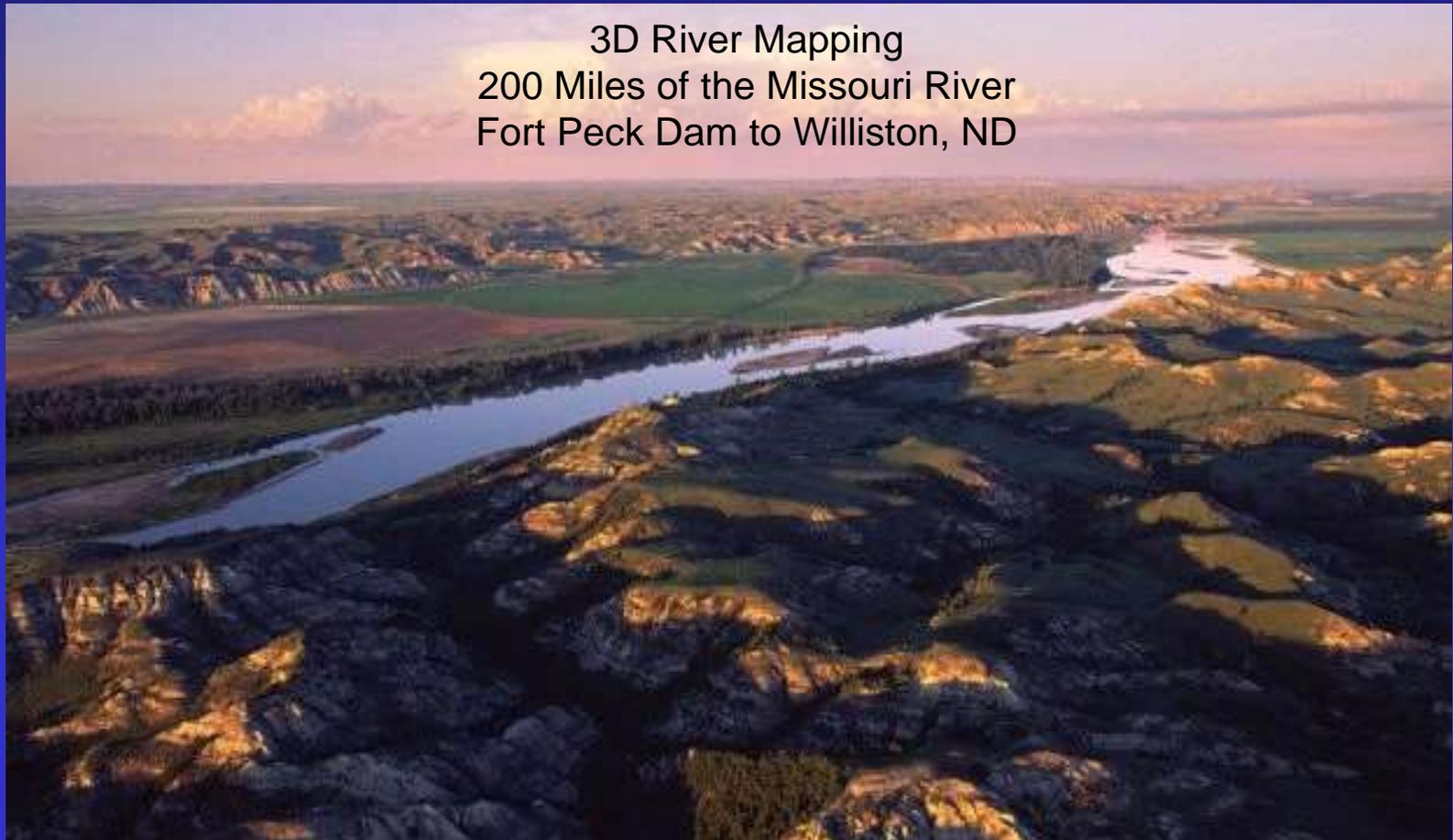


River Analyzer: A New 3D Hydro-Acoustic River Mapping Tool to Assess Hydraulic Conditions and Fish Habitat over Hundreds of River Kilometers.

Brian Marotz, Hydropower Mitigation Coordinator – Montana Fish Wildlife & Parks

Dr. Mark Lorang, Chief Science Officer – Freshwater Map





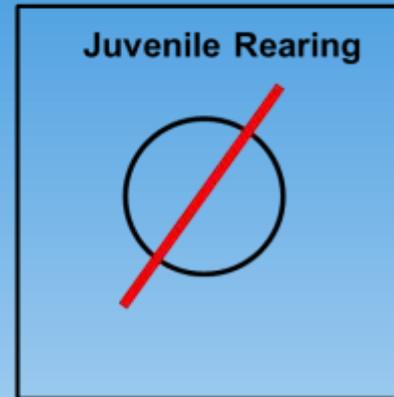
Study Area

200+ Miles of Missouri River - Milk River to Williston, North Dakota

Pallid Sturgeon Life-Cycle



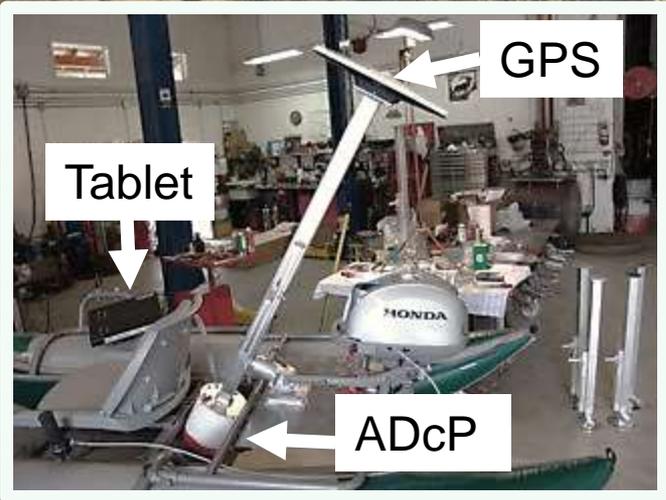
**FLUSHED TO ANOXIC
WATER IN DOWNSTREAM
RESERVOIR AND DIE.**



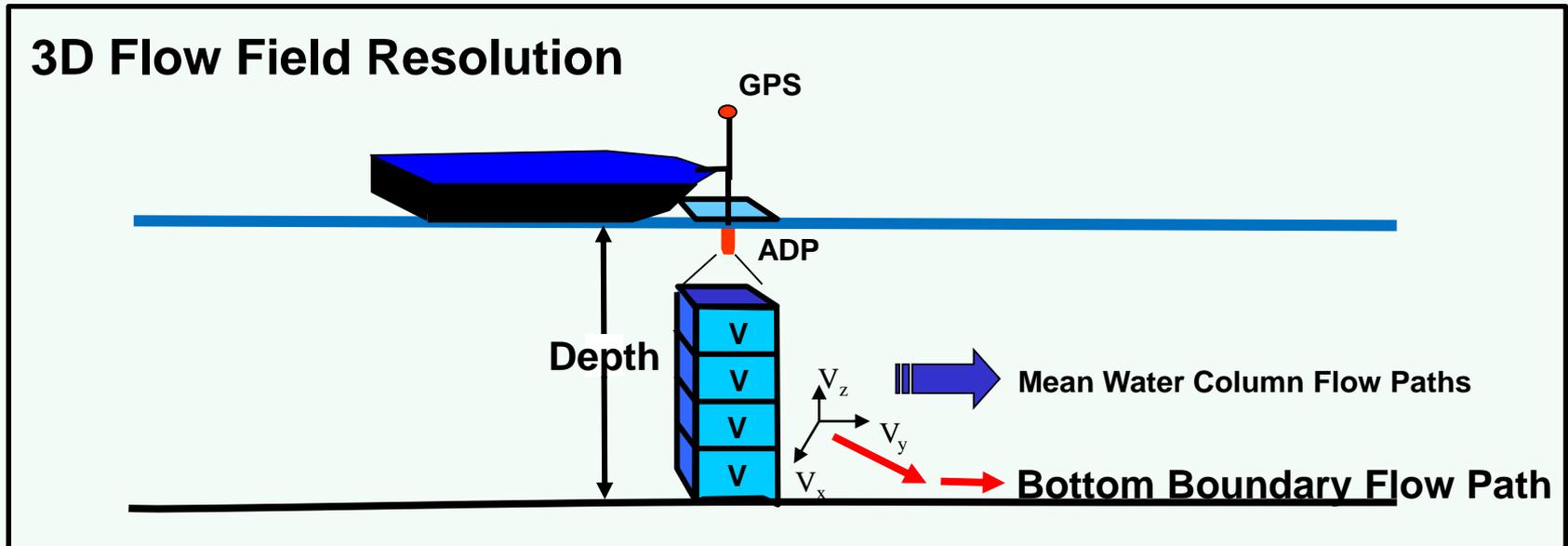
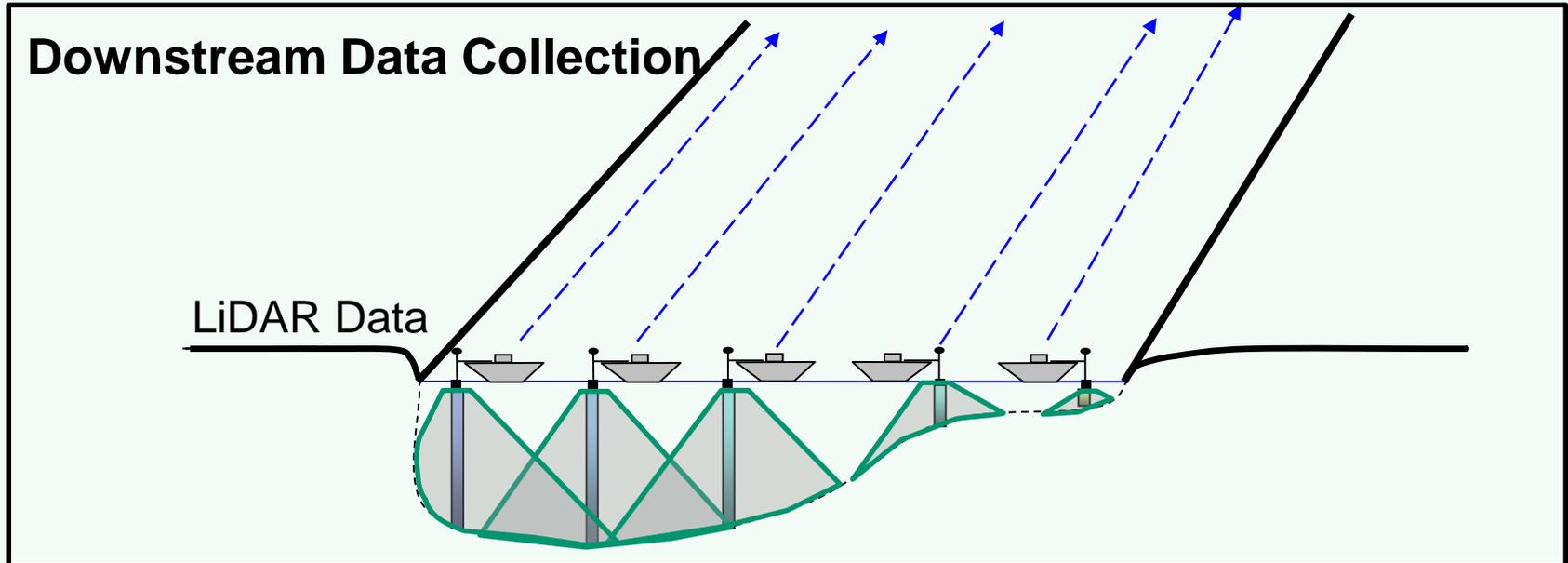
HABITAT ISSUE



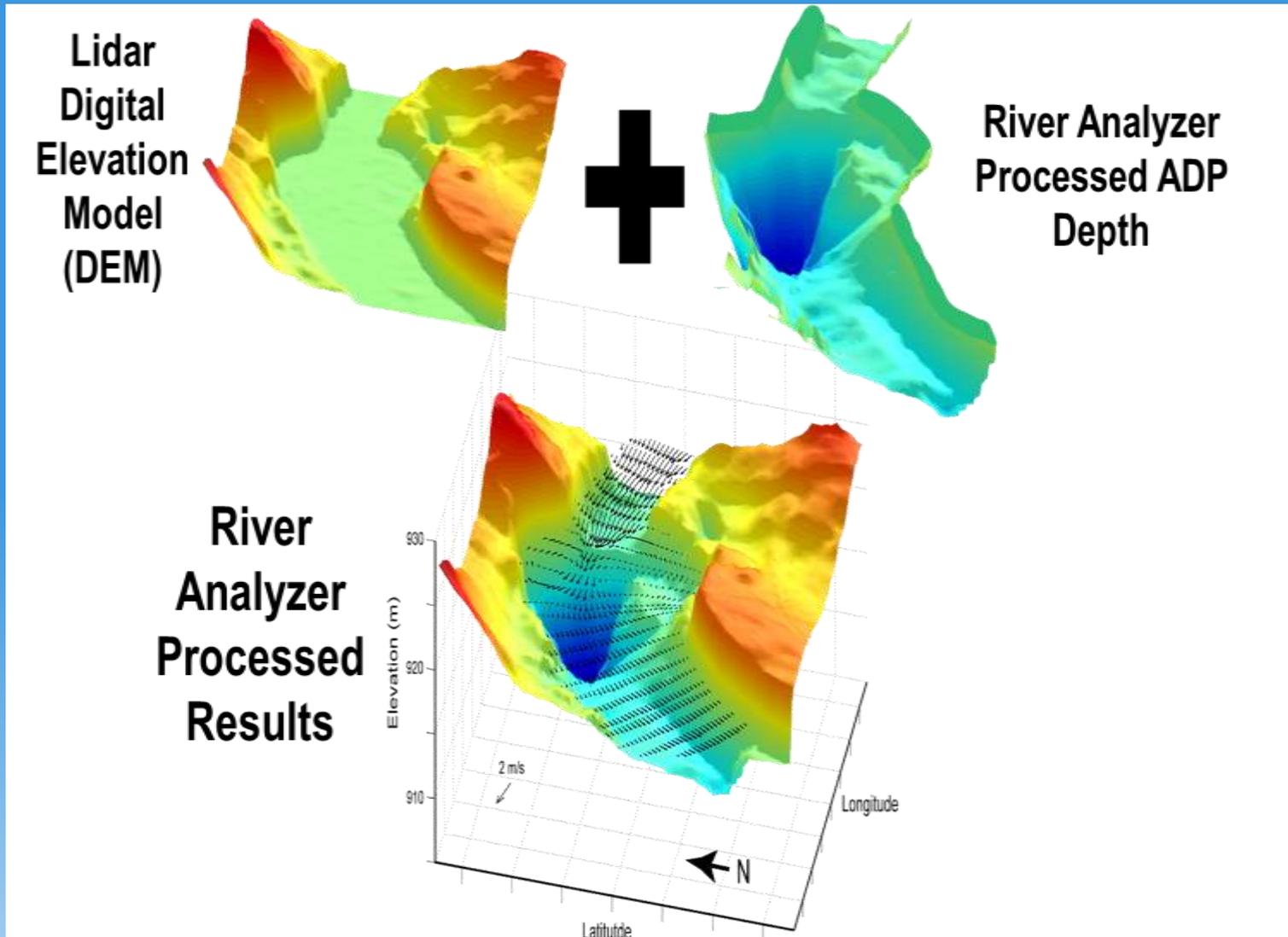
Boats Deploying Acoustic Doppler Current Profilers with Compass-Oriented GPS



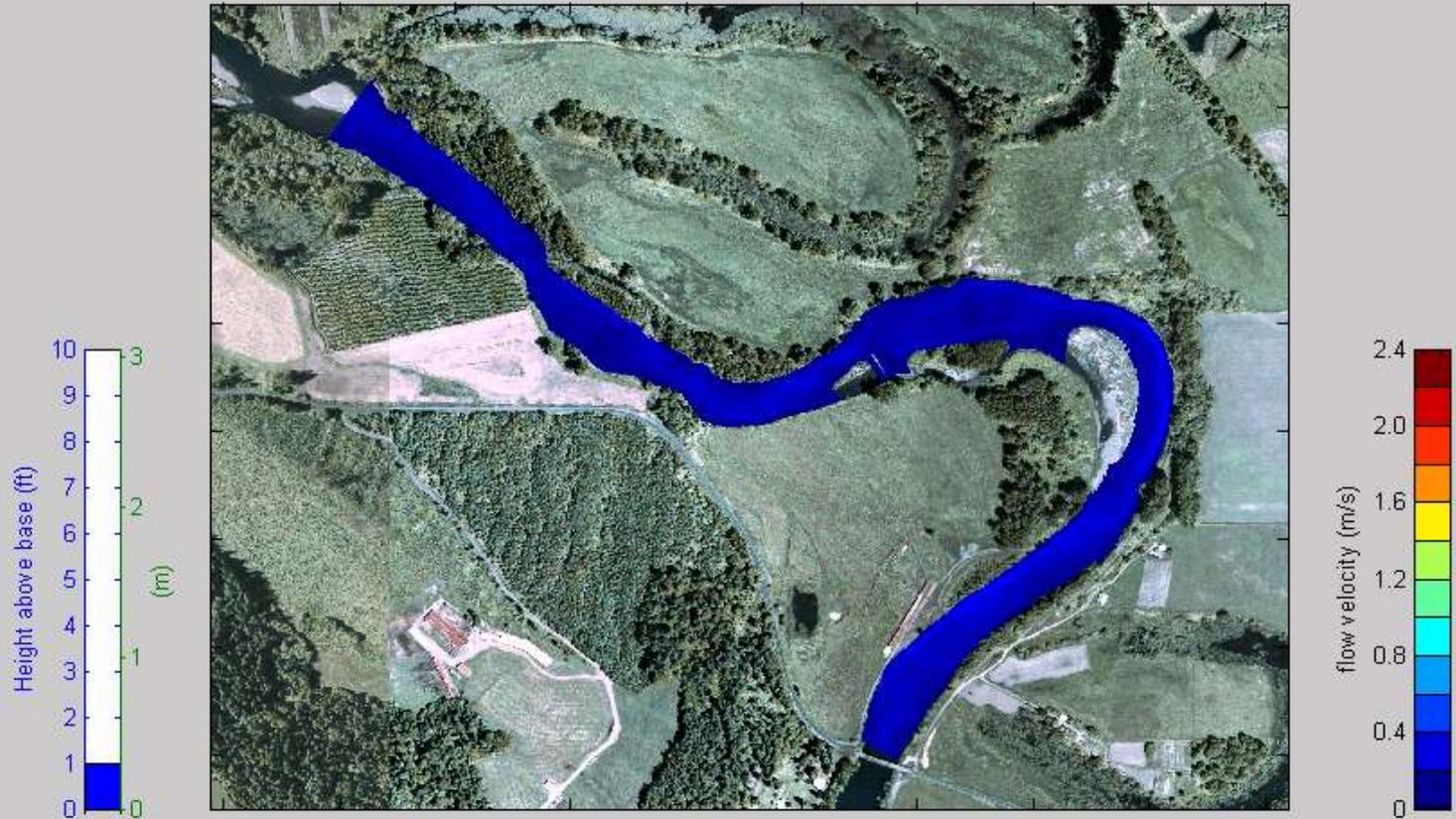
An Array of Boats Drift Downstream in Lanes Covering the River Width



RIVER ANALYZER: First Step of Data integration



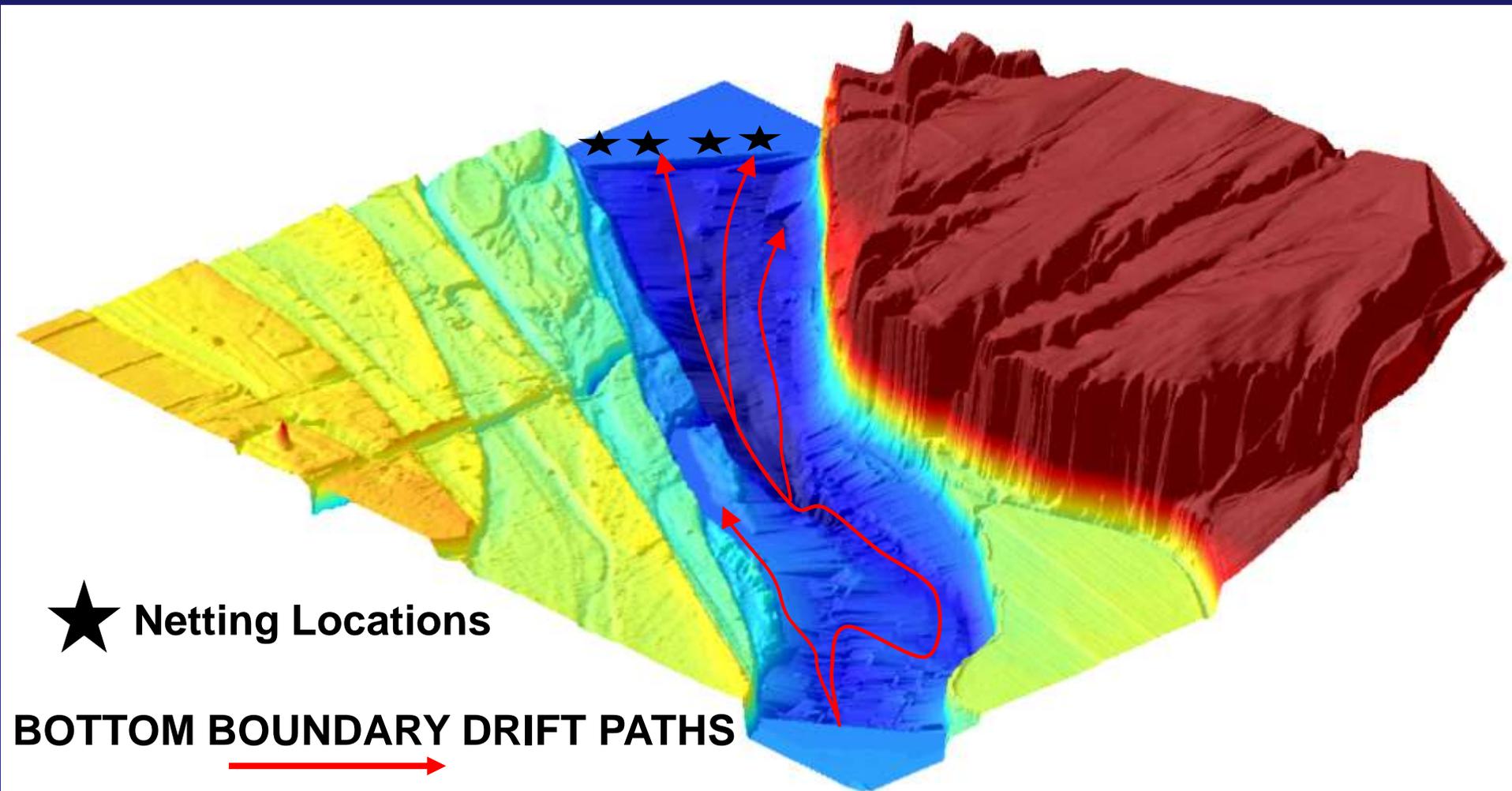
Repeat Surveys Allow Calculation Over the Range of River Stages



Dave Fuller (MFWP): Upper Missouri River Pallid Sturgeon

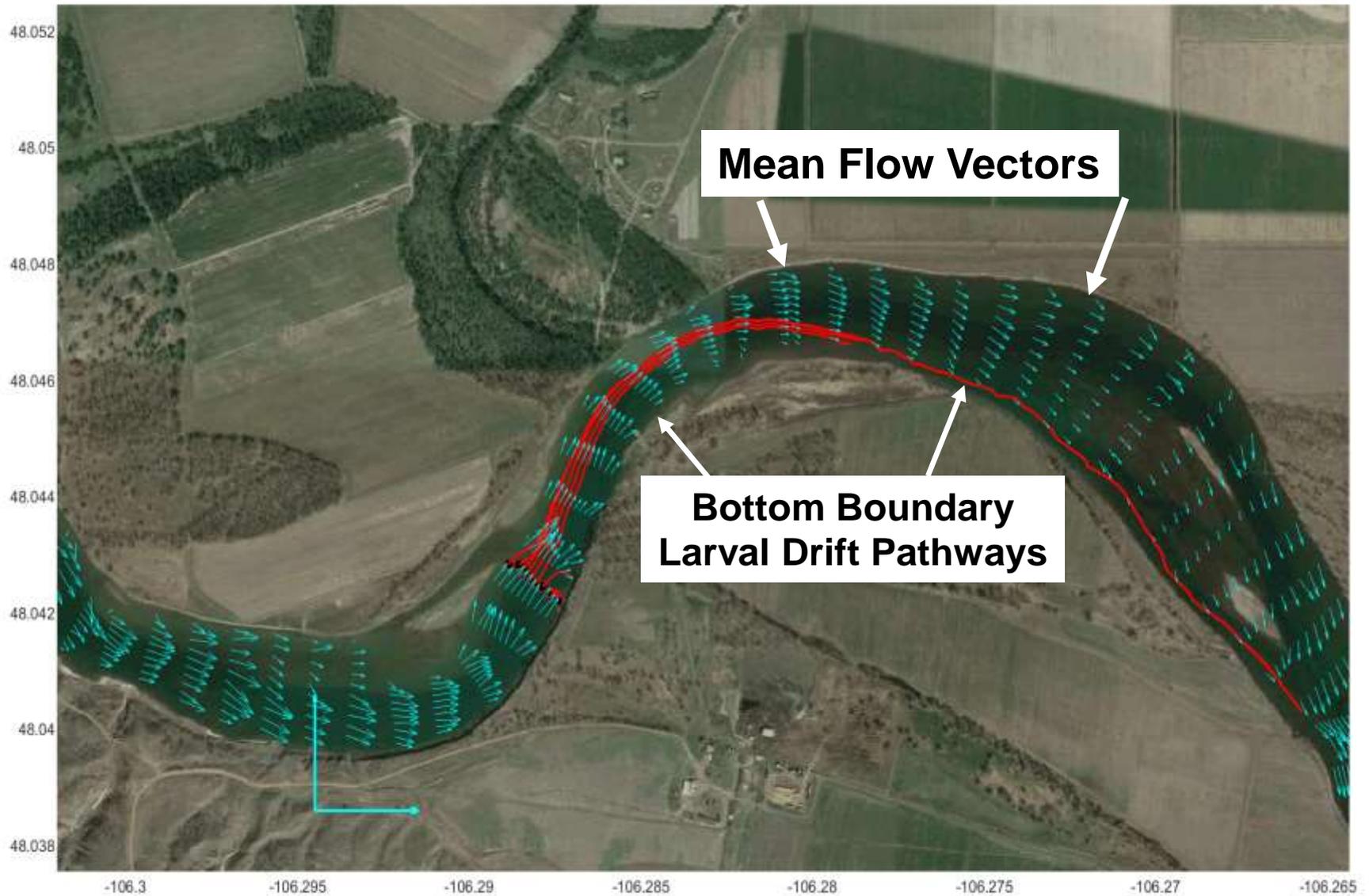


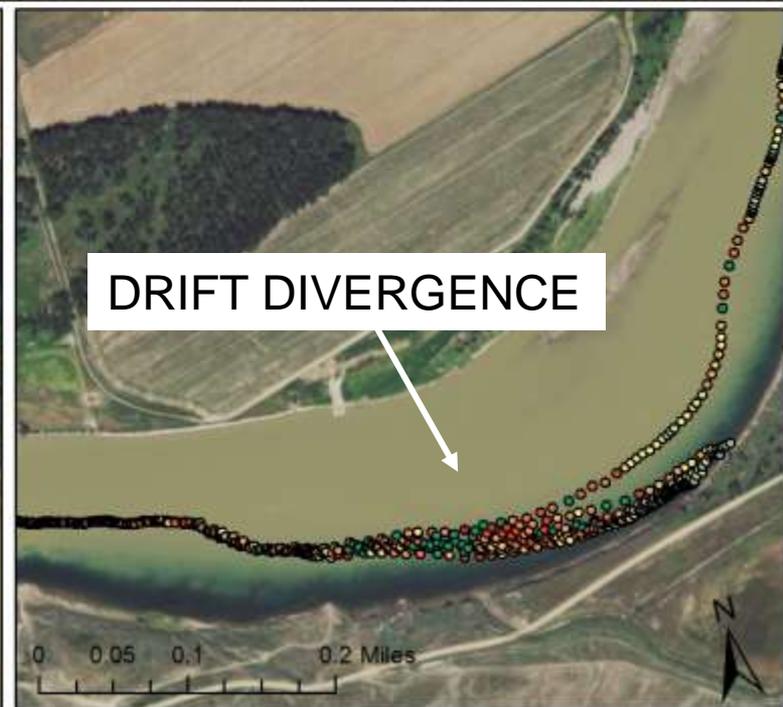
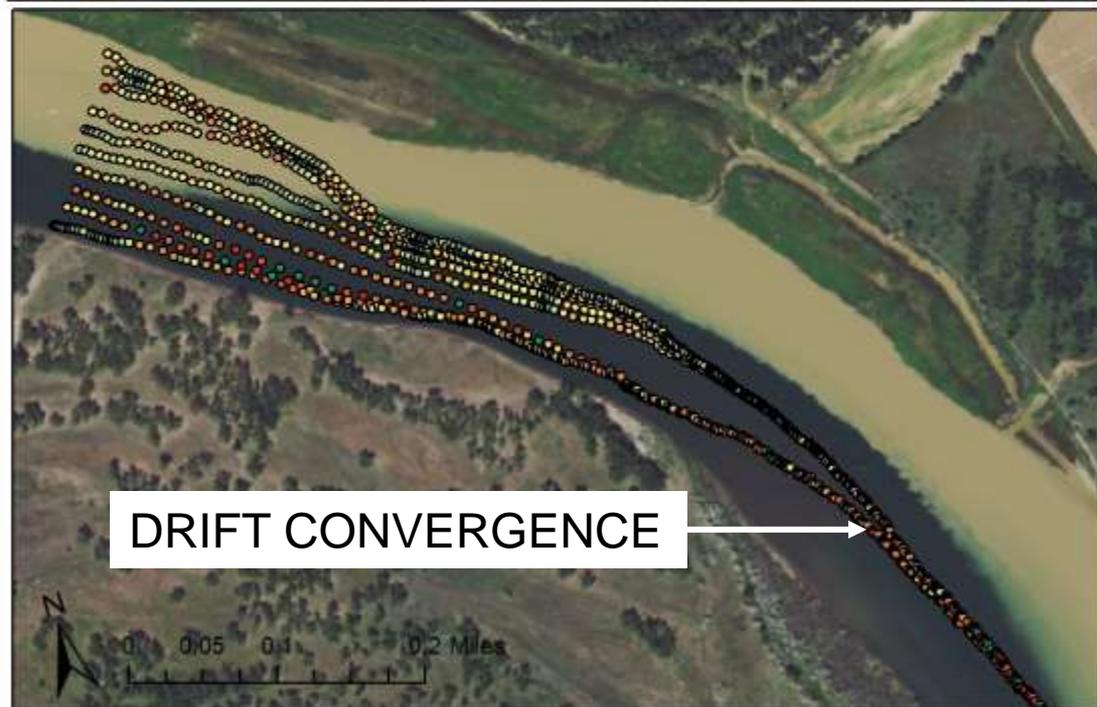
Channel Complexity and Embryo Drift Paths

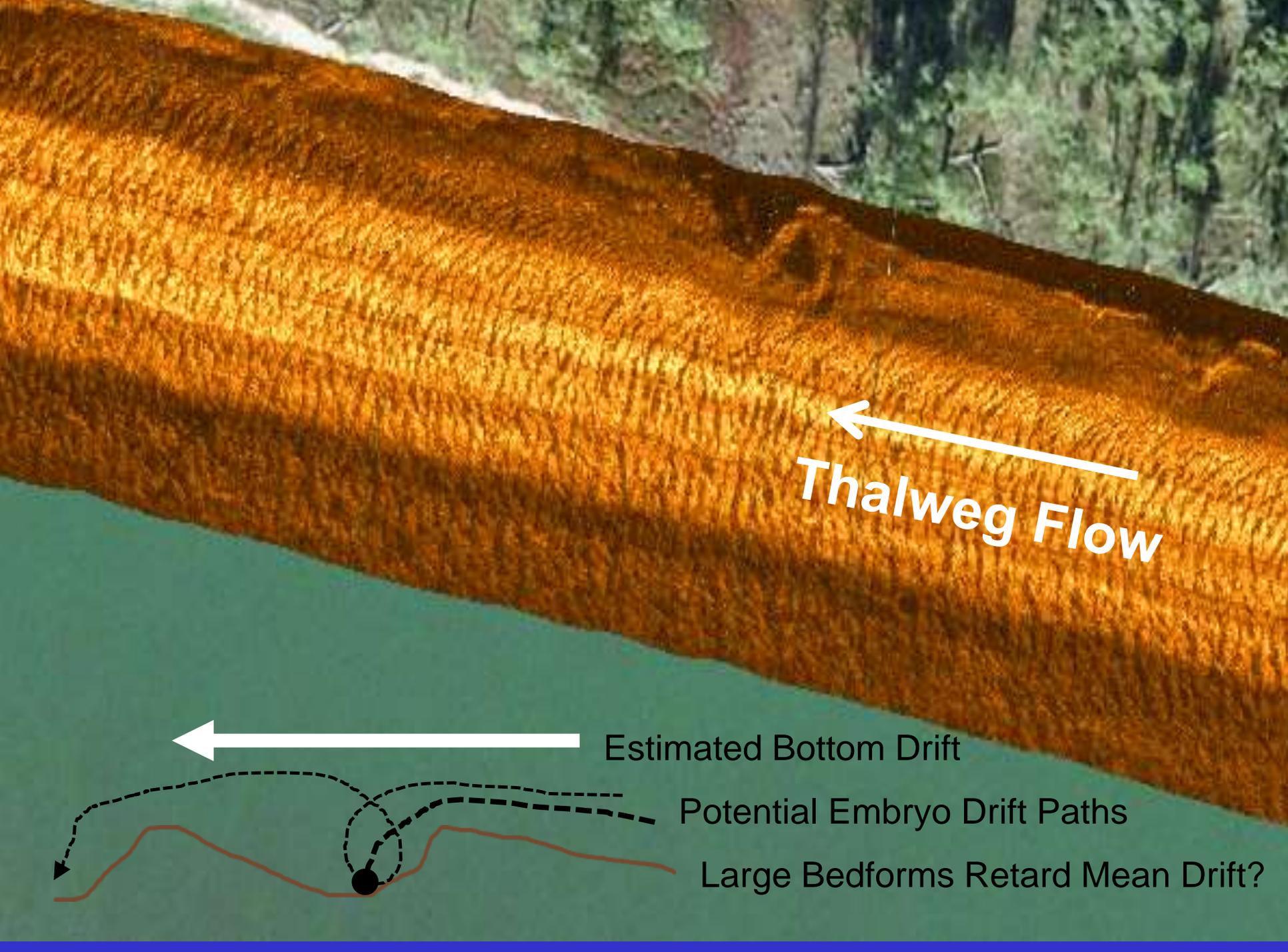


Channel Bathymetry with Floodplain Topography from LiDAR, Informs Calculation of Larval Drift Speed and Pathways

Flow Complexity and Larval Drift Pathways







←
Thalweg Flow

←

Estimated Bottom Drift

Potential Embryo Drift Paths

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—

Large Bedforms Retard Mean Drift?

Conclusions

3D River Mapping Allows Examining Larval Pallid Sturgeon Drift Over Long Distances

Channel Bedform and Hydraulic Complexity Controls Larval Drift Speed and Pathways

- a) Vertical Flow Vectors Carry Larvae into Slow Bottom Velocities or Up into Faster Currents**
- b) Horizontal Flow Vectors Concentrate or Disperse Larvae**
- c) Areas of Divergence Carry Larvae into Slow velocity Shoreline Habitats, extending River Residence Time**

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