USGS
science for a changing world

Where is the sand coming from in Whittlesey Creek?

OVERVIEW

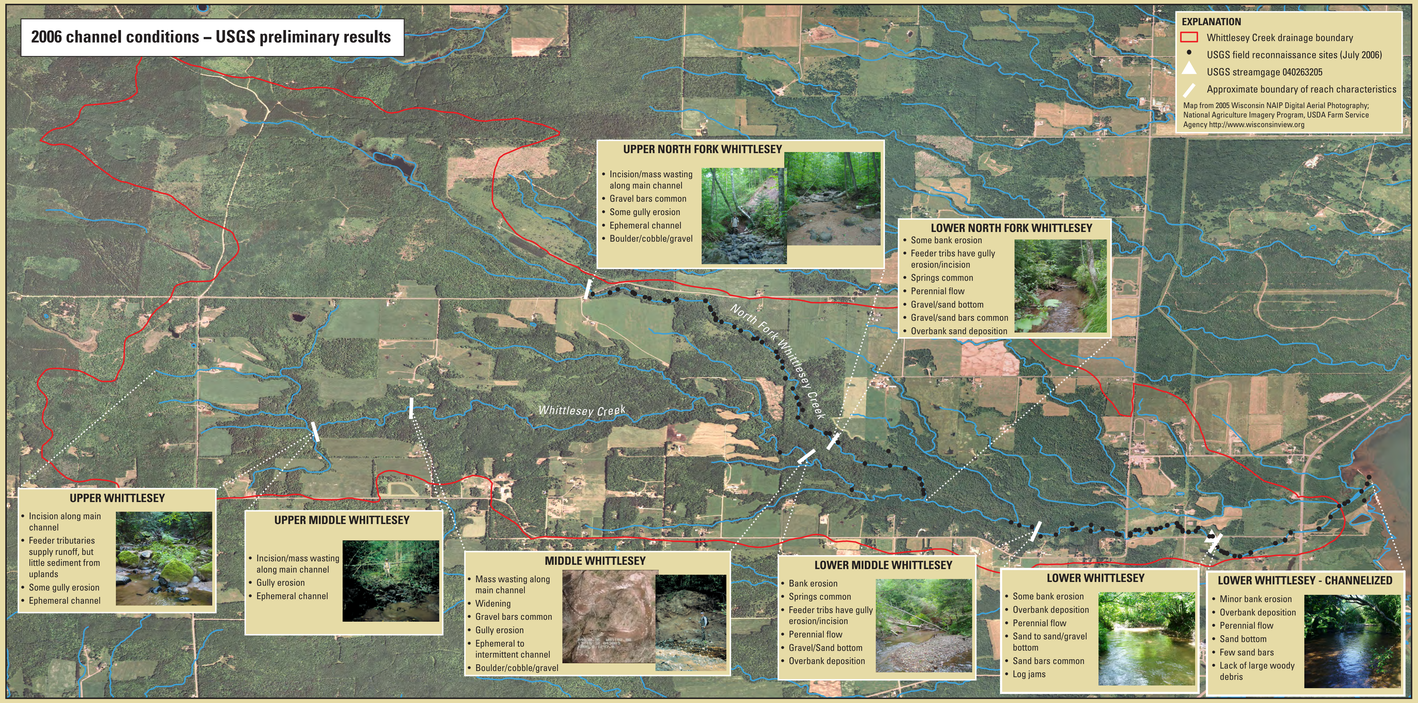
In July 2006, the U.S. Fish and Wildlife Service, U.S. Geological Survey, and Inter-Fluve, Inc. began a study of erosion and sedimentation patterns and sediment transport in Whittlesey Creek. The purpose of the study is to better understand the sources of excessive sand to, and the movement of sediment through, the lower reach of Whittlesey Creek. The data gathered from the study will be used to guide restoration plans for the Whittlesey Creek National Wildlife Refuge. Questions we would like to answer with the study are:

(1) How is sediment moving through the Refuge?
(2) Is stream restoration in the Refuge feasible?
(3) If so, what techniques are best for the situation?
(4) Where else in the watershed should we provide habitat funding to private landowners?

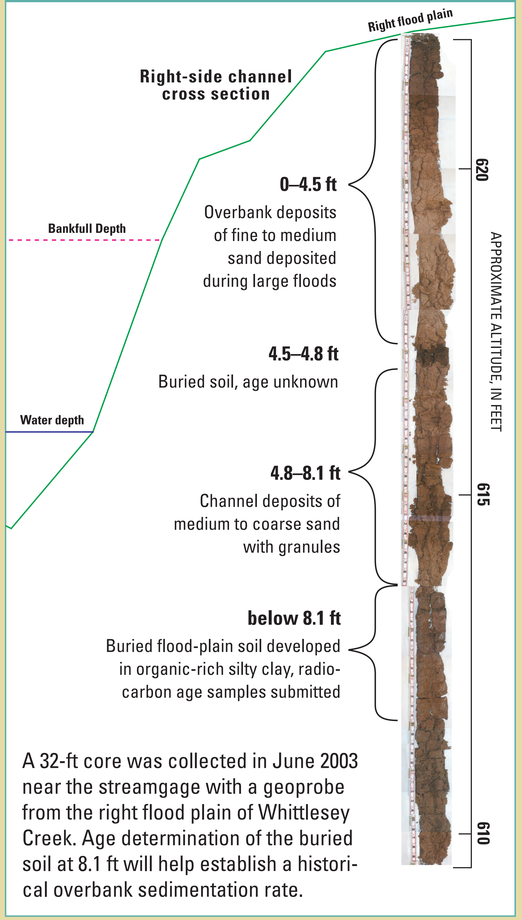
Results from this project will benefit native brook trout and the aquatic resources at the mouth of Whittlesey Creek as well as upstream spawning reaches and the estuary in Chequamegon Bay.

This summer and fall the USGS will identify and quantify sources of sediment and erosion zones throughout the watersheds of Whittlesey Creek and North Fork Whittlesey Creek. This is being done by examining historical and current aerial photography, helicopter video, and conducting field reconnaissance surveys. The USGS is mapping channel sources of sediment from gullies, landslides, and bank erosion. The USGS will determine sedimentation rates along banks, old channels, and flood plains by collecting 1-inch diameter hand cores. Flood-plain deposits will be described and presettlement land surface identified in depositional zones. A sediment budget for the watershed will be computed, which will describe how much sediment is moving through the system, where it is coming from, and where it is being stored.

Recent studies by the USGS (Fitzpatrick and others, in review) estimated that more than 5 feet of sediment was deposited on the flood plain historically through the refuge. Just upstream of the refuge, the channel of Whittlesey Creek has extensive shifting sand and gravel bars, coincident with regional ground-water upwellings (critical for brook trout habitat) (Lenz and others, 2003). Streambank and bluff erosion along the upper main stem of Whittlesey Creek and the North Fork of Whittlesey provide sand to downstream reaches. Sand bedload movement hampers rehabilitation efforts in the lower main stem. Historically, increased runoff from uplands has promoted erosion along the upper reaches of Whittlesey. Best management practices have reduced upland erosion, but upland runoff rates are still elevated above presettlement conditions and continue to promote channel erosion and mass wasting in upper reaches. **Habitat conditions in the lower reach are affected by a combination of modern inputs of sand and ongoing internal geomorphic responses to historically accumulated legacy sand stored along channel margins.**

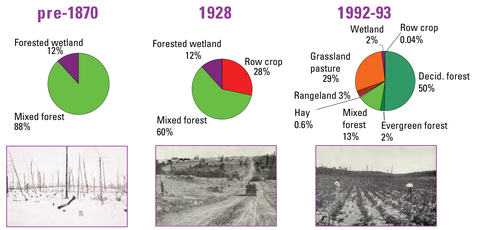


SEDIMENT CORE AT STREAMGAGE



A 32-ft core was collected in June 2003 near the streamgage with a geoprobe from the right flood plain of Whittlesey Creek. Age determination of the buried soil at 8.1 ft will help establish a historical overbank sedimentation rate.

LAND-COVER HISTORY



Land cover in the Whittlesey Creek watershed has changed substantially over the last 100+ years. Geomorphic processes in Whittlesey Creek are still responding to the large movement and storage of sediment that occurs during large floods.

PAST EFFORTS AT EROSION CONTROL

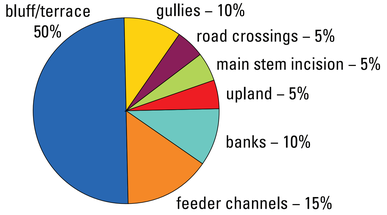
This bluff along Whittlesey Creek was part of Red Clay Interagency Committee efforts toward erosion control for south shore streams

1958: Whittlesey Creek bluff before stabilization (Red Clay Interagency Committee, 1960)

2003: Same Whittlesey Creek bluff 45 years later with 2nd generation willows on bank toe, aspen and birch on slope

PRELIMINARY SEDIMENT BUDGET

Preliminary percentage estimates of relative sources of sediment to the lower reach of Whittlesey Creek. Excessive sediment can damage critical habitat areas.



HABITAT IMPROVEMENTS

Potential ways to improve habitat:

- Reduce surface runoff from the watershed
  - improve infiltration, interception, and storage
  - increase overland flow roughness
  - remove unneeded artificial drainages/ditches
  - minimize road runoff
- Reduce bank/bluff/gully erosion in upper reaches
  - reduce runoff from uplands and roads
  - reduce incision
  - increase channel roughness
- Create local habitat in lower reach
  - use innovative designs that withstand sand transport/deposition

For more information contact:

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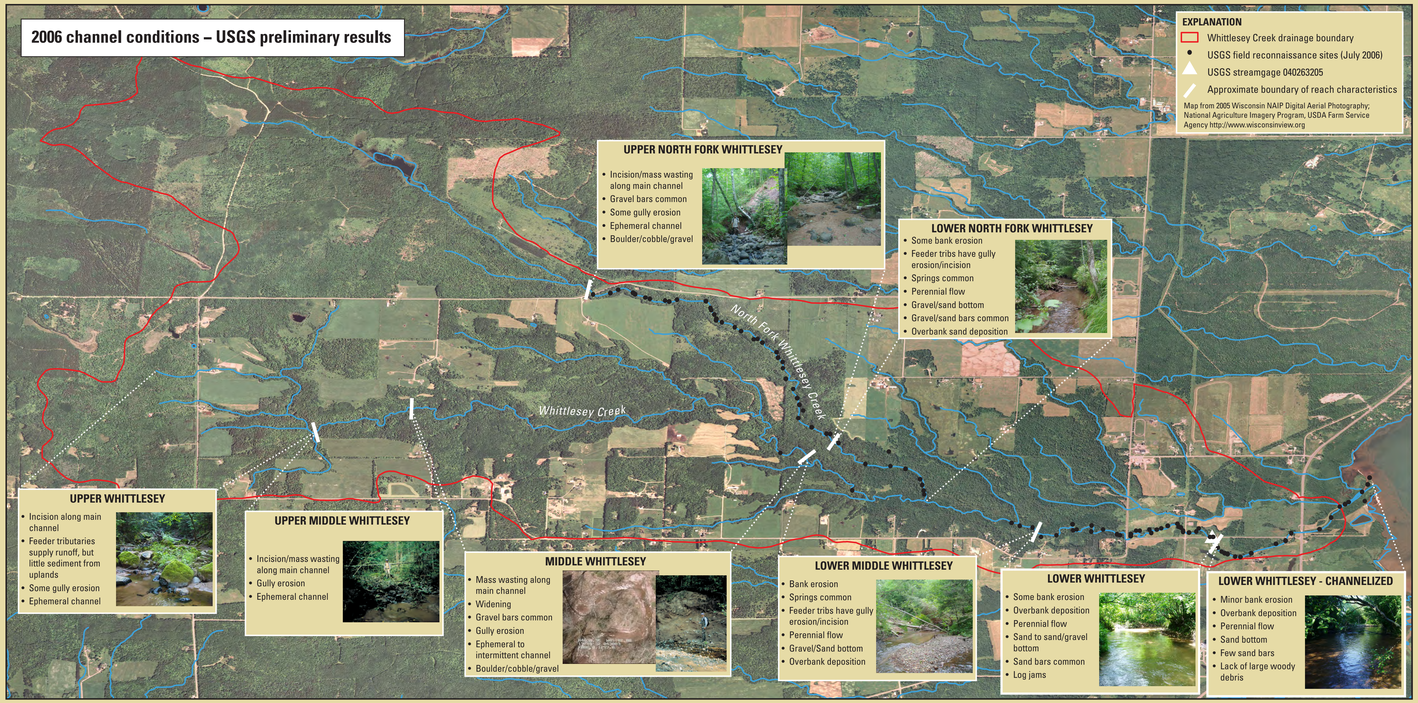

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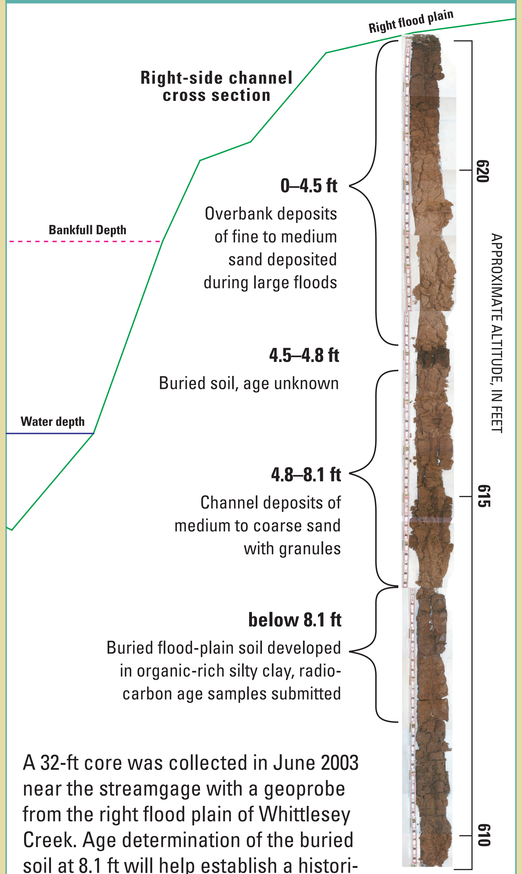

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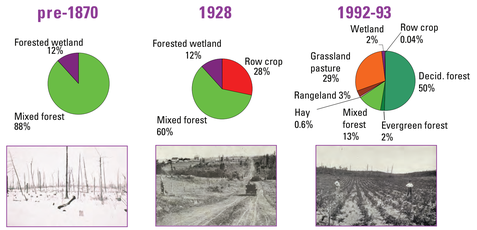

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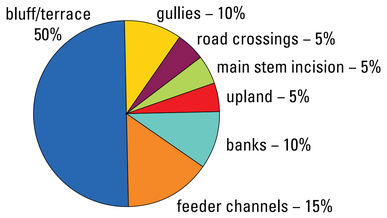

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