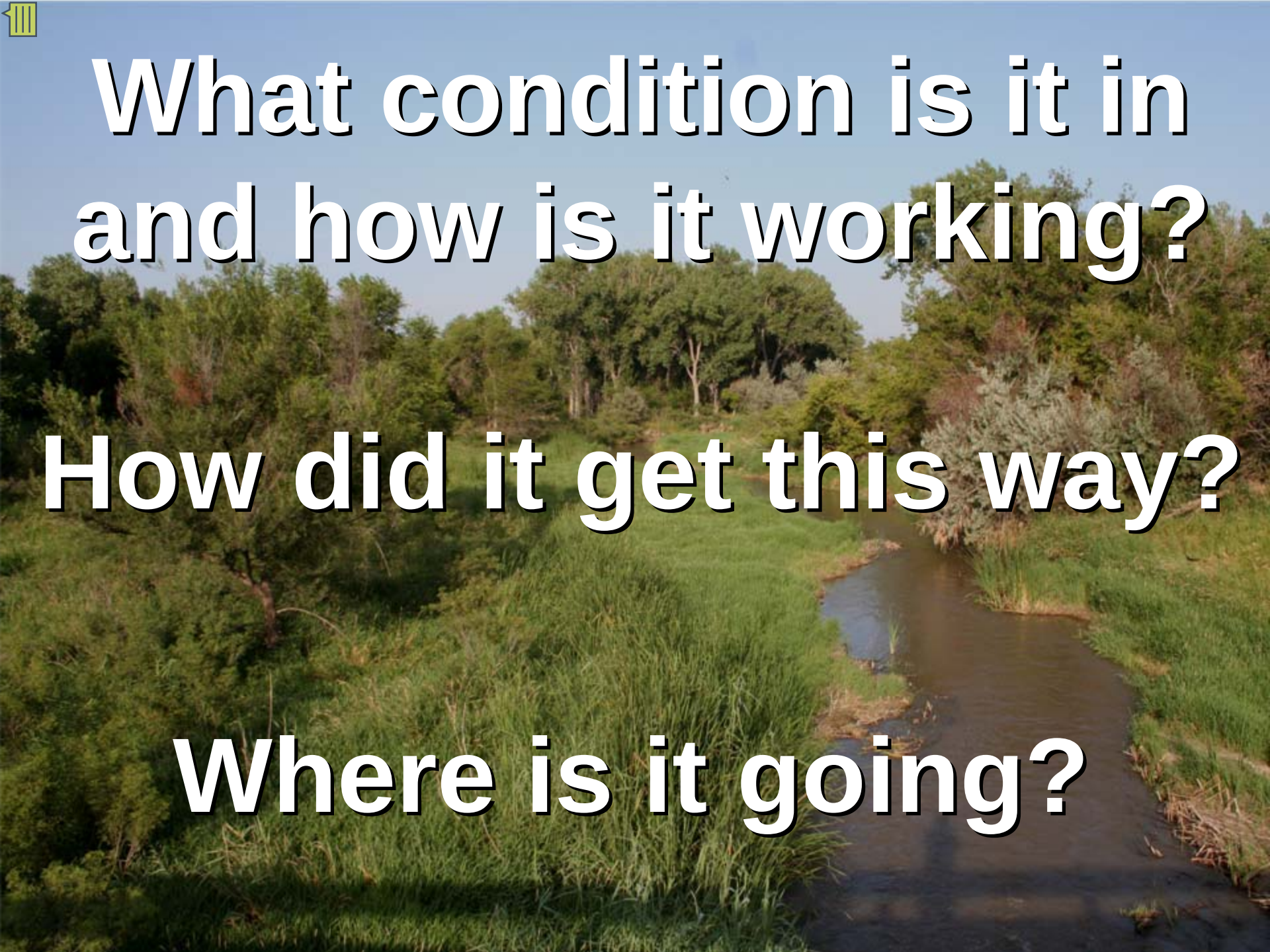
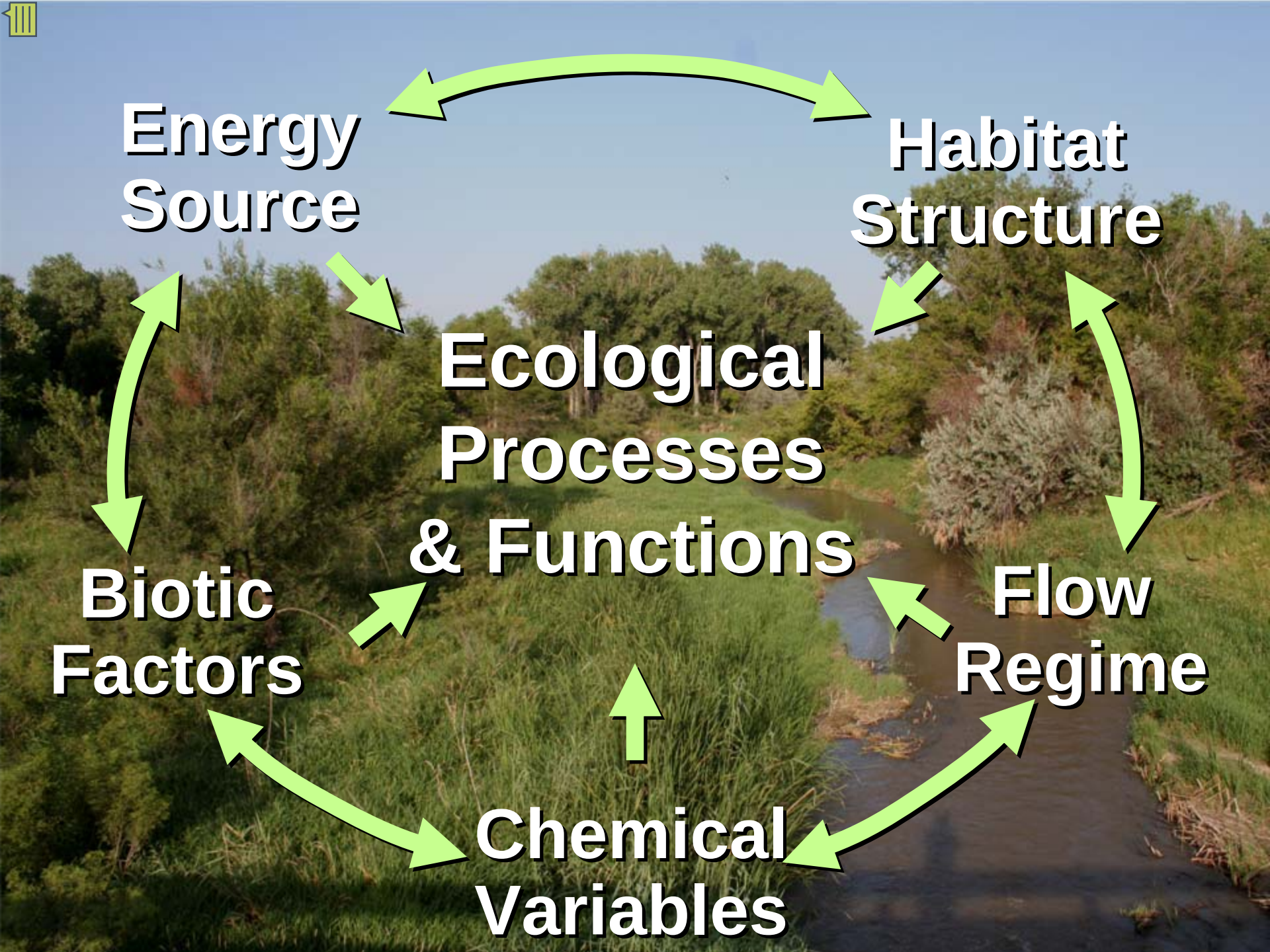
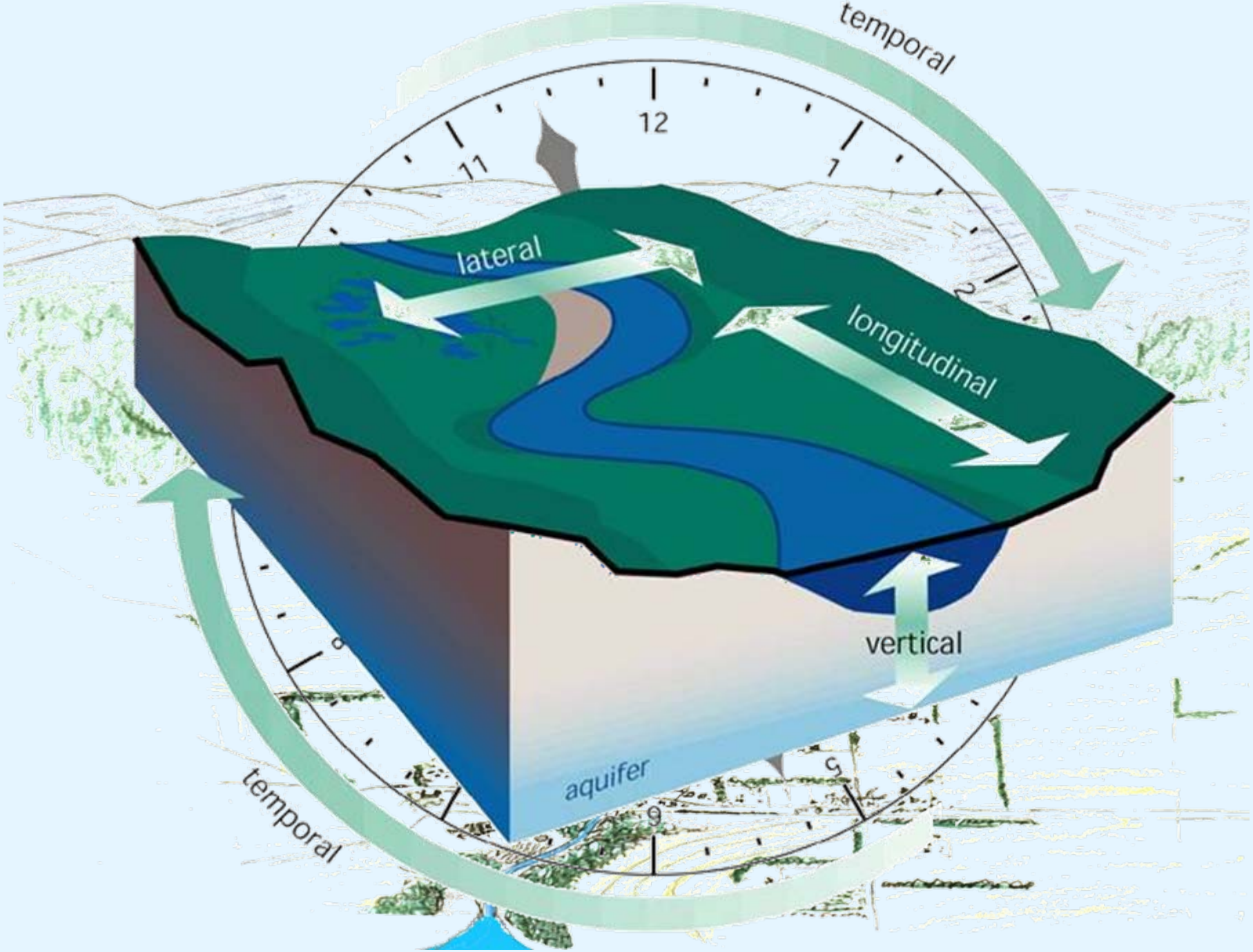
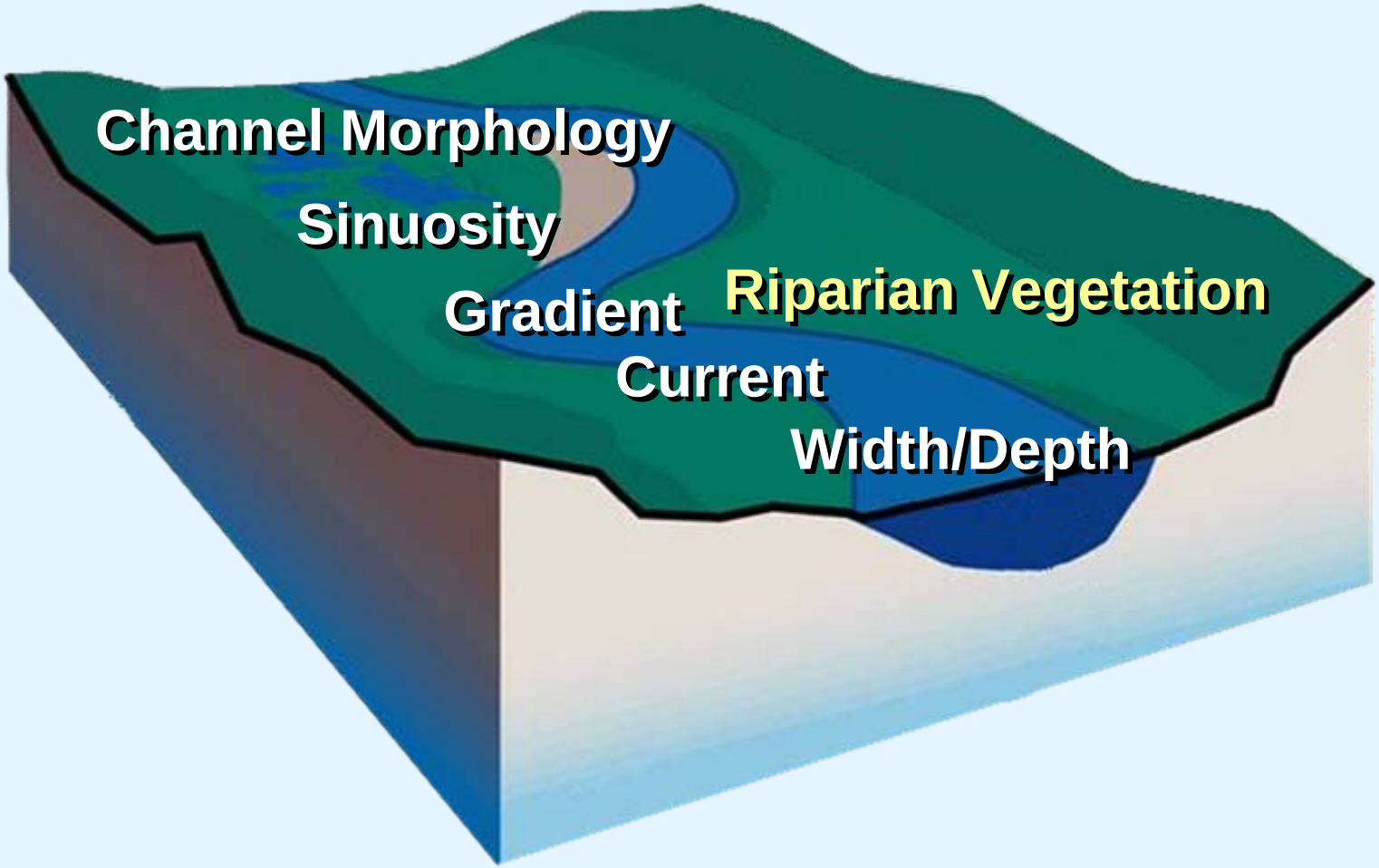
Stream Corridor Assessment

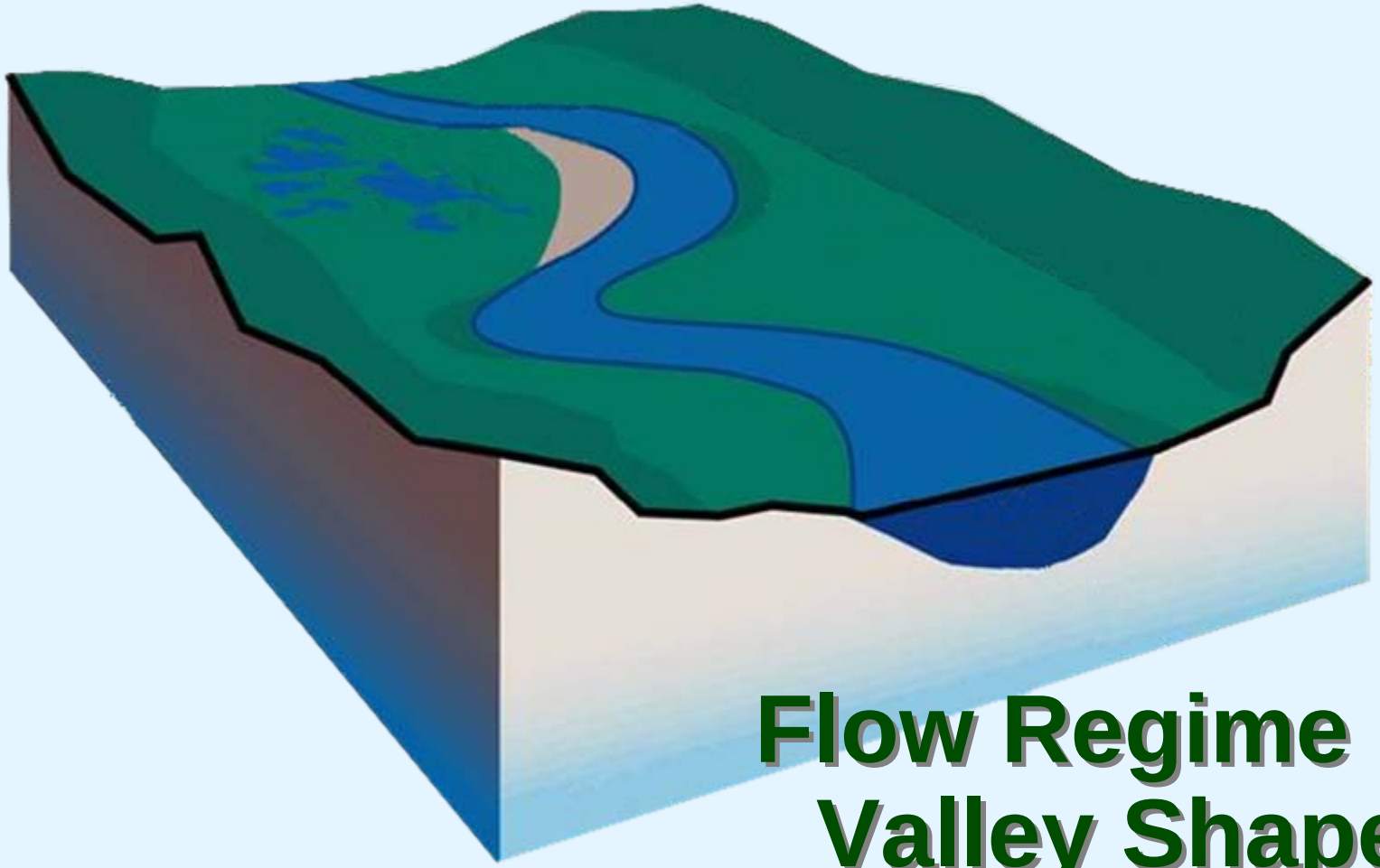

What condition is it in and how is it working?
How did it get this way?
Where is it going?


Energy Source
Habitat Structure
Ecological Processes & Functions
Biotic Factors
Flow Regime
Chemical Variables

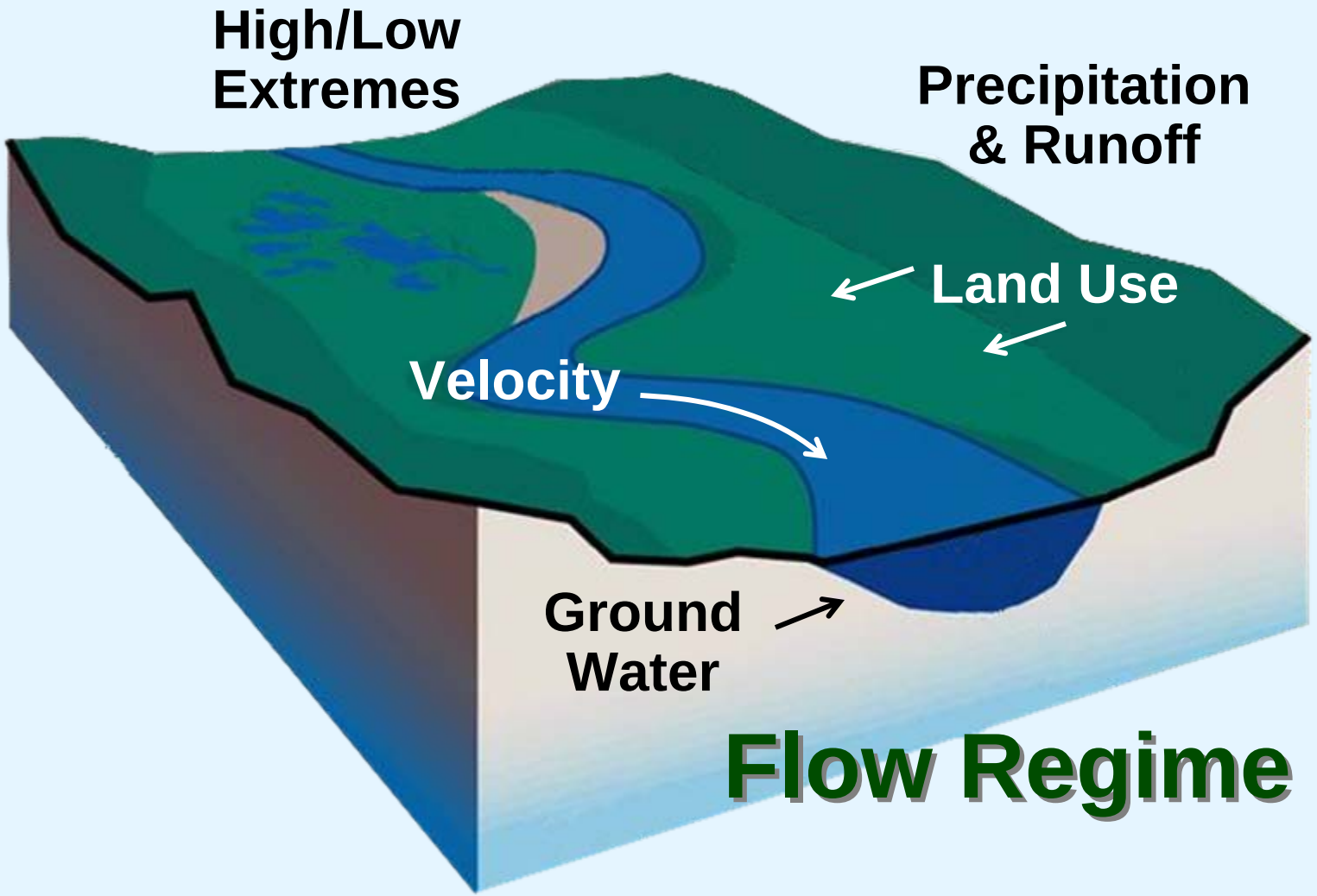

temporal
12
11
1
2
lateral
longitudinal
vertical
aquifer
temporal
9
6
5


Channel Morphology
Sinuosity
Gradient
Riparian Vegetation
Current
Width/Depth

Climate & Geology

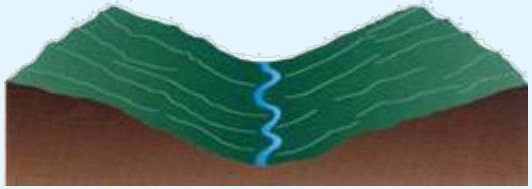


Flow Regime & Valley Shape

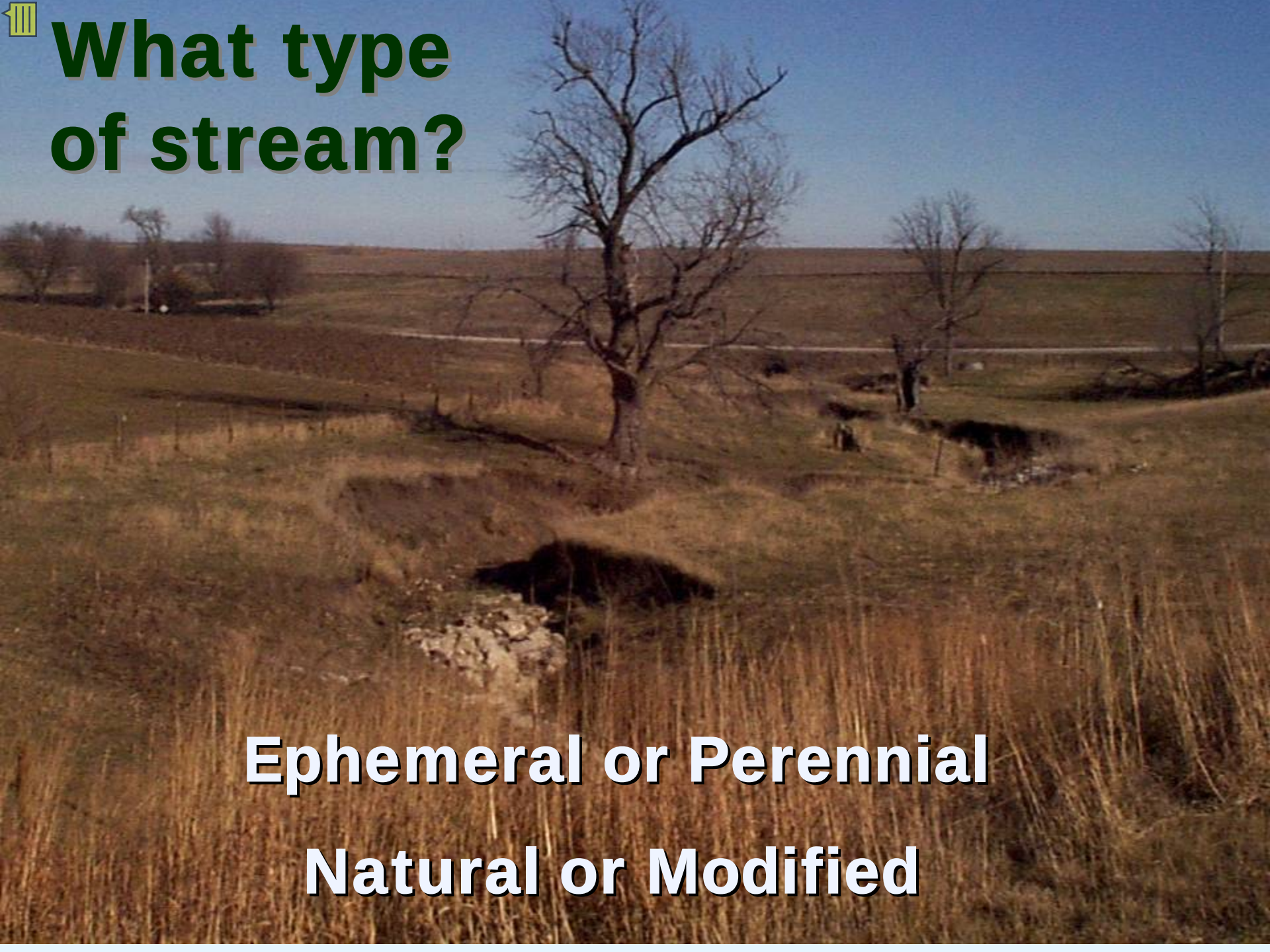

High/Low
Extremes
Precipitation
& Runoff
Land Use
Velocity
Ground
Water

Flow Regime

Valley Types and Floodplains



What type of stream?



Ephemeral or Perennial

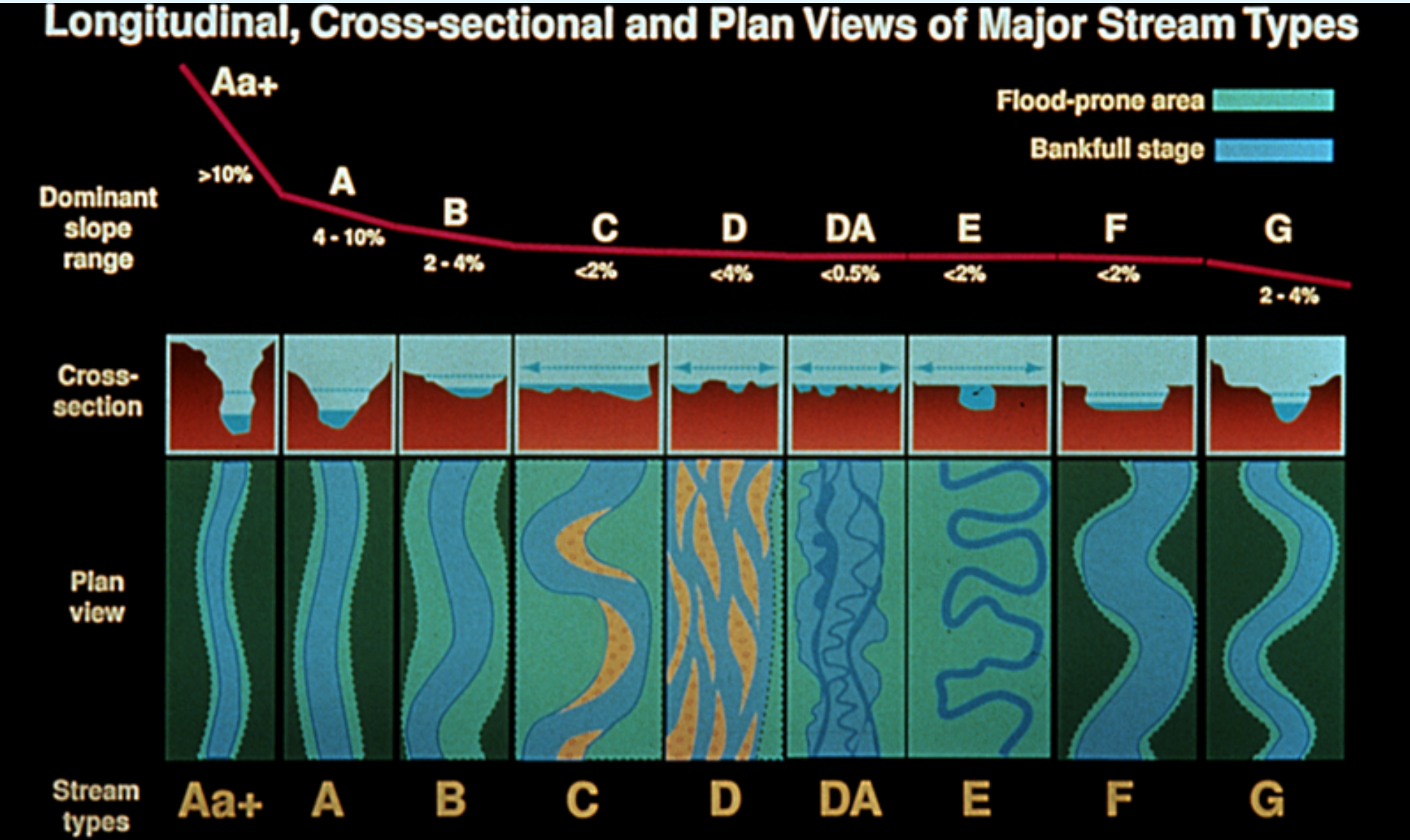
Natural or Modified

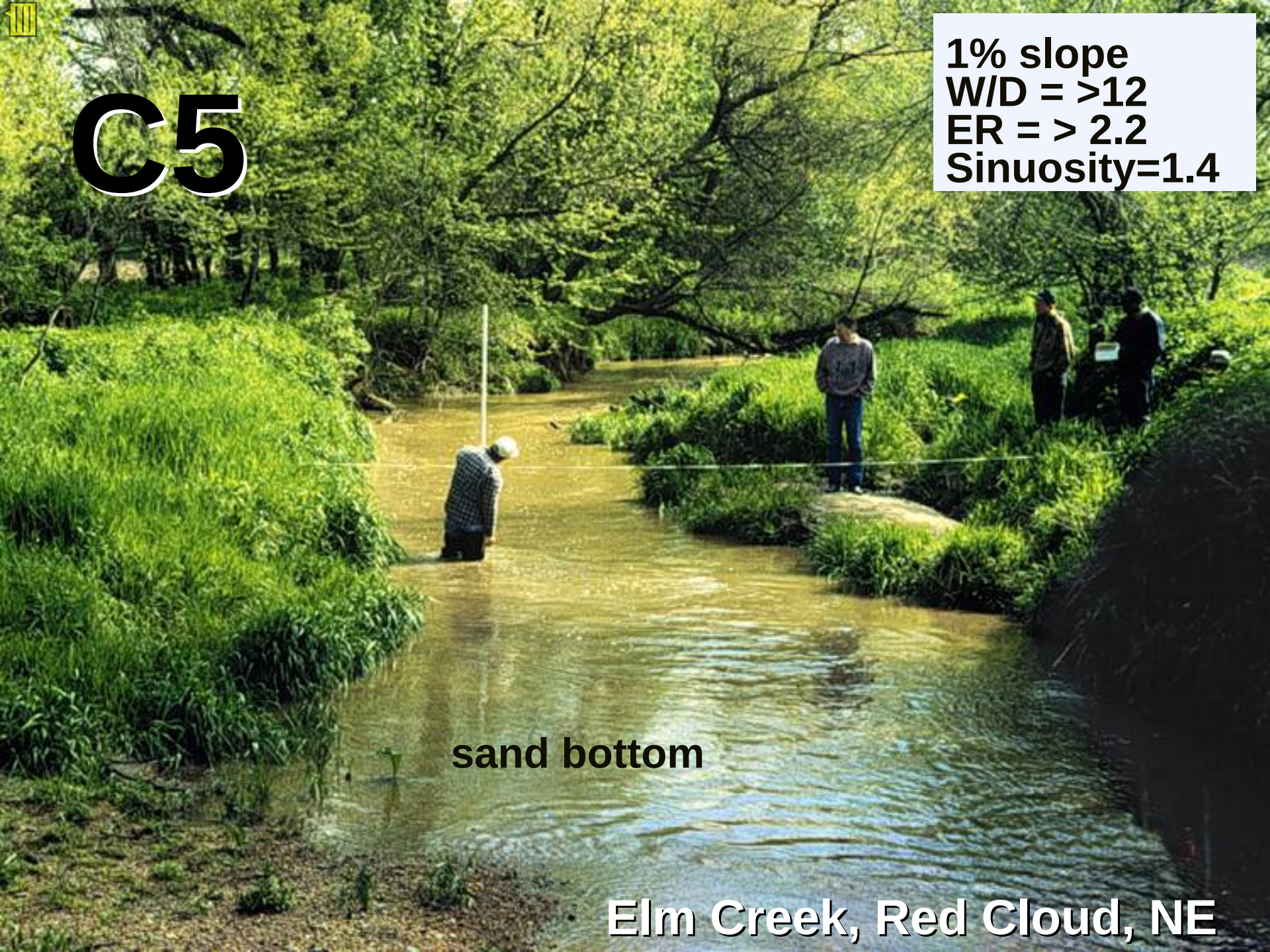
Stream Classification Systems

- Strahler & Schreve
- Schumm
- Montgomery & Buffington
- Rosgen
- Channel Evolution Model

Stream Classification Systems

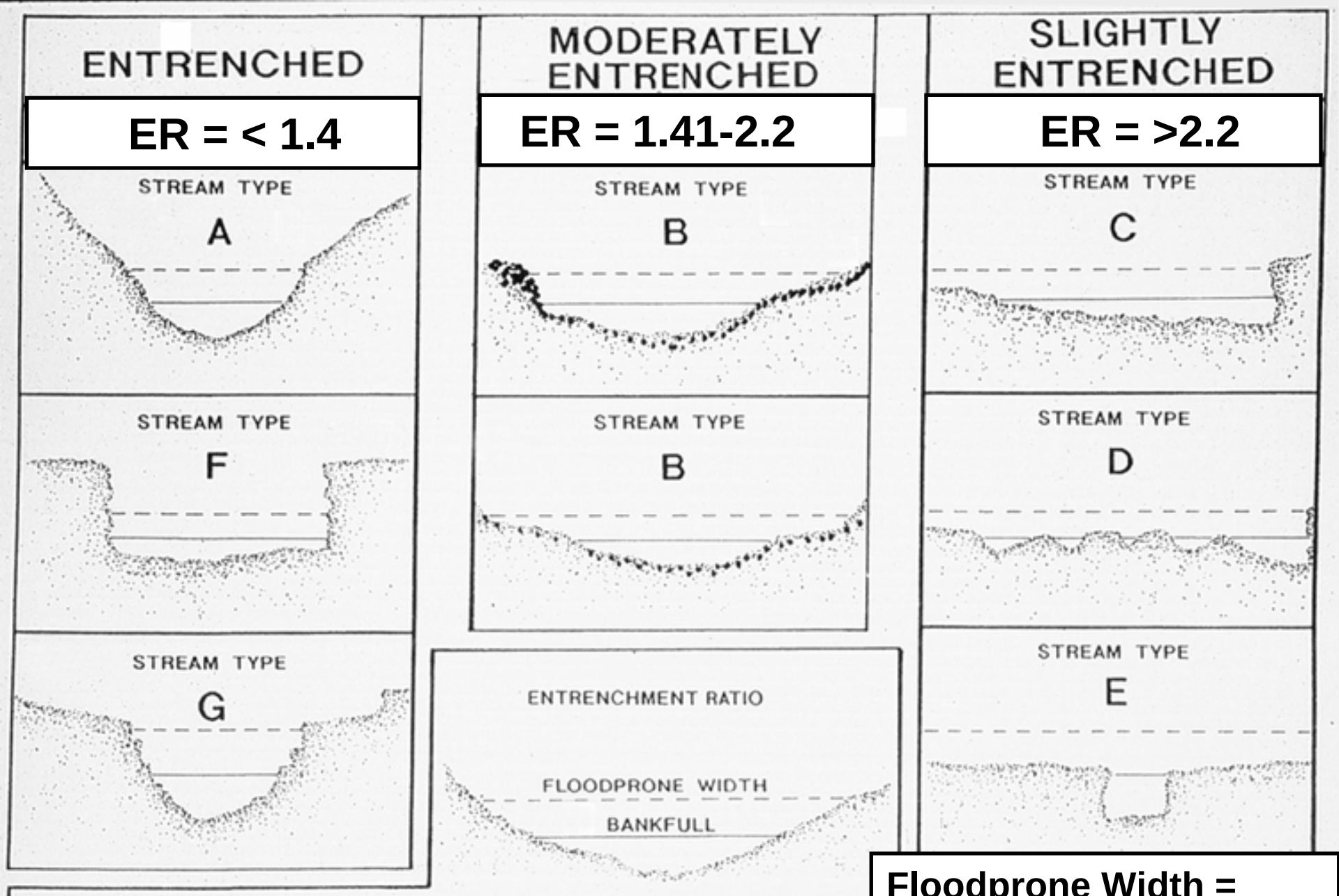
Rosgen (1996)




C5
1% slope
W/D = >12
ER = > 2.2
Sinuosity=1.4
sand bottom
Elm Creek, Red Cloud, NE

D4
multiple channel
2% slope
W/D >40
gravel bottom

Bow Valley Creek Between Fordyce & Constance, NE
terrace
active floodplain
bankfull
low flow

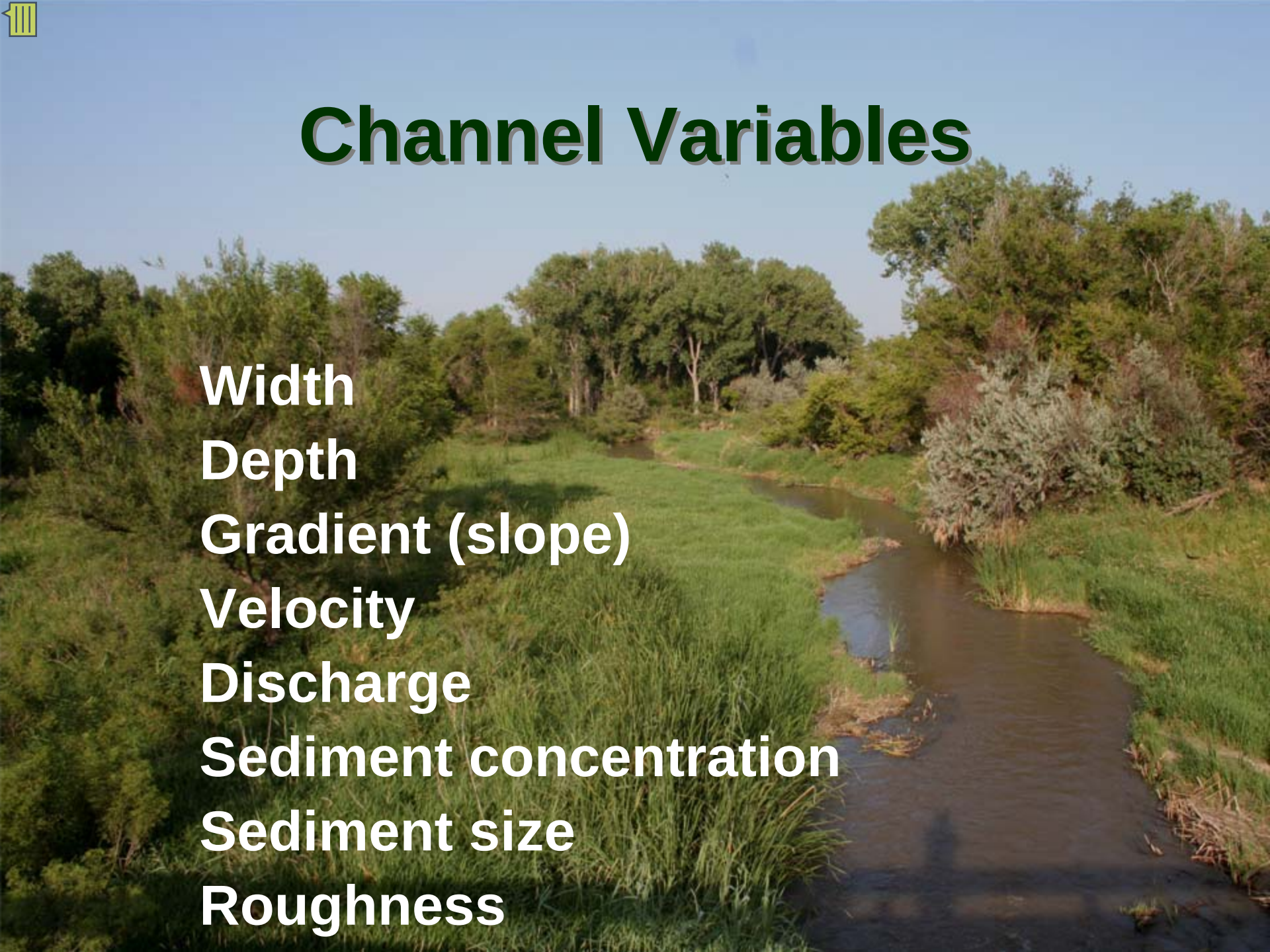


Floodprone Width/Bankfull Width=ER

Floodprone Width = Width @ 2x Maximum Bankfull Depth

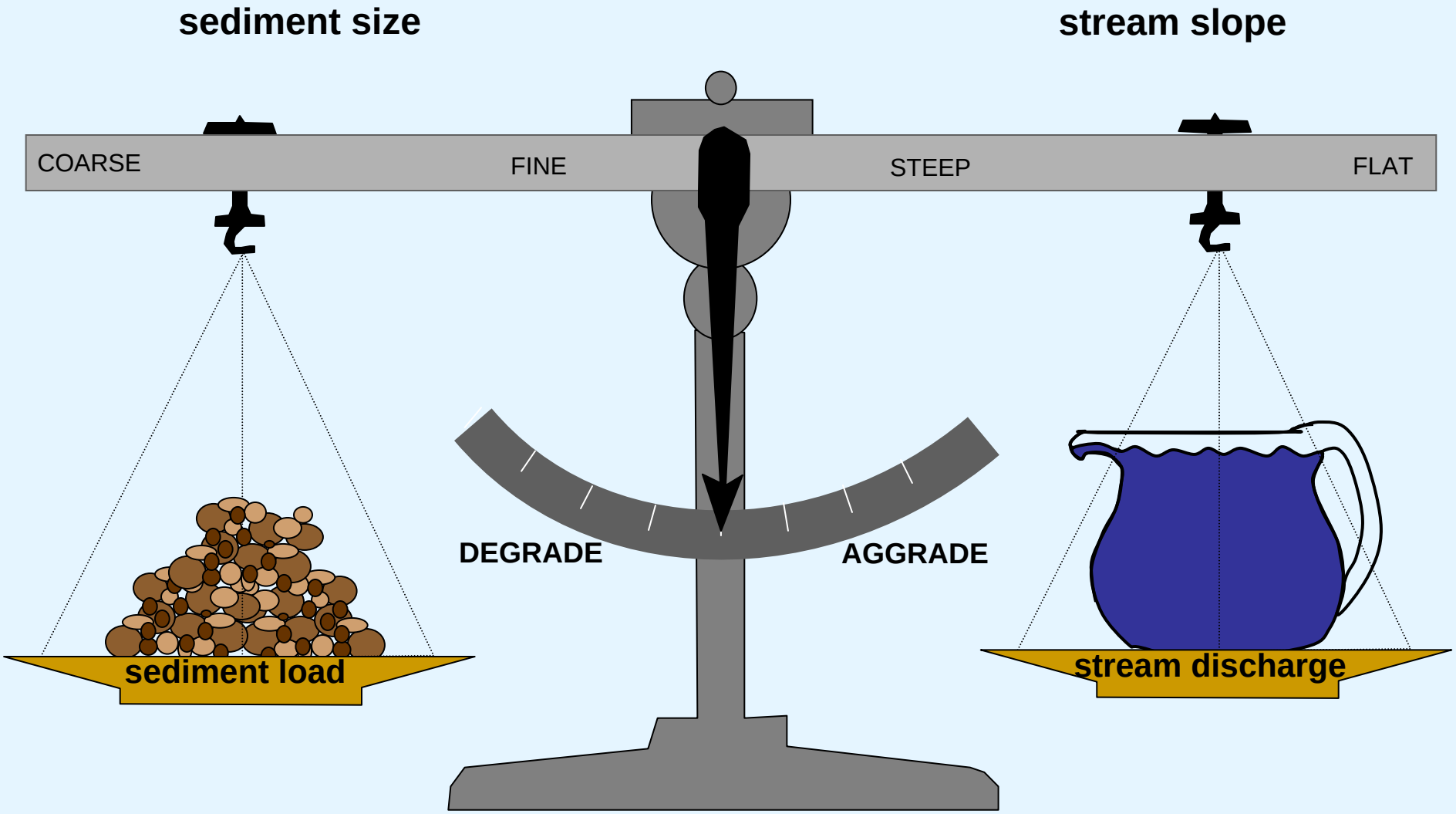
active floodplain
bankfull
low flow
Turkey Creek

Channel Variables



Width
Depth
Gradient (slope)
Velocity
Discharge
Sediment concentration
Sediment size
Roughness

Lane's Balance



$QS*D_{50} \sim S*Q$

Channel Adjustments

Bedforms

Bed armor

Channel width

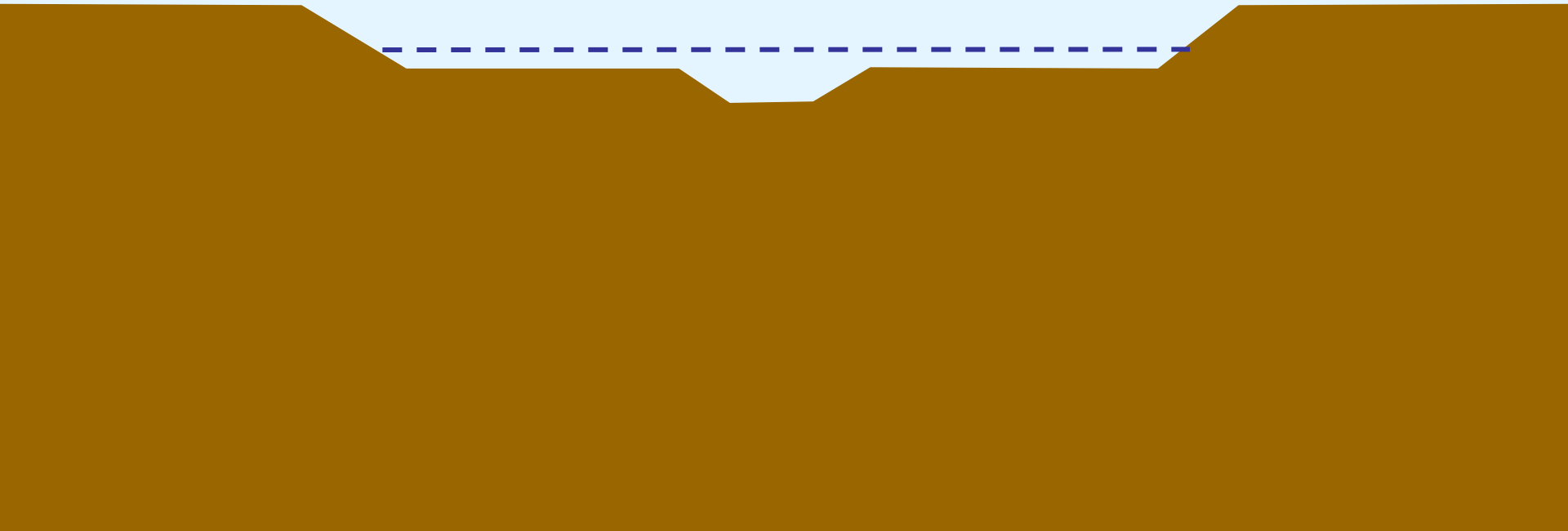
Channel pattern

Longitudinal profile

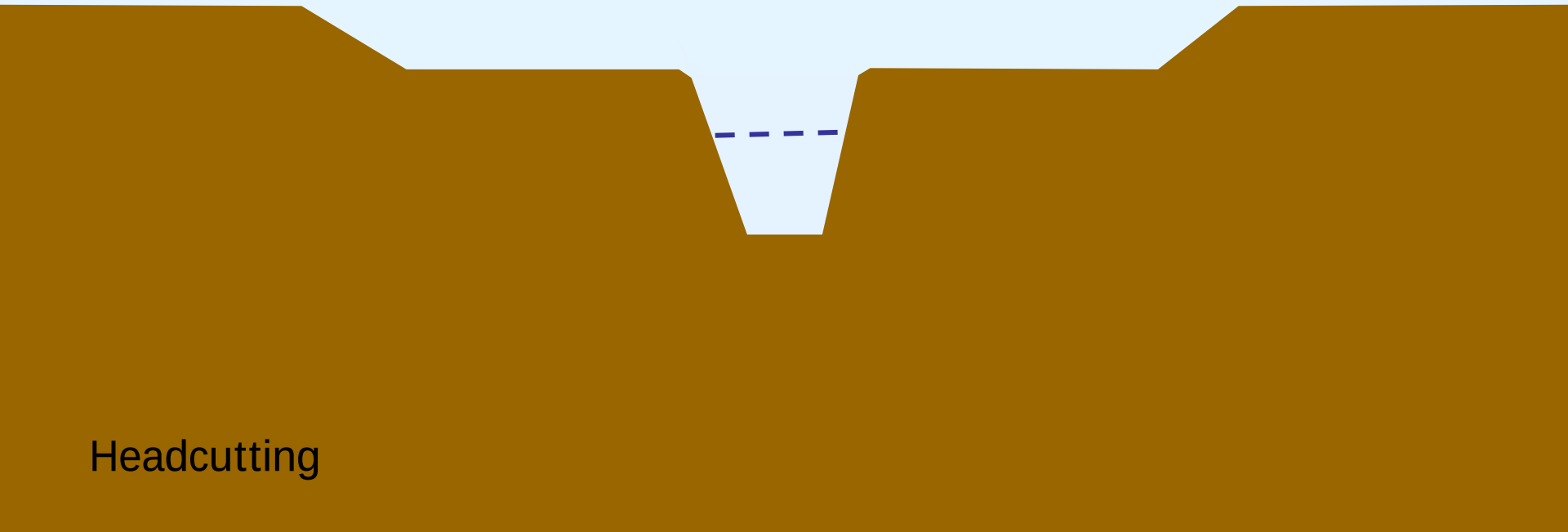
Channel Evolution Model (Schumm)

Stage I Stable

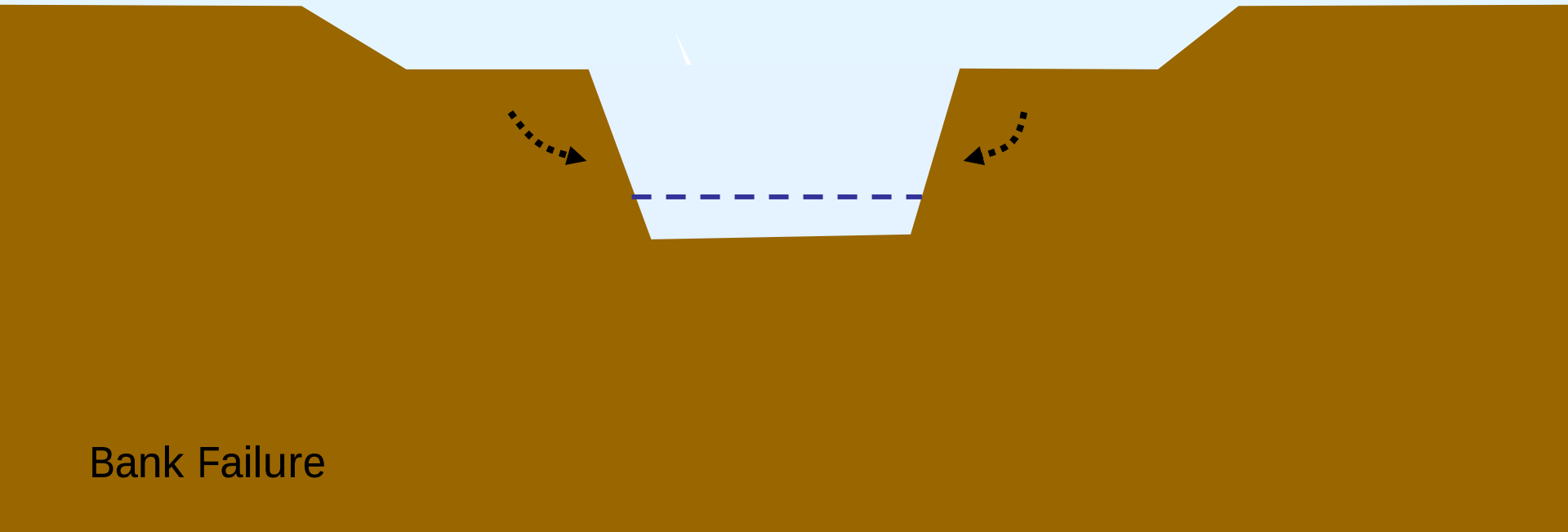
DISTURBANCE



Stage II Incision

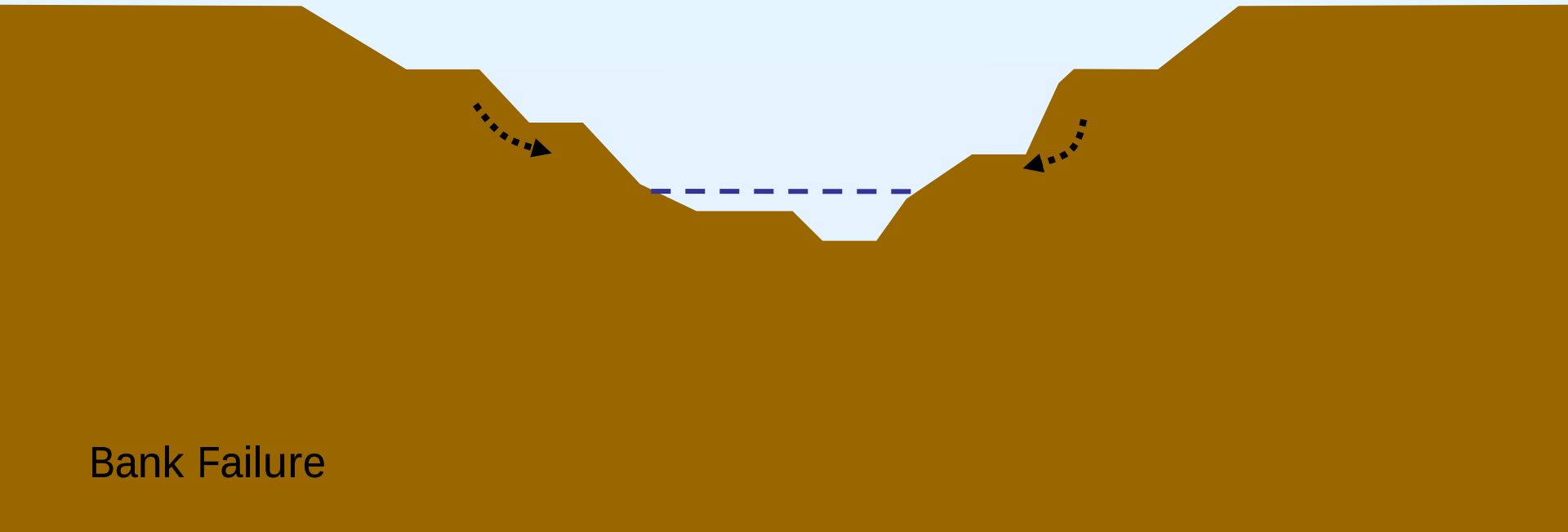


Stage III Widening



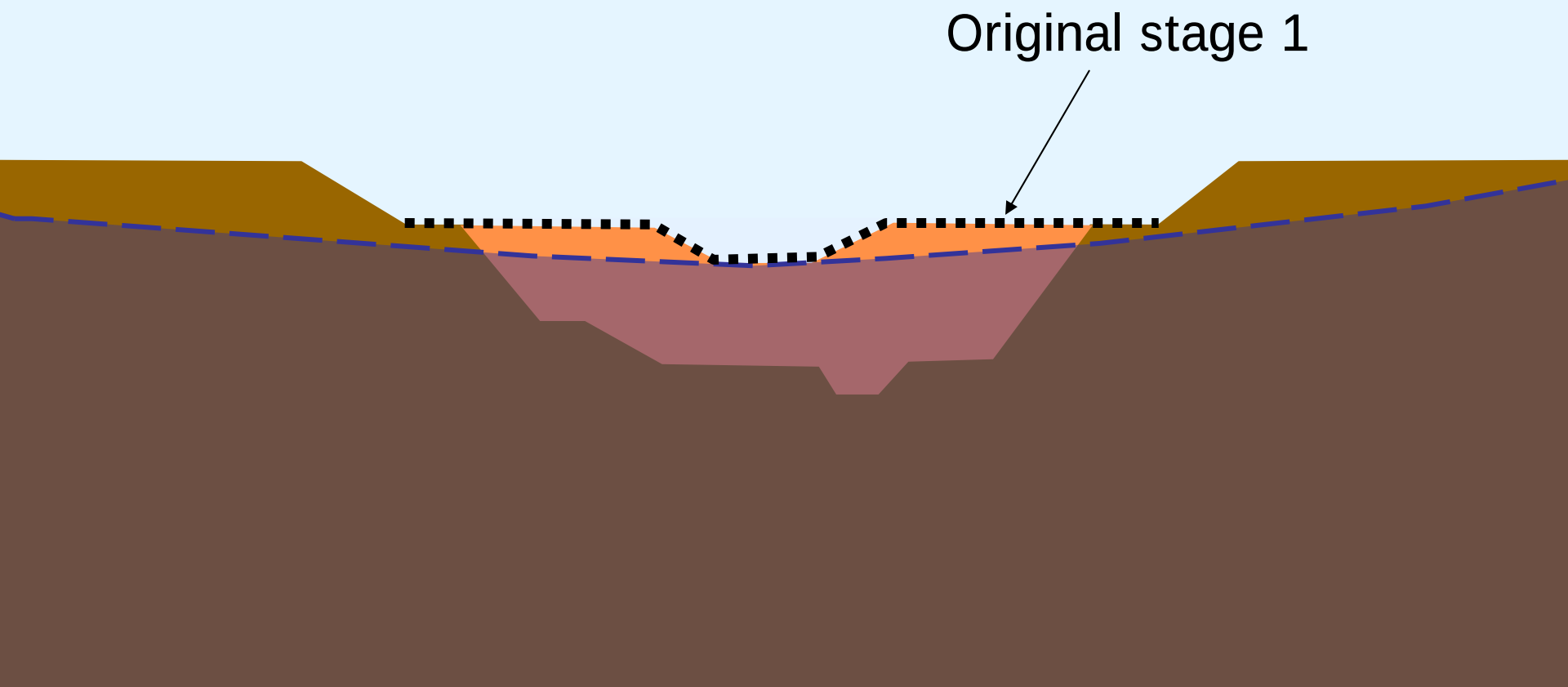
Bank Failure

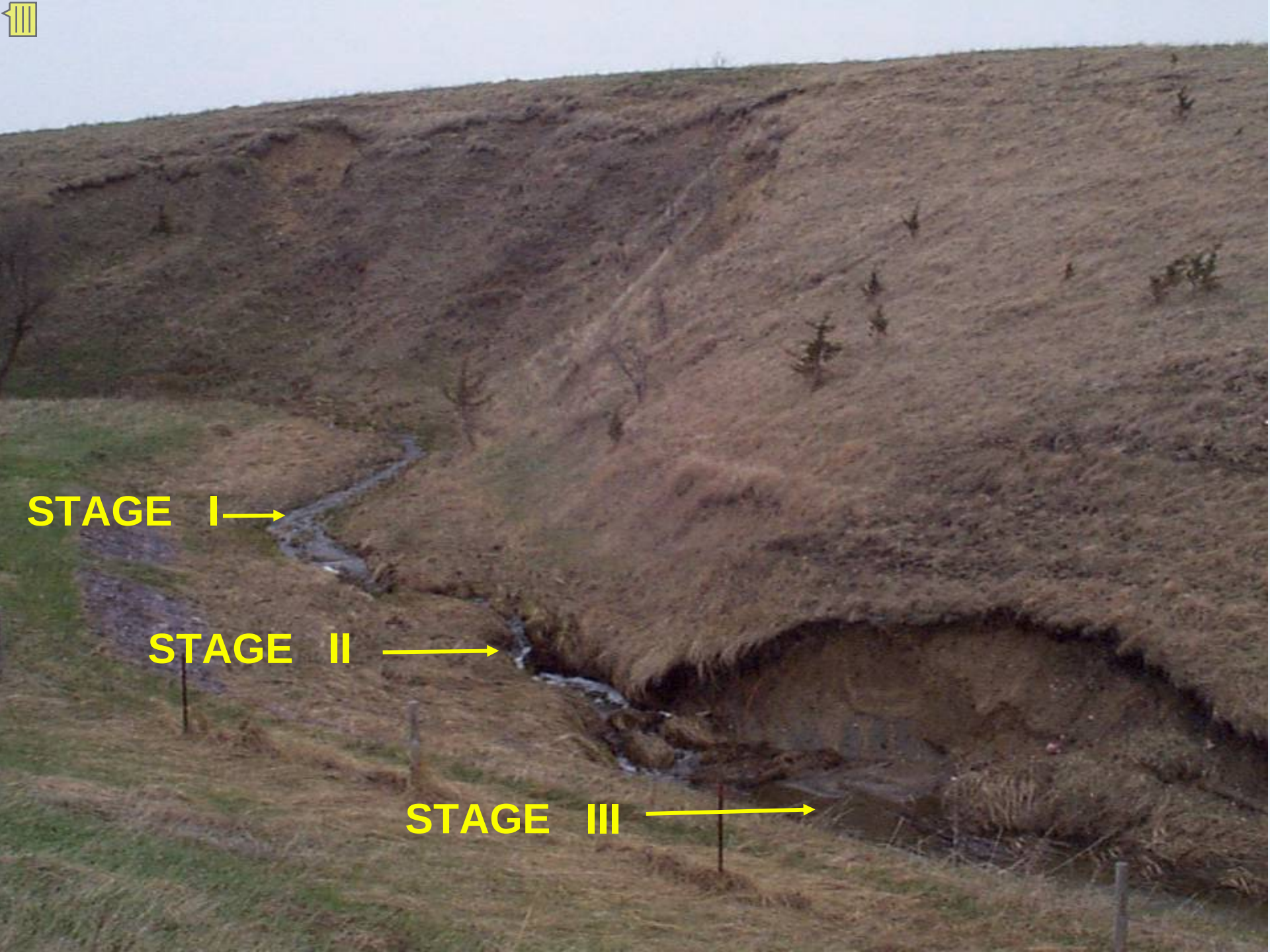
Stage IV Stabilizing



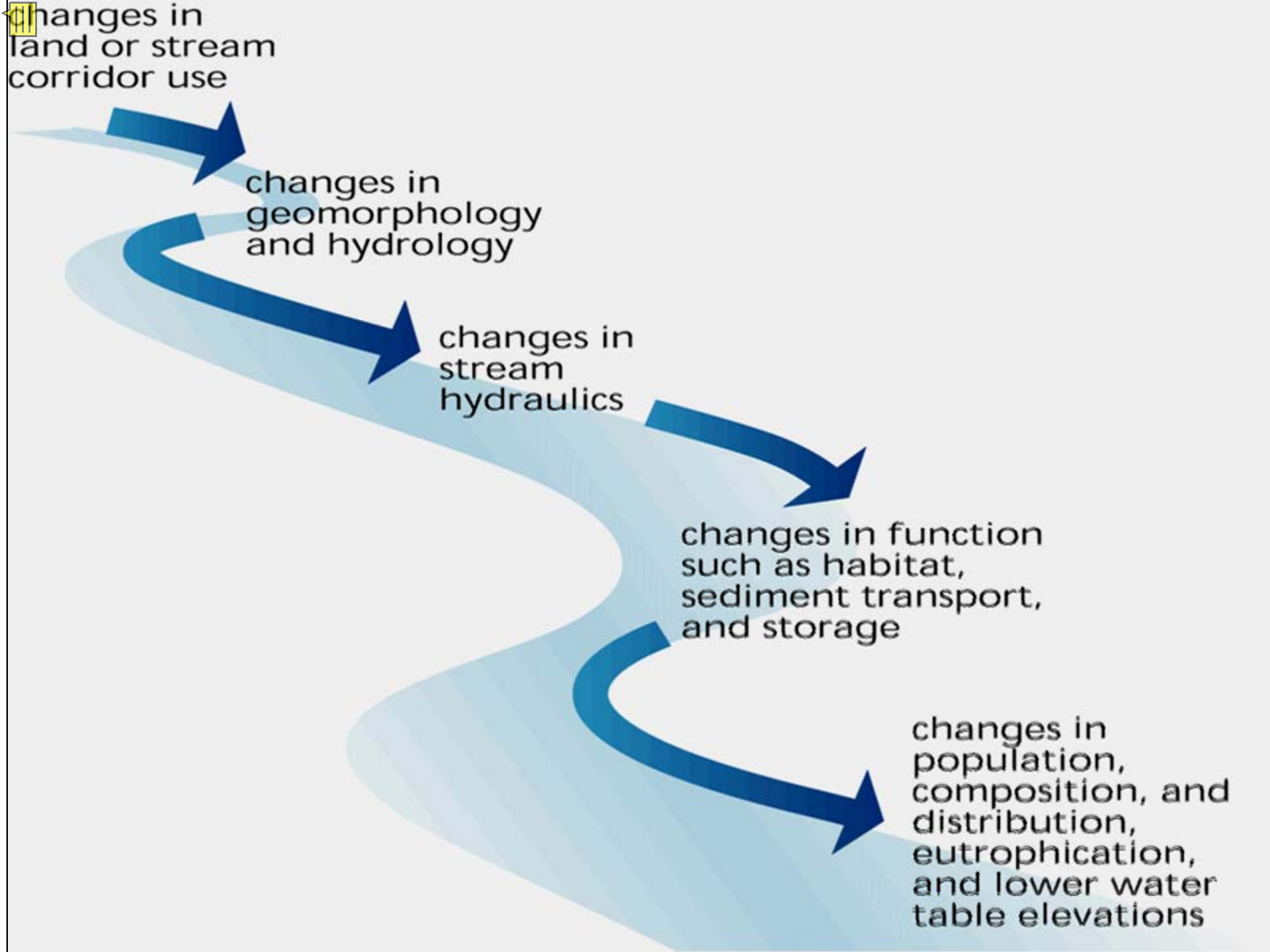
Bank Failure

Stage V Stable




STAGE I
STAGE II
STAGE III

White River, Glen NE


changes in
land or stream
corridor use
changes in
geomorphology
and hydrology
changes in
stream
hydraulics
changes in function
such as habitat,
sediment transport,
and storage
changes in
population,
composition, and
distribution,
eutrophication,
and lower water
table elevations

Little Nemaha River

near Auburn, NE
Circa 1910

2002

Straightened

Shortened

Increased slope

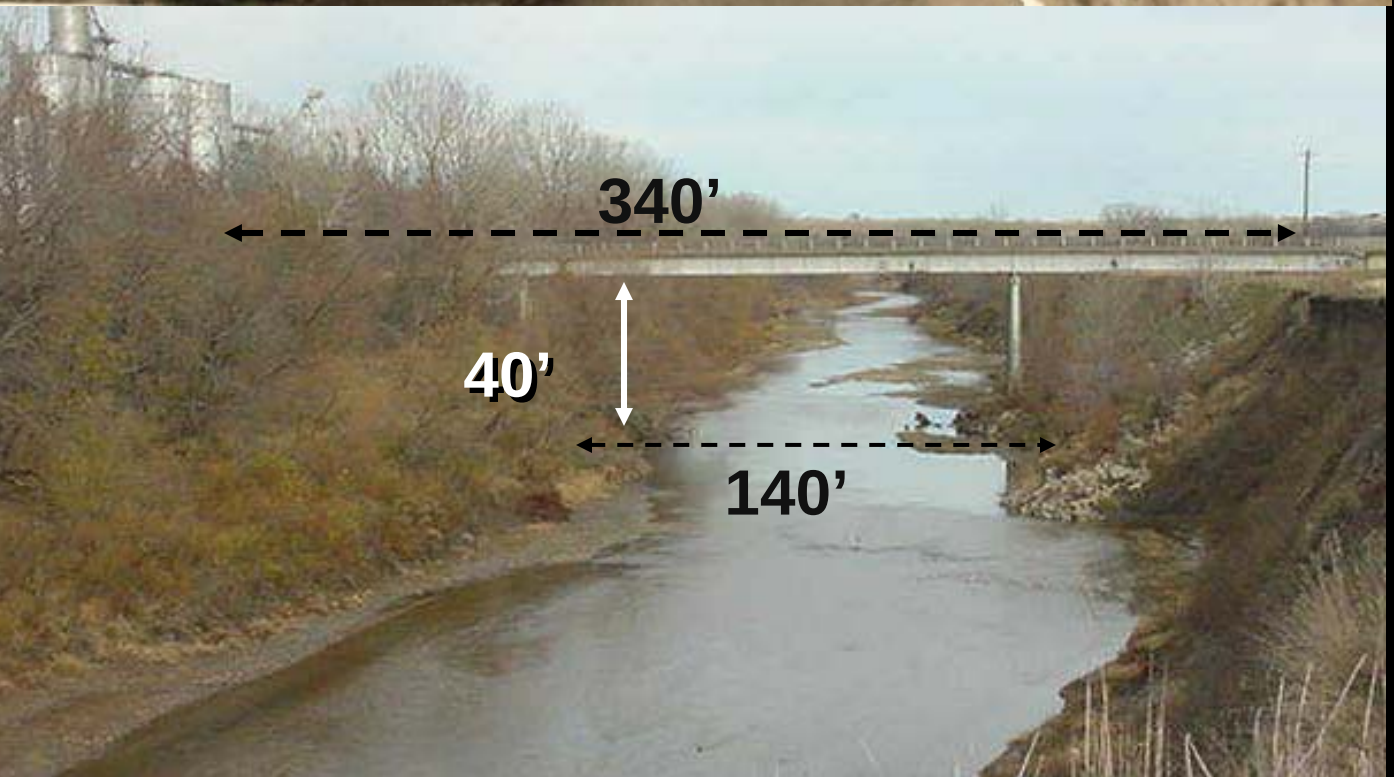
Land use conversion

wetlands to cropland

Increased peak flows

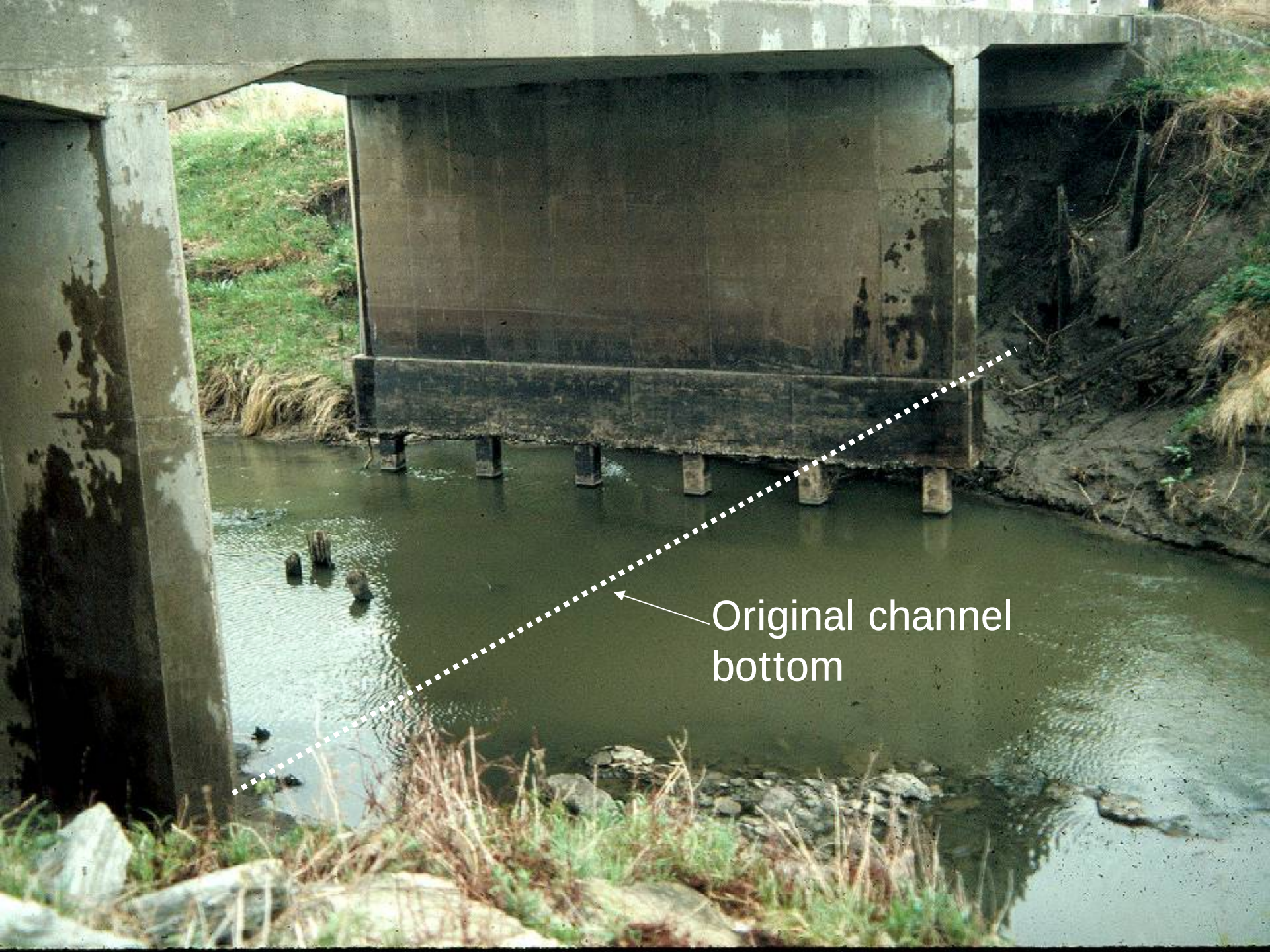
North Fork Big Nemaha River

Humboldt, NE
Circa 1930

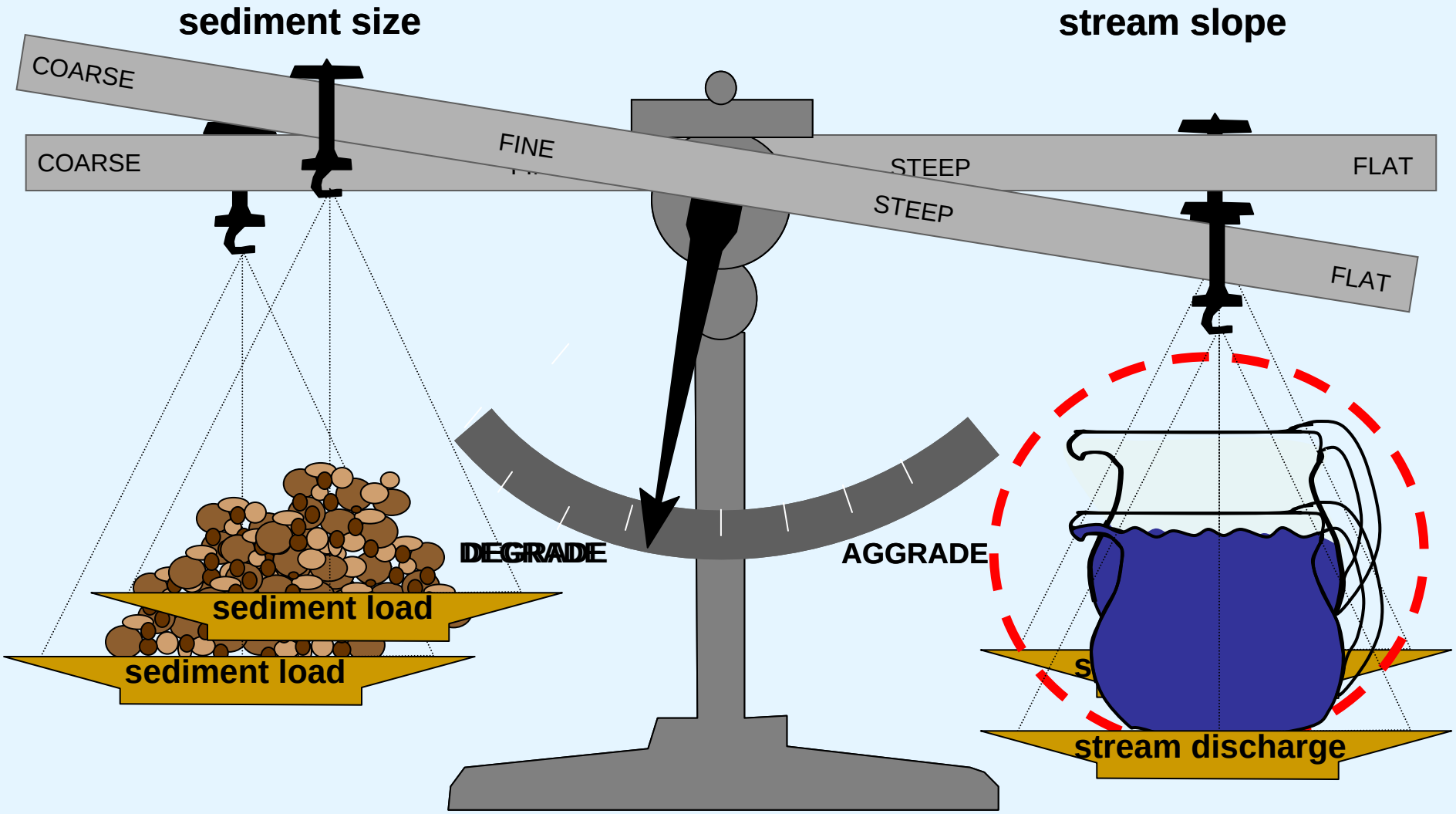


2002

18 ft.


Original channel
bottom

Incised channel

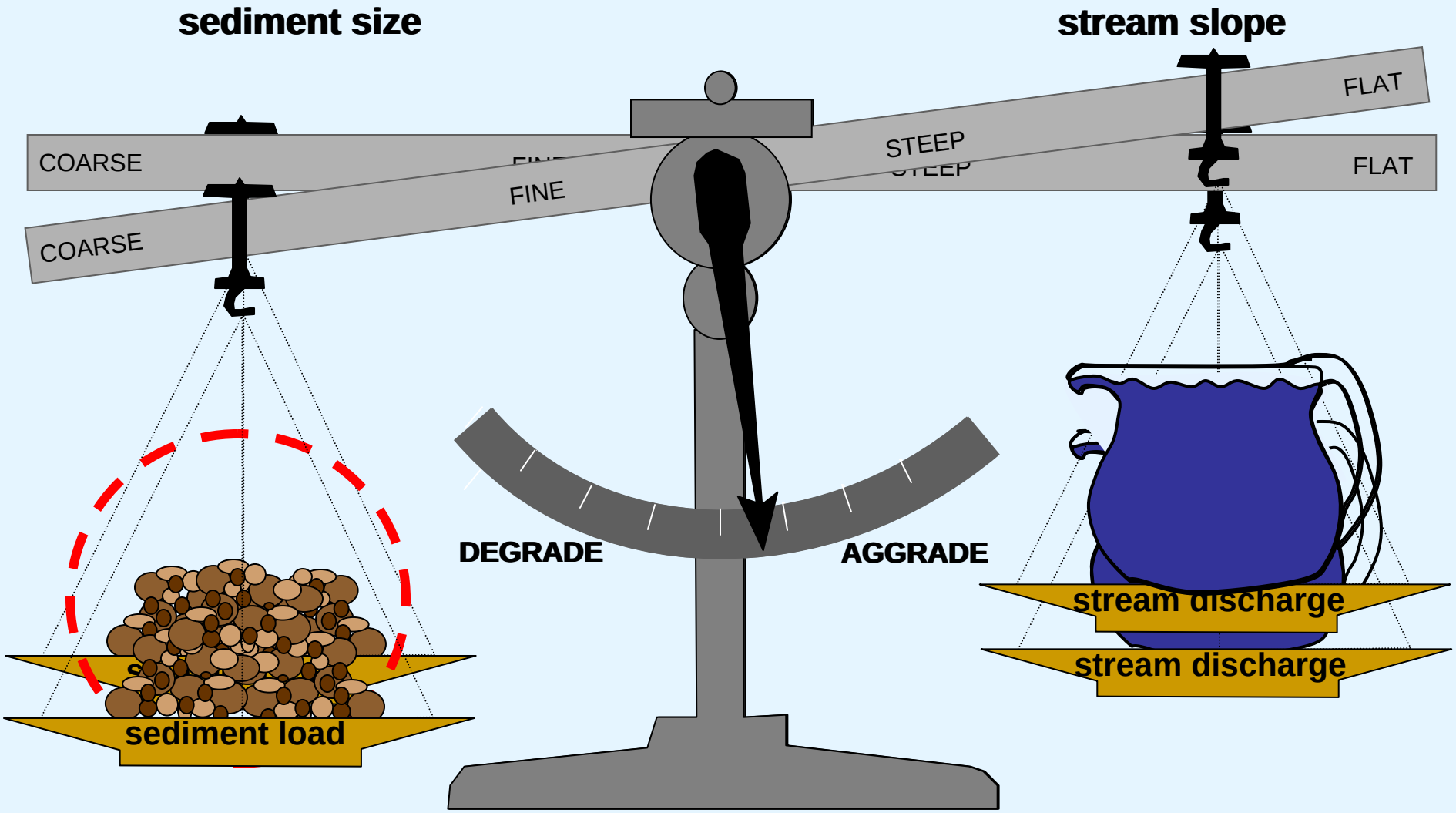

sediment size
stream slope
COARSE
FINE
COARSE
STEEP
FLAT
STEEP
FLAT
DEGRADE
AGGRADE
sediment load
sediment load
stream discharge

Affect of increased runoff from urbanizing watershed

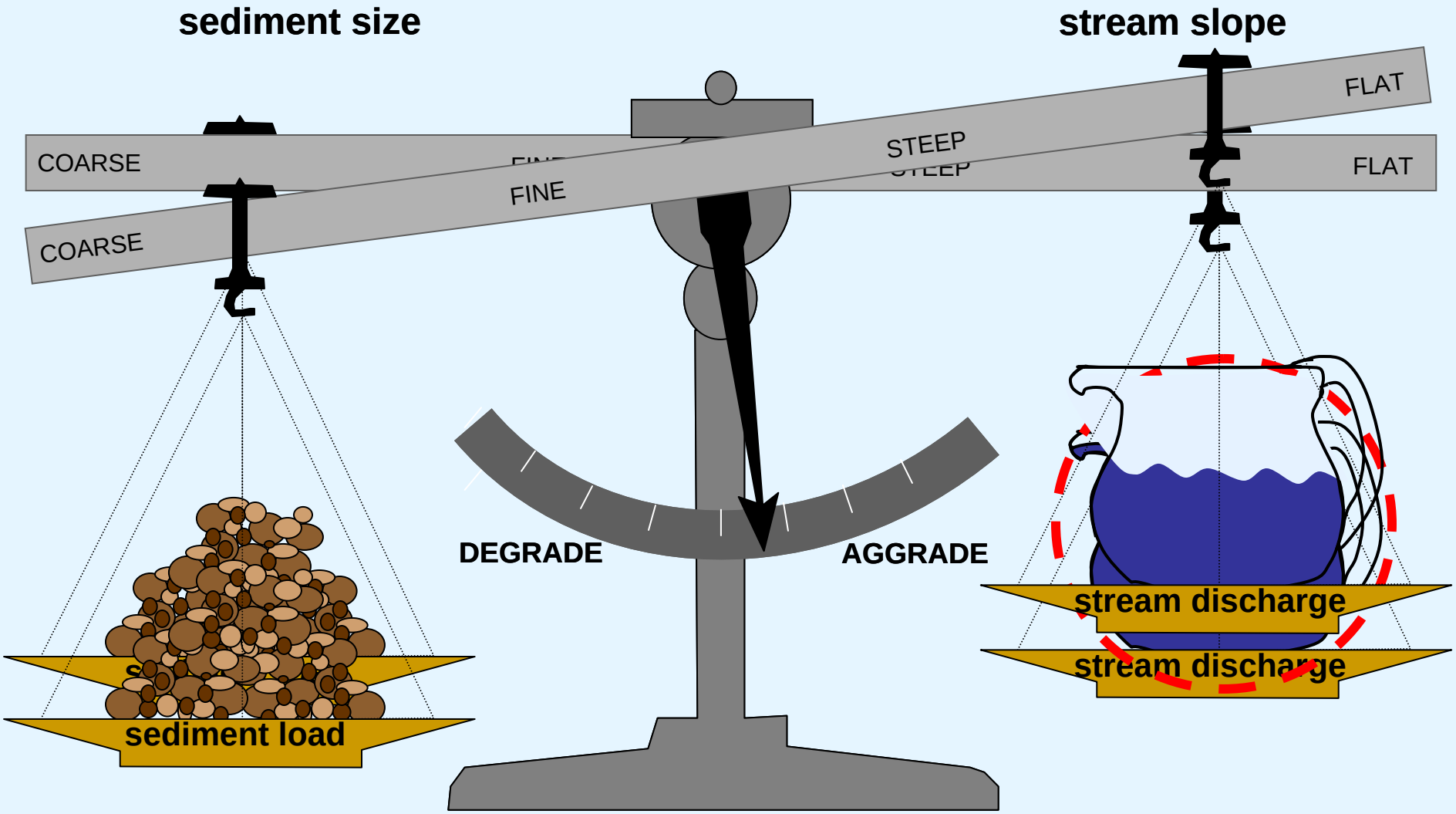
Affect of channel straightening

South Table Creek, Otoe Co., Nebraska

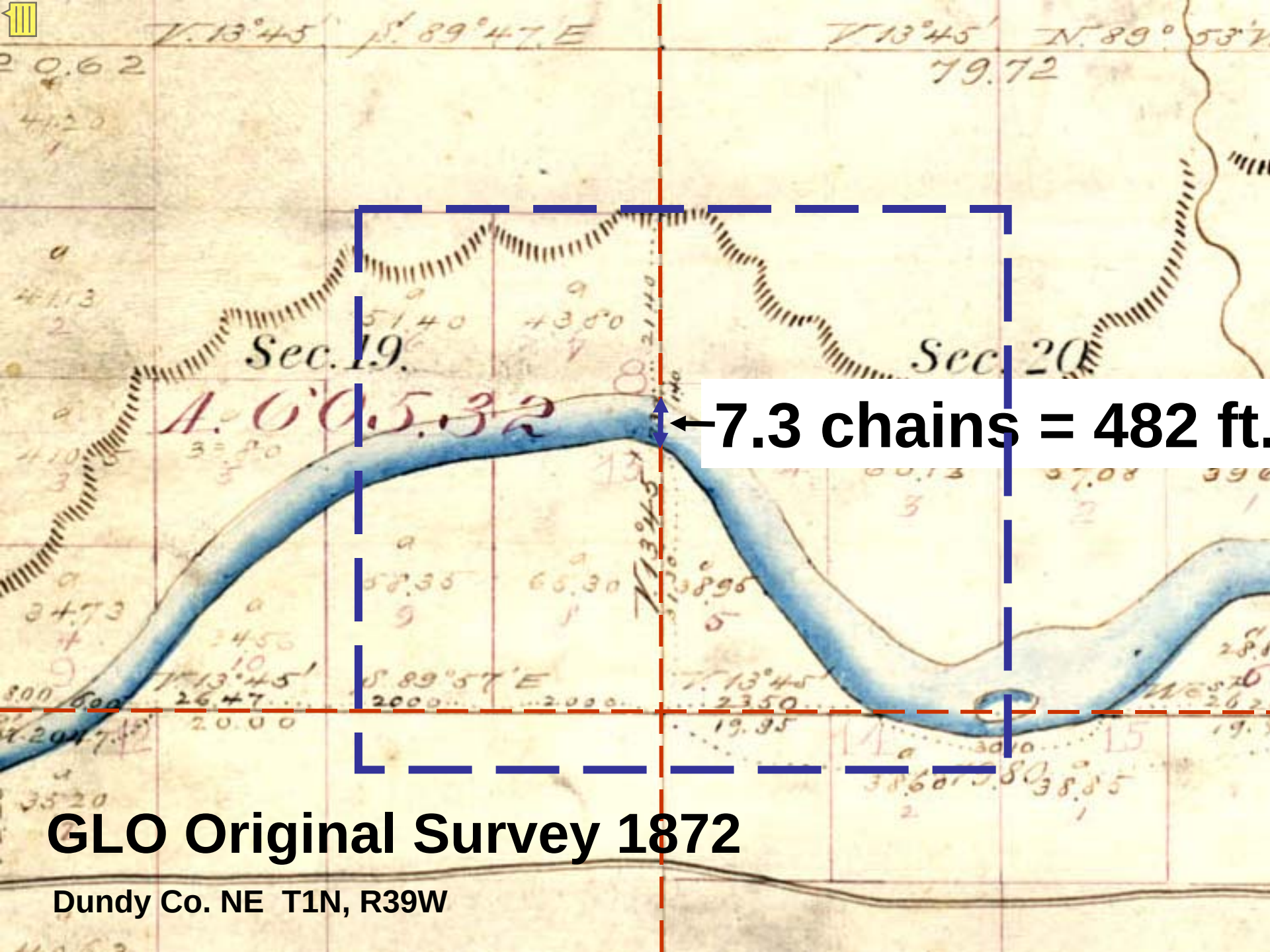
Birdwood Creek,
McPherson Co. NE

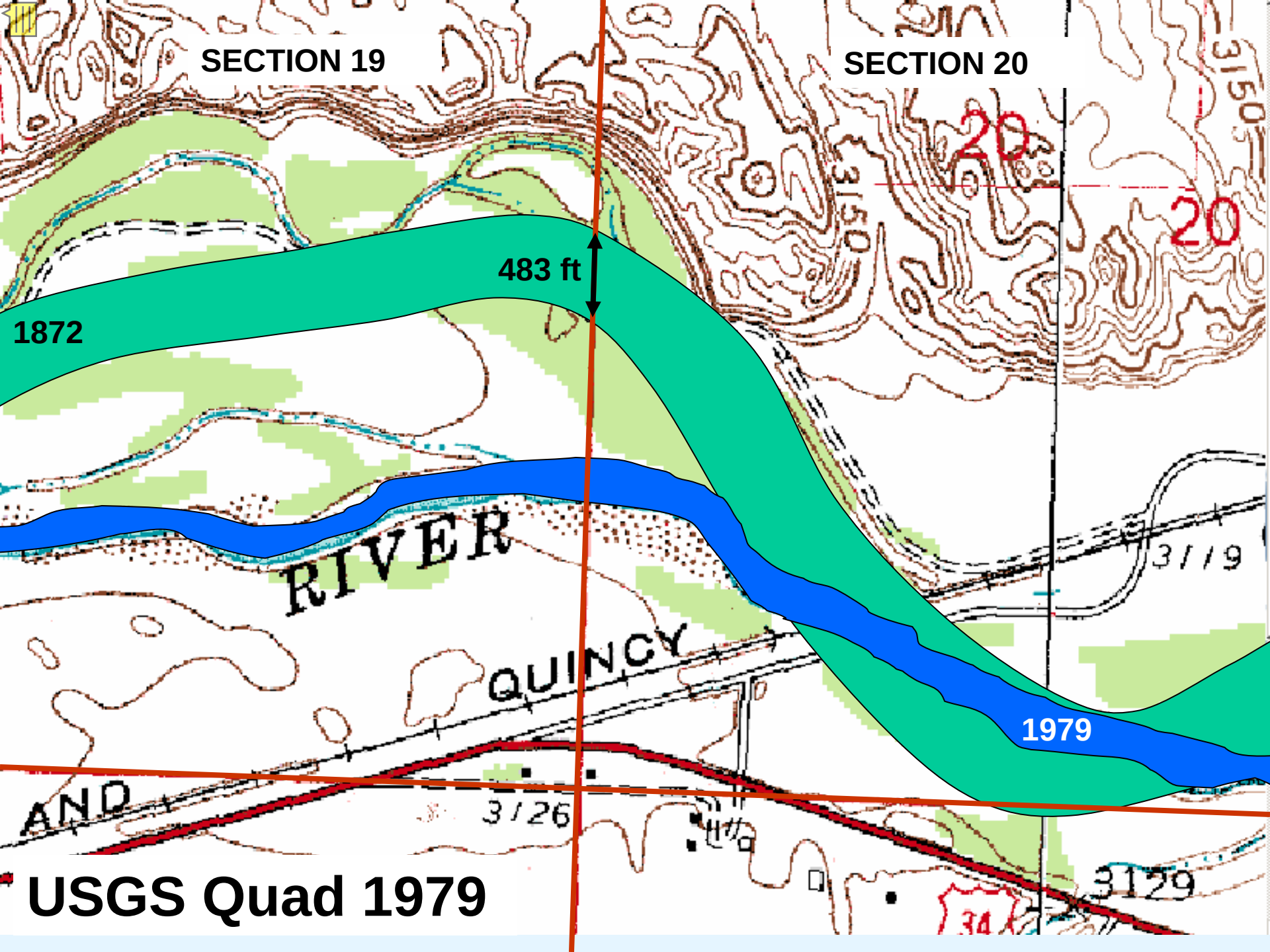

sediment size
stream slope
COARSE
COARSE
FINE
STEEP
FLAT
FLAT
DEGRADE
AGGRADE
sediment load
stream discharge
stream discharge

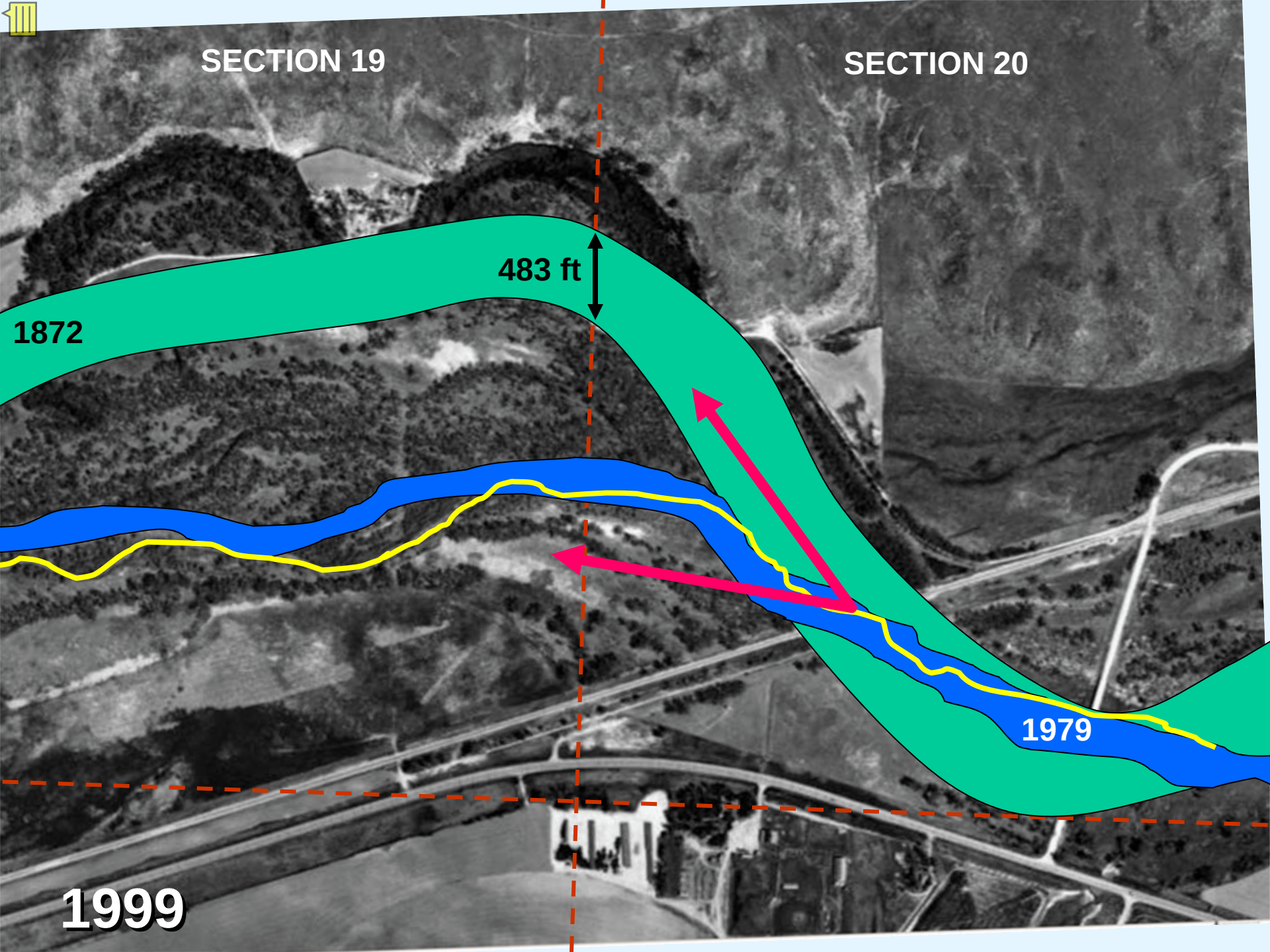
Post Settlement
Alluvium (PSA)
Billings Creek, Viroqua, WI


sediment size
stream slope
COARSE
COARSE
FINE
STEEP
FLAT
FLAT
DEGRADE
AGGRADE
sediment load
stream discharge
stream discharge

385
Dundy Co.
385
Wray
34
61
Benkelman
Parks
NEBRASKA
34
34
KANSAS
Vernon
COLORADO
27
385


Sec. 19.
Sec. 20
A. 605.32
←7.3 chains = 482 ft.
GLO Original Survey 1872
Dundy Co. NE T1N, R39W

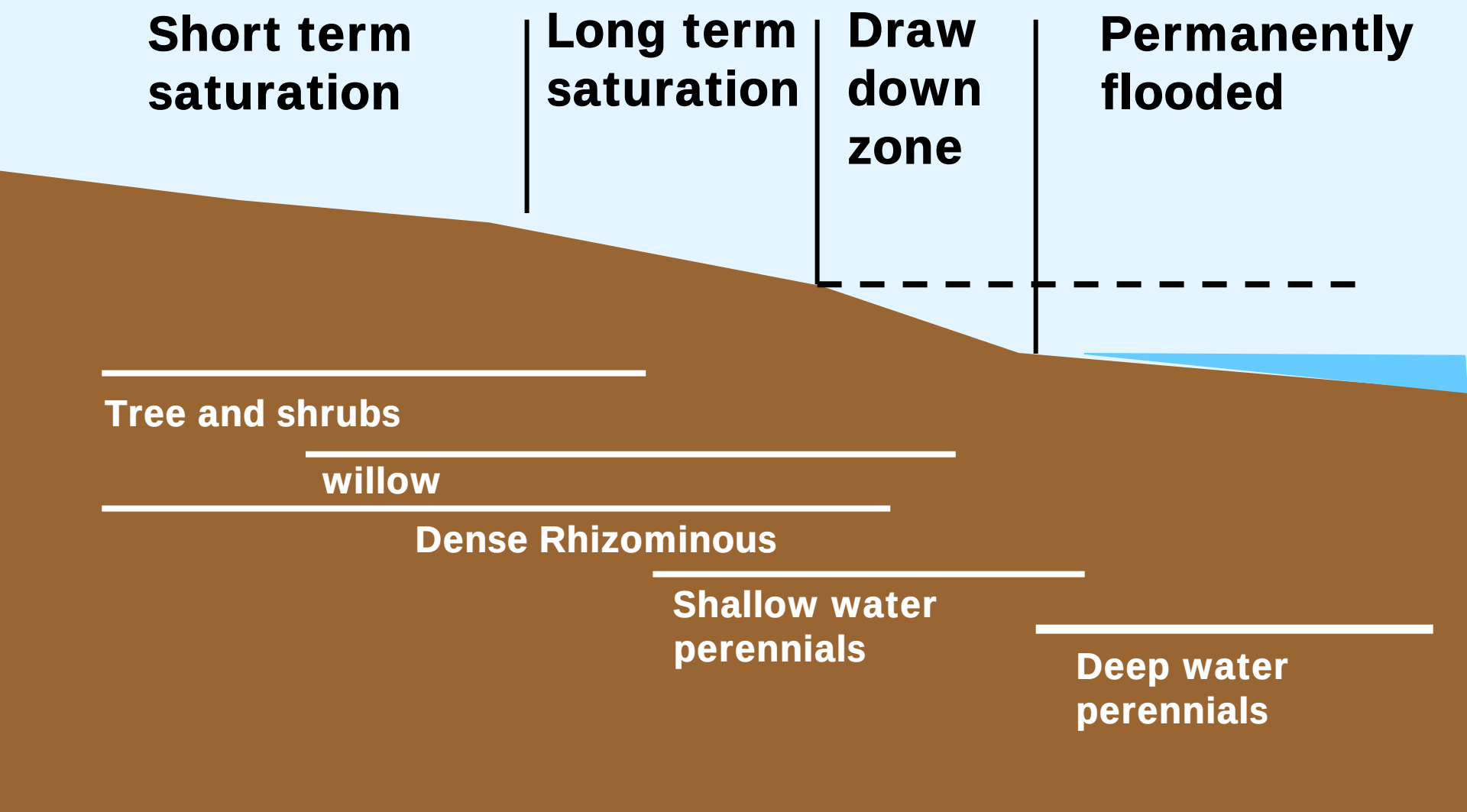

SECTION 19
SECTION 20
483 ft
1872
1979
RIVER
QUINCY
AND
3150
3119
3126
3129
20
20
USGS Quad 1979


SECTION 19
SECTION 20
483 ft
1872
1979
1999

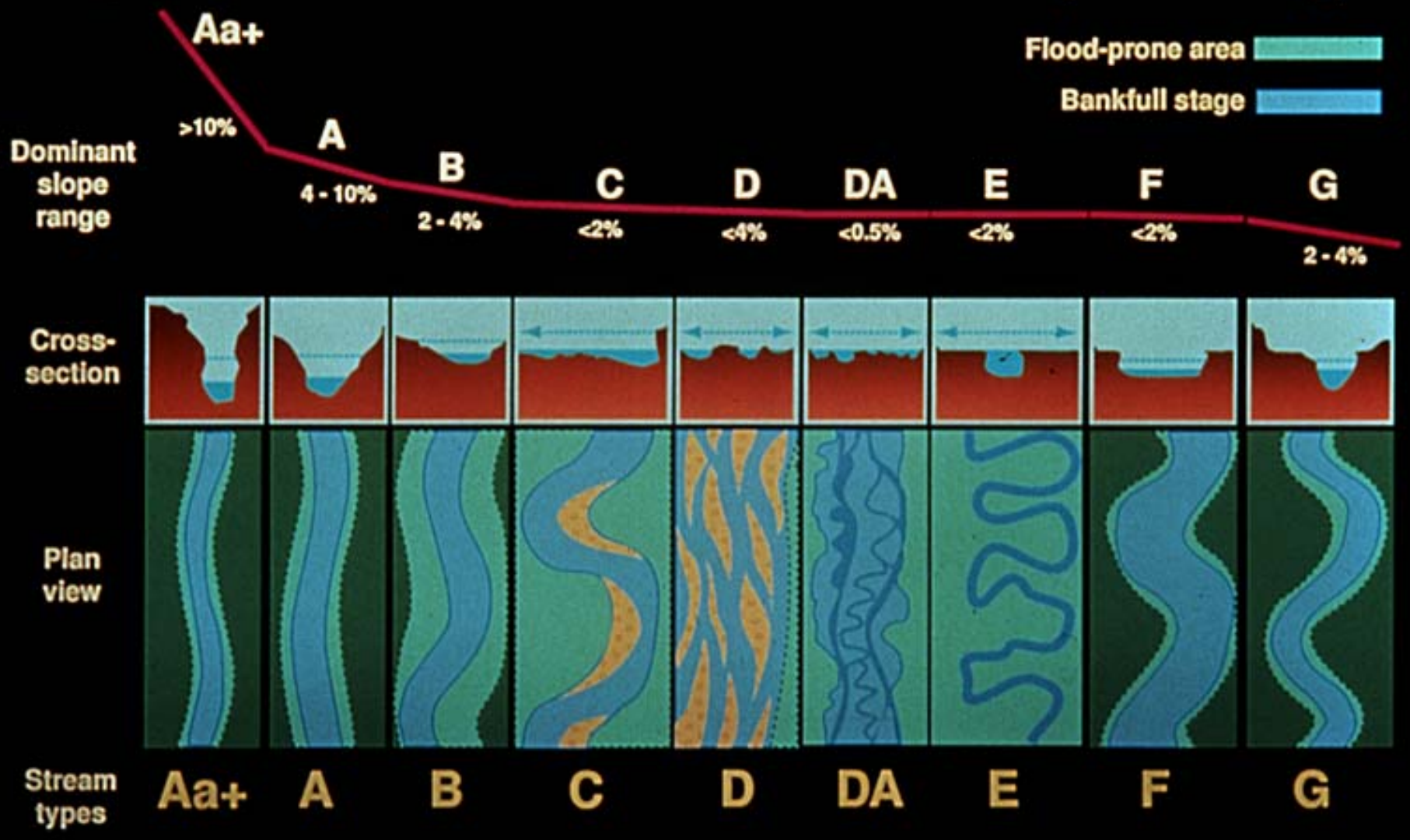
1951

1993

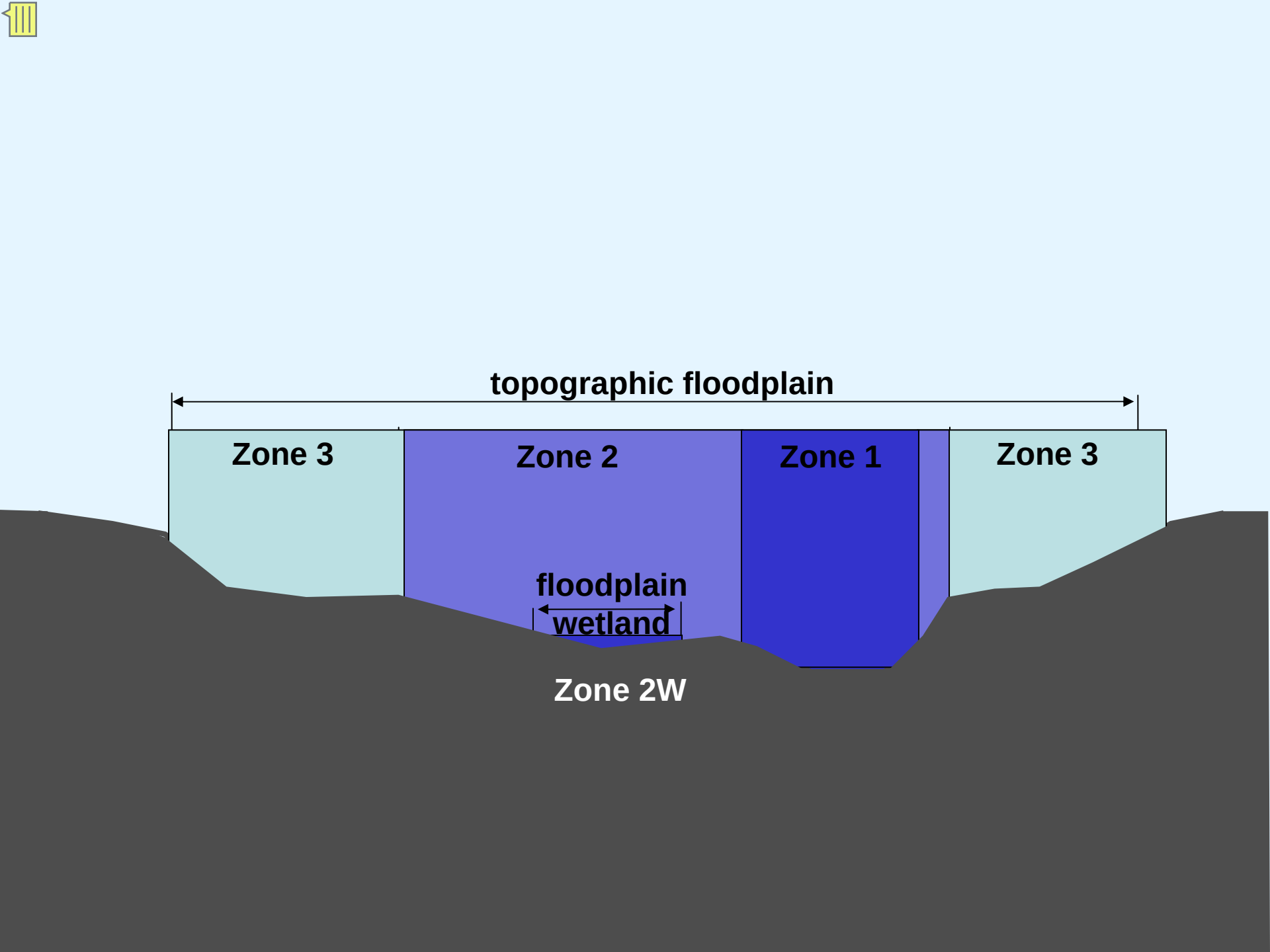
Plant Zones

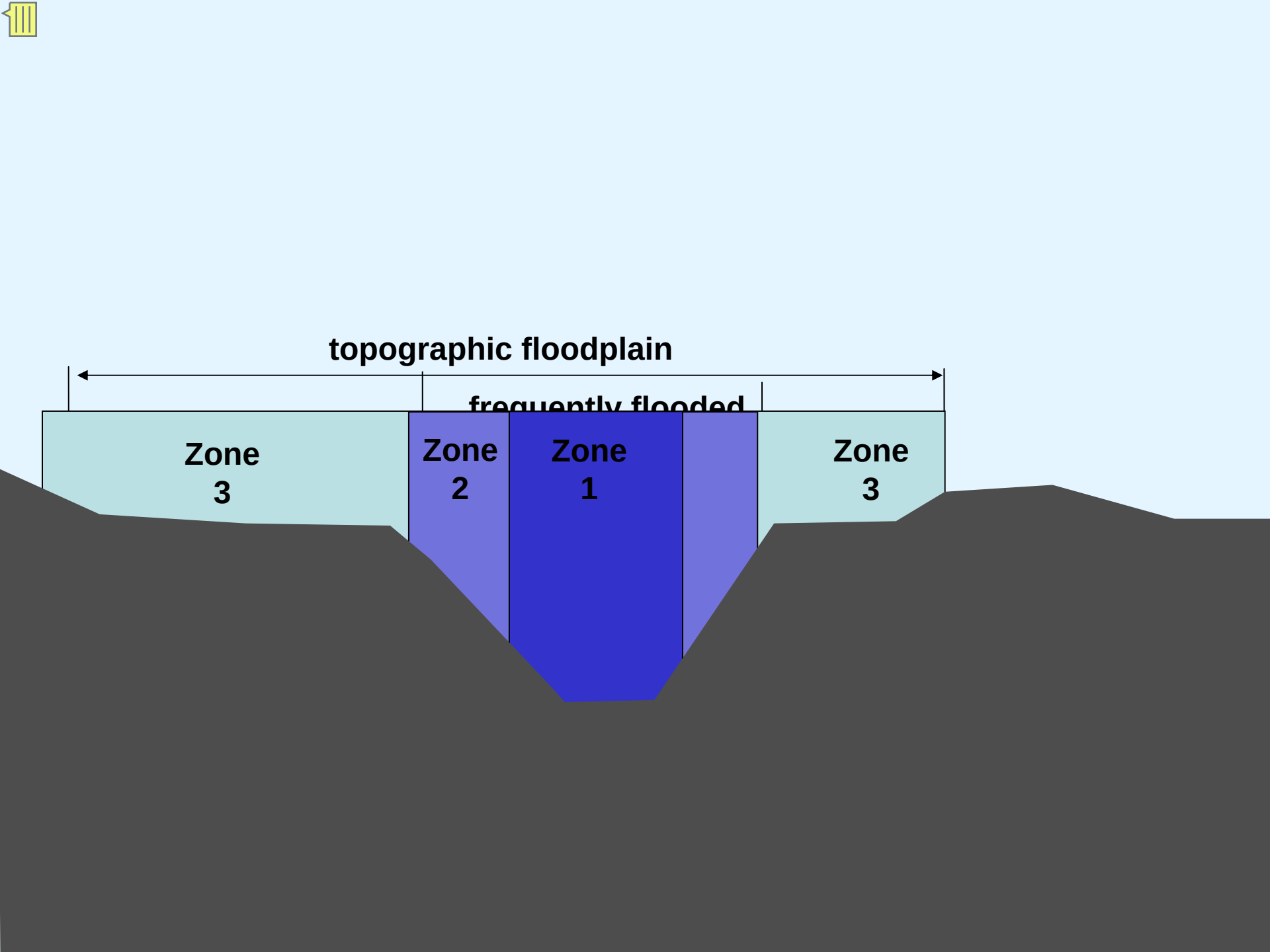

Short term saturation
Long term saturation
Draw down zone
Permanently flooded
Tree and shrubs
willow
Dense Rhizominous
Shallow water perennials
Deep water perennials

Longitudinal, Cross-sectional and Plan Views of Major Stream Types

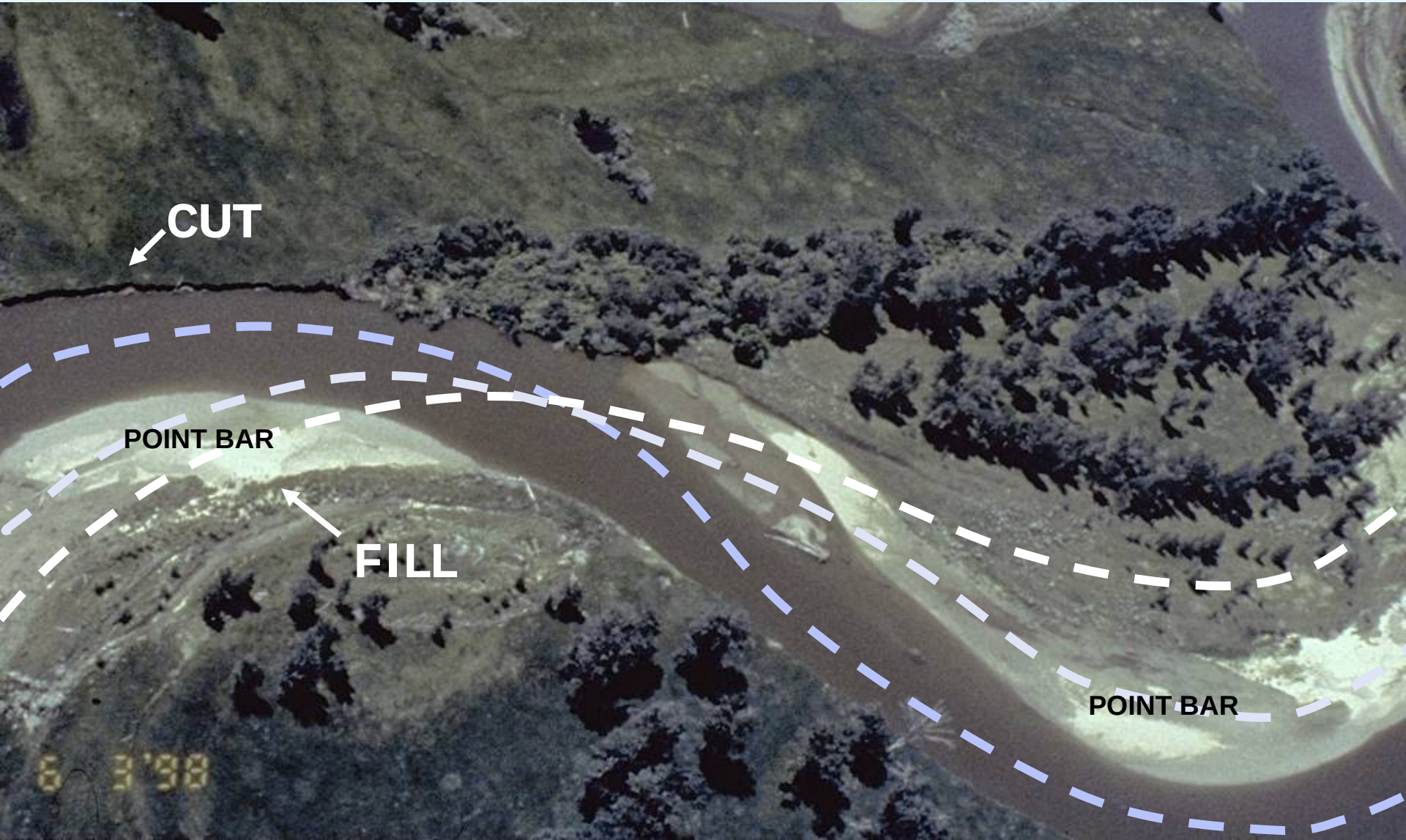


D.L. Rosgen / Catena 22 (1994) 169-199

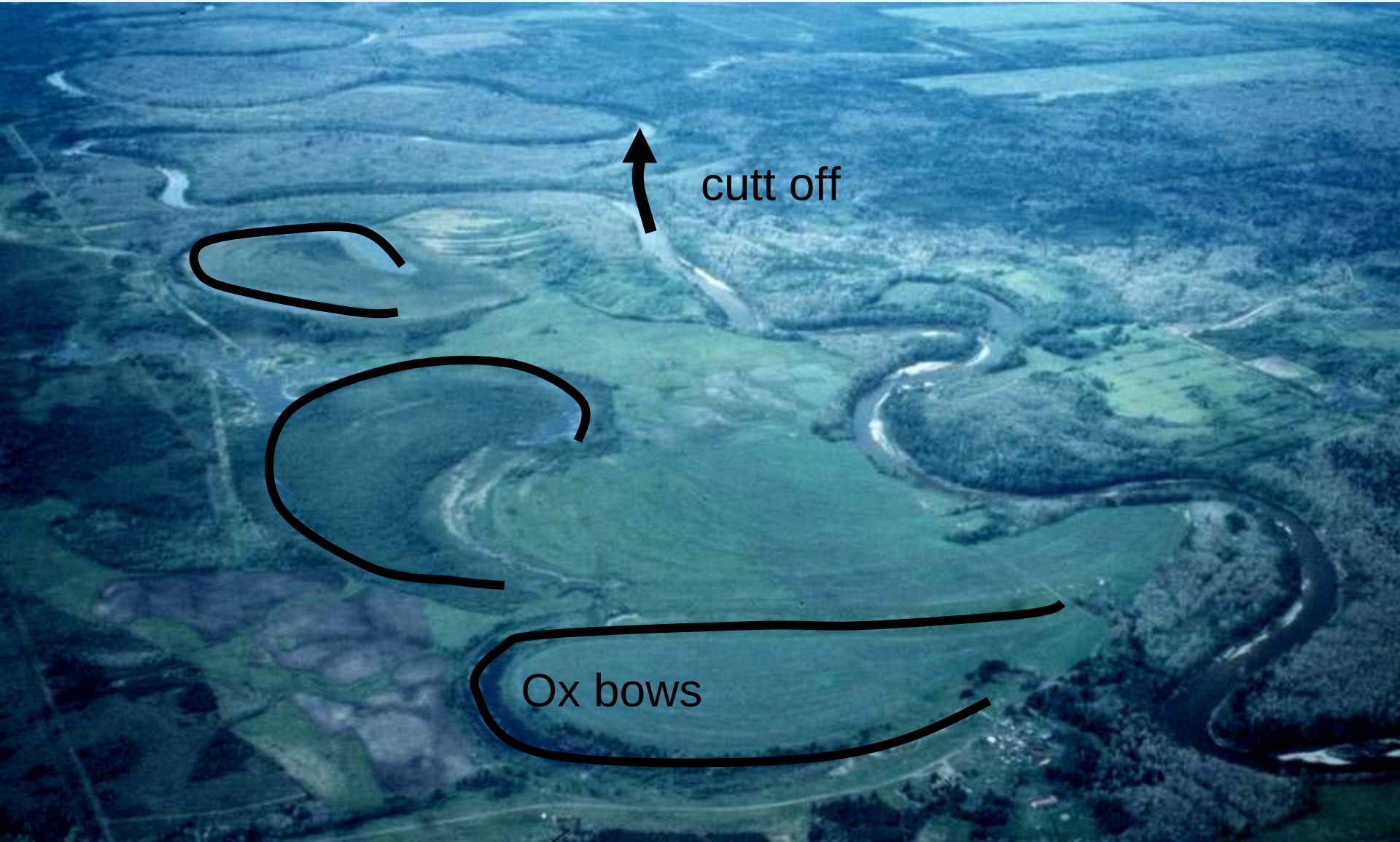

topographic floodplain
Zone 3
Zone 2
Zone 1
Zone 3
floodplain
wetland
Zone 2W

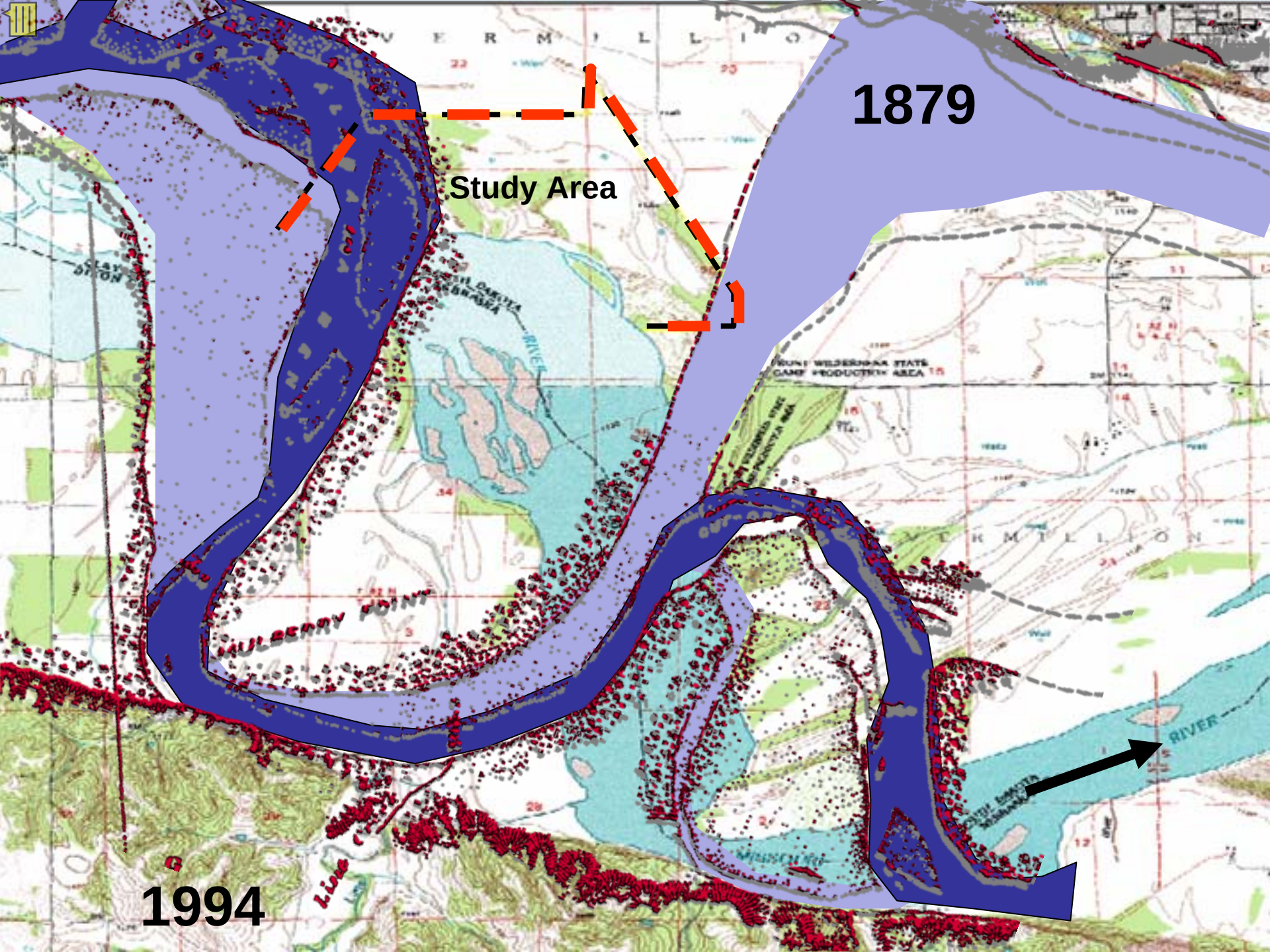

topographic floodplain
frequently flooded
Zone 3
Zone 2
Zone 1
Zone 3

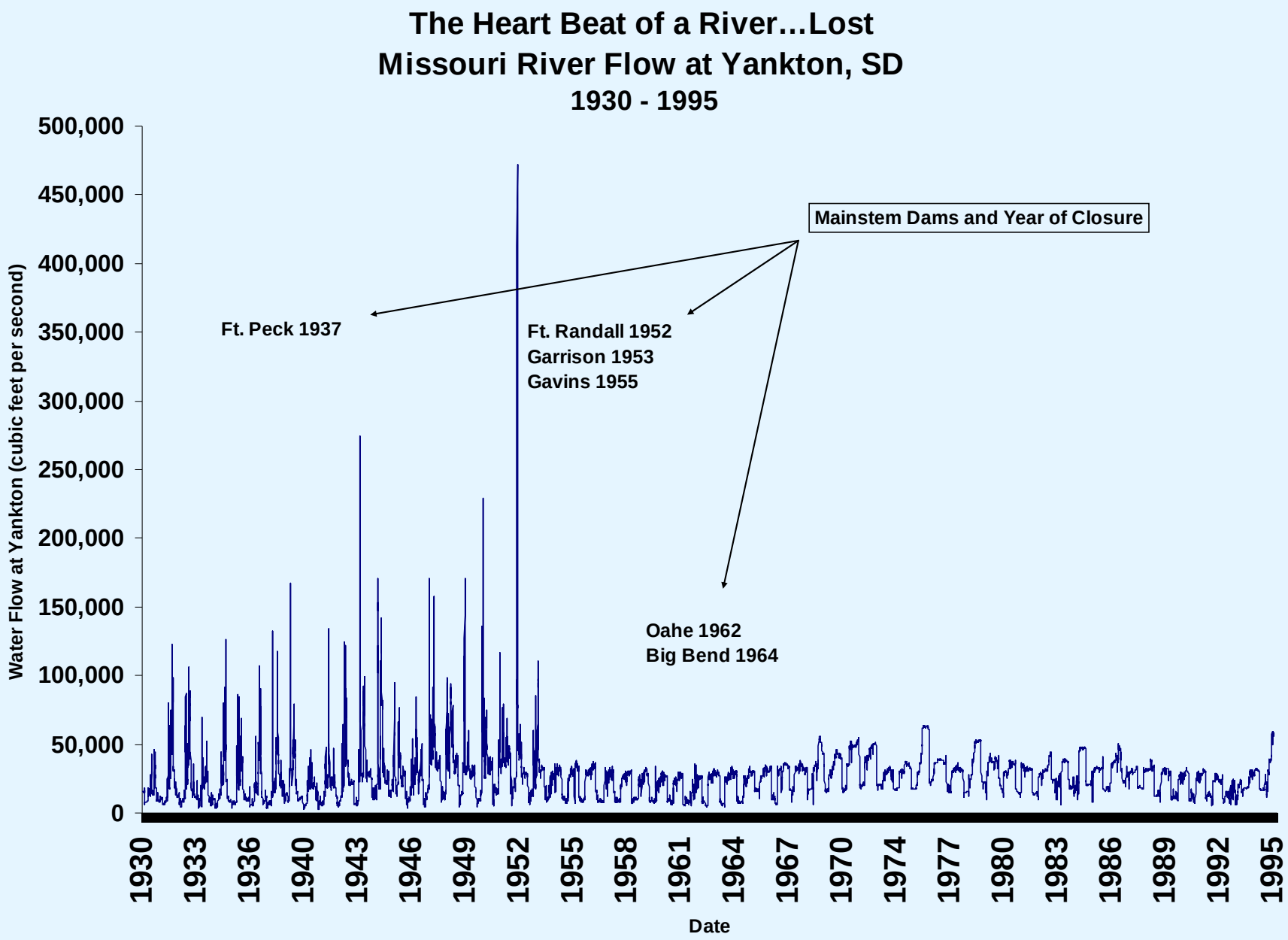
Lateral adjustments



Lateral adjustments

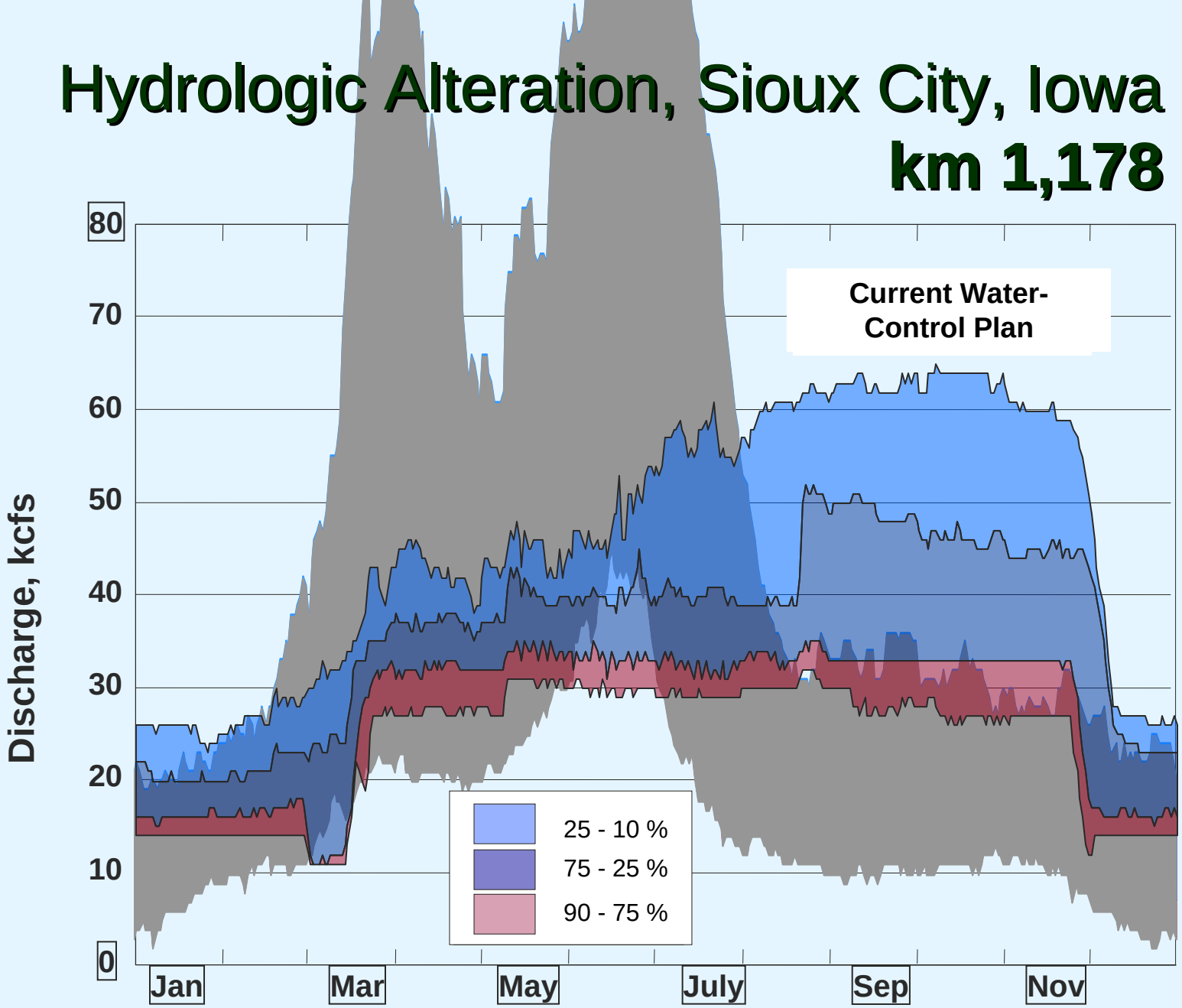



1879
Study Area
1994
MULBERRY POINT
RIVER
RIVER



Slide courtesy of Wayne Nelson-Stastny, USFWS

Hydrologic Alteration, Sioux City, Iowa
km 1,178



USGS

Slide courtesy of Wayne Nelson-Stastny, USFWS

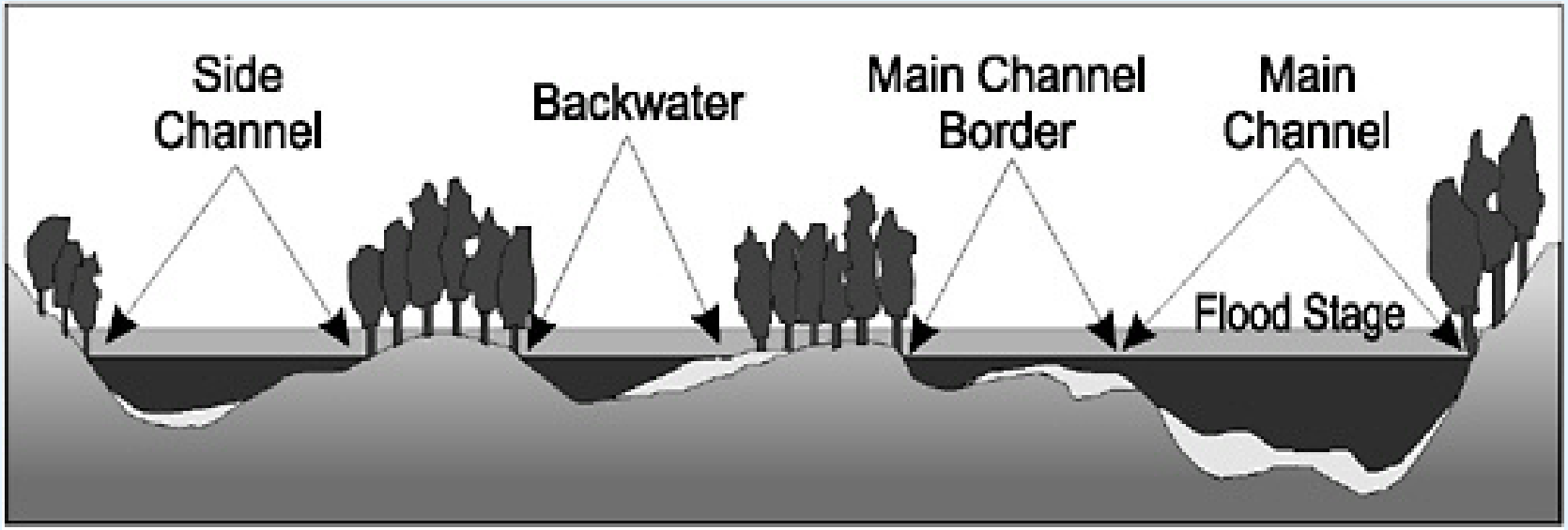
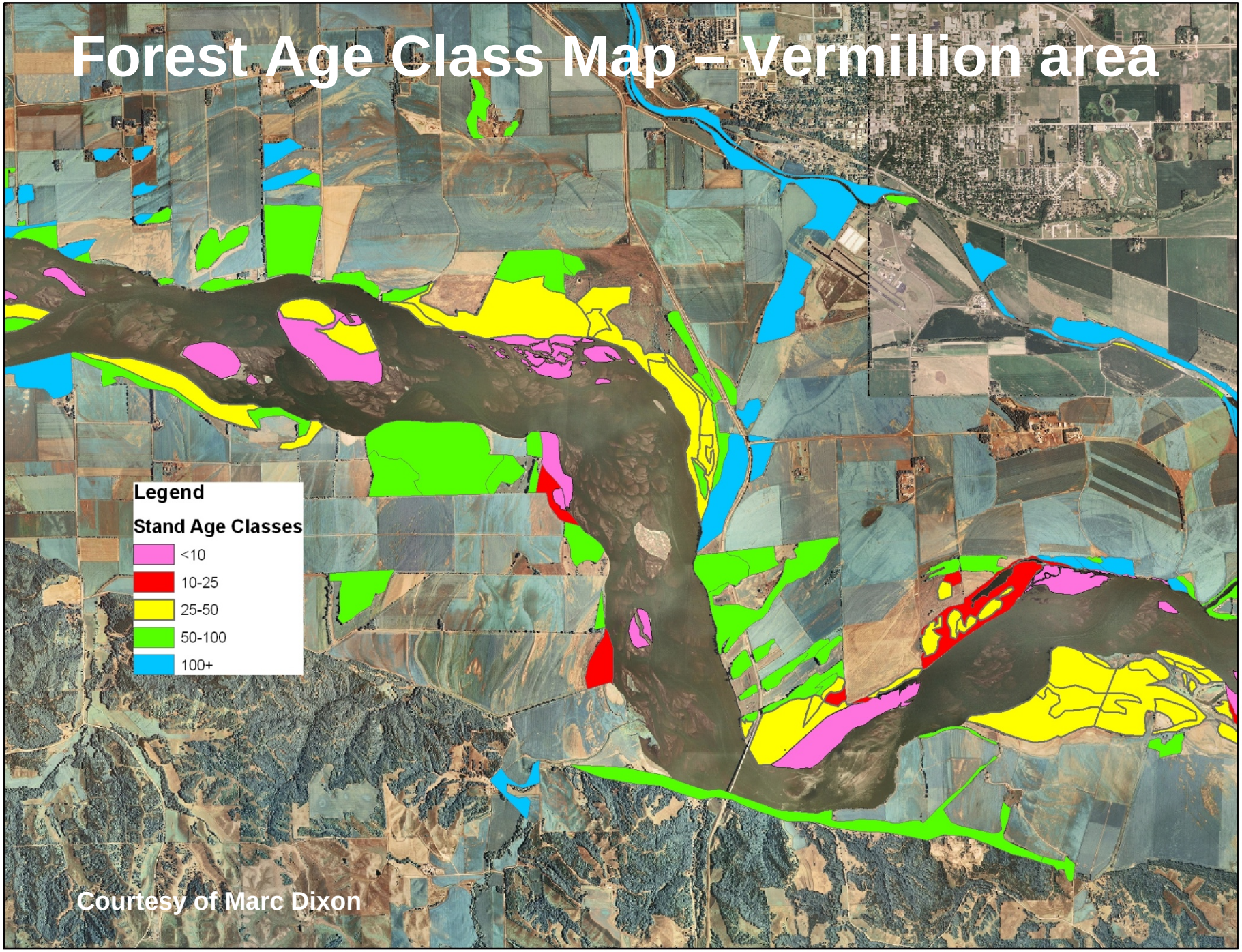
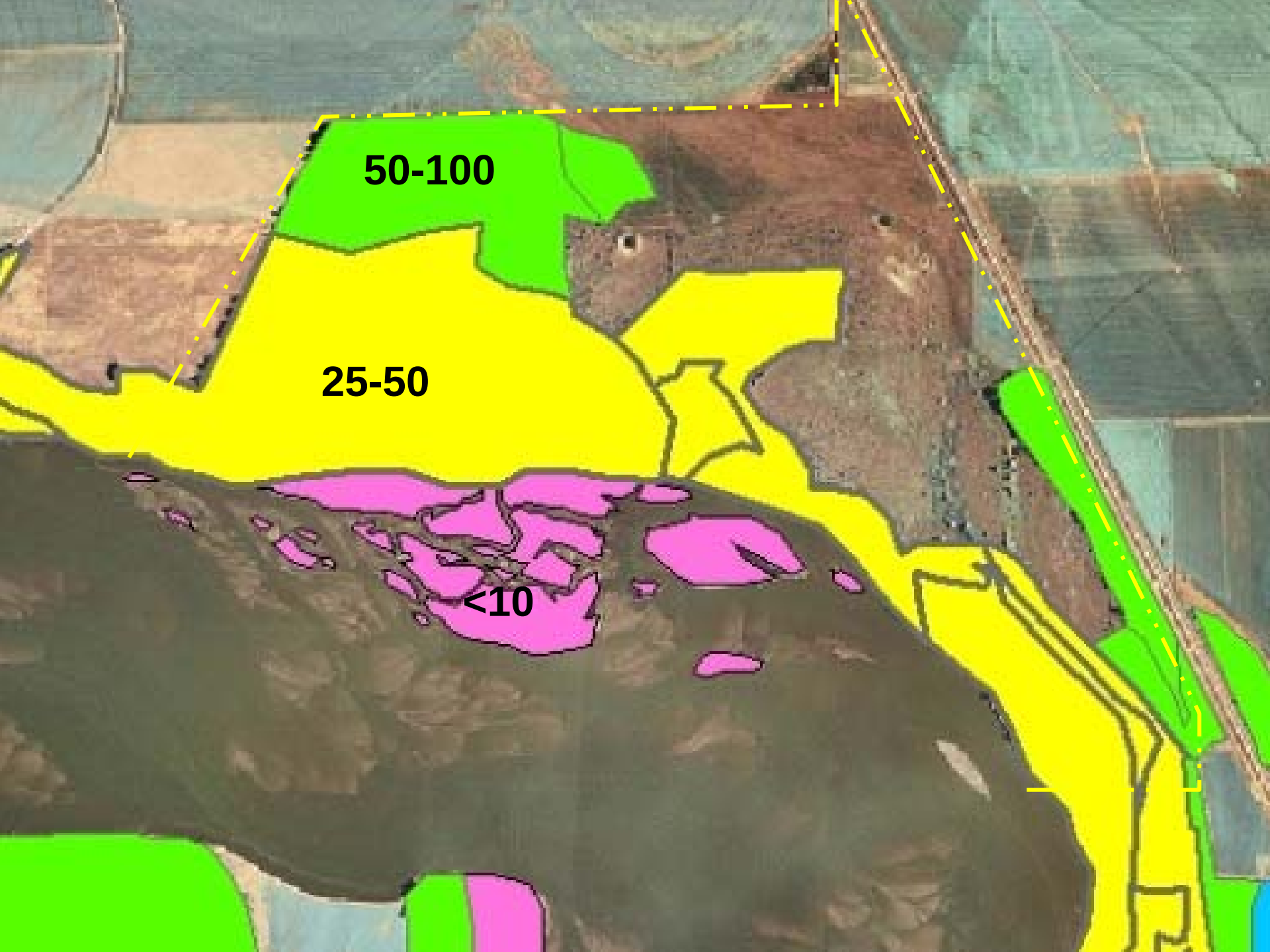


FIGURE 3.1 Typical cross-section of the pre-regulation Missouri River.
SOURCE: Rasmussen, 1999.

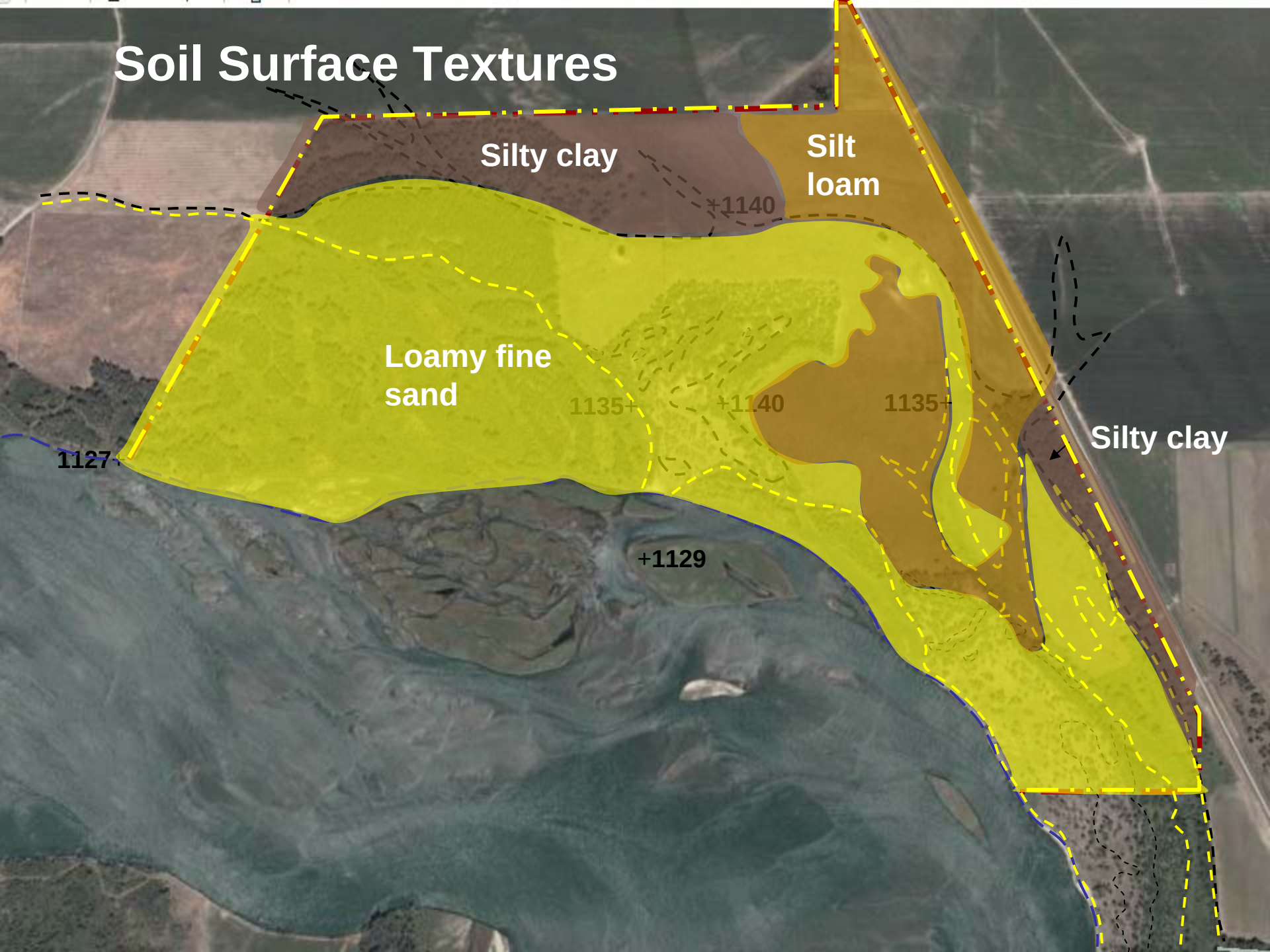
Forest Age Class Map – Vermillion area

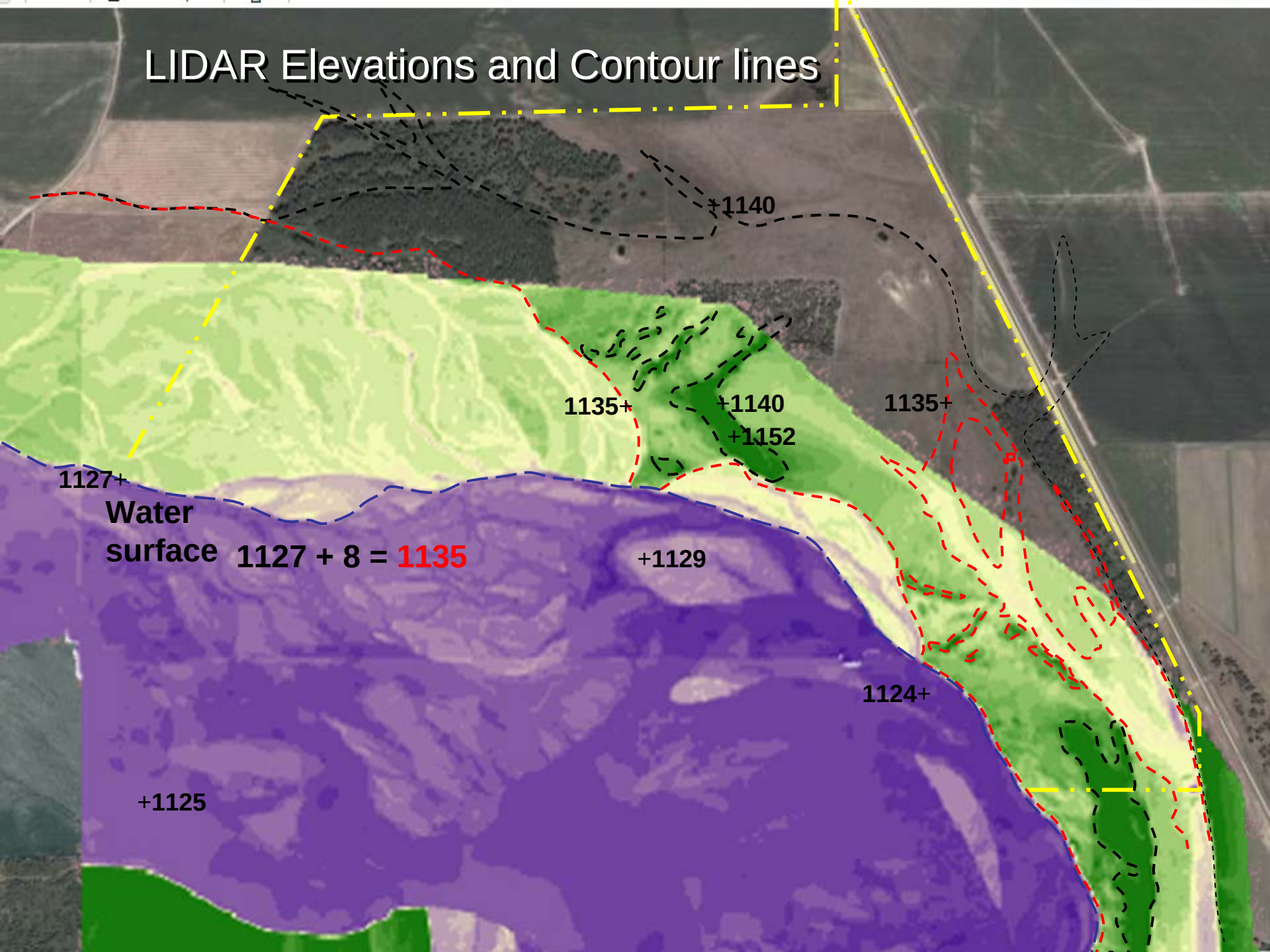


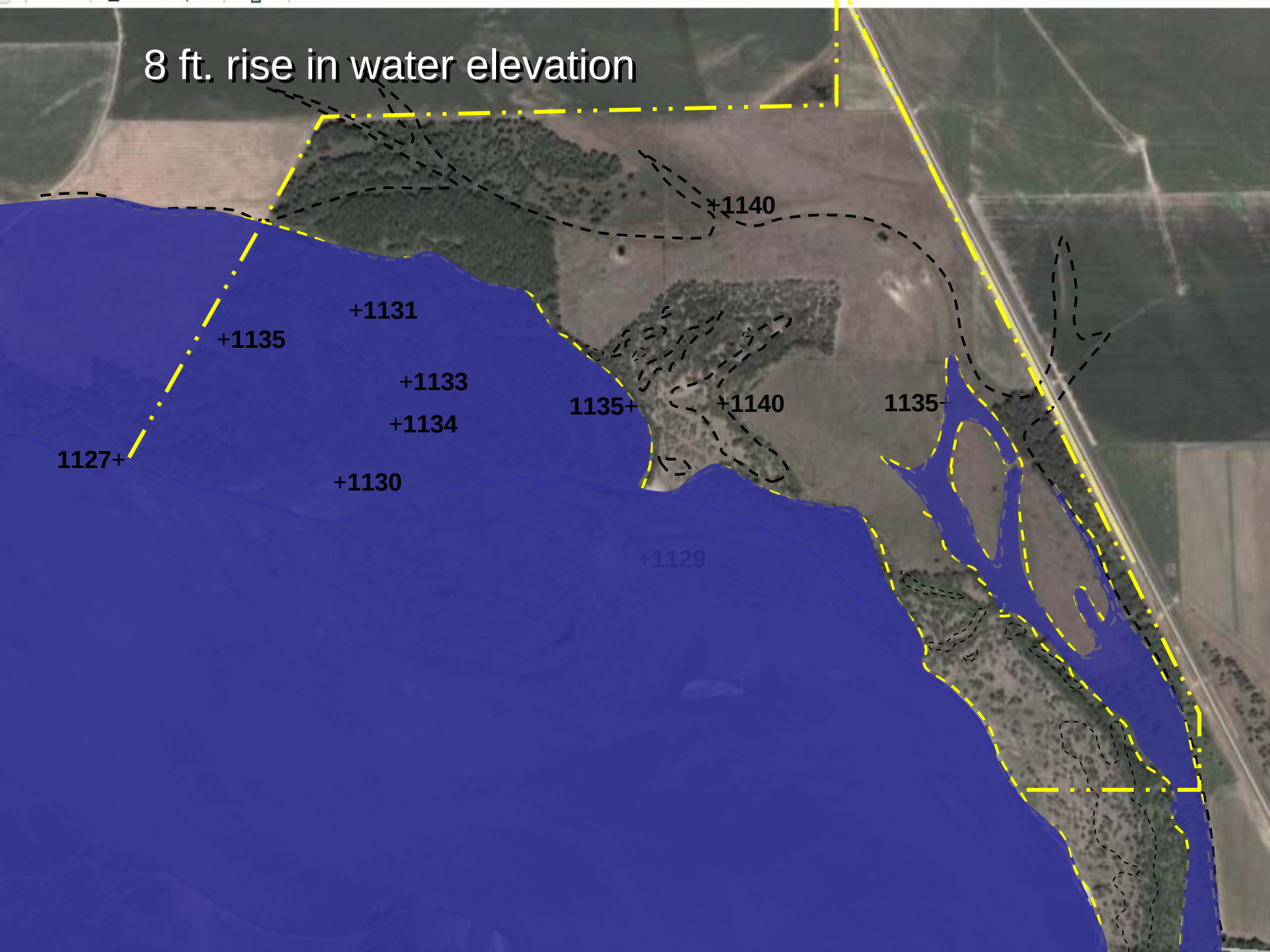
Courtesy of Marc Dixon


50-100
25-50
<10

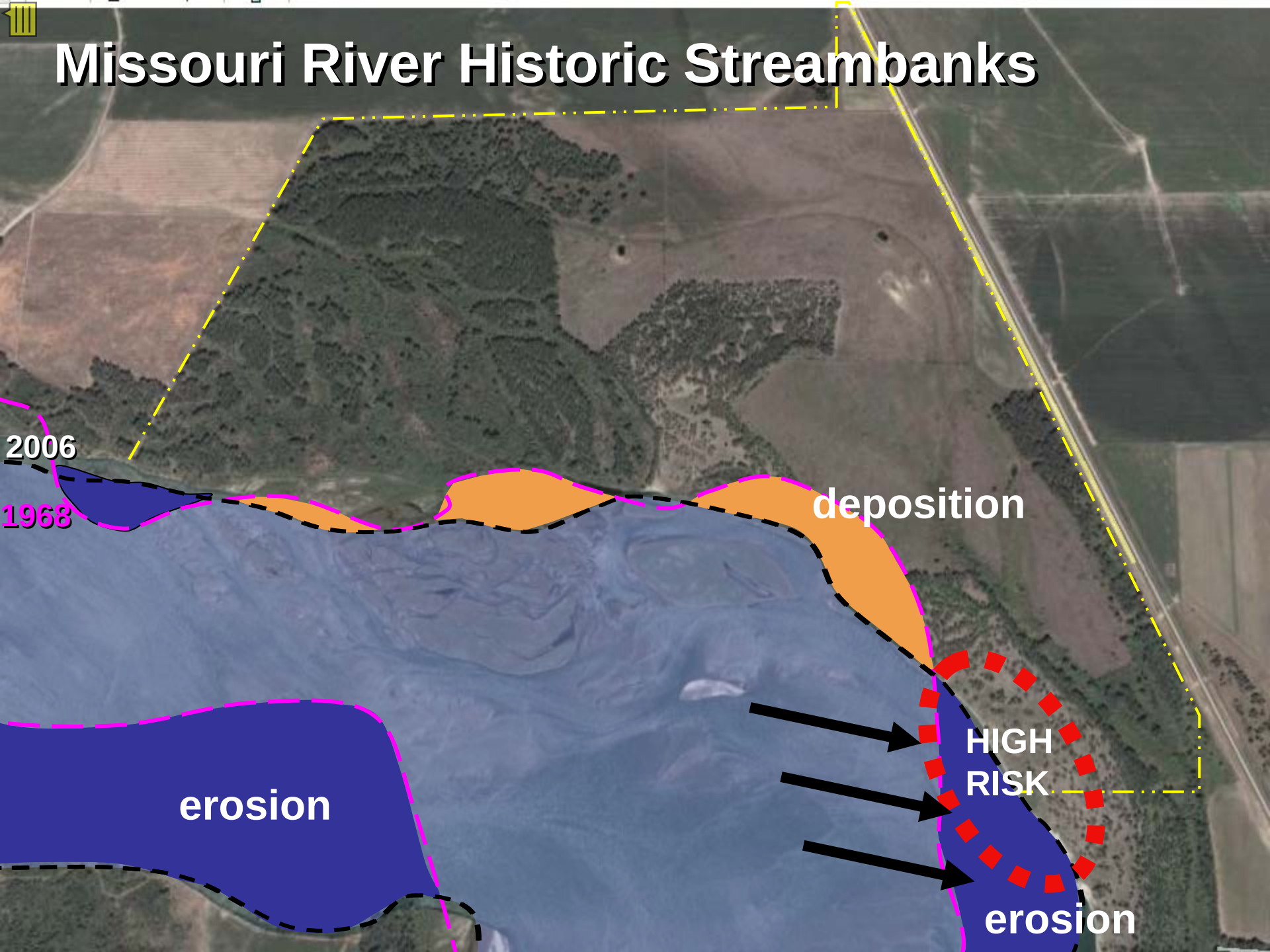
Soil Surface Textures




LIDAR Elevations and Contour lines
+1140
1135+
+1140
+1152
1135+
1127+
Water
surface
1127 + 8 = 1135
+1129
1124+
+1125

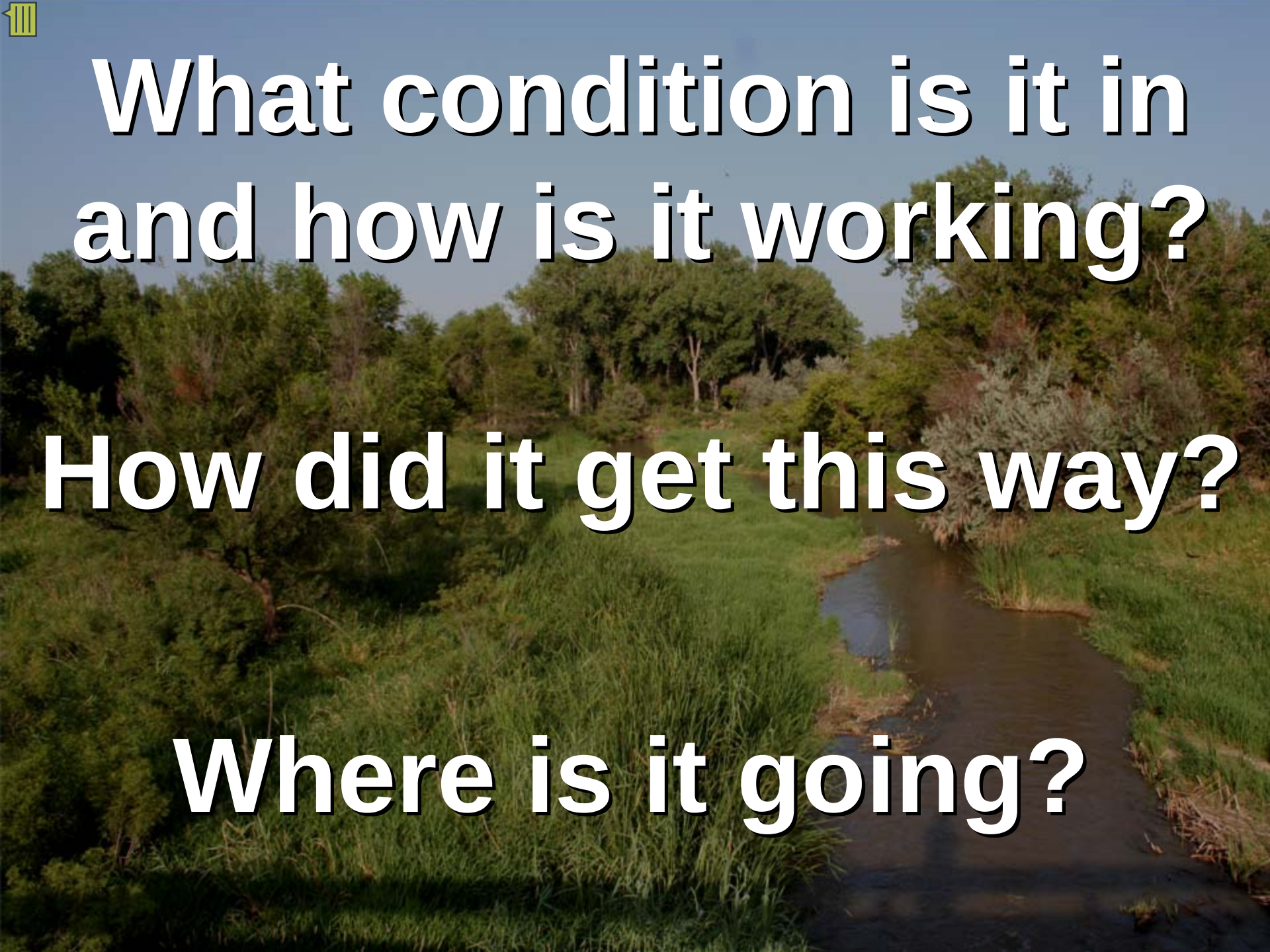

8 ft. rise in water elevation
+1140
+1131
+1135
+1133
1135+
+1140
1135+
+1134
1127+
+1130
+1129

Missouri River Historic Streambanks



South Table Creek, Otoe, Co.

June 24, 2008


What condition is it in and how is it working?
How did it get this way?
Where is it going?

Sream Corridors | NRCS NDCSMC - Microsoft Internet Explorer

http://www.ndcsmc.nrcs.usda.gov/technical/Stream/index.html

Address http://www.ndcsmc.nrcs.usda.gov/technical/Stream/index.html Go Links

United States Department of Agriculture
NRCS Natural Resources Conservation Service

National Design, Construction and Soil Mechanics Center

NDCSMC Home | About Us | Technical Resources | Contact Us

Search
NDCSMC
Enter Keywords GO

Stream Corridors
- NRCS Policy & Guidance
- Useful Links
- Publications
- Treatment & Practices
- Upcoming Workshops
- Design Tools
- Training Materials

- Find a Service Center
- States and Regions
- National Centers

Stream Corridor Restoration

This section is under development and review by the NRCS Stream Corridor Team Workgroup. Purpose is to provide an easy to access repository of technical training and design resources for NRCS employees.

NRCS Stream Corridor Team Workgroup co-chairs are Kathryn Boyer, Fisheries Biologist, WNTSC, Portland, OR and Jon Fripp, Stream Mechanics Engineer, NDCSMC, Fort Worth, TX.

NRCS Policy and Guidance Documents

The following is a list of NRCS handbooks and guidance documents which are applicable to stream corridor restoration.

- National Engineering Handbook 653 - Stream Corridor Restoration
- National Engineering Handbook 654 - Stream Restoration Design
- Engineering Field Handbook, Chapter 13 - Wetland Restoration, Enhancement, or Creation
- National Biology Handbook, Subpart B - Ecological Principles for Resource Planners
- National Biology Handbook, Subpart D, Part 640 and 641- Guidance for Effective Implementation and Reporting of Conservation Practice Standard 396, Fish Passage and Practice Standard 395, Stream Habitat Improvement and Management
- Engineering Technical Note 2 - Stream Water Surface Profile Modification for Wetland Restoration

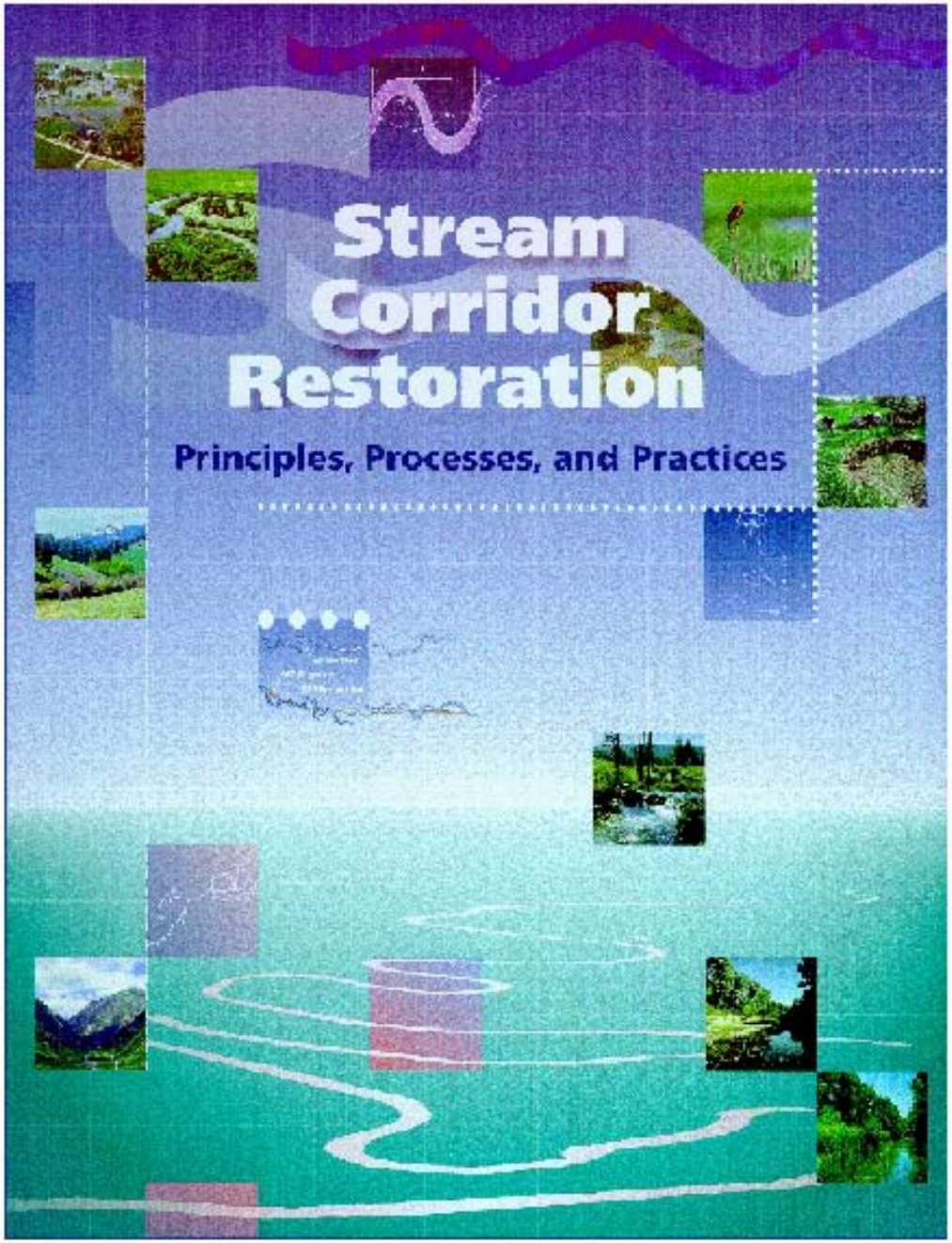
Useful Links

The following federal agency links may provide information useful for stream corridor restoration.

- NRCS Hydraulics and Hydrology Tools and Models
- USDA Plant Material Centers

Trusted sites

start | Microsoft PowerPoint ... | Sream Corridors | NR... | 6:41 AM


Stream
Corridor
Restoration
Principles, Processes, and Practices

United States
Department of
Agriculture

Natural
Resources
Conservation
Service

Part 654
National Engineering Handbook

Stream Restoration Design

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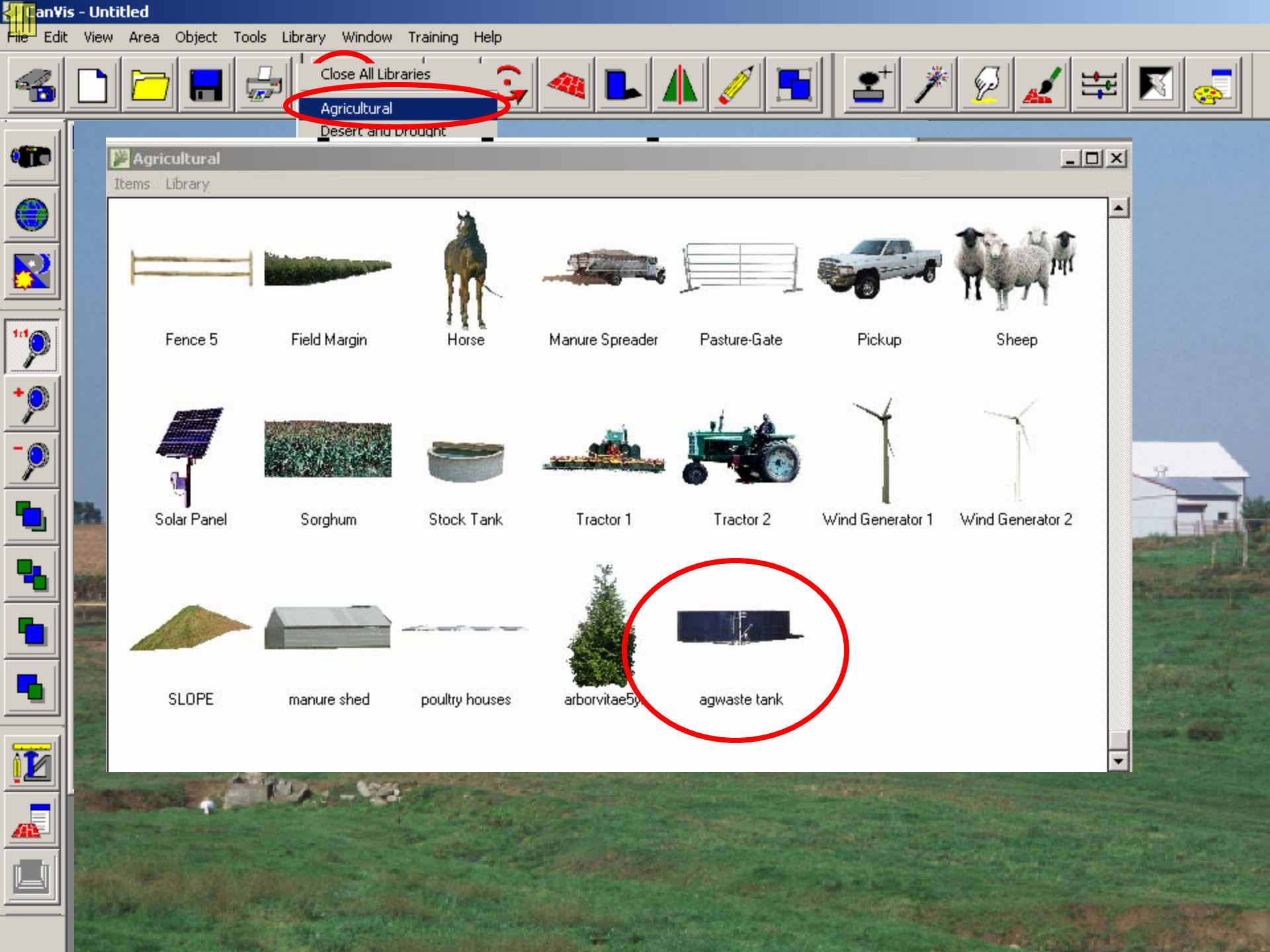
Visual Simulation Kit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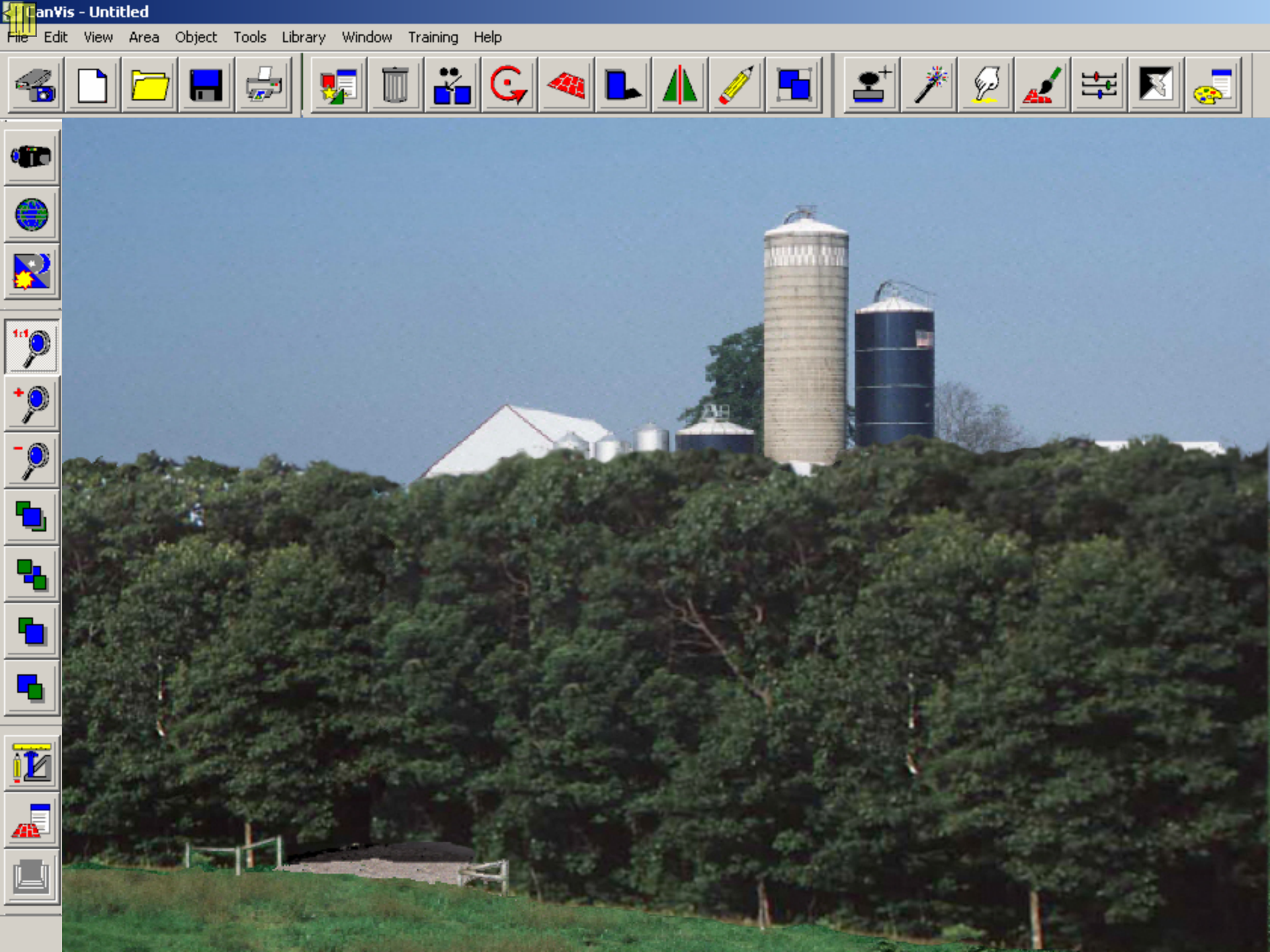
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Scenario 3

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