



# The Hunt for Deepwater Lake Trout Spawning Habitat: ?A River Runs Through It?

John Janssen (jjanssen@uwm.edu), Tom Hansen (tomh@uwm.edu)  
(U. Wisconsin-Milwaukee)



**Synopsis:** Lake trout became extinct in Lake Michigan in the 1950's as a consequence of overfishing and predation by the introduced sea lamprey. Efforts to restore lake trout began in the mid-1960's and have been unsuccessful perhaps because stocking did not target the most important spawning areas for the indigenous lake trout. Records from commercial fishers suggested that stocking should focus mainly on two areas with offshore reefs. Beginning in 1985 offshore reefs, including deep reefs (40-50 summits) have been the major focus for stocking juvenile lake trout.

In 2001 we began collecting viable embryos at several sites and began collecting sac fry in 2003 by ROV. After these initial technological successes we began mapping spawning habitat with 7-8 major subreefs and several minor ones. Qualitatively the spawning requirements are loose cobble and a current. The cobble must be near the a dropoff, either downslope or at the edge of the dropoff, probably to intercept deepwater currents.

## Mapping bathymetry and collecting eggs and sac fry

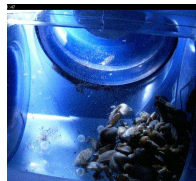
### Deepwater bathymetry mapping.

Existing NOAA maps have about 1-2 km resolution (Fig. 1, center of poster), so detailed bathymetry maps were generated by multibeam sonar (N. Watrus, U. Minn.-Duluth). Fig. 2 is Northeast Reef; Fig. 3 is East Reef.

**Collecting lake trout eggs, sac fry, and fry.** An unmanned submarine (ROV, below right) was modified to collect lake trout eggs via suction sampling (upper right shows eggs in the collecting chamber) and electroshock and suction sample sac fry.



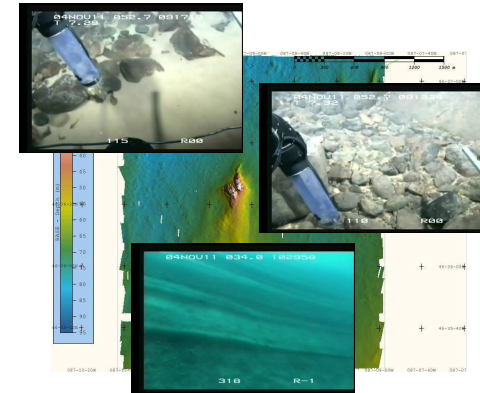
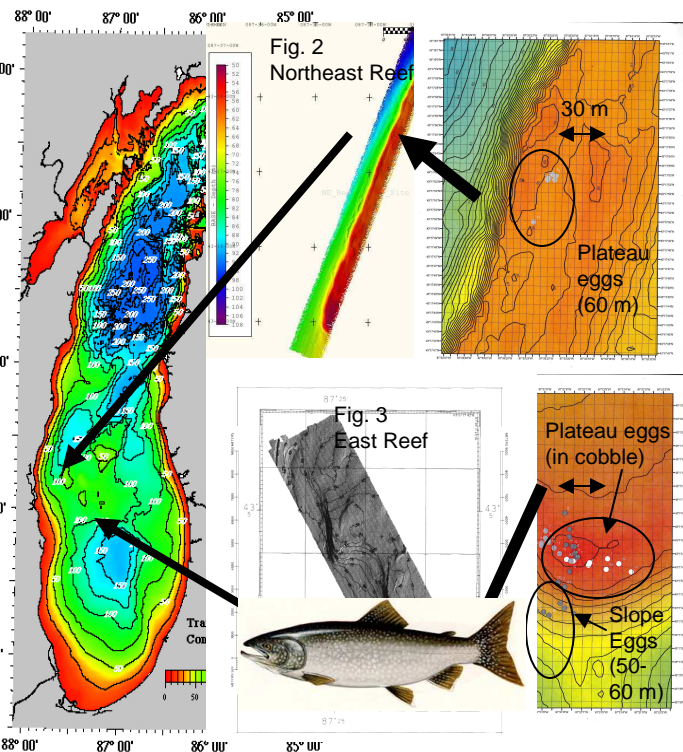
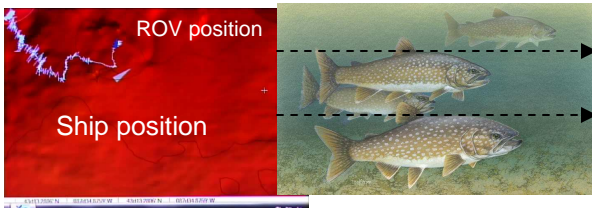
ROV



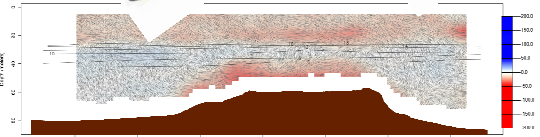
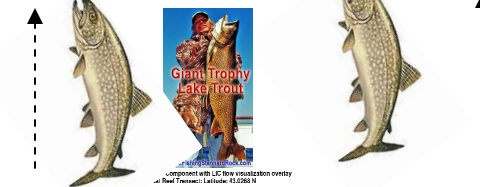
ROV viewing chamber with lake trout eggs

### Tracking the Submersible (below)

The ROV has a tracking system that allows us to determine GPS coordinates for each sampling event. These data can then be overlaid on the multibeam bathymetry map to show where eggs and sac fry are most abundant. It also allows us to target sites for more extensive sampling. This area is at the south end of East Reef.



?Exception that proves the rule? Cobble exposed by scour at the base of Shot Point Reef (50 m, Lake Superior).



**Deepwater currents.** Below are the direction and relative speeds for a transect over one East Reef spawning sites. Above shows speed enhancement over the reef from vertical profiles. (Via ADCP).

### Physical Distribution of Eggs (Above maps)

Lake trout eggs are found in cobble on slopes, but only if exposed to deep currents. Slope egg deposition is well-known for shallow spawning (surge zone). We also find eggs atop the reef plateau, in cobble, but only if close to the reef dropoff

