



Big Woods, Big Rivers

MINNESOTA MASTER NATURALIST PROGRAM

LESSON SIX: RUNS, RIFFLES, OXBOWS, AND KETTLES

Water in the Landscape

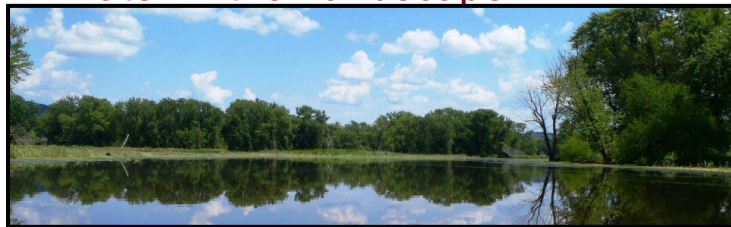


Image: Danielle Quist, U of MN Extension AFNR FWCE

Objective: *Understand that streams, rivers, and lakes are dynamic entities in MN's landscape.*



WHAT IS A WATERSHED?

A watershed is an area of land that drains all the streams and rainfall to a common outlet such as the outflow of a reservoir, mouth of a bay, or any point along a stream channel.

-The USGS Water Science School

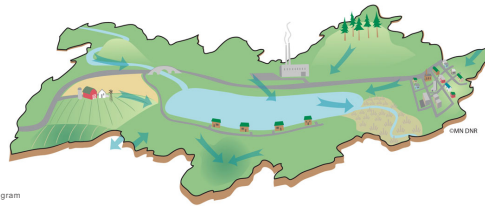


Image courtesy of the MN DNR and the MinnAqua Program



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WHAT ARE THE 3 LARGEST WATERSHEDS/DRAINAGE BASINS OF MINNESOTA?

1. Great Lakes/St Lawrence River
2. Nelson River
3. Mississippi River



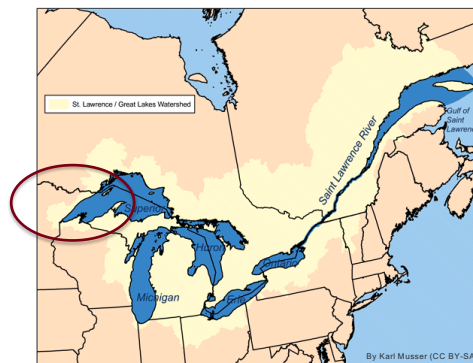
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GREAT LAKES/ST LAWRENCE RIVER WATERSHED



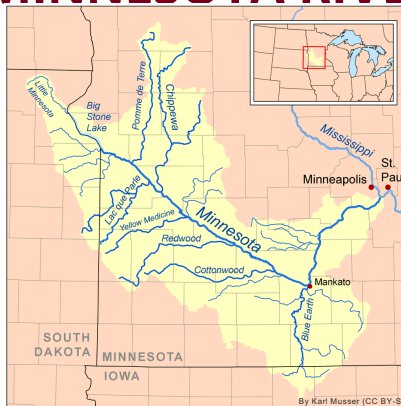
NELSON RIVER



MISSISSIPPI RIVER WATERSHED



MINNESOTA RIVER



RIVERS AND LAKES ARE DYNAMIC ENTITIES WITHIN A WATERSHED

RIVERS/LAKES CHANGE FROM...

- Upstream to Downstream (rivers)
- Shore to Shore (both)
- Top to Bottom (both)
- Season to Season (both)



LAKES IN 3D

- Shore to Shore
- Top to Bottom
- Season to Season



SHORE TO SHORE

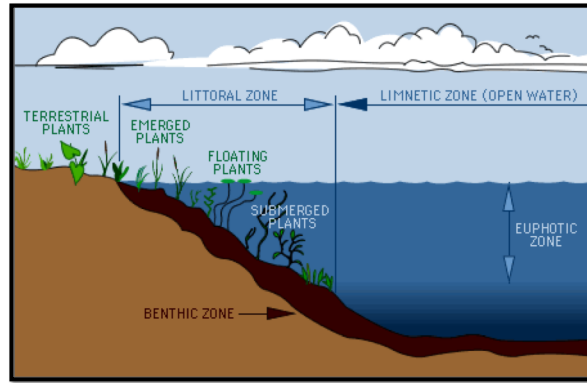
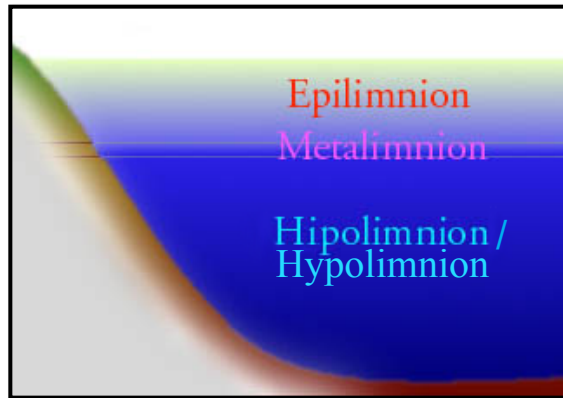


Image courtesy of Water on the Web (WOW)

TOP TO BOTTOM



SEASON TO SEASON

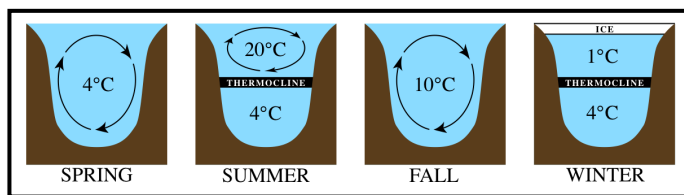


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RIVERS IN 4-D

- Rivers change
 - Longitudinally
 - Laterally
 - Vertically
 - Temporally

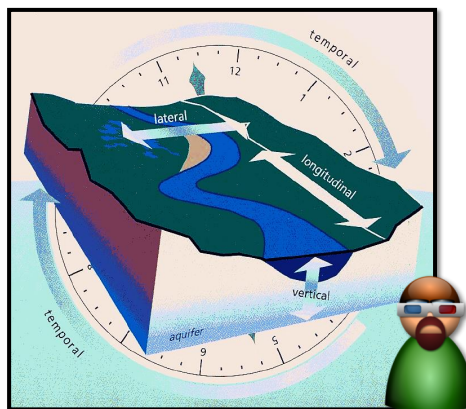
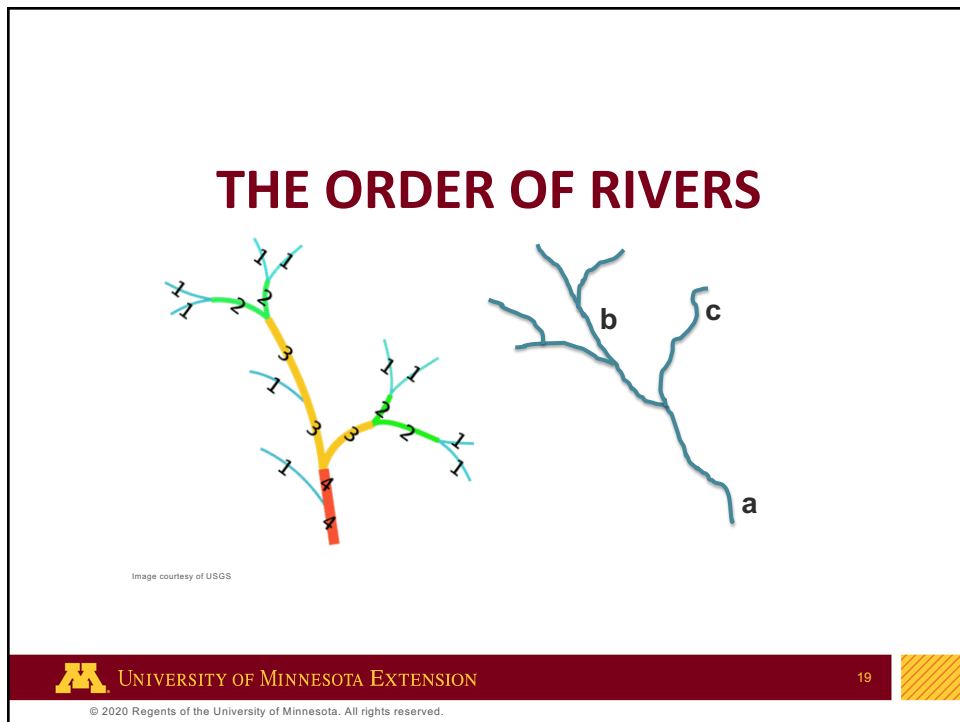
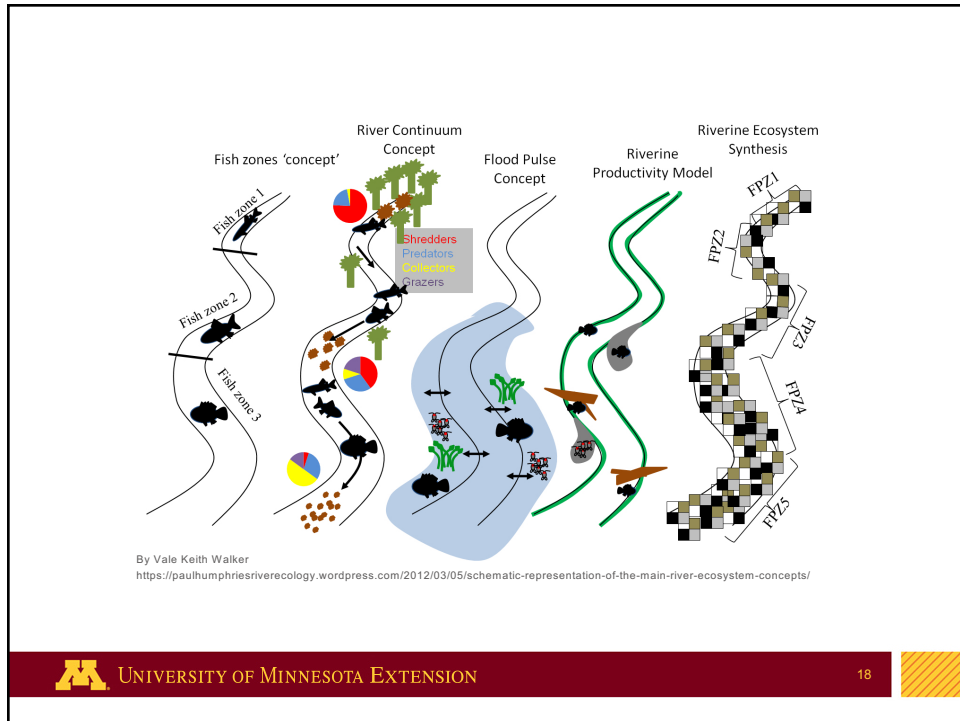
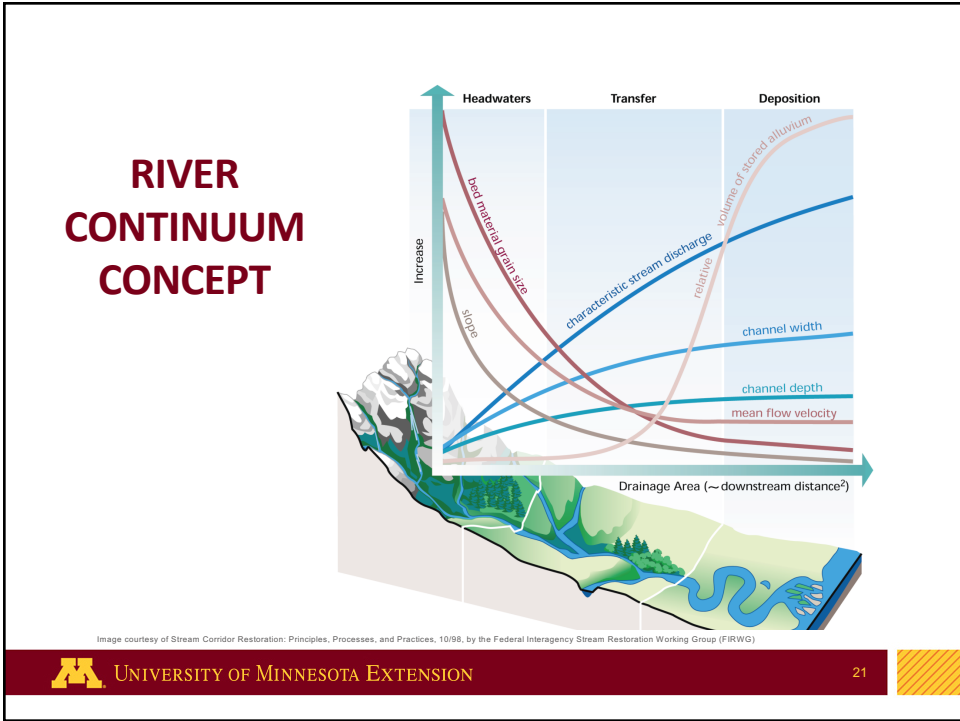
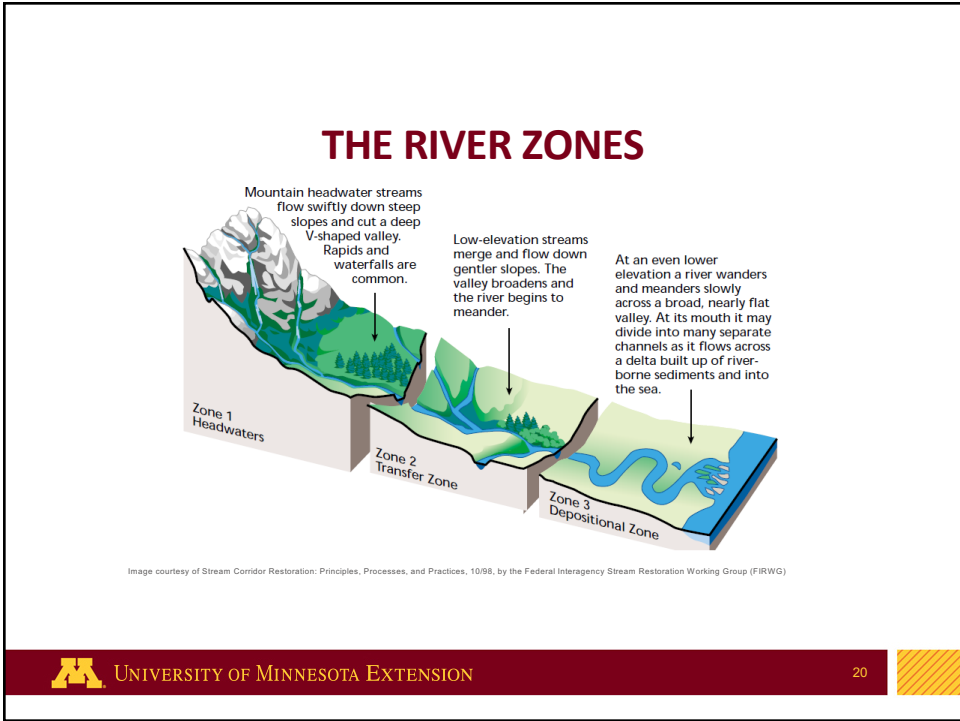


Image courtesy of Stream Corridor Restoration: Principles, Processes, and Practices, 10/98, by the Federal Interagency Stream Restoration Working Group (FIRWG)





PROGRESS OF RIVER EROSION

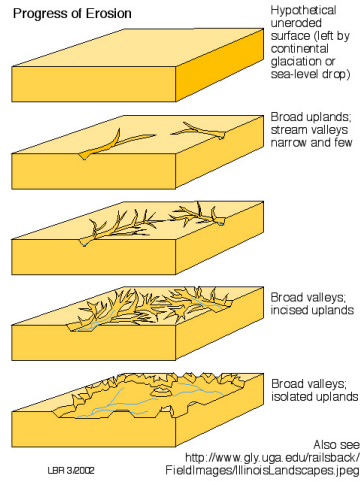


Image courtesy of Dr. Bruce Railsback (CC BY-SA)

RIVER'S FLOODPLAIN

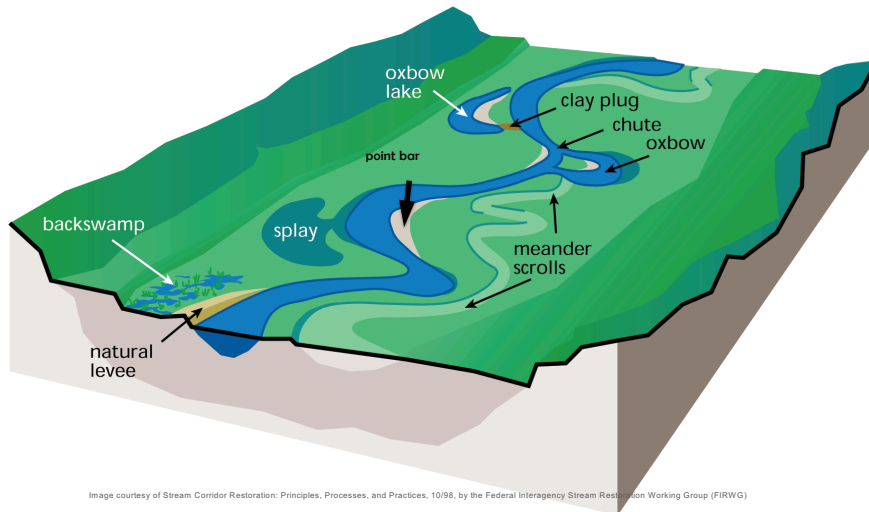


Image courtesy of Stream Corridor Restoration: Principles, Processes, and Practices, 10/98, by the Federal Interagency Stream Restoration Working Group (FIRWG)

EVOLUTION OF A MEANDER

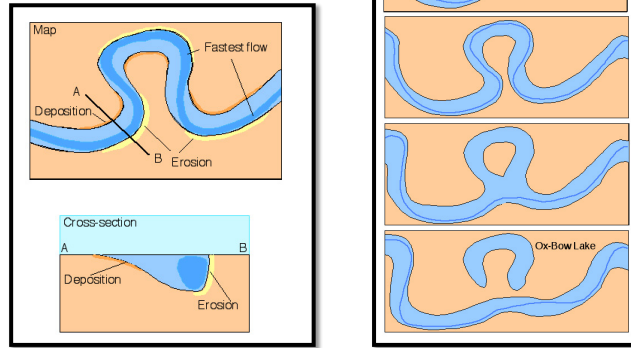


Image courtesy of Dr. Bruce Railsback (CC BY-SA)

RIFFLES, RUNS, AND POOLS

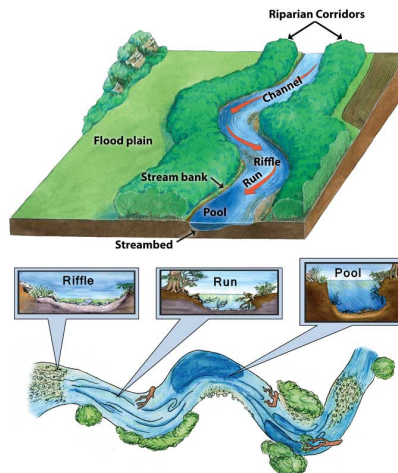




Image courtesy of Missouri Department of Conservation, Texas Parks and Wildlife Department, The Meadows Center for Water and the Environment, Rudolph Rosen

**DO YOU KNOW OF ANY
RIVERS IN MINNESOTA
THAT MEANDER OR HAVE
RIFFLES, RUNS, AND
POOLS?**

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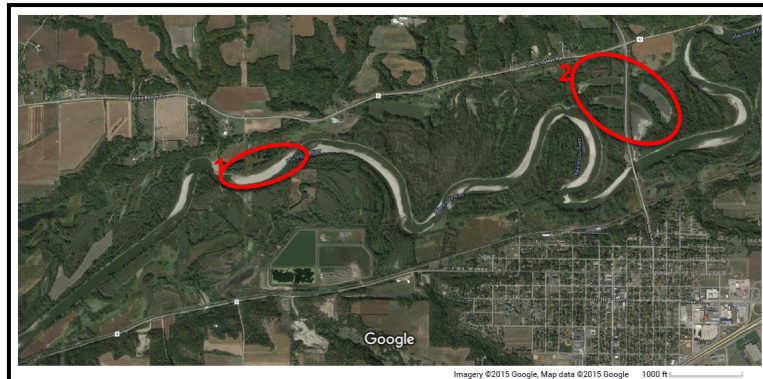
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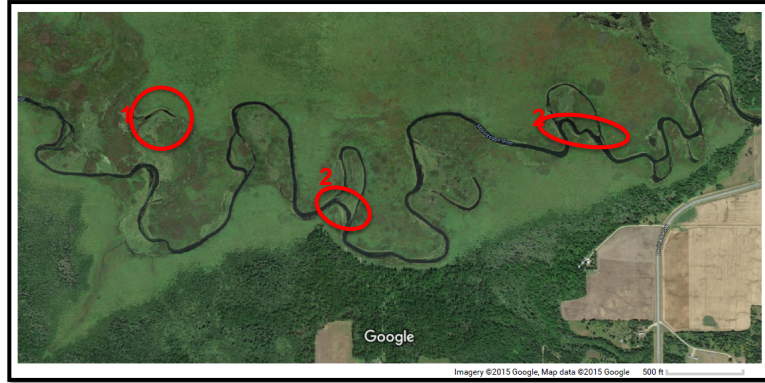
THE ROOT RIVER



MINNESOTA RIVER



MISSISSIPPI RIVER UP



**WHAT IS A SEASONAL
DISTURBANCE THAT CAN
EFFECT THE DYNAMICS
OF A RIVER?**

HIGH FLOWS AND FLOODING

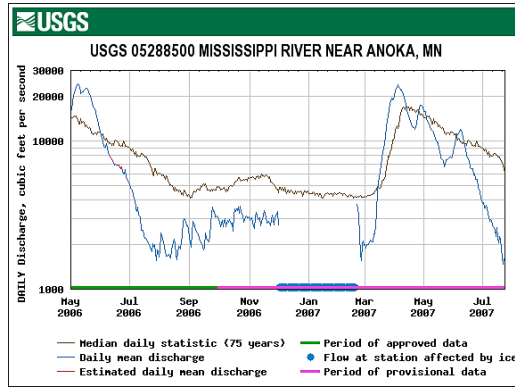


Image courtesy of USGS

RIVERS AND ITS FLOODPLAIN

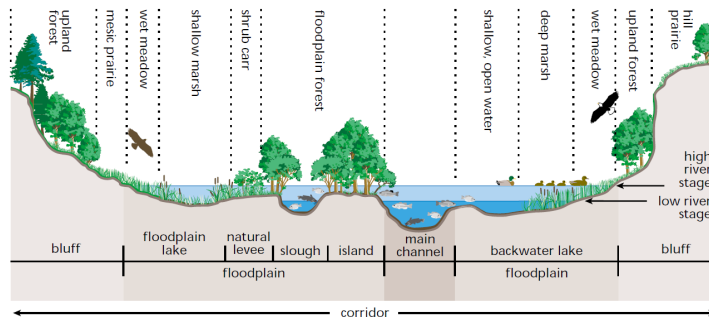


Image courtesy of AIBS. Bayley, Peter, 1995. Understanding Large River-floodplain Ecosystems. Bioscience, March, 1995, Vol. 45, No. 3, page 154.

FLOOD PULSE CONCEPT

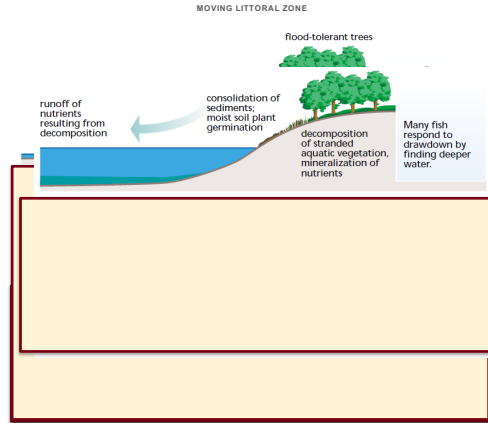


Image courtesy of AIBS. Bayley, Peter, 1995. Understanding Large River-floodplain Ecosystems. Bioscience, March, 1995, Vol. 45, No. 3, page 154.

CONTROLLING UNPREDICTABILITY





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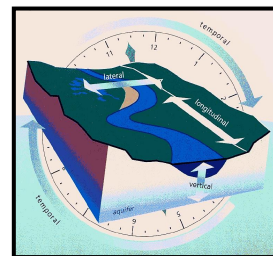


Image courtesy of Stream Corridor Restoration: Principles, Processes, and Practices, 10/98, by the Federal Interagency Stream Restoration Working Group (FIRWG)

Ponds, lakes, streams and rivers are dynamic entities in the Big Woods, Big Rivers biome.



ACKNOWLEDGMENTS

Images used in this presentation were taken from multiple sources and we thank all of the people who gave us permission to use them.



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Driven to DiscoverSM

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MAKING A DIFFERENCE IN MINNESOTA: ENVIRONMENT + FOOD & AGRICULTURE + COMMUNITIES + FAMILIES + YOUTH