; however, the low proportion of Good ratings and lack of Excellent ratings can be concerning for the water quality of the watershed as a whole.

## Methods

Ten of the primary inflows and the tailwater of Brookville Lake (Figure 1) were sampled in the summer of 2017. Macroinvertebrates were collected using IDEM's multi-habitat collection method and fish were collected using IDEM's backpack electrofishing method. Habitat was assessed using IDEM's Qualitative Habitat Evaluation Index (QHEI) and measured separately for macroinvertebrate and fish reaches; QHEI ranges from 0-100. Some of the metrics used in calculating mIBI and/or IBI include: taxa richness – number of taxa (i.e., types of organisms); EPT richness – number of taxa from the orders Ephemeroptera (mayflies), Plecoptera (stoneflies), and Trichoptera (caddisflies) which are organisms sensitive to poor water quality; sensitive species richness – number of species that are sensitive to poor water quality; and % tolerant – percentage of the total number of fish that were a species tolerant of poor water quality. Generally, good water quality is associated with higher values in mIBI, IBI, taxa richness, EPT richness, sensitive species richness, and QHEI, and lower values of % tolerant.

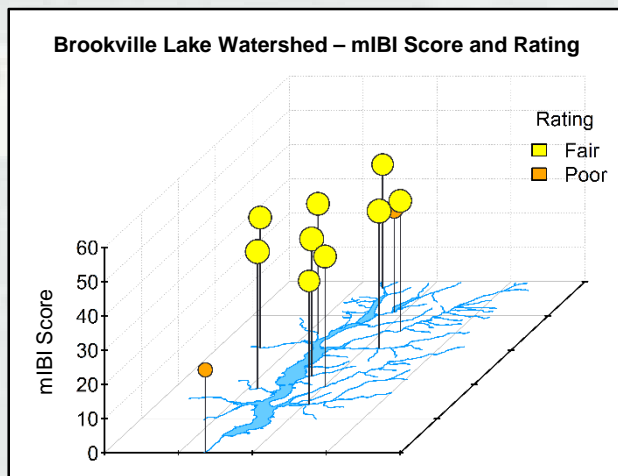


Figure 2. Lollipop chart of macroinvertebrate community mIBI scores and ratings. Lollipop height and circle size corresponds to mIBI score. Circle color corresponds to mIBI rating.

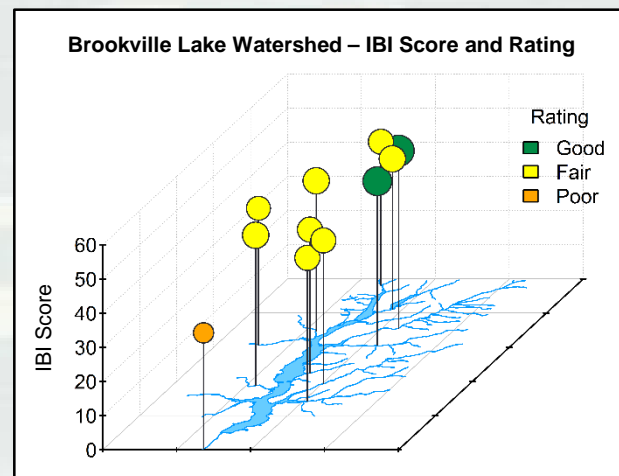


Figure 3. Lollipop chart of fish community IBI scores and ratings. Lollipop height and circle size corresponds to IBI score. Circle color corresponds to IBI rating.

