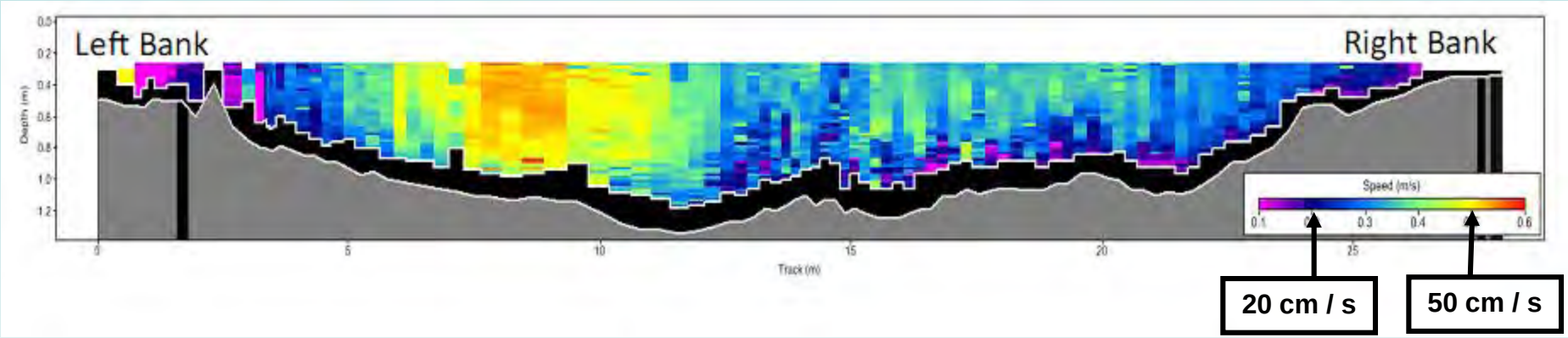
GRASS RIVER LARGE WOODY DEBRIS (LWD) PROJECT

2012 GRASS RIVER SEDIMENTATION STUDY

Grass River is becoming shallower & wider over time

DOPPLER SONAR FLOW MEASUREMENT

Flow velocity in stream channel cross section



- Flow volume is not evenly distributed across channel section
- Main channel flow is relatively slow allowing some sediment accumulation
- Areas with greater flow experience less accumulation
- Tree structures help focus flow toward main channel

COALITION OF FORCES

- Antrim County Drain Commissioner, Mark Stone, proposed placing natural wood structures along Grass River to determine if the technique could be used to control sediment build up without dredging.

- Preliminary findings presented by Professor Anthony Kendall of Michigan State University Hydrology Department in August 2011 helped launch the project of LWD structures in the Grass River.

- Antrim County and a number of co-sponsors were quick to provide funding for the project and a meeting to inform the public was held late in May 2011 at the Grass River Education Center.

- Mark Stone filed a permit application with the Michigan Department of Environmental Quality to begin work on Grass River.

- DEQ authorized eight structures to be installed. Seven were installed in 2014 with the help of many volunteers from various organizations.


Antrim
Charlevoix
Ellsworth
St. Clair Lake
Ellsworth Lake
Six Mile Lake
Wilson Lake
Eastport
Benway Lake
Green River
Dingman River
Hanley Lake
Torch Lake
Central Lake
Scotts Lake
Beals Lake
Intermediate River
Intermediate Lake
Grand Traverse Bay
Intermediate River
Bellaire
Blair Lake
Torch Lake
Lake Bellaire
Clam River
Cedar River
Kewadin
Clam Lake
Grass River
Elk Rapids
Alden
Elk Lake
Torch River
Torch River
Rapid City
Rapid River
Lake Skegemog
Rugg Pond
Grand Traverse
Kalkaska

LWD Sites

SEVEN TREE STRUCTURES INSTALLED SUMMER 2014

- Five first year tree structures shown (black arrows)
- Flow deflected toward main channel helps to keep sediments movin
- Tree structures protect emergent vegetation from boat props

JOINT EFFORT

•Technical guidance and installation expertise was provided by stream restoration specialist, Ken Reed.

•Ken Reed and his assistant strategically positioned and secured trees to the river bank while a dozen volunteers from Grass River Natural Area, the County Board of Commissioners, area lake associations, Short's Brewery, and the Antrim Conservation District harvested and transported whole trees to the pre-designated sites.

•Every tree was evaluated by representatives from GRNA with help from Antrim County Forester, Mike Meriweather.

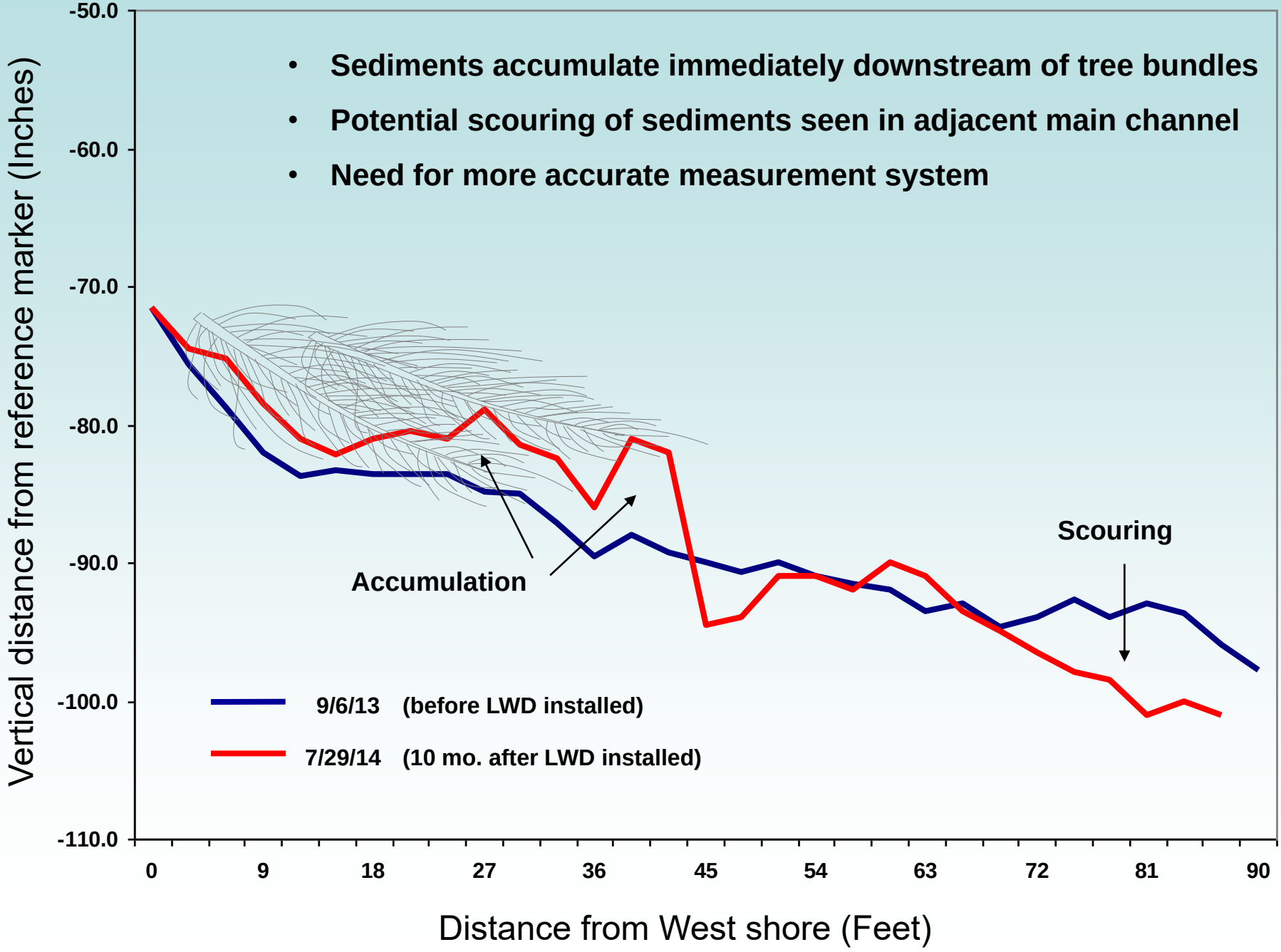
•Trees were selected away from the riverbank so removal would not have a visual impact from the water.

•The entire project was completed in under four days with around 150 hours of labor.

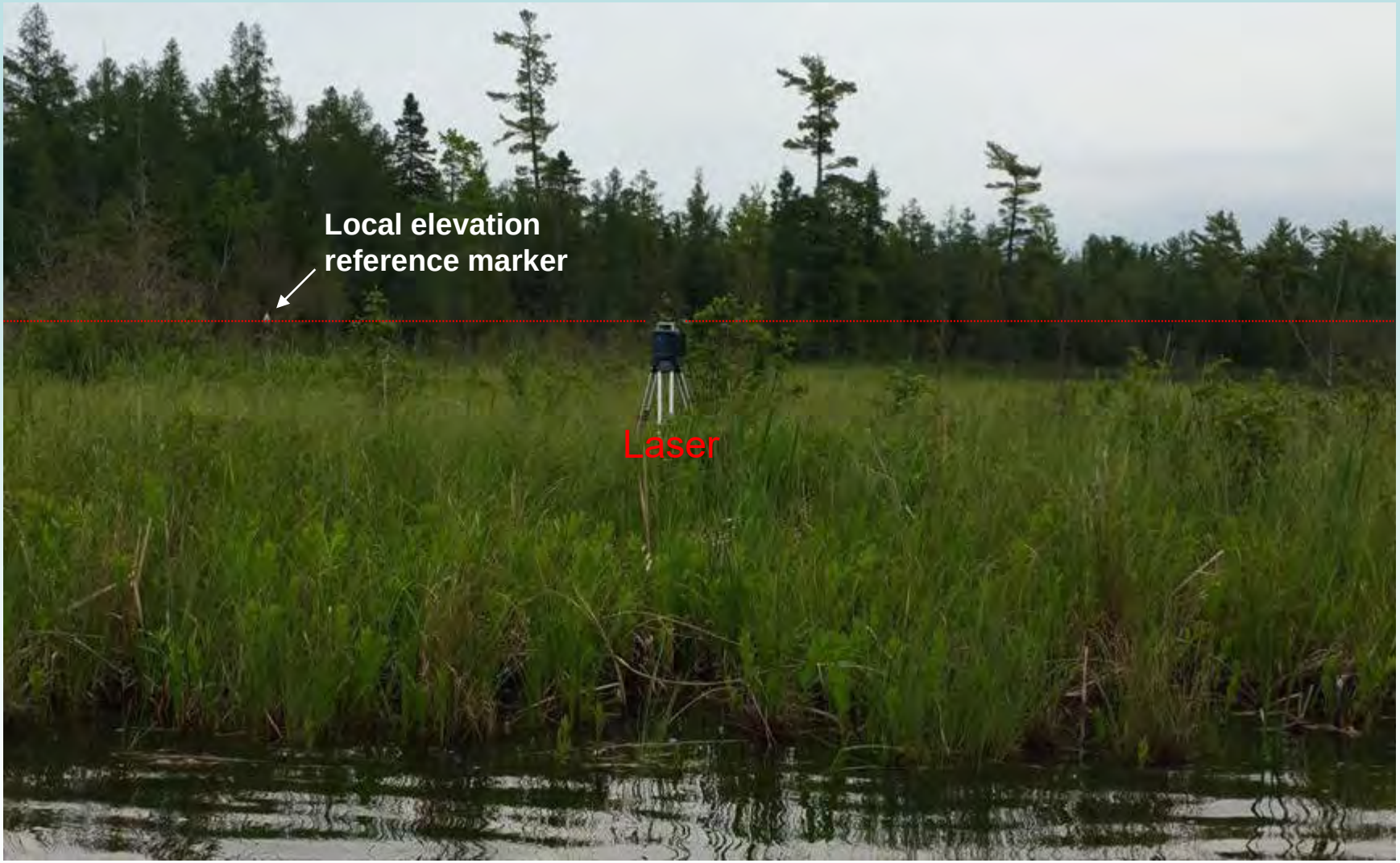
EARLY CHANNEL MONITORING RESULTS

- Emergent vegetation grows between tree bundles
- Width of river may be restored over time
- Where river is narrower, current increases and channel becomes deeper

EARLY CHANNEL MONITORING RESULTS



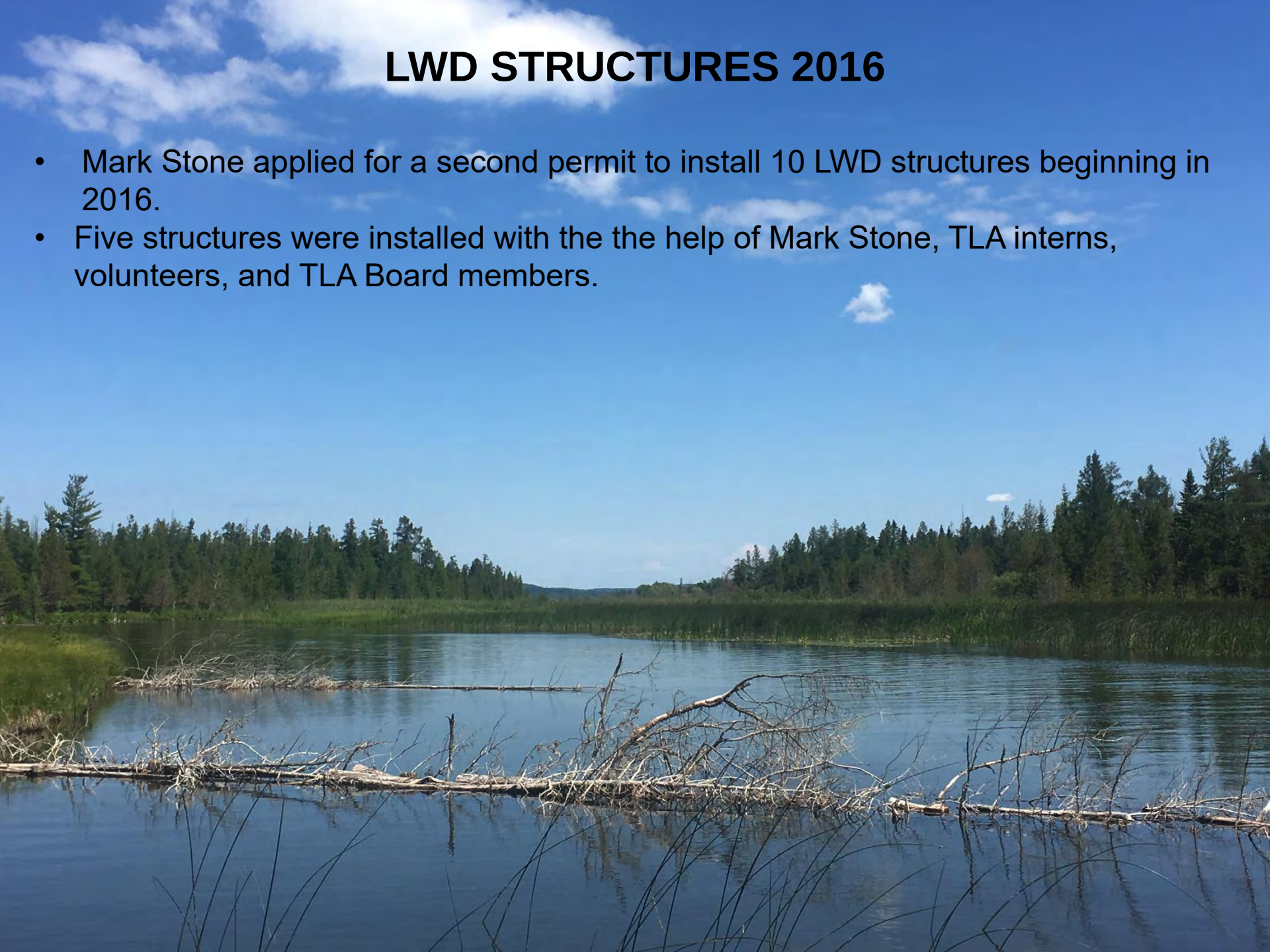
CHANNEL MONITORING PROCESS-2016



- Tree and white metal square used as a local elevation reference
- Laser is used to measure vertical distance to this elevation reference

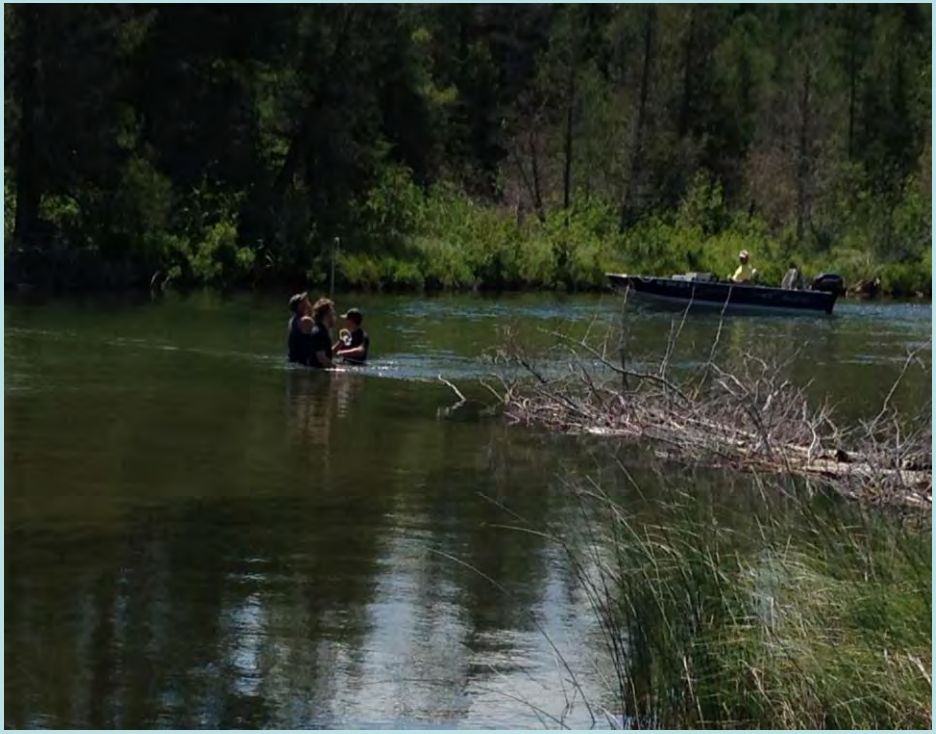
LWD STRUCTURES 2016

- Mark Stone applied for a second permit to install 10 LWD structures beginning in 2016.
- Five structures were installed with the the help of Mark Stone, TLA interns, volunteers, and TLA Board members.



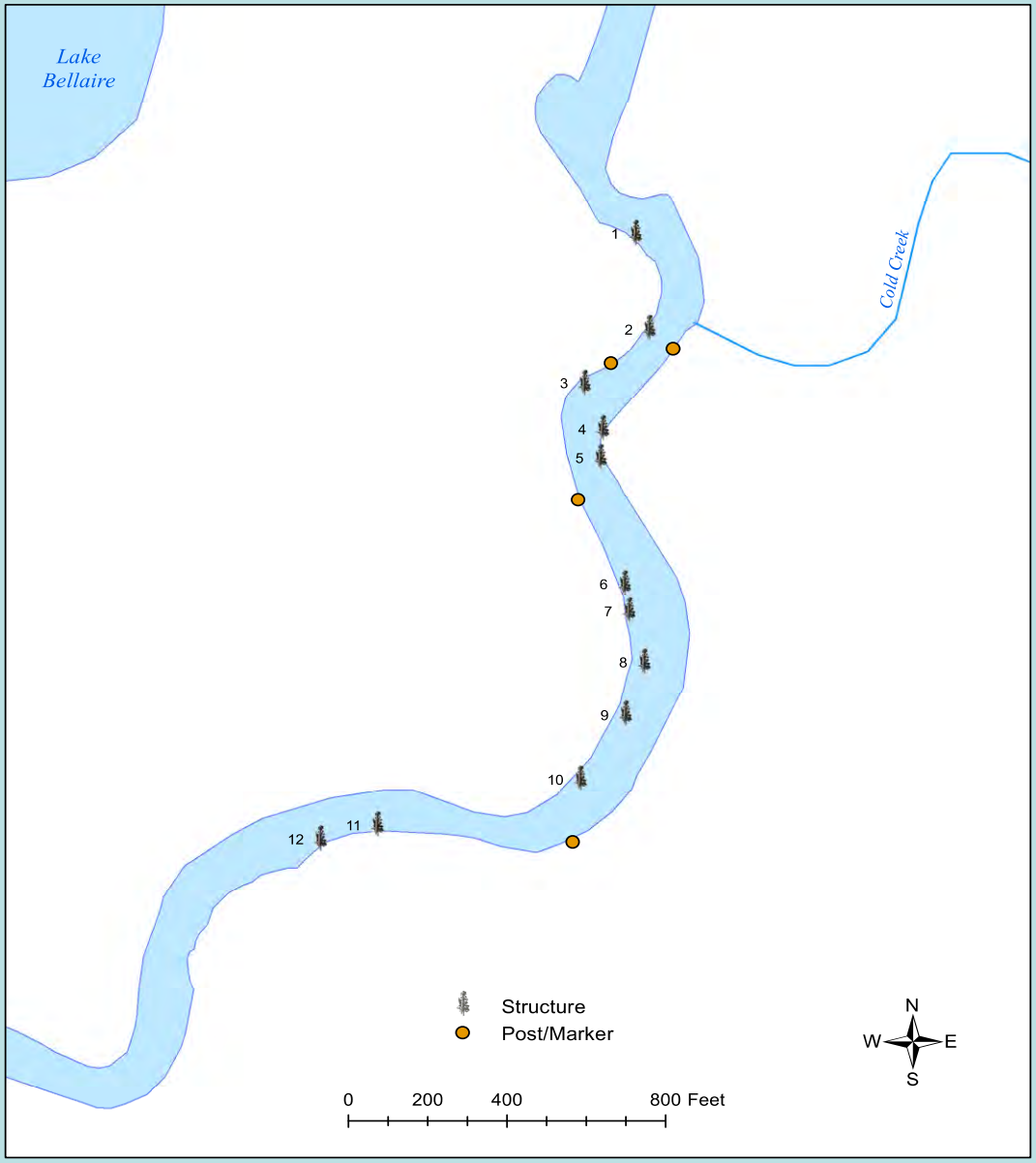
CHANNEL MONITORING PROCESS

- Vertical distance from elevation reference marker to the river bottom being measured along a chosen cross section before installing LWD



Grass River

Large Woody Debris



MOVING FORWARD

•Five more structures may be installed under the current permit conditions up until 2020.

•We will be able to compare results we obtain in spring 2017 to the measurements taken this summer.

•Placement of future LWD structures must be taken into great consideration in order to keep the river navigable and to not disturb the channel structure in harmful ways.

•Our work is just beginning and will continue for many years to come.

•If there's any interest from other lake associations about LWD work in your waterways, please feel free to contact Three Lakes Association.

•We will gladly help consult and assist along the way.

www.3lakes.com