Technical Work Update

YRBWEP Workgroup Meeting
September 9, 2015

Presented by:

Phil Rigdon, Yakama Nation
Sarah Pistorese, HDR
Wendy Christensen, Bureau of Reclamation
Andrew Graham, HDR
Mike Livingston, Washington Department of Fish And Wildlife
Rick Roeder, Washington Department of Natural Resources
Urban Eberhart, Kittitas Reclamation District

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Ongoing Projects

- Cle Elum Dam Fish Passage Facilities
- Cle Elum Pool Raise
- Tieton Dam Fish Passage Facilities
- Kachess Drought Relief Pumping Plant
- Keechelus-to-Kachess Conveyance
- Bumping Dam and Reservoir Enlargement
- Lower Yakima River Basin Hydrologic Modeling
- Groundwater Storage
- Teanaway Community Forest
- Manastash Creek Conservation and Tributary Enhancement

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Cle Elum Dam Fish Passage Facilities

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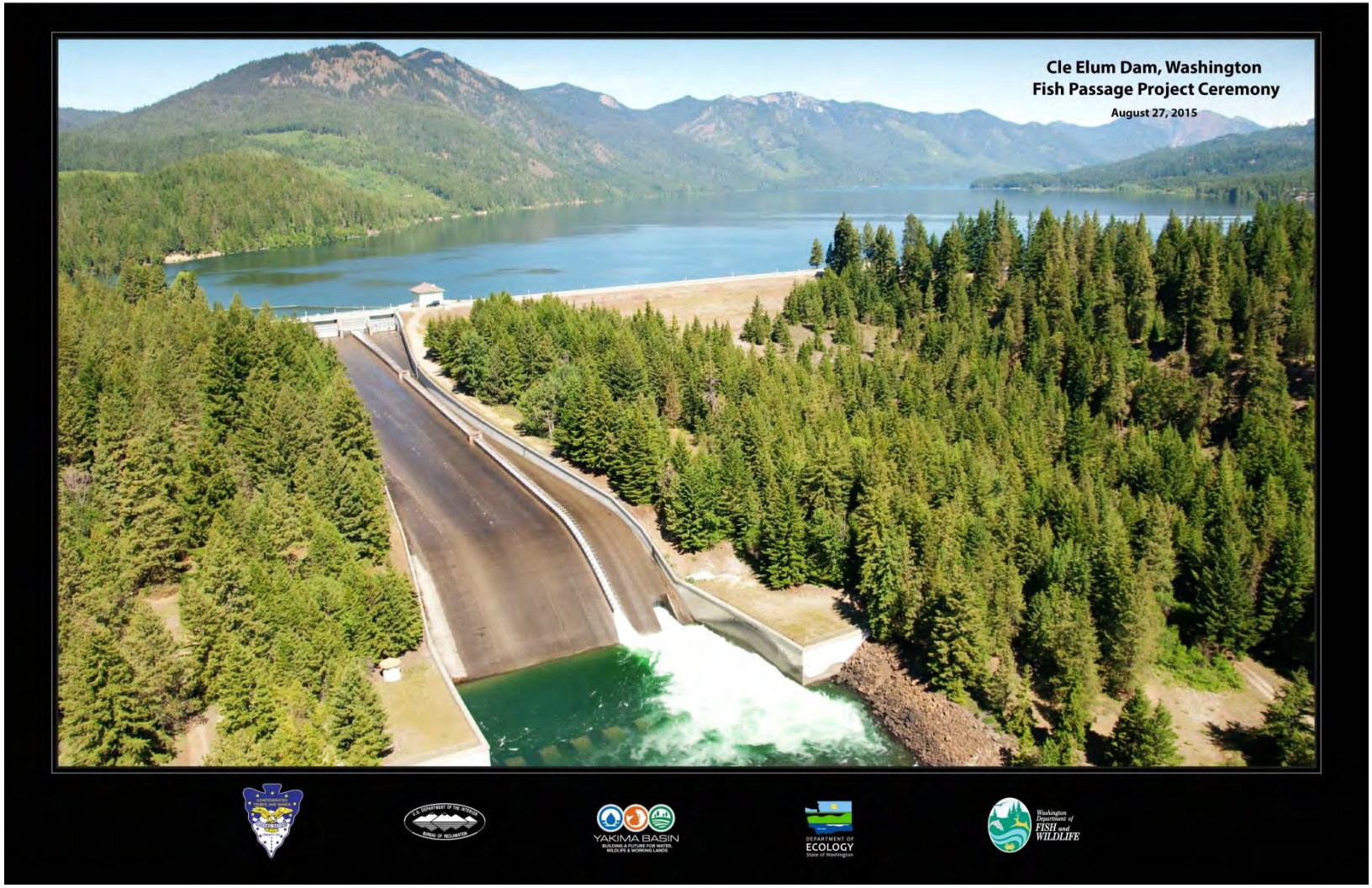
Cle Elum Dam Fish Passage Facilities



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Cle Elum Dam Fish Passage Facilities

- On August 27, 2015 the Yakama Nation, Reclamation, and Washington State Department of Ecology hosted a ceremony to mark the first phase of construction of fish passage at Cle Elum Dam
- The event included several speakers, a salmon bake, and numerous displays, including the 1:9 scale model of the helix.

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Fish Passage Fun Facts

How many seconds, on average, will it take fish to travel downstream via the helix?

Approximately 110 seconds

What is the maximum speed, in miles per hour, for fish going through the helix?

26 miles per hour

How many cubic yards of concrete are in the juvenile fish passage facility?

Approximately 18,000 cubic yards

How many gallons of water will go through the helix in a day?

100 cfs for 24 hours is about 65 million gallons of water. At 400 cfs, that is 260 million gallons of water

What is the maximum operating range, in feet, of reservoir fluctuation for the juvenile fish passage facility?

63 feet

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Cle Elum Dam Fish Passage Ceremony

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Cle Elum Dam Fish Passage Ceremony

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Cle Elum Dam Fish Passage Ceremony – Left to right: Tom Tebb (WA Dept. of Ecology), Urban Eberhart (Kittitas Reclamation District), Phil Rigdon (Yakama Nation), Lorri Lee (Bureau of Reclamation), and Tom Iseman (U.S. Dept. of the Interior)

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Cle Elum Pool Raise

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Cle Elum Pool Raise

- Radial Gate Modification
  - Award contract in September
  - Construction to start next year
- Shoreline Protection
  - Bid packages being prepared
  - Continued coordination with USFS and landowners

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Tieton Dam Fish Passage Facilities

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Tieton Dam Fish Passage Facilities
Appraisal Assessment

Status and Ongoing Efforts

Milestone	Date
HDR and Reclamation site visit and kickoff workshop	March 26, 2015
Core Team site visit and workshop - review design criteria	April 21 and 22, 2015
Core Team interim report workshop - refine initial alternatives	June 9, 2015
HDR submits Draft Appraisal Report	July 24, 2015
Core Team Meeting - review of draft report	July 28, 2015
Reclamation and Core Team provide comments on draft report	August 14, 2015
HDR submits draft cost estimate	August 28, 2015
HDR submits Final Appraisal Report	October 2, 2015

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Tieton Dam Fish Passage Facilities
Appraisal Assessment

Draft Alternatives:

- One Upstream Alternative
  - Trap and Haul
- Two Downstream Alternatives
  - Floating Collector
  - Fixed Collector

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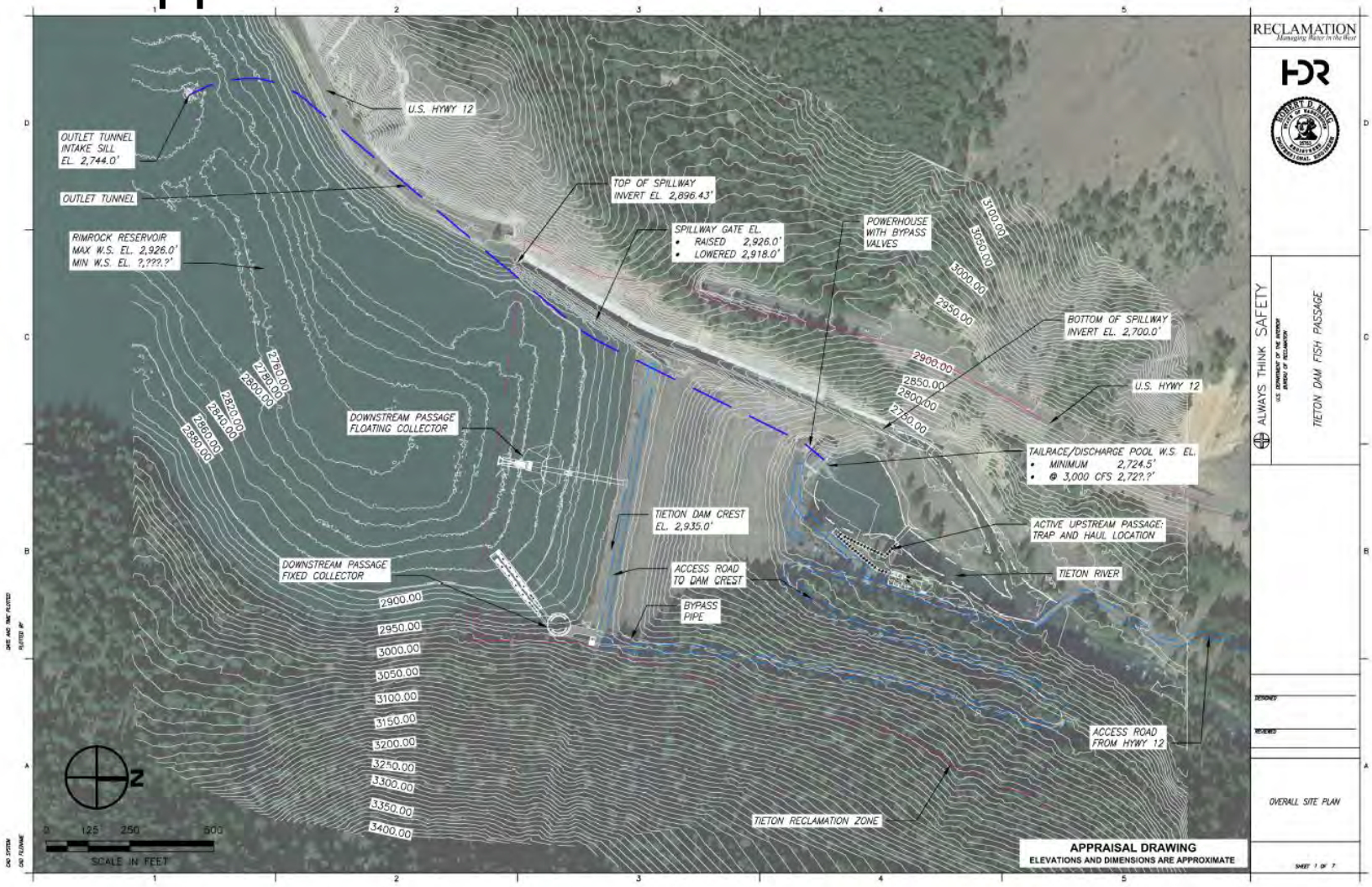
Tieton Dam Fish Passage Facilities
Appraisal Assessment – Site Plan



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Tieton Dam Fish Passage Facilities
Appraisal Assessment – Trap and Haul

Major Components:

- Fish barrier
- Fishway
- Fish trap and holding pond
- Fish lock and lift
- Monitoring and evaluation facilities
- Transport flumes

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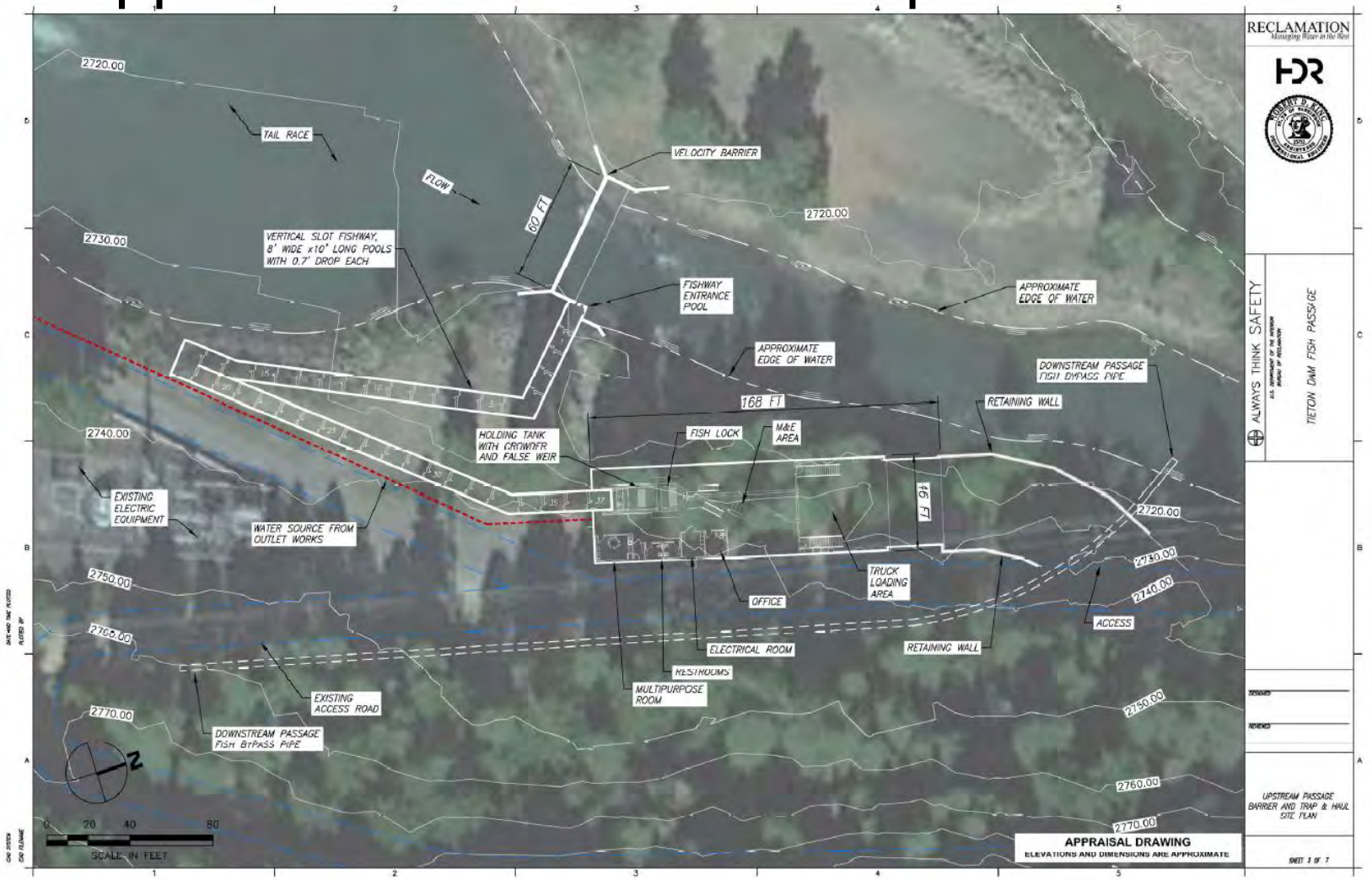
Tieton Dam Fish Passage Facilities
Appraisal Assessment – Trap and Haul



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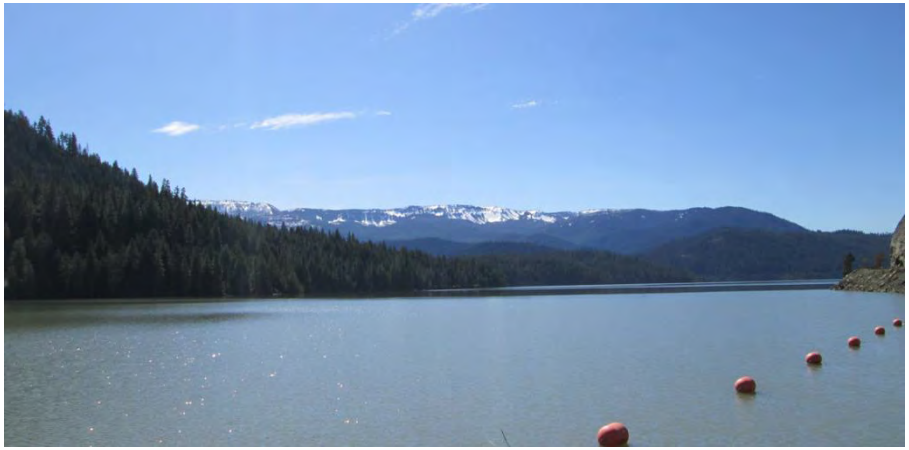
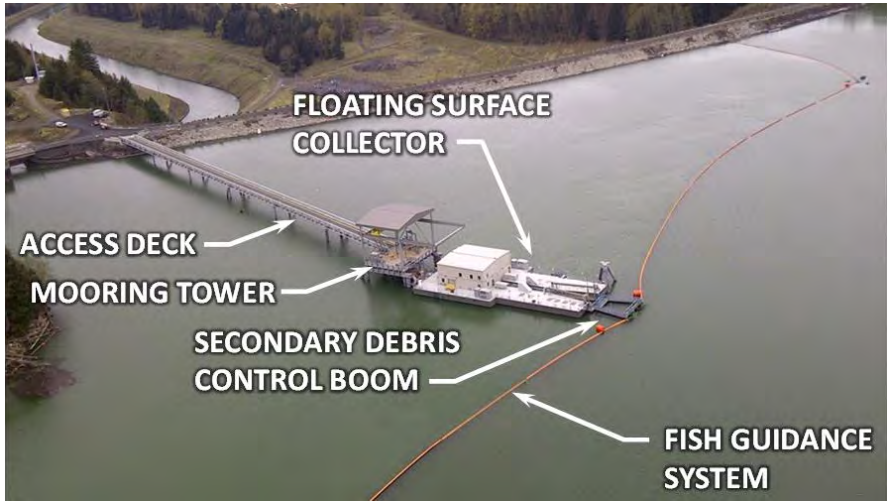
Tieton Dam Fish Passage Facilities
Appraisal Assessment – Alternative 1





Swift Dam Floating Collector, North Fork Lewis River, WA

Floating Collector Major Components:

- Debris Management System
- Fish Guidance System
- Floating Collection Barge
- Access System
- Fish Transfer System
- Fish Transport Vehicle

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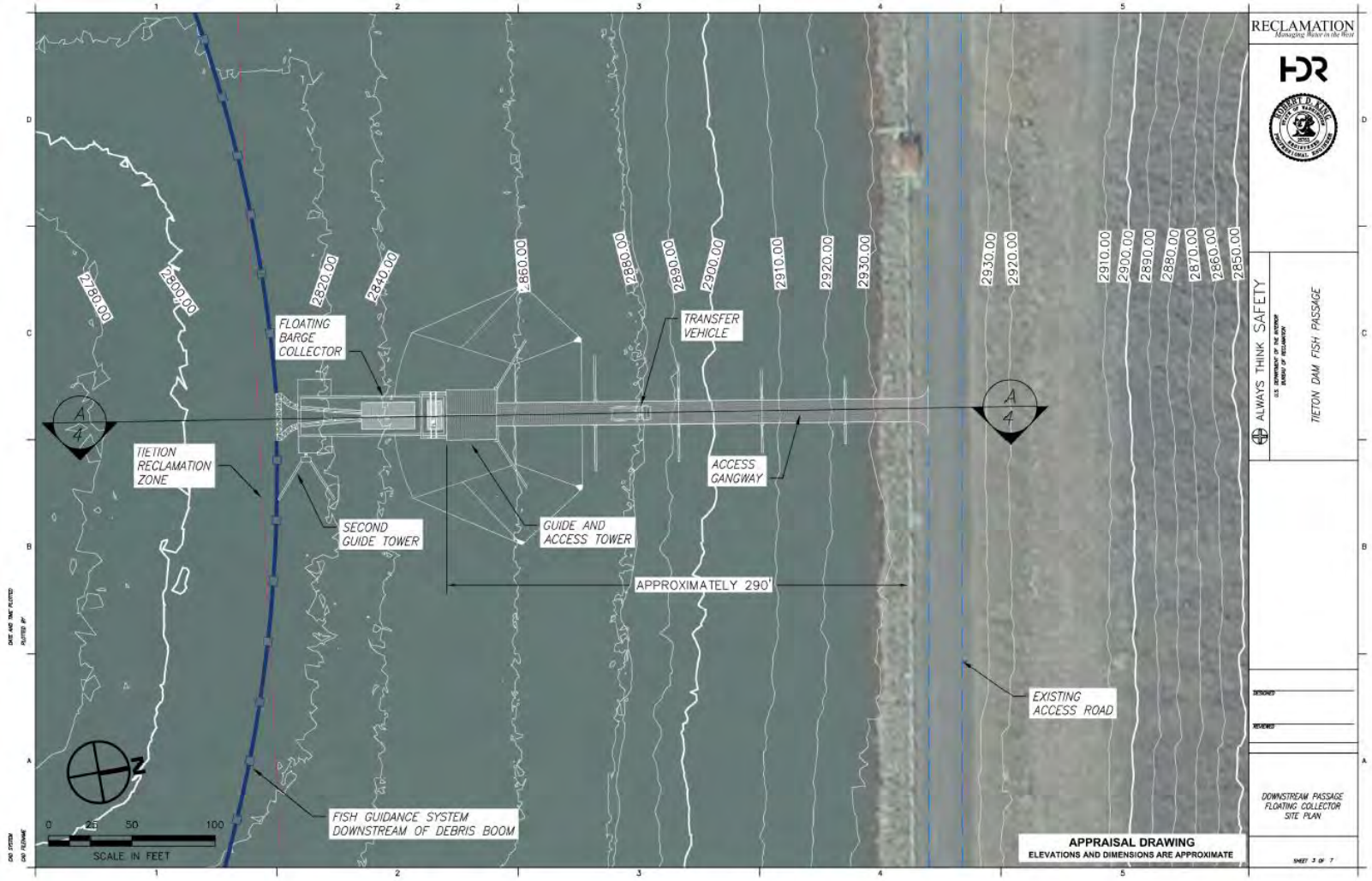
Tieton Dam Fish Passage Facilities
Draft Downstream Passage – Alternative 1



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Tieton Dam Fish Passage Facilities
Draft Downstream Passage – Alternative 2

Fixed Collector Major Components:

- Debris Management System
- Fixed Inlet Array
- Helical Bypass Structure
- Bypass Conduit

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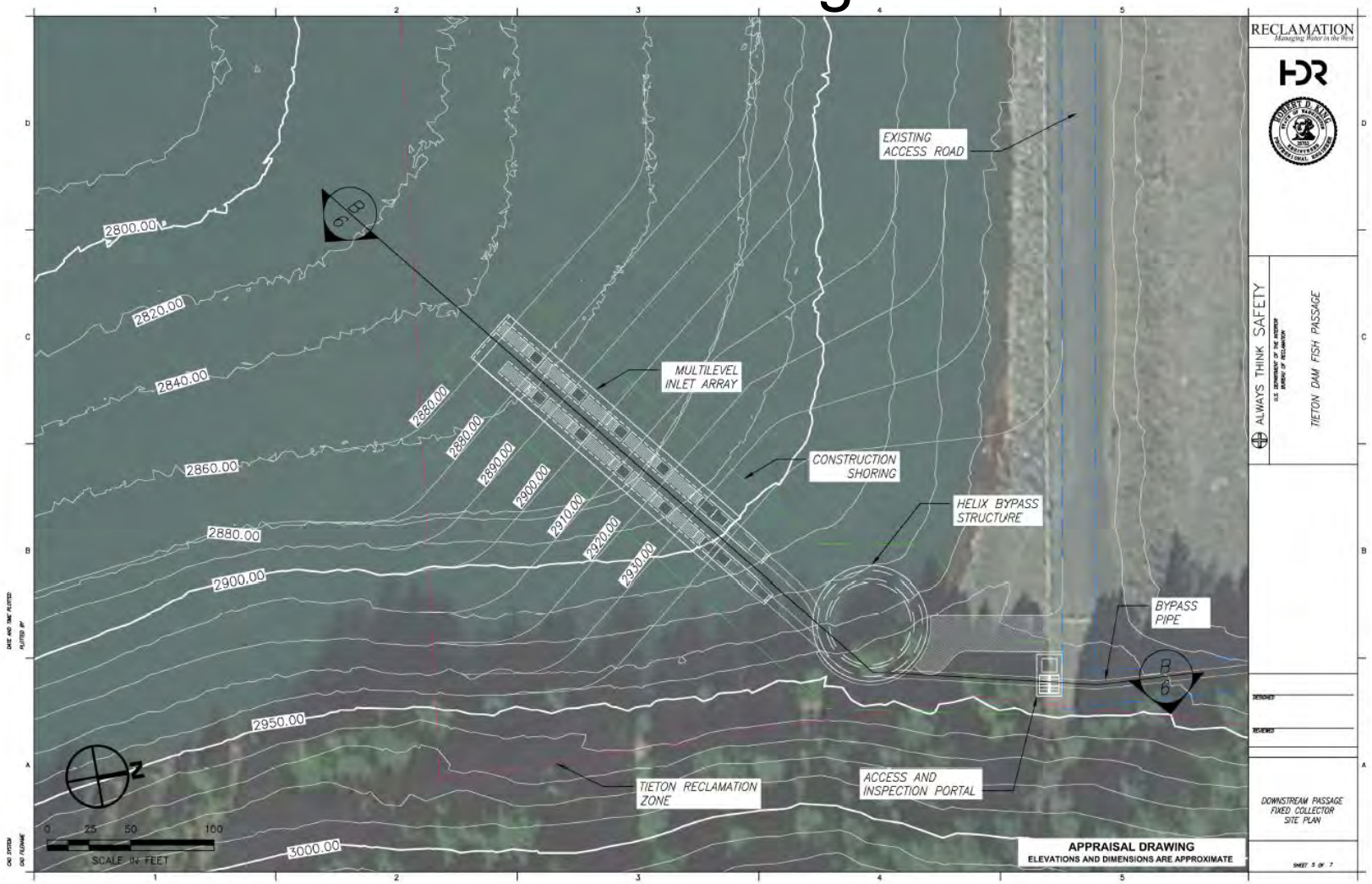
Tieton Dam Fish Passage Facilities

Draft Downstream Passage – Alternative 2



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Kachess Drought Relief Pumping Plant

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Kachess Drought Relief Pumping Plant

- Draft EIS – responding to comments
  - Monitoring existing groundwater wells
  - Reviewing Property Values
  - WDFW analyses ongoing
- Value Analysis Study was conducted with Yakama Nation and proratable irrigation districts
- Proratable districts' developing options based on outcome from Value Analysis
- Additional drilling to be performed this Fall
- Kachess Narrows
  - Evaluation of water surface elevations
  - Evaluation of top of rock
- Bull Trout Enhancement MOU

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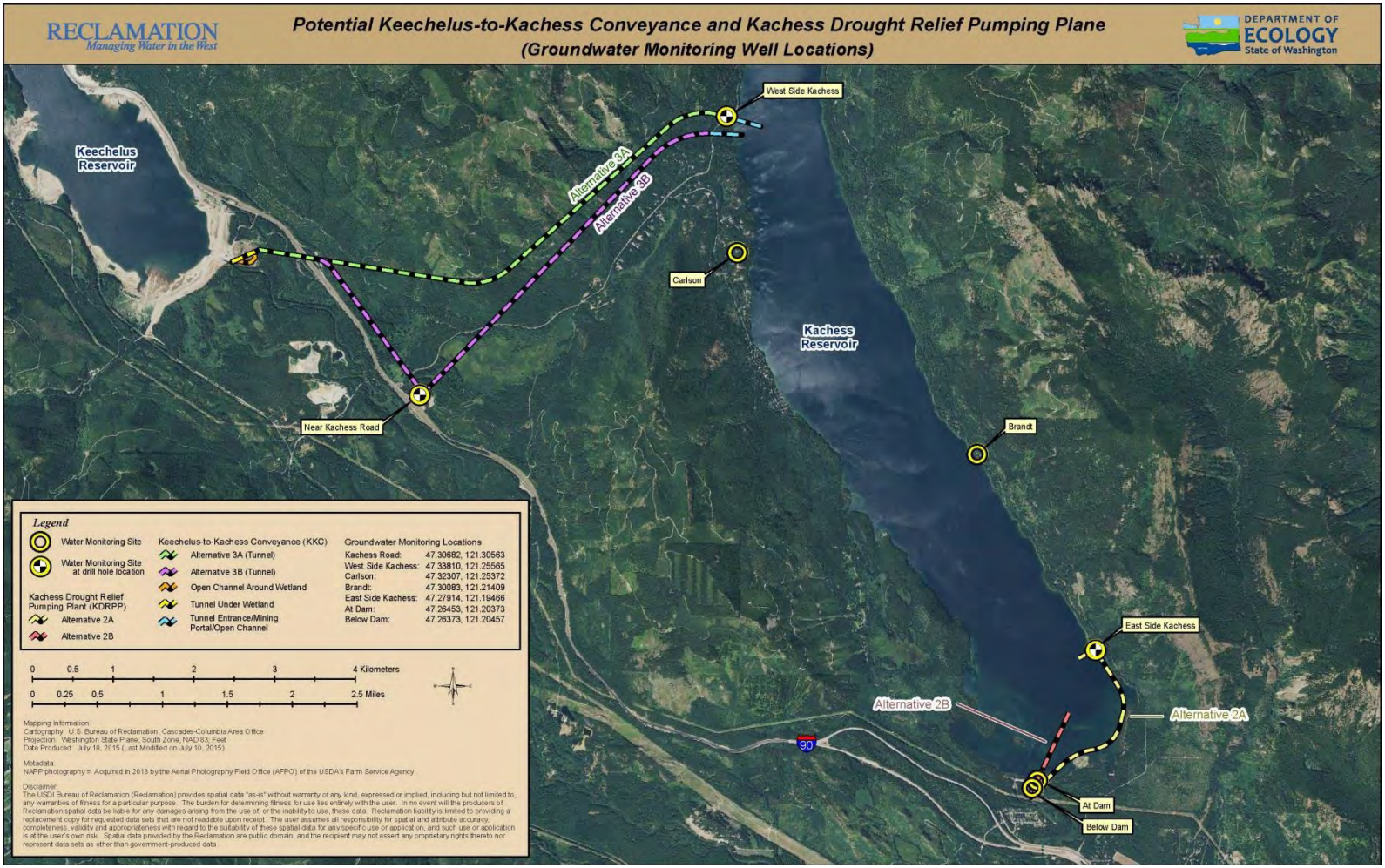
Status of Well Monitoring Near Kachess Reservoir



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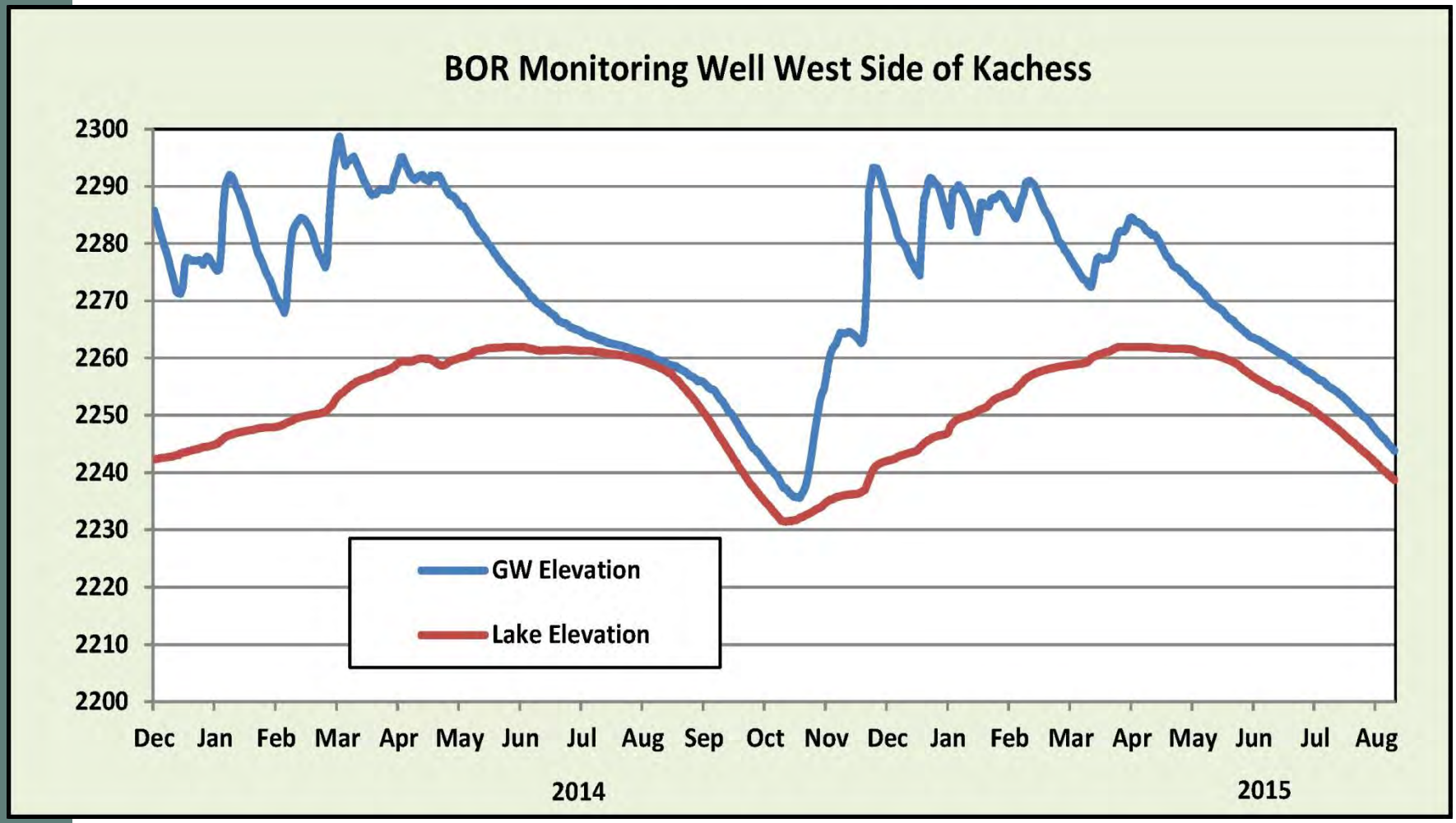

PRELIMINARY DATA

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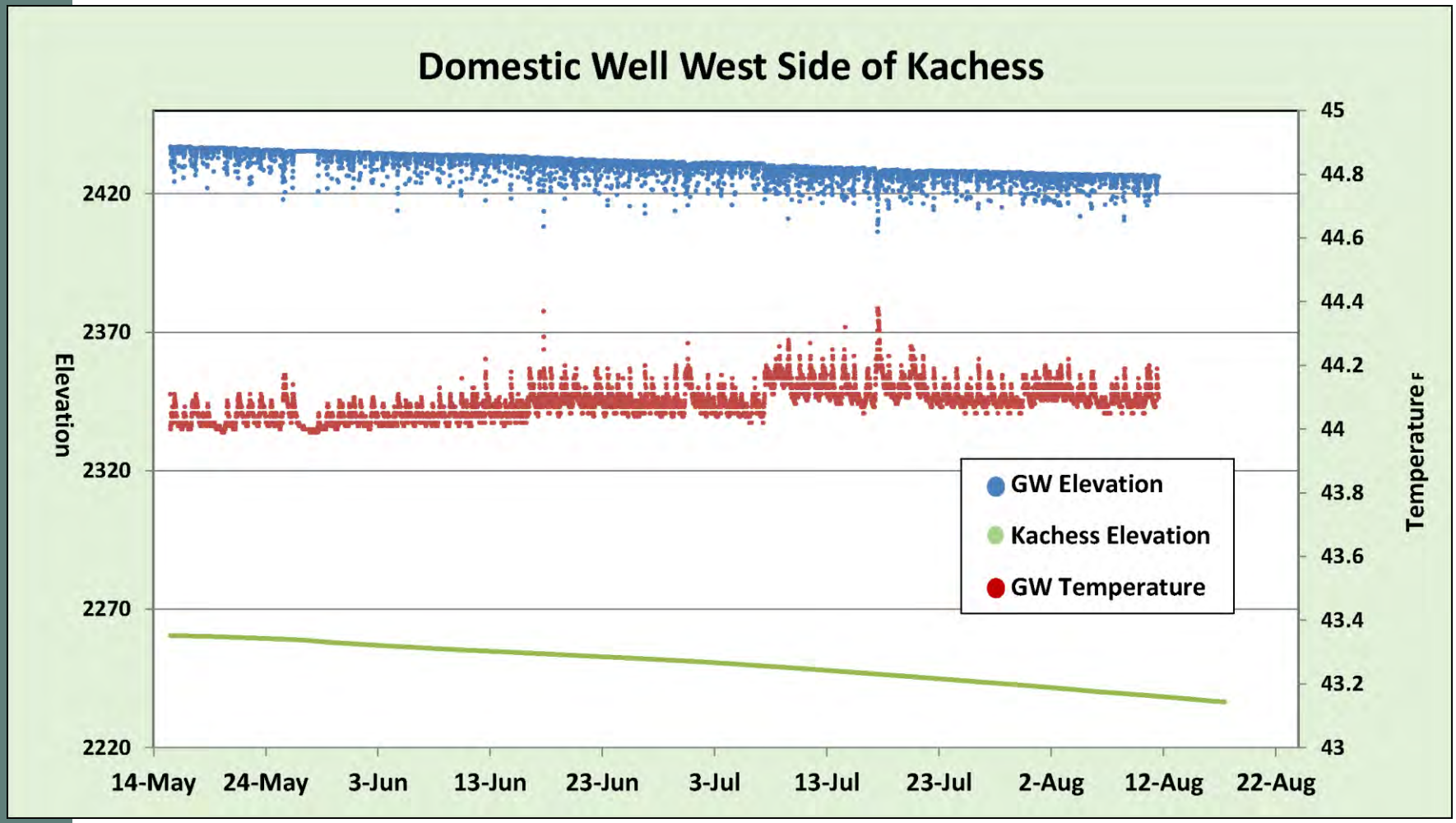

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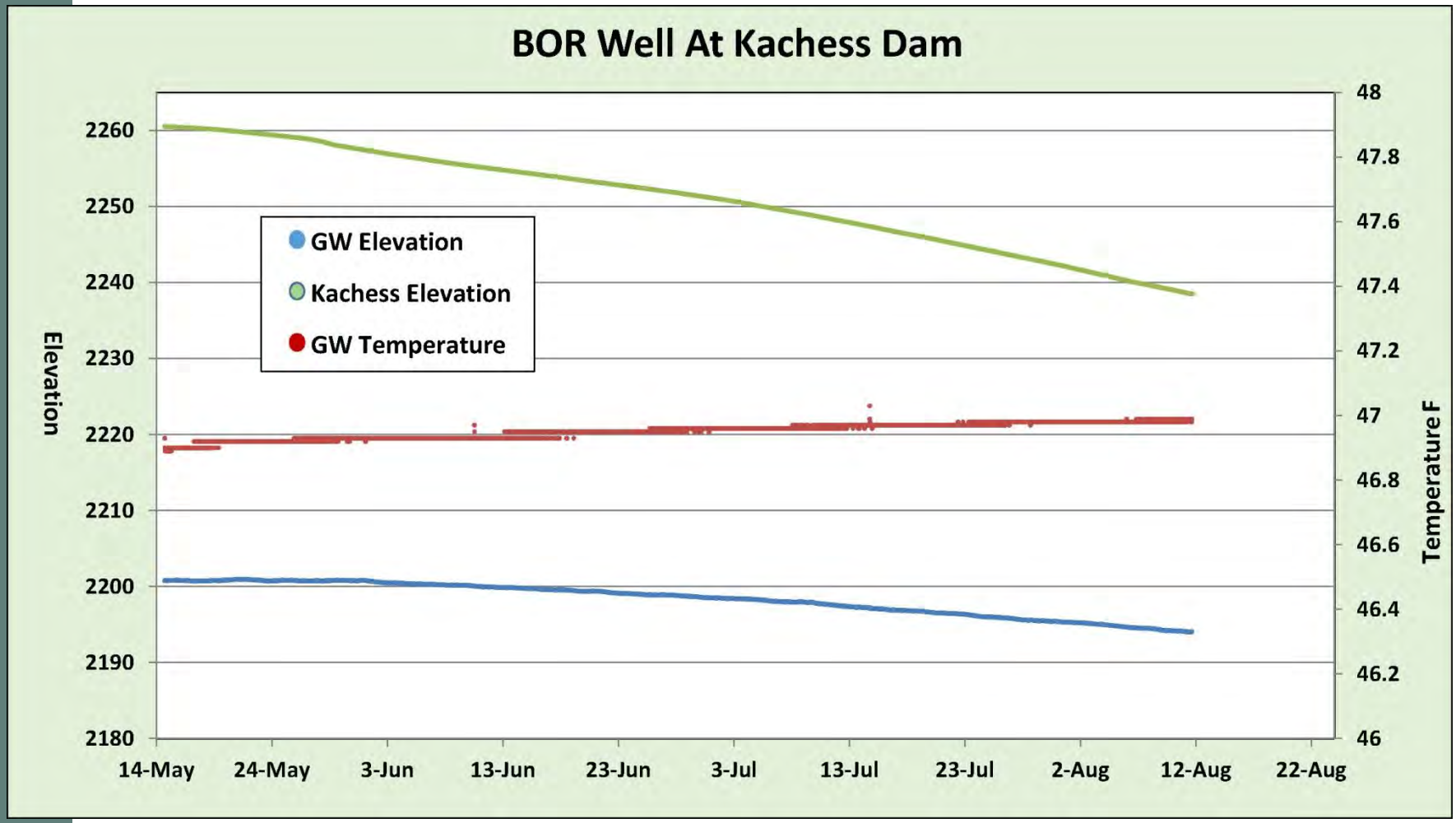

PRELIMINARY DATA

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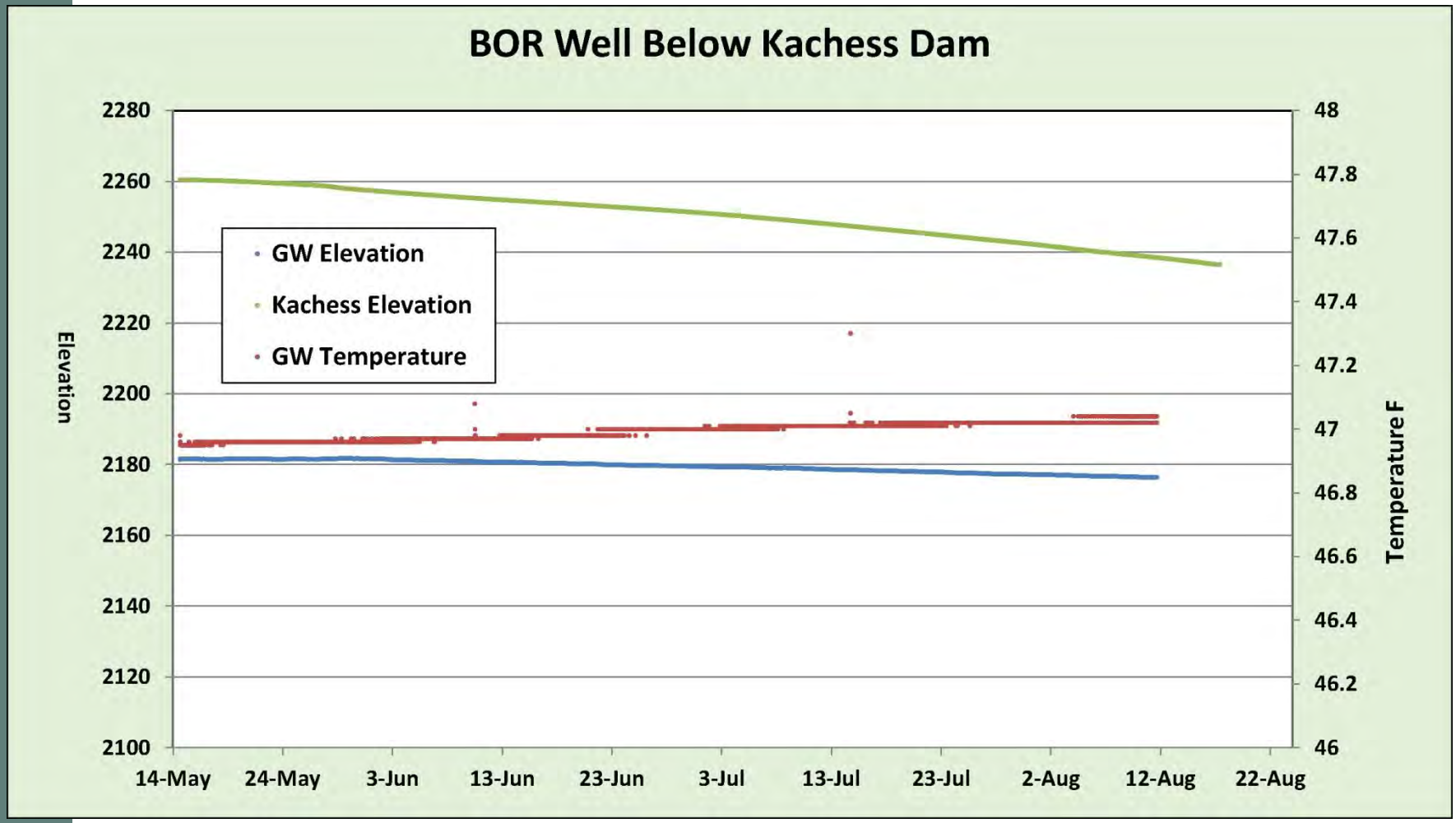

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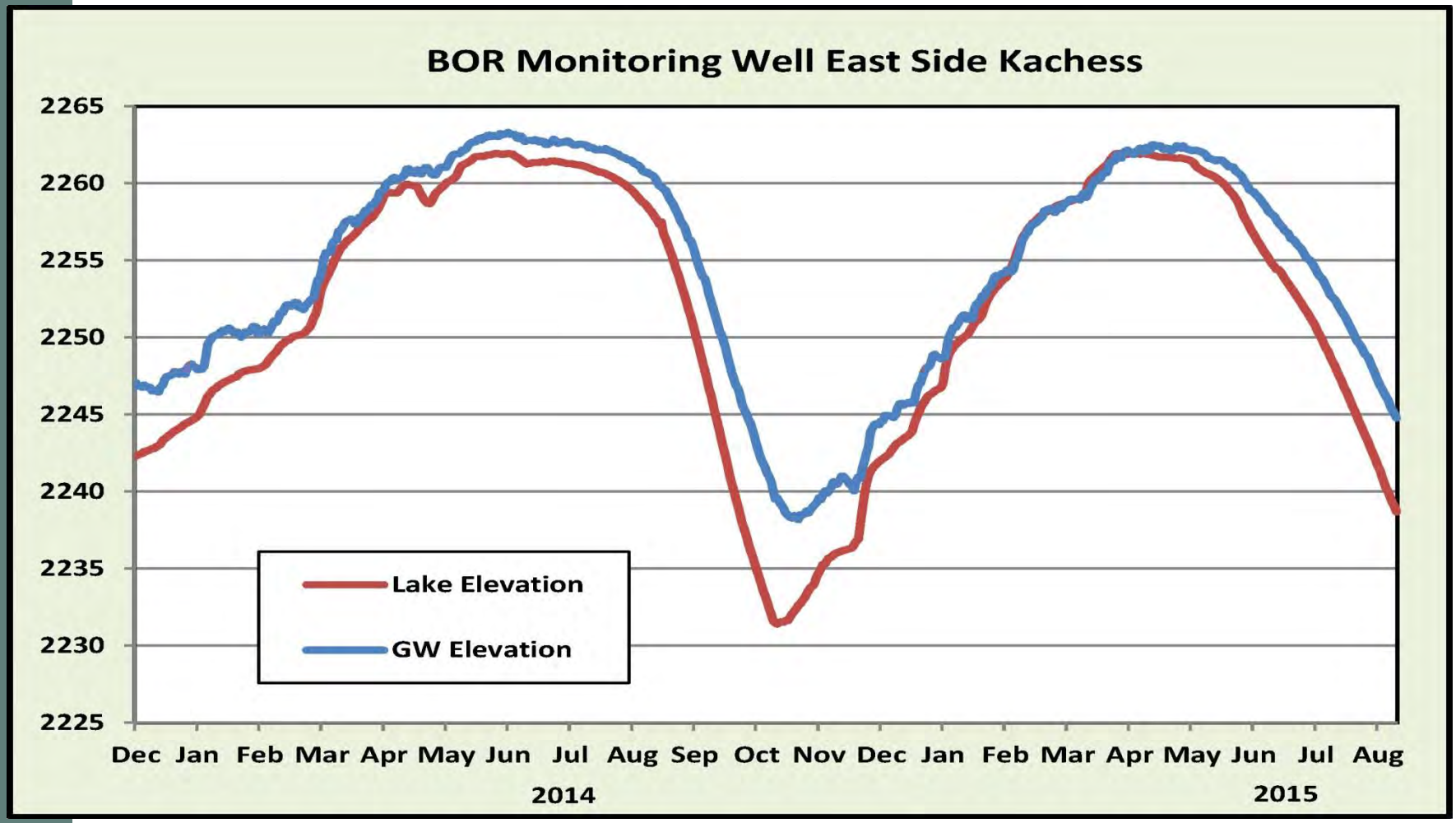

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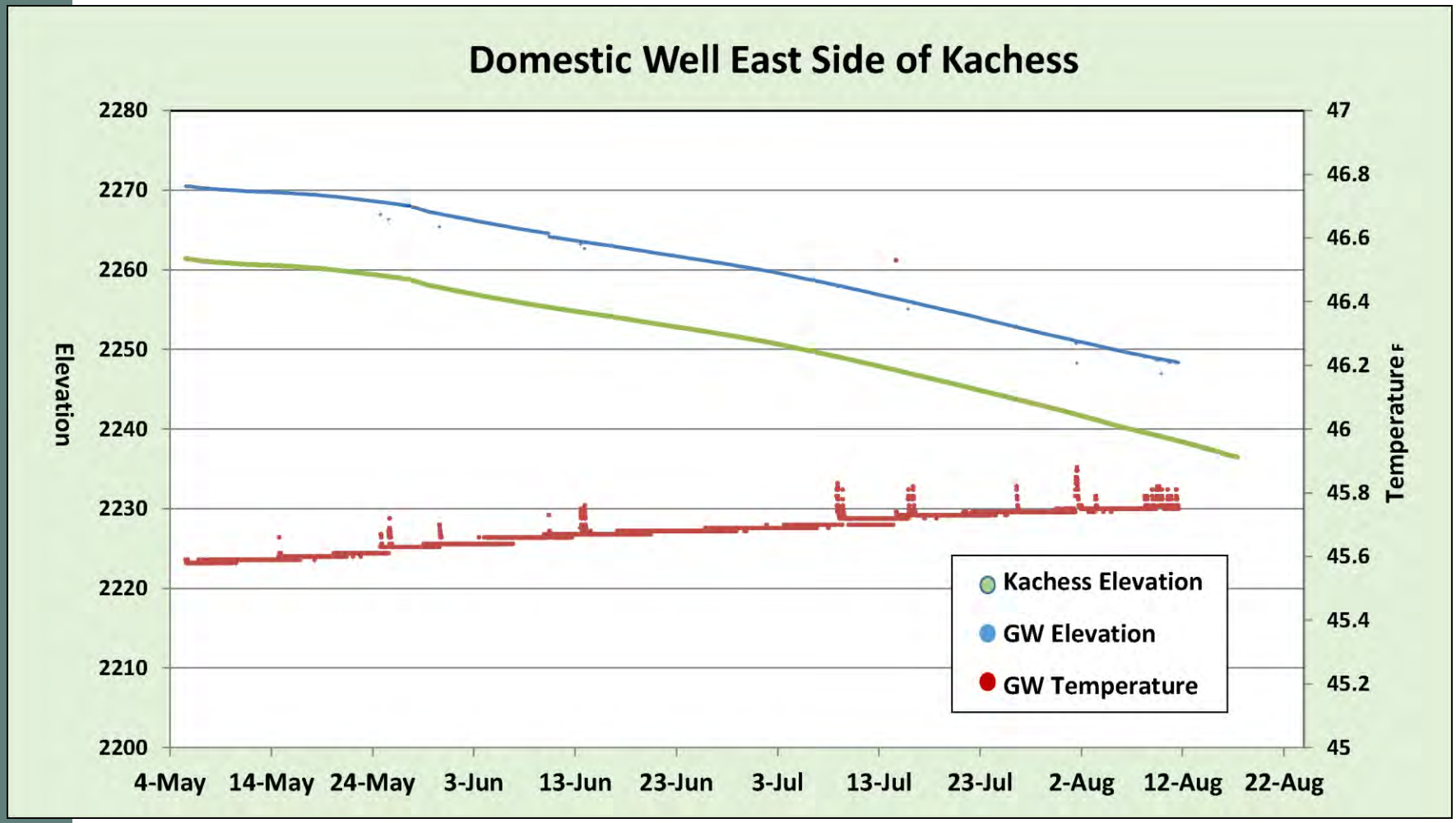
Status of Well Monitoring Near Kachess Reservoir



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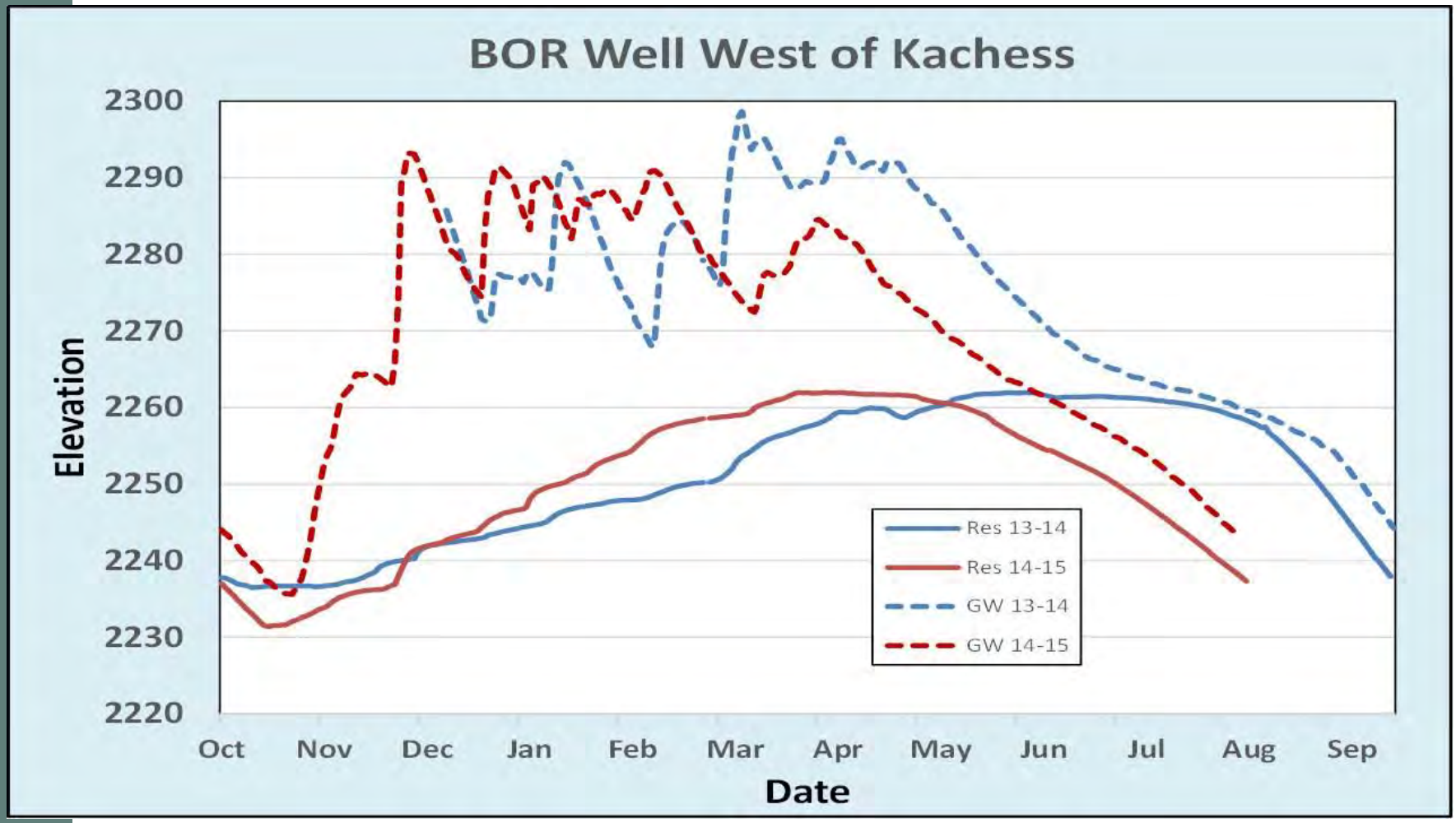
Comparison of 2013-2014 WY and 2014-2015 WY To Show Impacts of Drought on Wells



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Keechelus-to-Kachess Conveyance

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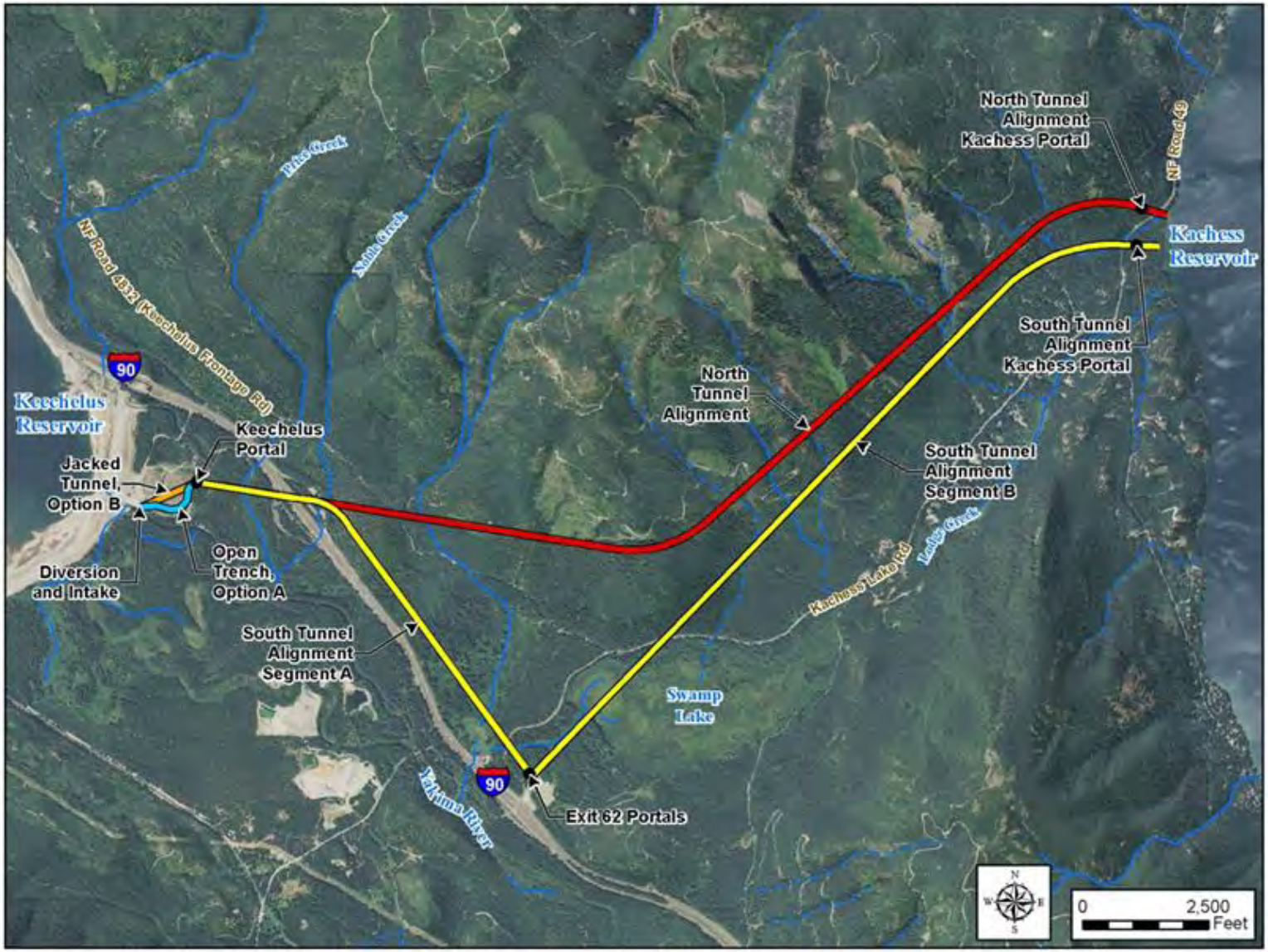
Keechelus-to-Kachess Conveyance

North Tunnel and South Tunnel Alternatives



Keechelus-to-Kachess Conveyance

- Draft EIS – responding to comments
  - Monitoring existing groundwater wells
  - Reviewing Property Values
  - WDFW analyses ongoing
- Drilling in progress

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Bumping Dam and Reservoir Enlargement

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Bumping Dam and Reservoir Enlargement

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Bumping Dam and Reservoir Enlargement

- Geotechnical Data Collection
  - Coordination with USFW
  - Notices to public
  - Drilling in progress
  - Seismic evaluation ongoing

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Lower Yakima River Basin Hydrologic Modeling

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Lower Yakima River Basin Hydrologic Modeling - Completed

- Upgraded model to more accurately reflect diversions, return flows, seepage, and gains between Parker and Prosser
- Refined how water conservation efforts below Parker are defined (Sunnyside, Roza, and WIP)
- Refined water conservation scenarios for expected future projects in this area

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Lower Yakima River Basin Hydrologic Modeling - Ongoing

- Run conservation scenarios and update outputs for Period of Record used previously (1927-2009)
- Run all YBIP scenarios (conservation and each storage project)
- Run all scenarios with climate change

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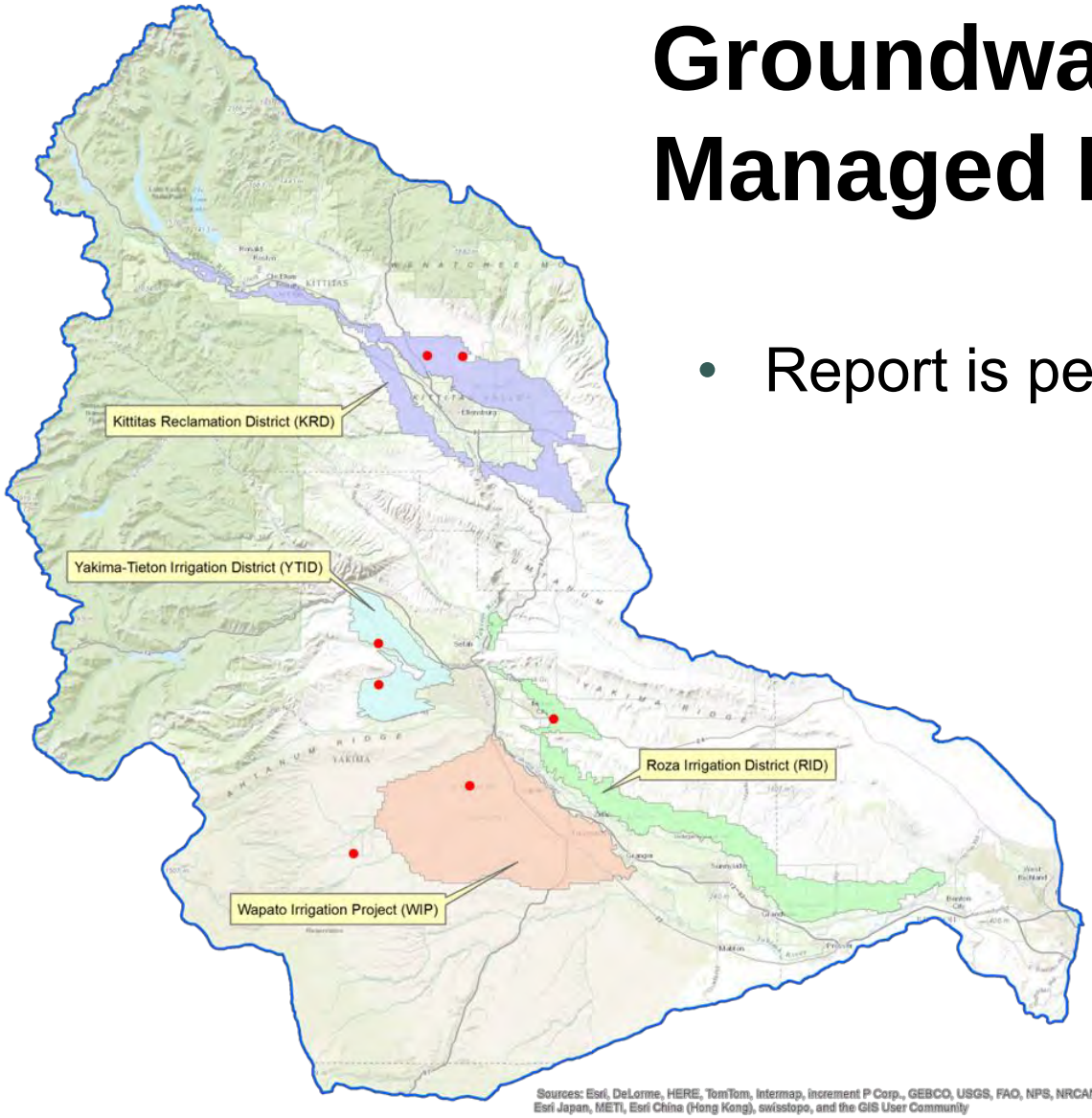
Groundwater Storage

Groundwater Managed Recharge



- Report is pending

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Teanaway Community Forest

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Manastash Creek Conservation and Tributary Enhancement

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Kittitas Reclamation District Stream Supplementation

- KRD's canal system crosses numerous streams throughout Kittitas County
- Recent agreements allow the KRD to augment streamflow during drought conditions - *agreement parties: KRD, Washington State Dept. of Ecology and the US Bureau of Reclamation; WDFW and Yakama Nation are also consulted*
- Water can be delivered through irrigation season, roughly April-October, subject to canal being operational and streams benefiting from flow
- Actual stream flow managed by Ecology

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Kittitas Reclamation District Stream Supplementation

- Existing agreements have enhanced flow during past droughts for
  - Manastash Creek
  - Taneum Creek
  - Wipple/Badger
- As of 9-3-2015, six additional streams were added
  - Tucker Creek - 3 cfs
  - Big Creek – 11 cfs
  - Little Creek – 10 cfs
  - Spex Arth Creek - 3 cfs
  - Tillman Creek - 3 cfs
  - Dry Creek – 15 cfs

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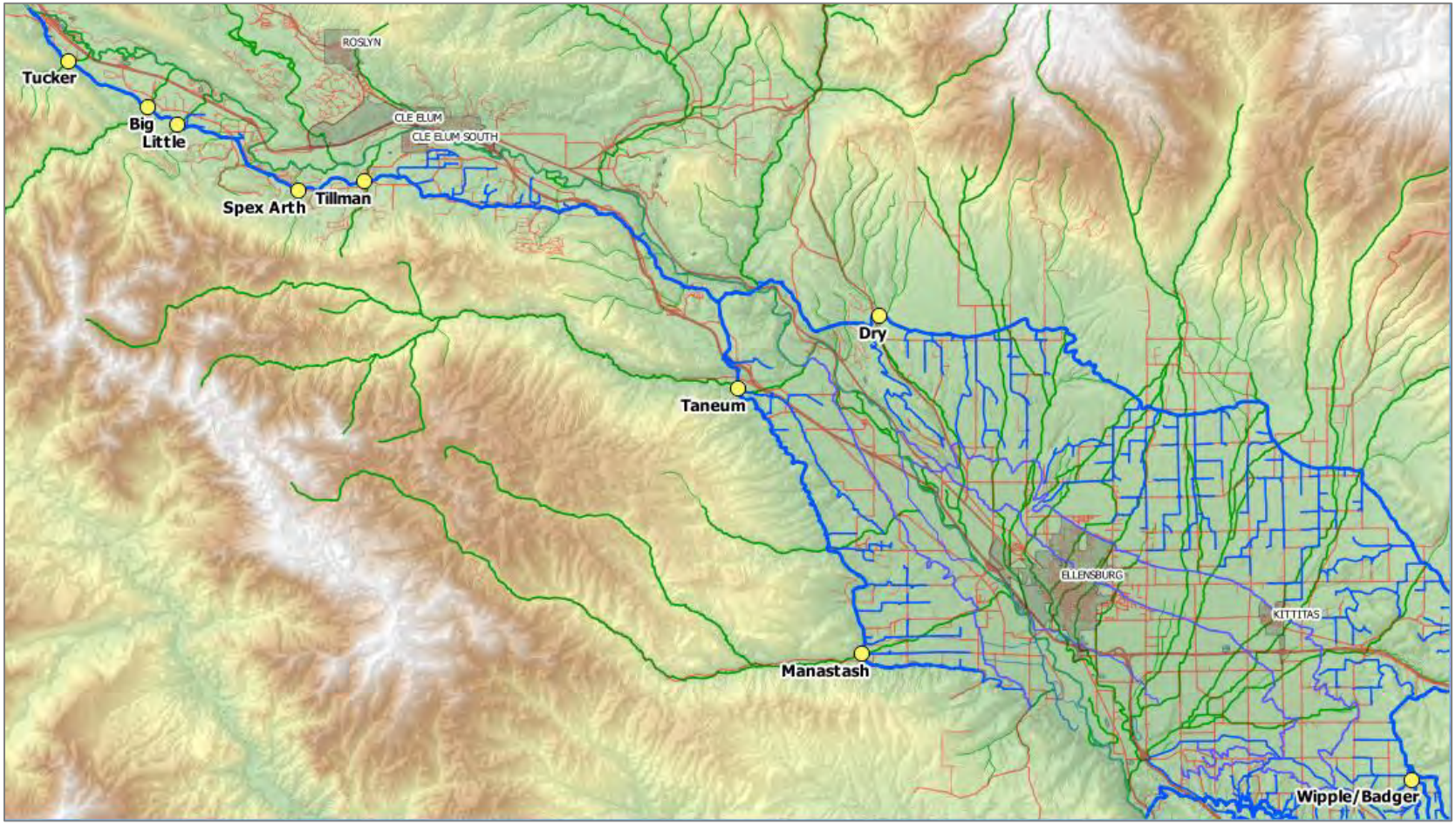
Kittitas Reclamation District Stream Supplementation



Nine tributaries currently supplemented by Yakima Project water routed through the KRD (yellow dots)

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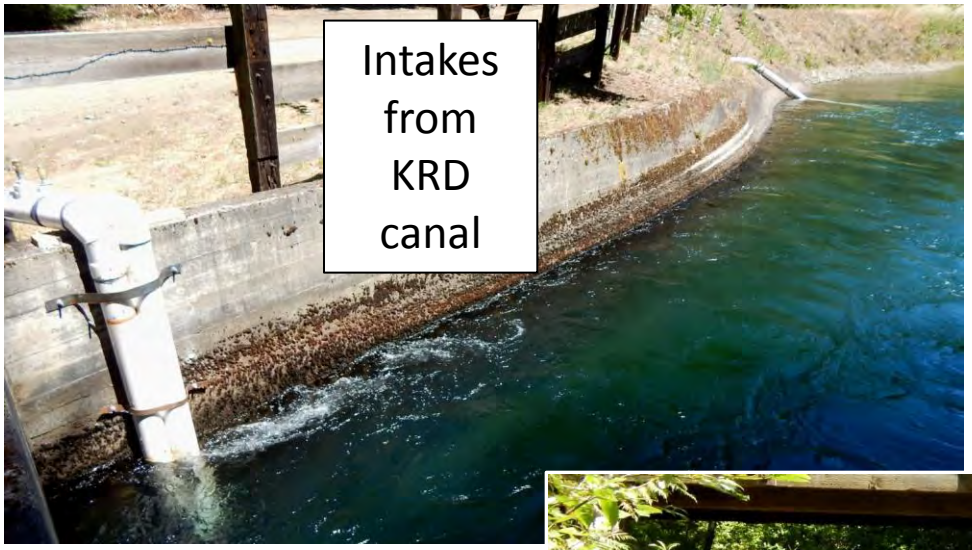
Kittitas Reclamation District Stream Supplementation



Little Creek

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Kittitas Reclamation District Stream Supplementation

An additional 6 CFS through a MB6.1 lateral to Little Creek

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Kittitas Reclamation District Stream Supplementation

Little Creek stranding pool on July 21, 2015 near John Wayne Trail, with 2.6 CFS inflow from KRD canal

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Kittitas Reclamation District Stream Supplementation

Little Creek stranding pool on July 23, 2015 with 4.9 cfs from KRD flow augmentation

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Kittitas Reclamation District Stream Supplementation

Little Creek stranding pool on July 25, 2015 with 9.2 cfs input from the KRD canal

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Kittitas Reclamation District Stream Supplementation

Recharged reach of Little Creek near I-90

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Kittitas Reclamation District Stream Supplementation

Big Creek Delivery at the Main Canal – 5 CFS
(Tom Iseman, Mark Limbaugh, and Urban Eberhart)

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Kittitas Reclamation District Stream Supplementation

An additional 6 CFS to Big Creek through MB4.9 lateral and pipe

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Kittitas Reclamation District Stream Supplementation

Tucker Creek Delivery – 3 CFS

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Kittitas Reclamation District Stream Supplementation

Spex Arth Creek Delivery – 3 CFS

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Kittitas Reclamation District
Stream Supplementation

Tillman Creek Delivery – 3 CFS

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Kittitas Reclamation District Stream Supplementation

Ecology blocks added to maintain supplementation water at low canal flows

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Kittitas Reclamation District Stream Supplementation

KRD delivery to Taneum Creek

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Kittitas Reclamation District Stream Supplementation

Manastash Creek at Cove Road

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Kittitas Reclamation District Stream Supplementation

Manastash Creek at Cove Road with 15 cfs of water from KRD canal

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Kittitas Reclamation District Stream Supplementation

Manastash Creek at SB13.8 bridge, 2.1 miles downstream of supplementation

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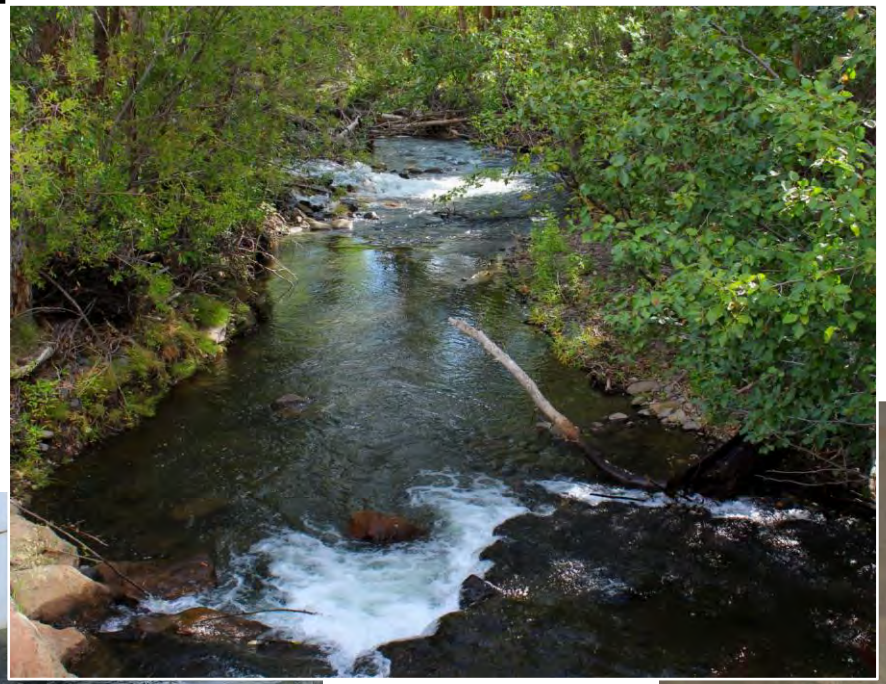
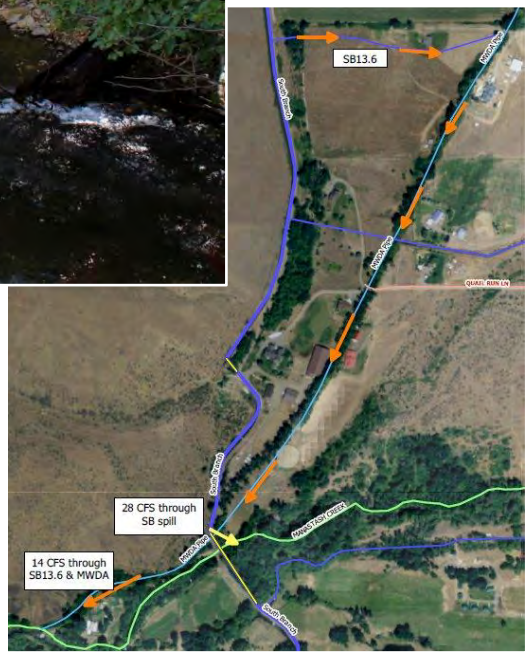
Kittitas Reclamation District Stream Supplementation





Current 42 cfs delivery to Manastash Creek through SB13.6 pipeline to MWDA diversion, and through South Branch spill

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Kittitas Reclamation District Stream Supplementation

Dry Creek supplementation through siphon drains and a lateral spill

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Kittitas Reclamation District Stream Supplementation

Dry Creek at Clarke Road

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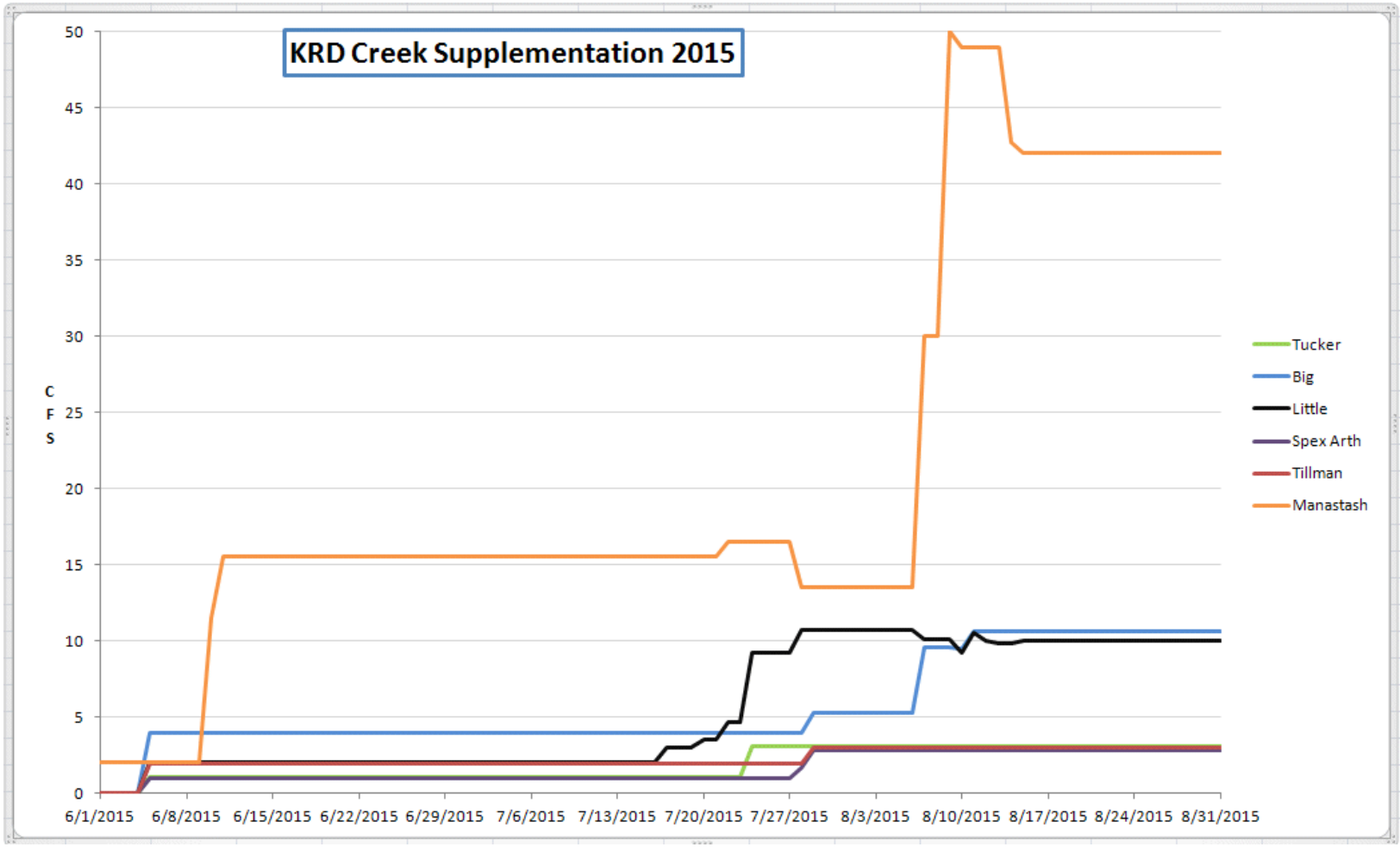
Kittitas Reclamation District Stream Supplementation



Flows delivered to the creeks changed over the summer as needs were identified, and natural flows dropped off

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