1 *Supplementary Information*

3 **Tracking phosphorus dynamics: Historical and future trends in eight Lake Erie tributaries**

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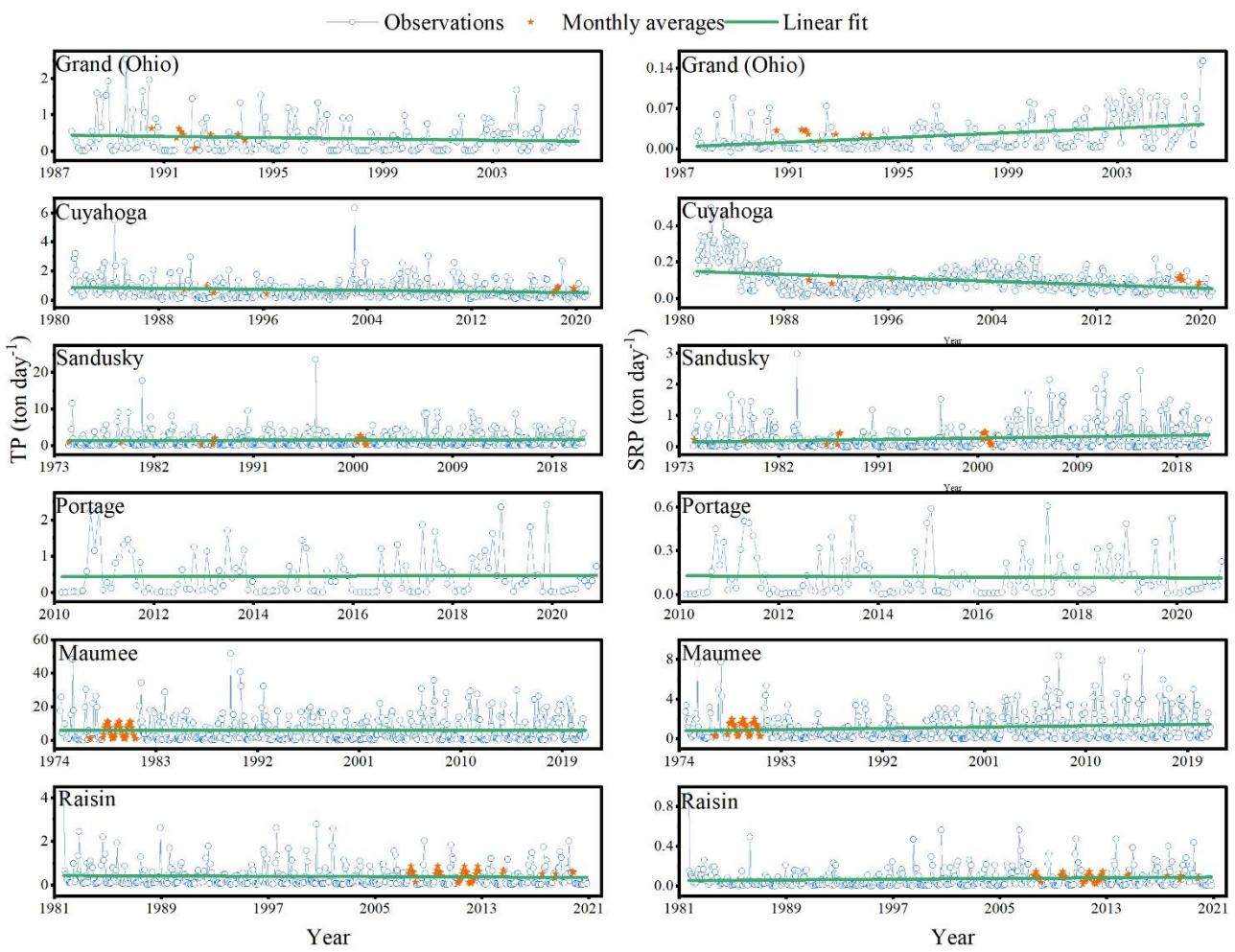
Figure S1. Monthly time series of monitored P loads. Imputed values are depicted in orange. The green line denotes a least-squares linear fit among the data.

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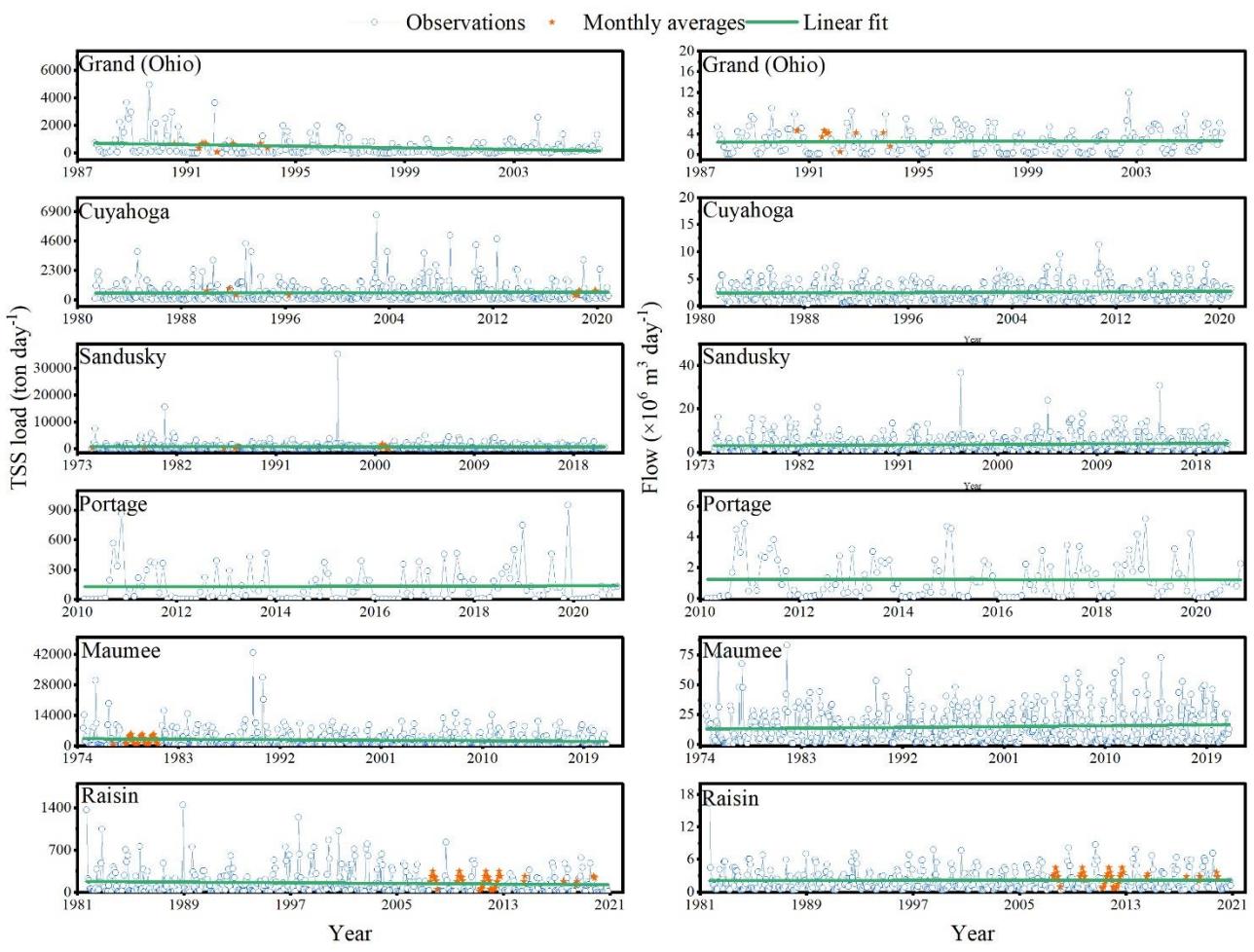
Figure S2. Monthly time series of monitored TSS loads and streamflow. Imputed values are depicted

in orange. The green line denotes a least-squares linear fit among the data.

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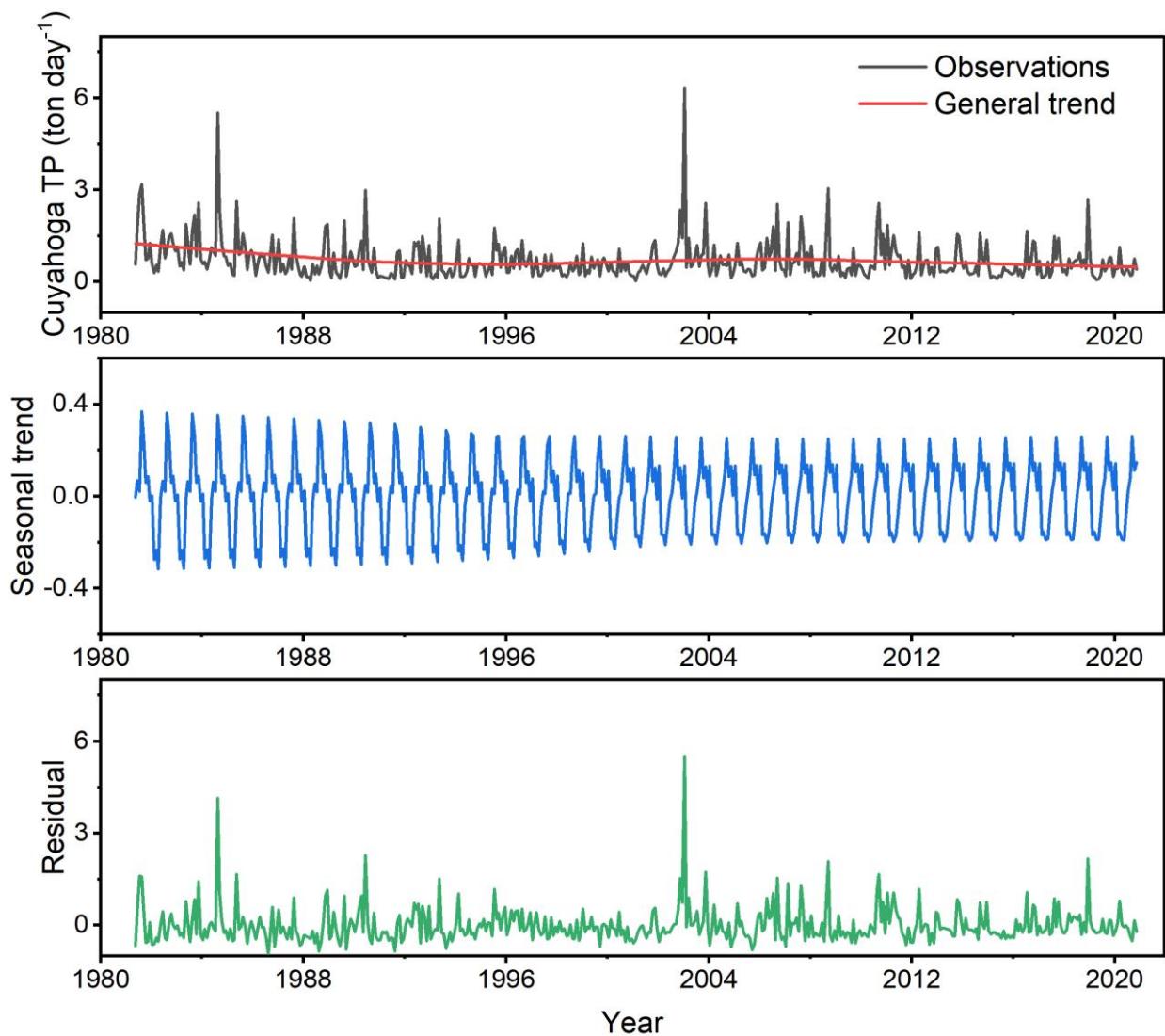
Figure S3. An example using STL method to decompose TP load time series data in Cuyahoga River

into smoothed long-term and seasonal trends.

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Figure S4. Relationship between daily flow, sediment, and daily P loads in eight Lake Eire tributaries

from 1974 to 1990.

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Figure S5. Relationship between daily flow, sediment, and daily P loads in eight Lake Eire tributaries

from 1990 to 2021.

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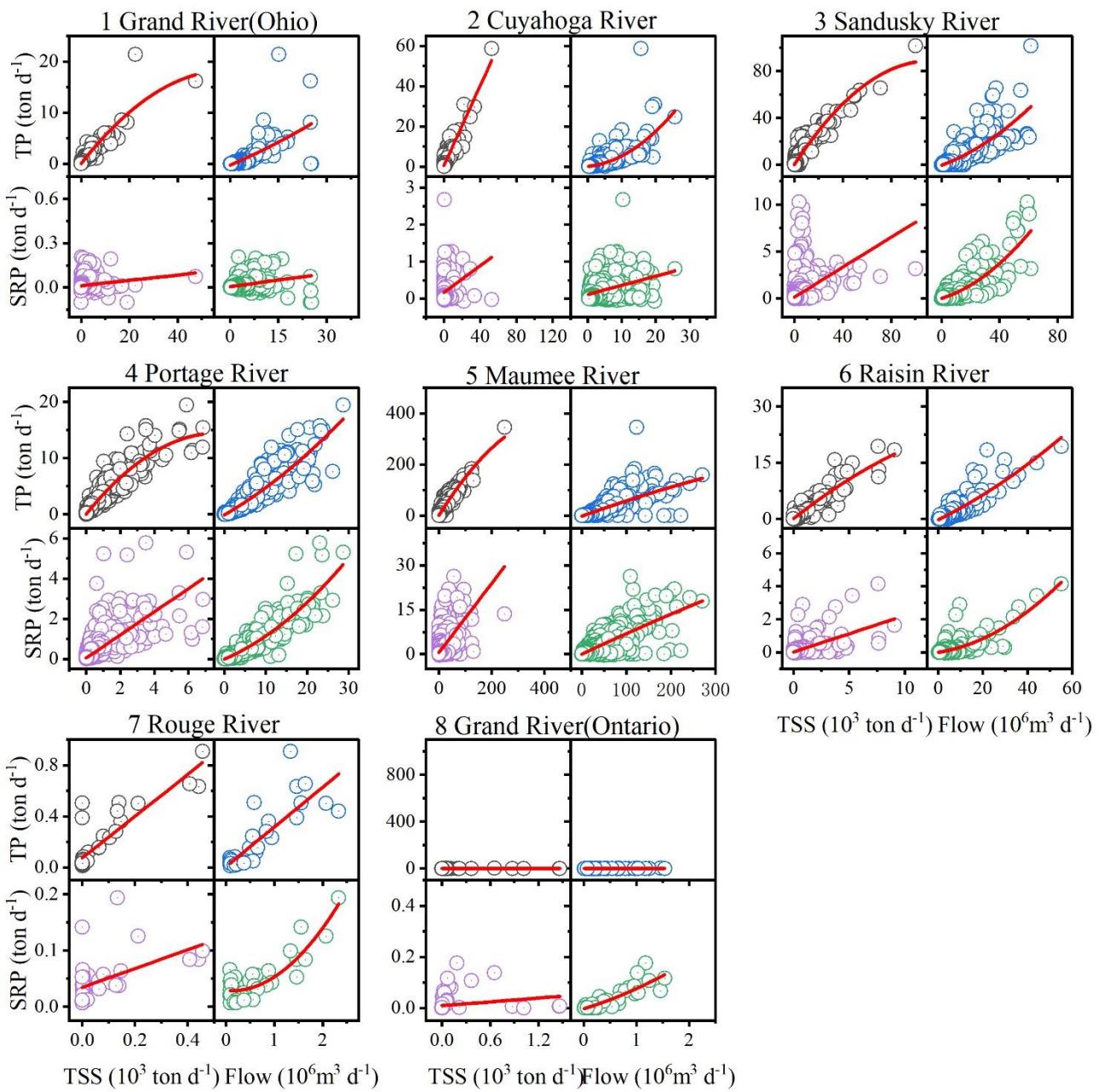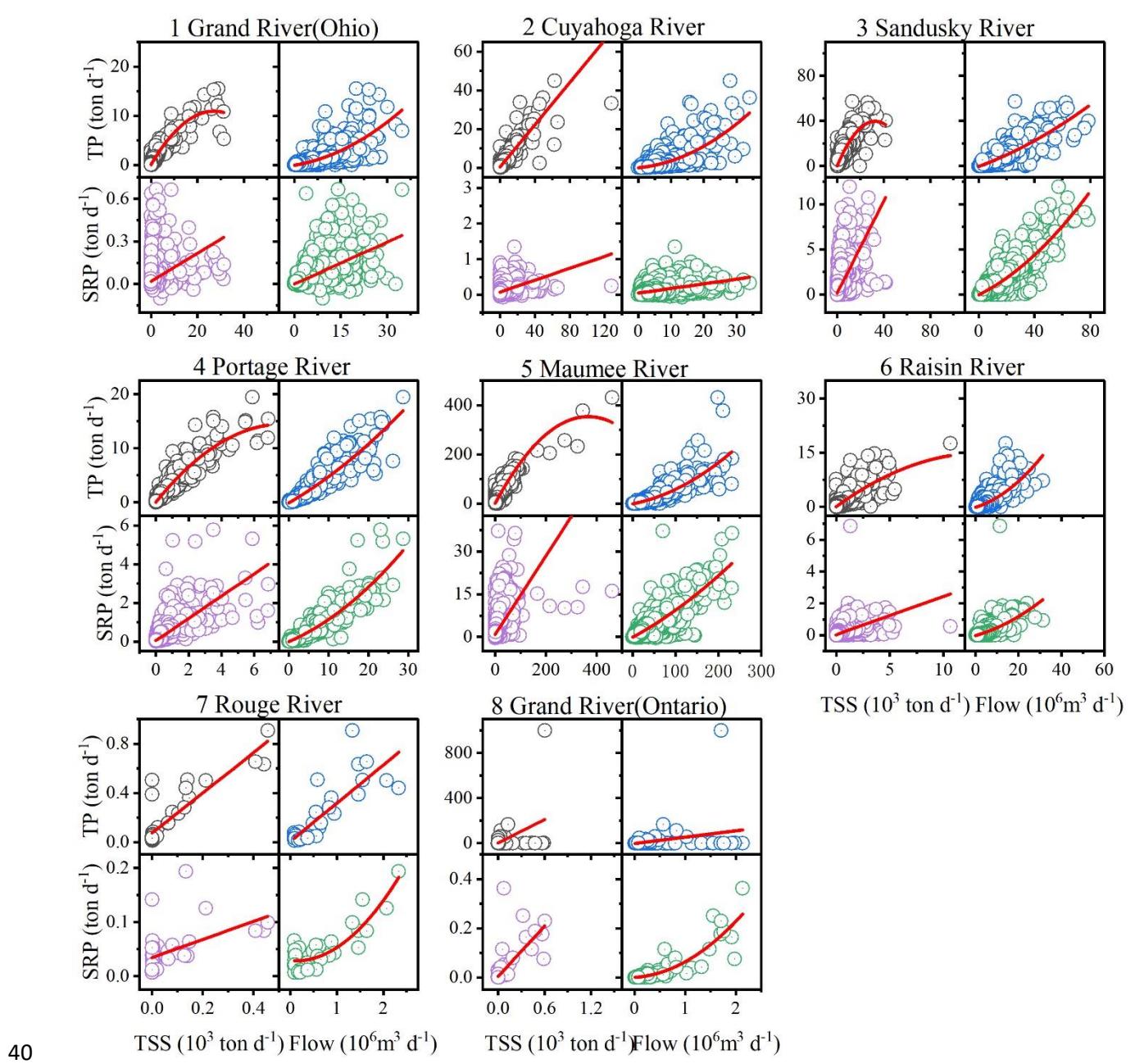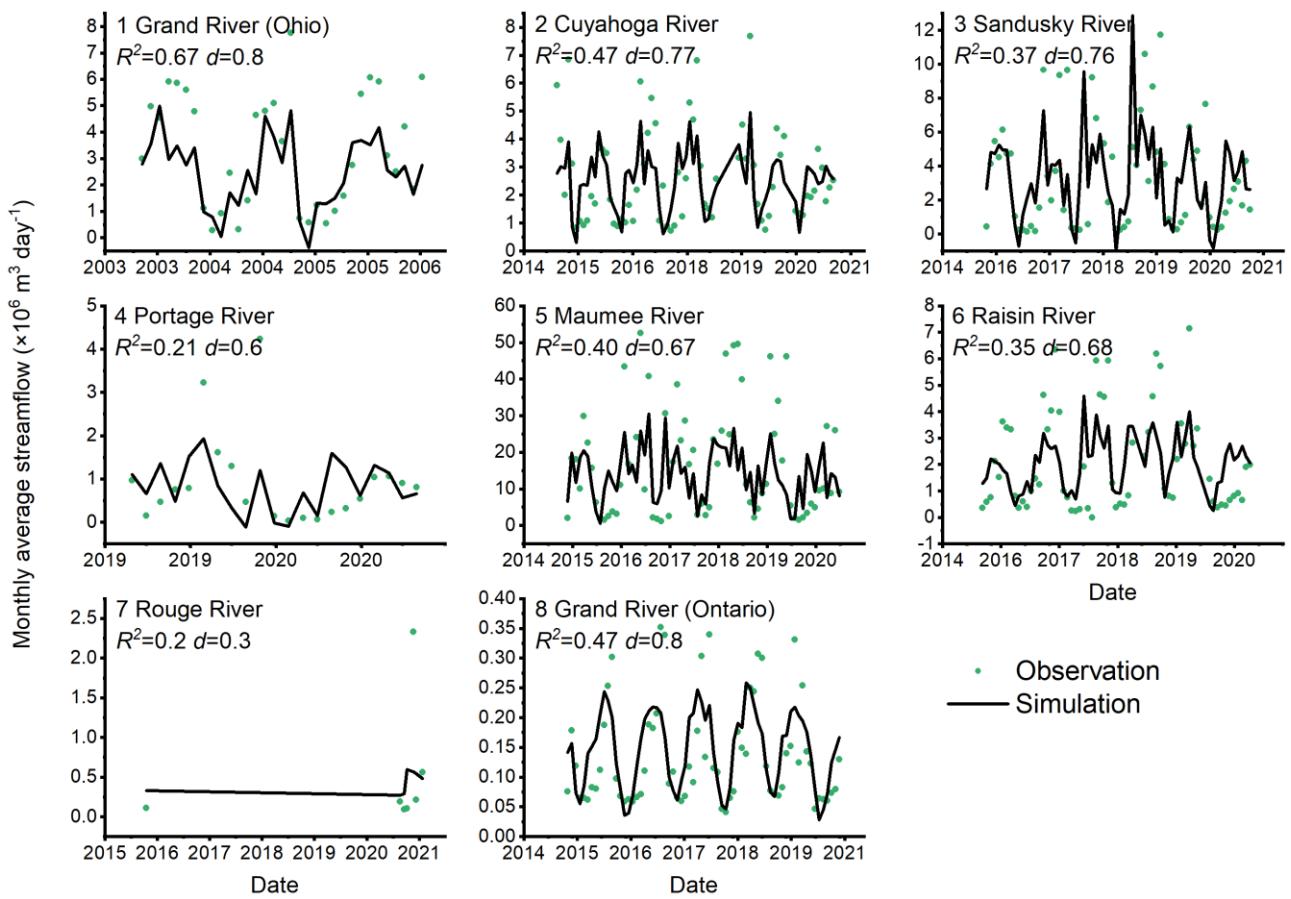
Figure S6. Predicted versus observed streamflow at the outlets of Lake Erie watersheds by using

MLR model.

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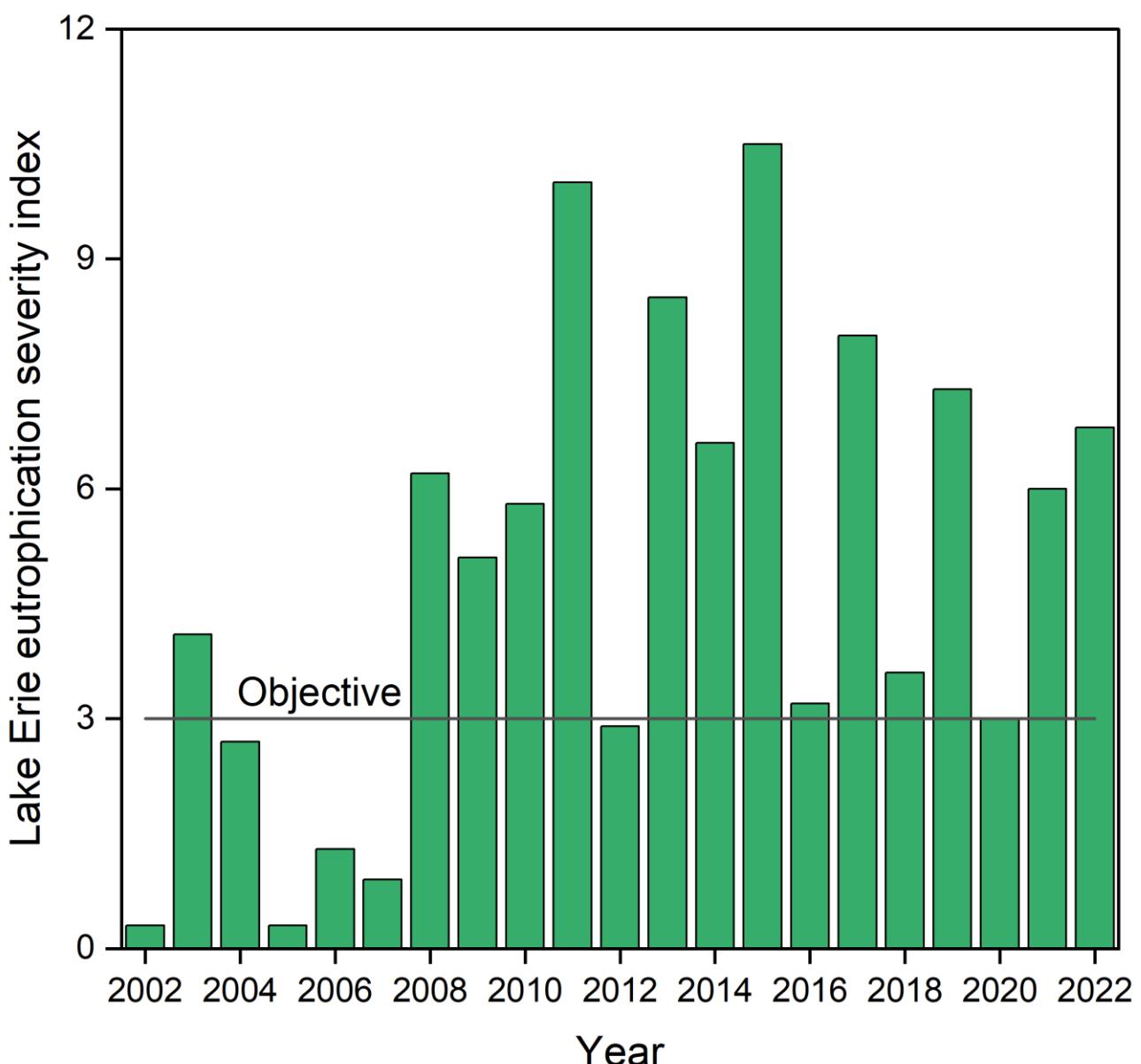
Figure S7. Temporal changes of Lake Erie eutrophication severity index. This information was collected from NOAA National Ocean Service (https://coastalscience.noaa.gov/news/2022-lake-erie-algal-bloom-more-severe-than-predicted-by-seasonal-forecast/)

59 **Table S1.** Evaluation of MLR model performance for predicting river streamflow.

River	leave-one-out cross validation		
	RMSE	*R^2*	*MAE*
Grand (Ohio)	1.67	0.45	1.24
Cuyahoga	1.19	0.48	0.92
Sandusky	3.42	0.34	2.14
Portage	0.98	0.41	0.73
Maumee	11.58	0.31	8.88
Raisin	1.58	0.23	1.21
Rouge	0.59	0.01	0.42
Grand (Ontario)	0.11	0.23	0.08

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