Characterizing Habitat & Developing Sturgeon Restoration Action Steps

Welcome to the Big Manistee River, the site of a major sturgeon rehabilitation project. It's an area steeped in the history of the Anishinaabek people and their descendents, the Little River Band of Ottawa Indians. This watershed has long been known as a spawning haven for lake sturgeon.

As the sturgeon disappeared over the last century, the Little River Band started seeking ways to bring back the sturgeon. During spring and summer of 2005, the Little River Band of Ottawa Indians collaborated with Northern Environmental to characterize the habitat at Suicide Bend (a known sturgeon spawning site) and Tunk Hole in the Big Manistee River, Michigan. One goal of the project was to compare and contrast the two sites with each other, as well as to characterize them with other documented sturgeon spawning habitats in North America. The information gathered from comparing and contrasting available data was used to determine what factors may limit habitat at Tunk Hole suitable for lake sturgeon spawning. From this, conceptual plans were developed for reclaiming sturgeon spawning habitat at Tunk Hole.

Suicide Bend (left) was a known sturgeon spawning area, and Tunk Hole (right) had the potential to provide suitable spawning habitat. By comparing and contrasting the two, it was easier to find ways to improve the habitat at Tunk Hole.

Goals of the Study

- Compare and contrast the two sites (Tunk Hole and Suicide Bend) with each other
- Characterize the two sites with other documented North American lake sturgeon spawning habitats
- Identify factors that may limit suitable lake sturgeon spawning habitat at Tunk Hole
- Develop conceptual plans to reclaim lake sturgeon spawning habitat at Tunk Hole

This project was designed and completed by the Little River Band of Ottawa Indians and Northern Environmental Technologies, Inc.

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Hydrologists · Engineers · Surveyors · Scientists

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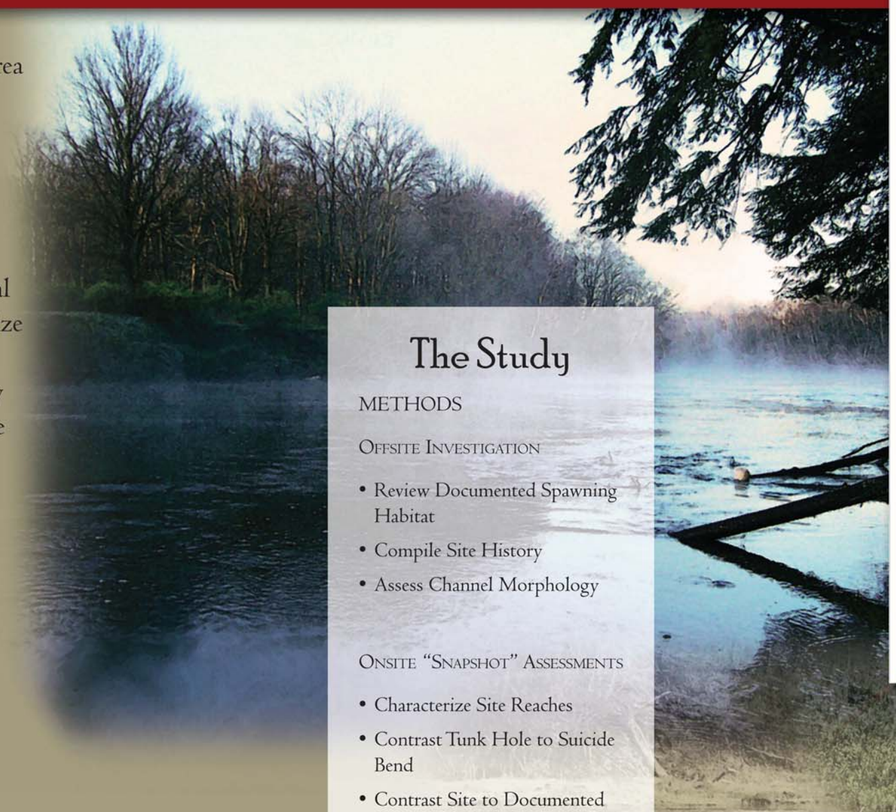


The Study

METHODS

Offsite Investigation

- Review Documented Spawning Habitat
- Compile Site History
- Assess Channel Morphology

Onsite "Snapshot" Assessments

- Characterize Site Reaches
- Contrast Tunk Hole to Suicide Bend
- Contrast Site to Documented Spawning Habitats
- Identify Habitat-Limiting Factor(s) at Tunk Hole

METRICS

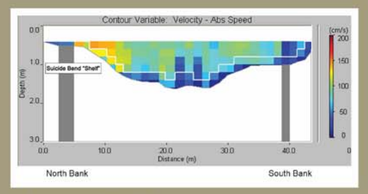
Shape and Pattern

- Entrenchment
- Width/Depth
- Sinuosity
- Slope
- Sediment Composition

Morphological Classification (Rosgen)

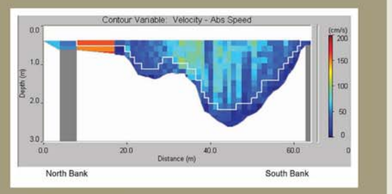
- Contrast Reaches
- Restoration Treatment Suitability

Summer 2005 Rivercat Depth/Velocity Profiles



SUICIDE BEND:

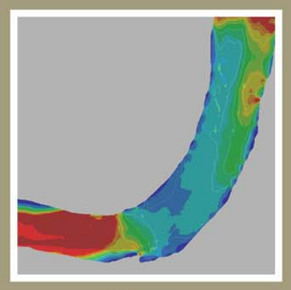
- Gravel/pebble and cobble material from historic treatment
- Clean interstitial pore spaces
- Sand transport begins at flow velocities between 0.16 and 0.65 m/s
- Spring 2005 near-bottom velocity ranged between 0.10 and 1.20 m/s
- Summer 2005 near-bottom velocity was approximately 1.25 m/s



TUNK HOLE:

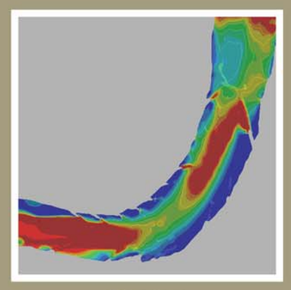
- Native gravel/pebble highly embedded with sand
- Spring 2005 near-bottom velocity ranged between 0.35 and 0.56 m/s at mid-reach (swiftest flows at downstream end of the reach)
- Summer 2005 near-bottom velocity was approximately 0.25 m/s
- Near-bottom velocities typically insufficient to transport large sand particles

2005 Tunk Hole Existing and Proposed Spring Flow Models



Existing

Spring flow transport of sediment, equal to or greater than suitable particle size, occurs in red regions. As shown in this figure, an equation was used to determine whether or not live-bed transport occurs in Tunk Hole. The results of this calculation indicate that flow entering Tunk Hole is capable of mobilizing the upstream bed as well as part of the streambed located near the exit of the bend. As a result of this calculation, live-bed equations were used to estimate scour resulting from the placement of guidance structures.



Proposed

Guidance structures proposed by Northern Environmental were added to the computer model (one cross-vane, seven log vanes, and five boulder arrays) and spring flow patterns were calculated. The results were used to determine if live-bed transport conditions exist in the modeled region. This figure shows the results of this analysis which indicates that, with the placement of control structures, live-bed conditions should be expected throughout the reach. The guidance structures focus flow towards the middle of the channel. In this case, the flow accelerates as it passes by the cross-vane, and the log vanes and boulder arrays slow the flow near the streambanks.

Project Profile

Who: The Little River Band of Ottawa Indians and Northern Environmental Technologies, Inc.

What: A comprehensive habitat study on two known spawning areas of the Big Manistee River.

When: Study completed in 2005 - the project is ongoing.

Where: Tunk Hole and Suicide Bend (Big Manistee River - Michigan).

Why: To supplement ongoing lake sturgeon restoration efforts in the Great Lakes. The Tribe's efforts also provide community benefits. Lake sturgeon were regarded as an important part of the Anishinaabek culture, and Tribal members look forward to making this species viable for generations to come.

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CONCLUSIONS

- Tunk Hole Lacks Suitable Spawning Substrate
  - Entrenched Channel
  - High Sheer-Stress Near Banks
  - Rampant Bank Erosion
  - Insufficient Sediment Transport
  - Benthic Surface Embedded With Sand
- Restoration Treatment Recommendations:
  - Construct Cross-Vane
  - Strategically Place Boulders - South Bank
  - Grade North Bank
  - Vegetate With Culturally-Significant Native Plants
  - Monitor Habitat Change and Sturgeon Spawning