

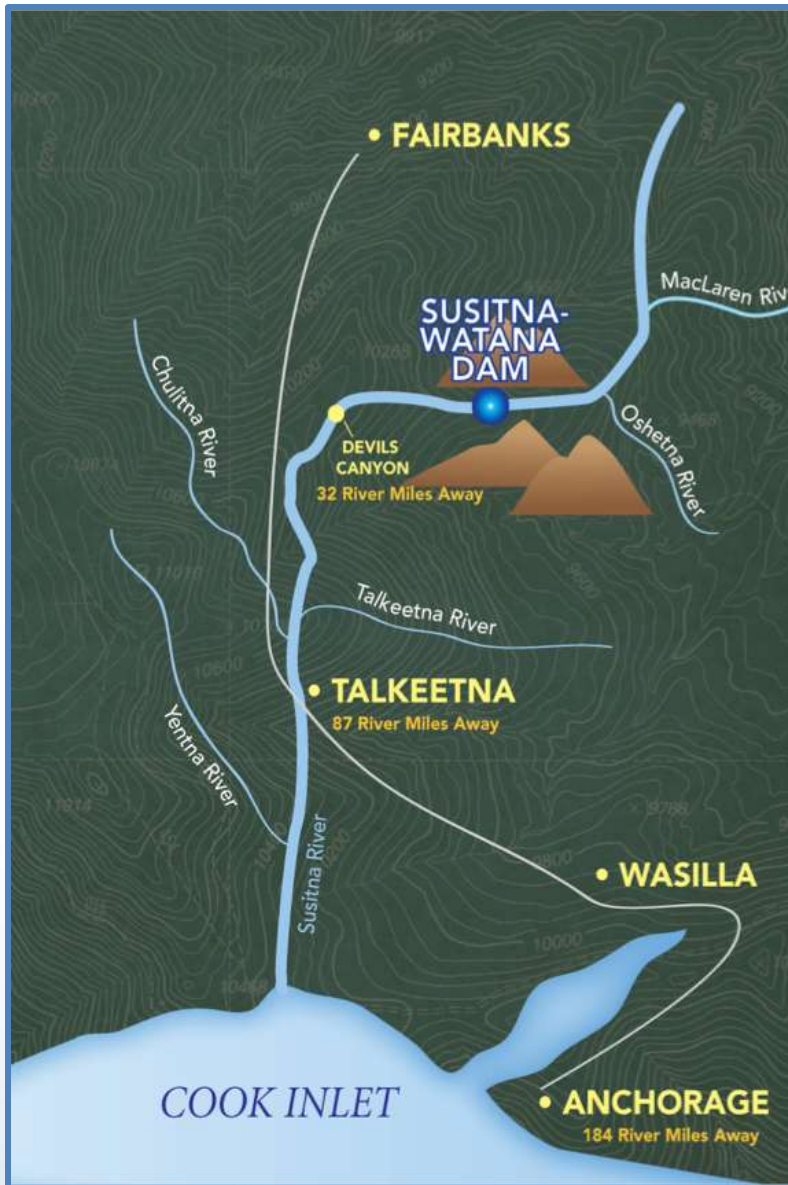
Technical Team Meeting

Riverine Modeling Proof of Concept

River2D Ice Processes Modeling

April 15-17, 2014

Prepared by HDR



SUSITNA-WATANA HYDRO *Clean, reliable energy for the next 100 years.*

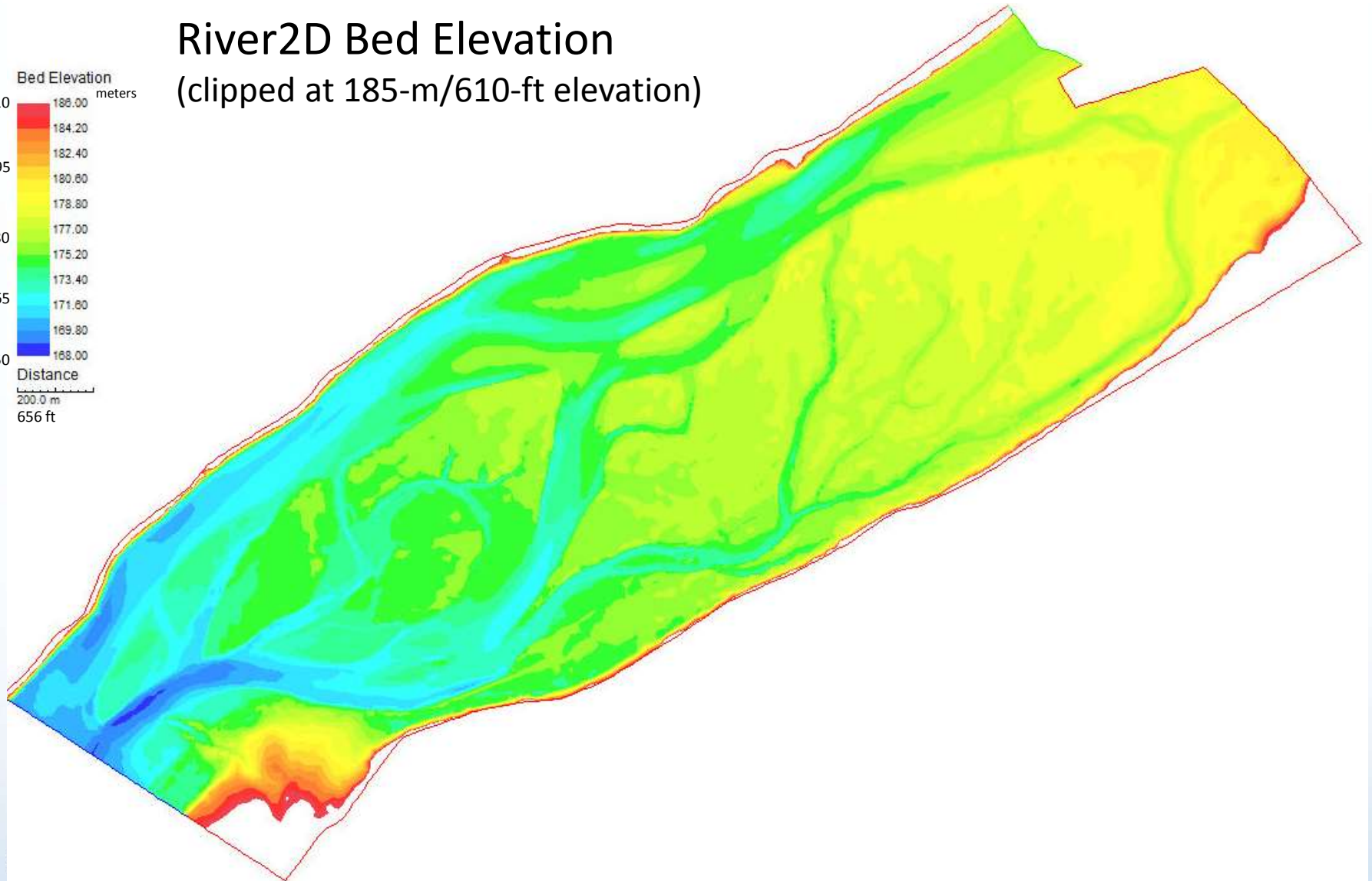
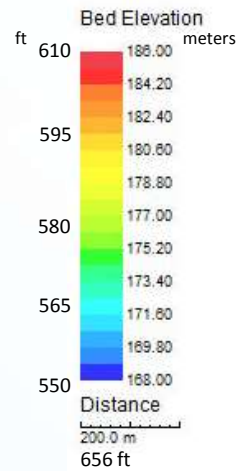
Riverine TT Meeting Issues Raised

- How are the River1D and River2D models brought together?
- How will the transition from open water to ice cover impact access to the lateral habitat? How to model?
- How will seasonal impacts/changes be modeled if River2D is only at specific times?
- How will the effects of load following be modeled?
- What about the dynamic conditions of load following?

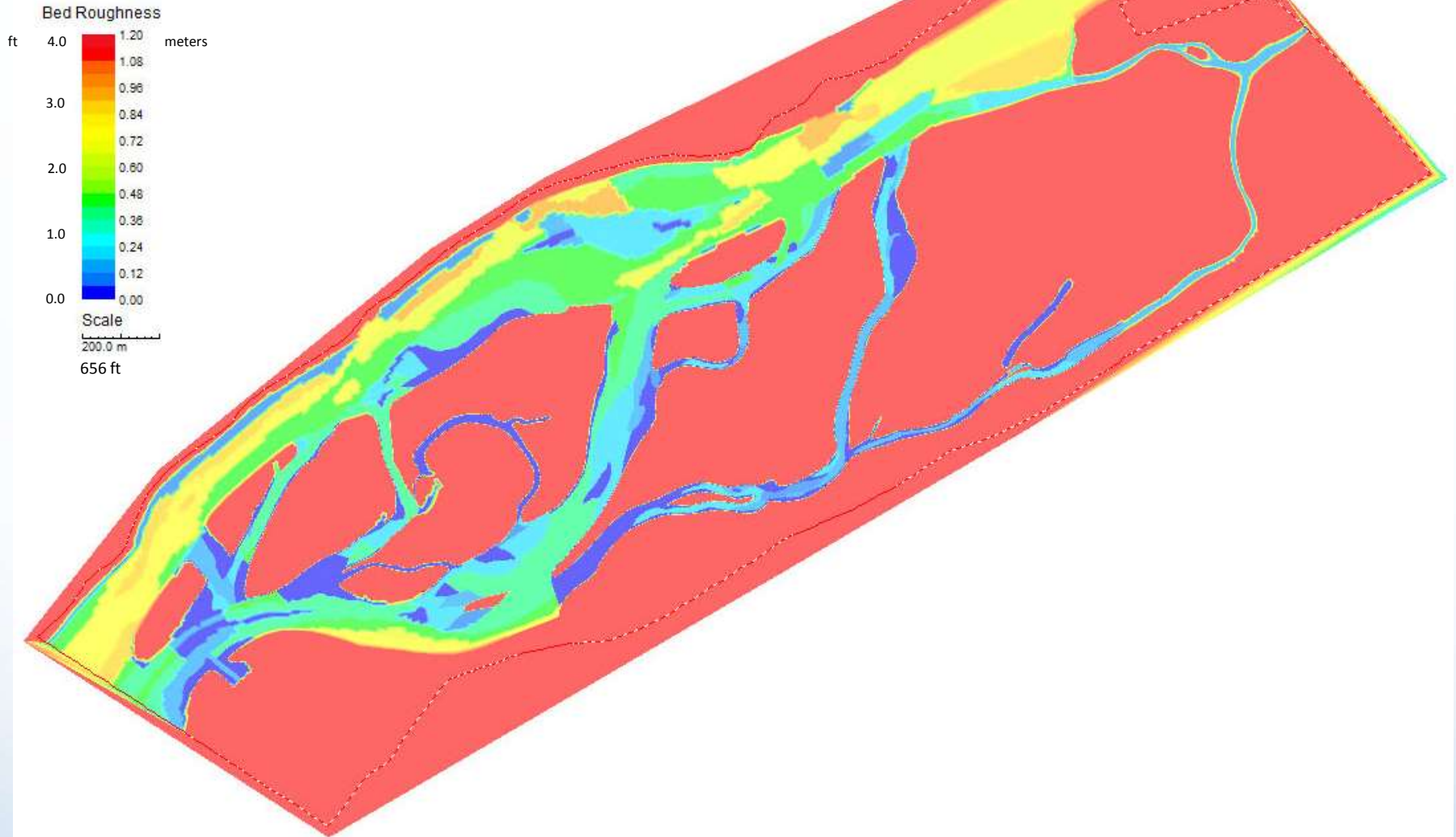
FA-128 (Slough 8A) River2D Modeling

- 6,000 cfs – open water (Gold Creek)
- 6,000 cfs as freeze-up begins (side channels ice over)
 - November 1, 2012
- 6,000 cfs with freeze-up ice cover on main channel
 - November 20, 2012
- 2,000 cfs with freeze-up cover
 - Mid-winter, low flow conditions
- 8,000 cfs, 10,000 cfs, and 12,000 cfs release from the dam with freeze-up ice cover to simulate OS-1b

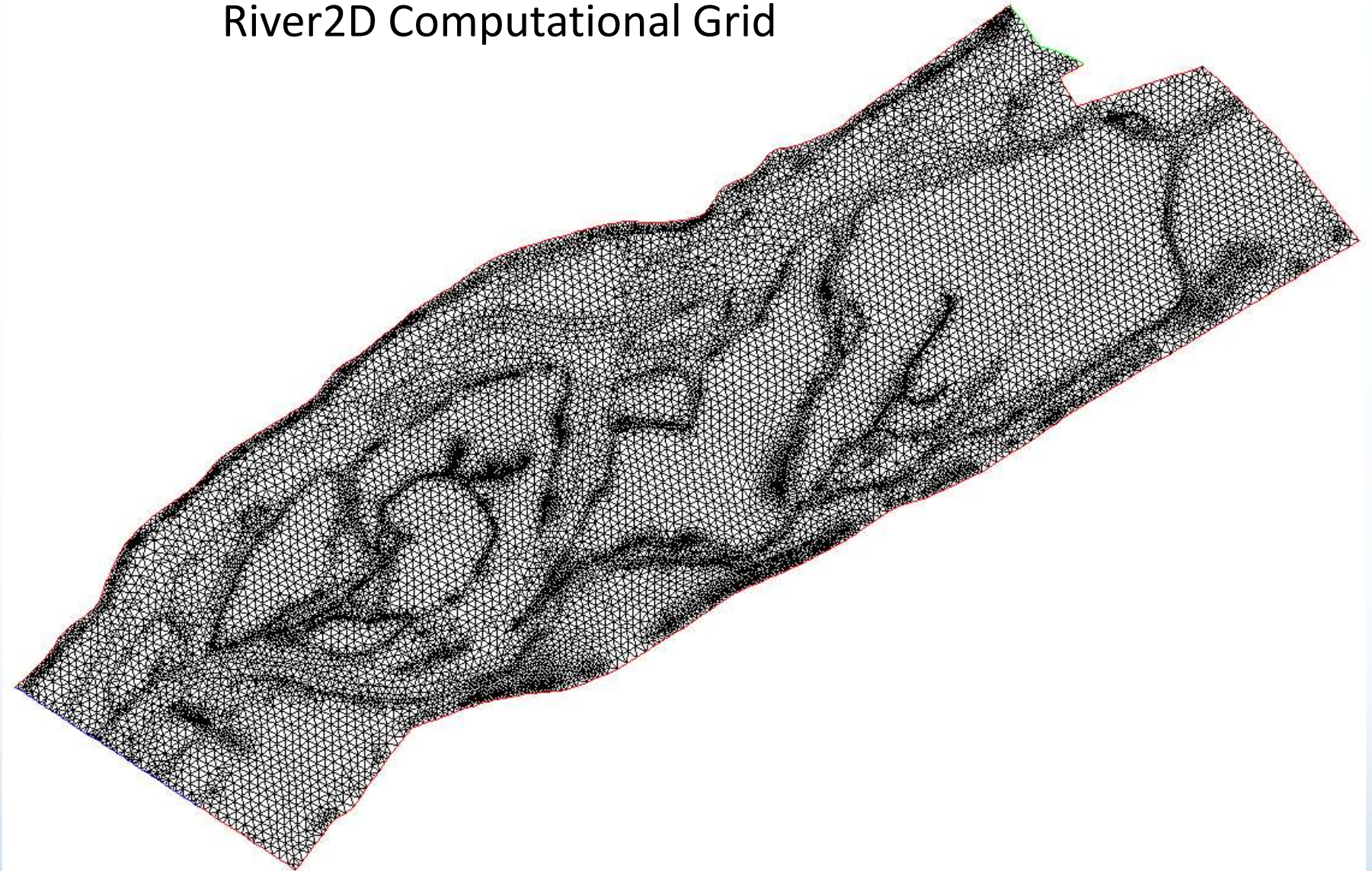
River2D Bed Elevation (clipped at 185-m/610-ft elevation)



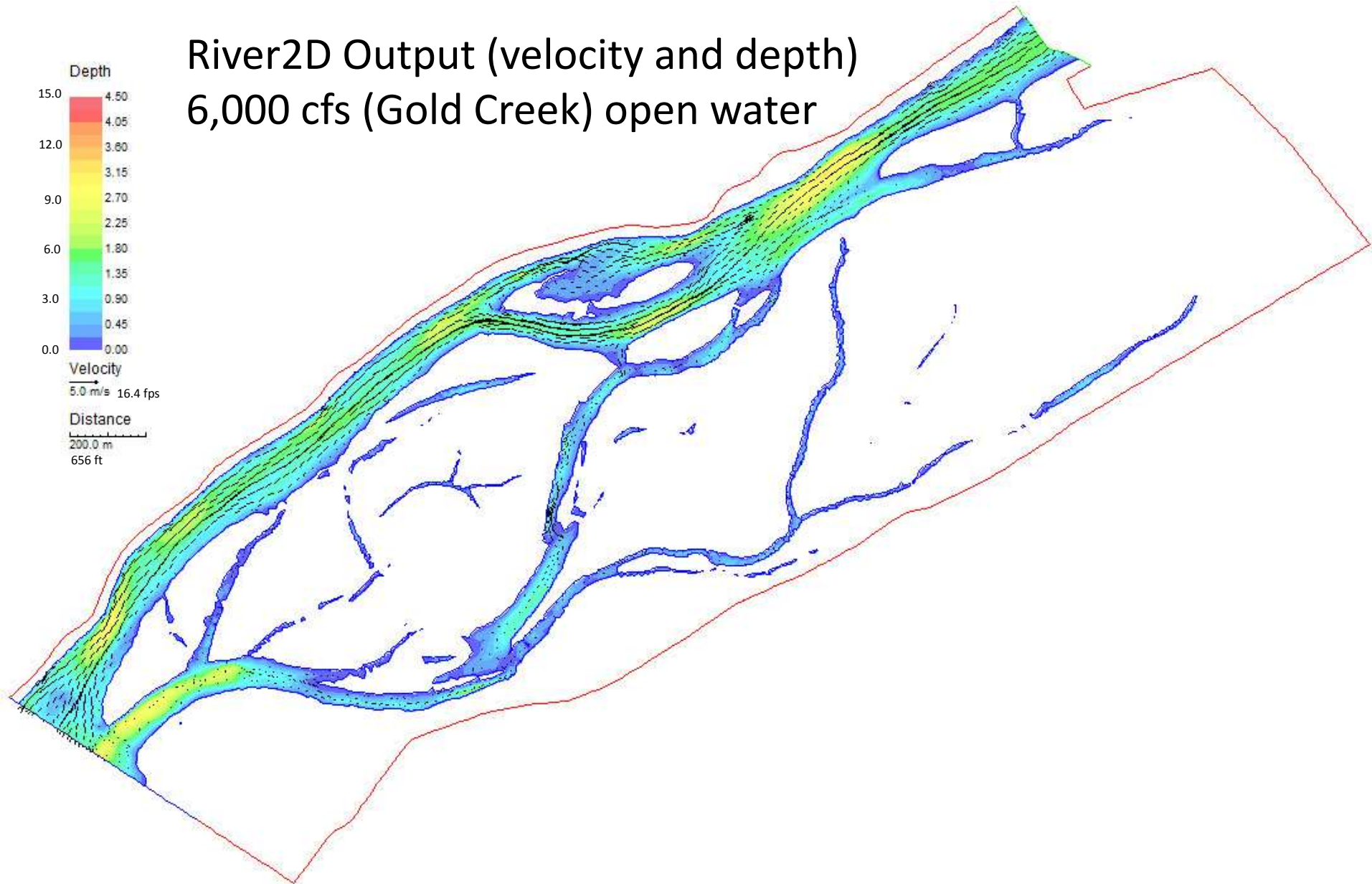
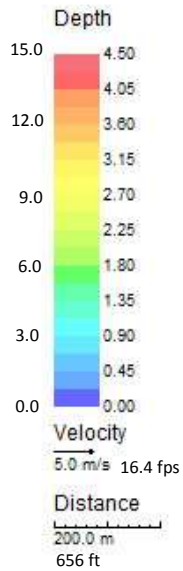
River2D Bed Roughness Length ($k = 3D_{84}$ in meters)



River2D Computational Grid



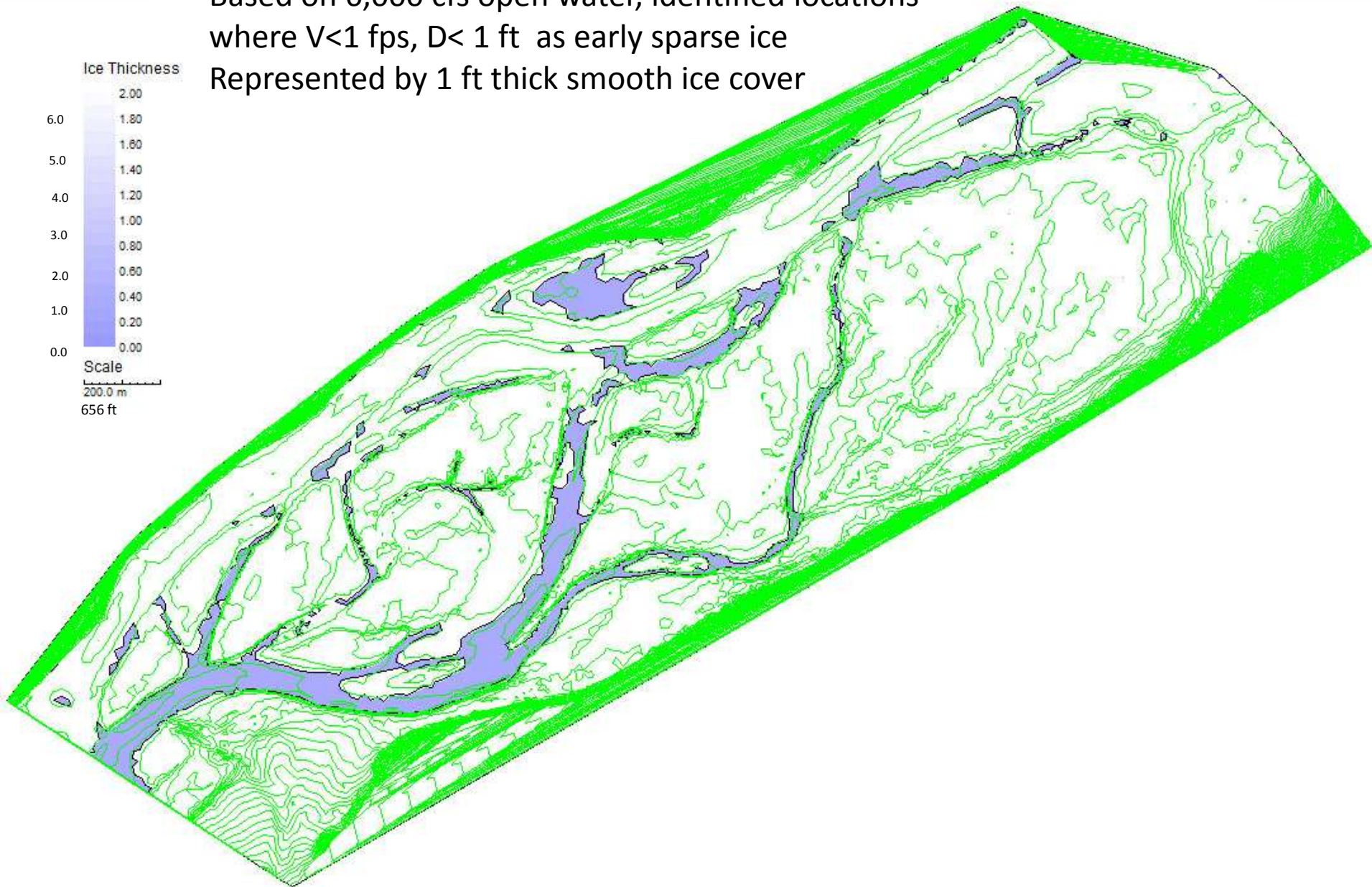
River2D Output (velocity and depth) 6,000 cfs (Gold Creek) open water



FA-128 (Slough 8A) on November 1, 2012
Early freeze-up conditions, ~6,000 cfs (Gold Creek)



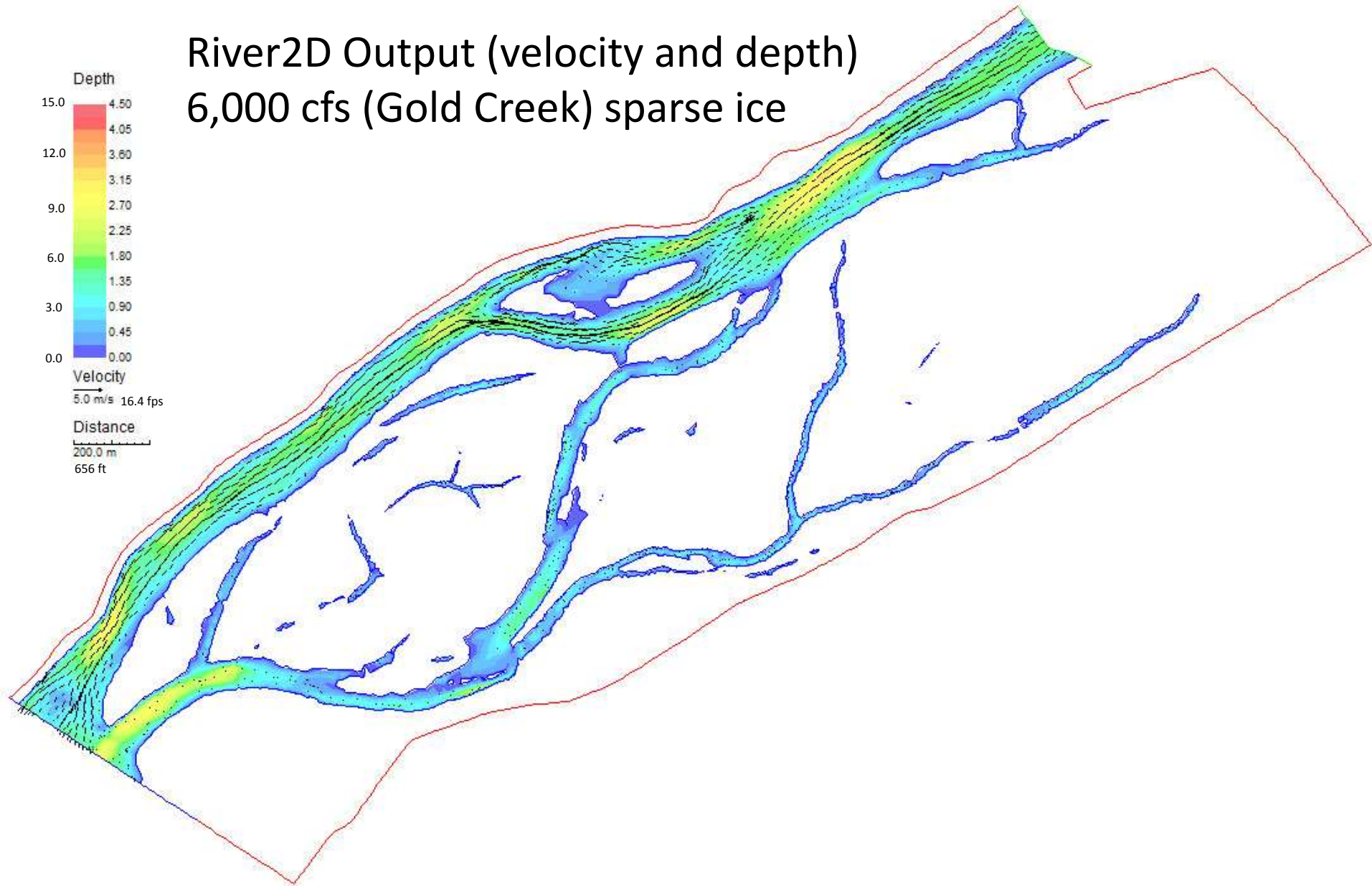
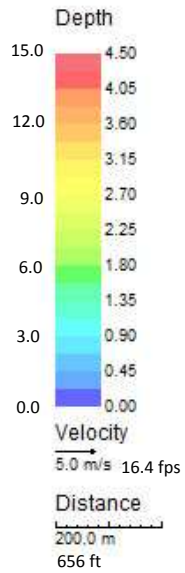
Based on 6,000 cfs open water, identified locations where $V < 1$ fps, $D < 1$ ft as early sparse ice
Represented by 1 ft thick smooth ice cover



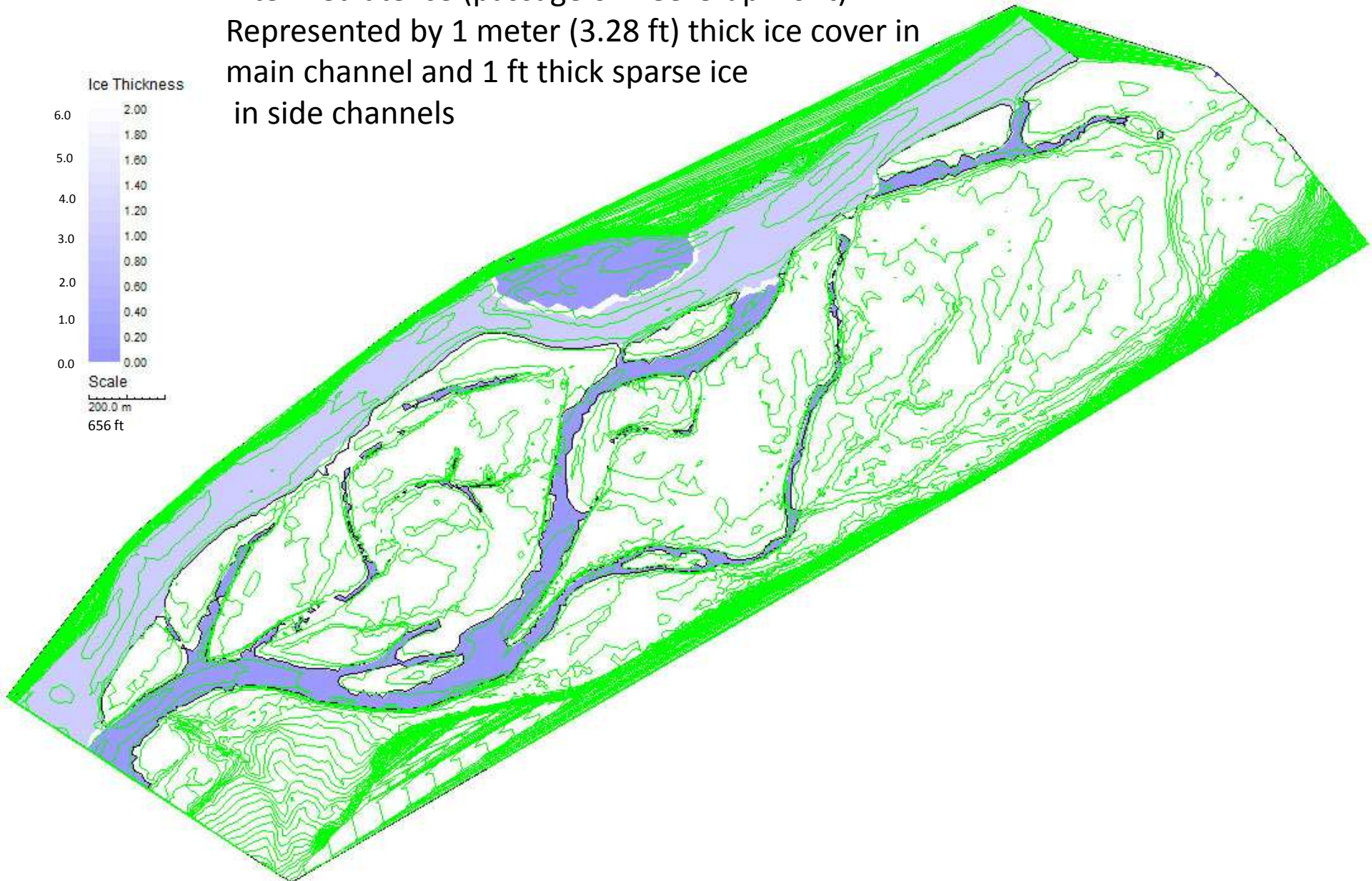
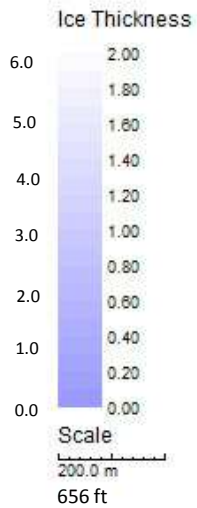
FA-128 (Slough 8A) on November 20, 2012
Sparse ice conditions, <6,000 cfs (Gold Creek)



River2D Output (velocity and depth) 6,000 cfs (Gold Creek) sparse ice



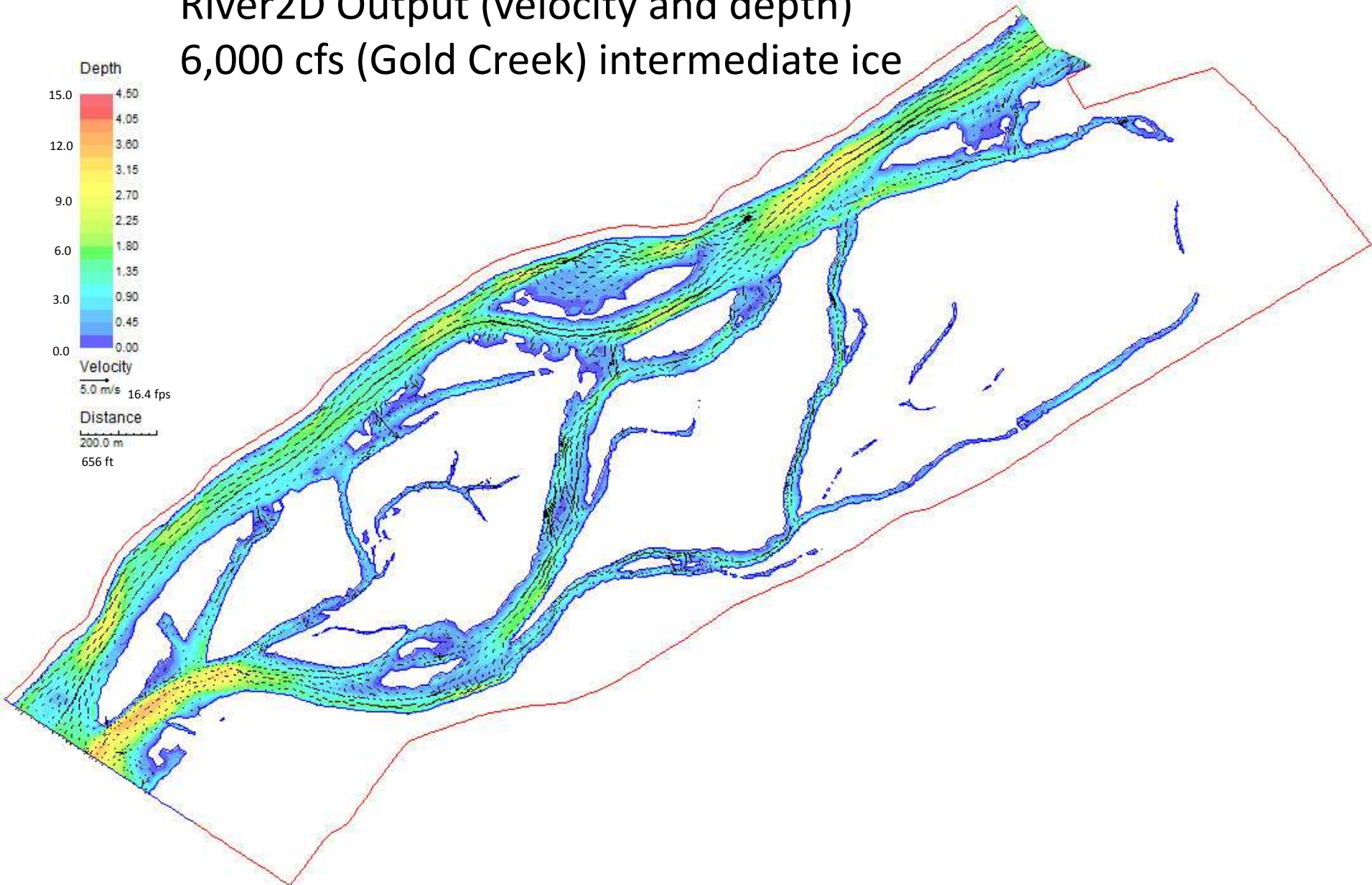
Intermediate ice (passage of freeze-up front)
Represented by 1 meter (3.28 ft) thick ice cover in
main channel and 1 ft thick sparse ice
in side channels



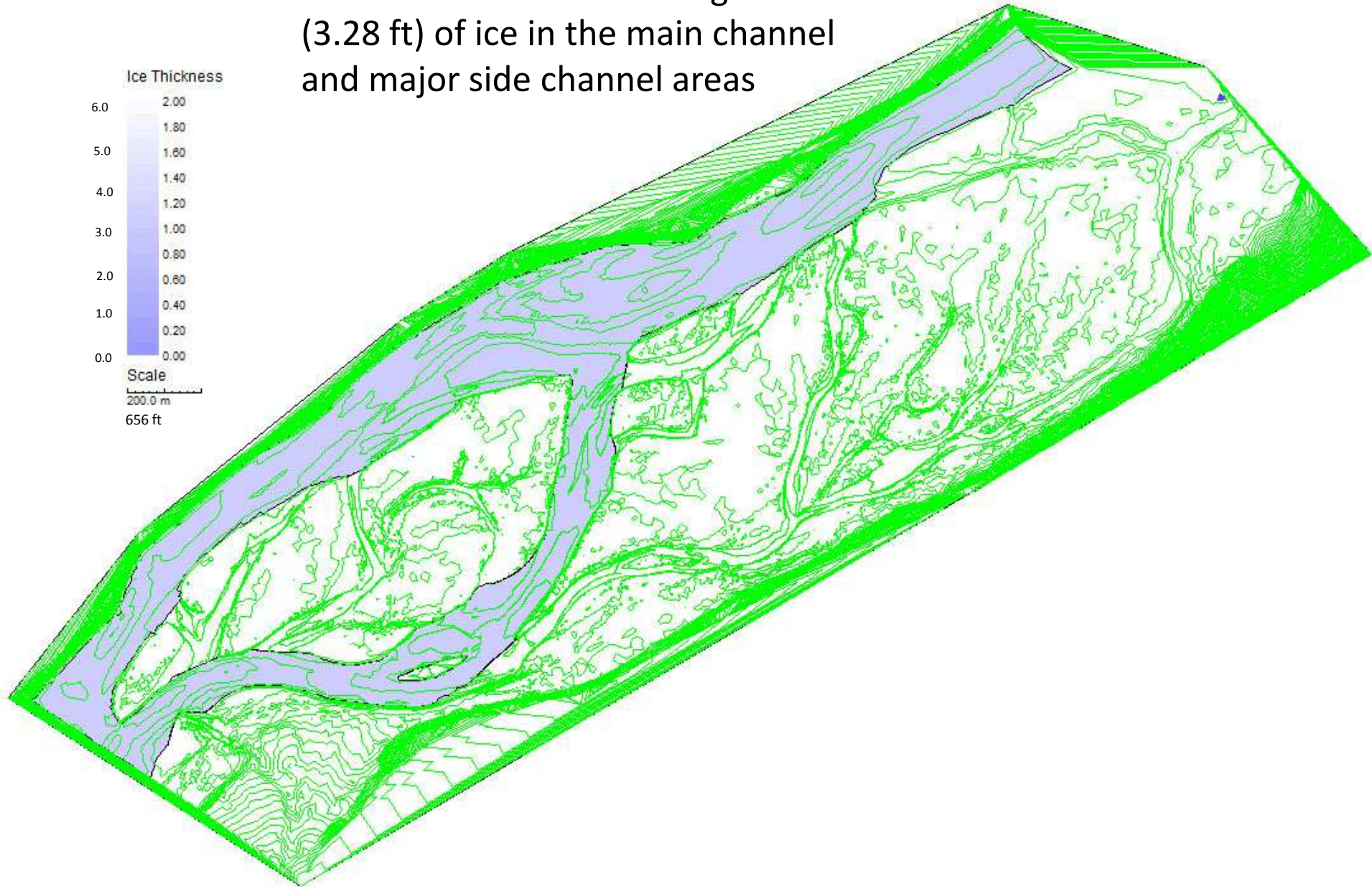
FA-128 (Slough 8A) on December 3, 2012
intermediate ice conditions, <6,000 cfs (Gold Creek)



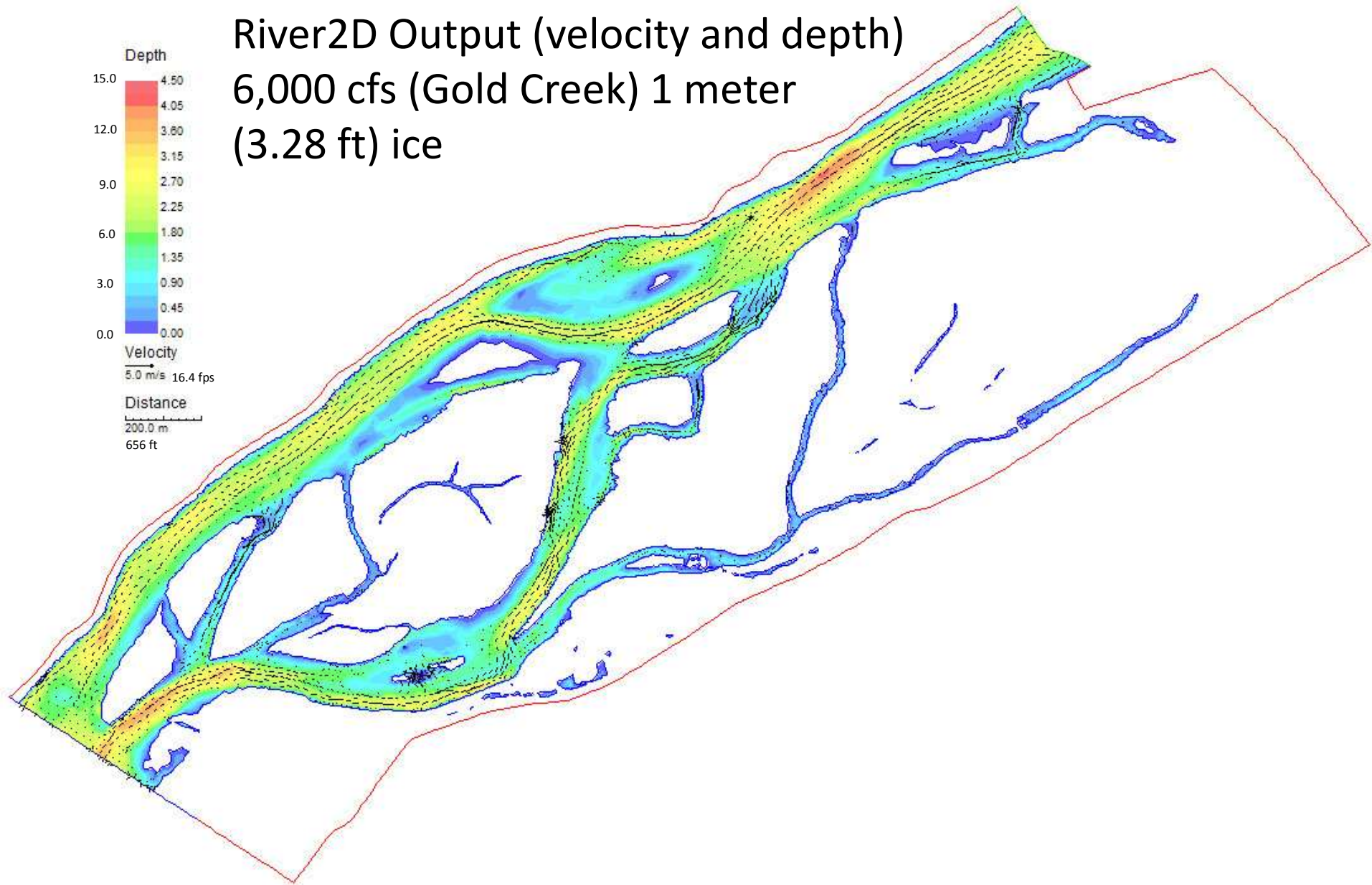
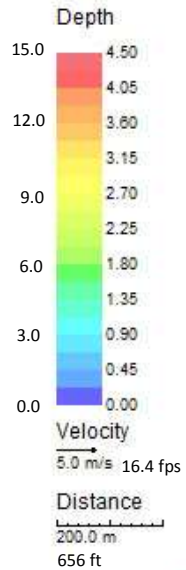
River2D Output (velocity and depth) 6,000 cfs (Gold Creek) intermediate ice



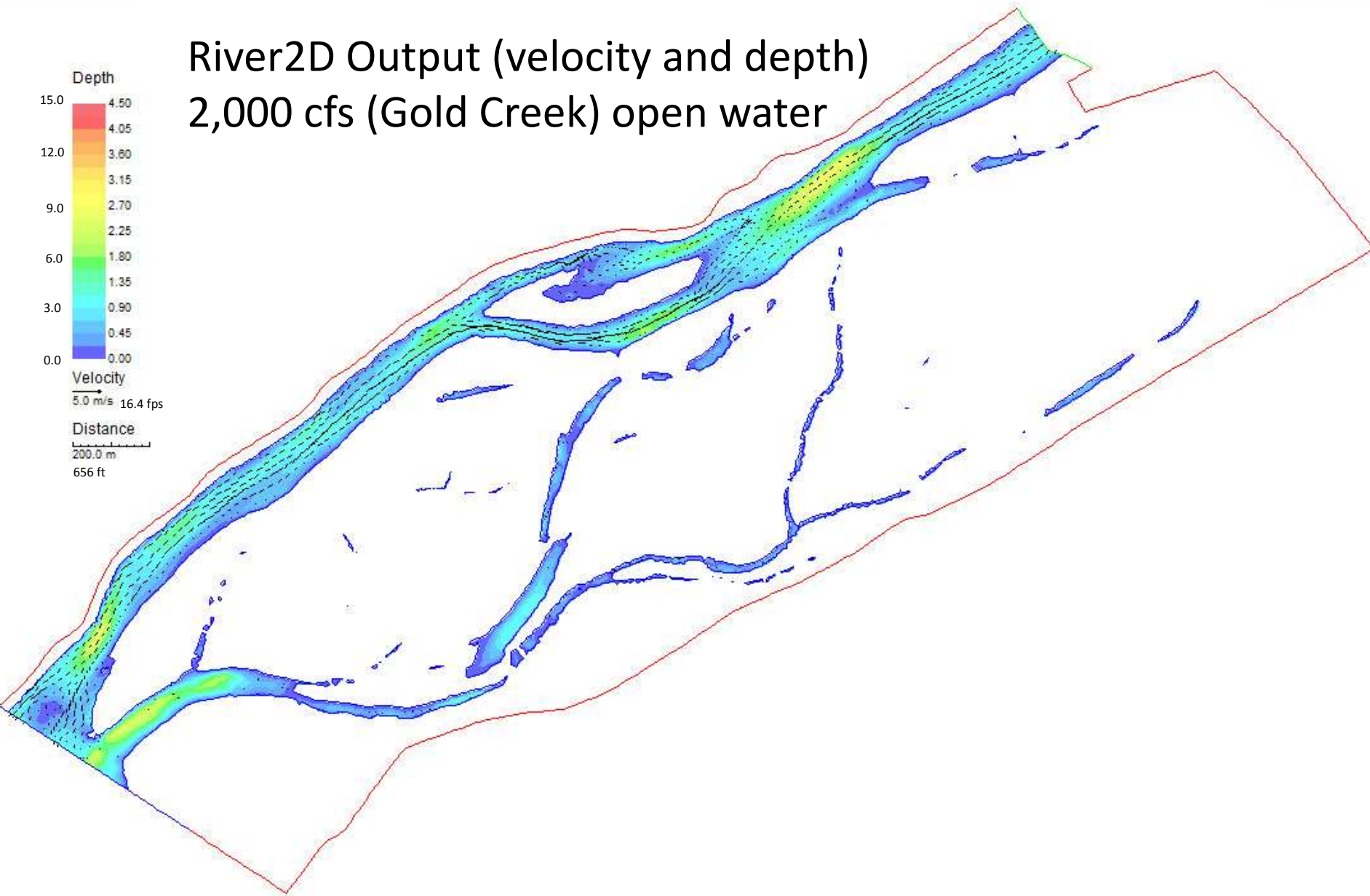
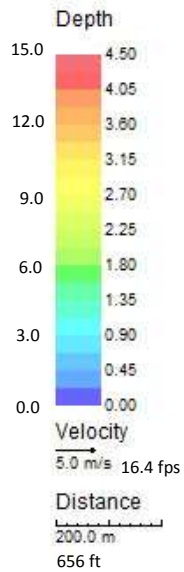
Initial ice covered modeling utilized 1 meter (3.28 ft) of ice in the main channel and major side channel areas



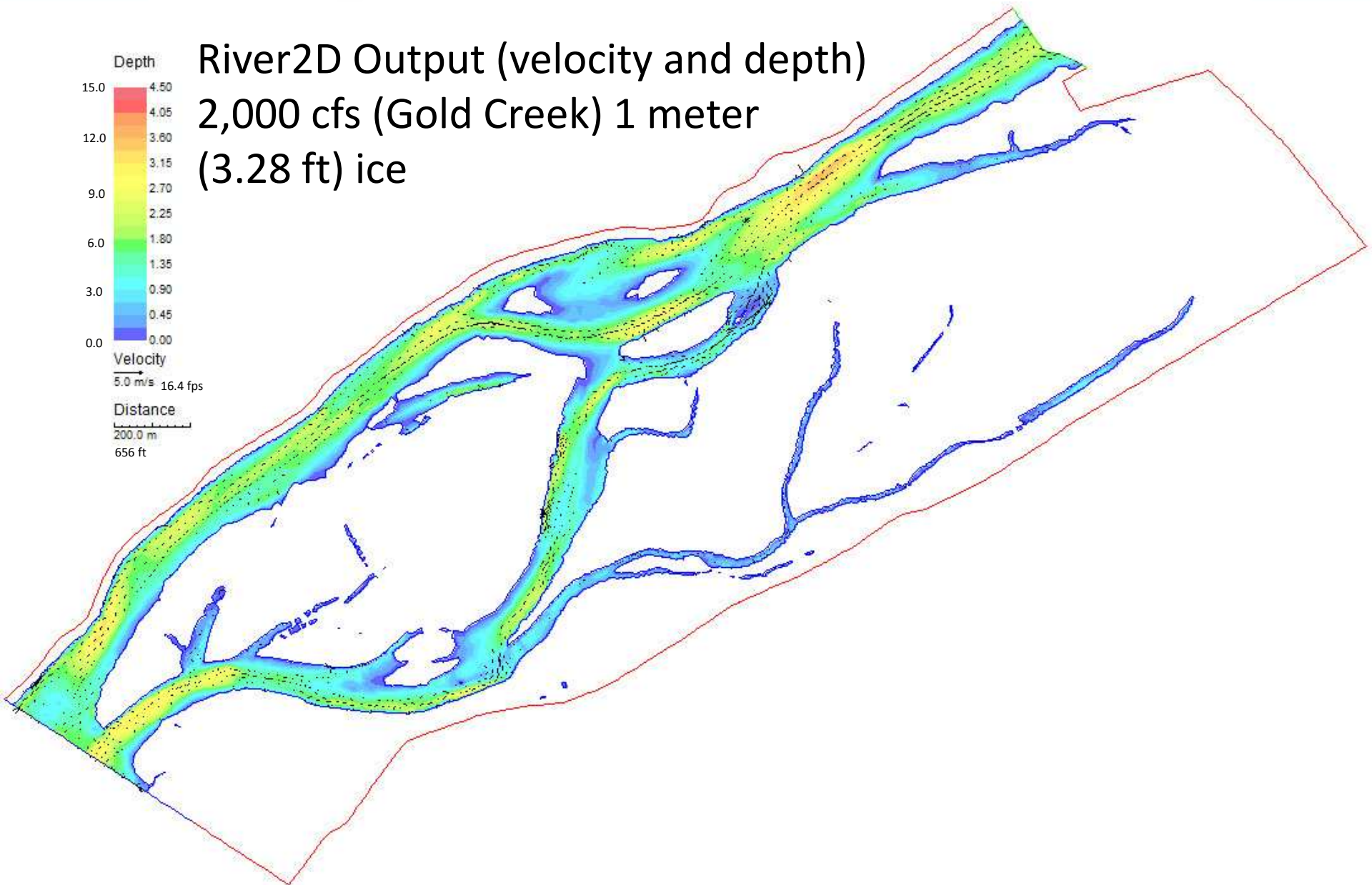
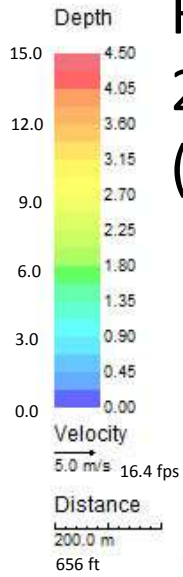
River2D Output (velocity and depth) 6,000 cfs (Gold Creek) 1 meter (3.28 ft) ice



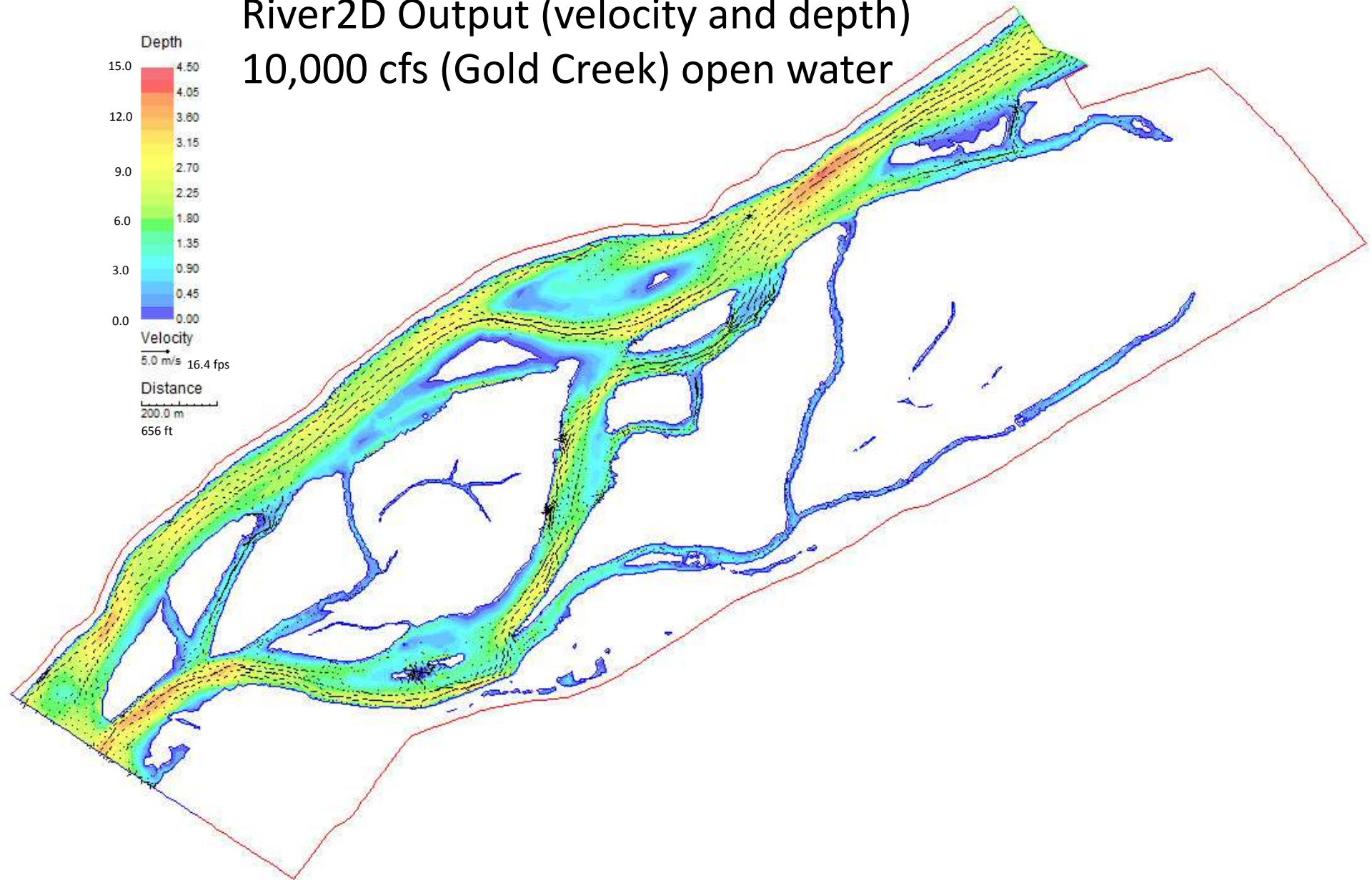
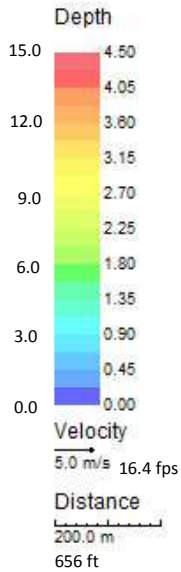
River2D Output (velocity and depth) 2,000 cfs (Gold Creek) open water



River2D Output (velocity and depth) 2,000 cfs (Gold Creek) 1 meter (3.28 ft) ice



River2D Output (velocity and depth) 10,000 cfs (Gold Creek) open water



River2D Output (velocity and depth) 10,000 cfs (Gold Creek) 1 meter (3.28 ft) ice

