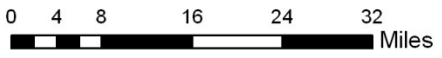
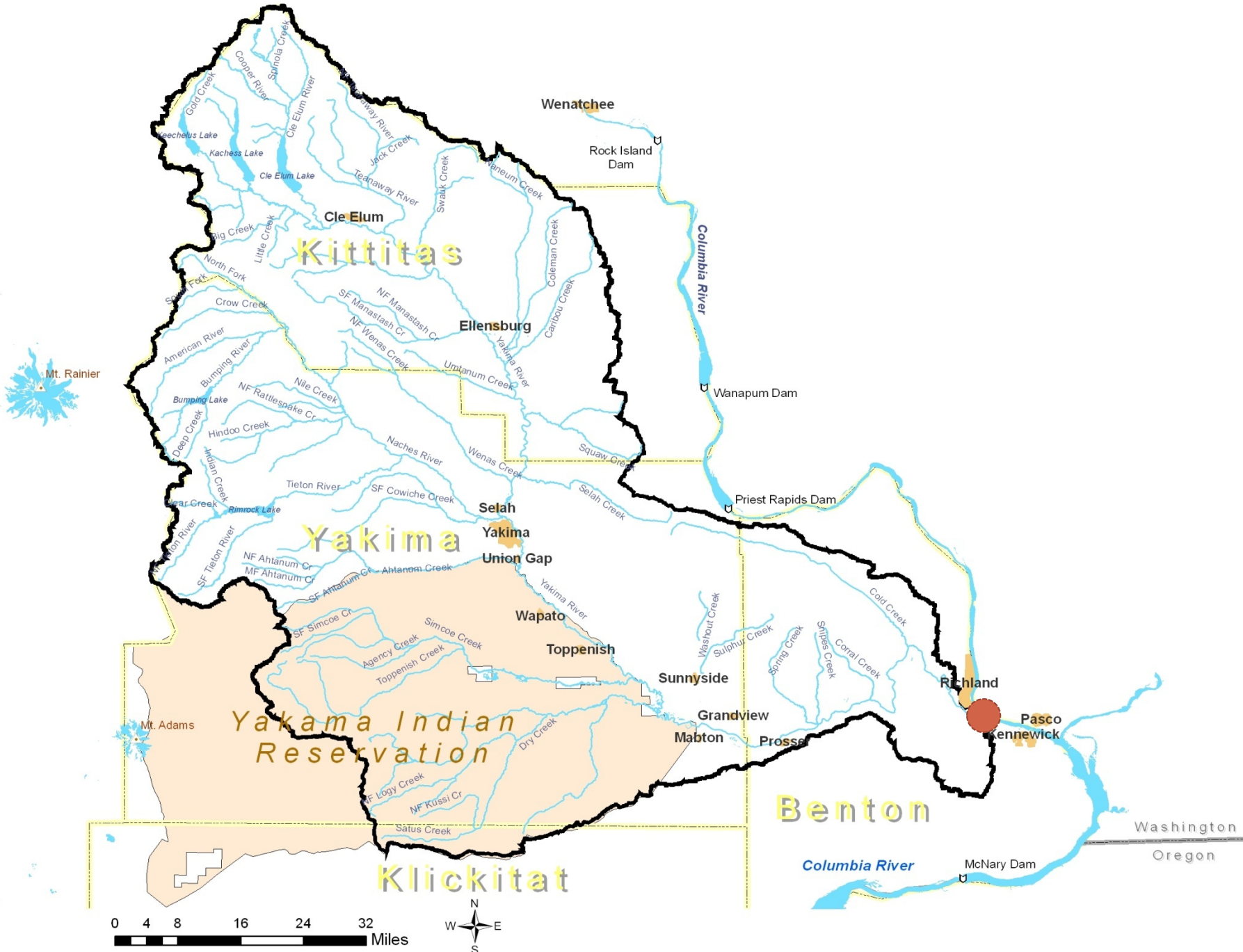


Yakima River Delta Habitat Assessment



SRFB PROJECT #10-1784

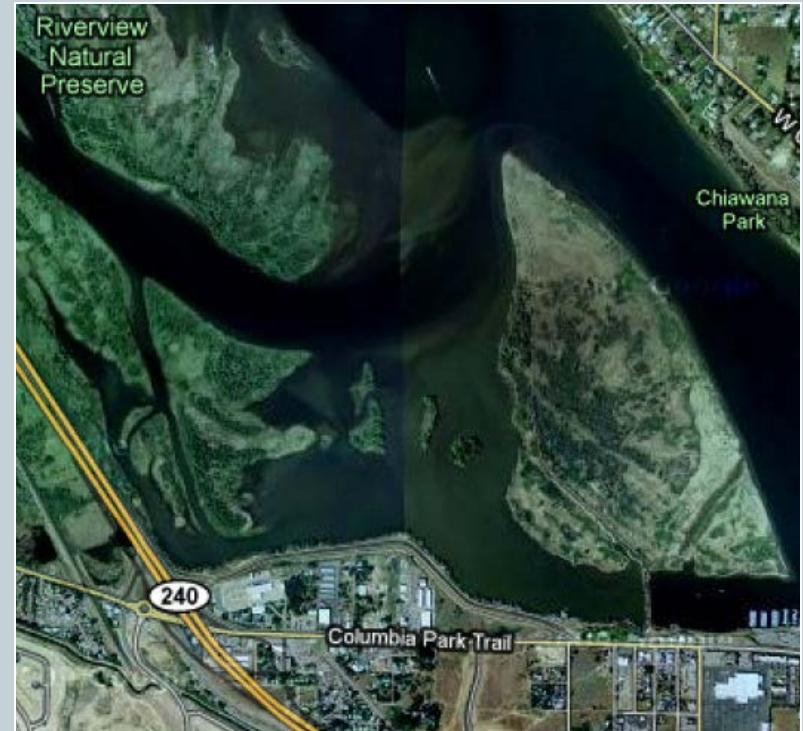
**MID-COLUMBIA FISHERIES ENHANCEMENT GROUP
AND
BENTON CONSERVATION DISTRICT**



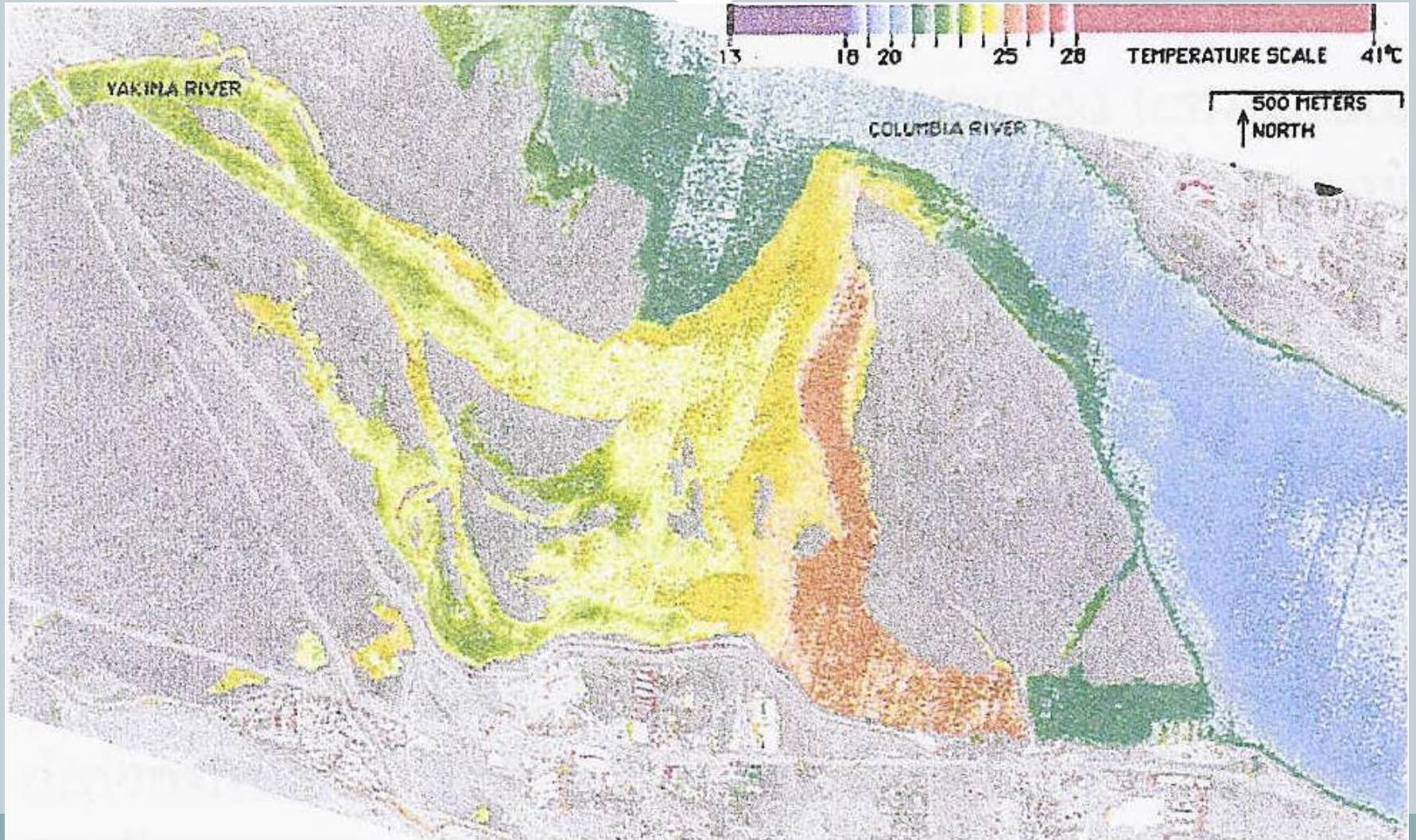
Project overview



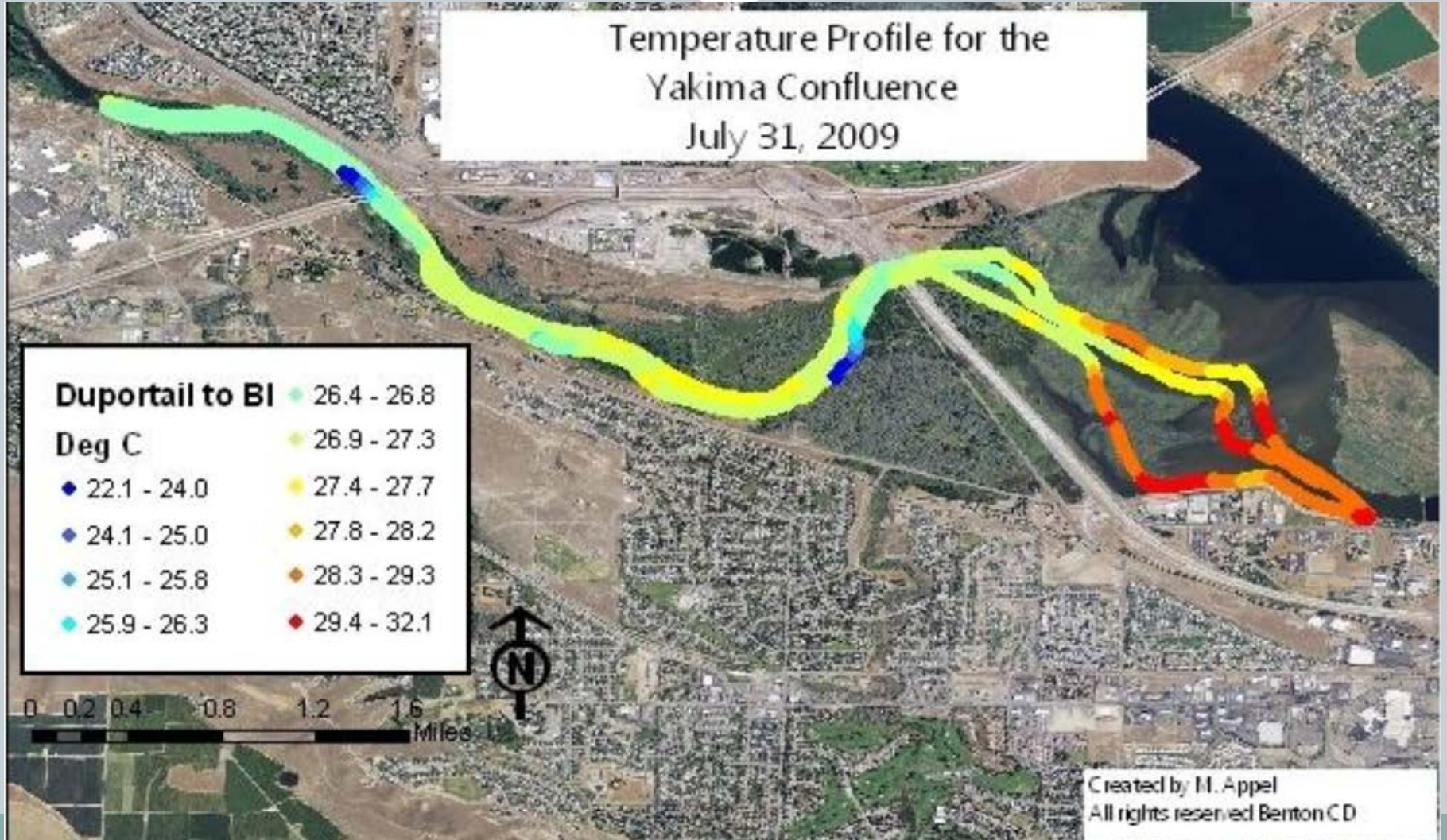
- **Assessment of habitat and non-habitat factors at the confluence of the Yakima and Columbia Rivers**
 - Temperature interactions
 - Sediment and hydrology
 - Fish movement and predation dynamics
 - Political and social feasibility of modifications



1997 Aerial Thermography Data



Benton CD Monitoring Data



Data gaps



- What are the current salmonid dynamics at the confluence? How do confluence dynamics (flow, temperature, sedimentation) impact migration patterns?
- What are the flow dynamics, water quality and sedimentation rates at the confluence? Would removal or modification of the Bateman Island Causeway result in improved salmonid passage, flow, and water quality conditions?
- What is the feasibility of causeway modification in terms of public and government support?

Assessment



- Specific objectives shaped by Yakima River Delta TAG
- Modeling and water quality monitoring conducted by INTERA
- YKFP sampling fish
- Open house to assess political and social feasibility of modifying Bateman Island causeway

Alignment with recovery plan

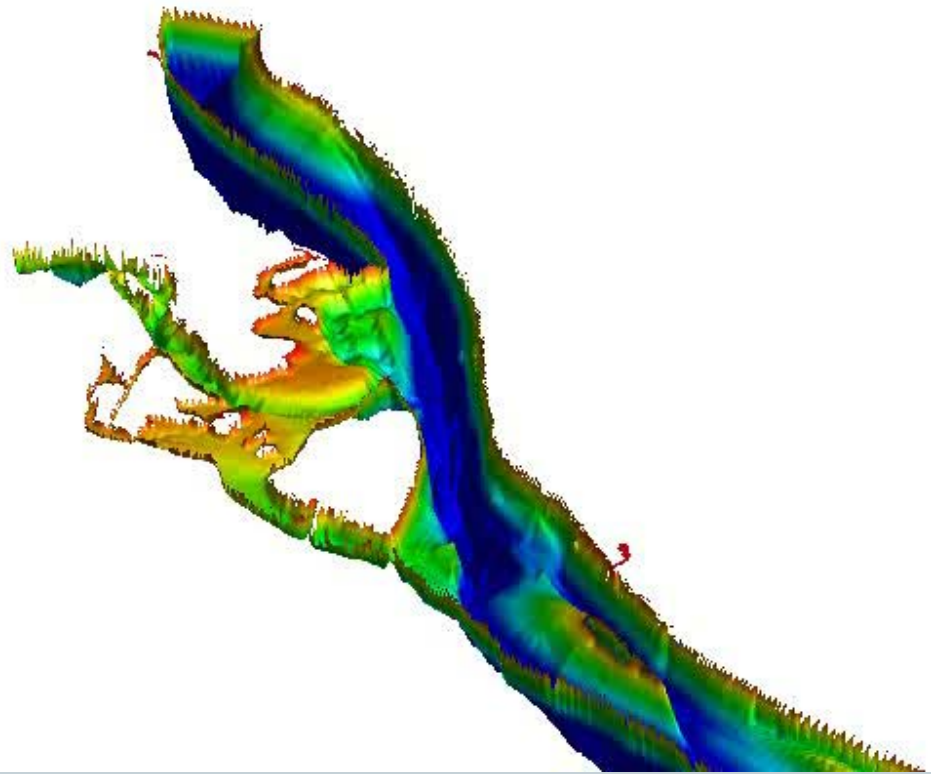


- **Addresses uncertainty in how mainstem conditions impact smolt survival (7.2.3, p. 219)**
- **Potential to address two limiting factors**
 - lower mainstem water temperature and
 - lower mainstem water quality (p. 107)

Work to Date



- Bathymetry
- Temperature
- Fish
- Preliminary Flow Model



INTERA

Environmental Fluid Dynamics Code



EFDC uses stretched or sigma vertical coordinates and Cartesian or curvilinear, orthogonal horizontal coordinates to represent the physical characteristics of a waterbody. It solves three-dimensional, vertically hydrostatic, free surface, turbulent averaged equations of motion for a variable-density fluid. Dynamically-coupled transport equations for turbulent kinetic energy, turbulent length scale, salinity and temperature are also solved.

EPA's Watershed and Water Quality Modeling Technical Support Center

<http://www.epa.gov/athens/wwqtsc/index.html>

EFDC Modeling



Refined Model (Active Cells)

Cell Type

- 1
- 2
- 3
- 4
- 5

Bateman Island



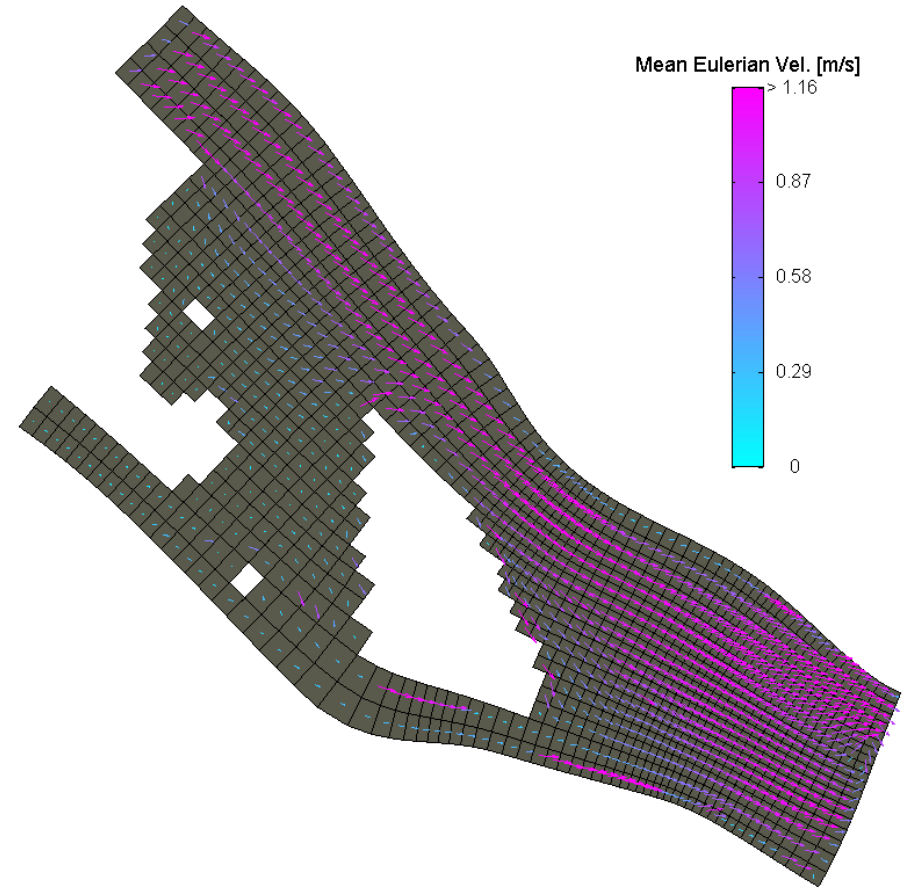
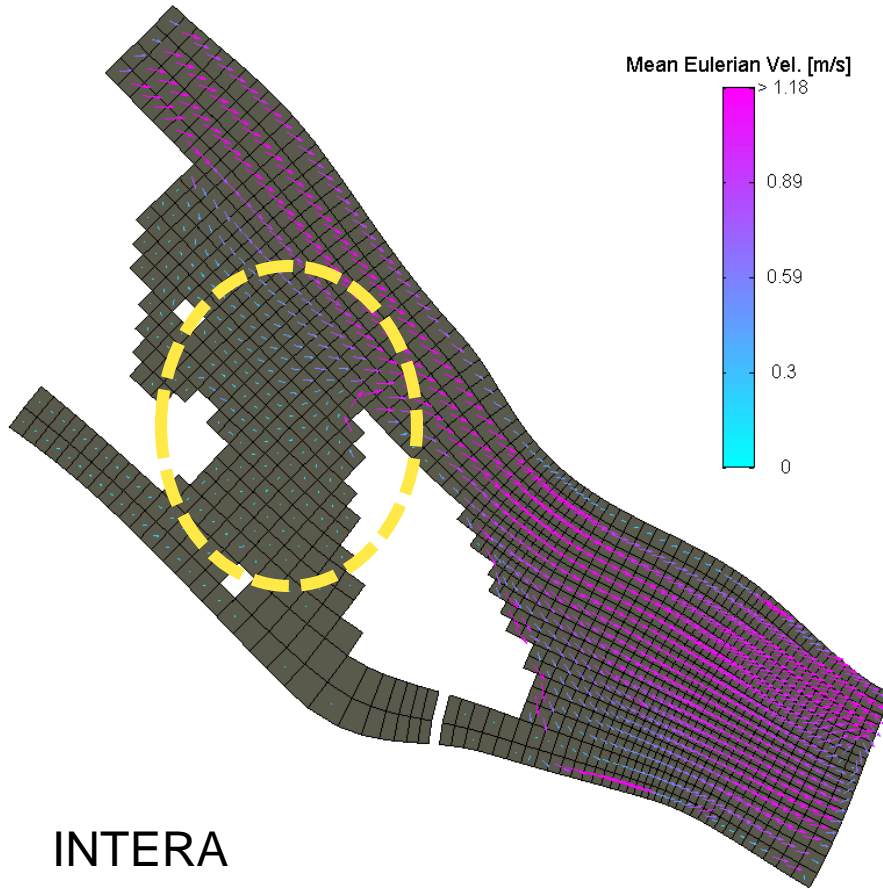
INTERA

Preliminary Flow Modeling Results

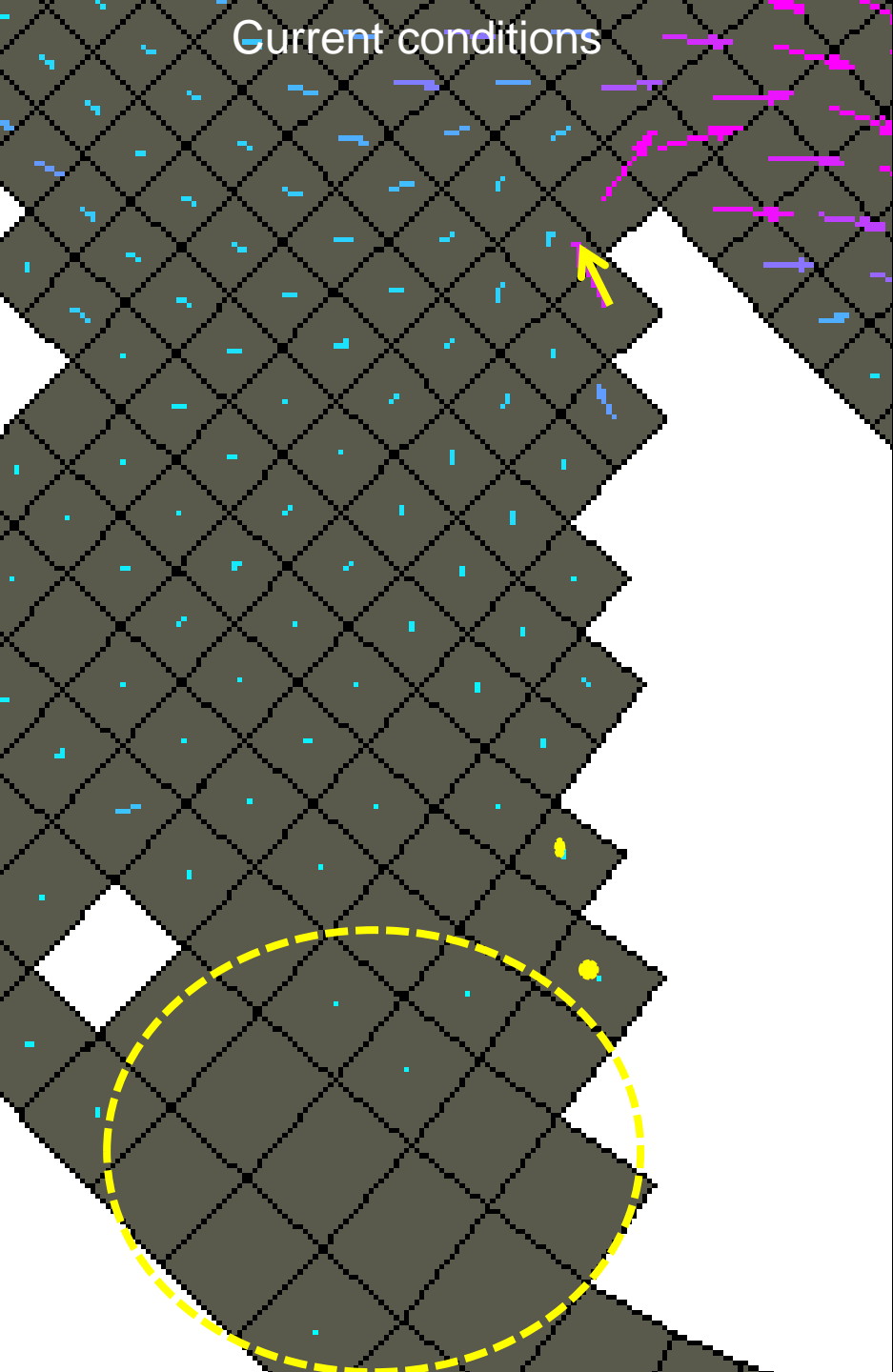


Current conditions

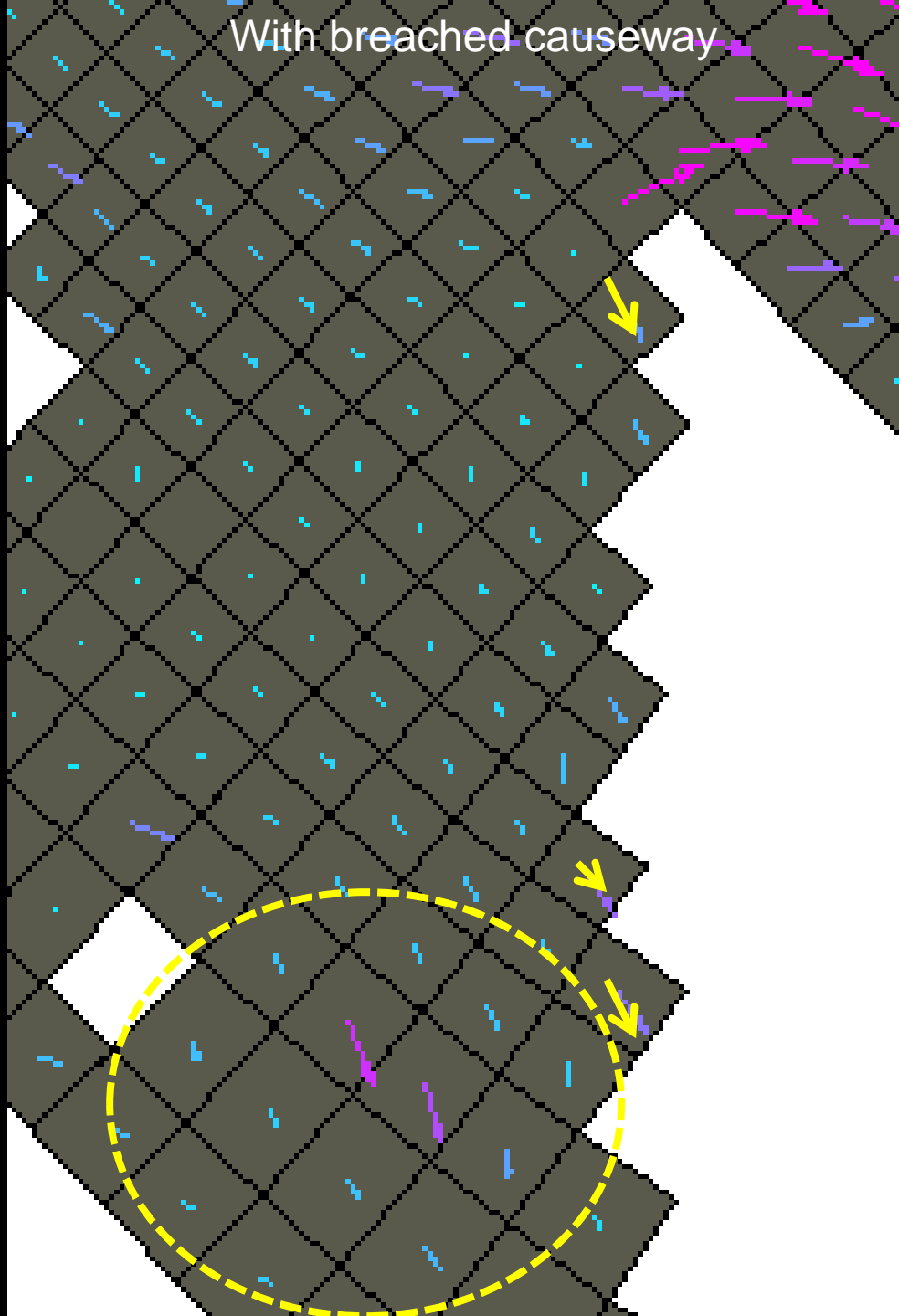
With breached causeway



Current conditions



With breached causeway

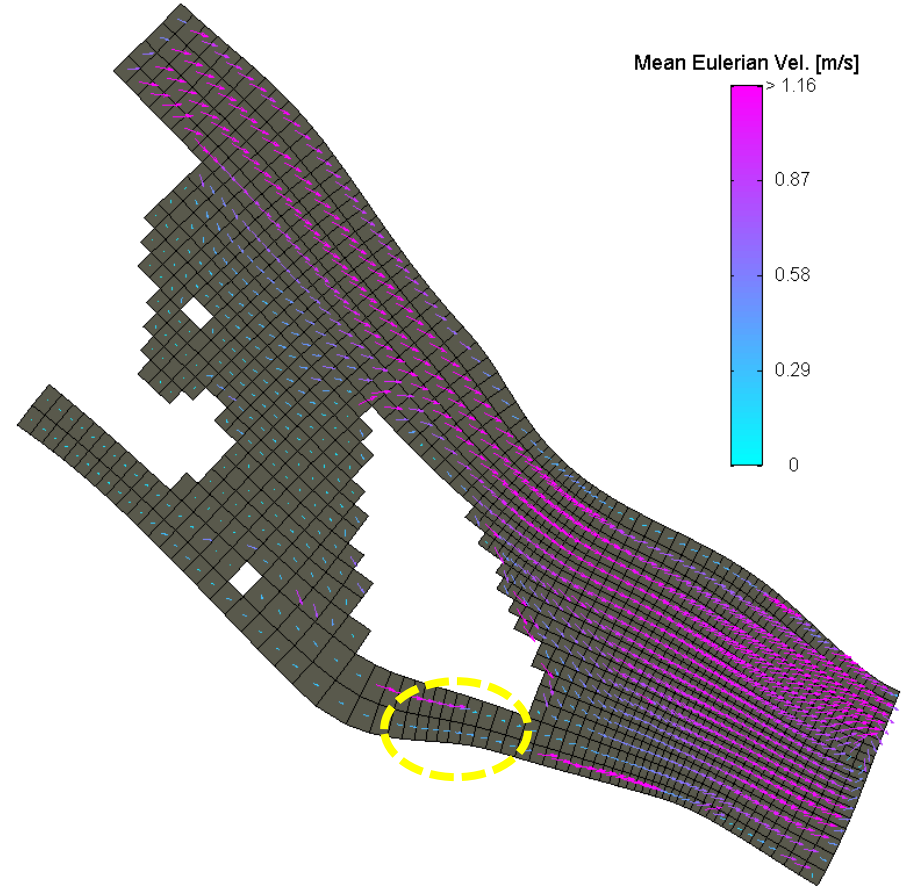
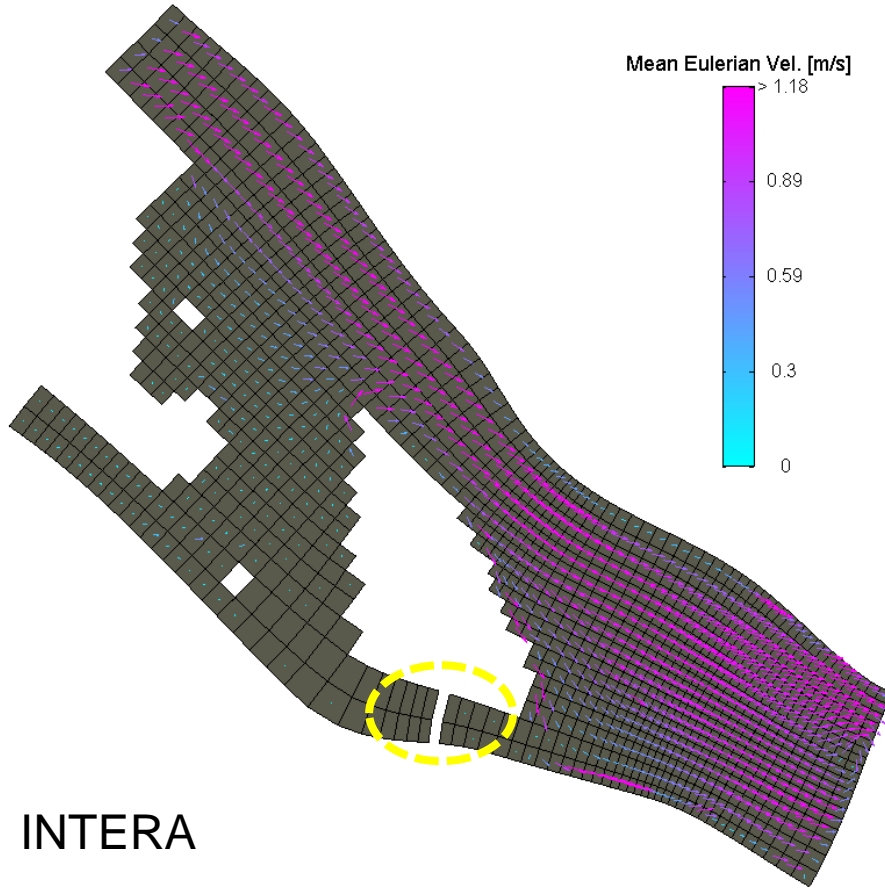


Causeway Area



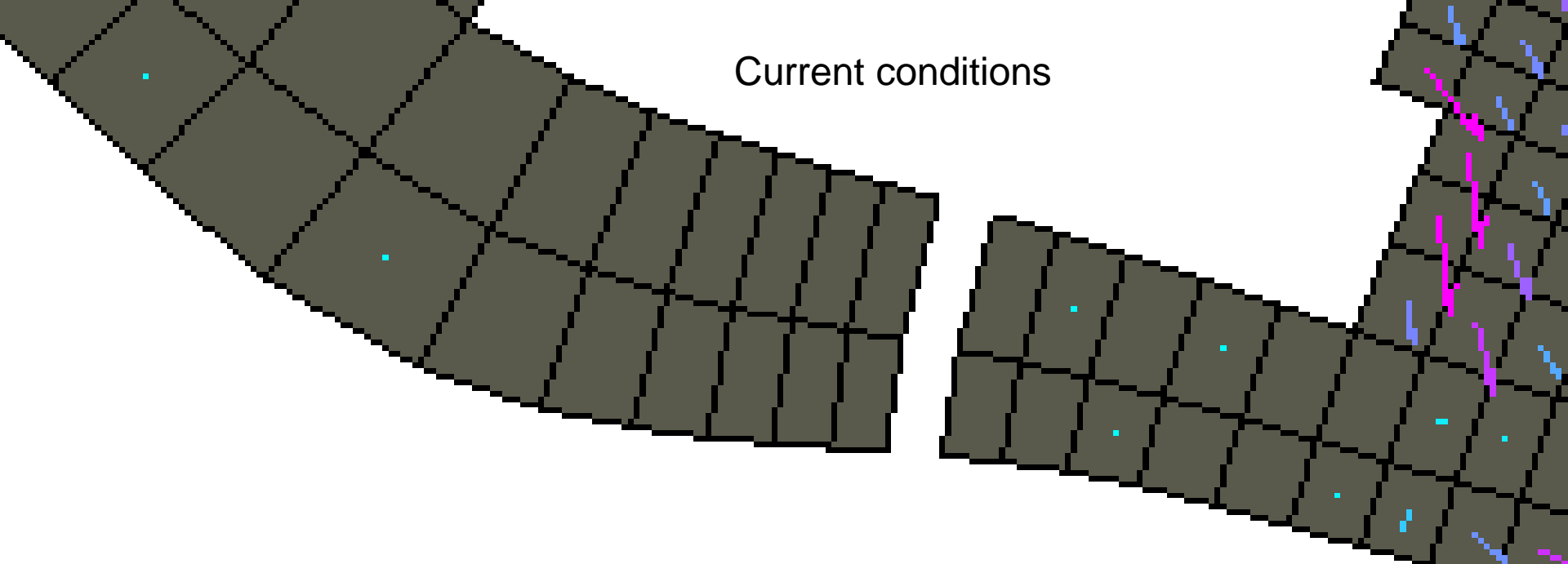
Current conditions

With breached causeway

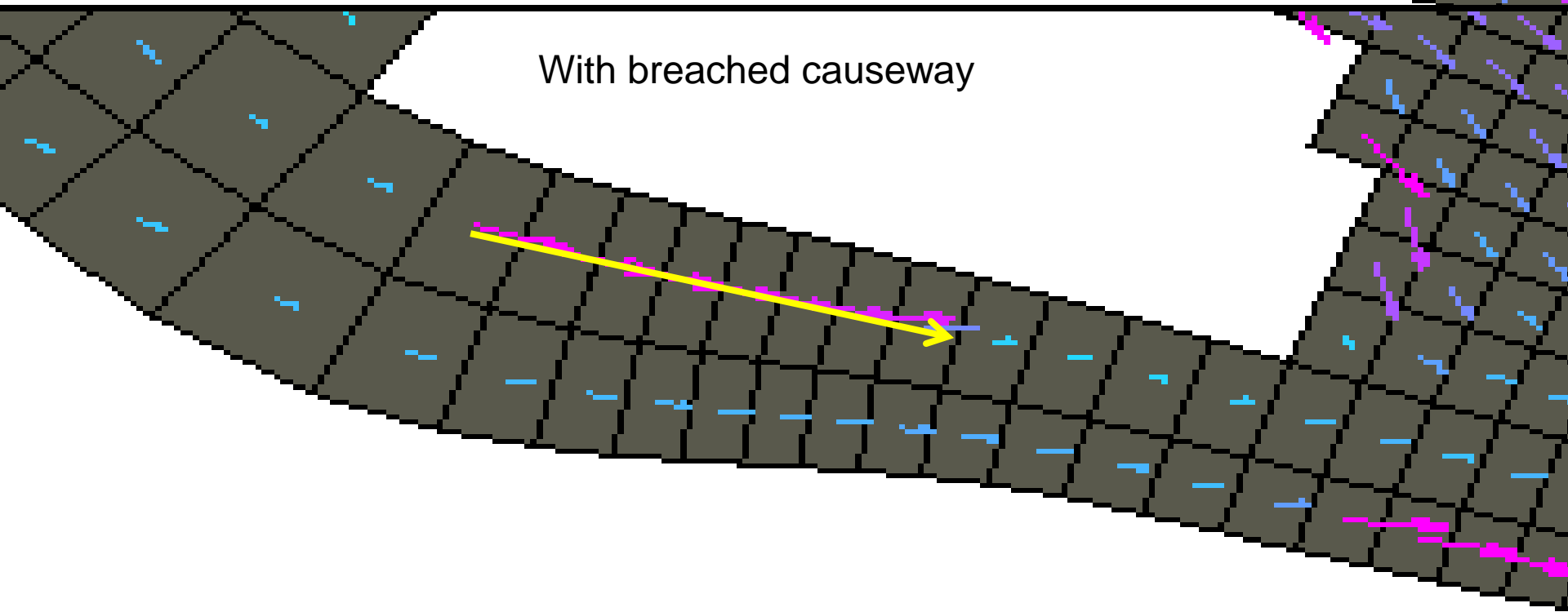


INTERA

Current conditions



With breached causeway



Water Quality Analysis Simulation Program

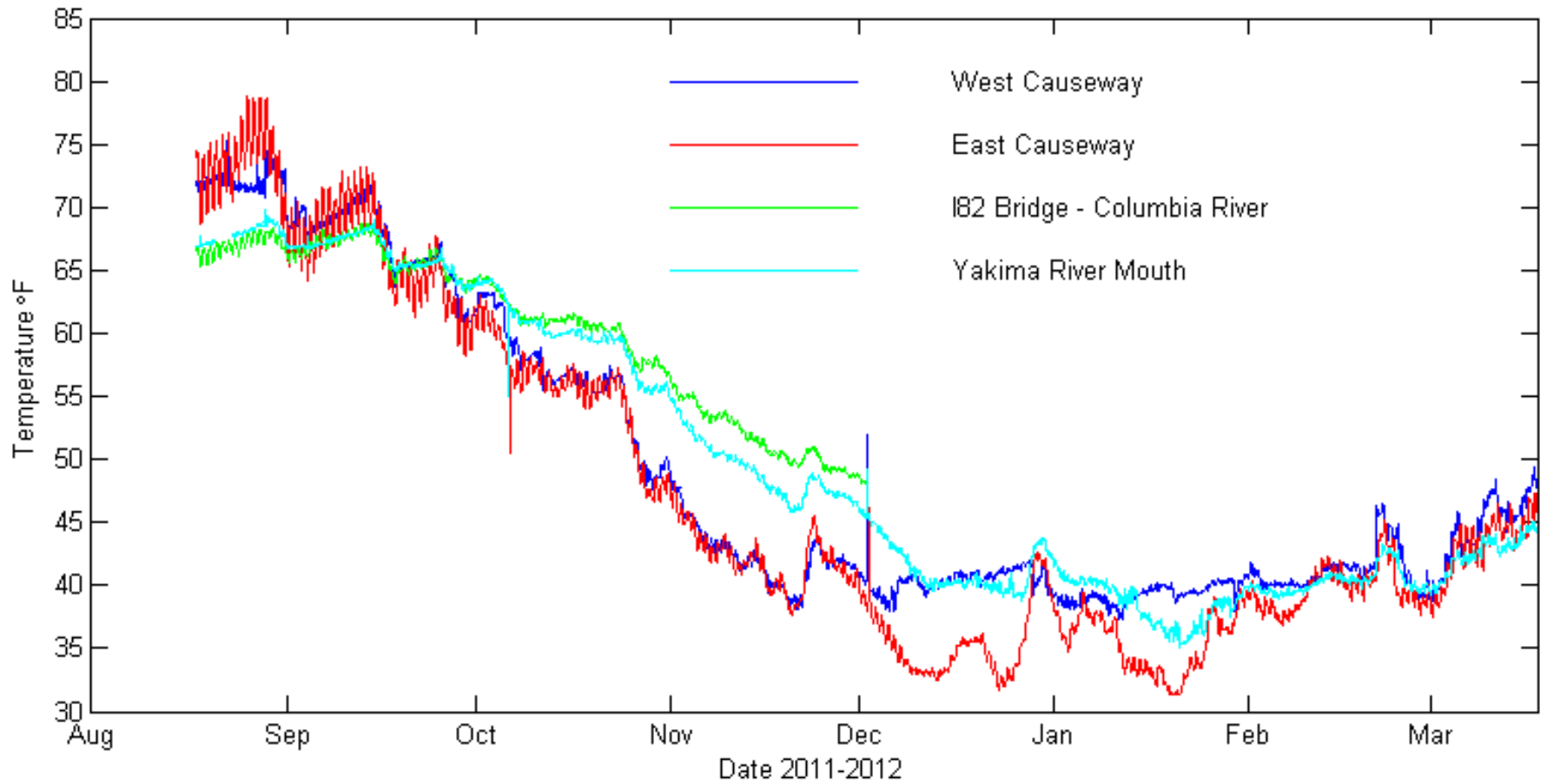


WASP is a dynamic compartment-modeling program for aquatic systems, including both the water column and the underlying benthos. WASP allows the user to investigate 1, 2, and 3 dimensional systems, and a variety of pollutant types. The time varying processes of advection, dispersion, point and diffuse mass loading and boundary exchange are represented in the model. WASP also can be linked with hydrodynamic and sediment transport models that can provide flows, depths velocities, temperature, salinity and sediment fluxes.

DO and Temperature Monitoring



Preliminary Temperature Data



Migration and Salmonid Utilization Studies



- Presence/absence and distribution of fish species
- Environmental information and GPS location for each sample site
- Sampling in smolt and adult migration timing periods



2011 Fish Data



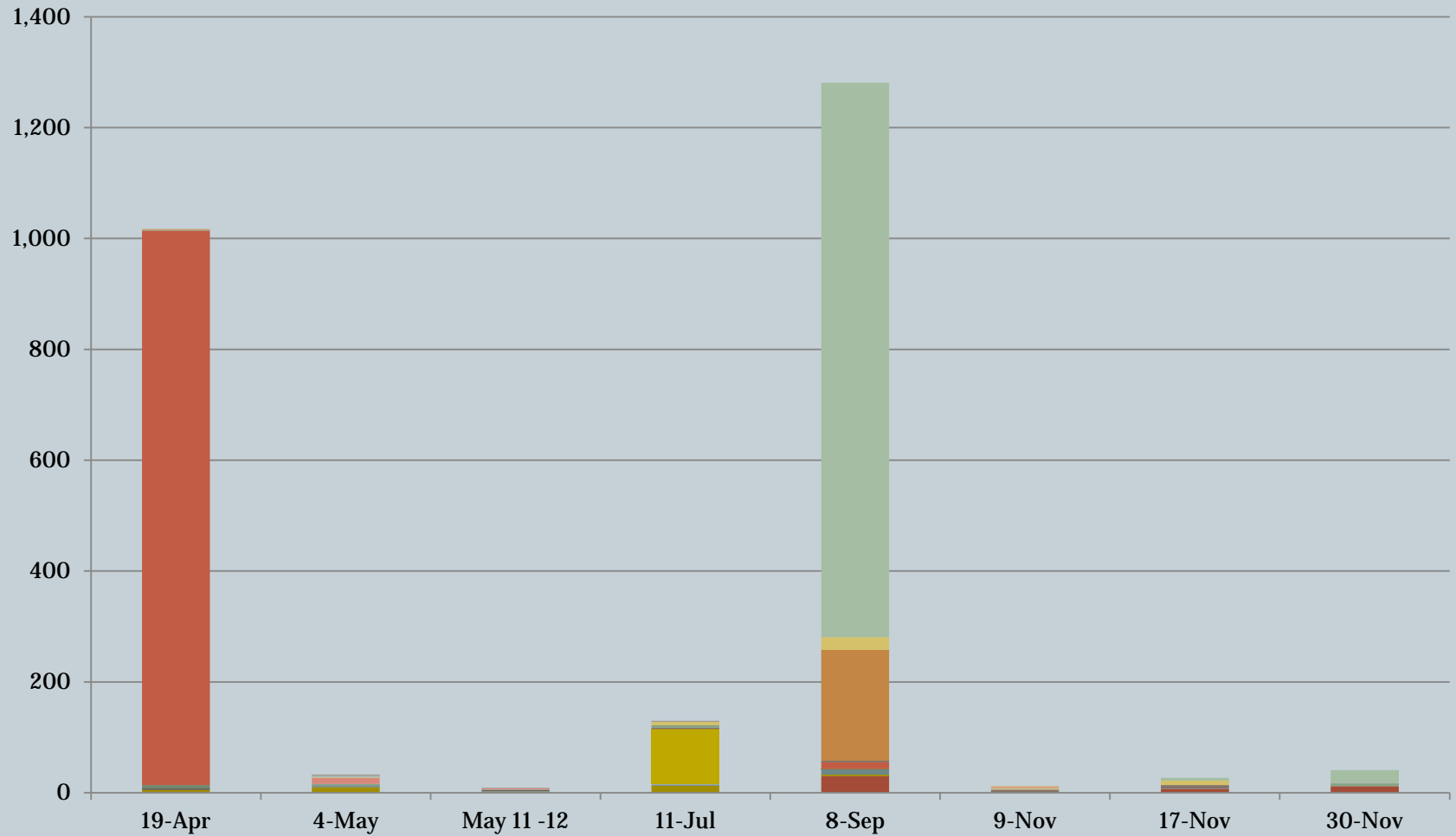
SPECIES	NUMBERS
BLUE GILL	4
CHISELMOUTH	1
DACE	222
PUMPKIN SEED	13
RAINBOW TROUT	19
SCULPIN	3
SHINERS	8401
SMALLMOUTH BASS	57
SPRING CHINOOK	11
STEELHEAD	60
STICKEL BACK	97
SUCKER	2629
WHITEFISH	2193
NORTHERN PIKE MINNOW	165
TOTAL	13875

Michael
Porter, YKFP

West of the Causeway



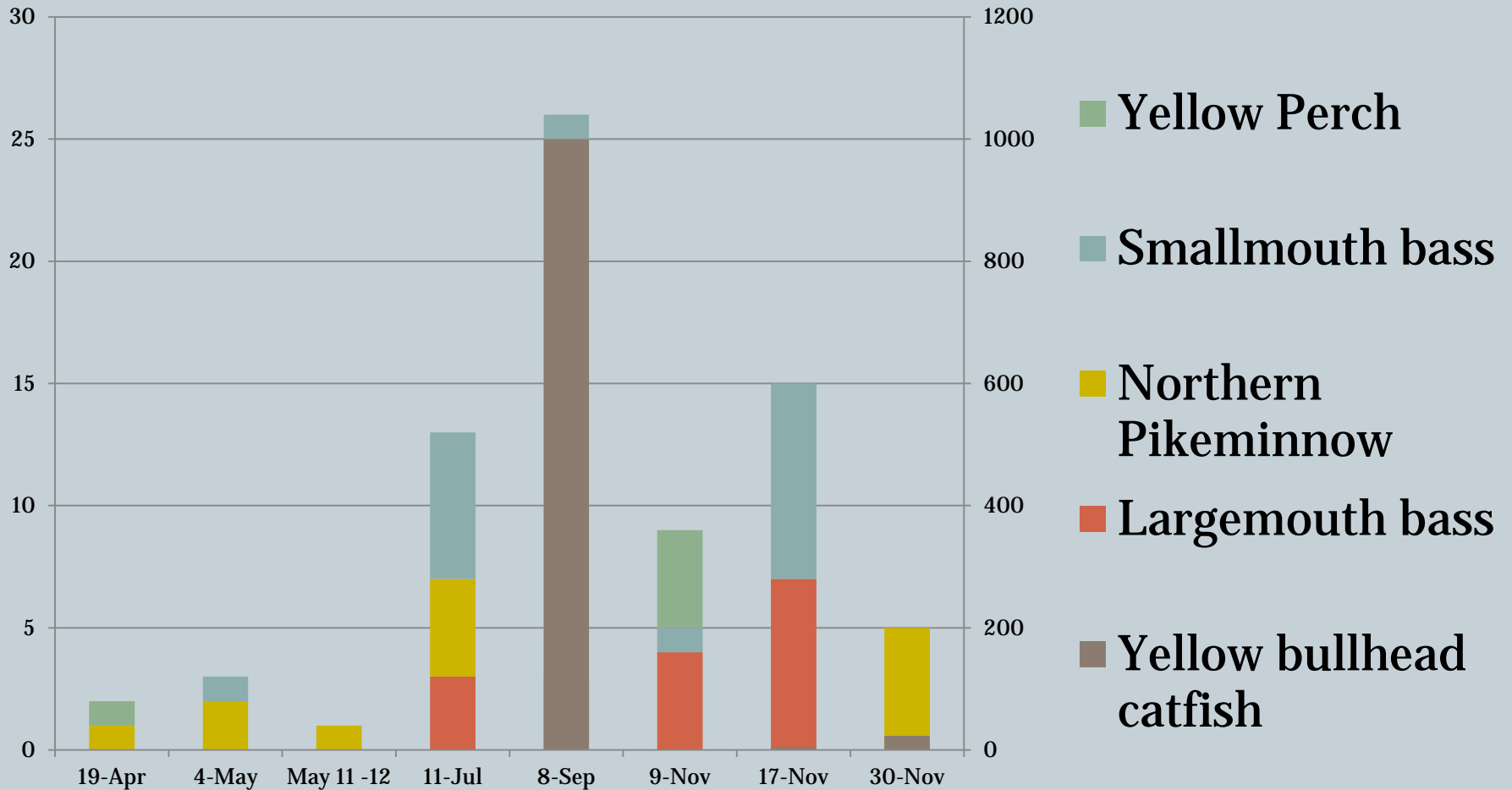
Seasonal Abundance Pattern



Salmonid Abundance



Predator Abundance



Next Steps



- Addition of other islands to the EFDC model
- Calibration of flow modeling using RiverSurveyor
- Continued DO and temperature sampling
- Development and population of WASP model
- Volunteer monitoring along causeway
- Integration of flow, water quality, and fish data
- Public meeting



Thanks!



- **Salmon Recovery Funding Board**
- **Alex Conley and the YBFWRB**
- **Michael Porter and Yakama Nation YKFP**
- **Members of the Yakima Delta TAG**
 - David Child, Richard Visser, Paul LaRiviere, Dave Fast, Eric Bartrand, Geoff McMichael, Sean Gross, Matt Morgan, Adam Fyall, Elaine Brouillard, Rachel Little, Mark Nielson
- **INTERA**
- **Jason McCormick**
- **Tighe Stuart, Department of Ecology**

