Technical Projects Update

YRBWEP Workgroup Meeting
September 4, 2013

Presented by:

Andrew Graham, HDR Engineering, Inc.

Bob Montgomery, Anchor QEA

Walt Larrick, Reclamation

Status of Projects

- Wymer Dam and Reservoir
- Kachess Inactive Storage
- Keechelus to Kachess Conveyance
- Cle Elum Fish Passage
- Manastash Creek Conservation & Tributary Enhancement

Wymer Reservoir Temperature Model

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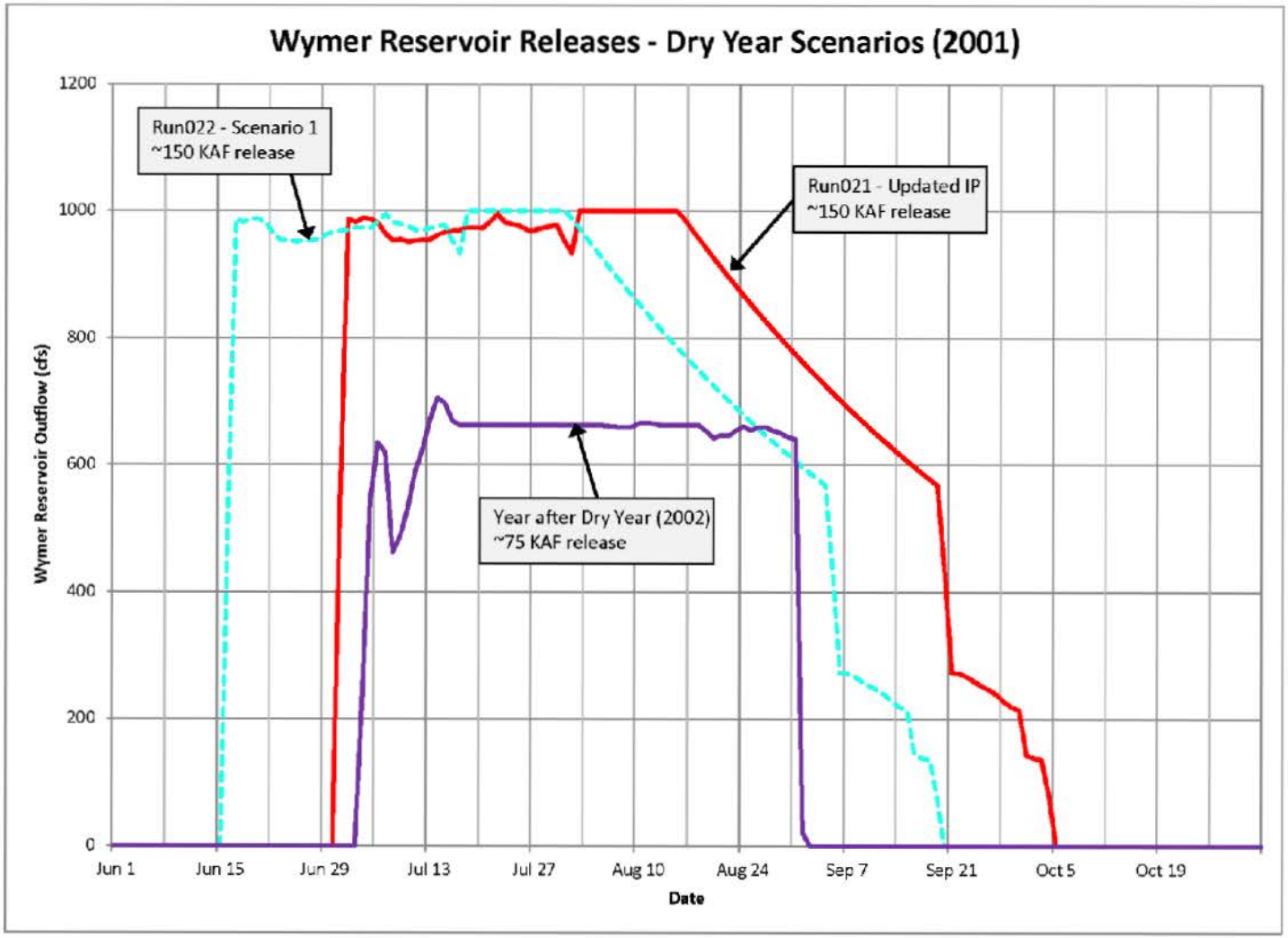
Wymer Reservoir Temperature Model Update

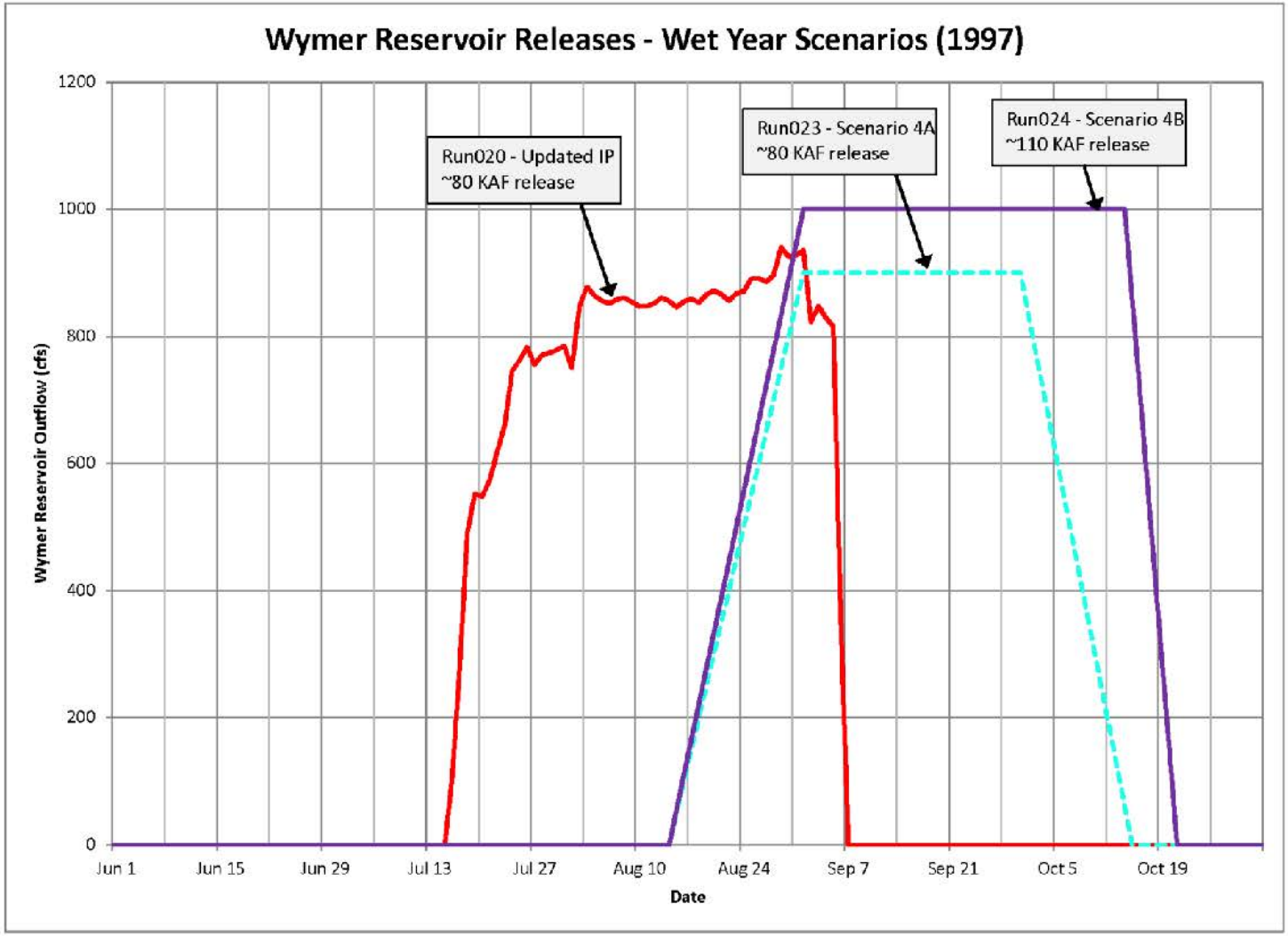
Work Completed

- Prepared and validated model
- Selected operational scenarios for Wymer Reservoir with Reclamation and Ecology
- Ran model for scenarios and estimated Yakima River temperatures with Wymer releases using single low-level outlet at bottom of reservoir
- Also ran model with multi-level outlet using three intakes

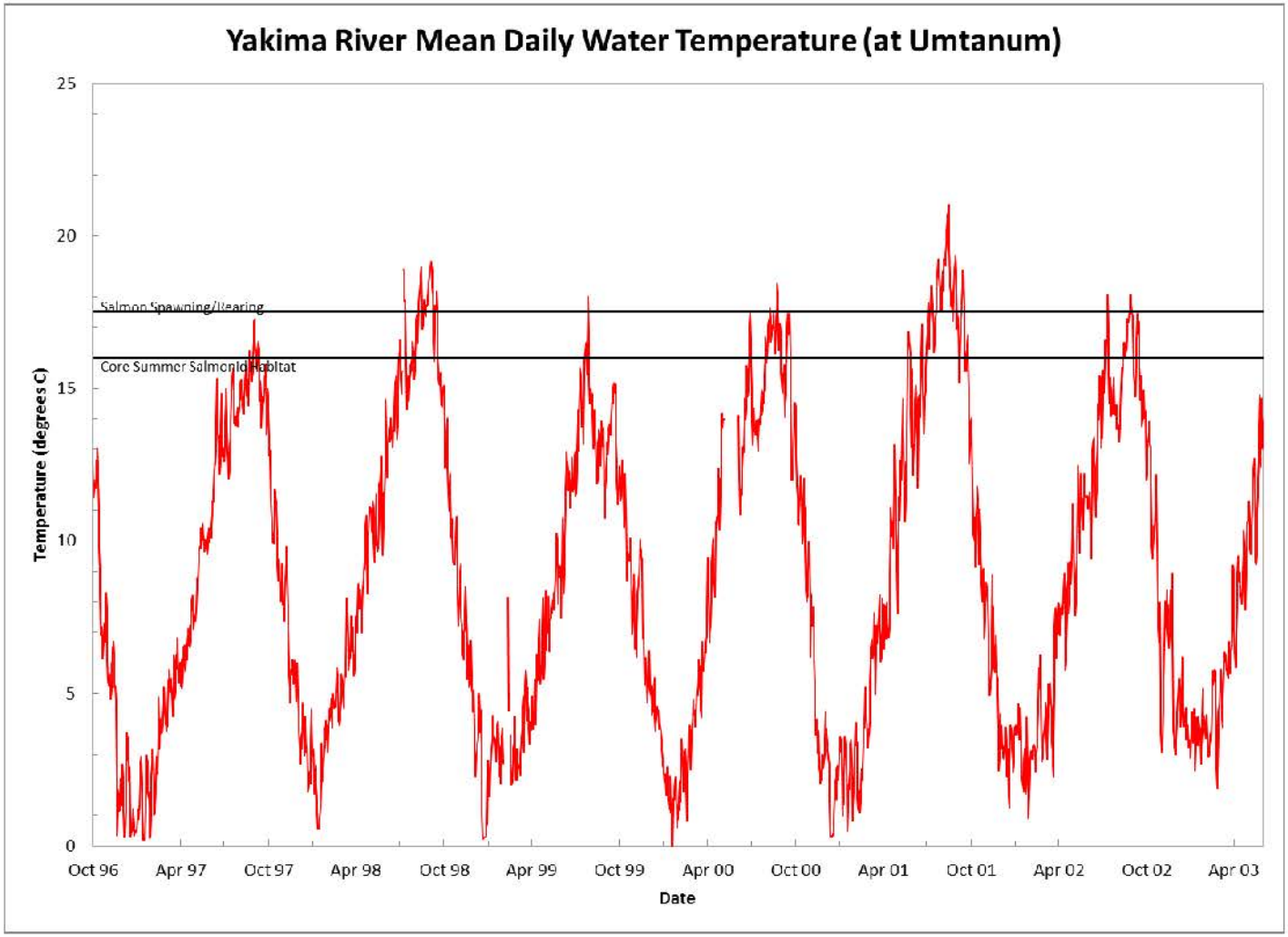
Wymer Temperature Model Operational Scenarios



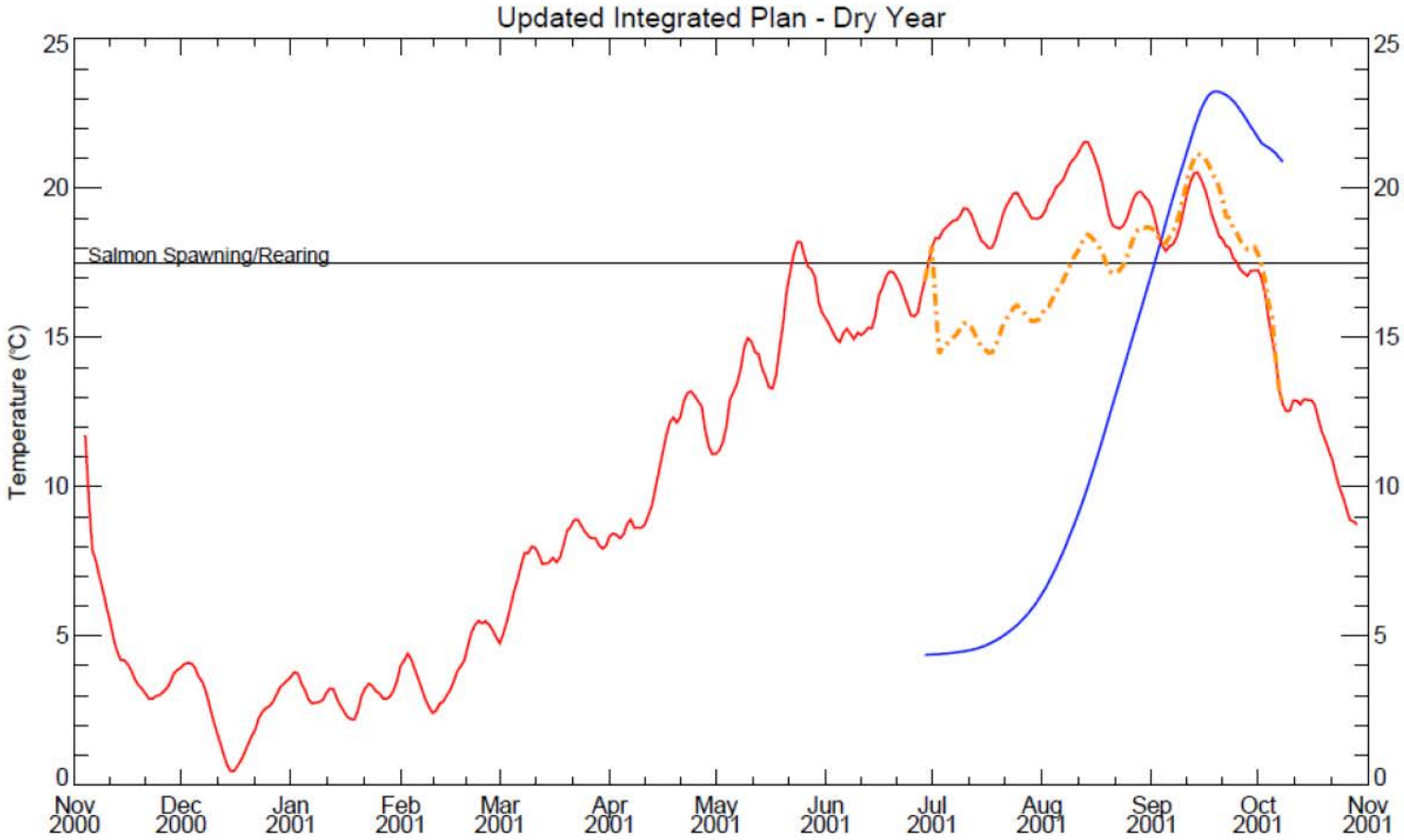
Wymer Temperature Model Operational Scenarios



Wymer Temperature Model Temperature in Yakima River

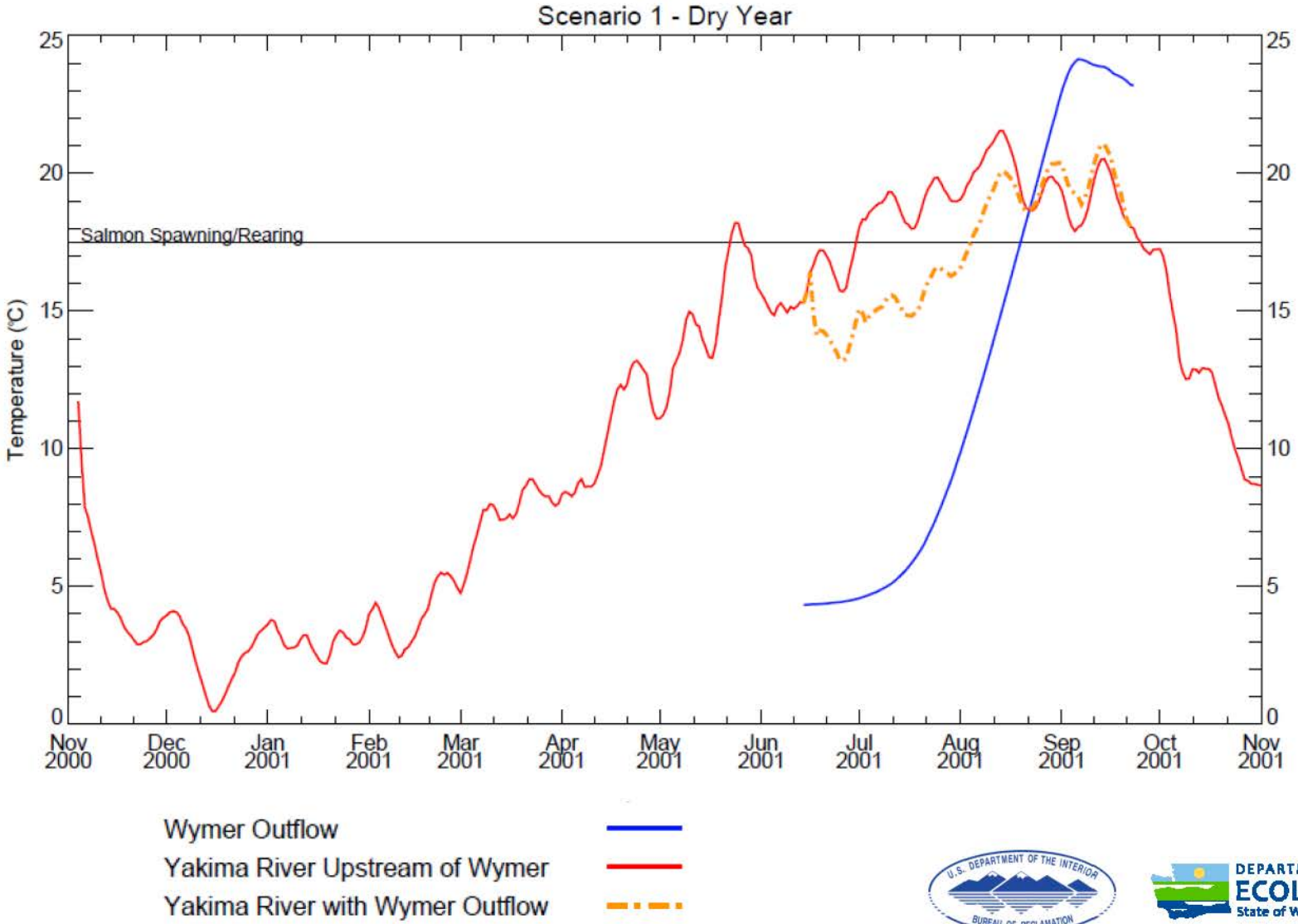


Predicted 7-DADMax for Integrated Plan Run - Dry Year, Single Outlet

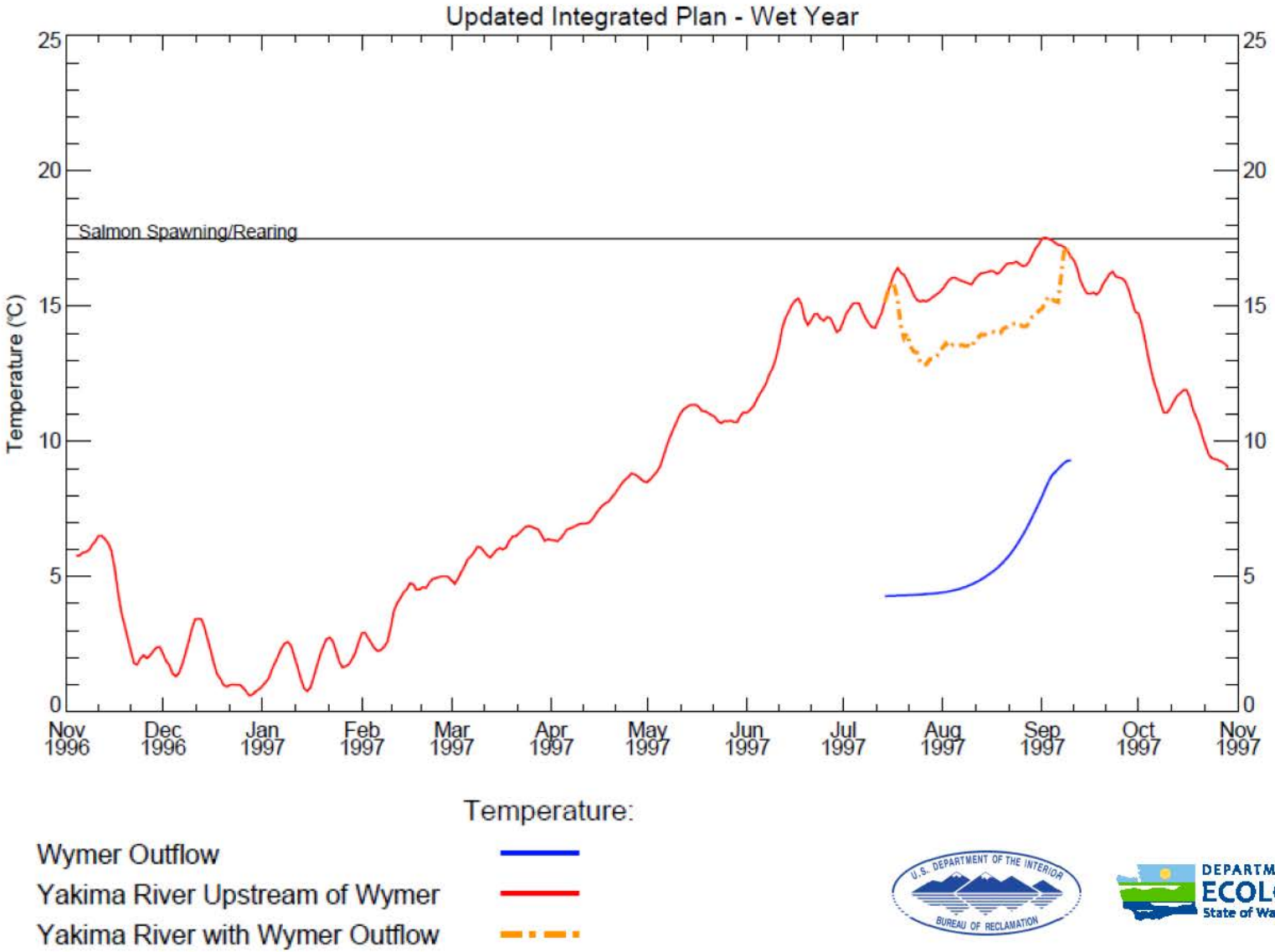


Wymer Outflow
Yakima River Upstream of Wymer
Yakima River with Wymer Outflow

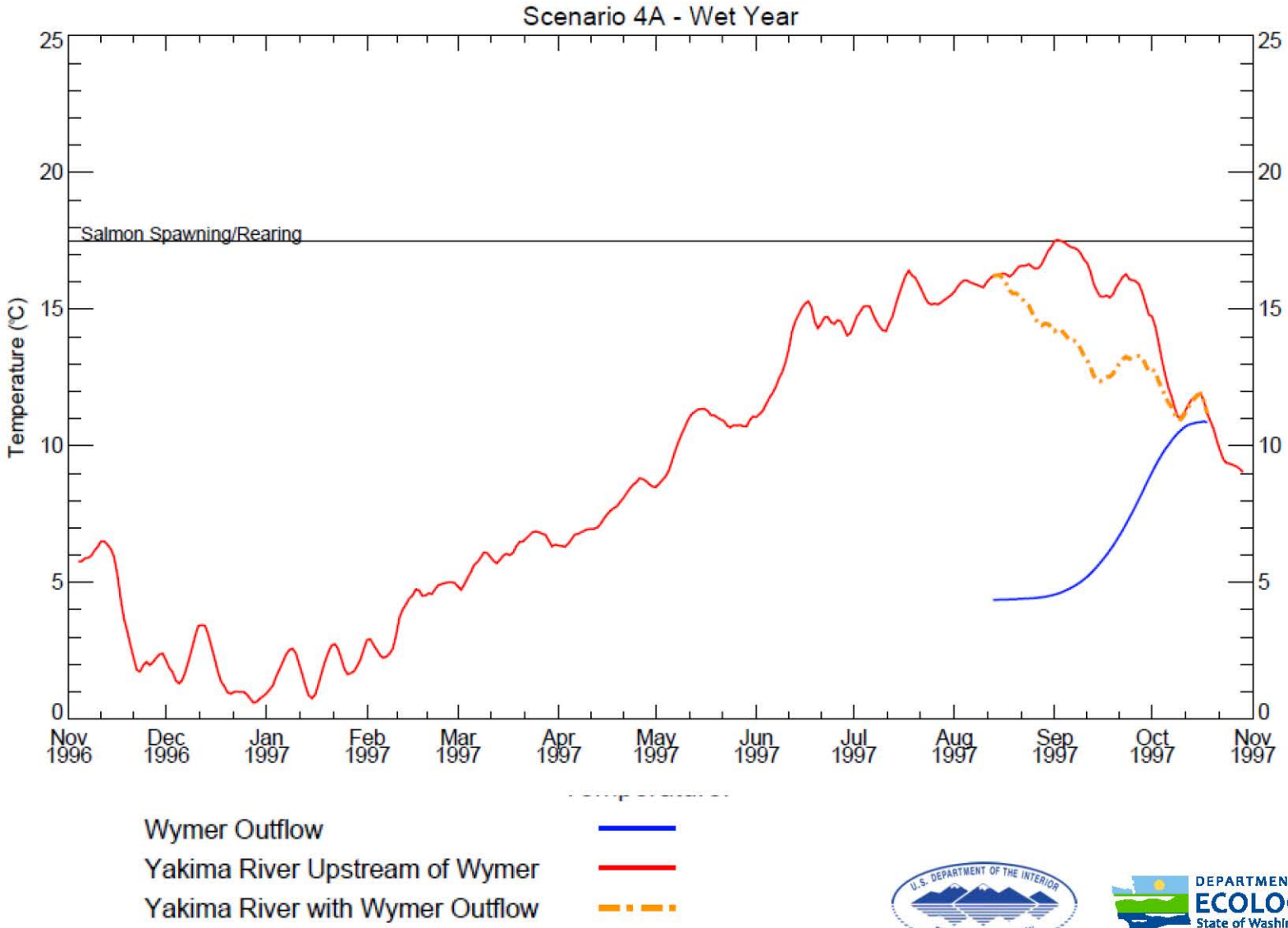
Predicted 7-DADMax for Scenario 1: Earlier Release in Dry Year, Single Outlet



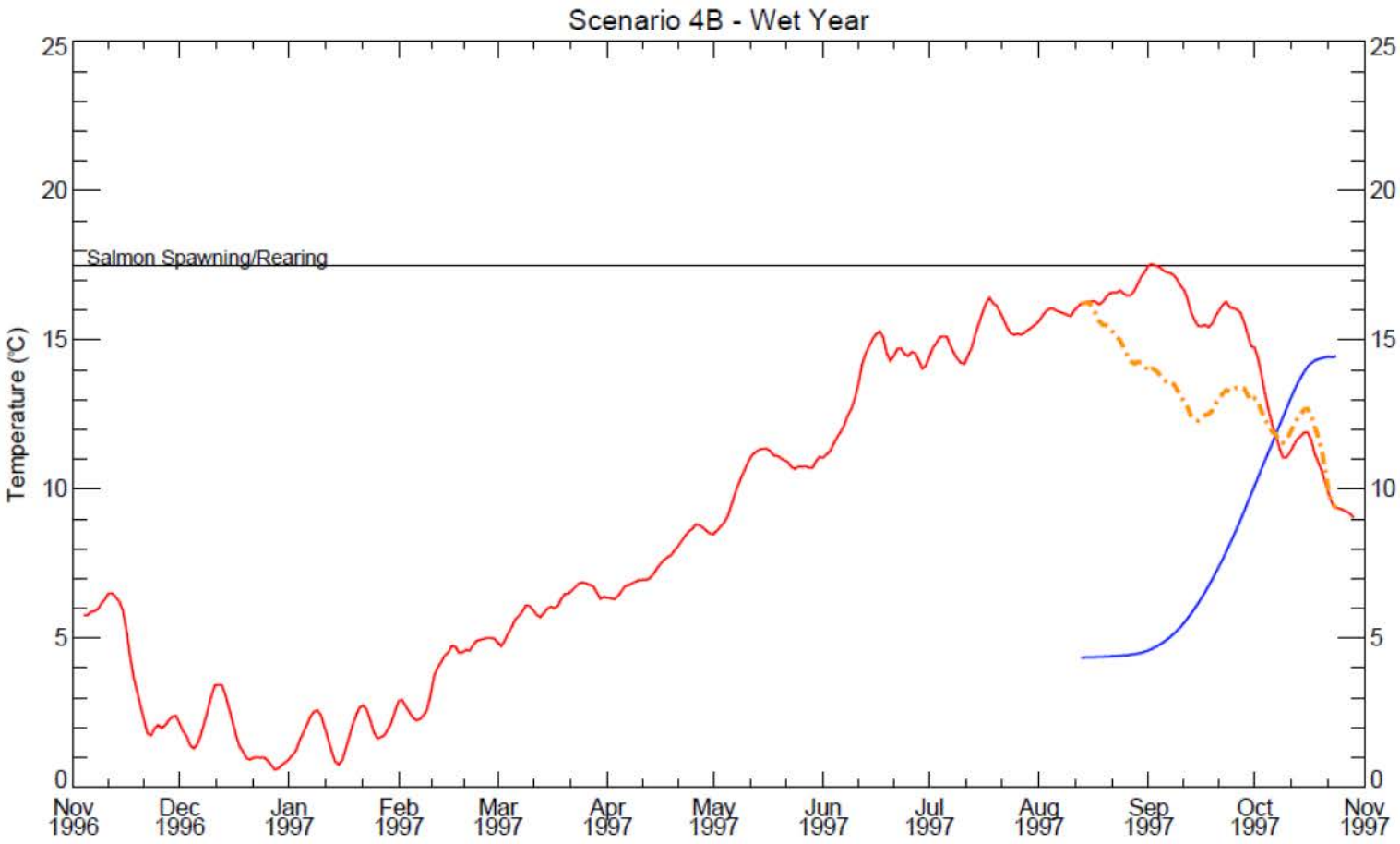
Predicted 7-DADMax for Integrated Plan Run - Wet Year, Single Outlet



Predicted 7-DADMax for Scenario 4A: Flip-Flop Reduction, 80kaf, Wet Year, Single Outlet



Predicted 7-DADMax for Scenario 4B: Flip-Flop Reduction, 110kaf Wet Year, Single Outlet



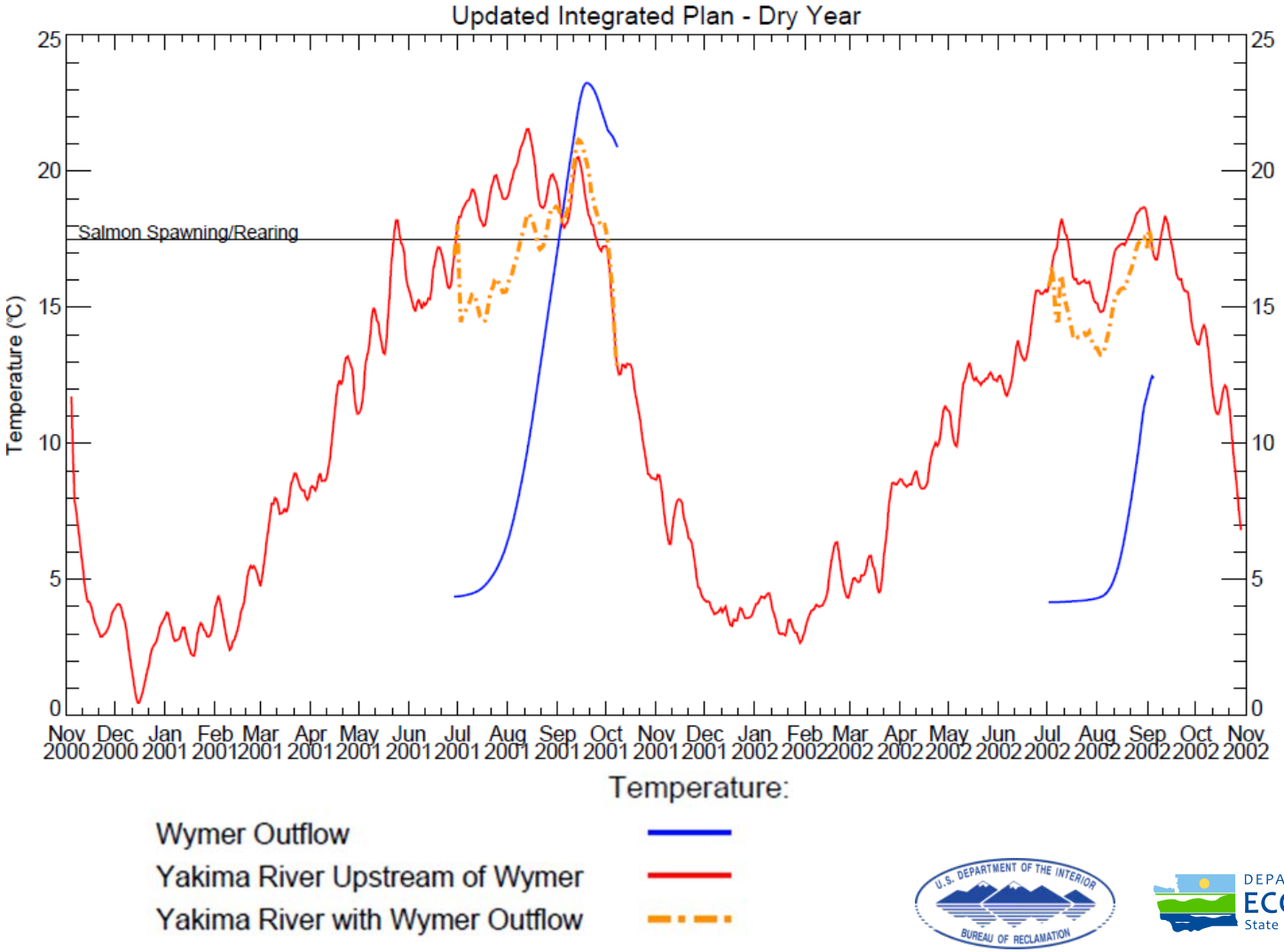
Temperature:

Wymer Outflow

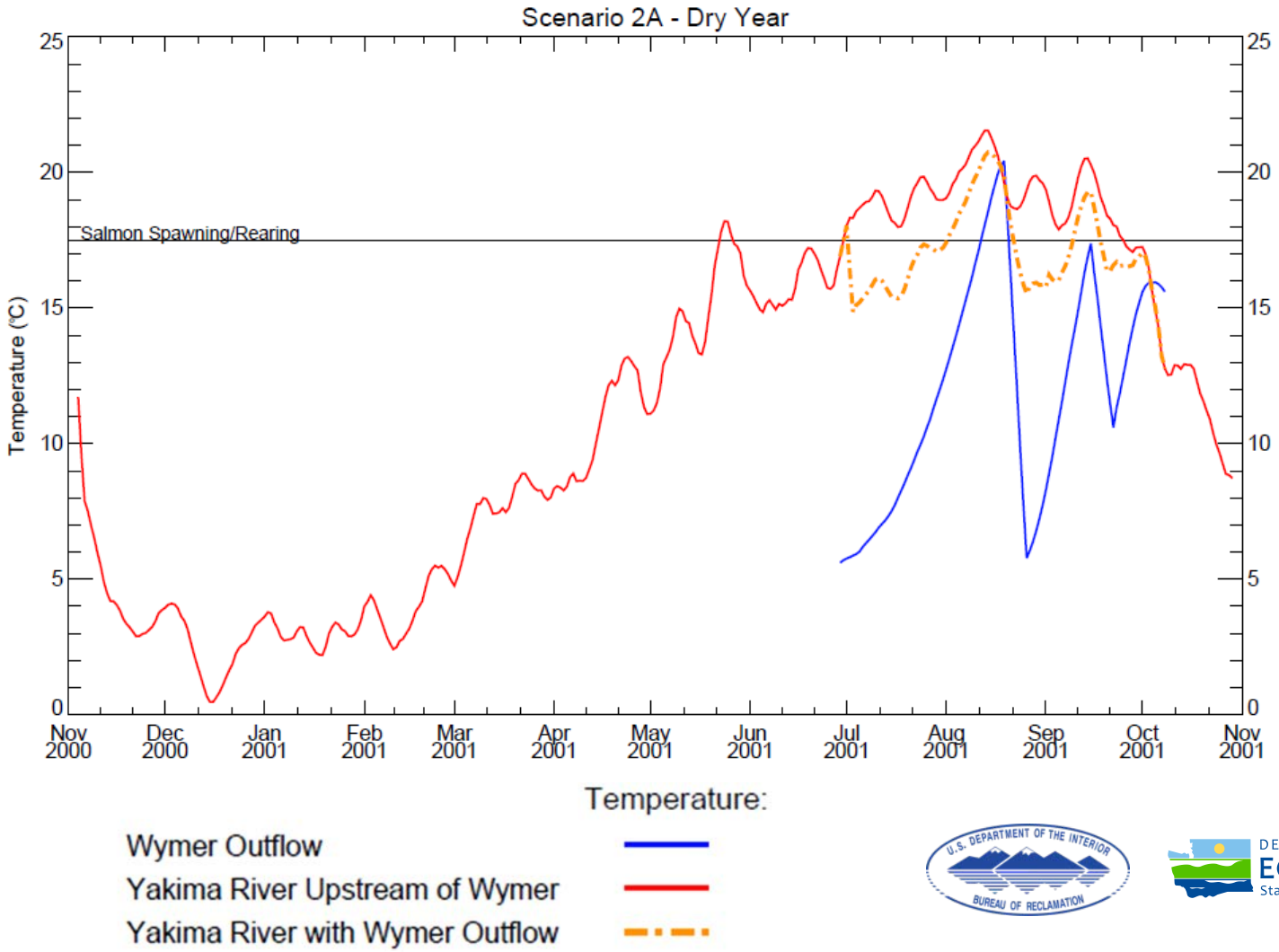
Yakima River Upstream of Wymer

Yakima River with Wymer Outflow

Predicted 7-DADMax for Integrated Plan Run – Average Year (2002) following Dry Year, Single Outlet



Wymer Temperature Model, Predicted 7-DADMax for Integrated Plan Run - Dry Year, Multilevel Outlets



Summary of Wymer Temperature Modeling

- Temperature model developed and 5 scenarios simulated for case using single low-level outlet
- For average-to-wet years and 80 kaf to 110 kaf discharge:
  - Predicted decrease in Yakima River temperature from onset of reservoir releases until late September or early October. At that time, river temperatures meet criteria for salmon spawning/rearing
- For dry years and 150kaf discharge:
  - Predicted decrease in Yakima River temperature from onset of reservoir releases until late August or early September

Summary of Wymer Temperature Modeling

- A multilevel outlet was also simulated. Three outlets at 1610 feet, 1510 feet, and at base of dam were used in the model. The modeling was performed for a dry year.
- For a dry year and 150kaf discharge:
  - The model simulations indicate a <u>decrease</u> in Yakima River temperature from onset of reservoir releases until October

Wymer Temperature Model Next Steps

- Present final results to Reclamation, Ecology and other Work Group representatives for comments
- Summarize work into Technical Memorandum including recommendations for Wymer Reservoir operations

Wymer Dam & Reservoir Field Exploration

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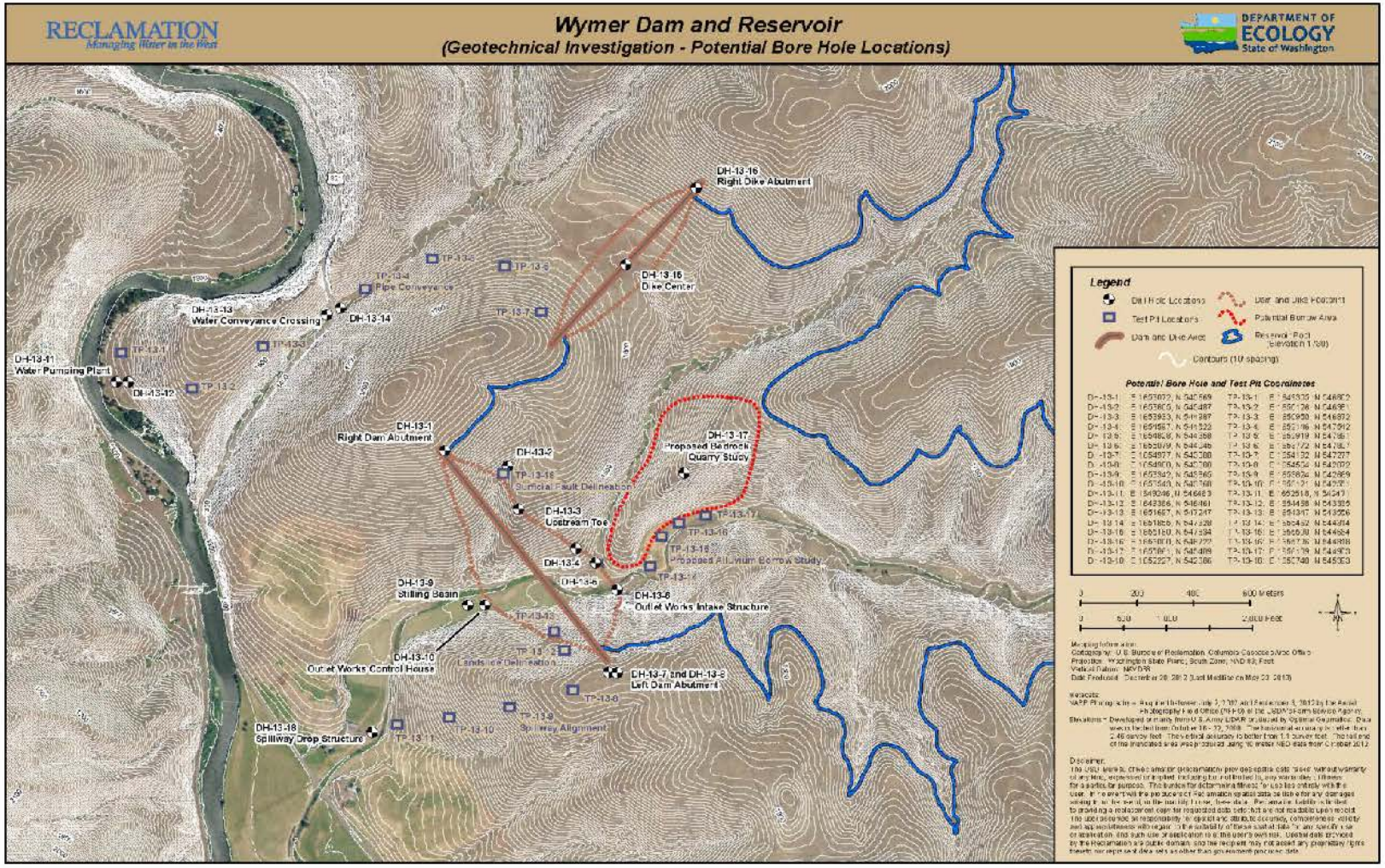
Wymer Geotechnical Investigation



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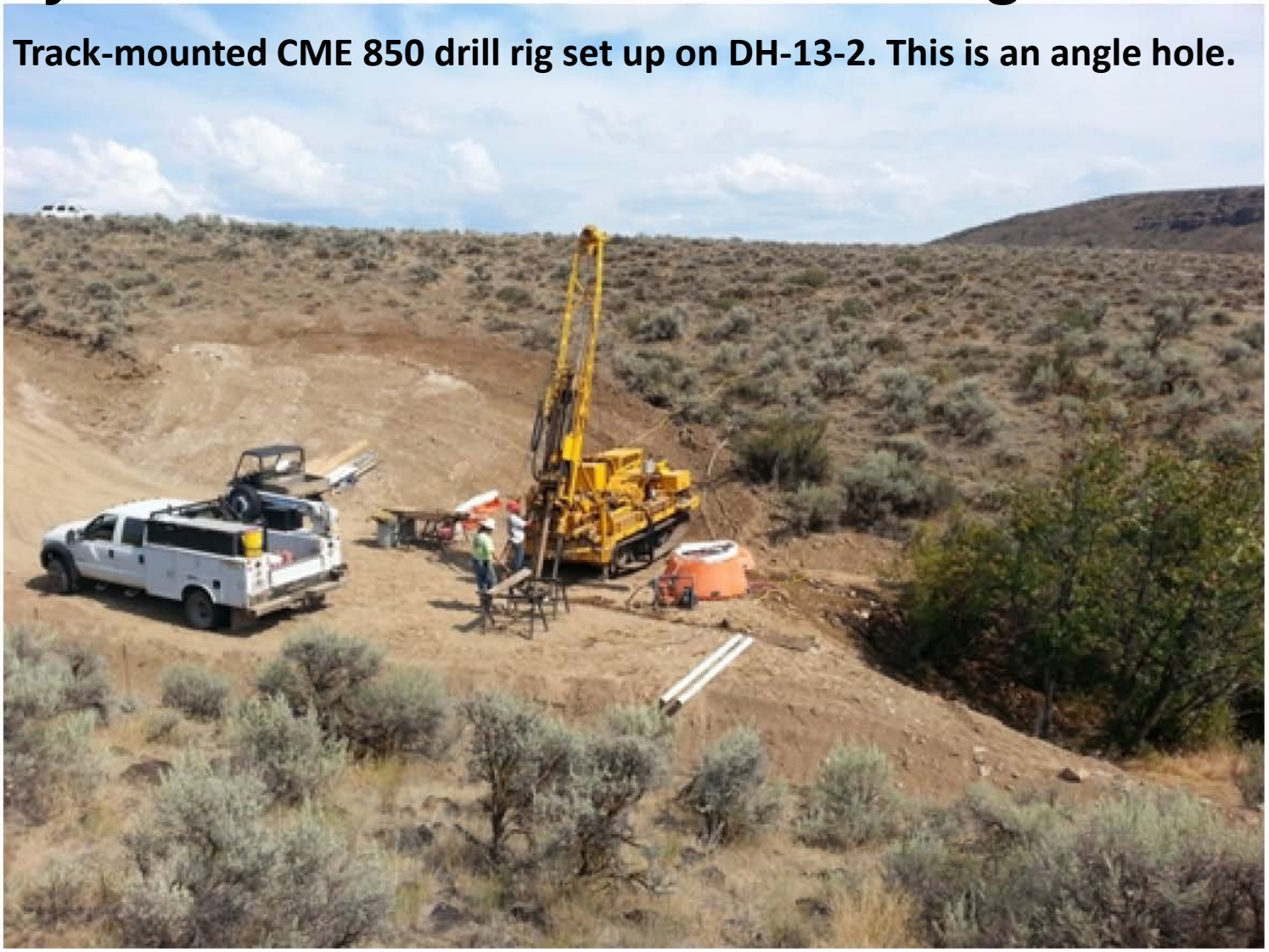
Wymer Geotechnical Investigation



Wymer Geotechnical Investigation

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Kachess Inactive Storage Field Exploration

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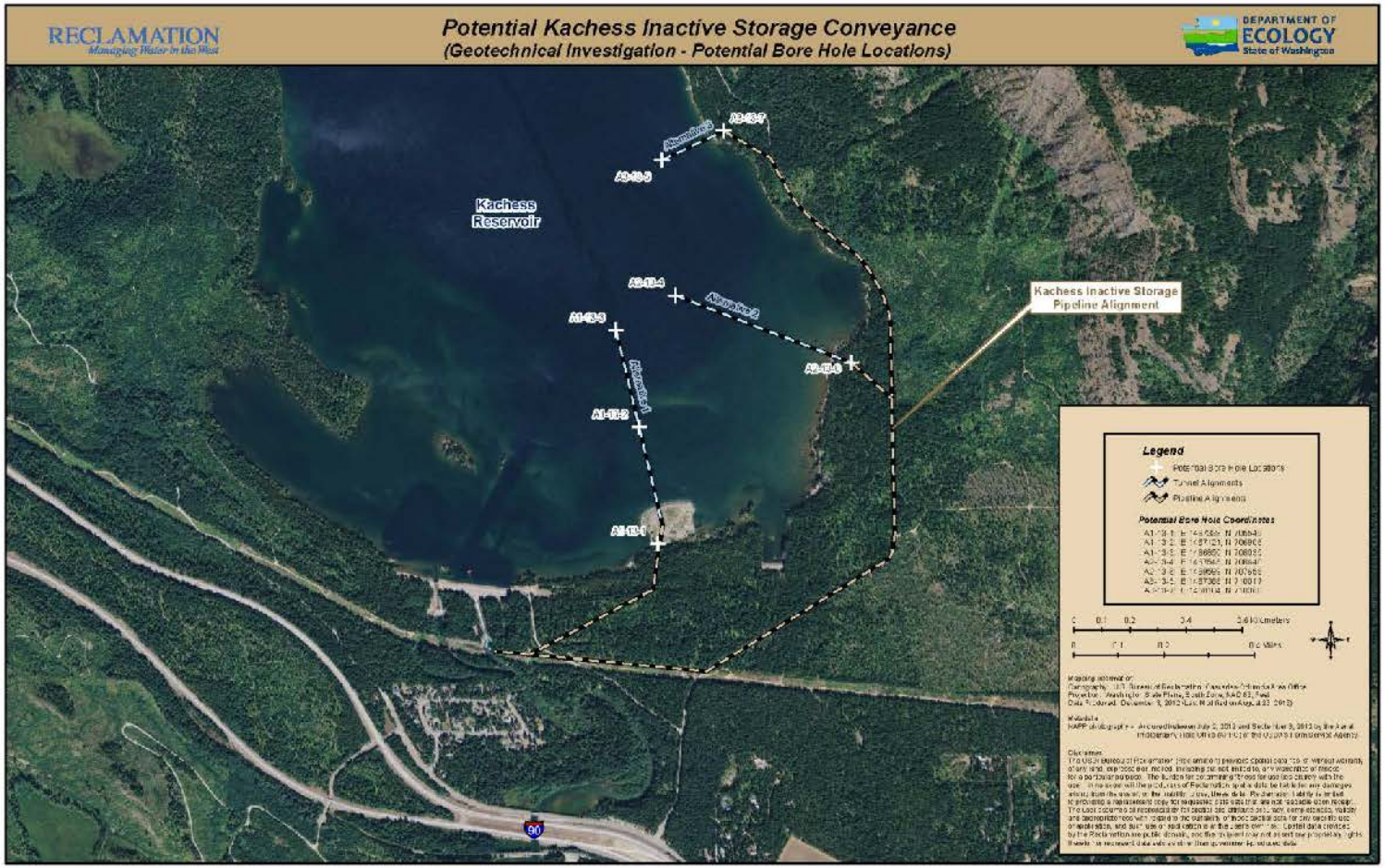
Kachess Inactive Storage Geotechnical Investigation



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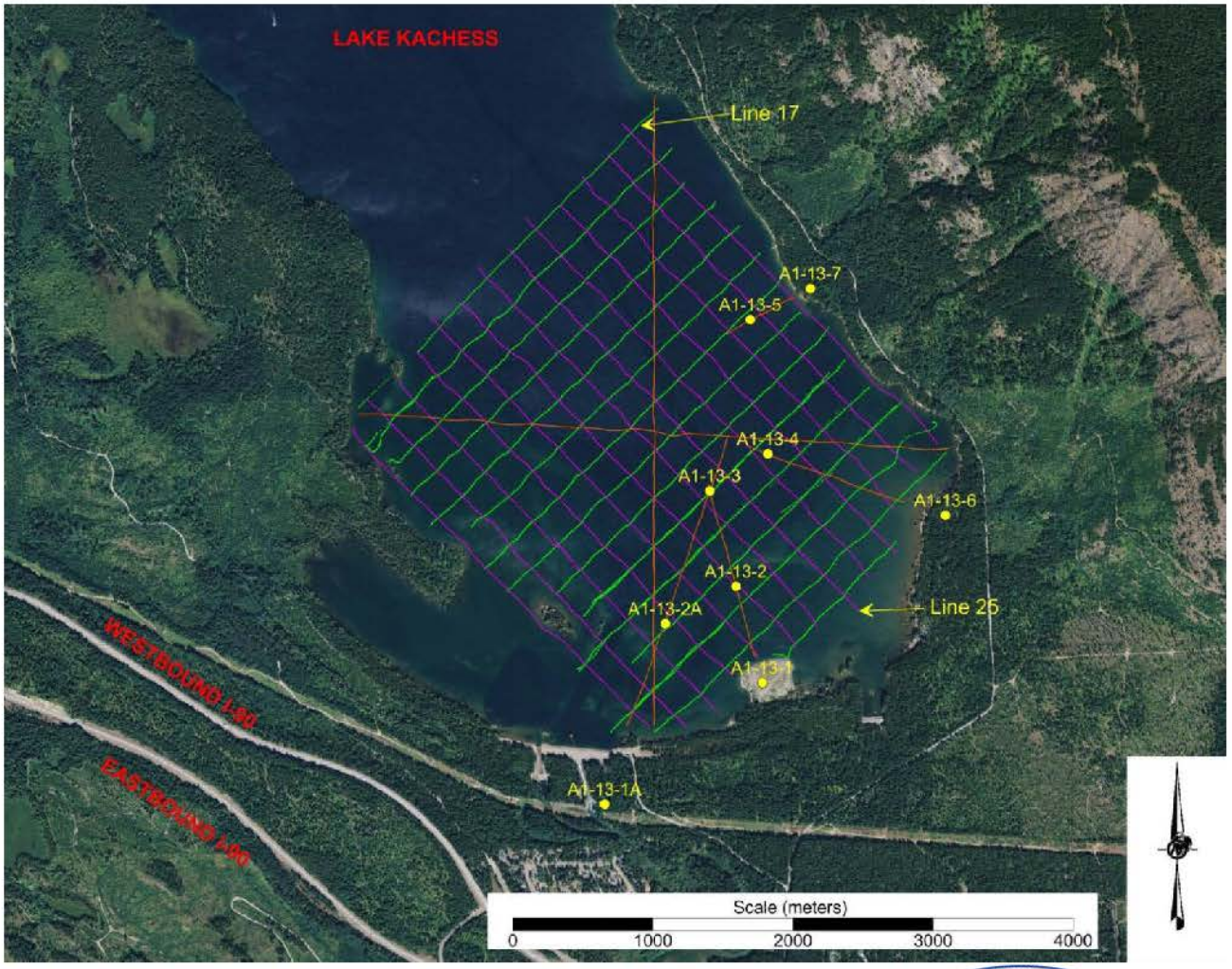
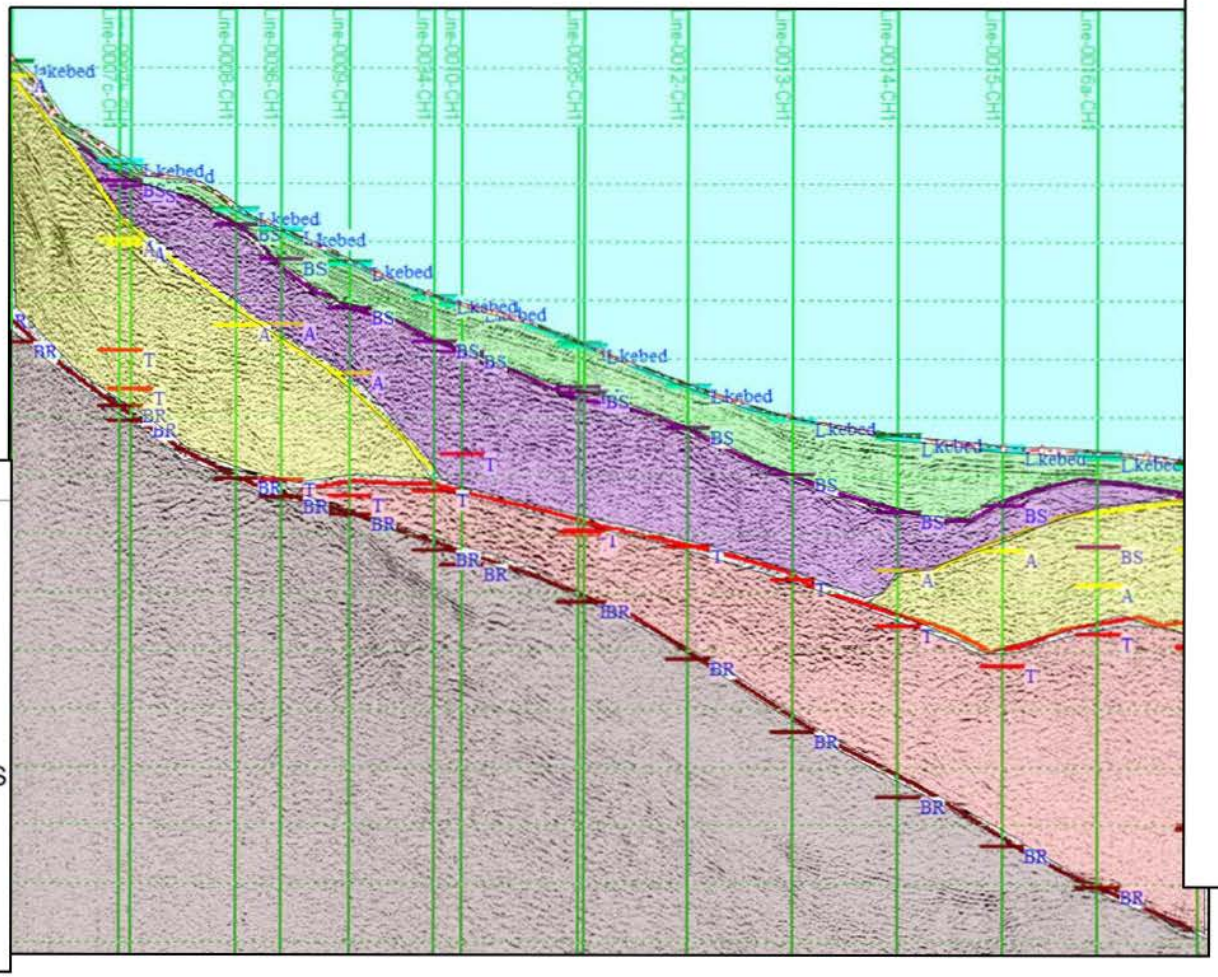
Kachess Inactive Storage Geophysical Survey of Lake Bottom



Kachess Inactive Storage Lake Bottom Profile-Line 25



Depth
(feet)
100
300
500
700

LEGEND

- WATER
- FINE GRAINED SEDIMENT
- BLOCKSLIDE OR LANDSLIDE DEBRIS
- ALLUVIUM
- TILL OR ROCK DEBRIS
- BEDROCK
- GAS CHARGED SEDIMENT MASKING LOWER LAYERS

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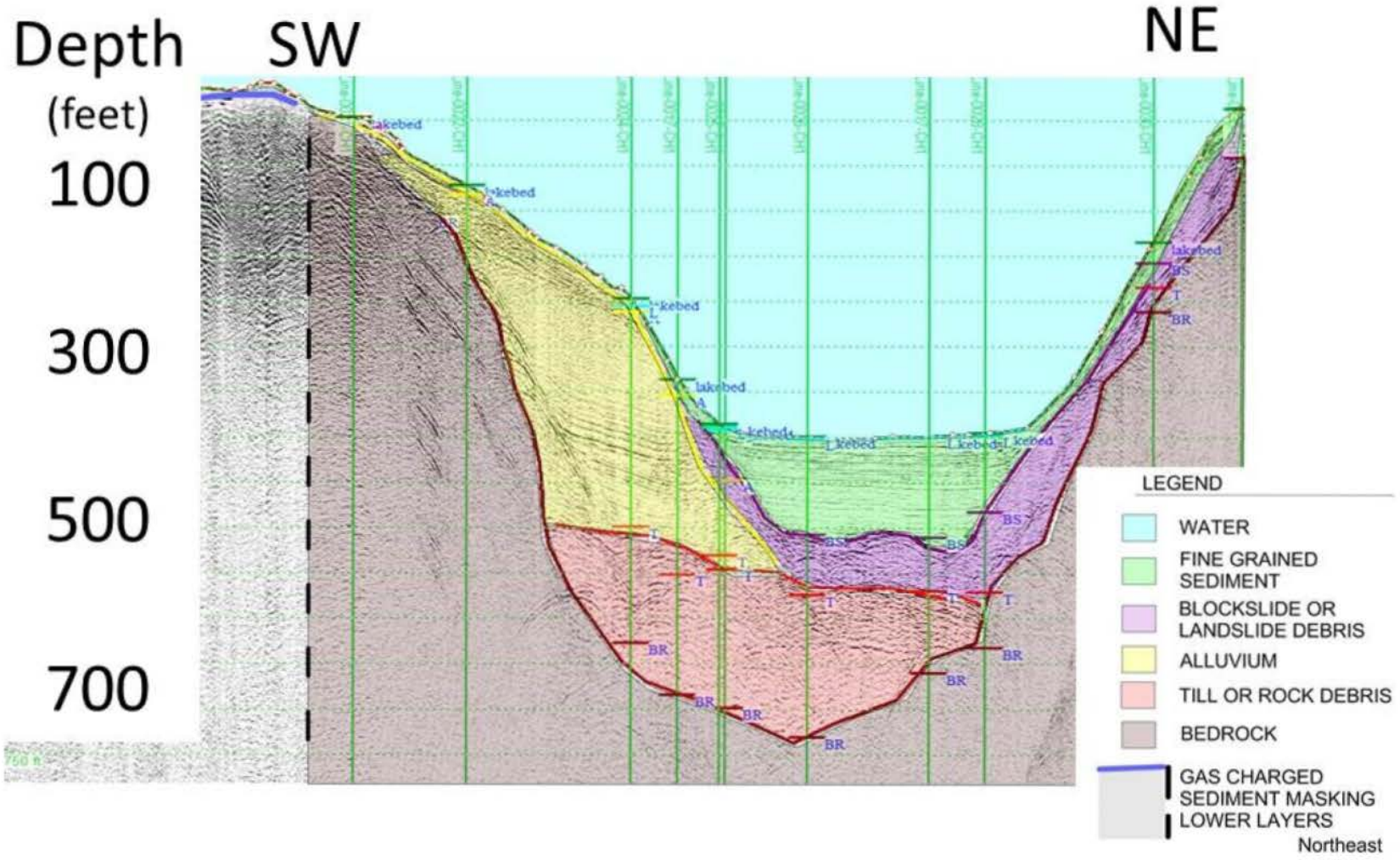
Kachess Inactive Storage Lake Bottom Profile-Line 17



Kachess Inactive Storage Next Steps

- Use geophysics results to refine placement of rock borings for tunnel and pump station
- Begin drilling Fall 2013

Keechelus to Kachess Conveyance Field Exploration

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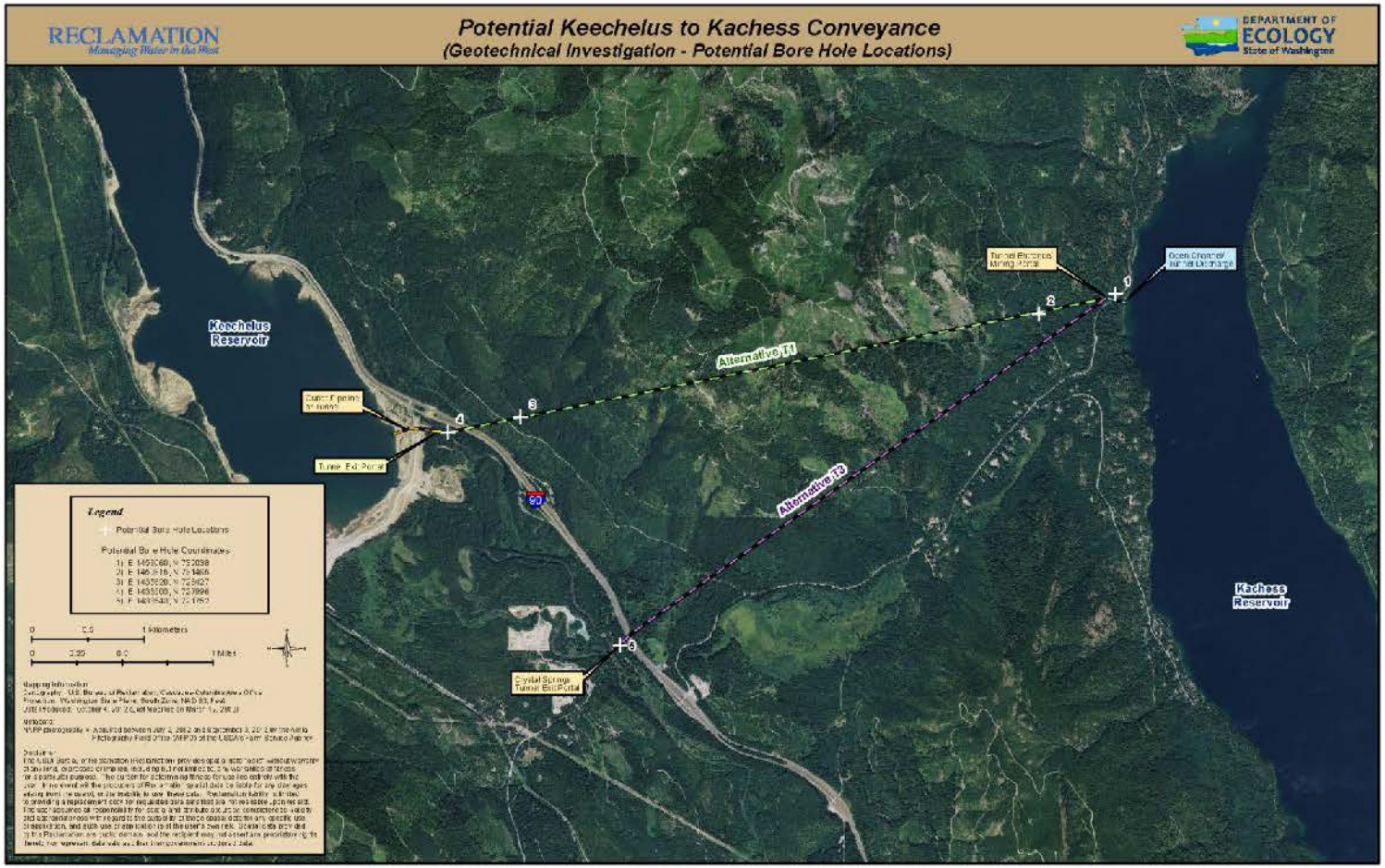
K to K Conveyance Geotechnical Investigation



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Cle Elum Fish Passage Facilities Modeling & Field Exploration

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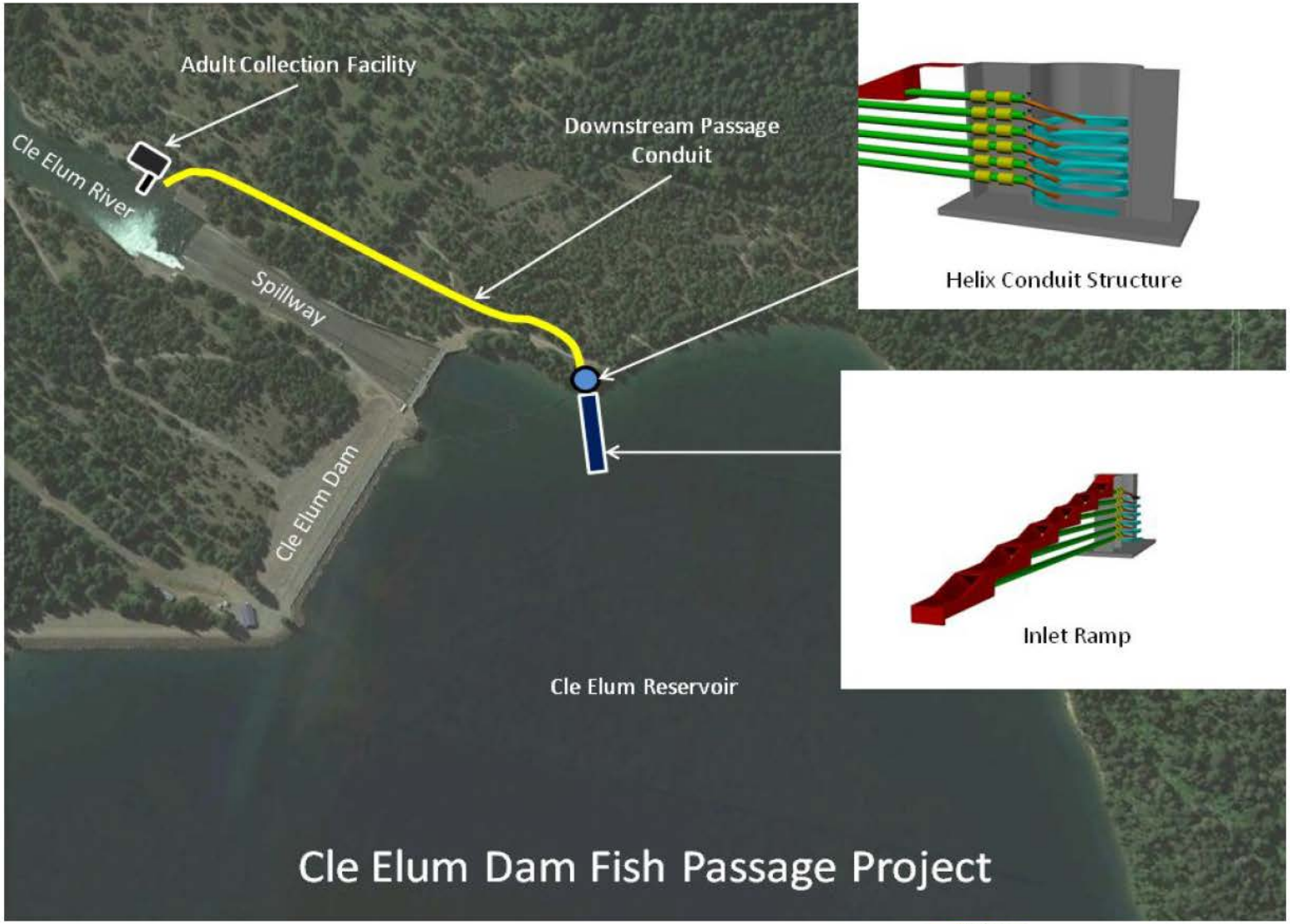
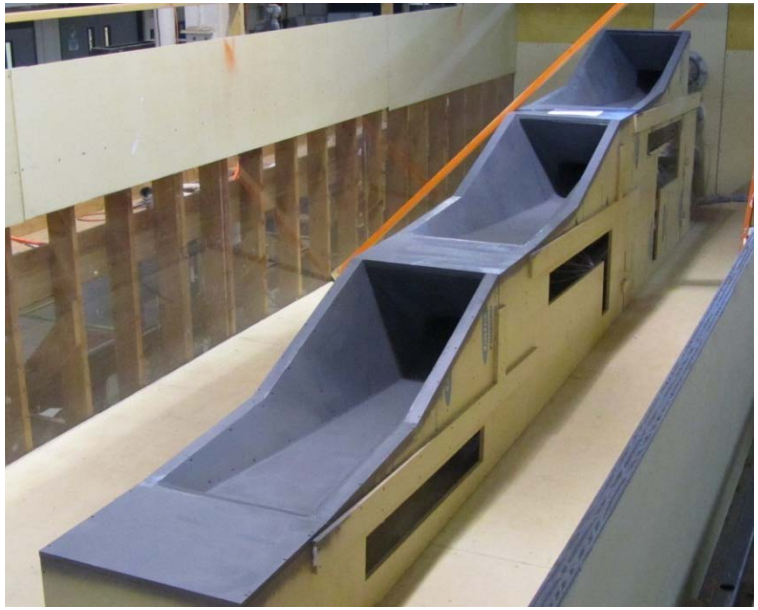
Cle Elum Fish Passage Facilities



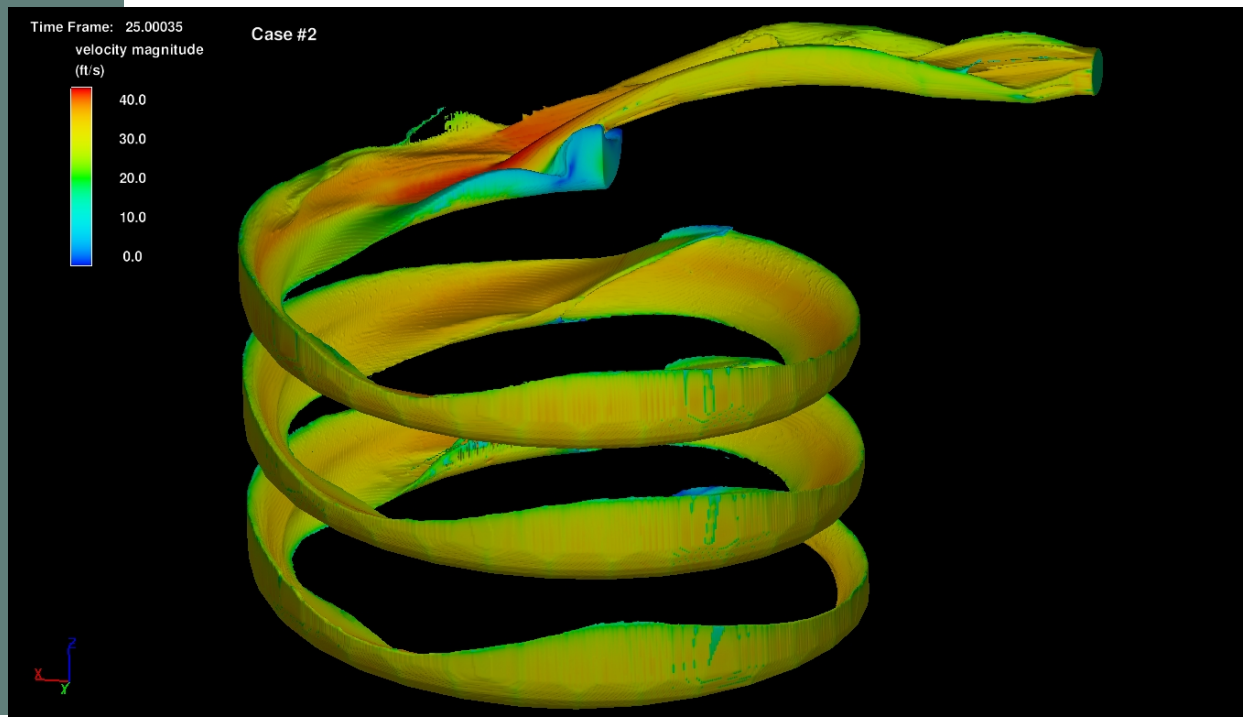
Cle Elum Fish Passage Facilities Downstream Passage Model - Inlet

- Intake structure only (1:9.5 scale) will be used to refine the intake structure design
  - Evaluate entrance flow conditions into inlet structure
    - Ensure smooth flow conditions and acceleration into structure
    - Determine best methods for operation with respect to entrance conditions with two inlets operating simultaneously



Cle Elum Fish Passage Facilities Downstream Passage Model - Helix

- Numerical modeling (by Jim Higgs) will be used to:
  - Provide smooth transitions from the drop chute into Helix
  - Determine conduit geometry
    - Ensure banked flow does not interfere with lower transitions

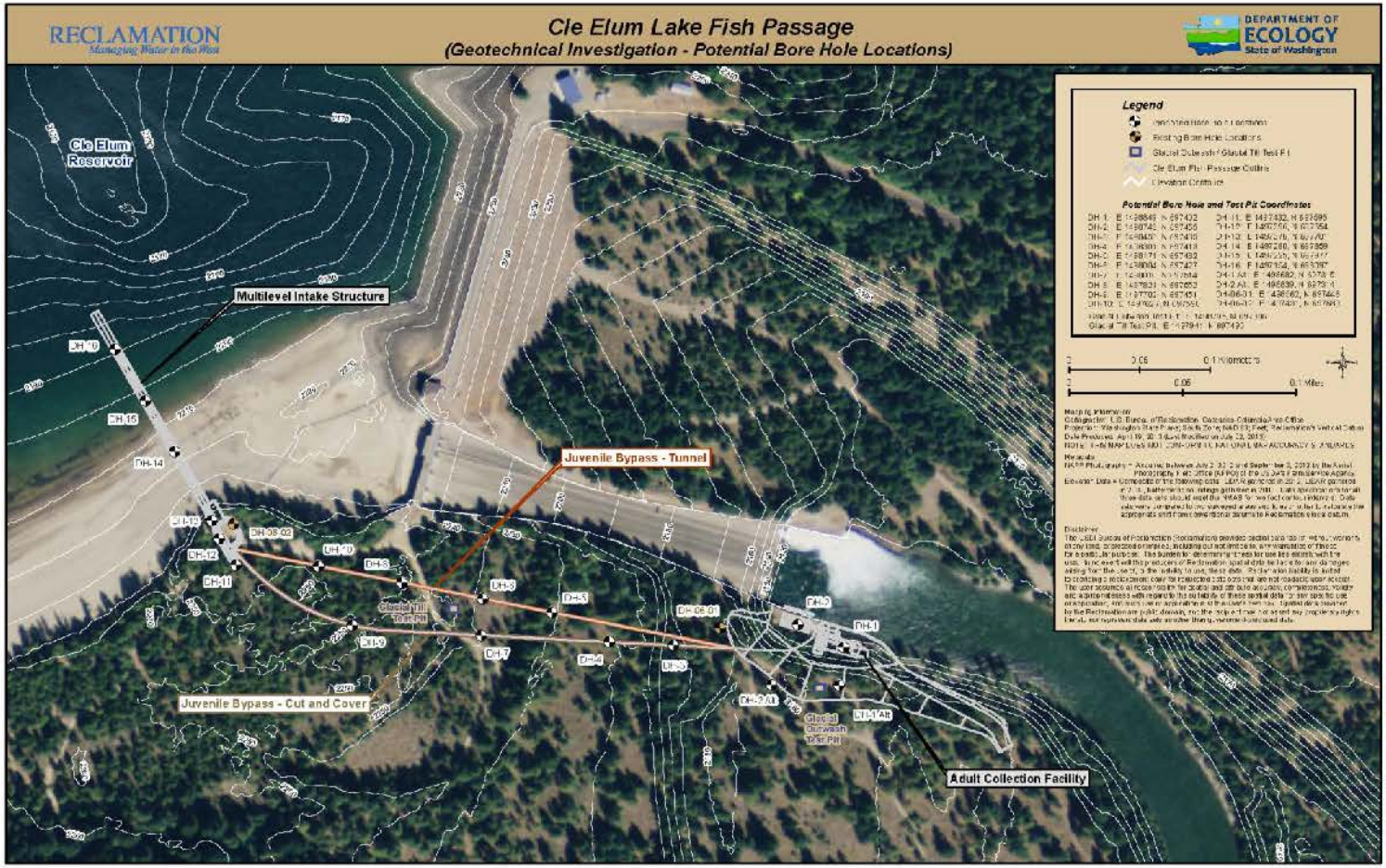


Cle Elum Fish Passage Facilities
Upstream Passage Model - Mirror Image 1:10 Scale

Cle Elum Fish Passage Facilities
Upstream Passage Model 3200 cfs Video

Cle Elum Fish Passage Facilities
Upstream Passage Model 500 cfs Video

Cle Elum Fish Passage Geotechnical Investigation



Cle Elum Fish Passage Geotechnical Investigation

Drill hole DH-13-9 for the proposed juvenile bypass conduit, final depth of 124 feet.

Cle Elum Fish Passage Geotechnical Investigation

Close shot of drill hole DH-13-9 for the proposed juvenile bypass conduit.

Manastash Creek Conservation and Tributary Enhancements

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Manastash Creek Conservation & Tributary Enhancement

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Manastash Creek Conservation & Tributary Enhancement

Unloading pipe at work site.

Manastash Creek Conservation & Tributary Enhancement

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