

# Evidence of multiple late Pleistocene outburst floods, upper Tanana River valley, eastcentral Alaska

Richard D. Reger, De Anne S.P. Stevens, and Diana N. Solie

presented by  
De Anne S.P. Stevens



This project is funded by the Alaska State Legislature and managed by State of Alaska Department of Natural Resources, Division of Geological & Geophysical Surveys. Partial funding for the geologic mapping was also provided through the U.S. Geological Survey National Cooperative Geologic Mapping Program (STATEMAP), under USGS award number 07HQAG0076.

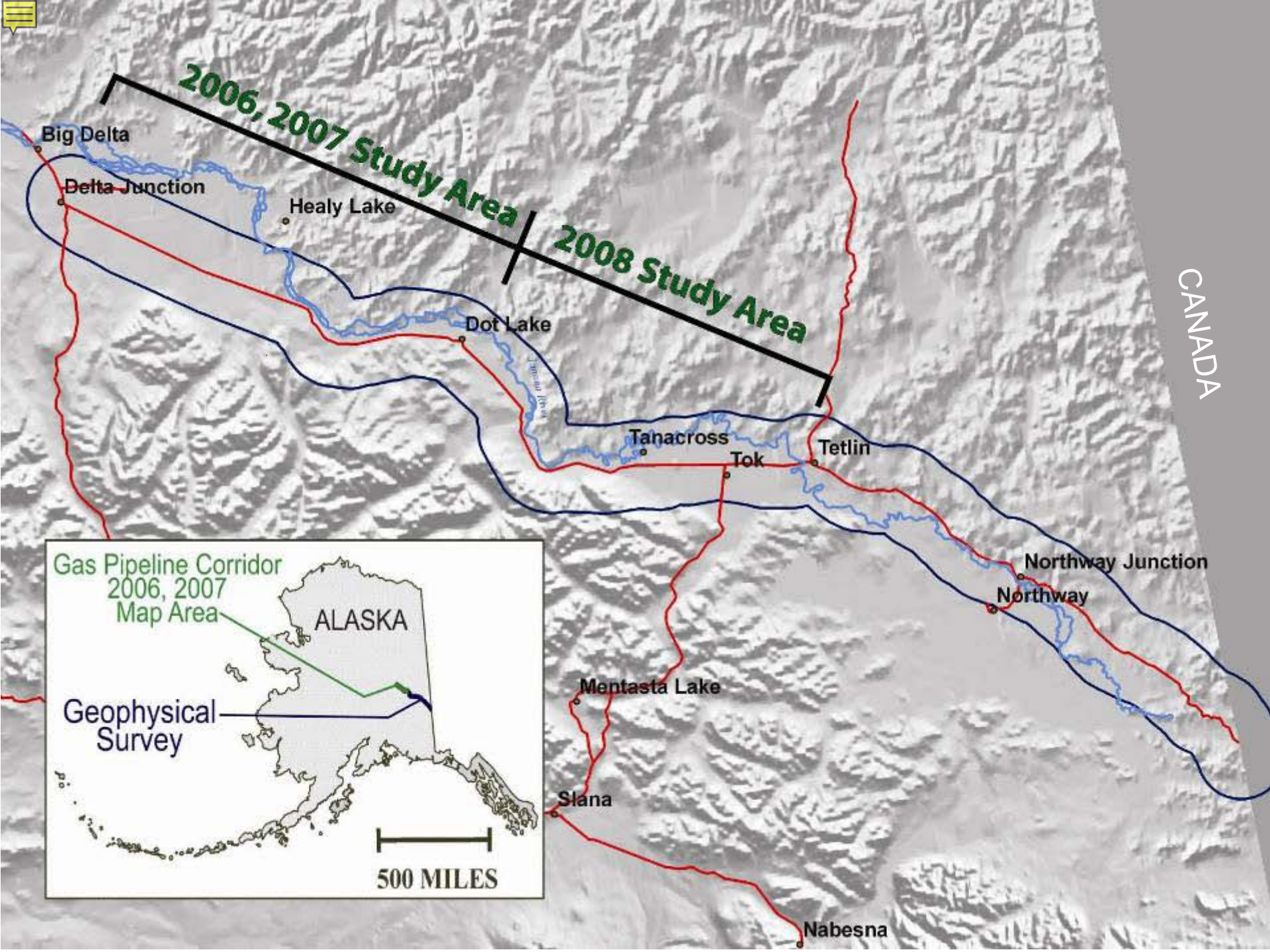


# What is Our Evidence for Outburst Floods?

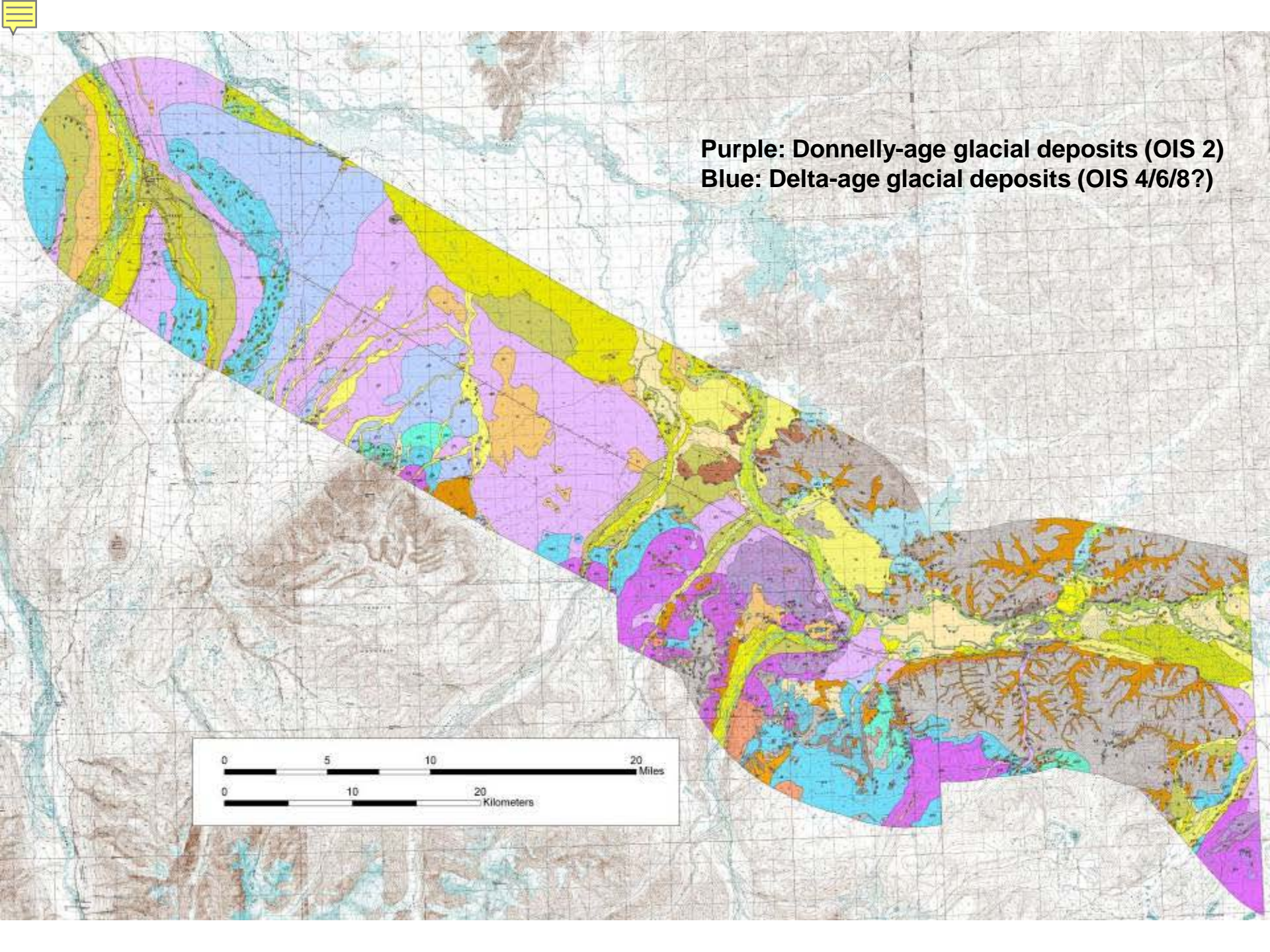
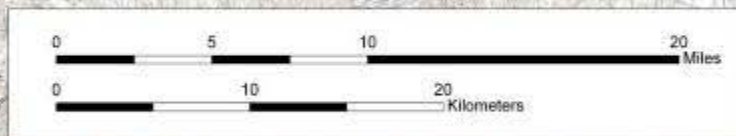
- Streamlined and aligned terraces
- Flood-modified granite knobs
- High-level eddy gravels
- Expansion fans with impounded lakes
- Longitudinal bars, pendant bars
- Massive flood deposits
- Megaripples
- Flood boulders
- Slackwater basins
- Flood-scoured lowlands
- Flood scarps

An aerial photograph showing a wide river valley. The foreground is dominated by a dense, green forest. A meandering river flows through the valley, surrounded by lush green fields and smaller water bodies. In the background, there are rolling hills and mountains under a clear blue sky with a few clouds. The perspective is from an elevated position, likely from an aircraft, as a portion of the wing is visible in the top right corner.

Background



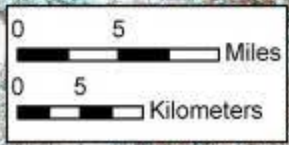
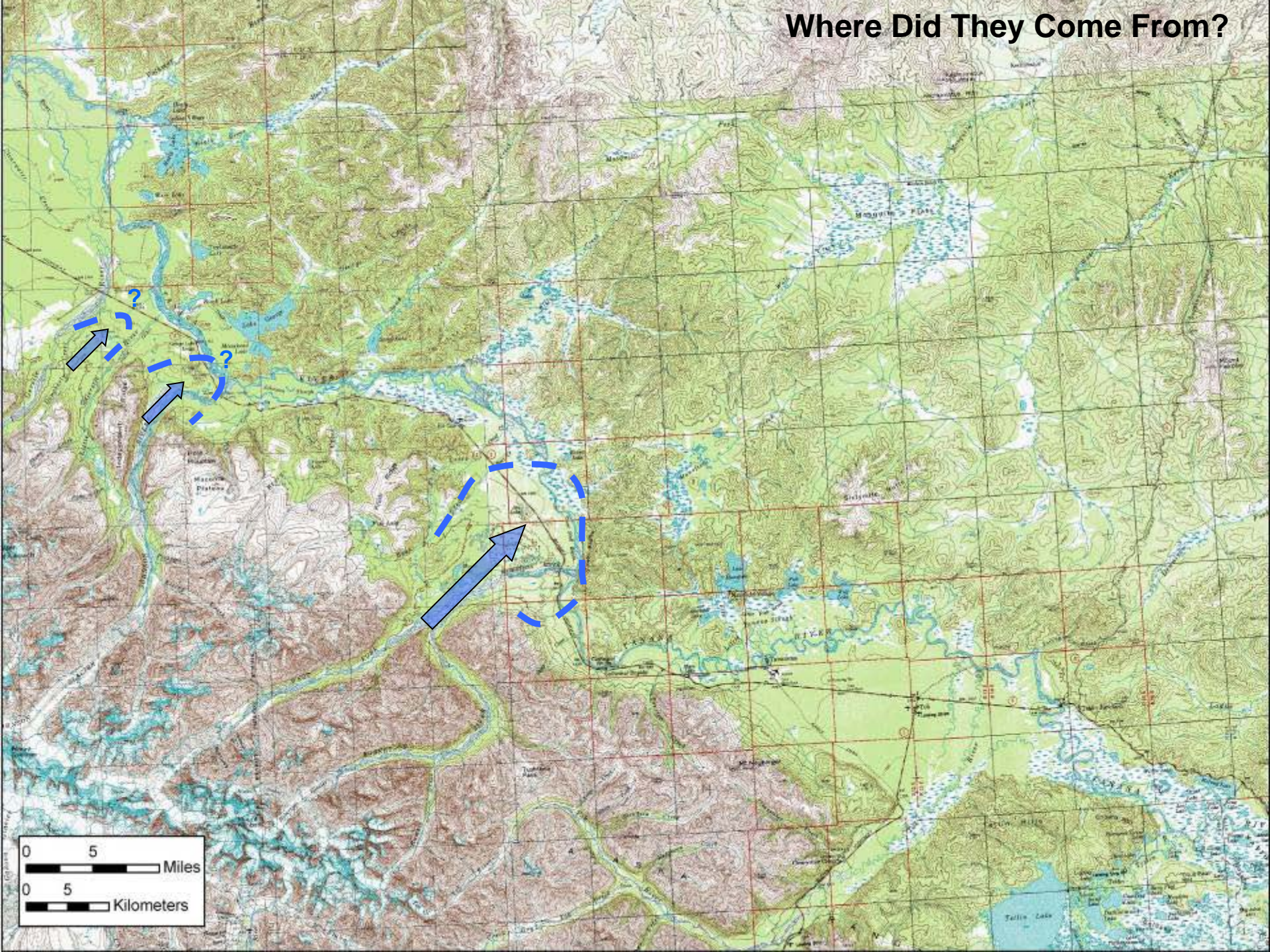
**Purple: Donnelly-age glacial deposits (OIS 2)**  
**Blue: Delta-age glacial deposits (OIS 4/6/8?)**



# The Flood Story

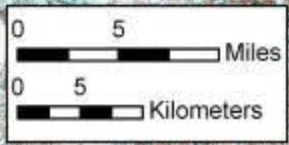
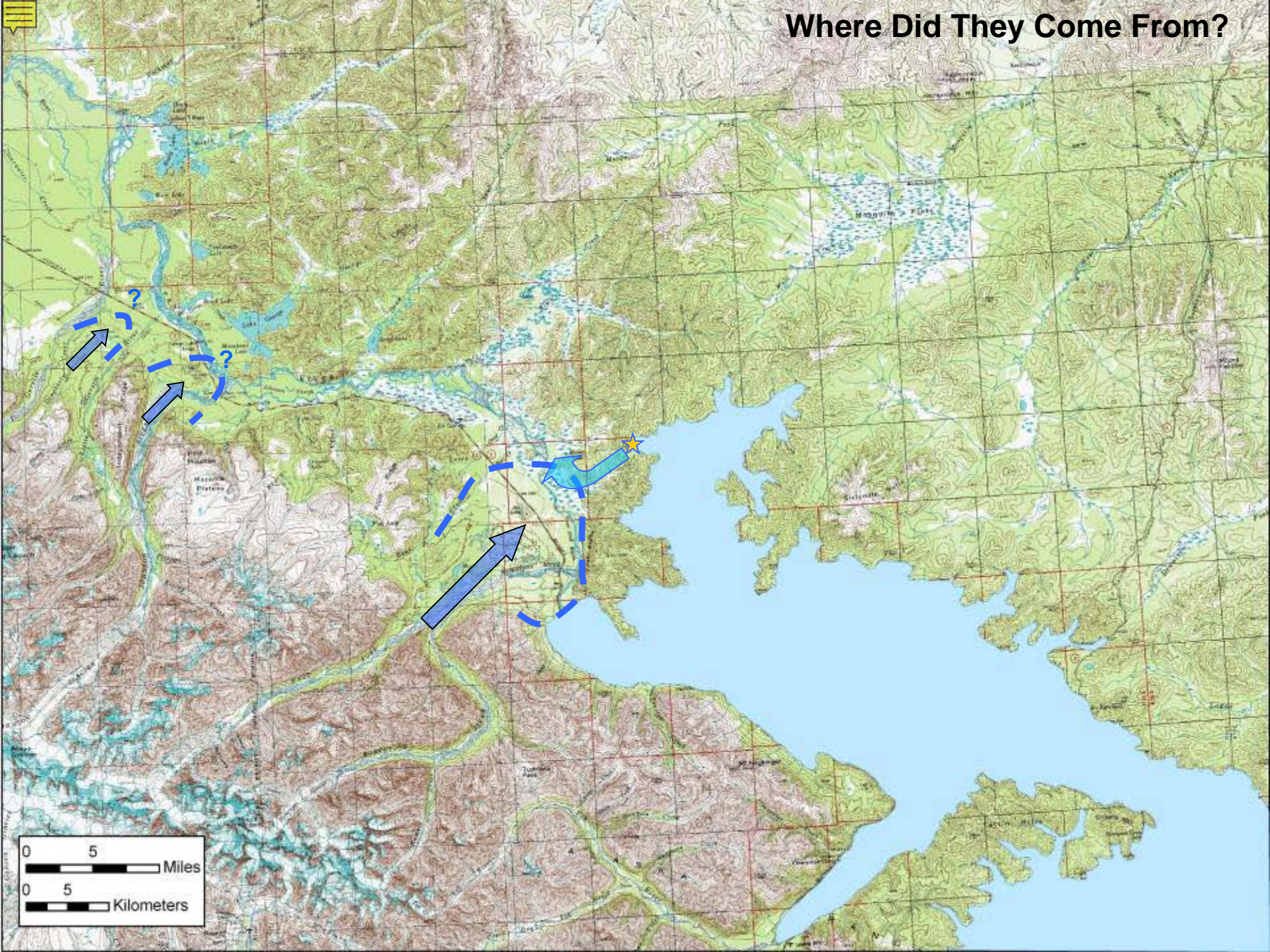


# Where Did They Come From?





# Where Did They Come From?



# Delta-age Megafloods



*Black  
Lake*

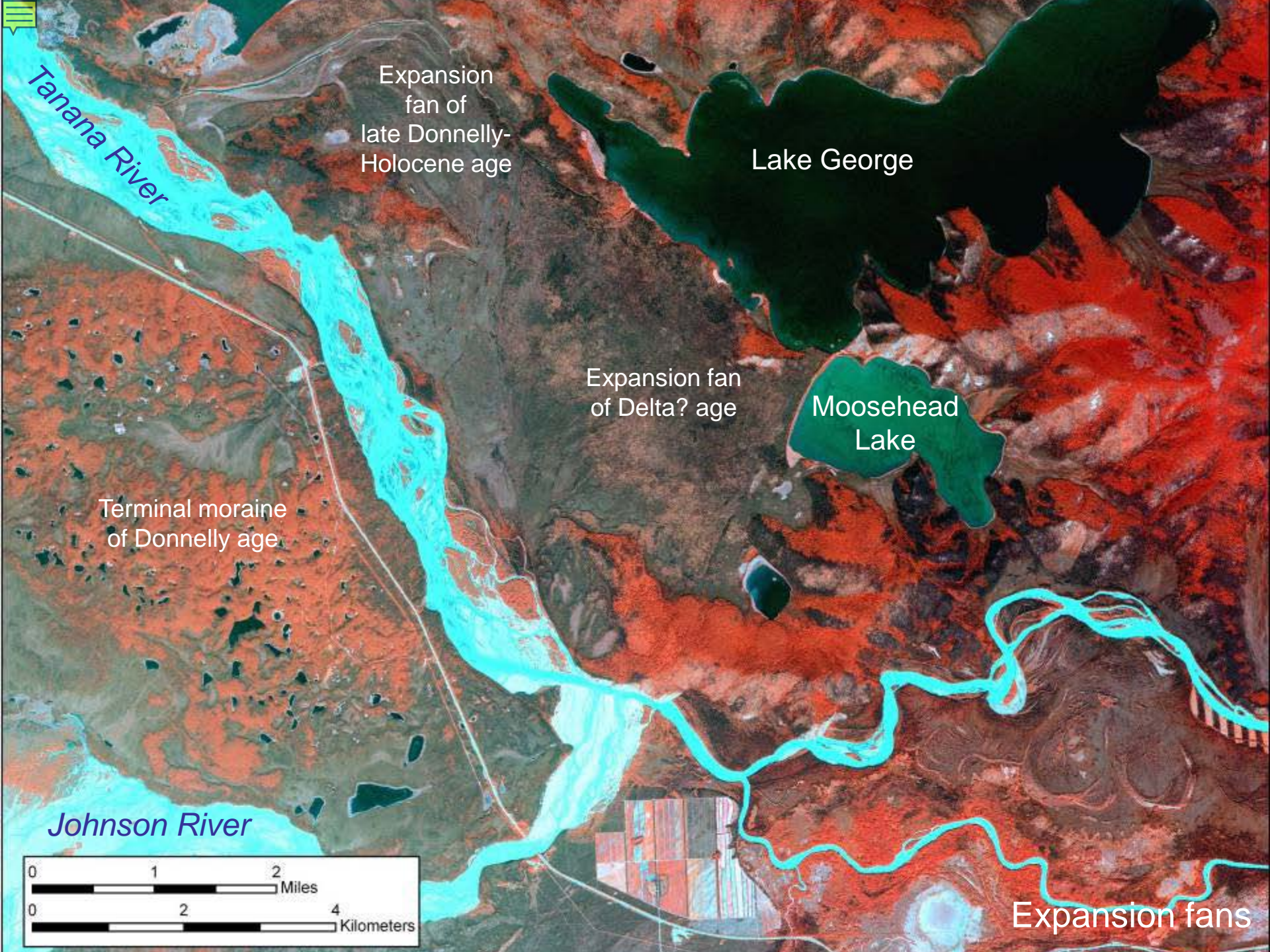
Flood-modified granite knobs



**Granitic knob**

**Pebble-cobble gravel of probable Delta age**

**High-level eddy gravels**



Tanana River

Expansion fan of late Donnelly-Holocene age

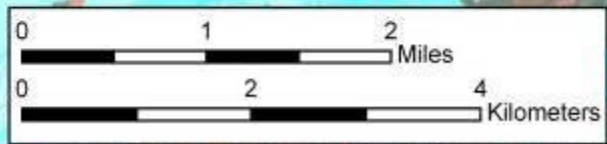
Lake George

Expansion fan of Delta? age

Moosehead Lake

Terminal moraine of Donnelly age

Johnson River



Expansion fans



Expansion fans of Delta  
and Donnelly age

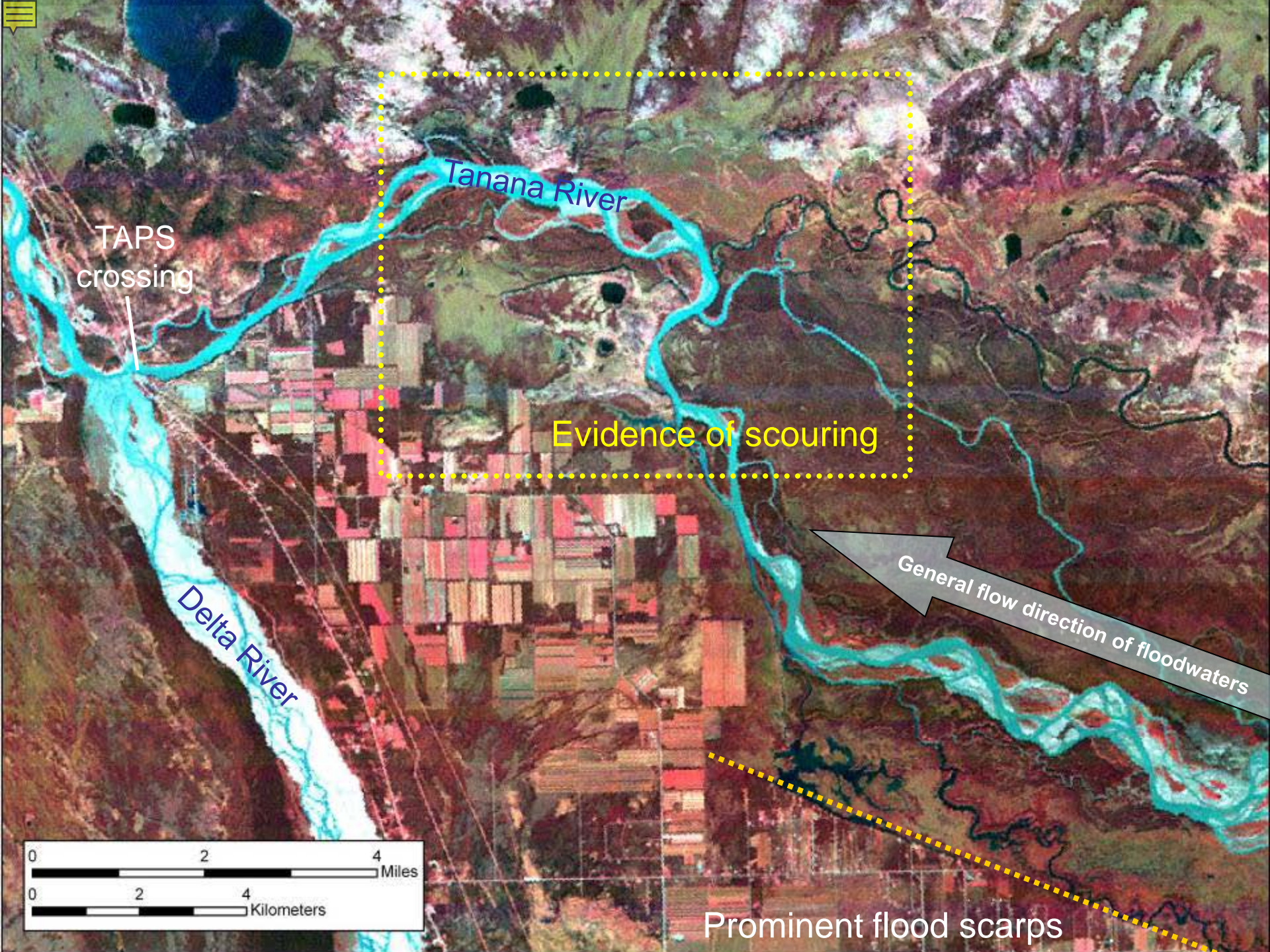
Lake George

Moosehead Lake

Johnson River

Expansion fans





Tanana River

TAPS crossing

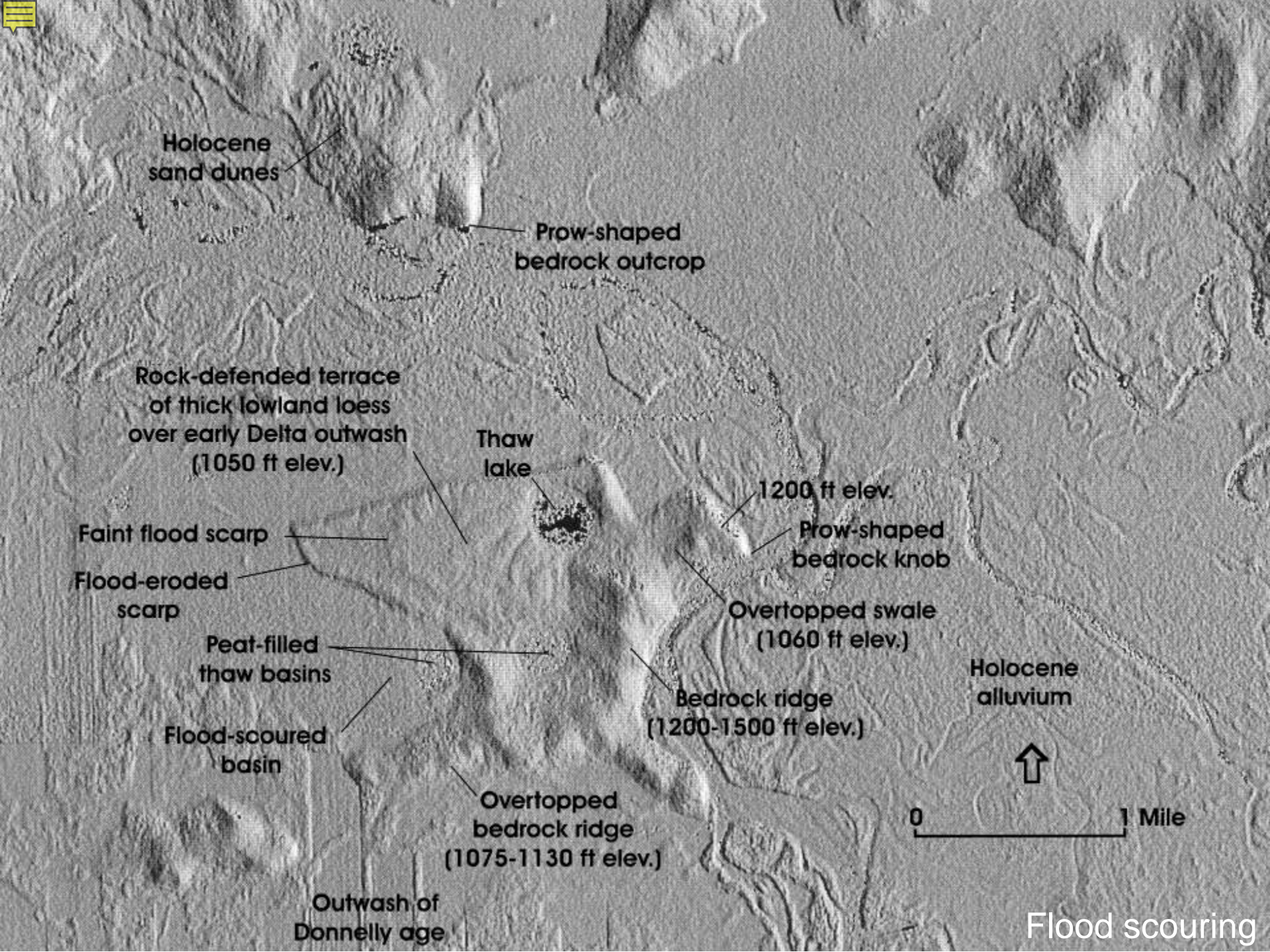
Evidence of scouring

Delta River

General flow direction of floodwaters

Prominent flood scarps





Holocene sand dunes

Prow-shaped bedrock outcrop

Rock-defended terrace of thick lowland loess over early Delta outwash (1050 ft elev.)

Thaw lake

1200 ft elev.

Faint flood scarp

Prow-shaped bedrock knob

Flood-eroded scarp

Overtopped swale (1060 ft elev.)

Peat-filled thaw basins

Bedrock ridge (1200-1500 ft elev.)

Flood-scoured basin

Holocene alluvium

Overtopped bedrock ridge (1075-1130 ft elev.)



0 1 Mile

Outwash of Donnelly age

Flood scouring





# Donnelly-age Outburst Floods



North →

Flood-scoured lowland

Streamlined terraces

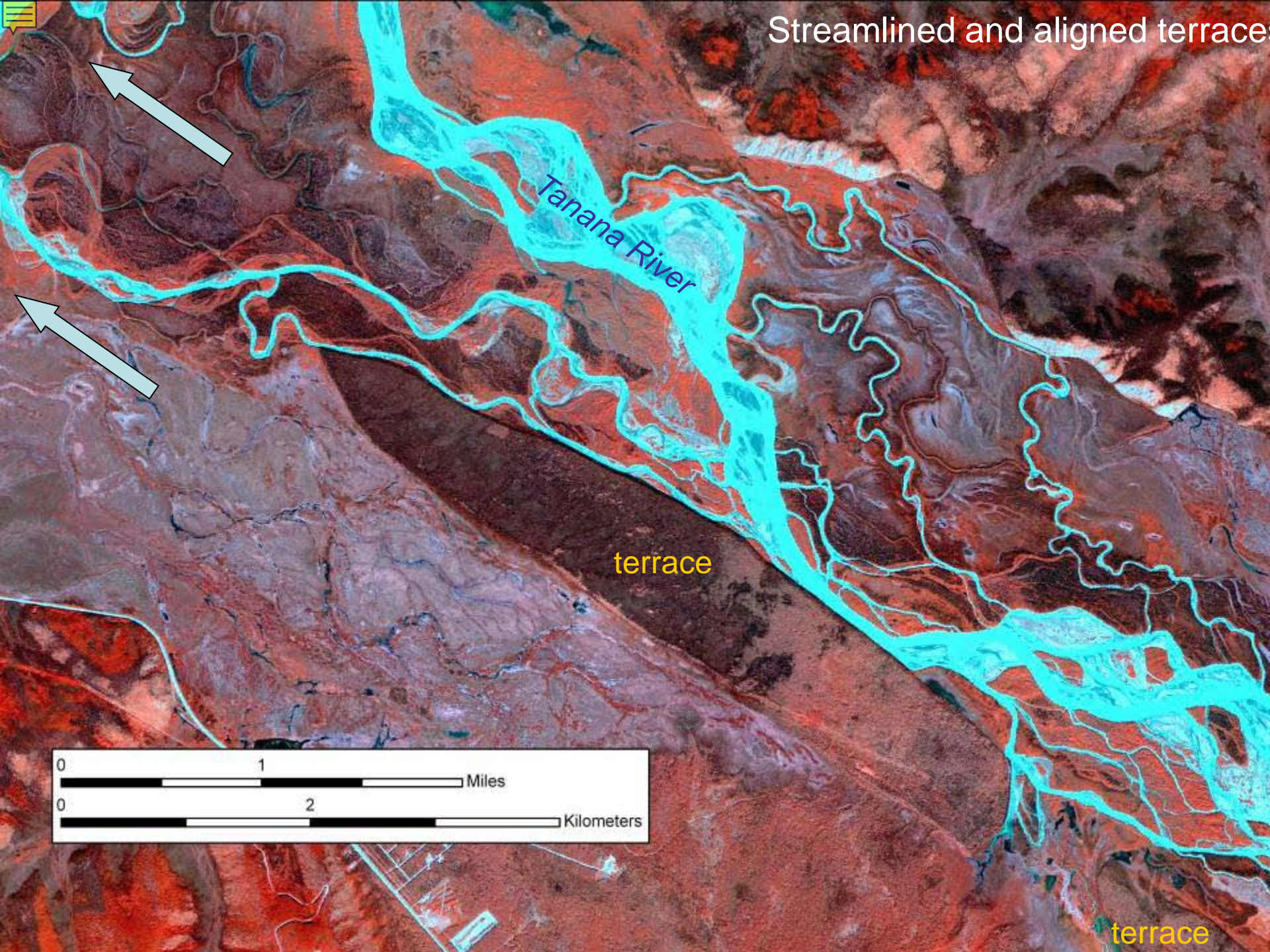
Bedrock knob

Tanana River →

Streamlined and aligned terraces



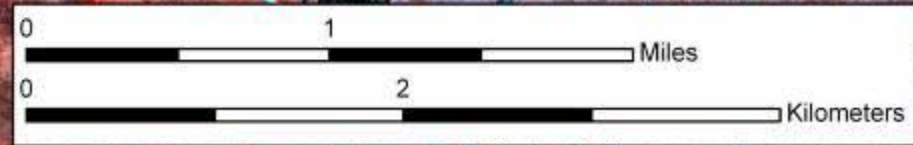
Streamlined and aligned terrace



Tanana River

terrace

terrace





Numerous cobbles,  
rare boulders

Pebbly sand  
flood deposits

Massive flood deposits





Margin of  
slackwater basin

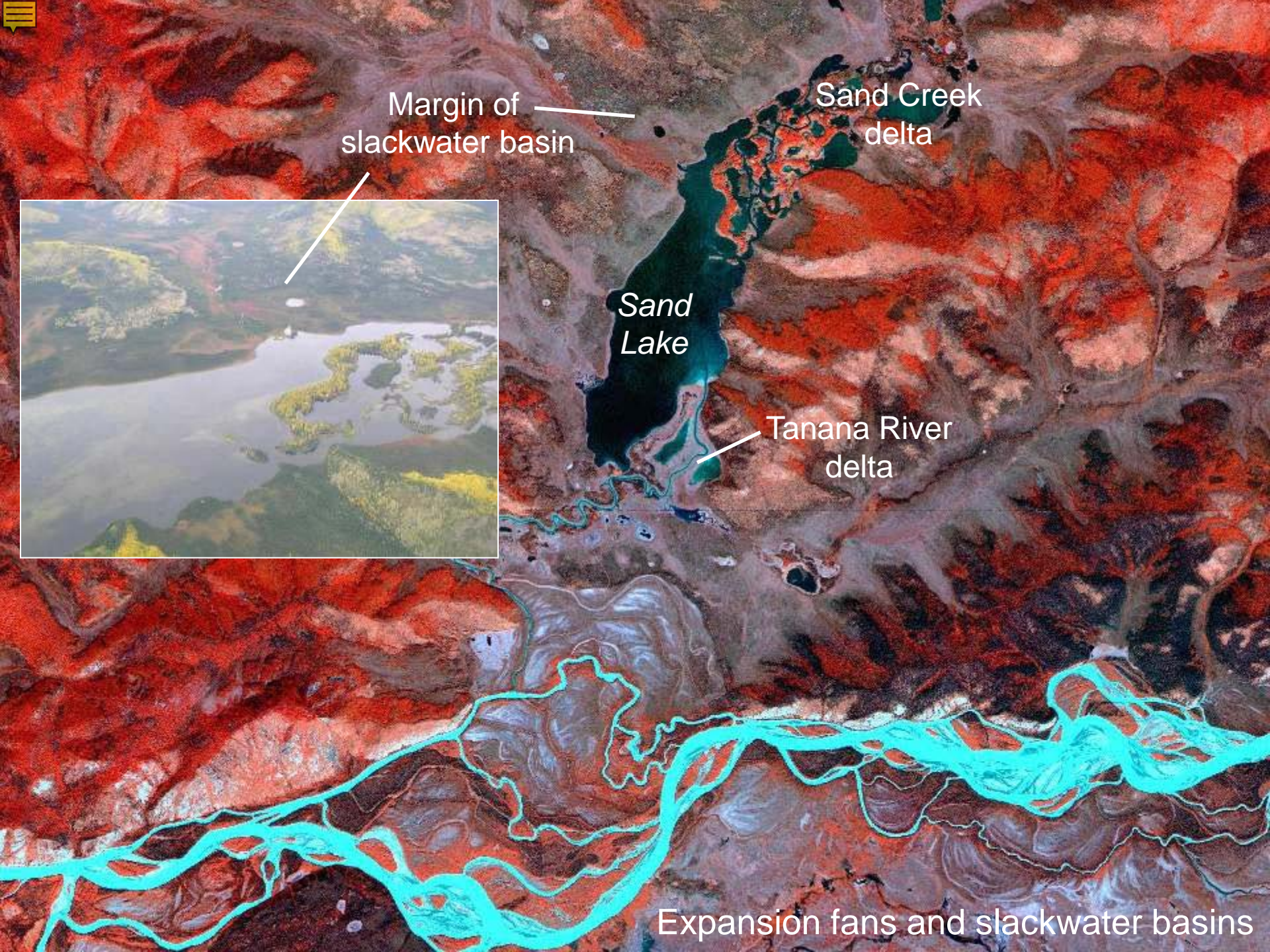
Sand Creek  
delta



Sand  
Lake

Tanana River  
delta

Expansion fans and slackwater basins





Flood-scoured bedrock knobs



Granitic  
flood  
boulder

Blocks of local  
granitic bedrock

Large flood boulders





# Late Donnelly-Early Holocene Floods



Holocene alluvial fan

Flood-scoured lowland

Dot Lake Village escarpment

Proximal outwash of Donnelly age

Flood scarps and scoured lowlands



Implications of Pleistocene  
Outburst Flooding:  
Clearwater Lake Escarpment



North 

Delta River

Outwash fan of  
Donnelly age

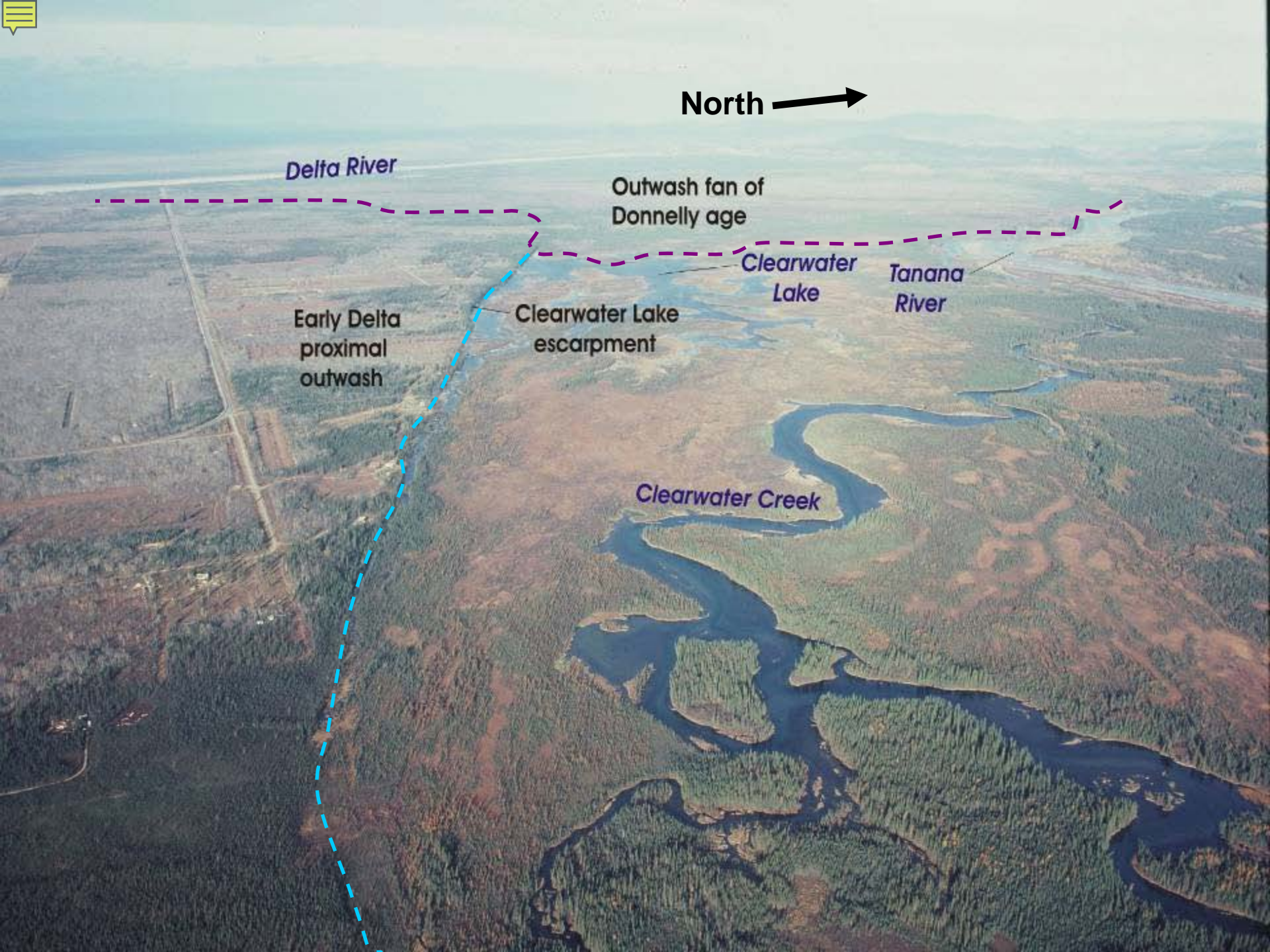
Early Delta  
proximal  
outwash

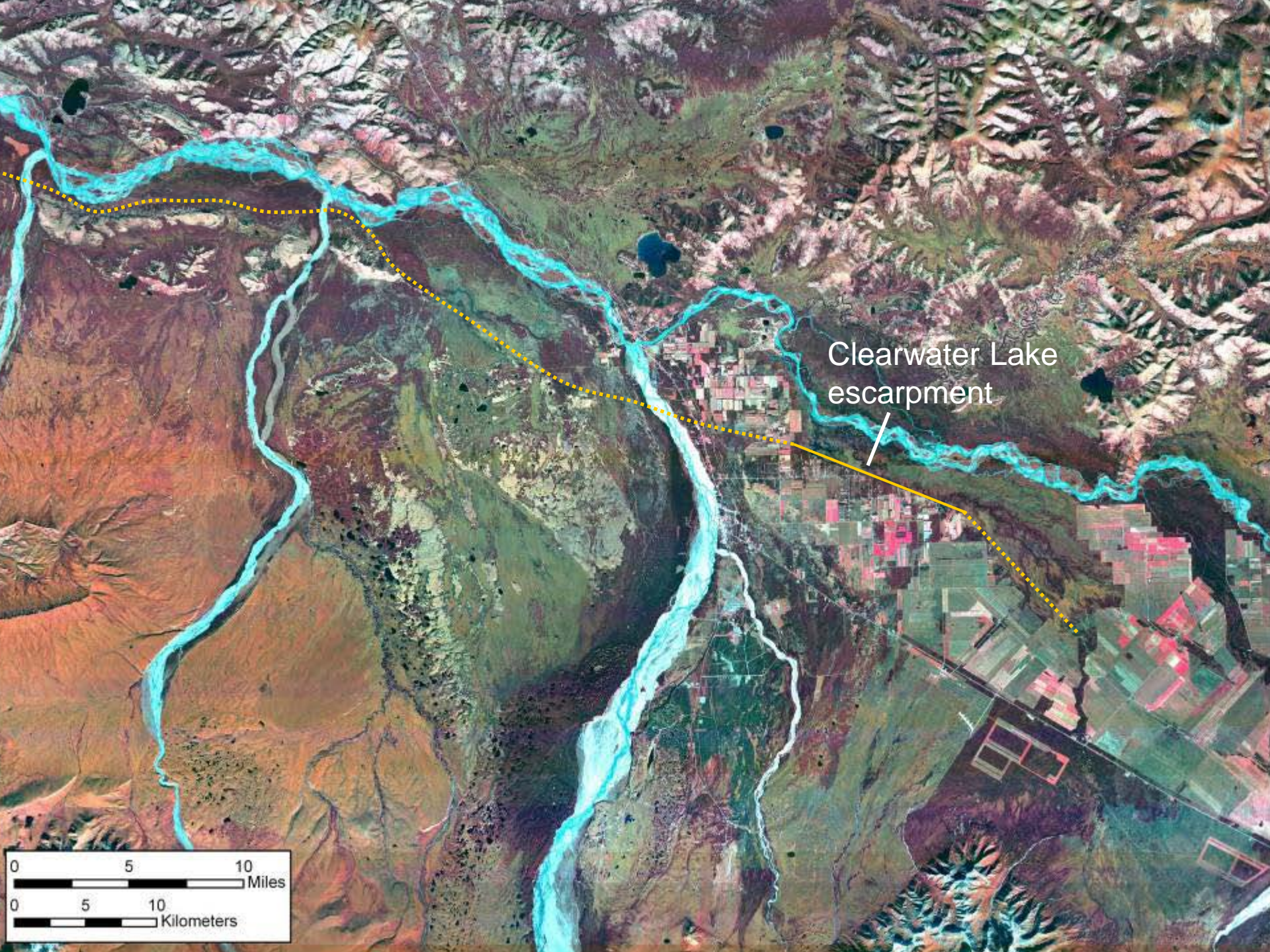
Clearwater Lake  
escarpment

Clearwater  
Lake

Tanana  
River

Clearwater Creek





Clearwater Lake  
escarpment



# Questions

