

The Grand

Ecology of a Large River

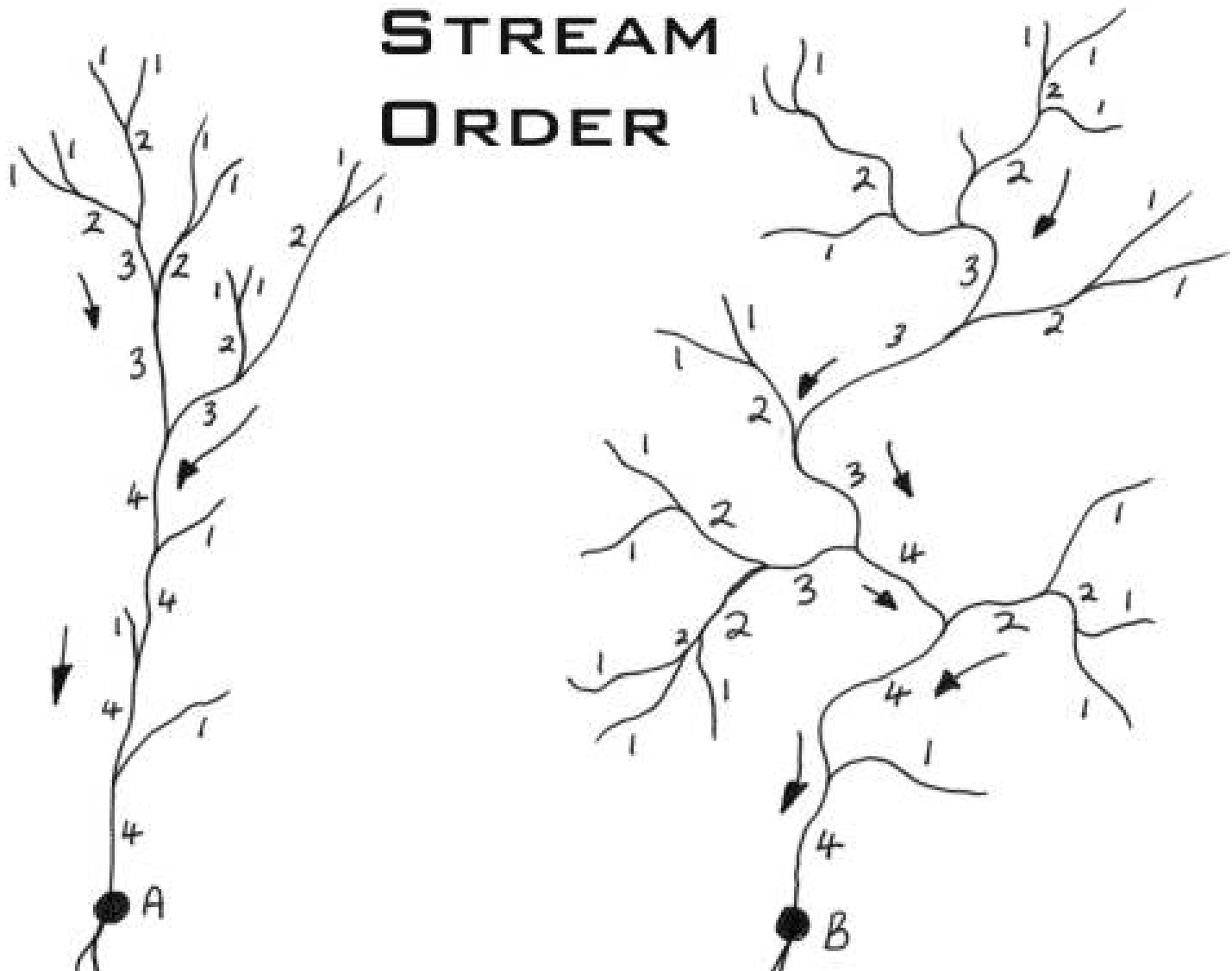


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EXTENSION



STREAM ORDER



The River Continuum

Headwater Creeks

Low Fish Diversity

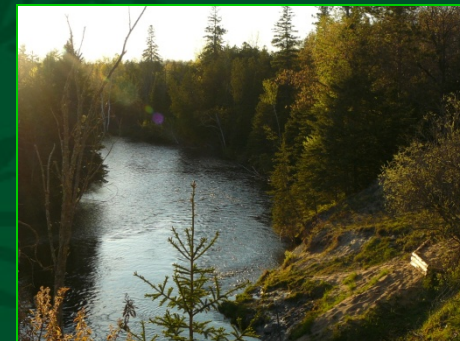
Trout, Sculpin



Midreach Streams

Balanced Energy Inputs

Suckers, Sm. Bass

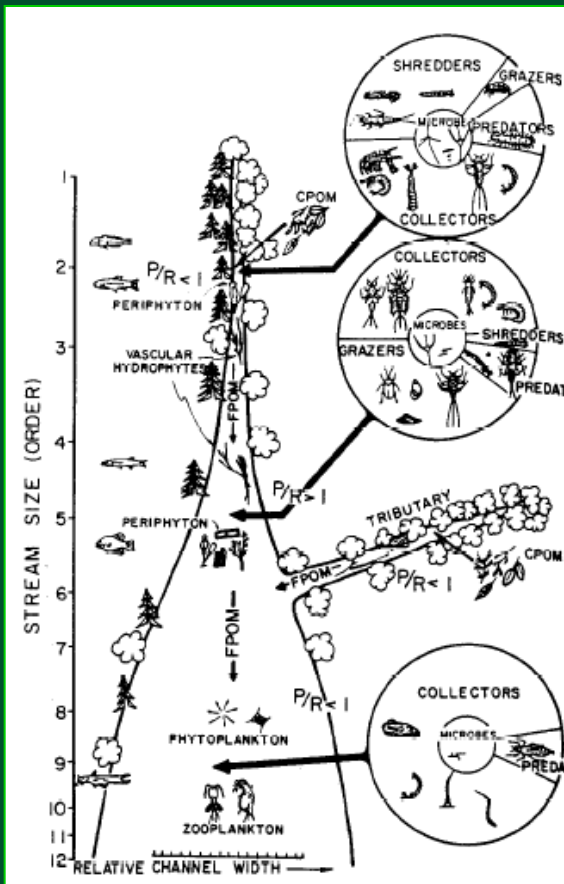


Large Rivers

Backwaters Important

Highly Productive

Diverse Fish Species



Vannote et al. 1980









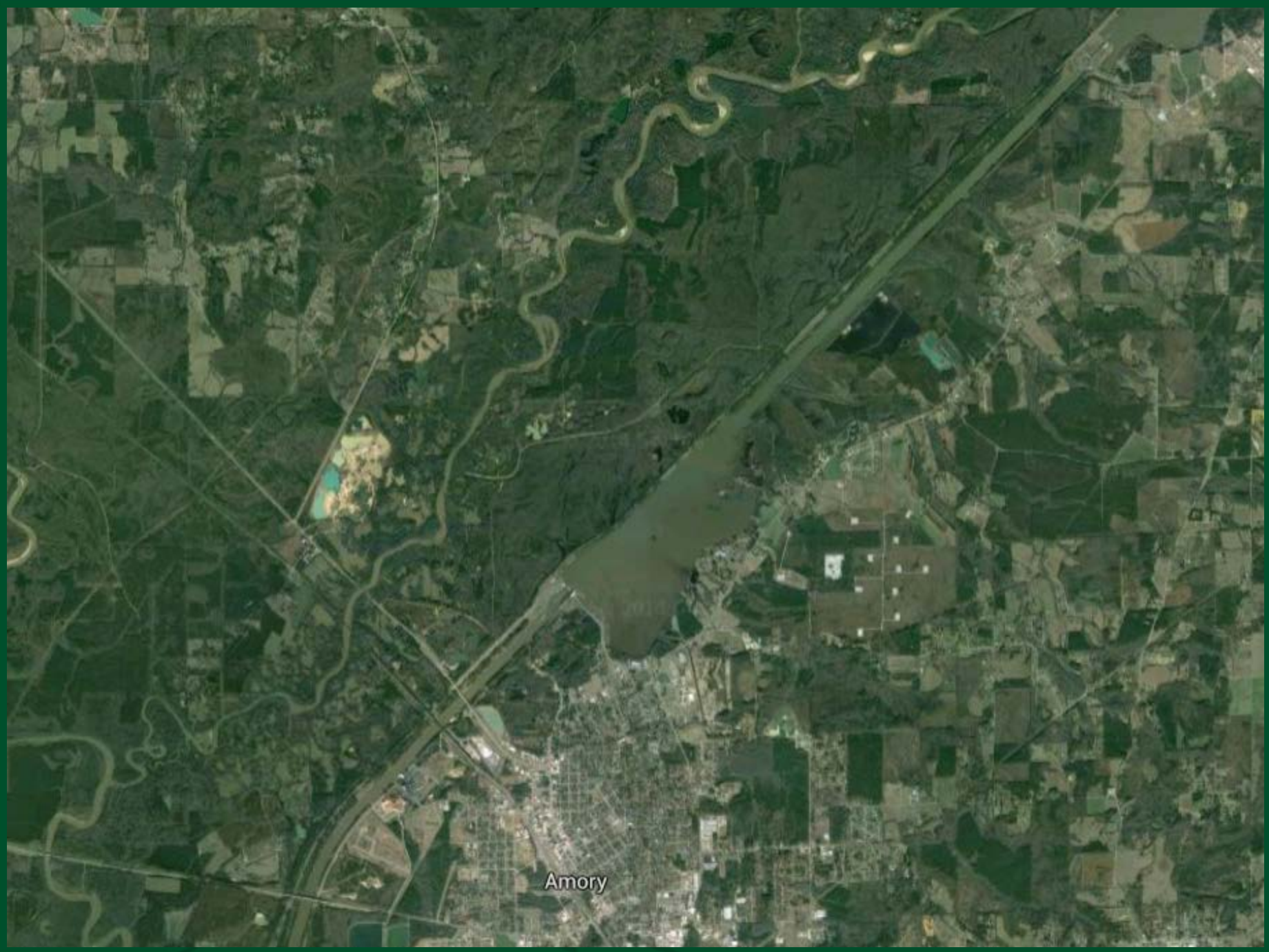
Tombigbee River
Basin in MS



Construction of the Tenn-Tom Waterway (USACE photo)



Divide Cut Section of the Tenn-Tom Waterway (USACE photo)



Amory

THE SHAPE OF A RIVER

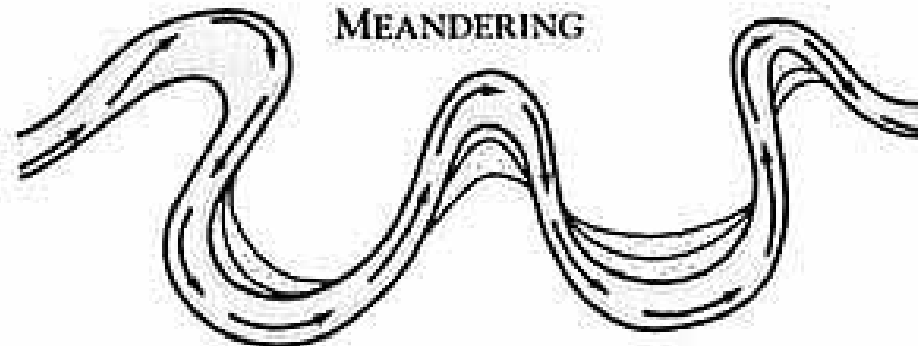
STRAIGHT



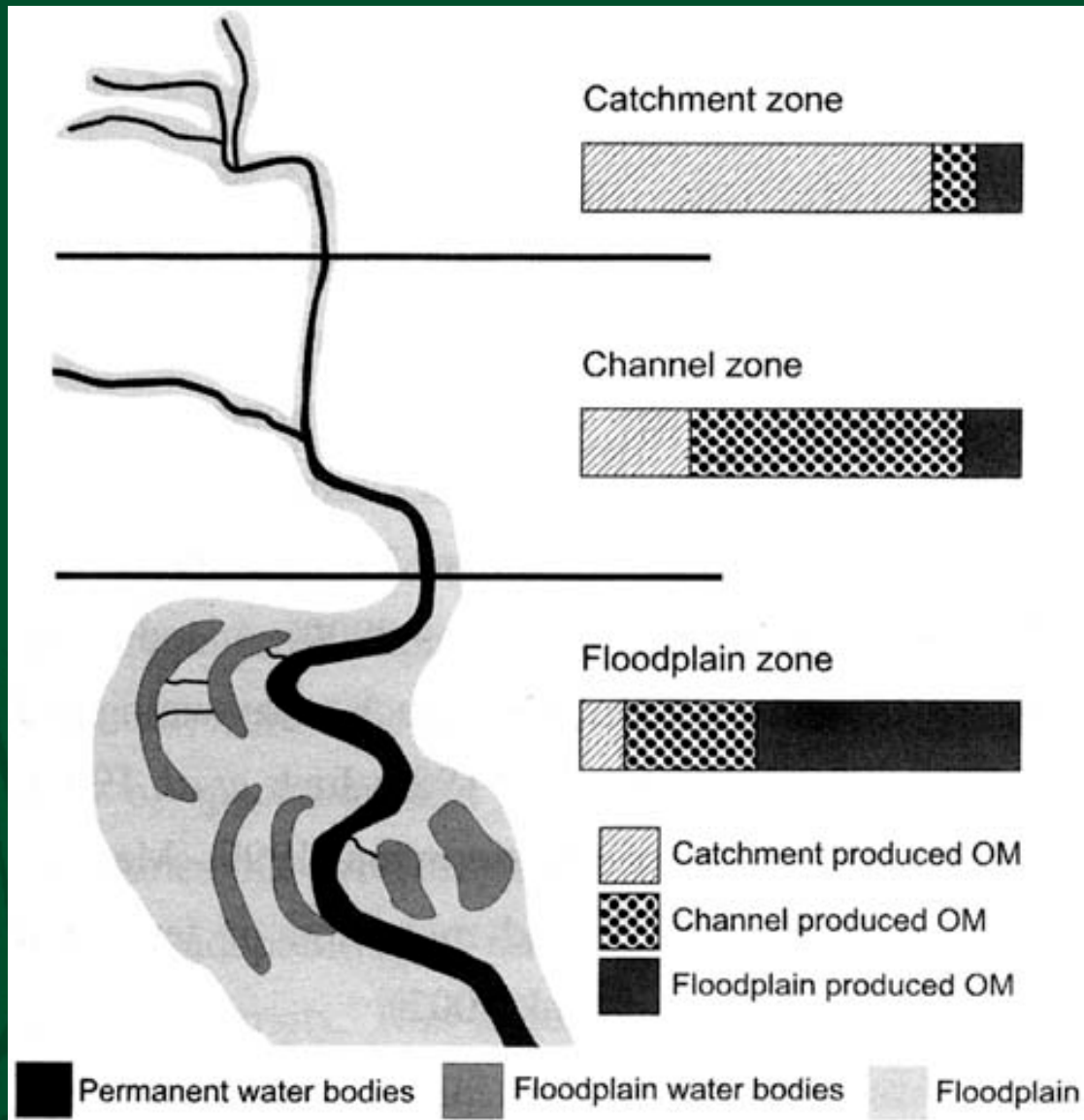
SINUOUS



MEANDERING

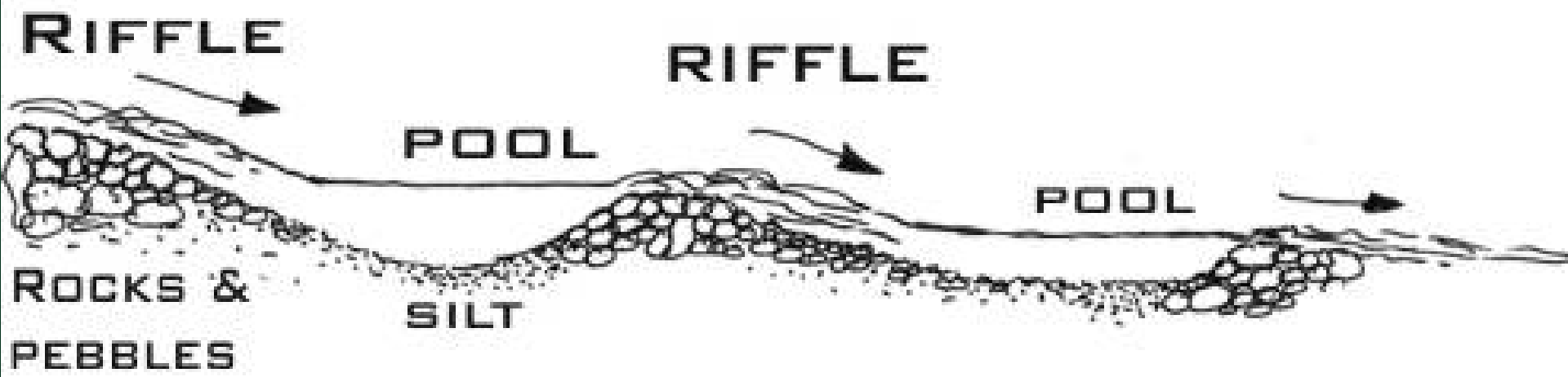


Flood Pulse Concept



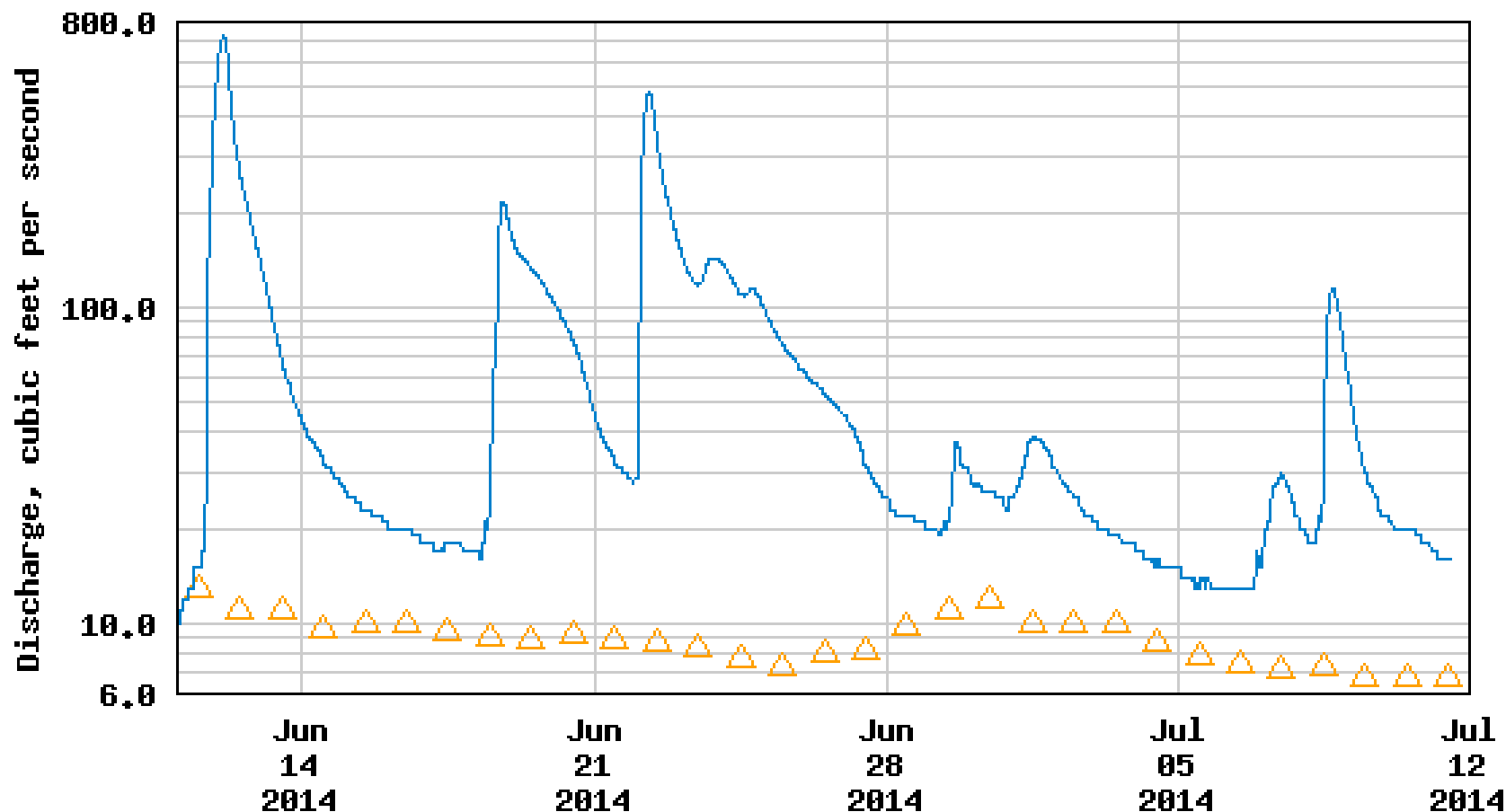






Hydrograph of a “Flashy” Stream

USGS 04108800 MACATAWA RIVER AT STATE ROAD NEAR ZEELAND, MI

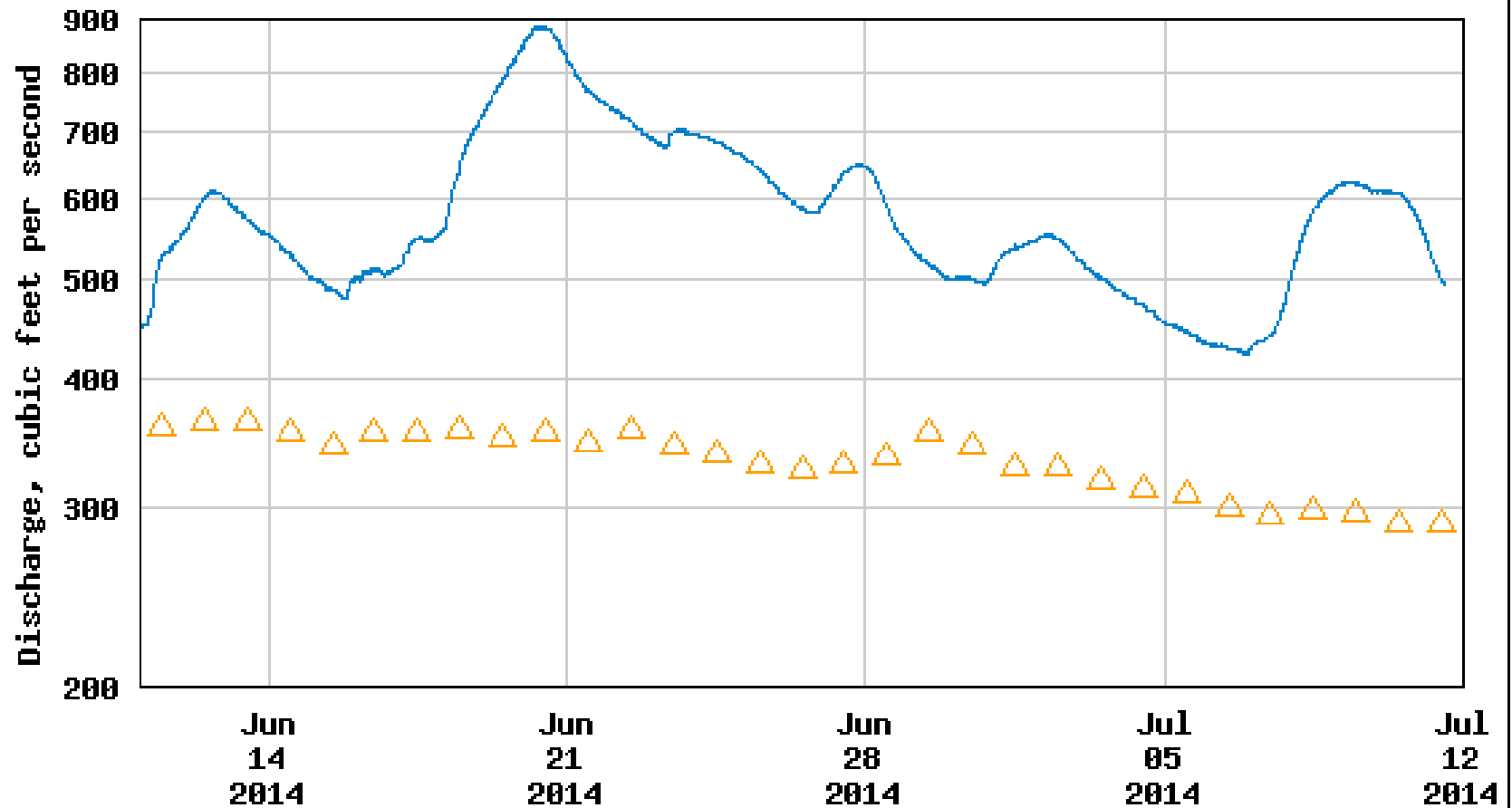


----- Provisional Data Subject to Revision -----

△ Median daily statistic (53 years) — Discharge

Graph courtesy of the U.S. Geological Survey

USGS 04122200 WHITE RIVER NEAR WHITEHALL, MI

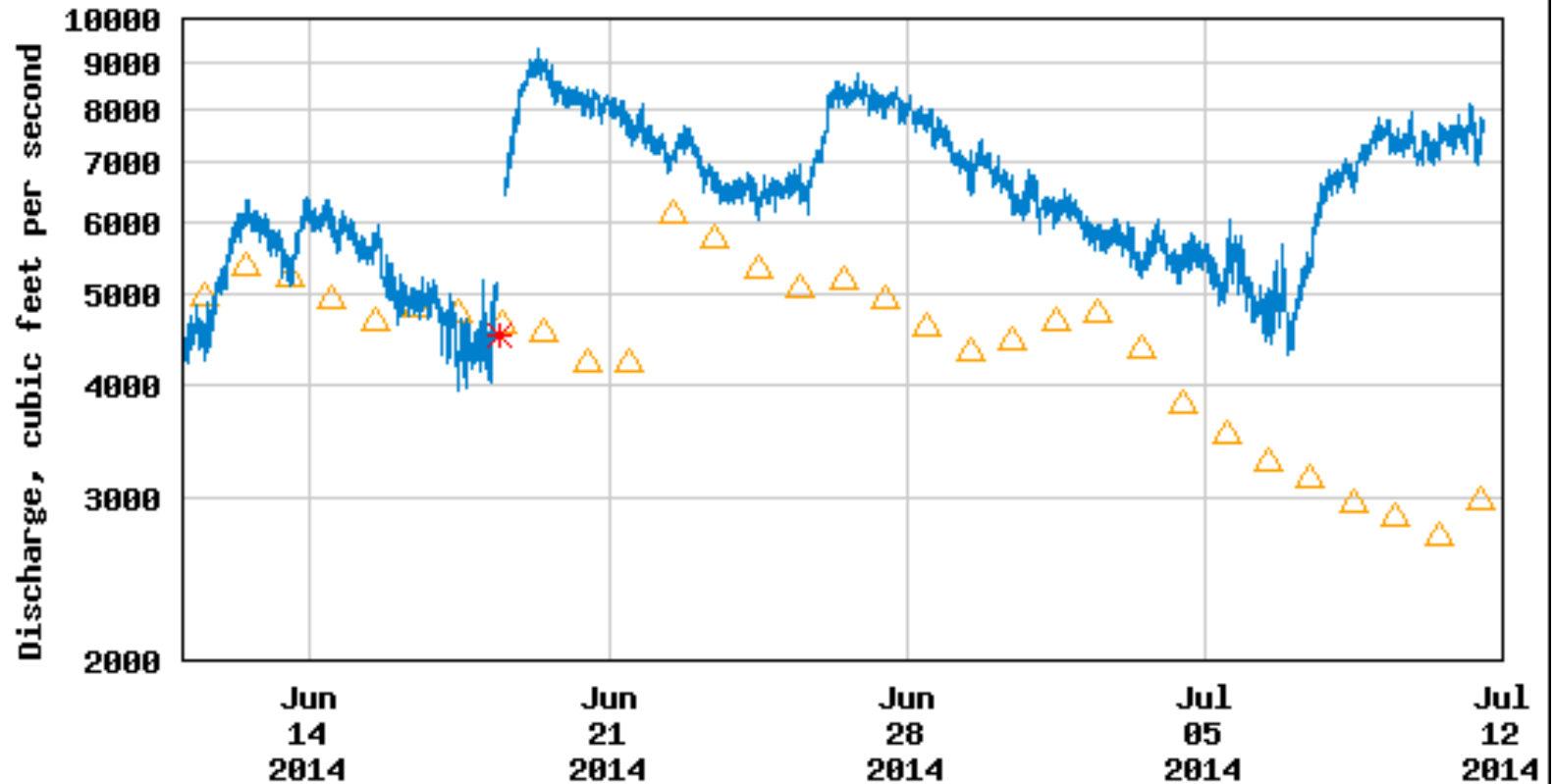


---- Provisional Data Subject to Revision ----

△ Median daily statistic (56 years) — Discharge

Graph courtesy of the U.S. Geological Survey

USGS 04119400 GRAND RIVER NEAR EASTMANVILLE, MI

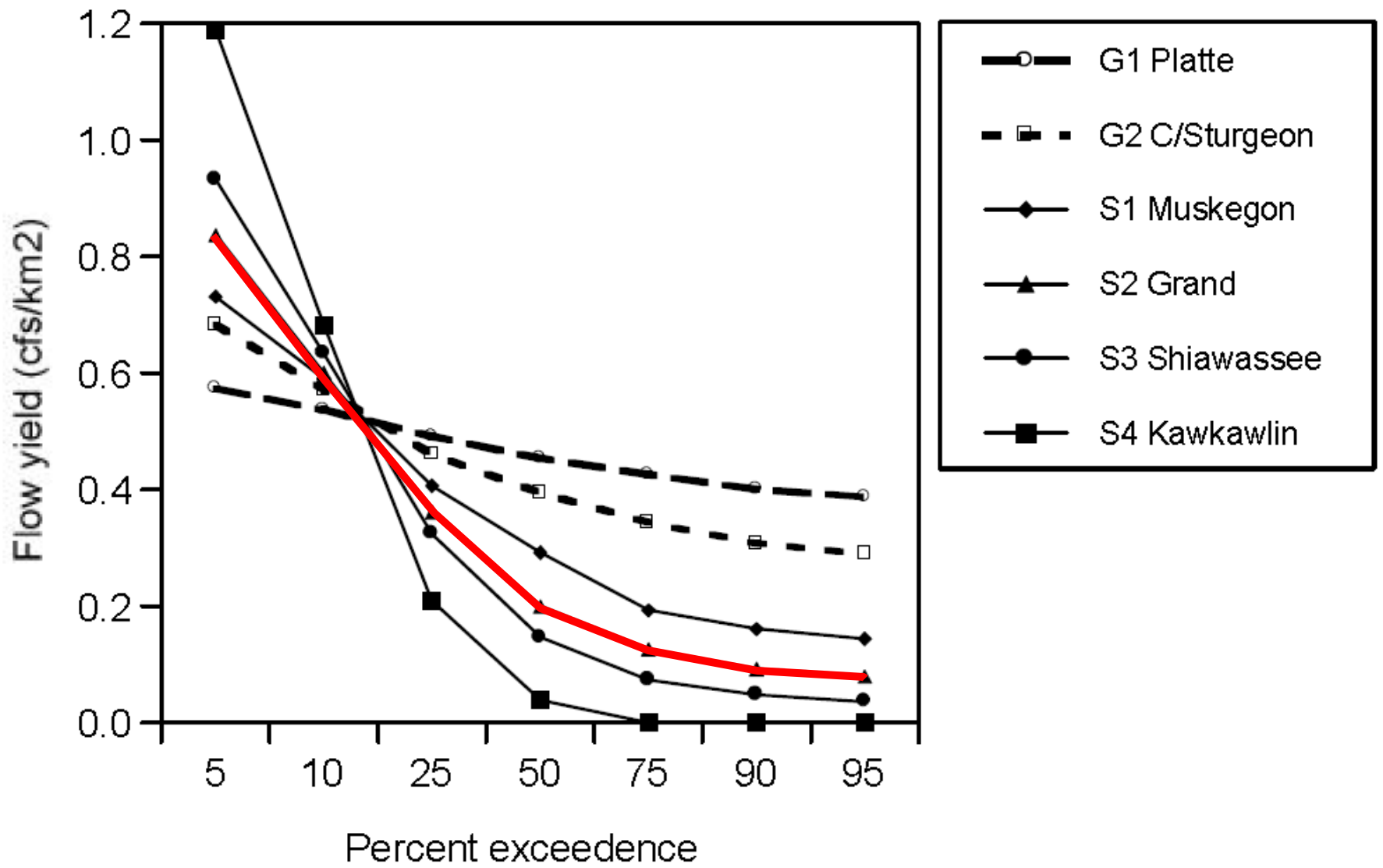


----- Provisional Data Subject to Revision -----

- △ Median daily statistic (3 years)
- * Measured discharge
- Discharge

Factors Leading to Flashy Hydrology

- Channelization and snag removal
Certain tributaries extensively channelized
- Draining of wetlands and levee building
Half of historic wetlands have been filled
- Soil type and impervious surfaces
Diverse soil types; 9% urban land use
- Frequency, timing, and magnitude of precipitation events and climate change



MDNR Figure





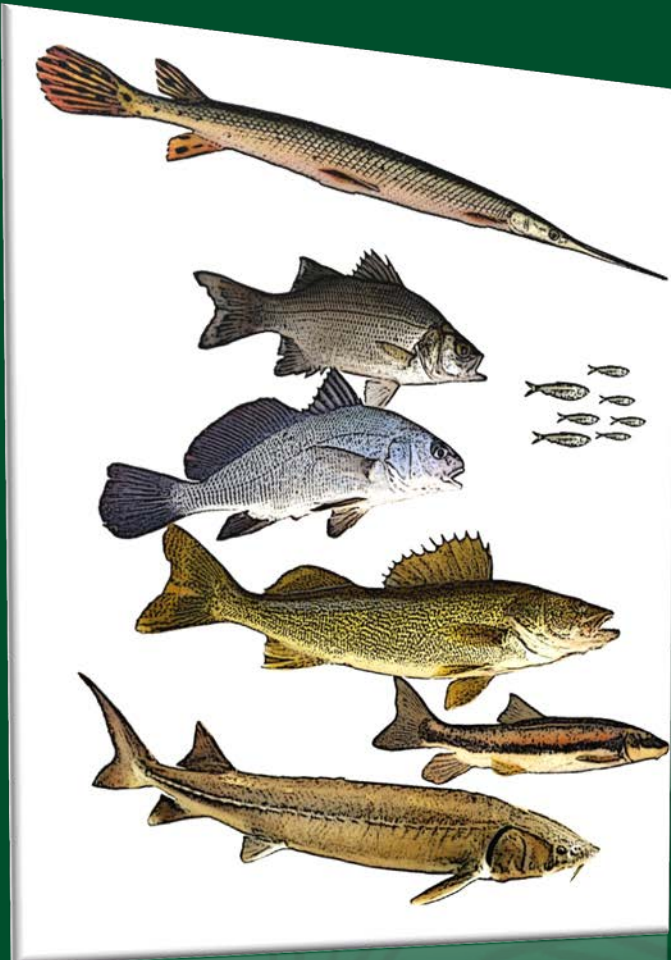




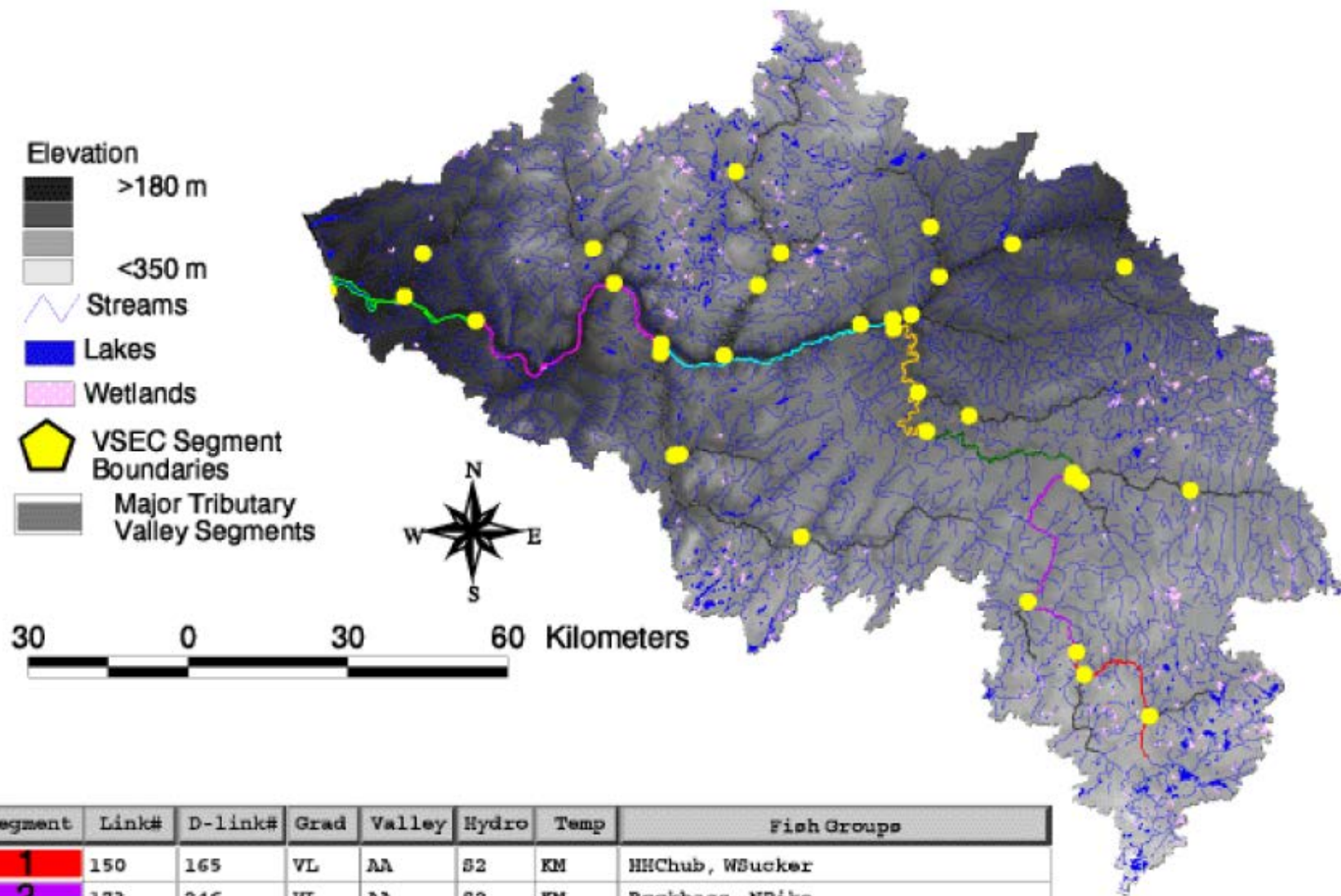
Concepts in Stream Ecology

- Stream Order and River Continuum
- Flood Pulse in Large River/Floodplain Systems
- Channel Sinuosity and Morphology
- Stream Hydrology and “Flashiness”

Fish Diversity



- 108 fish spp. in Grand River watershed
- ~100 in Ottawa County
- One native species extirpated in watershed
- Diverse habitats and connectivity are critical



Segment	Link#	D-link#	Grad	Valley	Hydro	Temp	Fish Groups
1	150	165	VL	AA	S2	KM	HHChub, WSucker
2	173	246	VL	AA	S2	KM	Rockbass, NPike
3	250	282	VL	AU	S3	WM	SMBass, Logperch, Rockbass
4	285	347	L	GC	S3	WM	SMBass, FlatCat
5	492	555	VL	GC	S3	WL	Walleye, FlatCat, GRedhorse, FDrum
6	615	679	VL	GC	S3	WL	Walleye, FlatCat, FDrum
	679	4278	VL	AC	S3	WL	FDrum, Walleye

MDNR
Figure

The Mussel-Fish Connection

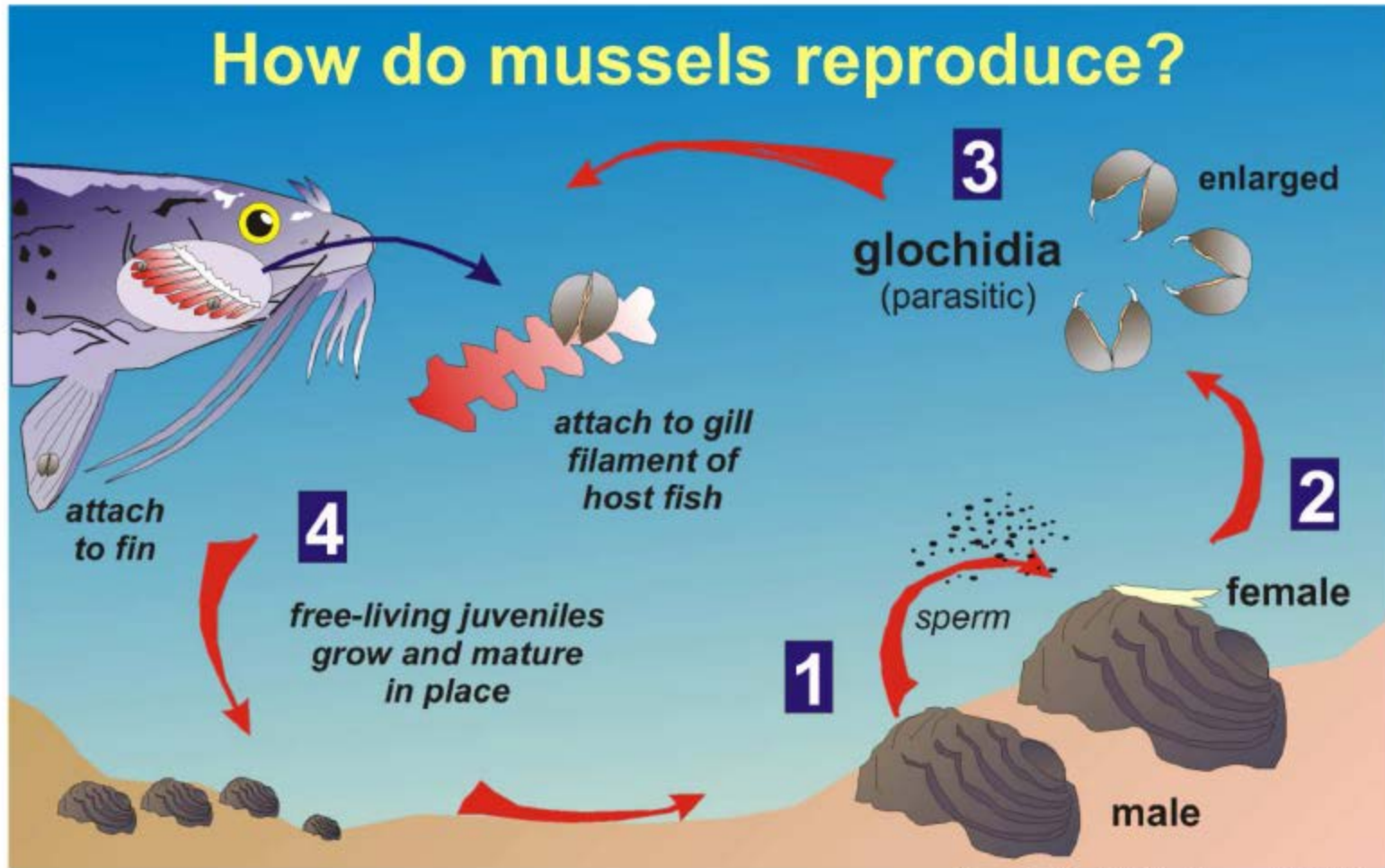


Figure by Karl J. Scheidegger, WIDNR

*The Logperch is host to Endangered
Snuffbox Mussel in Grand River*



Dams in the Grand River Watershed



Hubbardston Dam on Fish Creek



Sixth Street Dam in Grand Rapids

- 228 registered dams
- Many no longer serve their original purpose
- Six dams with fish ladders allow passage to Lansing
- Removal has pros & cons

Other Invertebrates



"Bloodworms" are a larval chironomids that tolerate low O₂.



Many caddisfly species do not tolerate poor water quality.

- Diverse dragonflies and damselflies in lower Grand
- 2009 DEQ survey found "poor" macroinvertebrates at all three Ottawa Co. Grand River sites
- Mostly chironomids and very few sensitive species

Legacy of Dredging

- 1881 River and Harbor Act authorized dredging to Grand Rapids
- 1886 completion of 60' wide 4 ½' deep channel
- 1887 report concluded in-channel deep water connection from Grand Rapids to Lk. MI
- 1930 River and Harbor Act abandoned Grand River above Bass River
- Adjacent canal using river water proposed but never attempted...



Divide Cut Section of the Tenn-Tom Waterway (USACE photo)

“Historical pollution as well as the current discharges from the remaining combined sewer overflows has left the Grand River with a reputation of being polluted. Although this was an accurate description of the past, the river has recovered and currently supports a diverse aquatic community.

The natural resources in the Grand River catchment are substantial and provide millions of dollars of recreation-based revenue to the residents of the watershed”

- Draft Grand River Assessment, MDNR

Acknowledgements

- Scott Hanshue, Michigan DNR
- Sam Noffke, Michigan DEQ
- Don Jackson, Mississippi State University

QUESTIONS?

