

Water Use Advisory Council
Models Committee Recommendation: Index Flows
October 10, 2021

The Water Use Advisory Council last reviewed statistics for the Index Flows in 2014 using streamflow data through WY2012. This current review uses streamflow data through WY2018. The analysis of the streamflow data was provided by the Water Resources Division, EGLE.

EGLE provided an analysis to the Models Committee of how percent change in exceedance flows have varied with gage station records from 2007-2018 compared with long-term data obtained prior to 2007. These data are useful in determining whether the long-term median flows used to derive the index flows for the WWAT have changed significantly since enactment of Part 327, thus indicating whether an overall statistical update of median flows maybe warranted at this time. The results show that the currently operating gaging stations, from the original analysis through 2007, provide information for 33.5% of the land area of Michigan. Of this 33.5% of land area, 24.2% had between -5% and +5% change in exceedance flows for the Index Flow, defined as the “lowest median flow of the summer months. In other words, 72% of the land area gaged showed that 2007-2018 August flows did not change from the previous long-term percent exceedance flows by more than plus or minus 5%. While several specific gaged watersheds did have percent exceedance flows that are changed by more than 5%, the majority are not altered significantly with the 2007-2018 flow data. The average change is +3.7%. The percent change in Index Flow is mapped in the attached figure. About 6% of the gaged land area had increases over 9%, and 2% of the gaged land area had decreases of over 9%. There may also be some regional patterns that merit further examination.

The committee also considered what the effects would be of using a “moving average” approach. An example of the approach is used by the National Weather Service for precipitation records. Every ten years they update their calculations of what is “normal” to include the last 30 years. This is a 30-year moving average.

We looked at moving averages because there is a concern that climate change may be influencing streamflows and therefore Index Flows – either up or down. To get a feel for what moving averages look like with gaged streamflow data, we considered 5- and 10-year moving averages. We also considered breaking up the time intervals based on “wet” or “dry” conditions. We found the results of the moving averages were volatile, i.e. the results changed dramatically from one time period to the next (going up or down), and they were not consistent across the state. In an effort to smooth out the volatility, we used the last twenty years of record to estimate the index flows. The results of the twenty year record are ambiguous, some estimates for Index Flow would increase, and some would decrease. None of the moving average results make a compelling case to change from our current system, at this time.

The Models Committee concludes the majority of gaged watersheds showed little change in low flow trends with the 2007 -2018 incorporated data, as compared to data collected prior to 2007, **we recommend that an overall statistical update of all index flows is not yet necessary.** The need to perform this statistical update should be reviewed at least every 5 years.

Michigan's % change of Index Flow From Water Year 2007 to 2018

Processed on August 18, 2021

Classes	% of Total area of the State	Number of Stations
Above 9.0%	2	13
5.0% to 8.9%	6	15
1.1% to 4.9%	11.6	26
-1.0% to 1.0%	7	22
-4.9% to -1.1%	5.6	9
-8.9% to -5.0%	0.7	3
Below -9.0%	0.6	3
Discontinued Station		56
Totals		147
Increased	19.6	55
No Change	4.4	18
Decreased	8.9	18

Based on U.S. Census Bureau:
Total area of Michigan is 56,538.0 sqmi

