



Managing Large Wood in Indiana Stream and River Corridors

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2018 INAFSM Conference

Sept 6, 2018

Evansville, Indiana



Definitions and Background

What is large wood?

- Large wood = downed wood > 10 cm in diameter and 1 m in length (Wohl et al, 2015)
- Woody debris?
- Historical accounts of rivers before settlement indicate that large wood was much more abundant than now – see Lyell (1830)
- Would have been even more abundant before the removal of the beaver from much of the Eastern United States
- Clearing and snagging began early, USACE 1824
- Wood is now often perceived as not “belonging” in the river

- “The dimensions of this mass of timber were given by Darby, in 1816, as ten miles in length, about two hundred and twenty yards wide, and eight feet deep, the whole of which had accumulated, in consequence of some obstruction, during about thirty-eight years, in an arm of the Mississippi called the Atchafalaya...” (Lyell, 1830)



Central Westcoast Forest Society

Jeremy Koreski



Traditional Maintenance Example, Bank “maintenance” on a tributary channel,
Kankakee River, Indiana 2015

Role of Large Wood in Streams and Rivers



Henry's Fork, Idaho

Physical effects of large wood on the stream channel and floodplain depend in part on the size and orientation of the wood

- single log along bank will often stabilize the bank
- large accumulation may cause an avulsion

Physical Effects of Instream and Floodplain Large Wood

- Increases flow resistance, bed roughness
- Decreases velocity
- Can slow flood wave
- Increases local storage of sediment and organic matter
- Can cause flow separation with localized scour of the bed and banks resulting in pools and channel complexity
- Increases bank stability



Yellow River, Lake County, Indiana



Upper Wabash River near Geneva, Indiana

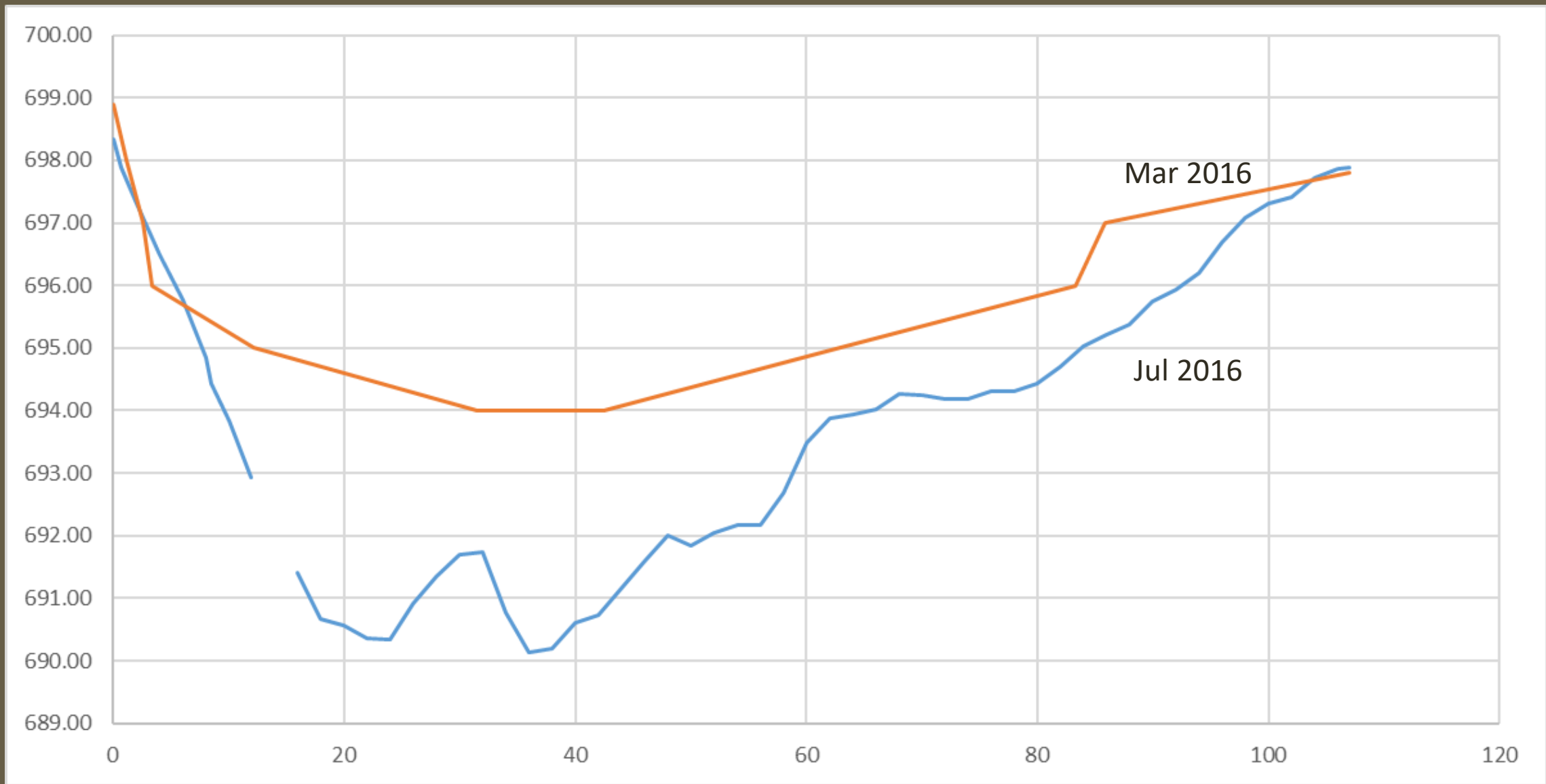


White River, Marion County, Indiana



Yellow River near Knox, Indiana

Jul 2016



Change in pool cross-section, Yellow River at Trigg Farms



Floodplain complexity, St Mary's River, Allen County, Indiana

Physicochemical Effects of Instream and Floodplain Large Wood

- Rivers with treed floodplains tend to have cooler water temperatures
- Loss of the riparian canopy can increase water temperatures
- With higher water temperatures, increased sunlight, and abundant nutrient algae populations increase
- Increased algae can lead to high DO during the day and may completely deplete the DO at night



Floodplain complexity, St Mary's River at Decatur, Indiana



McCormick's Creek, Monroe County, Indiana

Linkage to Fluvial Erosion Hazards (FEH)



St Mary's River at Fort Wayne, Indiana



Indianapolis Water Canal, Marion County, Indiana



Whitewater River near Brookville, Indiana

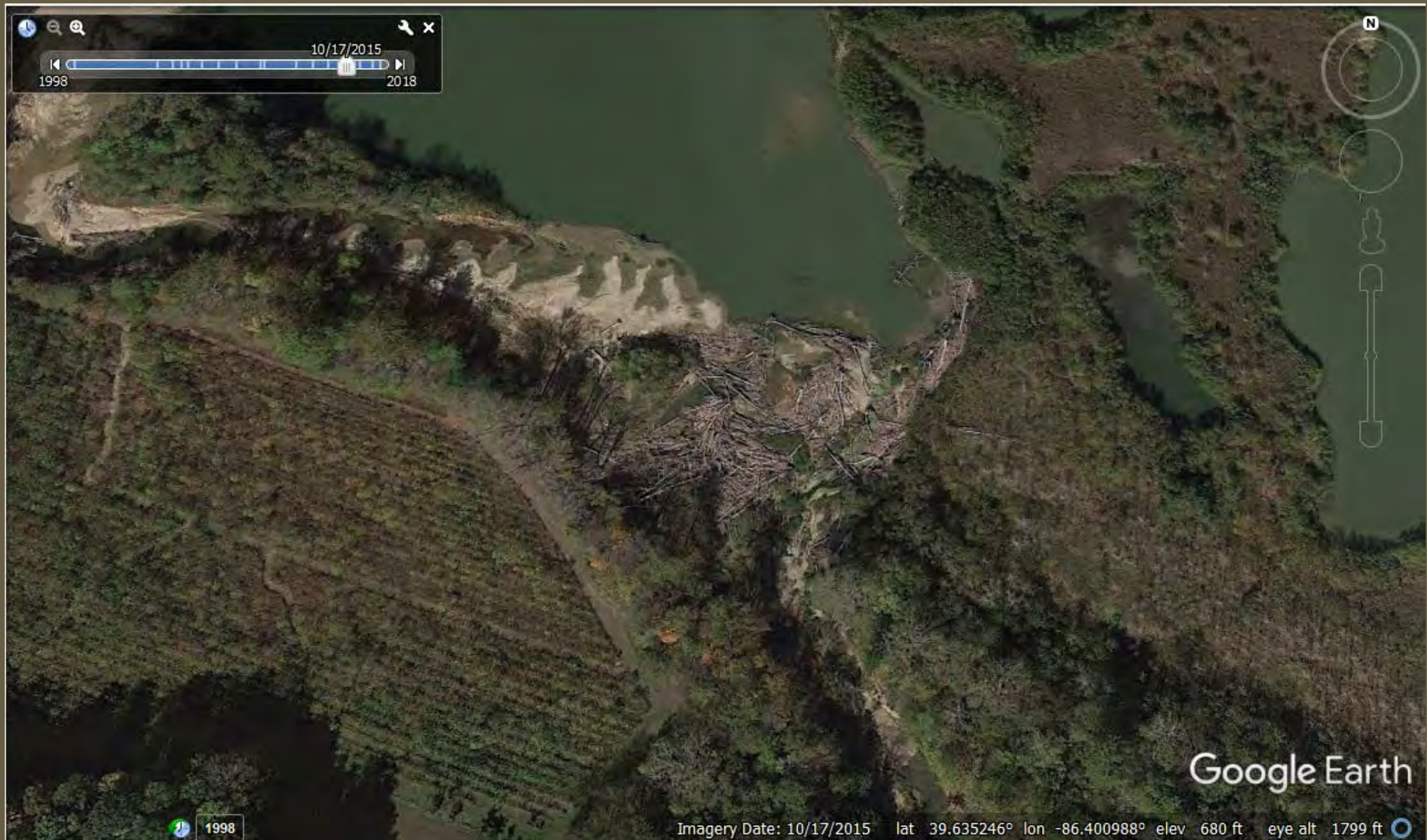


East Fork White River near Vallonia, Indiana

IDNR



Sugar Creek near Crawfordsville, Indiana



West Fork White Lick Creek near confluence with White Lick Creek, Hendricks County, Indiana
(wood pile perimeter = 0.25 miles, area = 9,000 yds²)



Avoid Disturbance inside the Fluvial Erosion Hazard Corridor: the area where the channel may migrate over time or where disturbance may impact the stability of stream

Wood Management Guidance

Section 5.4 , Indiana Drainage Handbook, 1999

LOGJAM REMOVAL AND RIVER RESTORATION SECTION

Definitions of Stream Obstruction Conditions

(Stream Renovations Guidelines Committee, The Wildlife Society and American Fisheries Society, 1983

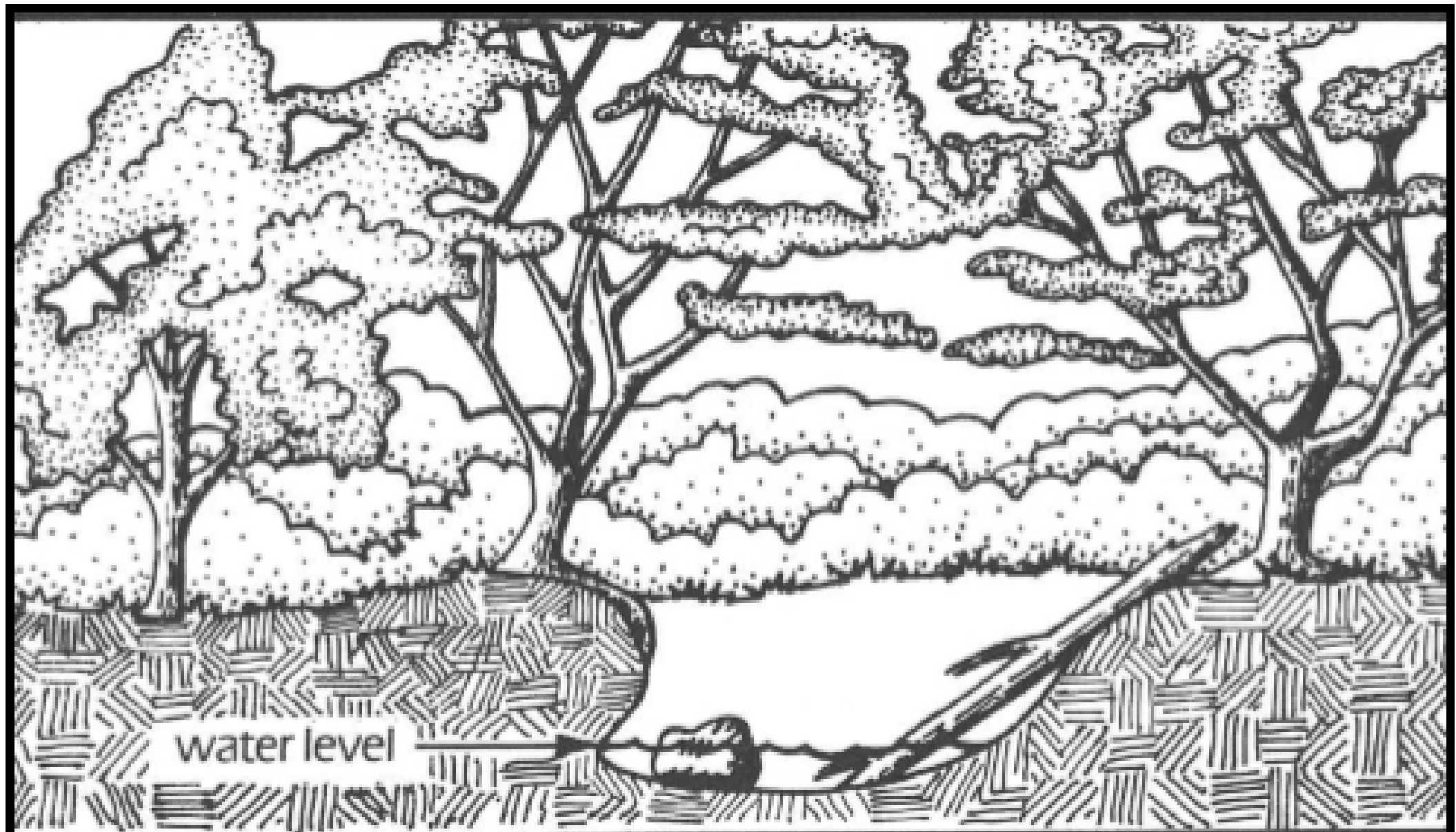


Illustration of a Condition 1 Logjam (Source: American Fisheries Society Obstruction Removal Guidelines) 1983



Illustration of a Condition 2 Logjam (Source: American Fisheries Society Obstruction Removal Guidelines) 1983



Illustration of a Condition 3 Logjam (Source: American Fisheries Society Obstruction Removal Guidelines) 1983

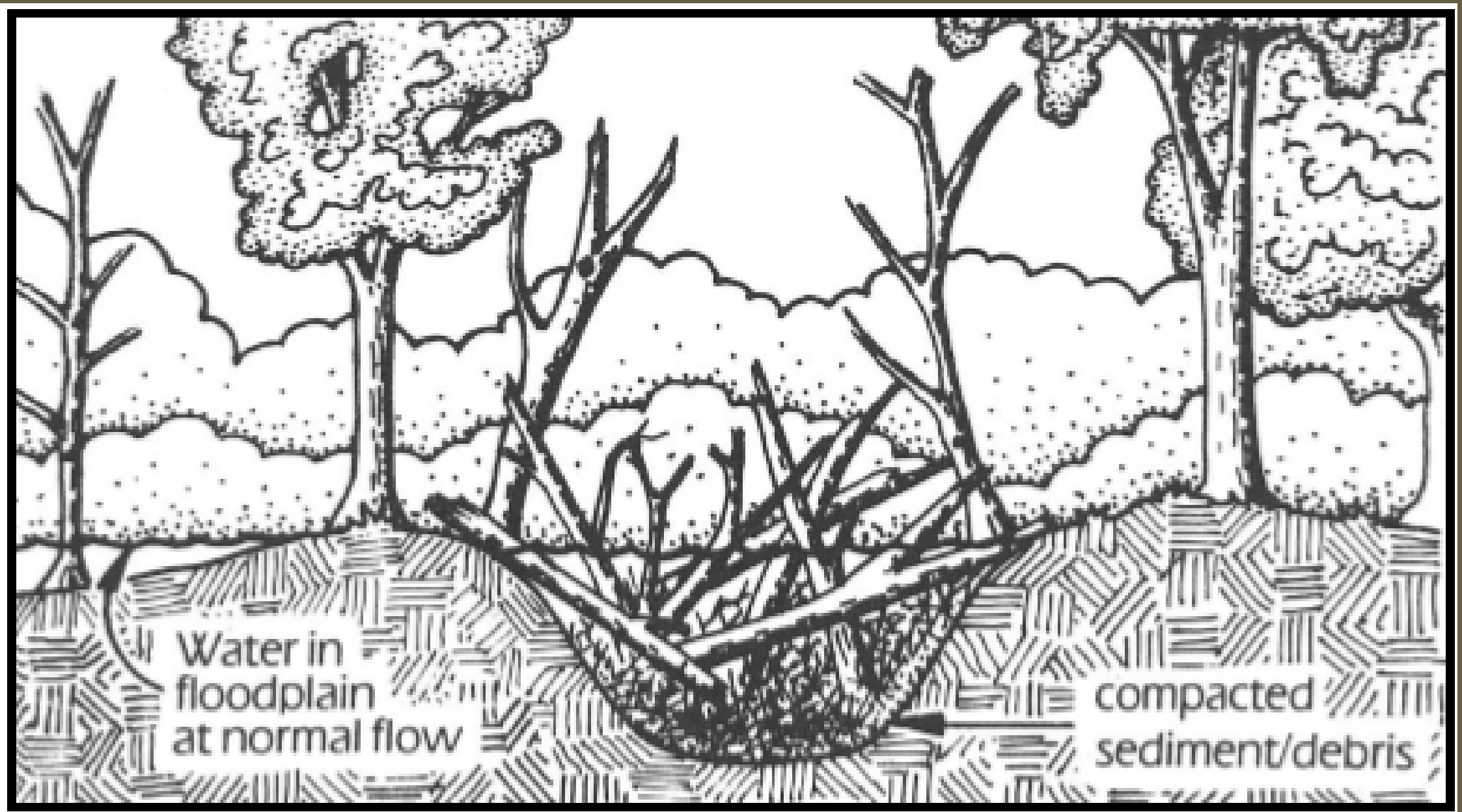


Illustration of a Condition 4 Logjam (Source: American Fisheries Society Obstruction Removal Guidelines) 1983

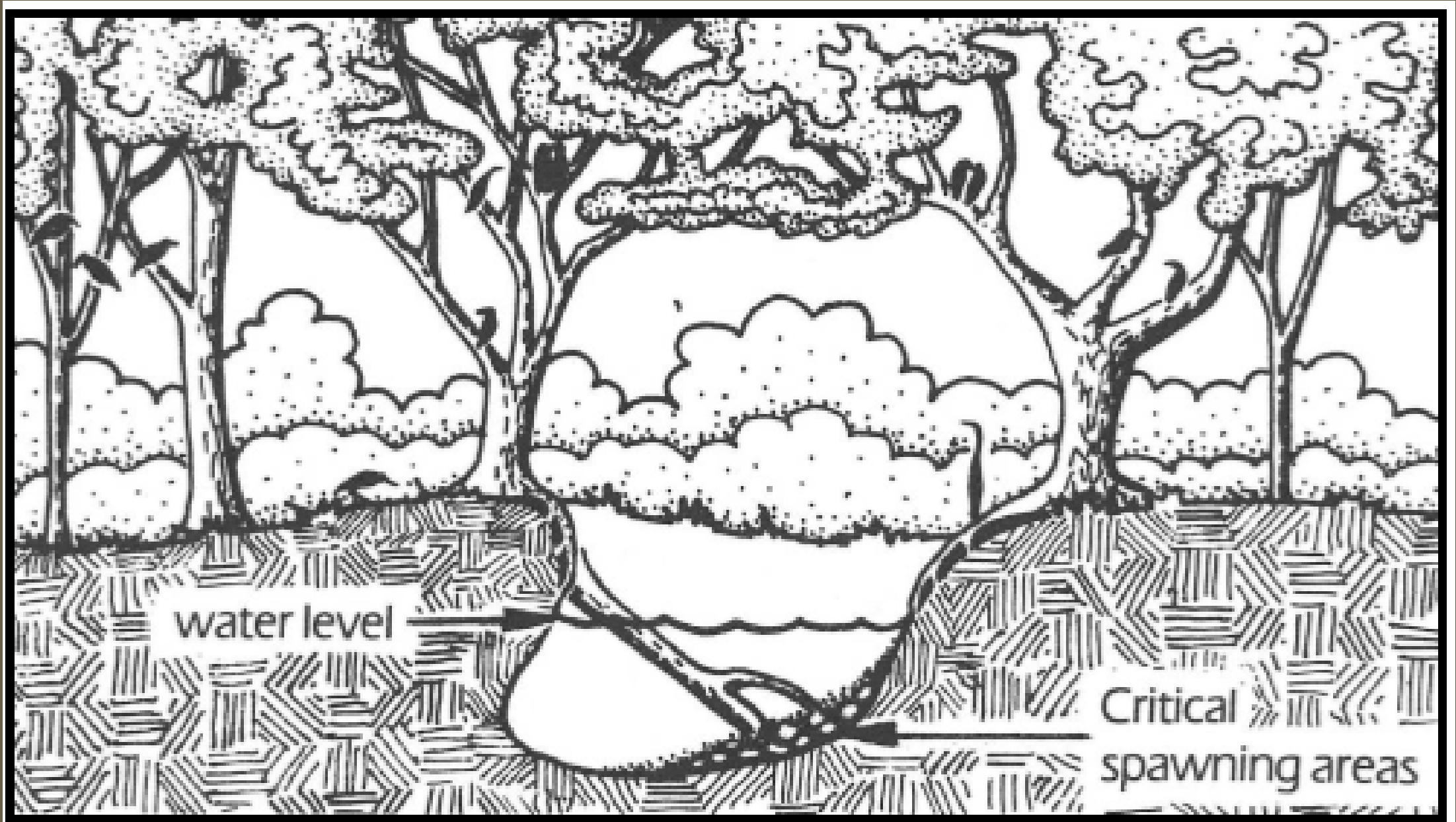
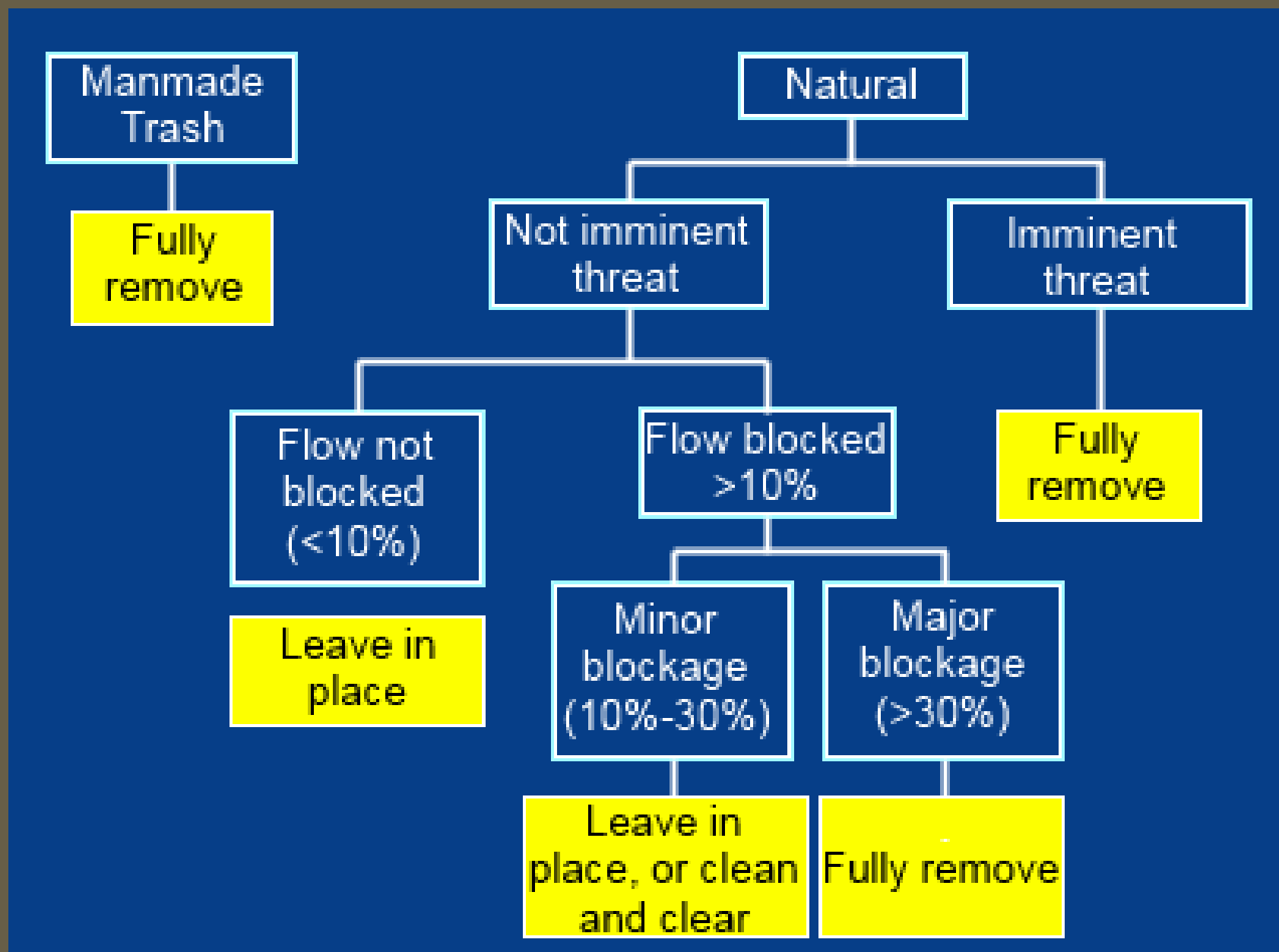


Illustration of a Condition 5 Logjam (Source: American Fisheries Society Obstruction Removal Guidelines) 1983



Wood Material Management Flowchart (MDEQ)

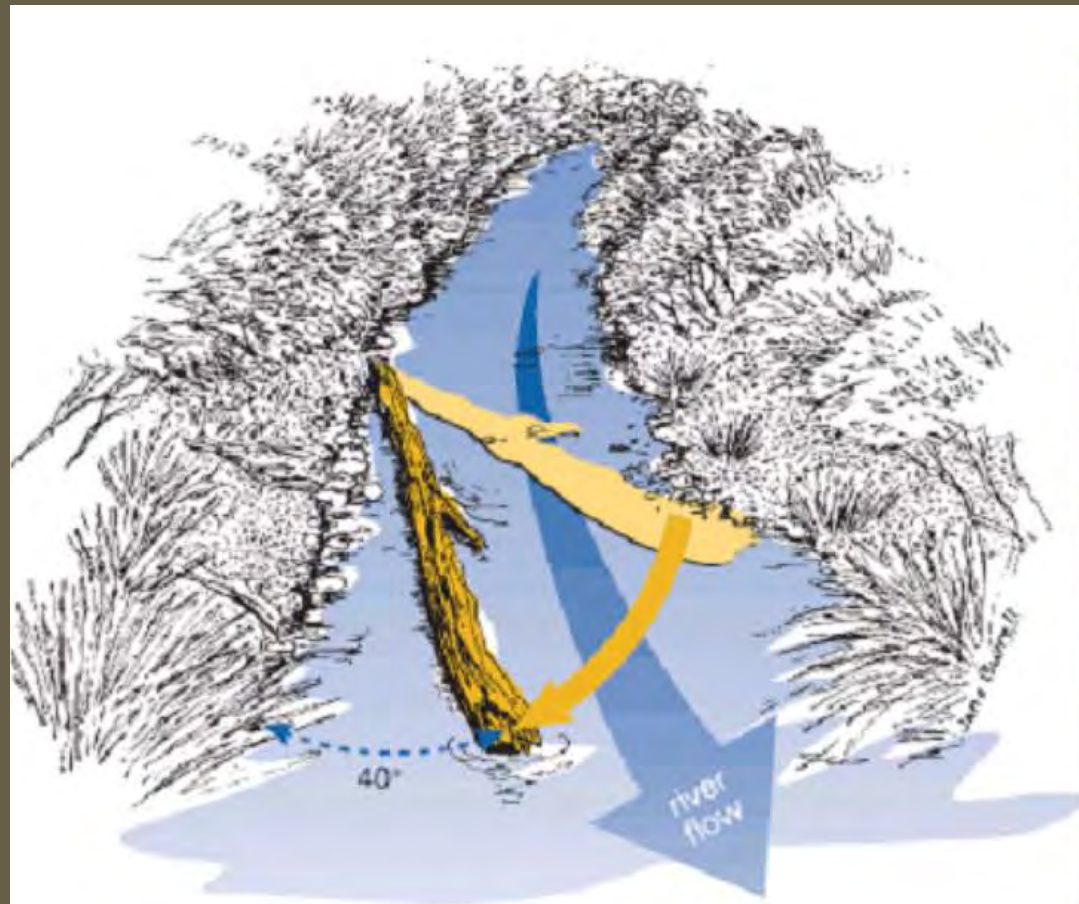


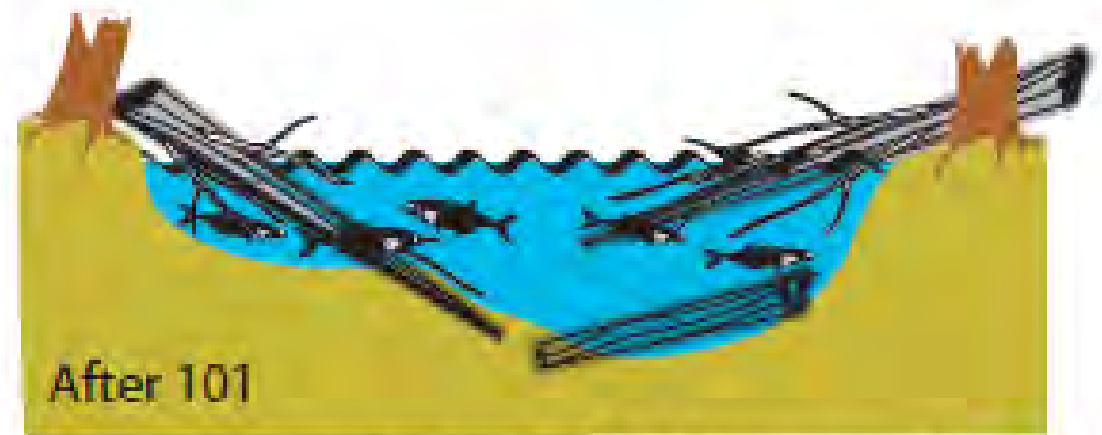
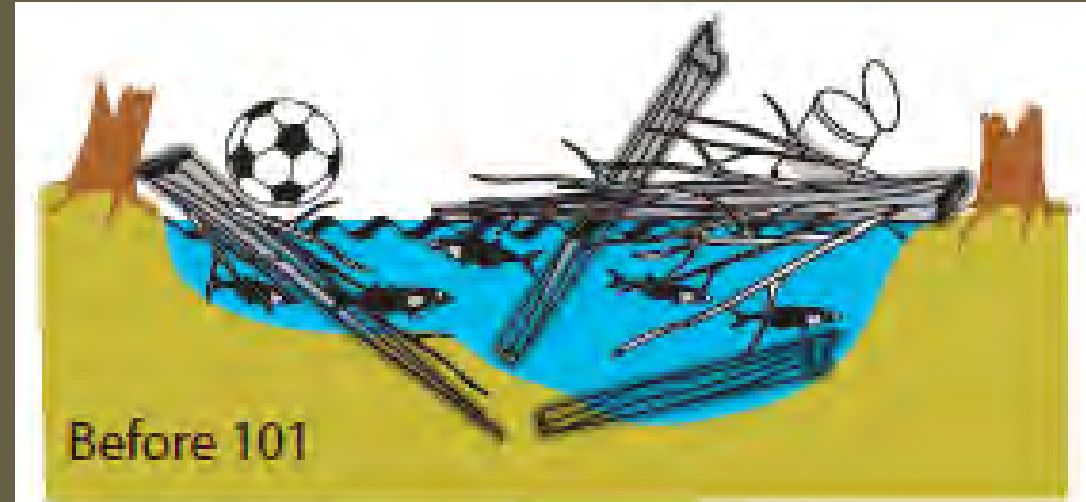
Figure 2: Clearing an obstructed channel



Natural example, Wildcat Creek, Howard County, Indiana

Clear and Clean Method

1. PLAN - Address public health, legal access, safety concerns, define point of access to river, determine depth of water, flow and emergency plans.
2. CLEAN - Remove urban rubbish (man-made materials) and dispose properly.
3. OPEN - Move or cut loose, floating debris to allow a passage for flow. Use a handsaw or chain saw to make the opening wide enough to allow flow through logjam.
4. Place excess woody debris along streambanks and in the adjacent riparian corridor to create habitat.
5. Leave woody debris that is embedded in the stream's banks or bottom undisturbed.
6. Minimize impact to the riparian corridor at work site.



- Leave rooted or embedded stumps & logs.
- Remove floating or resting logs.

Checklist for Initial Assessment of Individual Wood Pieces or Wood Accumulations

1. Imminent Threat to Public Safety

a) Has a river recreation accident involving the wood been reported?

If yes, remove.

If no, proceed to consider retaining.

b) Does the wood accumulation have crevices that can trap recreational users (i.e., is it porous) and completely span the active river channel in a location and season known for high recreational use?

If yes, remove.

If no, proceed to consider retaining.

2. Imminent Threat to Property and Infrastructure

a) Has the wood already damaged a facility or public or private structure?

If yes, remove.

If no, proceed to consider retaining.

b) Could the wood potentially create, or increase the extent of, damage to a facility or public or private structure that may cause loss of function to the facility or structure?

If yes, remove.

If no, proceed to consider retaining.

3. Legalities

For any reason, are you legally bound to extract the wood?

If yes, remove

If no, proceed to consider retaining

4. Overall

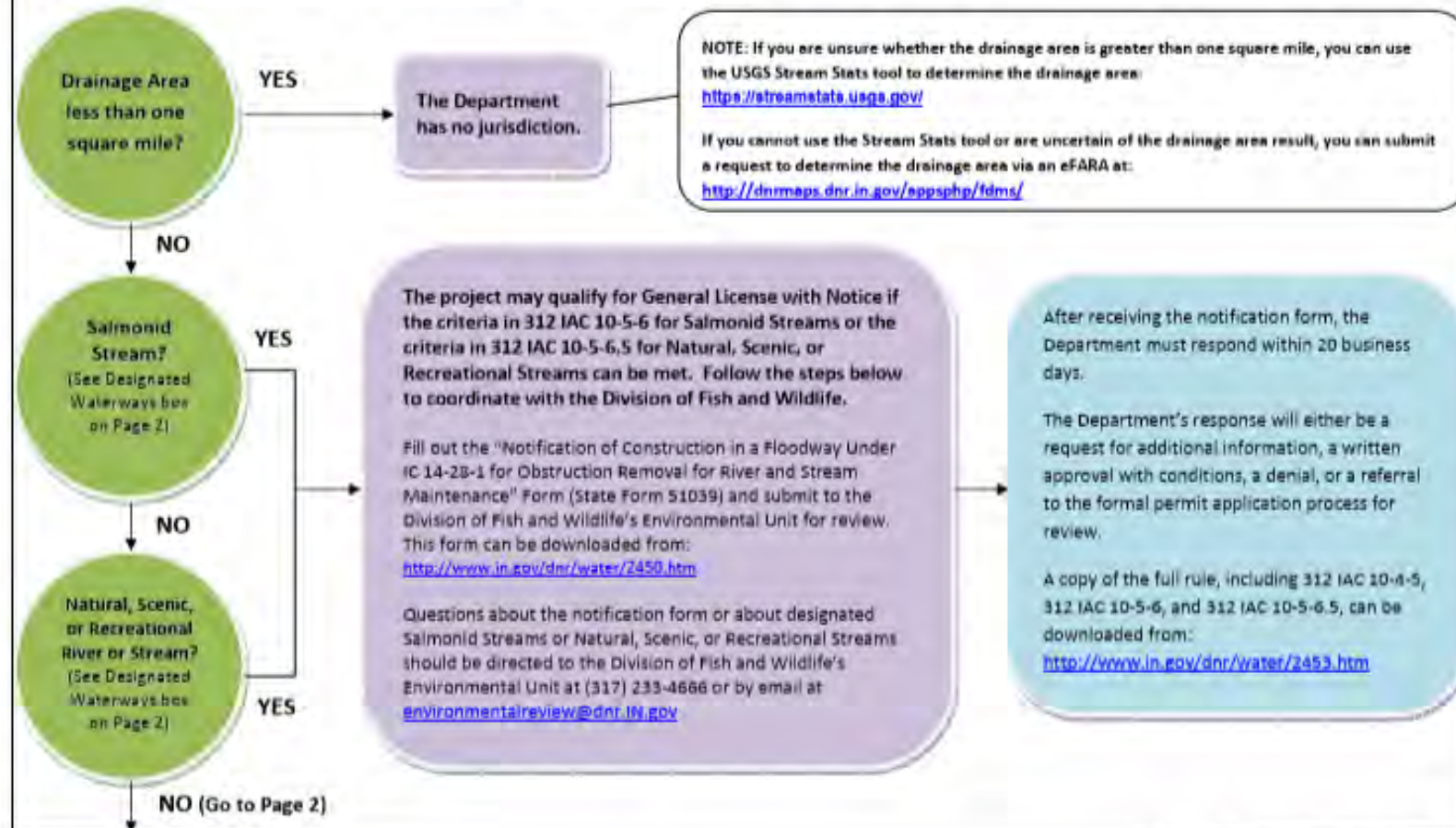
If the answer to all of the preceding questions was a clear 'no,' retain wood.

If the answers involved some qualifications, proceed to Tools 2-4 and consider retaining.

Regulatory Guide for Removal of a Logjam or a Mass of Wood Debris from a Floodway



This document should be used as a reference to determine whether or not a logjam or mass of wood debris (see definitions on Page 2) can be removed without prior written notification and approval from the Department, with written notification to the Department, or if a formal permit application needs to be submitted for review. **This document is not in reference to removal of a sandbar from beneath a bridge.** Generally, the Department does not have funds available to assist in the removal of a logjam or mass of wood debris. Permission from the landowner is needed if working on property other than your own. If you have any questions about this document, please contact the Division of Water's Technical Services Section at (877) 928-3755, Option 1.



↓ (Continued from Page 1)

For projects along streams with an upstream drainage area of one square mile or greater and not along one of the designated waterways listed below, if the project meets the conditions in IC 14-28-1-22 (b) (6) (C) through (I), no correspondence with the Department is required:

IC 14-28-1-22 (b) (6)

(C) Except as otherwise provided in Indiana law, free logs or affixed logs that are crossways in the channel must be cut, relocated, and removed from the floodplain. Logs may be maintained in the floodplain if properly anchored or otherwise secured so as to resist flotation or dislodging by the flow of water and placement in an area that is not a wetland. Logs must be removed and secured with a minimum of damage to vegetation.

(D) Isolated or single logs that are embedded, lodged, or rooted in the channel, and that do not span the channel or cause flow problems, must not be removed unless the logs are either of the following:

- (i) Associated with or in close proximity to larger obstructions.
- (ii) Posing a hazard to navigation.

(E) A leaning or severely damaged tree that is in immediate danger of falling into the waterway may be cut and removed if the tree is associated with or in close proximity to an obstruction. The root system and stump of the tree must be left in place.

(F) To the extent practicable, the construction of access roads must be minimized, and should not result in the elevation of the floodplain.

(G) To the extent practicable, work should be performed exclusively from one (1) side of a waterway. Crossing the bed of a waterway is prohibited.

(H) To prevent the flow of sediment laden water back into the waterway, appropriate sediment control measures must be installed.

(I) Within fifteen (15) days, all bare and disturbed areas must be revegetated with a mixture of grasses and legumes. Tall fescue must not be used under this subdivision, except that low endophyte tall fescue may be used in the bottom of the waterway and on side slopes.

If the project cannot meet the criteria above, a formal permit application review is required. A permit application form and additional information about the permit application process can be found at: <http://www.in.gov/dnr/water/2455.htm>

Designated Waterways:

1. SALMONID STREAMS are as follows and in: <http://www.in.gov/legislative/irc/703270/A00026.PDF>

327 IAC 2-1.5-5 (3) Where natural temperatures will permit, surface waters shall be capable of supporting put-and-take trout fishing. All waters capable of supporting the natural reproduction of trout shall be so maintained. The following waters are designated as salmonid waters and shall be capable of supporting a salmonid fishery:

- (A) Trail Creek and its tributaries downstream to Lake Michigan.
- (B) East Branch of the Little Calumet River and its tributaries downstream to Lake Michigan via Burns Ditch.
- (C) Salt Creek above its confluence with the Little Calumet River.
- (D) Kintzels Ditch (Black Ditch) from Beverly Drive downstream to Lake Michigan.
- (E) The Galena River and its tributaries in LaPorte County.
- (F) The St. Joseph River and its tributaries in St. Joseph County from the Twin Branch Dam in Wisconsin downstream to the Indiana/Michigan state line.
- (G) The Indiana portion of the open waters of Lake Michigan.
- (H) Those waters designated by the Indiana department of natural resources for put-and-take trout fishing. (Refer to <https://www.in.gov/dnr/fishwild/5457.htm> for listing of put-and-take trout fishing locations.)

2. NATURAL, SCENIC, or RECREATIONAL RIVER or STREAM listing:

- a) Blue River – Harrison, Crawford and Washington Counties
- b) Cedar Creek – Allen and DeKalb Counties
- c) Wildcat Creek – Tippecanoe and Carroll Counties

Further details can be found in 312 IAC 7-2, at: www.in.gov/legislative/irc/703120/A00070.PDF

Definitions

312 IAC 10-2-26 "Logjam" defined:

"Logjam" means an accumulation of lodged trees, root wads, or other debris that impedes the ordinary flow of water through a waterway. The term does not include the development of sandbars, sedimentation, or accumulations of stone or gravel.

Logjams are evidenced by a blockage that does any of the following:

- (1) Traverses the waterway.
- (2) Causes upstream ponding.
- (3) Results in significant bank erosion.

312 IAC 10-2-29.5 "Mass of wood debris" defined:

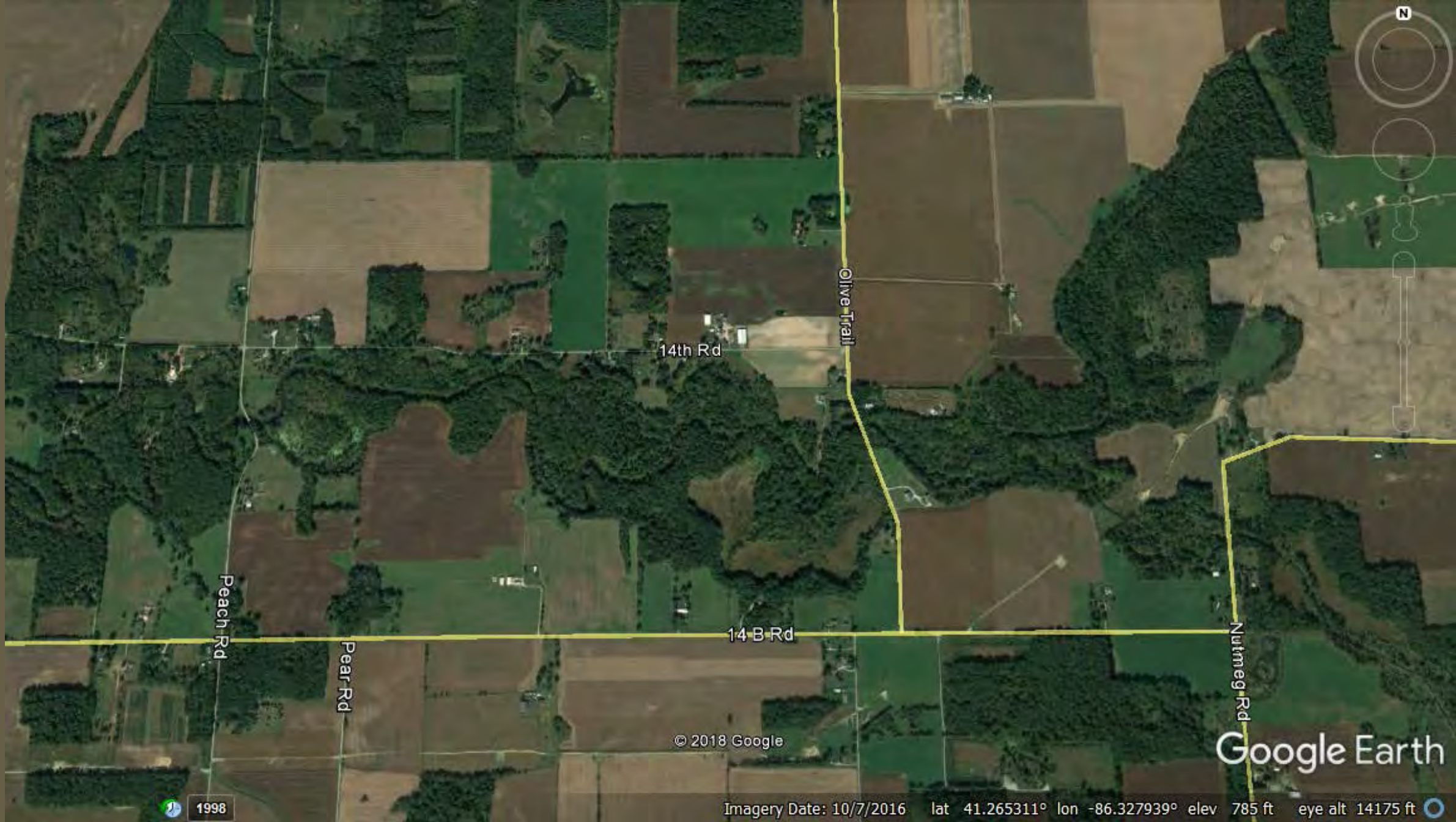
"Mass of wood debris" means an accumulation of lodged trees or other wood debris that is any of the following:

- (1) Causing or threatening to cause flooding on a road or private property.
- (2) Impeding navigation by a boat.
- (3) Reducing the capacity of a waterway to transport water.

Summary and Challenges



Kankakee River, Lake County, Indiana



Yellow River downstream from Plymouth, Indiana



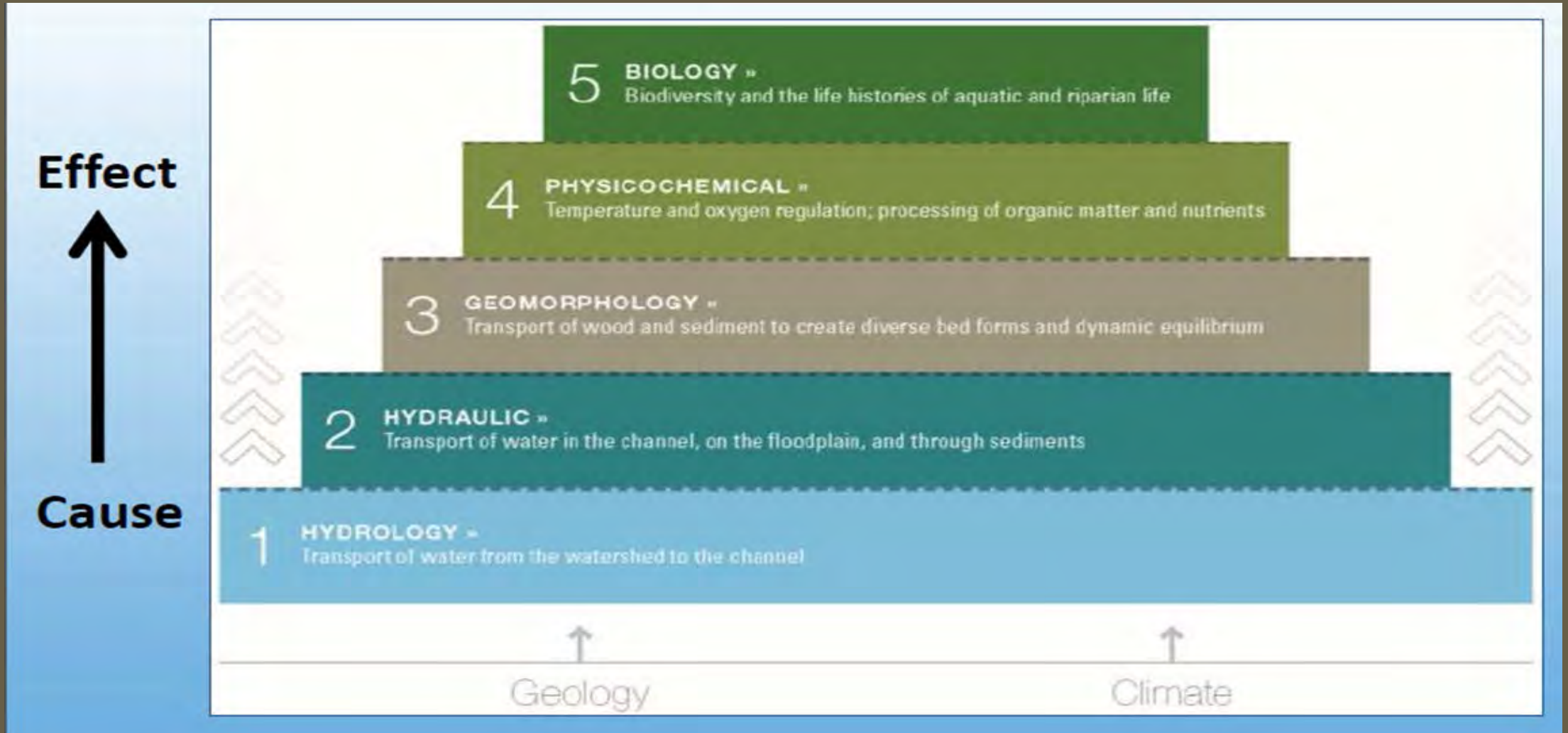
Yellow River at Marshall – Starke County Line



Wildcat Creek near Jerome, Indiana

Function-based Hierarchy

Function-based approach for addressing a legacy “ecosystem” restoration need & achieving “ecological lift”



Source: A Function-Based Framework for Stream Assessment & Restoration Projects, U.S. EPA, May 2012



Kankakee River, Jasper County, Indiana



Kankakee River, flow is towards the boat, Lake County L, Jasper County R



Fishback Creek, Marion County, Indiana

QUESTIONS?

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