

Initial Study Report Meeting Wallowa Falls Hydroelectric Project FERC Project No. 308

Day 2 - January 15, 2014





Welcome

Purpose of Meeting:


- to review the overall 2013 study methods, results, and recommendations
- to discuss and clarify the enhancement measures proposed in the Preliminary Licensing Proposal

Introductions

Process Schedule

Wallowa Falls Relicensing - Near Term Schedule

Party	Milestone	Date
PacifiCorp	File Initial Study Report (ISR)	January 3, 2013
All stakeholders	Initial Study Report Meeting	By January 17, 2013
PacifiCorp	File ISR Meeting Summary	By February 2, 2013
All Stakeholders	Disputes/Requests to Amend Study Plan Due to FERC	March 3, 2013
All Stakeholders	Responses to Requests Due to FERC	April 3, 2013
FERC	Director's Determination	May 3, 2013
PacifiCorp	Second Study Season (as needed)	Spring Summer 2013
PacifiCorp	Final Technical Report (assumes 1 study season)	June 2013
PacifiCorp	File Preliminary Licensing Proposal	October 1, 2013



Party	Milestone	Date
All stakeholders	Preliminary Licensing Proposal Comments Due	December 30, 2013
PacifiCorp	File Updated Study Report (USR)	January 3, 2014
All stakeholders	Updated Study Report Meeting	By January 17, 2014
PacifiCorp	File USR Meeting Summary	February 2, 2014
PacifiCorp	File Final License Application	February 28, 2014
PacifiCorp	Issue Public Notice of App. Filing	March 14, 2014
Party	Post Filing Milestone	Date
FERC	Issue Public Tendering Notice	March 14, 2014
FERC	Director's Determination on Any Additional Study Requests	March 30, 2014
FERC	Issue Ready for EA Notice	April 29, 2014
Agencies	Terms, Condit's, Recomm's Due	June 28, 2014
FERC	Issue License Order	March 25, 2015

Geology and Soils

Russ Howison

Licensing Project Manager

PacifiCorp



Geology and Soils

Objectives: Characterize existing geology, evaluate long-term surficial erosion potential in the Project area, identify potential slope instability issues and geologic hazards that could pose a risk to both the Project facilities and the surrounding drainages, and recommended remediation measures as necessary.

Study Area: Lands adjacent to the proposed Project boundary including the forebay, access road, penstock, and tailrace.

Methods:

- Desktop analysis of existing maps and publications to develop knowledge concerning project operations and history, local geology, and known geologic hazards.
- Conduct field reconnaissance to identify: geologic hazards, slope stability concerns (cuts and fills), and erosion potential.
- Assess the risk from geologic hazards, slope stability issue and erosion, and develop conceptual options and cost estimates for remedial assessment.



Geology and Soils

Field Work Conducted and Study Status:

- The desktop analysis was completed in August, 2012.
- A three-day walking field reconnaissance was conducted on September 17-19, 2012 by an engineering geologist and a geotechnical engineer. Work included assessment of: geomorphology, surficial geology, potential geologic hazards, slope stability and erosion concerns within the study area. Areas observed include the slopes adjacent to the forebay, access road, penstock, bypass reach and tail race.
- A subsequent site visit was performed on June 11 and 12, 2013 to evaluate a failing slope condition within the inboard shoulder of the penstock access road at Station 11+50
- A risk and needs assessment was performed.



Geology and Soils

Variance to Study Plan: No variances from the study plan occurred .

Geology:

- Northern portion of project (tailrace, powerhouse, and lower penstock section) consists of glacial deposits and alluvium. Characterized by thicker overburden materials and granular soils.
- Southern portion of project (middle and upper penstock sections and forebay) consists of volcanic and metavolcanic rocks (principally pyroclastics and andesite). Characterized by relatively thin soils and talus deposits.

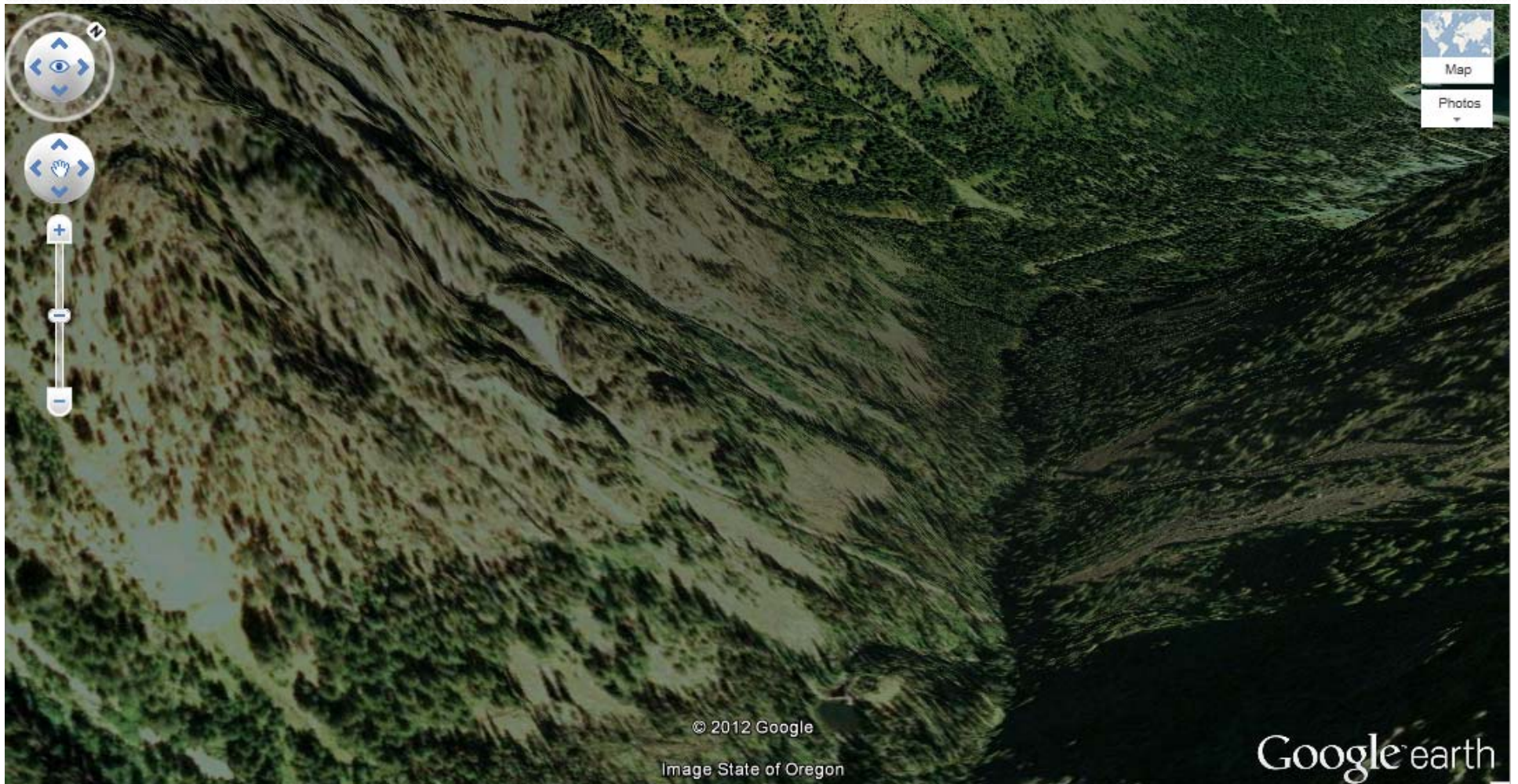


Geology and Soils

Geologic Hazards:

- The project area has no history of large translational landslides and no signs of ancient landslide terrain or global instability were observed during the site reconnaissance.
- No historically active deep-seated slumps or rotational slides were observed.
- History of debris flows in the drainages of the E. and W. Fork of the Wallowa River.
- A significant debris flow slide occurred in 2006 on the west slope across the East Fork Wallowa River. The debris flow slide occurred on the opposite side of the river from the penstock, and the event deposited a significant amount of debris and sediment that temporarily dammed the river.
- Based on the steeper slopes and thinner soil and vegetation cover, the western slopes above the East Fork Wallowa River appear more susceptible to debris flows than the eastern slopes; therefore, the penstock and access road are less vulnerable to this type of slide event.

Geology and Soils





Geology and Soils

Slope Stability (cuts and fills) and Erosion Concerns:

- Localized areas of minor sloughing associated with cut and side cast construction techniques along the access road were observed during the site reconnaissance.
- These areas do not pose an immediate risk to the penstock; however, they will likely continue to be an access road maintenance issue.
- A shallow failure area (~30 ft. across) was observed within outboard shoulder of the penstock road at Sta. 11+50. The penstock is buried within the road, adjacent to the headscarp of the failure.
- Concern that failing slope could retrogress further into embankment and undermine the penstock.
- A 65-foot long mechanically stabilized earth (MSE) wall has been designed to improve the stability of the access road and support the penstock along the failing slope section. Construction of MSE wall is scheduled for the spring of 2014.

Geology and Soils

Shallow Failure Area (~Station 11+50)





Geology and Soils

Other Hazards:

- The only penstock failure and subsequent uncontrolled discharge of water due to natural hazards was the result of a tree fall event.
- Hazard trees (near trestle locations and the Royal Purple Creek diversion flowline).



Geology and Soils

Additional Work Proposed:

- No additional licensing-related studies are proposed.
- Under the current license, PacifiCorp will monitor the failing (sloughing) slope section along the access road at Station 11+50 until mitigation measures can be implemented this spring. The objective of the monitoring program would be to provide forward notice of increased slope movement, which could undermine the buried penstock, leaving it unsupported within the road grade.



Geology and Soils

Proposed Measures

- As part of the proposed Vegetation Management Plan, assess and remove any trees along the penstock alignment and the Royal Purple Creek diversion flowline that present a hazard.
- Under the FERC Dam Safety and Surveillance Monitoring Plan, routinely monitor the access road and cut and fill slopes along the penstock alignment paying particular attention to the Royal Purple Creek drainage area and the segment between the dam and where the penstock is located on the west side (down slope) of the access road (approximate Stations 0+00 to 17+50).

Terrestrial Resources

Kendel Emmerson
Terrestrial Scientist
PacifiCorp



Special Status Plant Study

Objectives: To identify and map occurrences of special status plants within the Study Area. Special status plants include any plants that are on the following lists:

- United States Fish and Wildlife Service (USFWS) status that is Federally Listed Endangered, Threatened, Proposed, Candidate, and Species of Concern
- Oregon Department of Agriculture status that is Listed Endangered, Listed Threatened, Proposed Endangered, Proposed Threatened, and Candidate
- Oregon Biodiversity Information Center (ORBIC) List 1 or 2
- Regional Forester's Special Status Species Lists for Sensitive Non-Vascular and Vascular plants on the Wallowa-Whitman National Forest
- Wallowa-Whitman National Forest Strategic Plant Species List

Study Area: All lands owned by PacifiCorp or USFS that are within 100-meters of a PacifiCorp facility.

Wallowa Falls Terrestrial Study Area

Study Area Total: 126.5 acres

Page 2

Legend

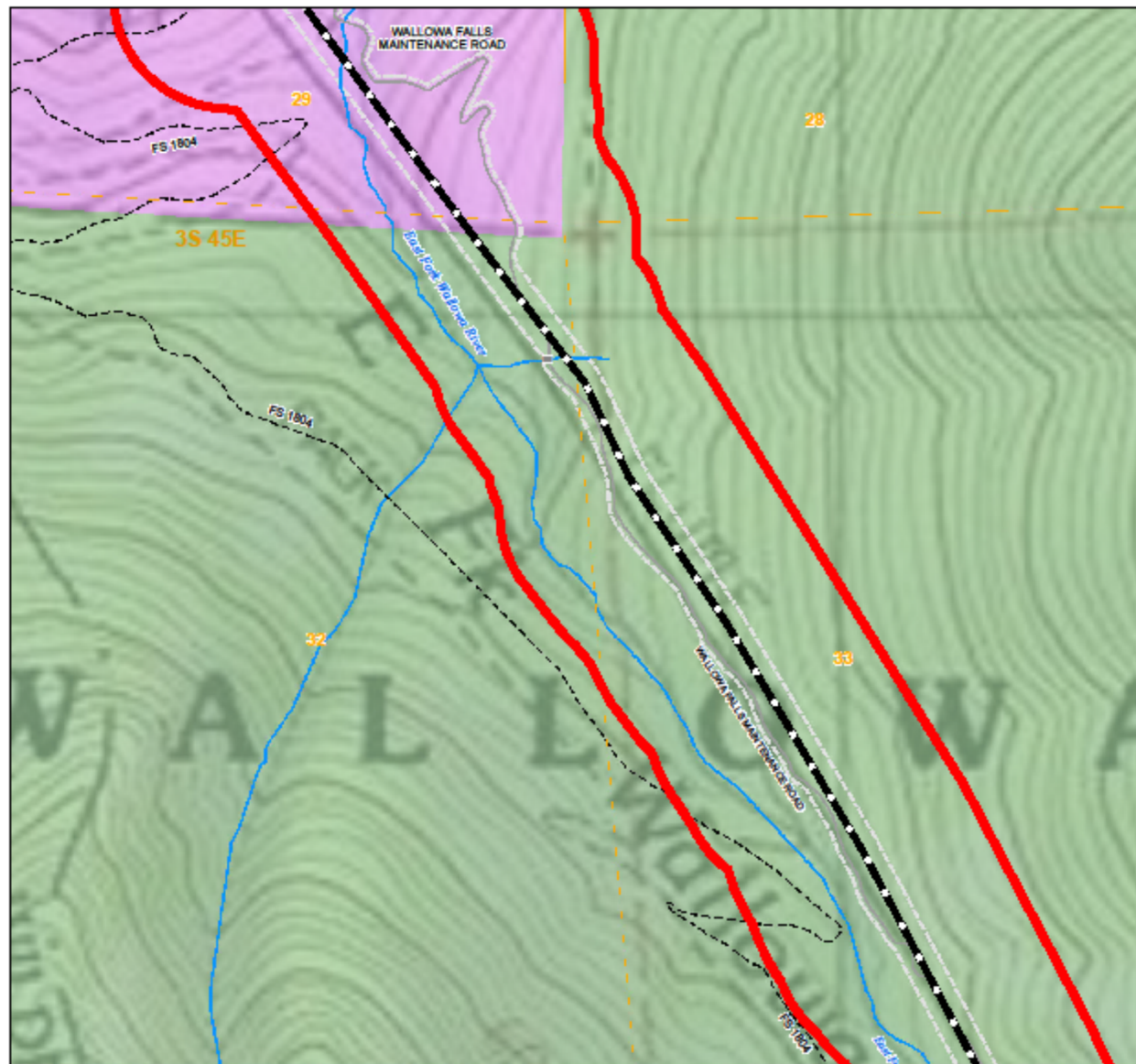
- Study Area
- Proposed Project Boundary
- Road
- Trail
- Trailhead Parking
- Culvert
- IM
- PacificCorp Facility
 - Anchor Block
 - Royal Purple Pipe Outlet
 - Reclamation Storage Shed
 - Royal Purple Checkdam
 - Storage Shed
- WALLOWA FALLS PLANT FENCE
- 7.2 KV TRANSMISSION LINE
- DM
- ELEVATED TRIBUTARY
- LOW LEVEL OUTLET
- ROYAL PURPLE DIVERSION CHANNEL
- ROYAL PURPLE FLOWLINE - BURIED
- ROYAL PURPLE FLOWLINE - EXPOSED
- SLOWLY CATWALK
- EXISTING TALUSACE
- PROPOSED TALUSACE
- PINESTOCK
- FOREBAY
- INTAKE AND CONTROL STRUCTURE
- LAYDOWN AND STORAGE AREA
- SLOWLY
- SUBSTATION
- WALLOWA FALLS POWERHOUSE
- Station
- Turbine
- Waterbody
- Stream
- Land Ownership - County Data
 - Private
 - PACIFICCORP
 - LUPP

0 50 100 Meters

PACIFICCORP ENERGY
A TETRA TECH COMPANY

Data are projected in UTM Zone 11, NAD83, meters.

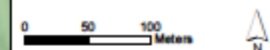
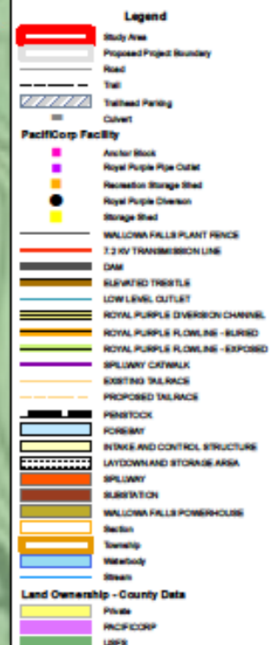
No Warranty: With respect to any information, including but not limited to the Confidential Information, which a Party discloses or otherwise discloses to another Party for the purpose of evaluating compliance, it is understood and agreed that the Disclosing Party does not make any representation or warranty as to the accuracy, completeness or fitness for a particular purpose thereof. It is further understood and agreed that no Party or its Representatives shall have any liability or responsibility to another Party or to any other person or entity resulting from the use of any information so furnished or otherwise provided pursuant to this Agreement.



Wallowa Falls Terrestrial Study Area

Study Area Total: 126.5 acres

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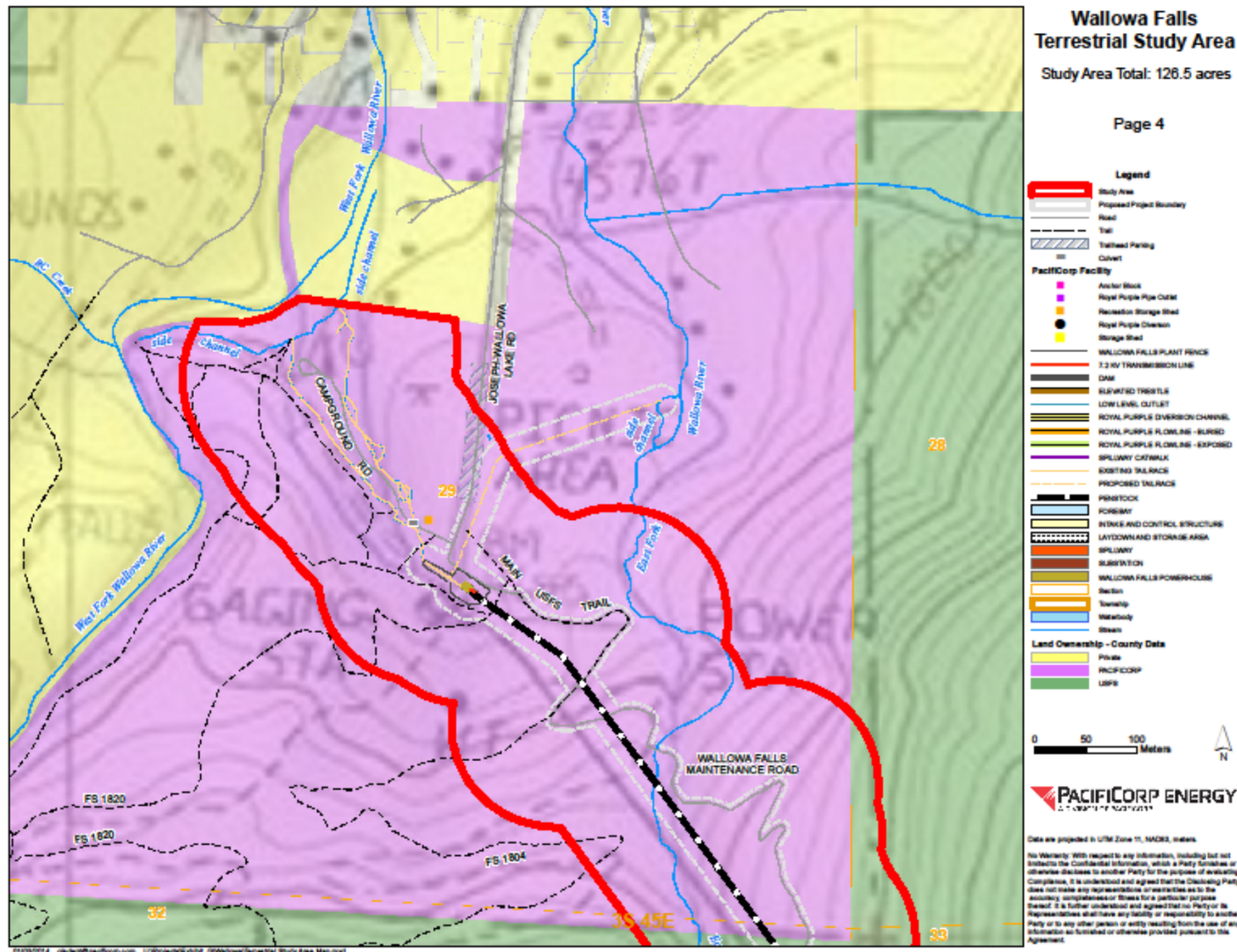
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Wallowa Falls Terrestrial Study Area

Study Area Total: 126.5 acres

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Special Status Plant Study

Methods:

- Pre-field review to update current special status plant lists and evaluate any existing data.
- Conduct field surveys using an intuitive-controlled methodology as described in Whiteaker et al. 1998.
- Survey results documented using USFS guidelines and standards.

Study Status:

- Pre-field review was completed May 30, 2012.
- Field surveys were completed June 13 and July 31, 2012.
- Documentation completed Updated Study Report December 2013.

Variance to Study Plan: No variances from the study plan occurred.



Special Status Plant Study

Discussion Points:

- No special status plant species were observed
- Field data collected is sufficient to meet study objectives.
- Project operations and routine maintenance should have no effect on special status plant species.

Additional Work Proposed:

- No additional special status plant studies are proposed prior to the issuance of a new license.
- Post license issuance special status plant surveys would occur for proposed tailrace reroute and forebay area.



Noxious Weed Study

Objectives: To identify and map noxious weed populations on lands and aquatic areas within the Study Area.

Study Area: All lands owned by PacifiCorp or USFS that are within 100-meters of a PacifiCorp facility.

Methods:

- Update current state and county noxious weed lists
- Evaluate existing data on noxious weed locations within the Study Area
- Produce a map of high, medium, and low potential noxious weed areas within the Study Area
- Conduct field surveys simultaneously with special status plant surveys using the same intuitive-controlled methodology
- Develop map of existing noxious weed locations and document results



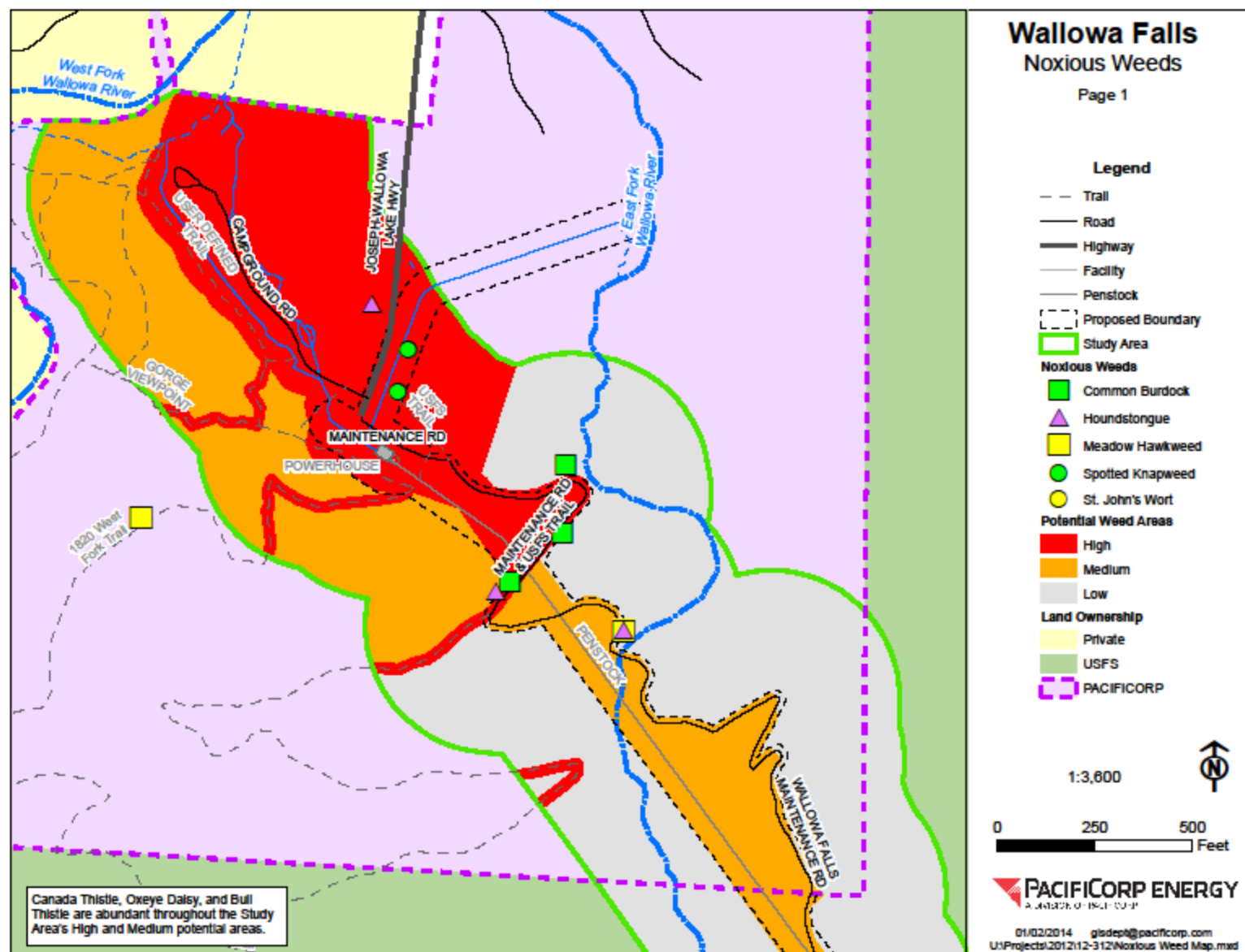
Noxious Weed Study

Study Status:

- Pre-field review was completed May 30, 2012.
- Field surveys were completed June 13 and July 31, 2012.
- Maps and documentation were completed and are in the Updated Study Report December 2013 .

Variance to Study Plan: No variances from the study plan occurred.

Discussion Points: Noxious weeds were located within the Study area. The field data collected is sufficient to meet study objectives.



Wallowa Falls Noxious Weeds

Page 2

Legend

- Trail
- Road
- Highway
- Facility
- Penstock
- - - Proposed Boundary
- Study Area
- Noxious Weeds**
- Common Burdock
- Houndstongue
- Meadow Hawkweed
- Spotted Knapweed
- St. John's Wort
- Potential Weed Areas**
- High
- Medium
- Low
- Land Ownership**
- Private
- USFS
- PACIFICORP

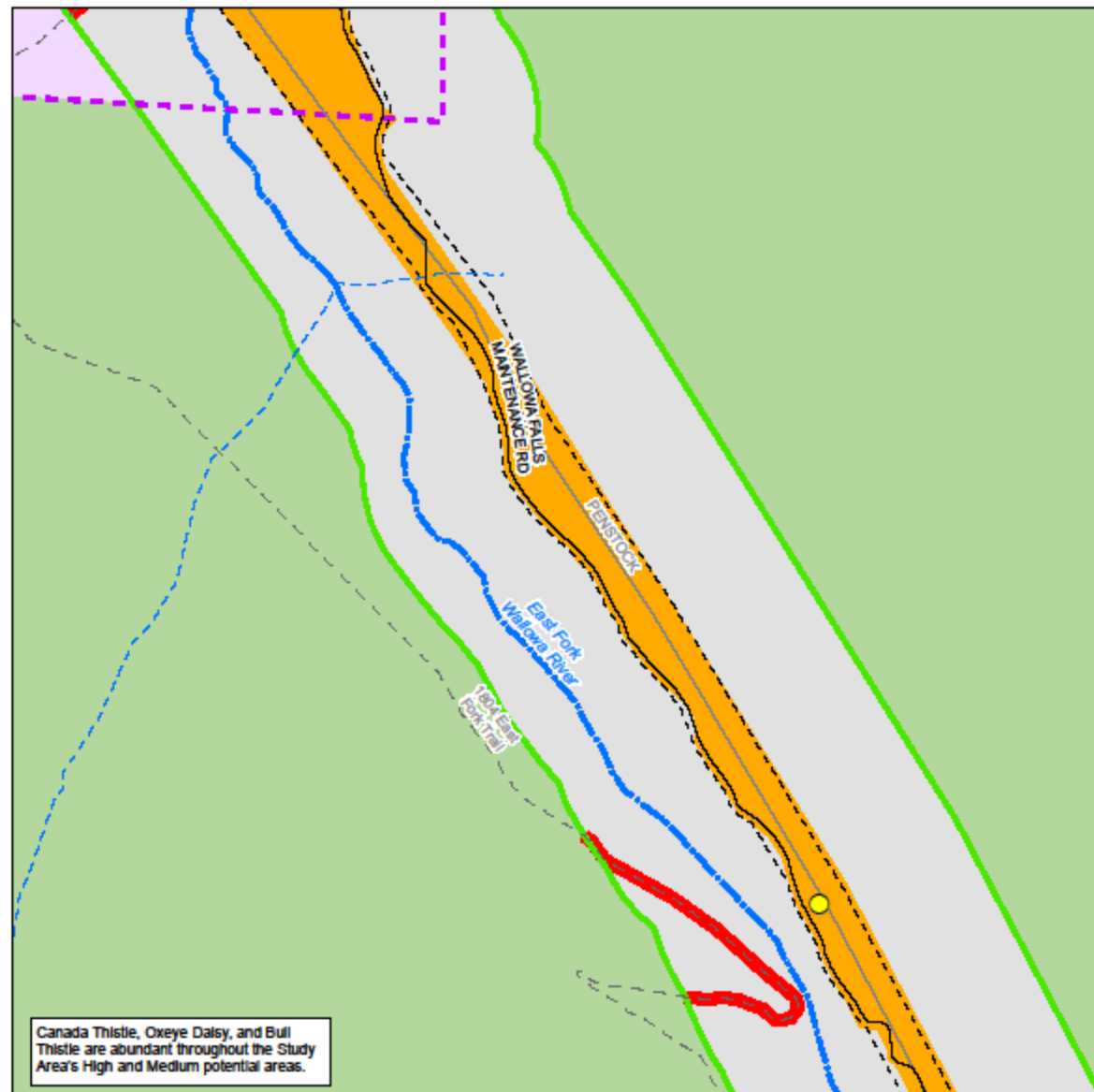
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PACIFICORP ENERGY
A DIVISION OF BEACON POWER

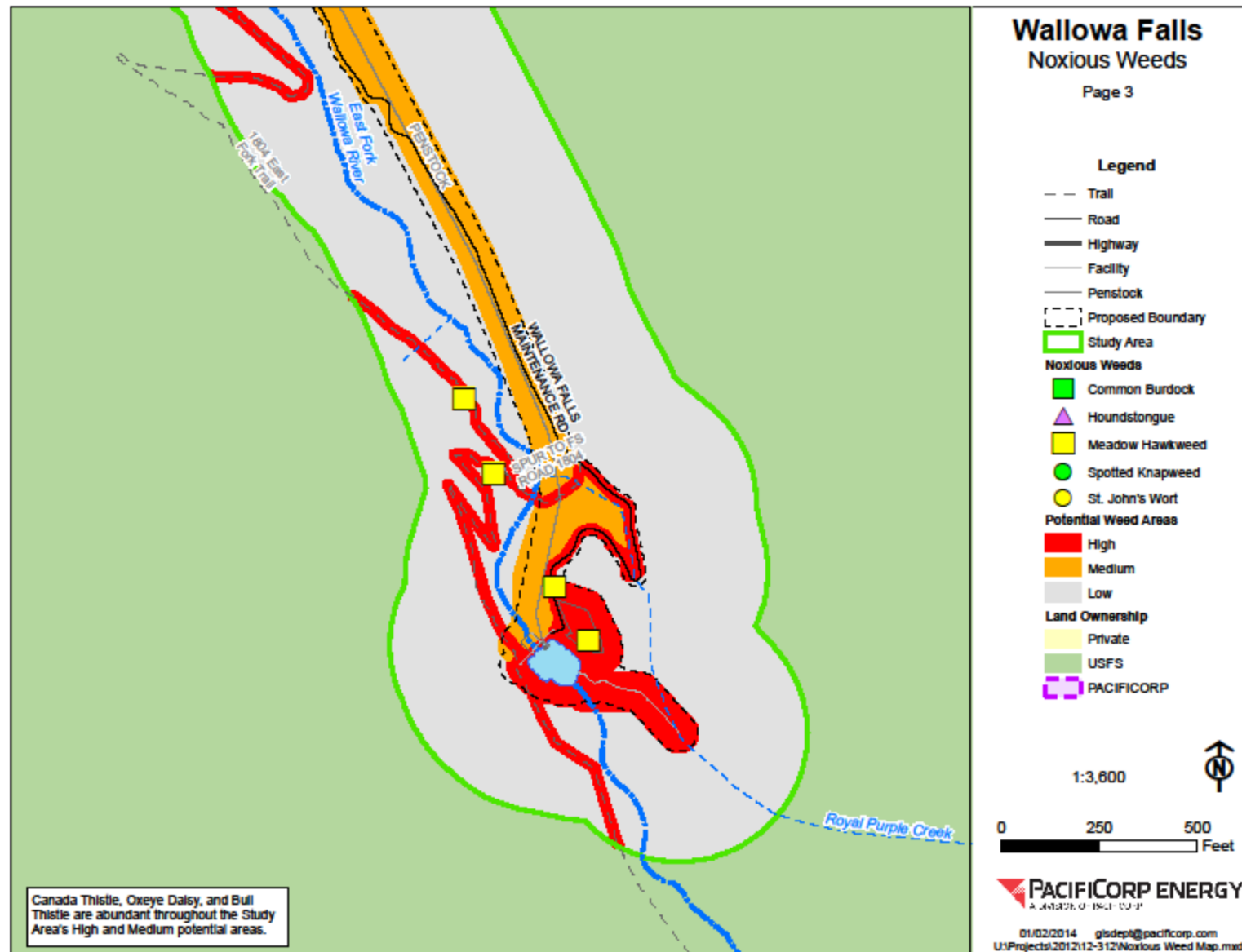
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Canada Thistle, Oxeye Daisy, and Bull Thistle are abundant throughout the Study Area's High and Medium potential areas.

Wallowa Falls Noxious Weeds

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Noxious Weed Study

Additional Work Proposed:

- No additional Noxious Weed Studies are proposed prior to the issuance of a new license.
- Post license issuance , PacifiCorp proposes to implement a Noxious Weed Management Plan to monitor and control noxious weeds on both USFS and PacifiCorp owned lands within the Project boundary .



Riparian and Wetland Study

Objectives:

- To identify and map the estimated boundary of wetlands and ordinary high water mark for rivers and streams within the Study Area.
- Describe the existing riparian and wetland habitat location, extent, and conditions.
- Assess the Project's operational effects on the riparian and wetland function in the Study Area.
- Identify any potential management measures or opportunities to protect and improve wetland or riparian habitat conditions.

Study Area: All lands and aquatic areas that are owned by PacifiCorp or USFS that are within 100-meters of a Project facility.



Riparian and Wetland Study

Methods:

- Pre-field review of information (topography, existing GIS datasets)
- Field surveys for wetlands and riparian areas were conducted simultaneously.
- Riparian and wetland perimeters were determined by the obvious signs of hydrology, vegetation, and soil indicators.
- Maps and study documentation was completed and available in the Updated Study Report December 2013.

Study Status:

- Field surveys were completed between July 3-5, 2012.

Variance to Study Plan:

- Most of the East Fork Wallowa River banks within the Study Area are inaccessible, so points were collected where accessible and then corrected, as needed, on aerial imagery.



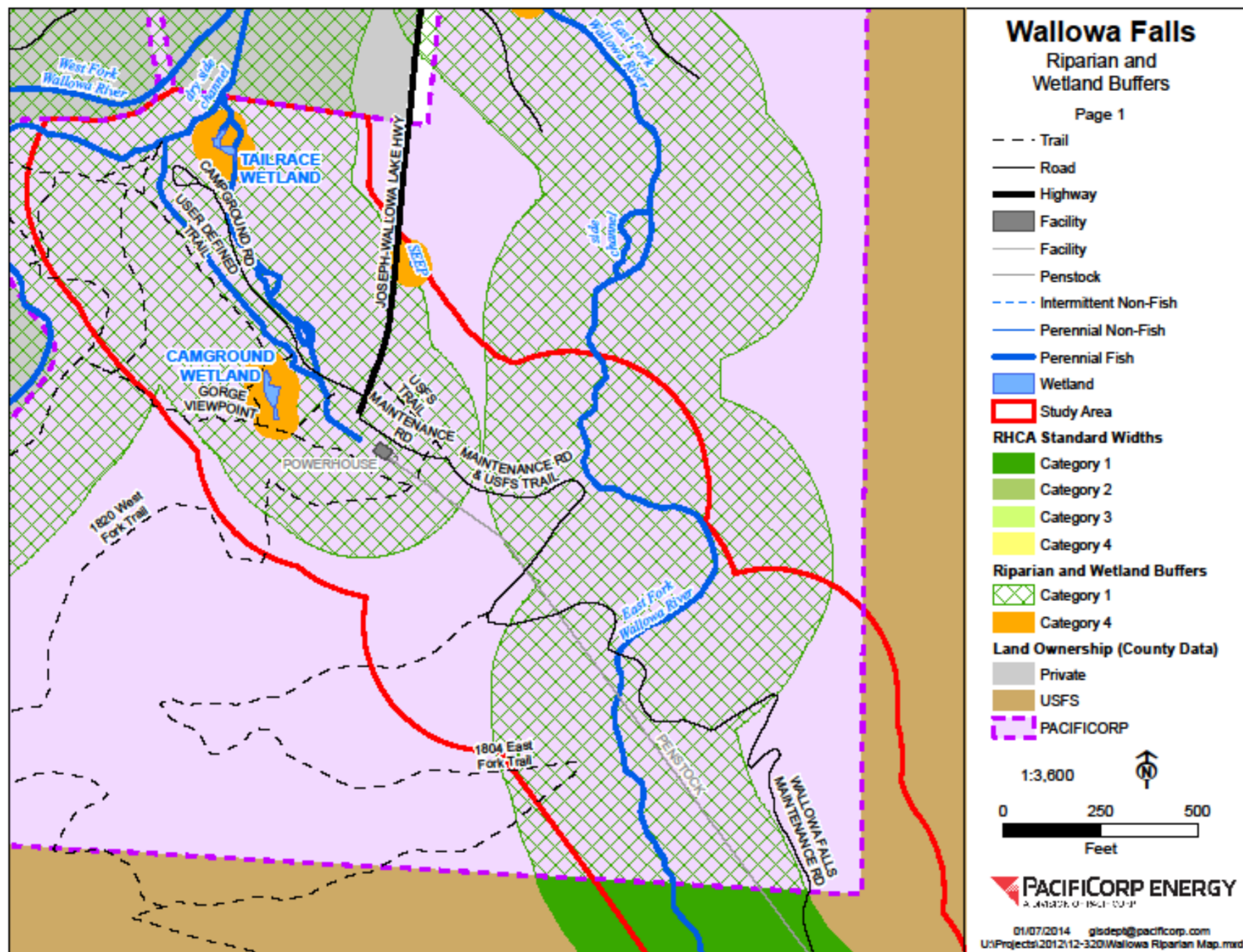
Riparian and Wetland Study

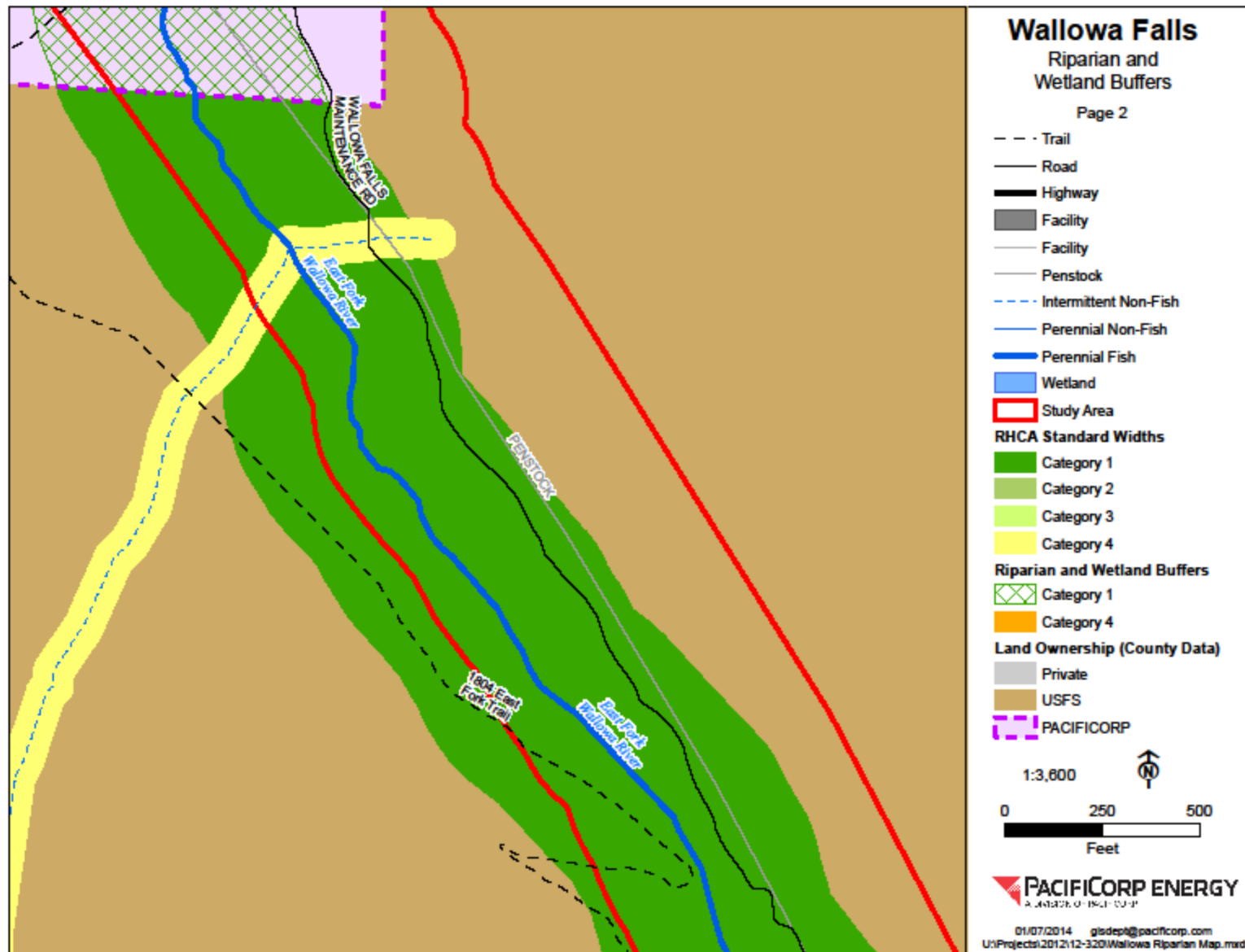
Discussion Points:

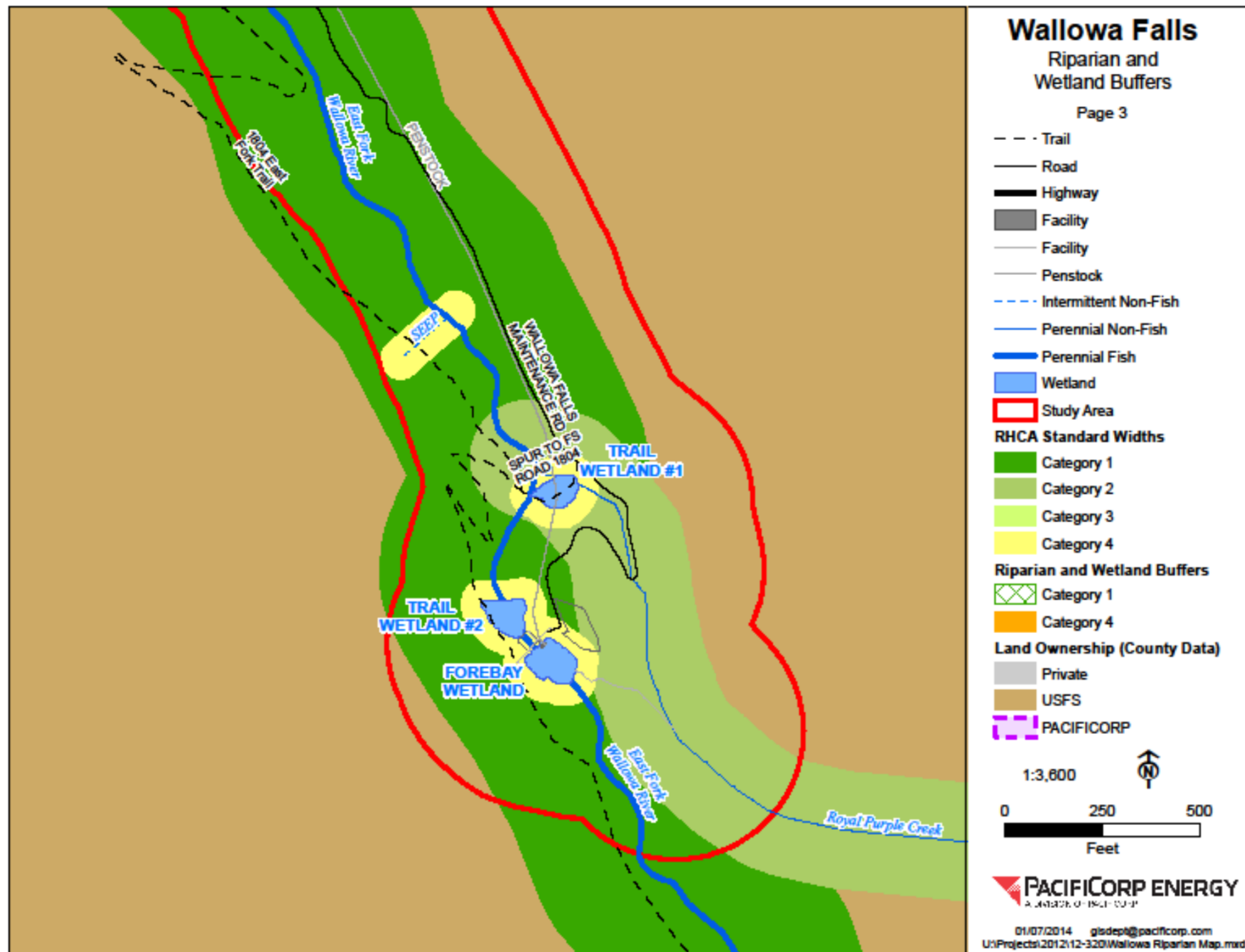
- A few small wetlands and tributaries were located and mapped.
- The field data collected is sufficient to meet study objectives.
- Riparian Habitat Conservation Area versus PacifiCorp 's own land buffers.

Additional Work Proposed:

- No additional Riparian and Wetland Studies are proposed prior to the issuance of a new license.
- Post license issuance , PacifiCorp proposes to conduct wetland delineation and ordinary high water mark determination in the summer prior to the proposed tailrace reroute.









Vegetation Cover Study

Objectives:

- To identify and classify vegetation cover types within the Study Area.

Study Area: All lands owned by PacifiCorp or USFS that are within 100-meters of a Project facility.

Methods:

- Produce a map that delineates the distinct plant communities into vegetation cover type polygons using aerial imagery, topography, streams, roads, and existing GIS datasets
- Conduct field surveys to ground-truth and correct the vegetation cover type boundaries and to determine appropriate plant association group (PAG) for each polygon.

Study Status:

- Field surveys were completed between June 12-14 and July 3-5, 2012.



Vegetation Cover Study

Variance to Study Plan:

- Several areas were inaccessible and had to be assessed from vantage points.
- No PAGs accurately describe talus slopes. Three PAGs were created to capture this information: Talus (TALU), Talus-shrub (TALU-SHRU), and Talus/Aspen (TALU-POTR).

Discussion Points:

- Major vegetation cover types included grand fir and subalpine fir series, talus slopes, and rock outcrops.

Additional Work Proposed:

- No additional vegetation cover studies are proposed.
- Final results and recommendations are presented in the December 2013 Updated Study Report

Plant Association Group Types and Acres within the Study Area.

PAG Name	PAG Code	Number of Acres within the Study Area	Total Percent of the of Study Area
Black Cottonwood/Pacific willow	POTR ₂ /SALA ₂	1.35	1.07
Developed	DEV	1.58	1.25
Grand Fir/ Queen's Cup	ABGR/CLUN	1.75	1.38
Grand Fir/Twinflower	ABGR/LIBO ₂	15.24	12.05
Grand Fir/Big Huckleberry	ABGR/VAME	59.73	47.22
Palustrine Emergent	PEM	0.11	0.09
Palustrine Scrub Shrub	PSS	0.34	0.27
Palustrine Unconsolidated Bottom	PUB	0.28	0.22
Ponderosa Pine/Common Snowberry	PIPO/SYAL	1.03	0.81
Rock Outcrop	RO	1.55	1.23
Subalpine Fir/Big Huckleberry	ABLA ₂ /VAME	18.24	14.42
Talus	TALU	9.78	7.73
Talus/Aspen	TALU/POTR	7.74	6.12
Talus/Shrubland	TALU/SHRU	7.78	6.15
Total		126.50	



Wildlife Study

Objectives:

- To document baseline information on the occurrence, distributions, and relative abundance of terrestrial species and with special emphasis on the following species:
 - USFWS status that is Listed Endangered, Listed Threatened, Proposed Endangered, Proposed Threatened, Candidate, Species of Concern, and Partial Status
 - Oregon Department of Fish and Wildlife List of Threatened, Endangered and Sensitive Species ORBIC List 1 or 2
 - Regional Forester's Special Status Species Lists for Sensitive Vertebrates and Federally Threatened, Endangered, and Proposed (TE&P)
 - Management Indicator Species for the Wallowa Whitman National Forest

Study Area: All lands and aquatic areas that are owned by PacifiCorp or USFS and are within 100-meters of a Project facility.



Wildlife Study

Methods:

- Update current special status wildlife species lists
- Evaluate any existing data
- Conduct field surveys to document wildlife observations
- Conduct dip net surveys to document amphibian use in the Study Area.

Field Work Conducted to Date and Study Status:

- Field surveys were completed during the May 15-16, 2012 and August 21-22, 2012 and anecdotally while conducting other field studies.

Variance to Study Plan: No variances from the study plan occurred.



Wildlife Study

Discussion Points:

- Surveys confirmed the presence of the known sensitive species and determined the presence of the Rocky Mountain tailed frog (*Ascaphus montanus*) in the waters upstream of the fore bay.
- The two State Sensitive Vulnerable avian species were detected within the Study Area; Olive-sided flycatcher and pileated woodpecker are not likely to be affected by project operations.
- No known potential project effects on bald eagles.
- The field data collected is sufficient to meet study objectives.

Additional Work Proposed:

- No additional wildlife studies are proposed.
- Final results and recommendations are presented in the December 2013 Updated Study Report.

Water Resources

Ken Carlson
Water Resources Scientist
CH₂M Hill



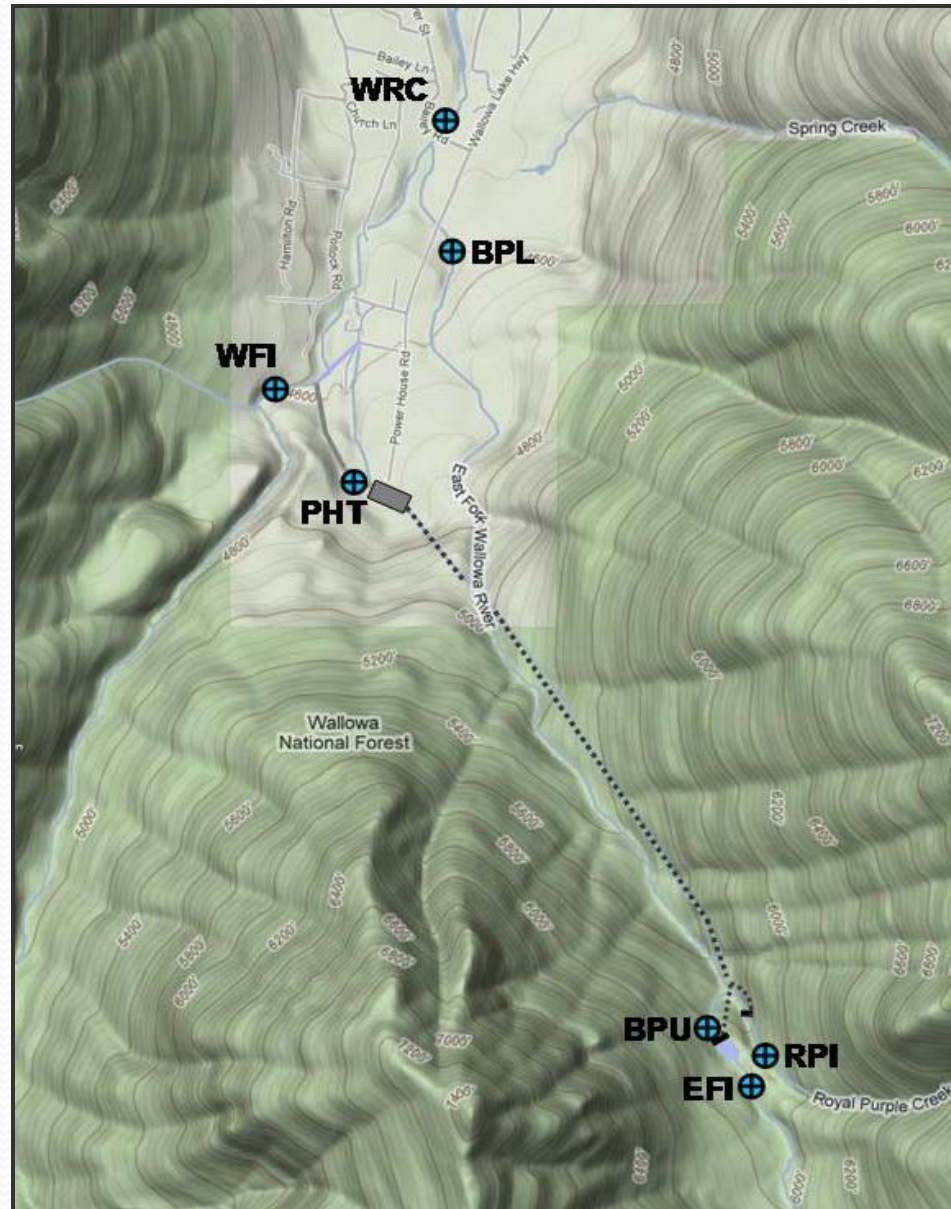
Water Resources

Objectives:

- Characterize and assess hydrology in the Project area
- Monitor and evaluate key water quality parameters in the Project area

Study Parameters:

- Flow
- Water temperature
- DO
- TDG
- Turbidity
 - Other parameters not a concern in this pristine watershed and have no specific nexus to Project operations





Water Resources

Variance to Study Plan:

- No routine forebay flushing in 2013. Therefore, no turbidity sampling.
- Study activities related to forebay drawdown addressed in Sediment & Substrate Characterization.

Status - Additional Work Since Initial Study Report:

- Continued flow and water temperature data collection in 2013
- Assessment of Project-related effects on water resources
- Assessment of compliance with Oregon State water quality standards
- Updated Study Report (Final Technical Report) – Public Draft



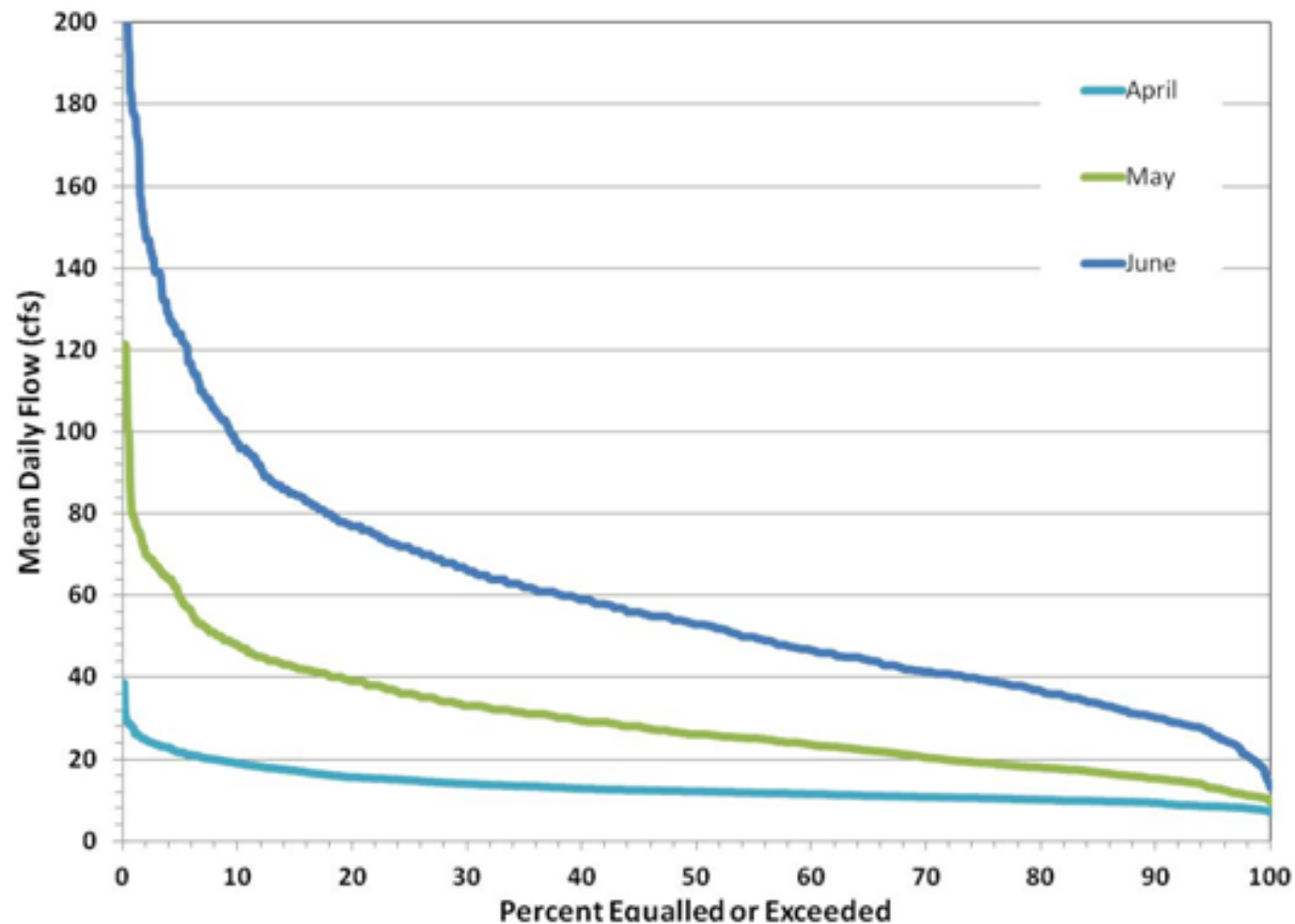
Flow Data Collection in 2013

- **Additional water year flow data collected in WY 2013 indicate:**
- Average annual flows near historic normal levels (same in 2012)
- Average monthly inflows to the Project:
 - Wet: October through February; September
 - Normal: other months.
- Rain-on-snow events recorded at site BPL site not as evident during WY 2013

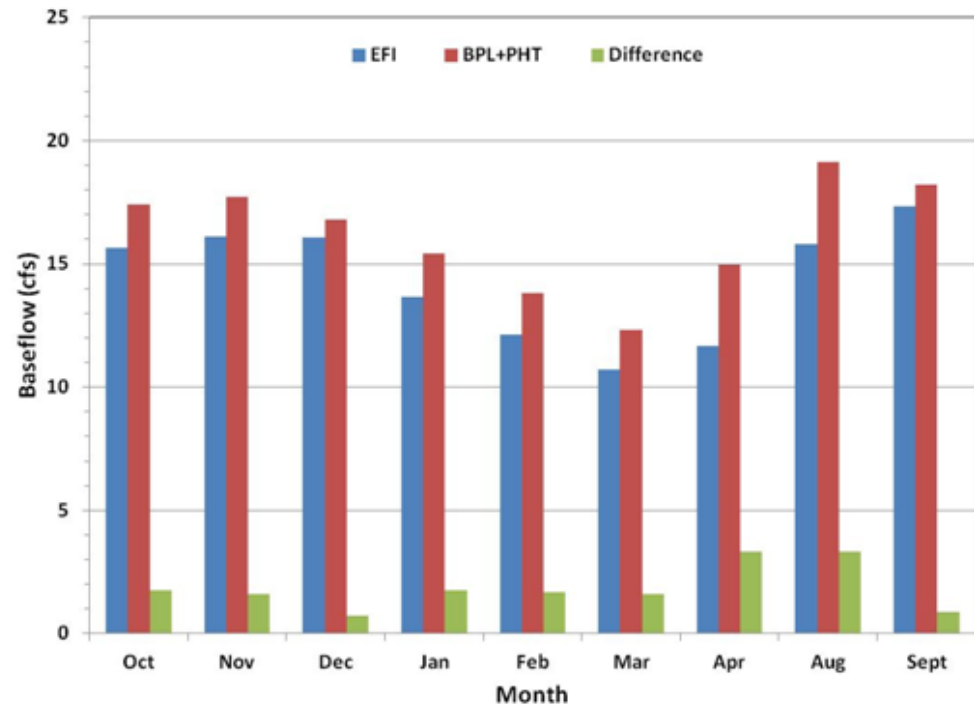
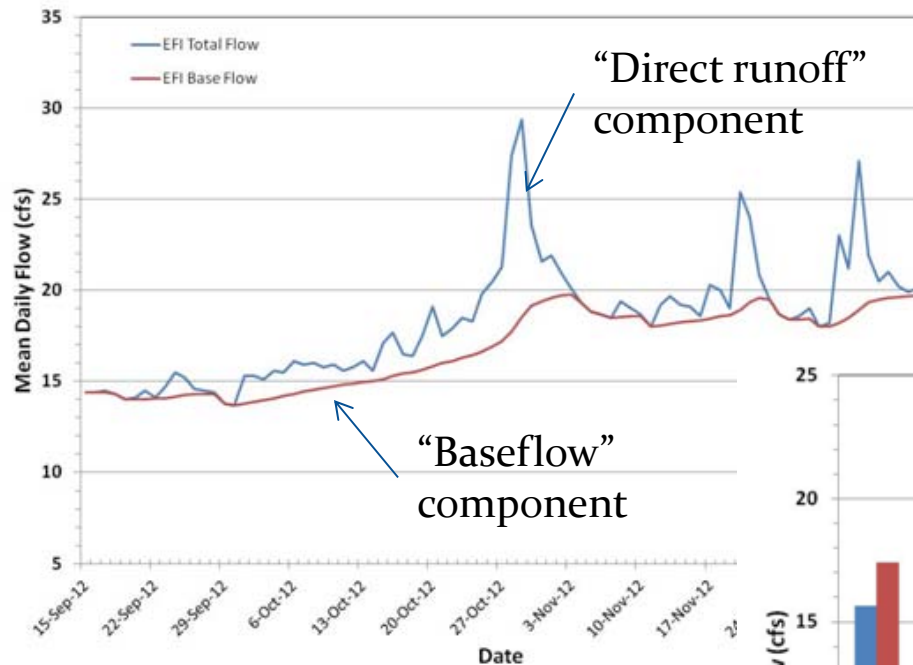
Additional Flow Data Analysis in 2013

- Determined that 44-year flow records from historic USGS gages in the East Fork are representative of current hydrologic conditions
- Used 44-year flow record to develop daily flow duration curves by month
- Used hydrograph separation analysis to estimate baseflow contributions to the East Fork
- Estimated proposed Project effects on flow in East Fork and West Fork

Example Flow Duration Curves



Hydrograph Separation Analysis





Hydrograph Separation Analysis

- Average monthly baseflow estimates (for months of low flow periods):
 - 10 to 17 cfs at site EFI
 - 12 to 19 cfs at site BPL
- Net average monthly baseflow between sites EFI and BPL: 1 to 4 cfs.
 - Net baseflow provides estimate of the sustained groundwater discharge in the East Fork between the EFI and BPL locations (during low flow seasons)



Project Effects on Flows

- Effects are related to diversions from East Fork to the Powerhouse
- Effects under Current Conditions
 - Reduced flows in the East Fork below the Project Diversion dam
 - Increased flows in about 0.5 miles of the West Fork between the existing tailrace discharge location and the East Fork
- Effects of Proposed Measures
 - Increased flows back to the East Fork bypassed reach
 - Correspondingly decreased flows in the West Fork (below the current tailrace discharge location)

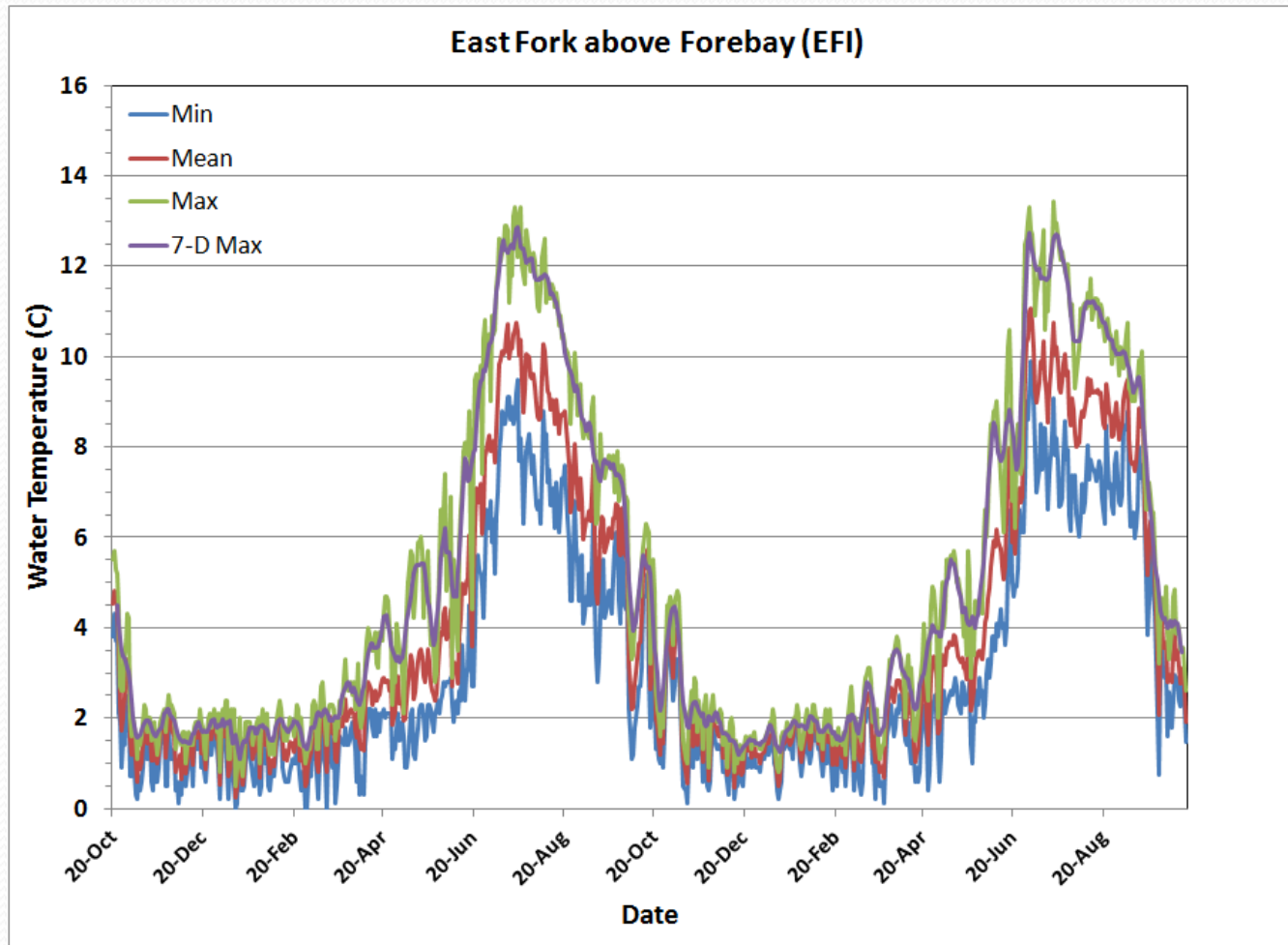
Effects of Proposed Measures on Flows

- East Fork bypassed reach (to the new tailrace discharge location):
 - Flows would be increased by about 3.2 to 3.5 cfs
 - i.e., the difference between the proposed 4 cfs minimum instream flow release and the 0.5 to 0.8 cfs that is currently released.
- East Fork bypassed reach (downstream portion):
 - Flows would be increased by the re-routed (returned) powerhouse diversion amounts (which are currently discharged to the West Fork).
 - On average, flows would be increased from:
 - 20 to 35 cfs (73 percent) during the spring runoff period (April-July)
 - 1.8 to 14.7 cfs (7-fold) during the summer/early fall low-flow period (August-October)
 - 0.9 to 10.9 cfs (10-fold) during the winter lower-flow period (November-March).

Effects of Proposed Measures on Flows

- West Fork (from current tailrace discharge location to East Fork):
 - Flows would be decreased by the Powerhouse diversion amounts that would no longer be discharged to the West Fork.
 - On average, flows would be decreased by:
 - 8 percent during the spring runoff higher-flow period (April-July)
 - 30 percent during the summer/early fall low-flow period (August-October)
 - 42 percent during the late fall/winter lower-flow period (November-March)
- Wallowa River (downstream East Fork and West Fork):
 - No changes in flow would occur because the effects of Project operations on flows dissipate as the East Fork and West Fork join.

Water Temperature Data Collection in 2013





Water Temperature Conditions

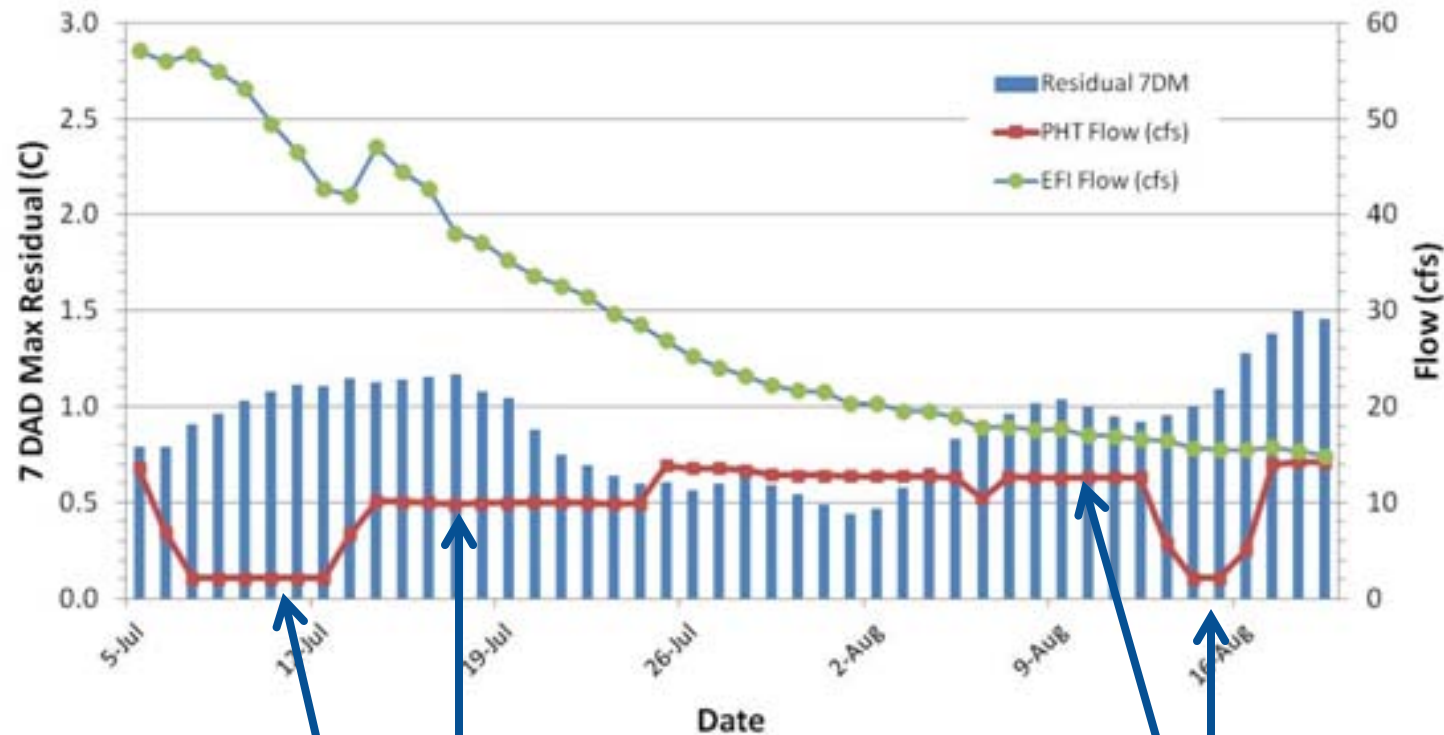
- Overall thermal regime is “cold” in the streams of the Project area
- Peak 7-DAD Max temperatures:
 - WFI: 15.0°C
 - WRC: 14.2°C
 - BPL: 14.0°C
 - RPI: 13.4°C
 - EFI: 12.9°C
 - BPU : 12.4°C
- 7-DAD Max values less than (and therefore meet) the State’s 12°C bull trout criteria throughout most of the year at all study sites.
- 7-DAD Max values exceeded 12°C for relatively short periods (about 2 to 4 weeks) in mid-summer at all sites.
 - The 12°C criteria is for streams supporting use for bull trout spawning and juvenile rearing (per OAR 340-041-0028).



Temperature Effects: East Fork

- Related to effects on flows as previously discussed (Current Conditions and under Proposed Measures)
- Differences in values at sites EFI and BPL indicate warming about 0.5 to 1.5°C in the East Fork between these sites during mid-summer.
- However, no systematic changes in these differences whether or not Powerhouse diversions were occurring during mid-summer

Temperature Effects: East Fork



No systematic changes in temperature differences with and without Powerhouse operations



Temperature Effects: East Fork

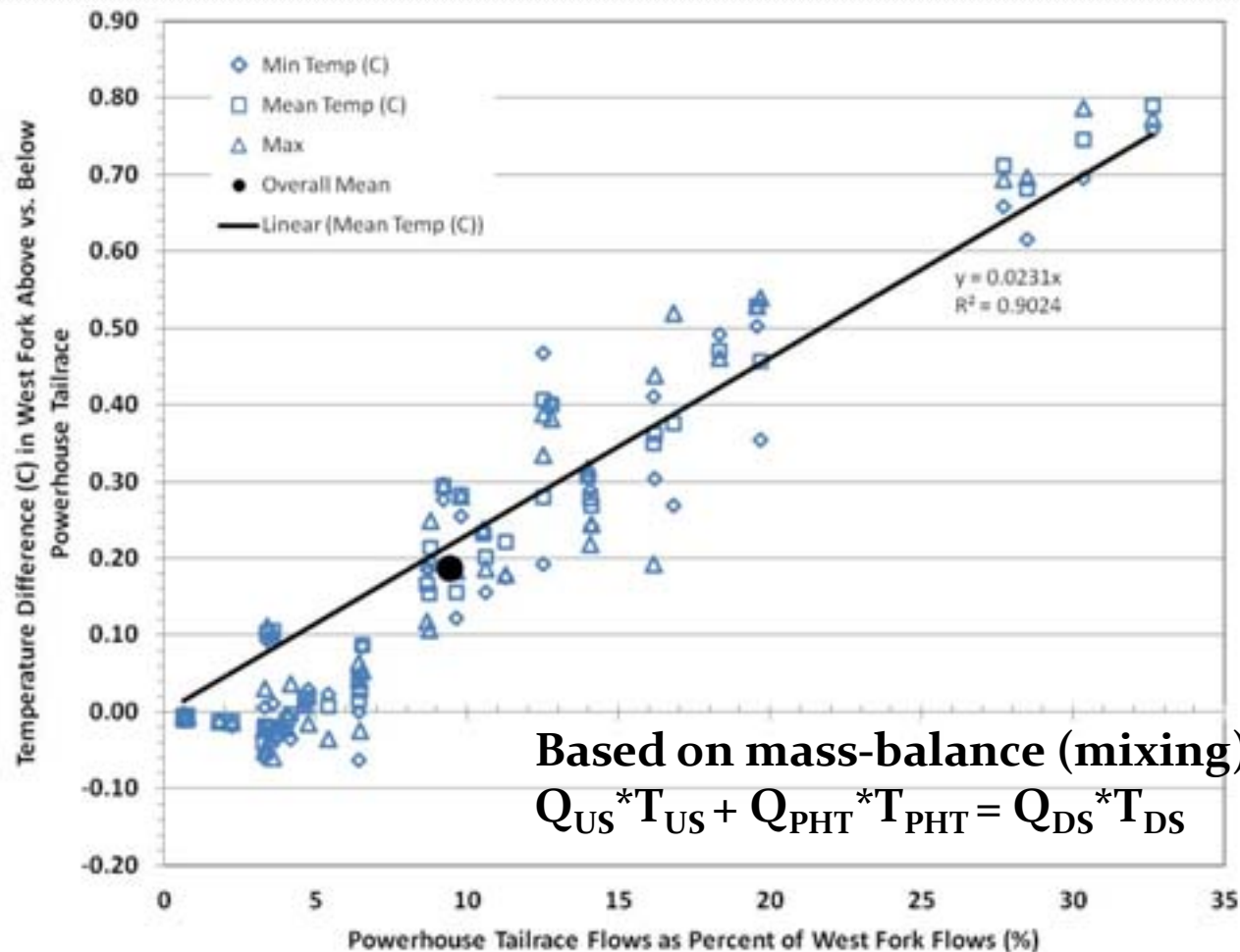
- Estimated Effects in the East Fork (mid-summer):
 - Therefore, we assume that the warming observed in the East Fork is mostly related to the 1,200-ft elevation change
 - Elevation change has a direct effect on the rate of stream heating due to adiabatic lapse rate of air temperature
 - Under Proposed Measures, increases in flow in the East Fork could act to further moderate the rate of warming in the reach. However, the above analysis suggests such changes in summer may not be significant



Temperature Effects: West Fork

- Under Project Measures, the absence of Powerhouse tailrace flows in the West Fork (due to the tailrace re-route) will result in slightly warmer temperatures in summer in the 0.5-mile distance between the existing tailrace discharge location and the confluence with the East Fork.
 - Slightly cooler tailrace flows will be re-routed back to the East Fork rather than discharged to the West Fork.
 - Estimated warming: 0.2°C warmer on average, and up to about 0.8°C.
 - West Fork inflow temperatures are naturally warmer than East Fork temperatures
 - Larger drainage area with comparatively lower mean elevation, lower average gradient, greater stream width, and longer stream reach length

Temperature Effects: West Fork



Based on mass-balance (mixing) equation:

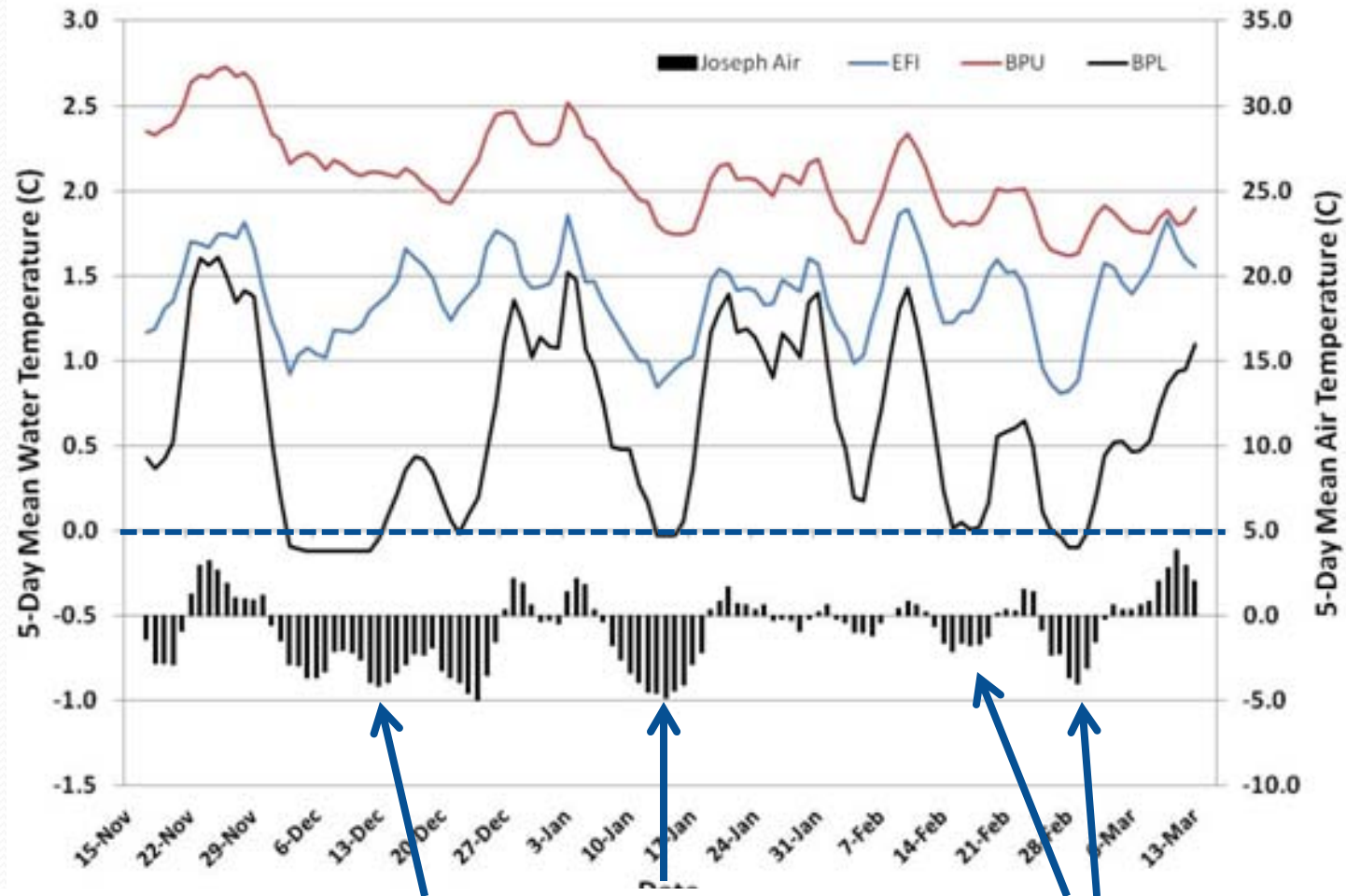
$$Q_{US} * T_{US} + Q_{PHT} * T_{PHT} = Q_{DS} * T_{DS}$$



Ice Formation Effects: East Fork

- Evidence that in-stream ice formation occurs in lower East Fork at times during winter
- Data from site BPL indicate that water temperatures dropped to 0 to -0.1°C on several days during winter
- Notable that freezing levels (0°C or less) not reached at either of the upstream, higher-elevations EFI and BPU sites on the East Fork

Ice Formation Effects: East Fork



Apparent episodes of freezing in the lower East Fork



Ice Formation Effects: East Fork

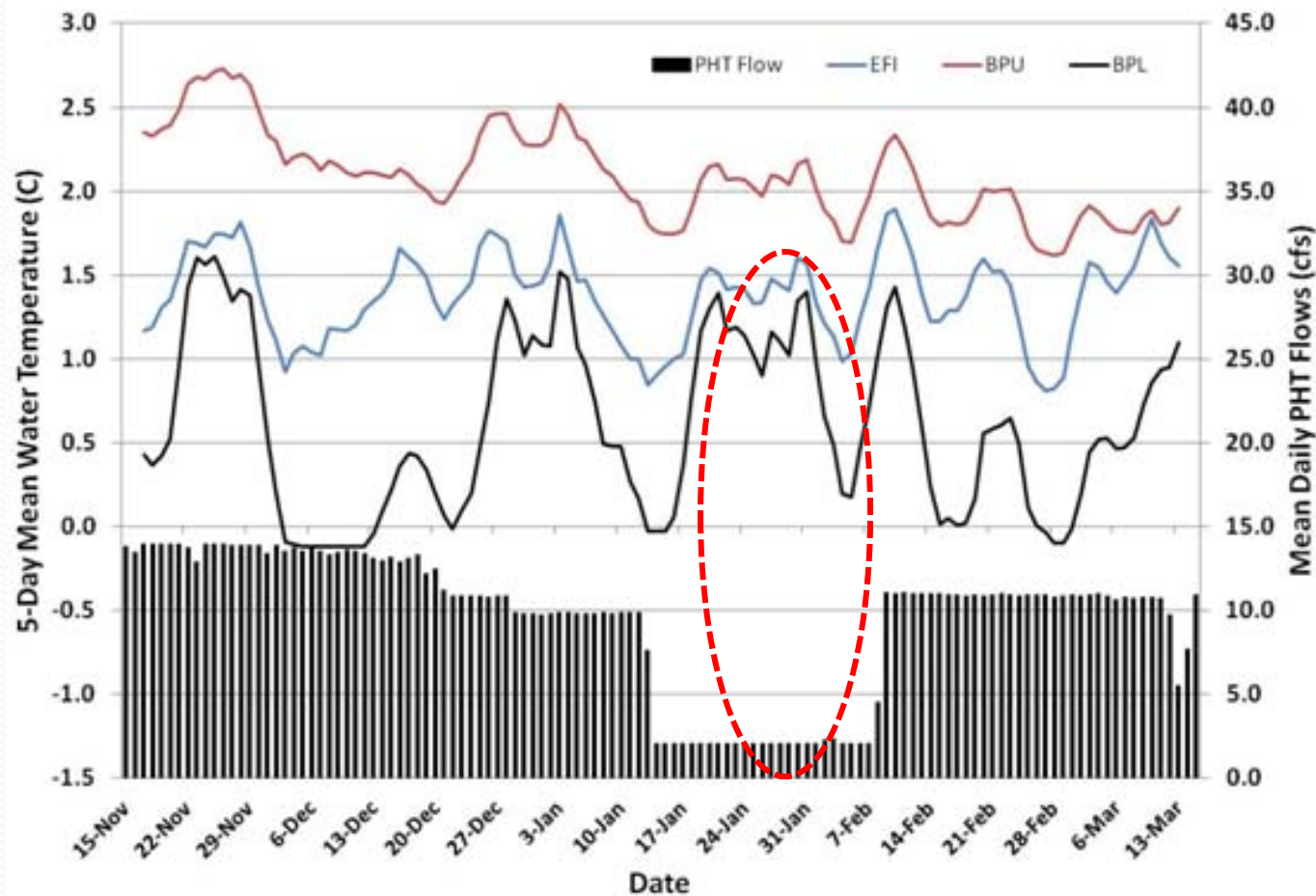
- Reasons for freezing episodes at the lower site BPL, but not the upper sites, are not specifically known, but are likely a combination of factors:
 - More baseflow at site EFI that likely increases the groundwater-related thermal load present at site EFI
 - Project forebay's water volume (thermal mass) further retains thermal load at site BPU (which is located just below the forebay)
 - Occurrence of winter air temperature inversions that cause cold air pooling around the area of site BPL
 - Differences in stream hydraulics between BPL and the other upstream sites that may further affect the occurrence of ice formation



Ice Formation Effects: East Fork

- Drops in water temperatures to freezing levels at site BPL appear to be more strongly correlated with air temperature than flow
- However, slightly warmer water temperatures when diversions of flow to the Powerhouse were not occurring indicate that higher bypass instream flow releases (as would occur under proposed Project operations) could play a further role in reducing ice formation in the East Fork bypassed reach.

Ice Formation Effects: East Fork

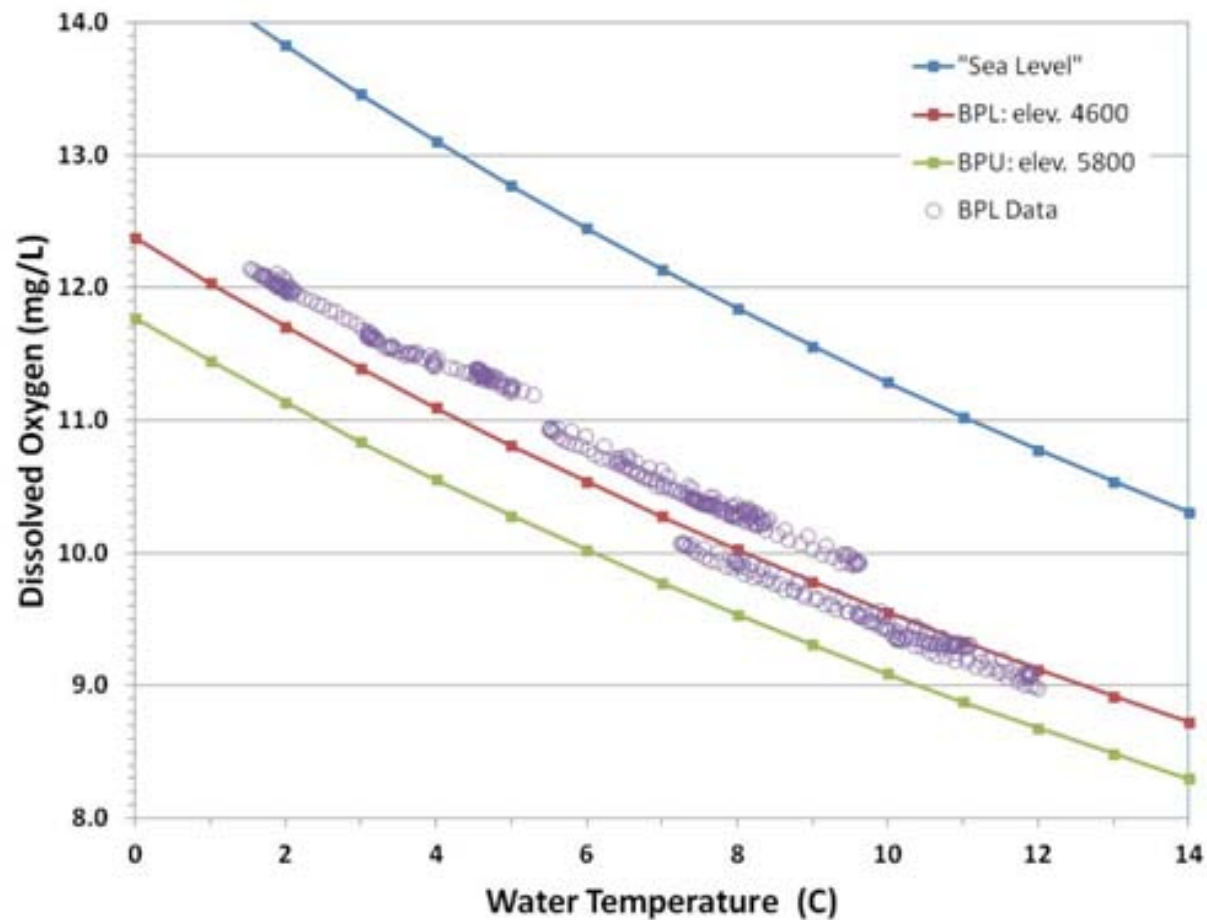




Dissolved Oxygen

- No additional data collection in 2013
- DO near full saturation (100 percent) in all measurements during the sampling in 2012
- No Project-related effect on DO
- DO values meet the State standard's 90 or 95 percent saturation criteria

Effects of Elevation on DO





Total Dissolved Gas

- No additional data collection in 2013
- TDG at or near 100 percent saturation (i.e., average of 98 percent saturation; range 96 to 100 percent saturation)
- These values indicate that TDG supersaturation not a concern at the Project powerhouse
- TDG values at the powerhouse tailrace meet the State standard's 105 or 110 percent saturation criteria



Turbidity

- Routine forebay maintenance flushing did not occur during the study period. Consequently, proposed sampling did not occur.
- PacifiCorp has developed a proposal to guide future forebay flushing events that would occur.
- Turbidity monitoring occurred during June 2012 in the East Fork
 - Purpose: develop a record of background turbidity for a typical June runoff period when future forebay flushing events would occur
- PacifiCorp will include a proposed Turbidity Monitoring Plan in the Final License Application



Water Resources

Additional Work Proposed:

- No additional water resources studies are proposed.
- Final results and recommendations are presented in the December 2013 Updated Study Report.

Sediment and Substrate Characterization

Briana Weatherly
Environmental Compliance Manager
PacifiCorp



Sediment and Substrate Characterization

Study Plan Objectives

- Characterize baseline sediment and substrate conditions in the project area.
- Analyze potential effects of future forebay flushing on water quality, substrate compositions and aquatic resources in the bypassed reach of the East Fork Wallowa River.



Sediment and Substrate Characterization

2012 Field Work Review

- Professional survey of the surface and thickness of the fine grain sediment deposit in the drained forebay was conducted to calculate sediment volume.
- Sediment samples were collected in the forebay and analyzed for metals and particle size distribution at a Test America laboratory.
- Streambed grain size analysis using Wolman surface pebble counts and bulk samples were conducted in the lower bypass reach.
- Suspended sediment surface water samples were collected in the lower bypass reach in June 2012; and analyzed at a Test America laboratory.
- Continuous turbidity monitoring was conducted for the entire month of June 2012 in the lower bypass reach.



Sediment and Substrate Characterization

2013 Objectives

- Collect additional data to support 401 Water Quality Certification application and ESA consultation.
- Collect surface grain size data at the same 5 transect locations in the bypassed reach as done in 2012.
- Record habitat type and average channel gradient at each transect.
- Compare 2012 surface grain size data to data collected in 2013.
- Record continuous turbidity data for the month of June 2013 at the upper staff gage site above the Project forebay and the lowest staff gage site in the bypassed reach.
- Collect surface grain size data from areas of the West Fork Wallowa River upstream of Project tailrace discharge and East Fork Wallowa River above Project forebay in order to provide comparison data from areas unaffected by a forebay flush.



Sediment and Substrate Characterization

Field Work and Analysis Conducted in 2013:

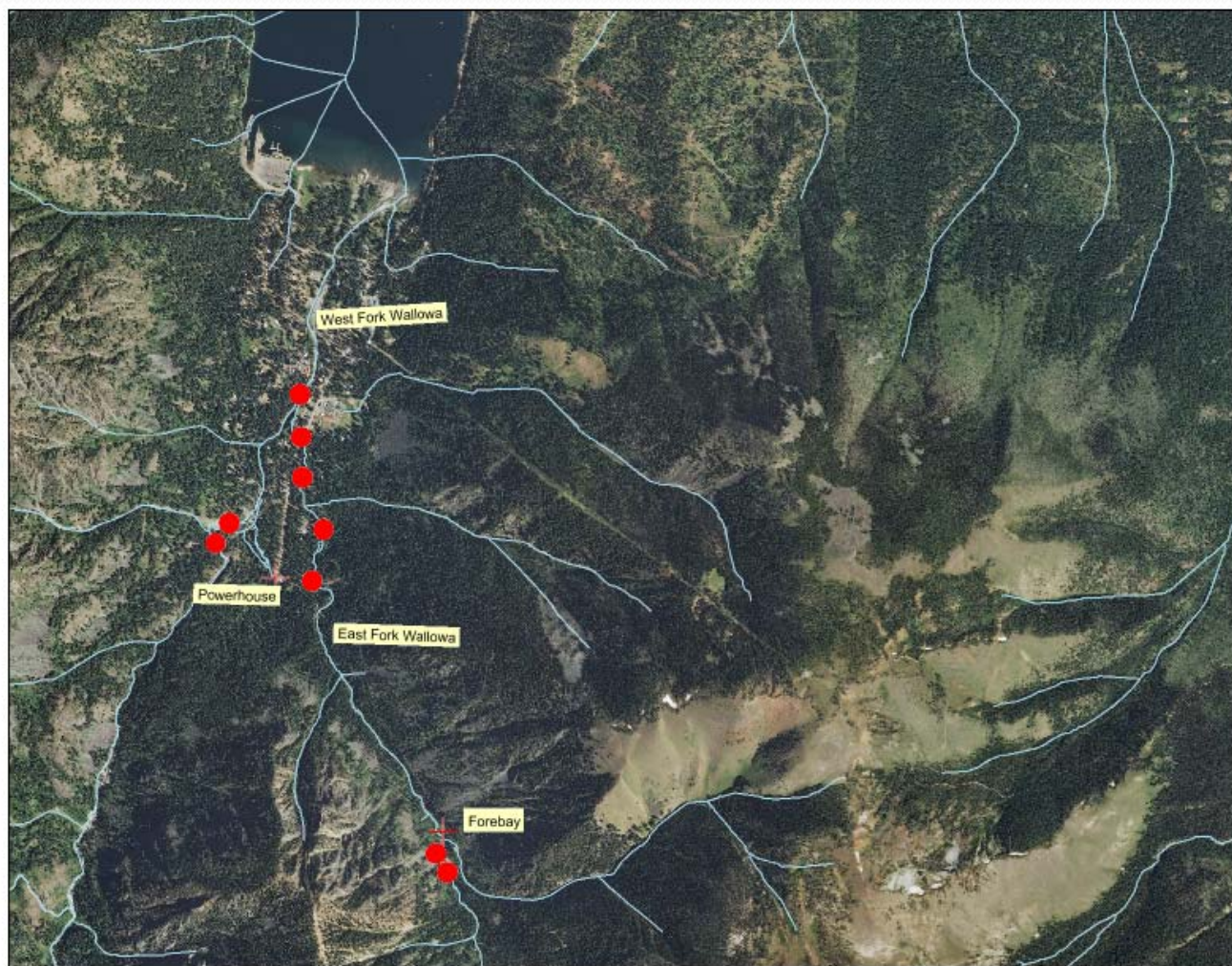
- Collection and analysis of 2013 surface grain size data from 2012 replicate areas within the East Fork Wallowa River bypassed reach.
- Record of habitat type and channel gradient at all transect locations.
- Collection and analysis of additional surface grain size data from the East Fork Wallowa River upstream of the Project forebay and the West Fork Wallowa River upstream of the Project tailrace to provide comparison data from geomorphically similar areas not affected by forebay flushing.
- Deployment of water quality sondes for turbidity measurement at the upper and lower staff gages.

Study Area

- Replicate areas, from 2012 data collection, within bypassed reach of the East Fork Wallowa River. East Fork Wallowa River upstream of Project forebay. West Fork Wallowa River upstream of Project tailrace discharge.

Methods

- Streambed grain size analysis (Wolman Pebble Counts)



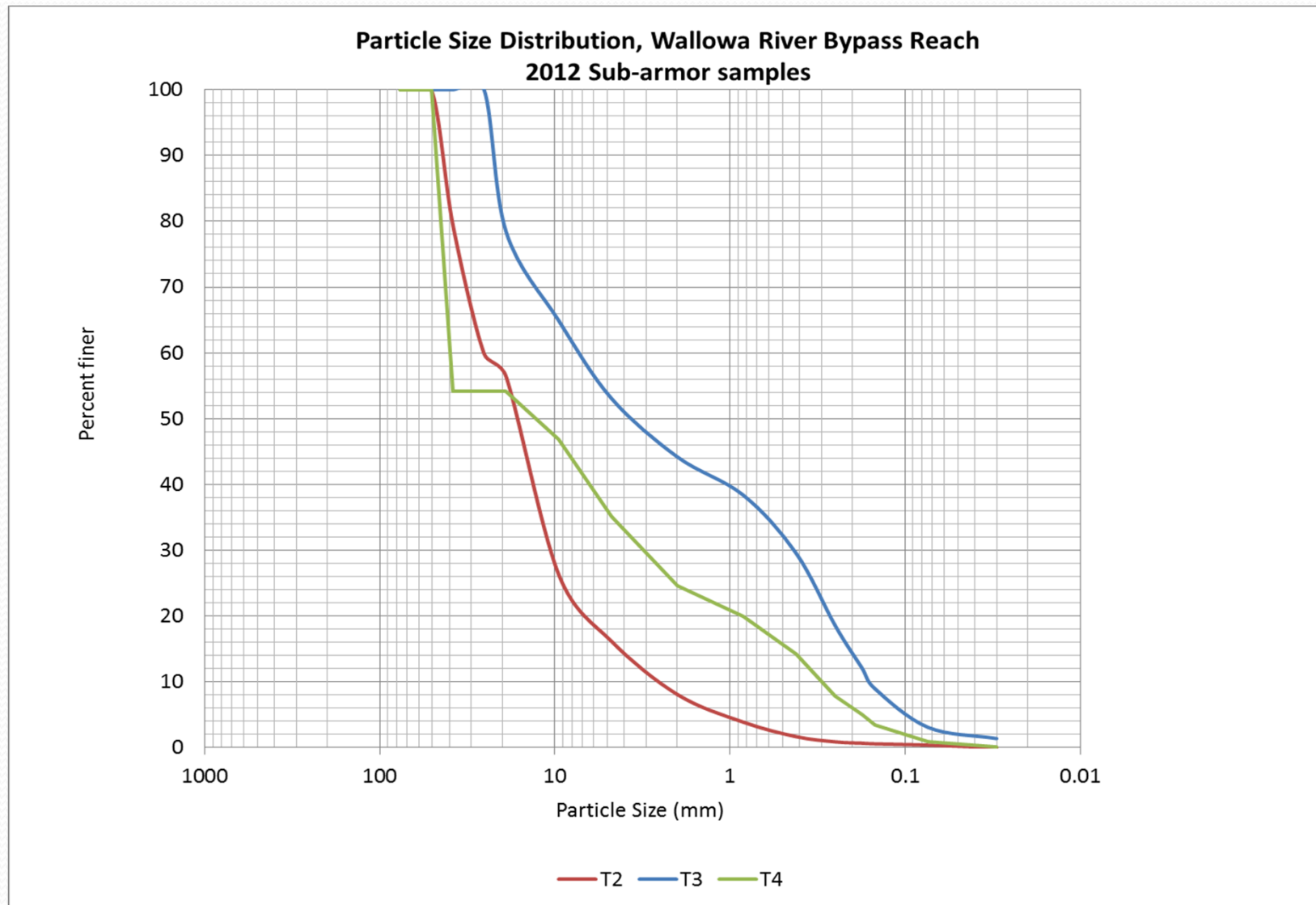
0 3250 6500 9750 ft.

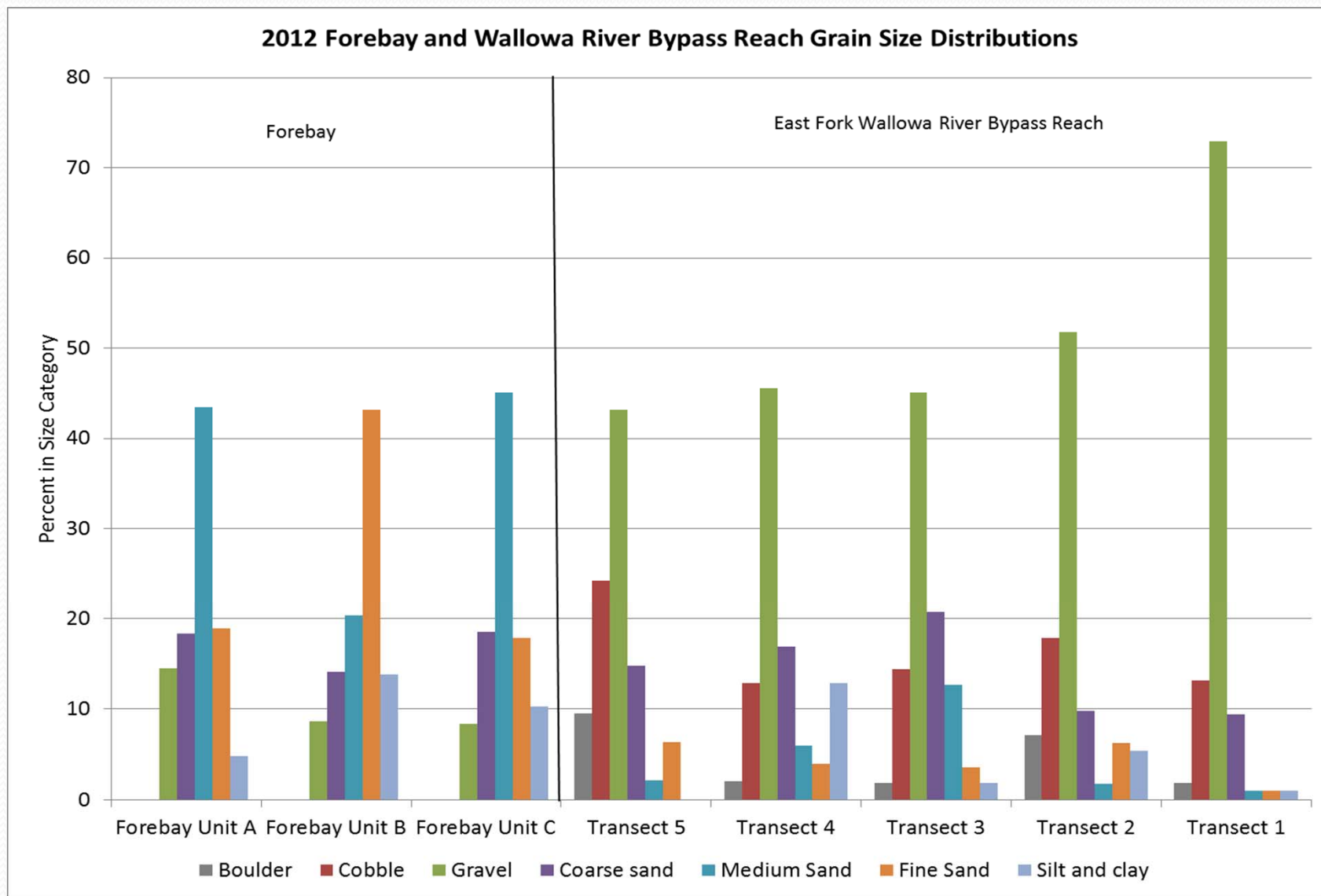
Transect #	Location	Wetted Width	Average Gradient	Habitat Unit Type	Photo Reference
9 (2013)	West Fork Wallowa River: In front of third snag on river left upstream of mess hall.	35 ft (10.7 m)	3%	Cascade over boulder	1
8 (2013)	West Fork Wallowa River: In front of Boy Scout mess hall.	35 ft. (10.7 m)	3%	Cascade over boulder	2
7 (2013)	Above project forebay	19.5 ft. (6.0 m)	3%	Riffle	4
6 (2013)	Above project forebay	13.7 ft. (4.2 m)	3%	Pool tailout	5 and 6
5	Above abandoned well house/old staff gage site at abandoned water intake.	14.2 ft. (4.3 meters)	2%	Cascade over boulder	7 and 8
4	At channel split near USFS maintenance yard	12 ft.side channel (3.7 m);	2%	Side channel - Riffle	9 and 10
		13.4 ft main channel (4.1 m)	3%	Main channel – Cascade over boulder	11 and 12
3	At IFIM Transect 13	15 ft. (4.6 m)	2%	Riffle/glide	14 and 15
2	Approximately 20 meters below road bridge	18.3 ft. (5.6 m)	3%	Riffle	17 and 18
1	Immediately above confluence of the East and West Fork Wallowa Rivers.	13.4 ft. (4.1 m)	3%	Riffle	21 and 22

		2012 Percent of total in size class in bypassed reach transects				
Size Category	Size Ranges (mm)	Transect 5	Transect 4	Transect 3	Transect 2	Transect 1
Sand and Fines	≤2 mm	23.1	36.9	38.7	23.1	12
Very fine gravel	2-4	1.1	3.7	12.6	4.4	2.8
Fine Gravel	5-8	6.3	13	3.6	9.7	9.3
Medium gravel	9-16	9.5	5.5	9.9	9.7	20.6
Course gravel	17 - 32	14.7	13.9	8.1	12.4	24.2
Very course gravel	33 - 64	11.6	6.5	10.8	15	15.9
Small cobble	65 - 90	10.5	1.9	5.4	6.2	2.8
Medium cobble	91 - 128	10.5	0.9	5.4	3.5	2.8
Large cobble	129 - 180	3.2	4.6	2.7	4.4	2.8
Very large cobble	181 - 255	0	4.6	0.9	3.5	4.7
Small boulder	256 - 512	9.5	1.9	0.9	6.2	1.8
Medium boulder	513 - 1024	0	0	0.9	0	0

		2013 Percent of total in size class in bypassed reach transects				
Size Category	Size Ranges (mm)	Transect 5	Transect 4	Transect 3	Transect 2	Transect 1
Sand and Fines	≤2 mm	15.4	33.9	18.9	15.5	14.8
Very fine gravel	2-4	10.3	6.5	7.1	15.5	7.8
Fine Gravel	5-8	12	14.5	16.5	16.5	16.5
Medium gravel	9-16	6.8	12.1	20.5	16.5	14.8
Course gravel	17 - 32	9.4	14.5	18.1	11.7	18.3
Very course gravel	33 - 64	12.8	8.1	9.4	9.7	12.2
Small cobble	65 - 90	12.8	2.4	1.6	6.8	7
Medium cobble	91 - 128	6	1.6	2.4	2.9	2.6
Large cobble	129 - 180	2.6	3.2	3.1	2.9	0.9
Very large cobble	181 - 255	7.7	0.8	0.8	1	3.5
Small boulder	256 - 512	1.7	1.6	1.6	1	1.7
Medium boulder	513 - 1024	0	0	0	0	0

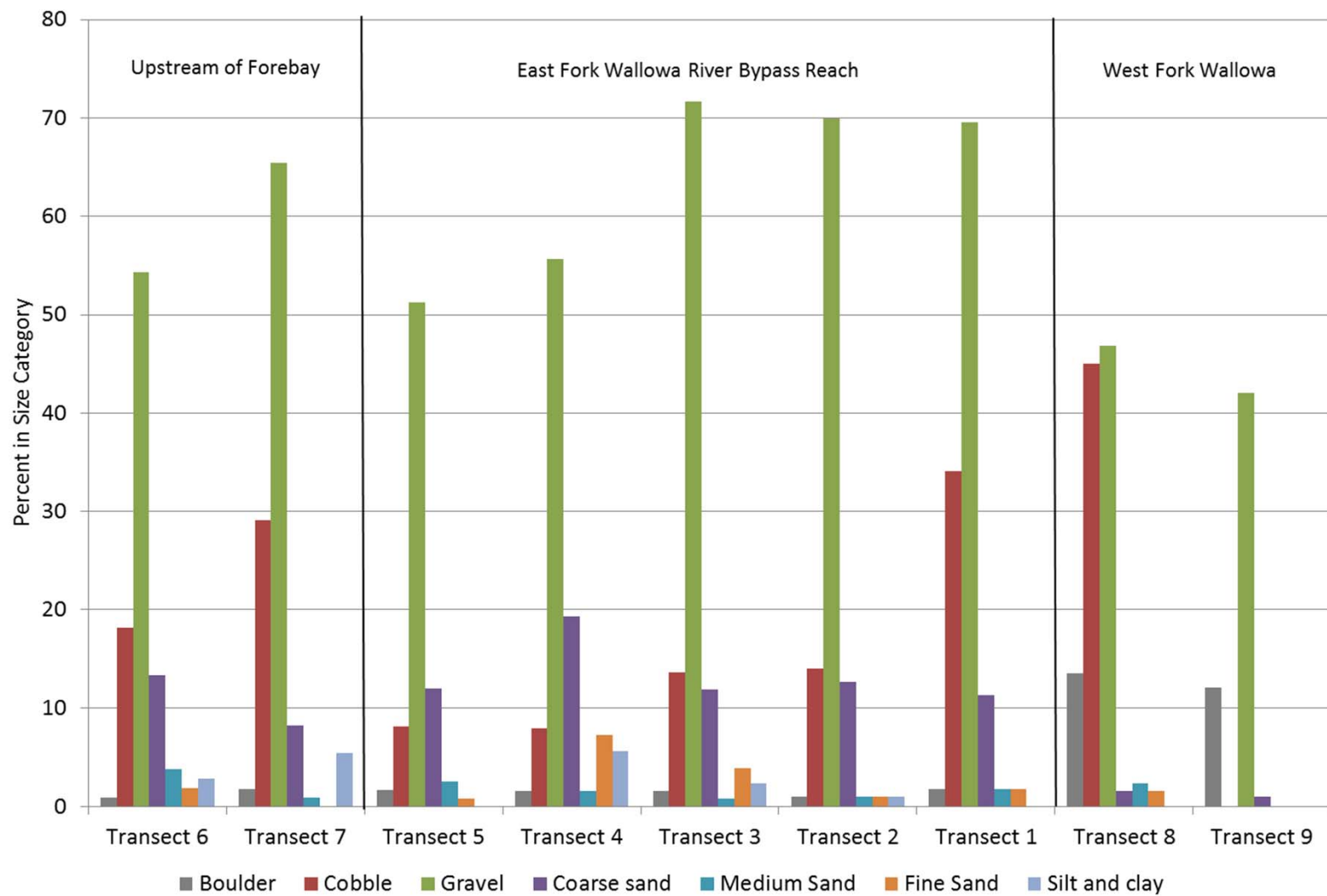
		2013 Percent of total in size class upstream of forebay and in West Fork Wallowa River transects			
Size Categories	Size Ranges (mm)	Transect 6 (upstream of forebay)	Transect 7 (upstream of forebay)	Transect 8 (West Fork Wallowa)	Transect 9 (West Fork Wallowa)
Sand and Fines	≤2 mm	21.9	14.5	5.5	1.0
Very fine gravel	2 - 4	11.4	1.8	4.0	2.0
Fine Gravel	5 - 8	21.0	20.0	6.3	5.0
Medium gravel	9 - 16	8.6	17.3	12.7	3.0
Course gravel	17 - 32	4.8	10.9	12.7	11.0
Very course gravel	33 - 64	8.6	15.5	11.1	21.0
Small cobble	65 - 90	10.5	2.7	11.1	24.0
Medium cobble	91 - 128	5.7	3.6	6.3	5.0
Large cobble	129 - 180	3.8	8.2	9.5	10.0
Very large cobble	181 - 255	2.9	3.6	7.1	6.0
Small boulder	256 - 512	1.0	1.8	5.6	10.0
Medium boulder	513 - 1024	0	0	1.6	0







2013 East and West Fork Wallowa River Grain Size Distributions





Sediment and Substrate Characterization

Observations:

- 2012 Pebble count data reflects streambed surface conditions after the August 2012 project-related sediment input to the bypassed reach. Pebble count data collected in August 2013 represent conditions one year after the sediment release.
- In 2013 the percent of sand and finer grain substrates at each transect in the bypassed reach was generally less than in 2012.
- Pockets of fine grain substrates were still observed during 2013 data collection.
- Smaller gravels were at higher densities in 2013 sample, while larger gravels were a higher proportion of the sample during 2012 sampling.
- Larger grain substrate proportions (cobble, boulder) were similar in both the 2012 and 2013 sample.



Sediment and Substrate Characterization

- The fine grained particle size distribution of 2013 sample areas in the bypassed reach looks similar to the particle size distribution in the 2012 sub-armor samples from the bypassed reach.
- The percent sand and finer in samples upstream of the forebay were similar to the 2013 sampling in the bypassed reach:
 - Upstream of forebay: 14.5-21.9
 - Bypassed reach: 14.8 to 33.9
- This suggests that the level of fines in the bypassed reach is similar to areas not being influenced by forebay flushing.
- The bypassed reach transect with the highest levels of fine-grained sediment during both years, Transect 4, is likely being influenced by a very low gradient side channel which includes primarily fine-grained substrate.



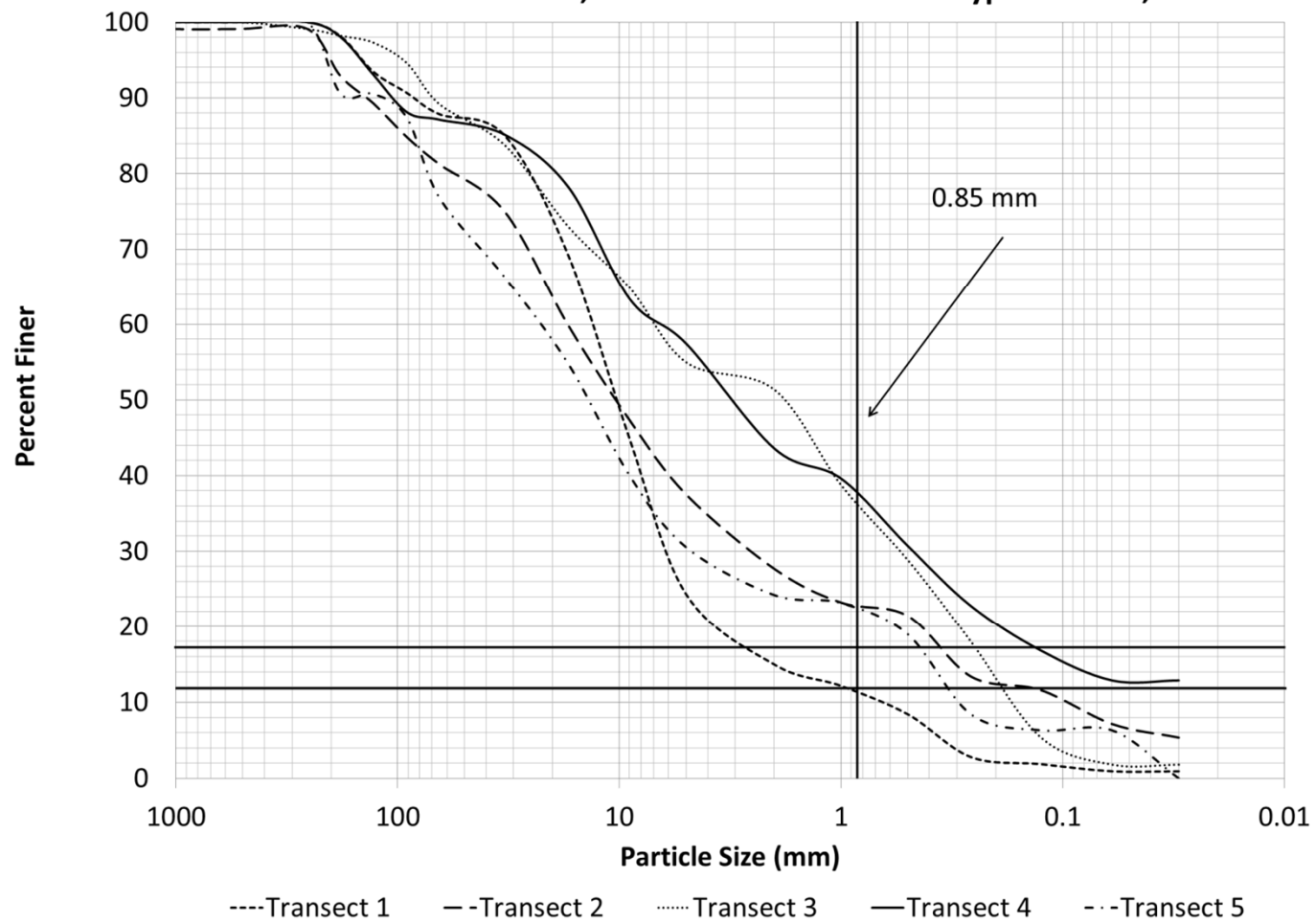
Sediment and Substrate Characterization

To meet a functioning appropriately characterization for bull trout (as defined by USFWS), sediment fines (0.85 mm particle size) should comprise no more than 12 percent of surface sediments.

- In 2012 (with the exception of transect 1), results of pebble counts indicate substrate at the lower end of the East Fork Wallowa River bypassed reach above the West Fork Wallowa River confluence fall within the functioning appropriately range for sediment (all were unacceptable).
- In 2013, results of pebble counts indicate substrate at all 2012 repeat sample locations, except Transect 4 (all functioning at risk).
- 2013 Transects 6 and 7, in the East Fork Wallowa River above the Project forebay, percent fines is very similar to the 2013 bypassed reach data.

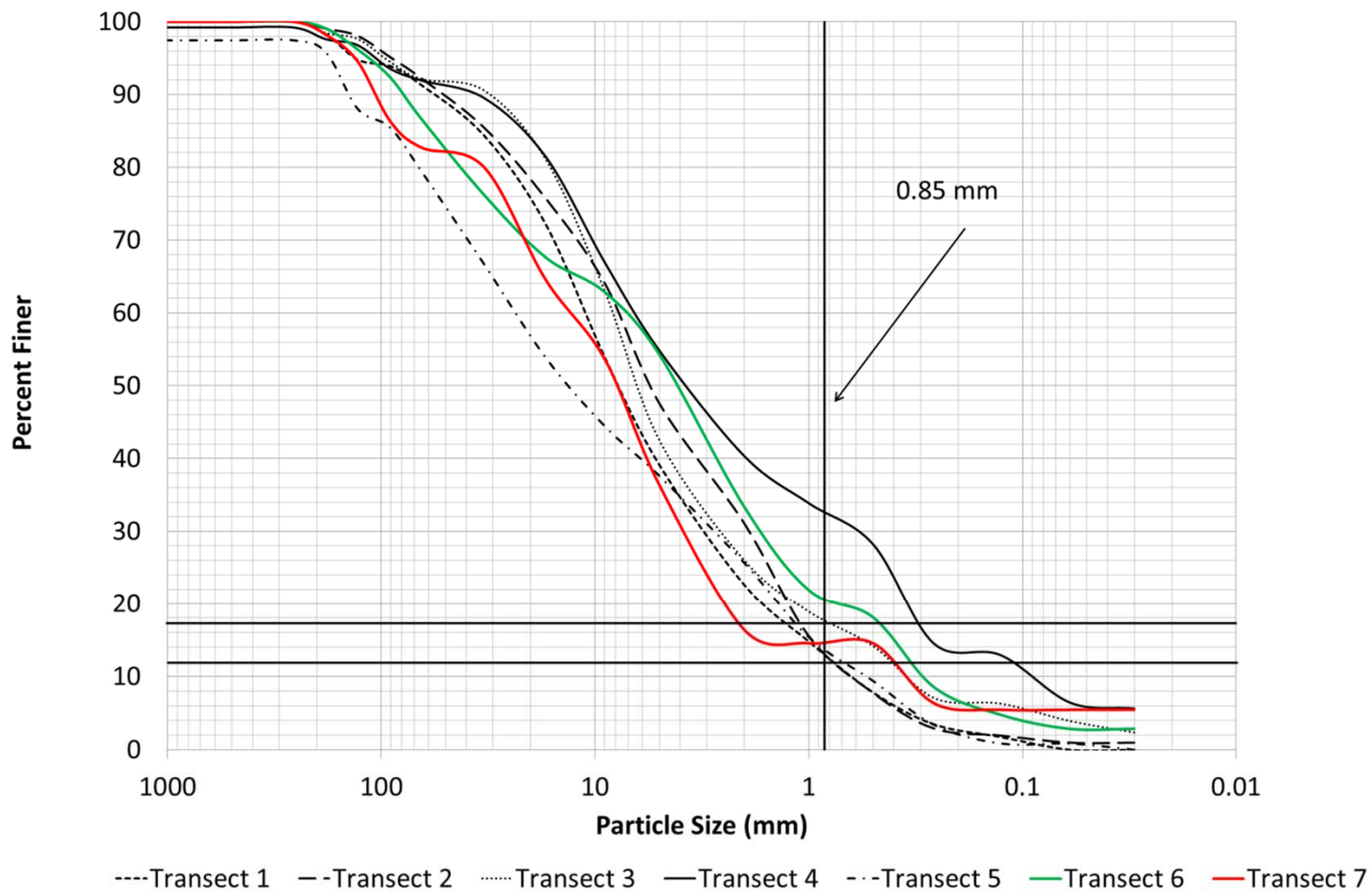


Sediment Size Distribution, East Fork Wallowa River Bypass Reach, 2012

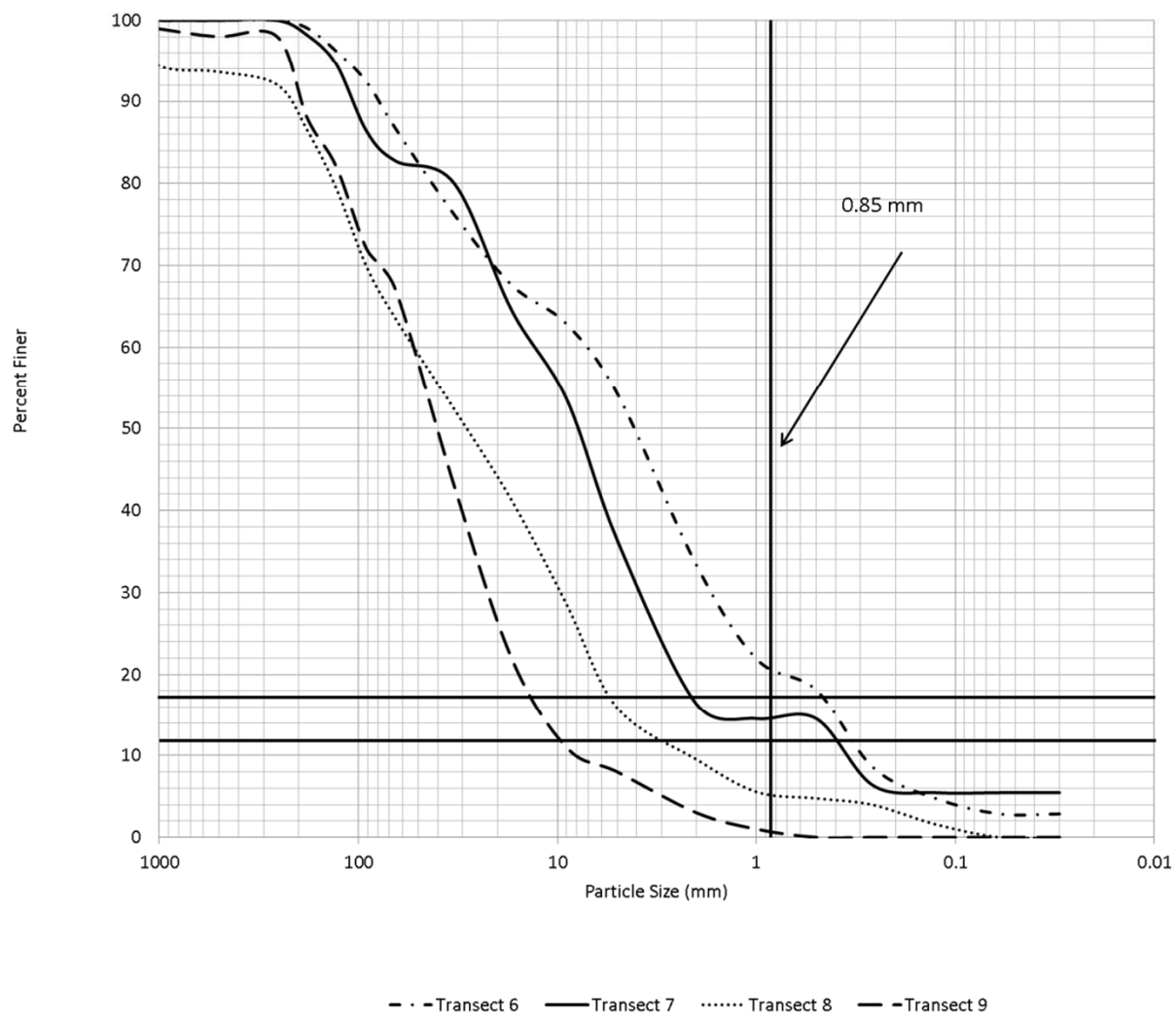




Sediment Size Distribution, East Fork Wallowa River Bypass Reach, 2013



Sediment Size Distribution, East Fork Wallowa River Bypass Reach 2013





Sediment and Substrate Characterization

Estimated Flow to Transport Sand and Fines:

- Hydraulic data collected at PHABSIM transects were used to estimate shear stress in the center of the channel at the highest flow measured (15 cfs) and compared to critical shear stress required to move 2mm particles on the stream bed.
- Calculations suggest that flows of 15 cfs would be able to pick up and transport fines through the thalweg of the channel in the bypassed reach.
- At higher flows, fines would be able to be picked up across the majority of the channel cross sections; shear stress will always be lowest along shallow channel margins for a given flow, but at 45 cfs (June 50 percent exceedence flow in bypassed reach) it is likely that sand and fines would be moved throughout the bypassed reach.



Sediment and Substrate Characterization

Discussion Points: Considerations for Future Forebay Flushing

- Based on shear stress calculations at PHABSIM transects in the lower bypassed reach, flow during June (spring runoff) should be able to move 2 mm and finer sediment through the bypassed reach. If possible, given access and snow pack considerations, flushing the forebay during June would provide the best chance of high flows moving sediment through the bypassed reach in a natural manner.
- It is expected that there will be short-term increases in turbidity during the flushing event; monitoring of turbidity levels prior to, during, and following the flushing event will provide information on the magnitude and duration of increased turbidity levels in comparison to normal levels.
- Fine sediment levels at transects upstream of the forebay and in the lower bypassed reach were similar, suggesting that past forebay flushing does not result in a long-lasting increase in fine sediment levels in the bypassed reach.



Sediment and Substrate Characterization

Additional Work Proposed:

- No additional Sediment and Substrate studies are proposed.
- Final results and recommendations are presented in the December 2013 Updated Study Report.

Aquatic Resources

Jeremiah Doyle
Aquatic Scientist
PacifiCorp



Kokanee Spawner Abundance West Fork Wallowa River

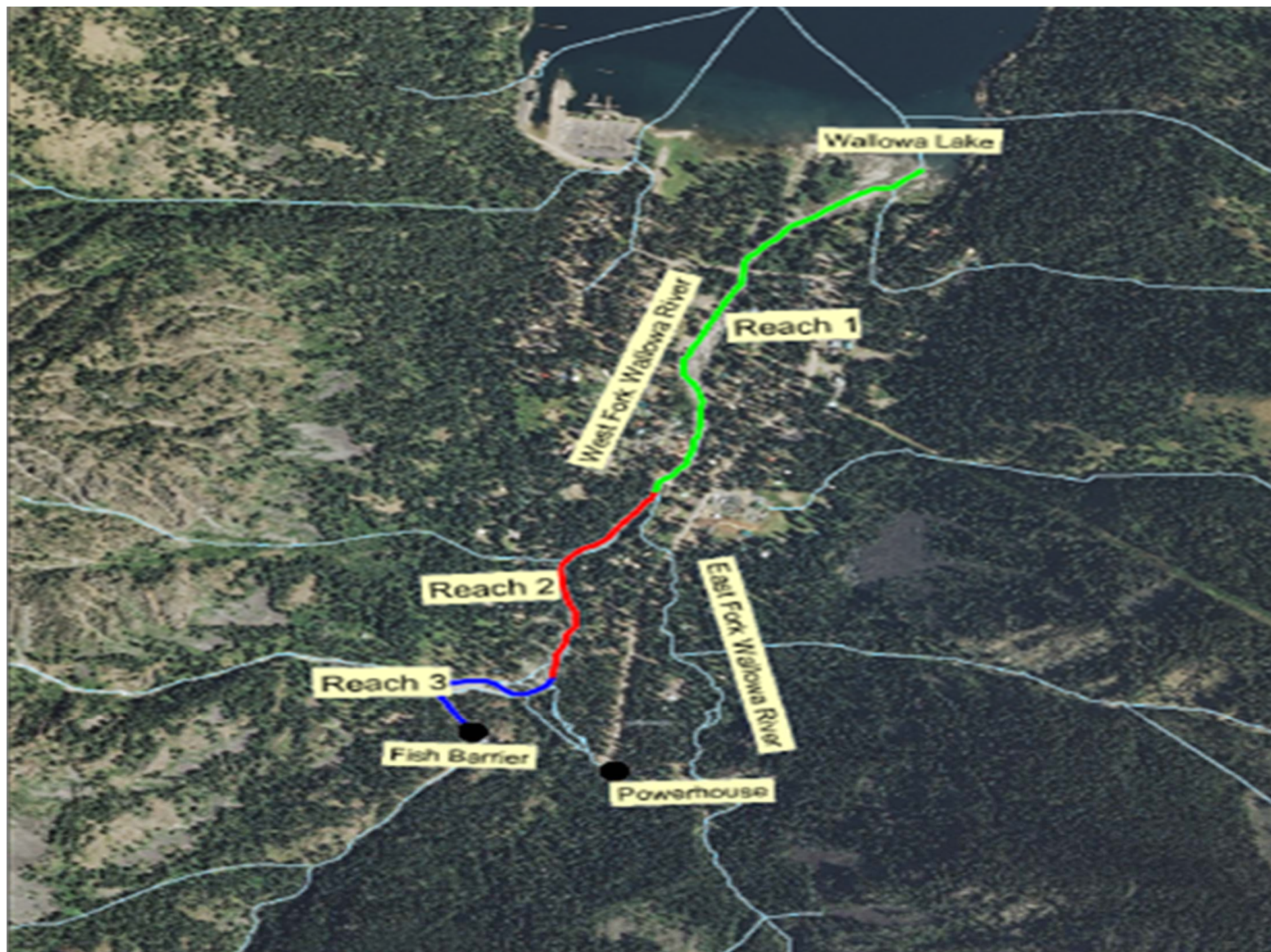
Objective: Estimate 2013 total kokanee spawner abundance of the West Fork Wallowa River by Reach.

Study Area: Surveys were conducted within the East Fork Wallowa River Bypassed Reach and the West Fork Wallowa River.

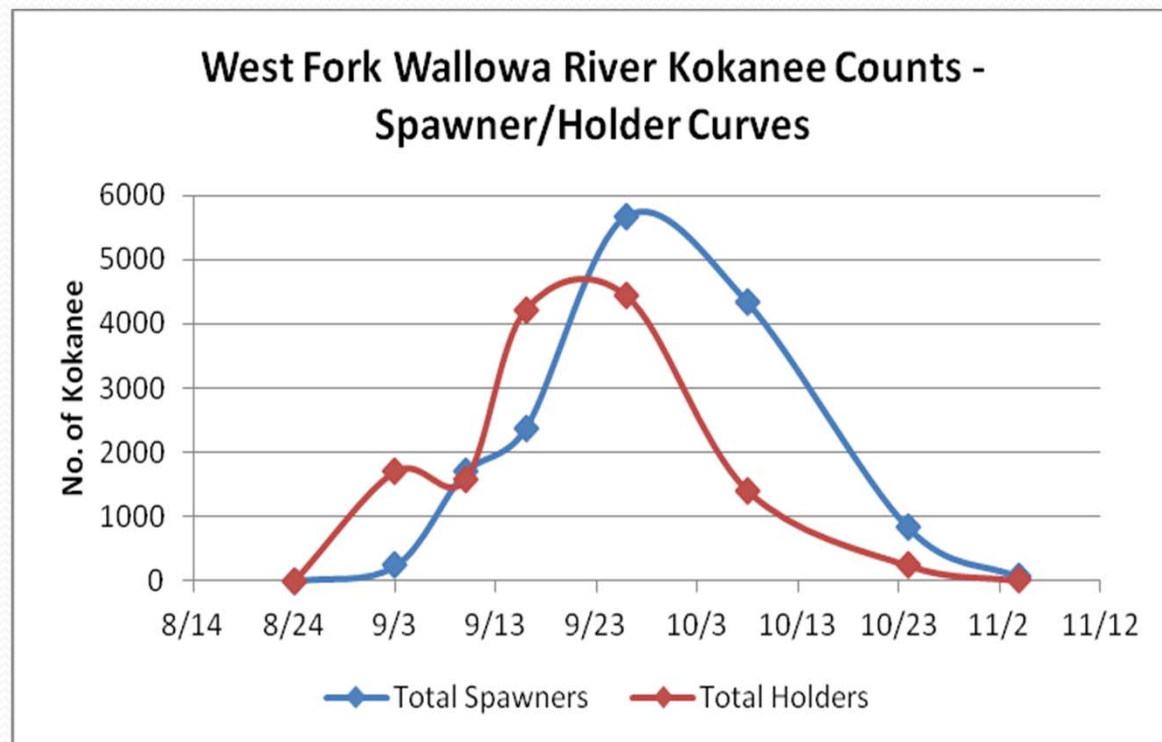
Methods: Visual counts. Population estimated using Area Under the Curve. AUC was captured by trapezoidal approximation divided by holder residence time. Holder residence time evaluated by temporal space between the peak holder and peak spawner count.

Field Work Conducted to Date and Study Status: All tasks associated with this study were completed by November 2013.

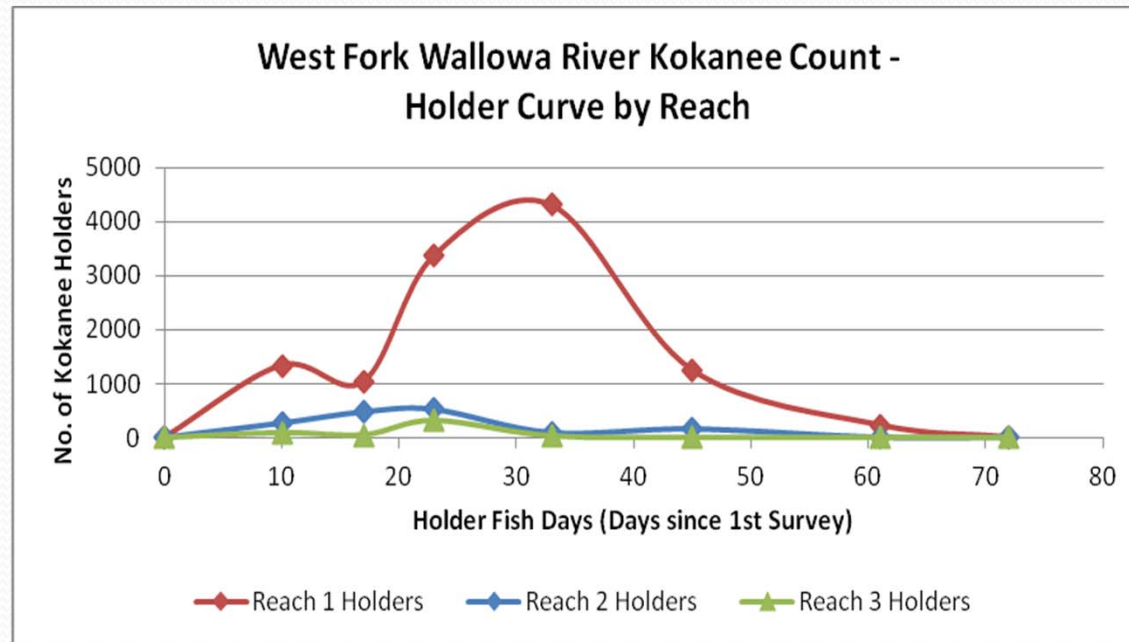
Variance to Study Plan: No variances to Study Plan.



Kokanee Spawner Abundance



Kokanee Spawner Abundance



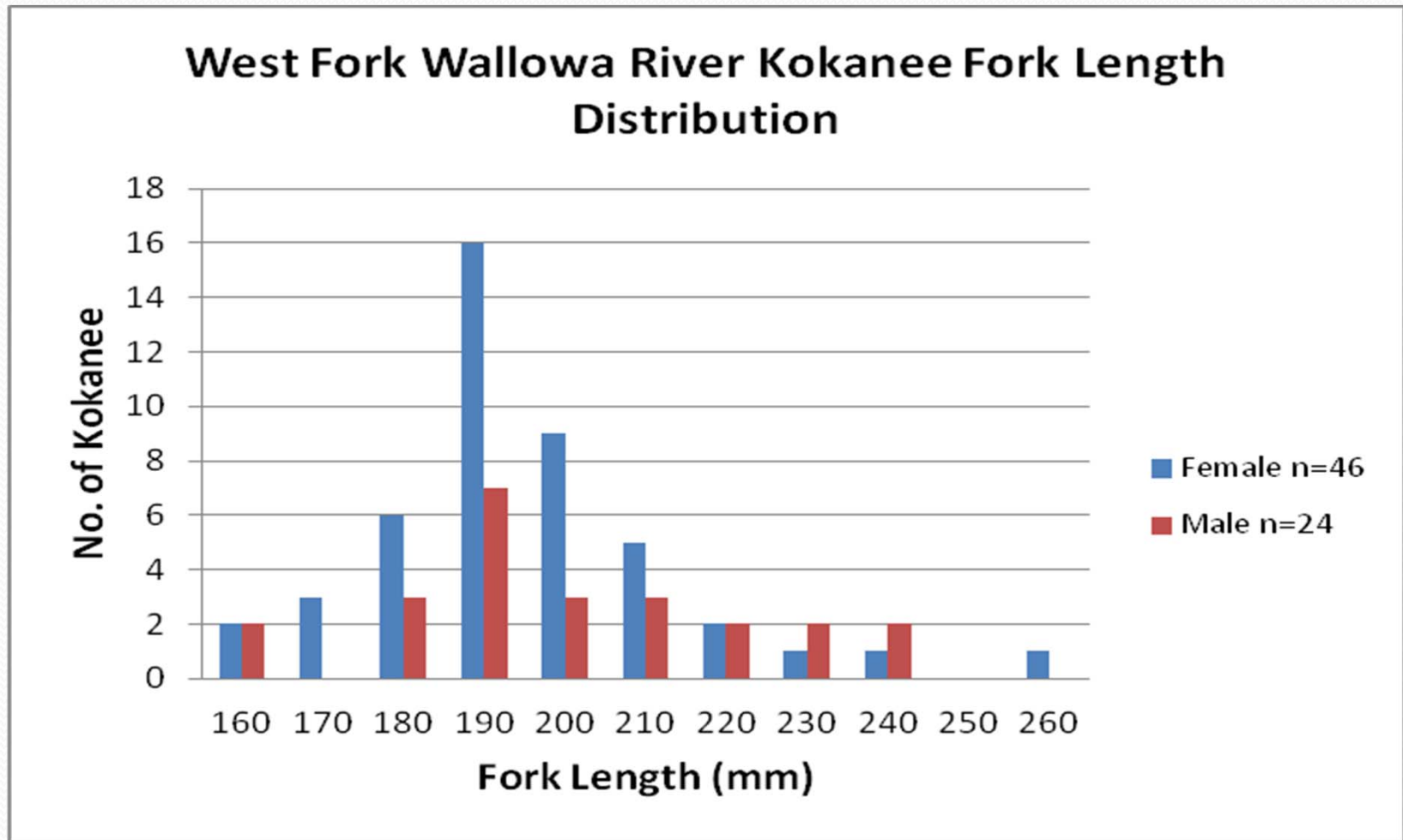
Estimates of Spawning Kokanee by Reach using AUC (trapezoidal approximation/residence time)	
Reach	Total Kokanee
1	23,455
2	2,607
3	791
Total	27,128



Kokanee Spawner Abundance

- The West Fork Wallowa River was surveyed for spawning kokanee on eight occurrences between August 24, 2013 and November 4, 2013.
- The peak holder count was observed on September 21 with the peak spawner count following shortly thereafter on September 26, giving a residence time of five days.
- A peak kokanee total count of 10,110 was observed in the West Fork Wallowa River on September 26, 2013. A peak total count of 100 kokanee was observed within the East Fork Wallowa bypassed reach during the same survey
- 86 percent of the estimated total number of spawning kokanee within the West Fork Wallowa River in 2013 were counted within Reach 1, as compared to ten percent of the total in Reach 2 and four percent of the total in Reach 3.
- During each survey, along with kokanee live counts, a portion of spawned-out kokanee carcasses were also measured in order to evaluate size at spawn. Average female fork length observed was 198mm with a standard deviation of 20.6mm. Males were observed to be slightly larger, having an average of 206mm fork length with a standard deviation of 25.6mm. The largest measured male was 280mm and the largest female 260mm.

Kokanee Spawner Abundance






Kokanee Spawner Abundance

Additional Work Proposed:

- No additional data collection or analyses are proposed
- The study methodology and results are fully described in the Updated Study Report (Final Technical Report)
- Results and recommendations will be summarized in the Final License Application




Bull Trout use of Project Tailrace and Bypassed Reach

Objectives: A better understanding of the current distribution and life history of Wallowa River bull trout population upstream of Wallowa Lake, specifically with concern to the Project tailrace and bypassed East fork Wallowa River. Seventeen captured bull trout in 2012 were inserted with a Passive Integrated Transponder (PIT) tag prior to release, much of the proposed 2013 study hinged on the ability to recapture these previously PIT tagged bull trout.

Study Area: Collection efforts to capture and or interrogate bull trout targeted areas within the EF Wallowa River bypassed reach, and the Project tailrace.

Methods: Identified streams were electrofished to capture bull trout in August 2013. Passive PIT antennas were deployed at specified sites to interrogate previously tagged bull trout.

Variance to Study Plan: No variances from the FERC Study Plan Determination were made during the course of this Study.



Bull Trout use of Project Tailrace and Bypassed Reach

Study Status: All data gathering and analysis is complete

Results and Discussion:

- 68 total bull trout were captured, 54 from the bypassed reach and 12 from the tailrace.

Bull Trout use of Project Tailrace and Bypassed Reach

Project Tailrace

SPECIES	Sample Size	MEAN LENGTH (mm)	STANDARD DEVIATION	MAXIMUM LENGTH
Bull trout & hybrids – 2012	5	300	175.49	550
Bull trout & hybrids – 2013	12	232	92.12	440

EF Wallowa Bypassed Reach

SPECIES	Sample Size	MEAN LENGTH (mm)	STANDARD DEVIATION	MAXIMUM LENGTH
Bull trout & hybrids – 2012	47	113	44.46	245
Bull trout & hybrids– 2013	56	111	73.14	480

Bull Trout use of Project Tailrace and Bypassed Reach

- PIT antennas at the mouth of the Project tailrace and East Fork Wallowa River bypassed reach were constructed and powered up on August 16, 2013.
- The East Fork Wallowa River bypassed reach PIT antenna ran continuous until taken out of the stream on November 3, 2013
- The Project tailrace channel antenna was taken off-line on August 26, 2013. The short study duration for the Project tailrace antenna was due to the channel de-watering on August 26 and remaining de-watered until September 27 at which time a barrier weir was constructed at the mouth of the channel to prohibit fish from entering. Weir was in place until November 5, 2013.



Bull Trout use of Project Tailrace and Bypassed Reach

EF Wallowa Bypassed Reach PIT Antenna Detections - 2013

PIT #	Capture Year & Location	FL @ capture	PIT Antenna Transit Times
C58803D	2012 - 600-700m EFW bypassed reach	179	8/27 @A2, downstream
AC35675	2013 - Project tailrace	440	8/30 @A2, upstream 9/18 @A4 and A2 downstream
C587230	2013 - Project tailrace	227	9/3 @A2, upstream
AC35672	2013 - 800-900m EFW bypassed reach	480	9/11 @A2, upstream
C583A3C	2013 - Project tailrace	246	10/13 @A4, upstream

Bull Trout use of Project Tailrace and Bypassed Reach

Project Pit Antenna Detections – 2013

PIT #	Capture Year & Location	FL @ capture	PIT Antenna Transit Times
6586847	2012 - BC Creek	170	8/19 - 8/21 @A2

- No previously tagged bull trout were encountered during the August 2013 electrofishing survey of the East Fork Wallowa bypassed reach.
- All handled recaptures (3) were encountered in the Project tailrace during the August maintenance de-watering event. Of specific interest concerning the tailrace recaptures, was the recapture of previously captured and tagged bull trout from the upper East Fork Wallowa bypassed reach in 2012.

Bull Trout use of Project Tailrace and Bypassed Reach

- Along with these three handled recaptures, two additional bull trout captured and tagged during 2012 activities were also interrogated moving past passive PIT antenna sites in 2013.

PIT #	FL @ Initial Capture	FL @ Recap	2012 Capture Location	2013 Recap Location	Comments
591847	215	255	Project tailrace	Project tailrace	40mm growth. Hybrid
C586E5C	191	237	700-800m EFW bypassed reach	Project tailrace	46mm growth
658484B	179	234	700-800m EFW bypassed reach	Project tailrace	55mm growth
C58803D	179	unknown	600-700m EFW bypassed reach	EFW PIT antenna	
6586847	170	unknown	BC Creek	Project tailrace PIT antenna	



Bull Trout use of Project Tailrace and Bypassed Reach

- Maiden bull trout captures from 2013 activities (63) have not been genotyped. It is anticipated this action will occur in early 2014.
- To date, 55 bull trout captured upstream of the dam at the outlet of Wallowa Lake and prior to 2013 activities have been genotyped for species identification by the United States Fish and Wildlife Service's Abernathy Fish Conservation Genetics Lab.
- Of these 55 samples, 10 were verified to be bull trout/brook trout hybrids.

Bull Trout use of Project Tailrace and Bypassed Reach

Additional Work Proposed:

- No additional data collection or analyses are proposed
- The study methodology and results are fully described in the Updated Study Report (Final Technical Report)
- Results and recommendations will be summarized in the Final License Application



Macroinvertebrate Surveys

Objectives: In order to follow a more thorough protocol, a second year of Relative Abundance and Composition of Macroinvertebrate Species were collected from waters in and around the Project.

Study Area: Surveys were conducted within the East Fork Wallowa River Bypassed Reach, Wallowa Falls Hydro Tailrace, and above the Wallowa Falls Hydro Forebay.

Methods: Surber Sampler type dip net.

Study Status: All tasks associated with this Study were completed by the end of August 2013.

Variance to Study Plan: There were no variances to the FERC Study Plan Determination during the course of this study.



Macroinvertebrate Surveys

Discussion Points:

- Square meter macroinvertebrate samples were collected on August 12, 2013 from sites established during 2012 activities.
- Sample locations; the EF Wallowa River just above the Project forebay, the EF Wallowa River 500 meters upstream from the confluence with the WF Wallowa River, and the EF Wallowa River just upstream from the confluence with the WF Wallowa River.
- During collection of the macroinvertebrate sample from the upper East Fork Wallowa River bypassed reach above the Project forebay on August 12, 2013 the Project forebay itself was also surveyed for fish presence. Using snorkel survey techniques, the entire forebay was surveyed. Three brook trout parr were observed. These fish were most likely out-migrants from Aneroid Lake upstream of the forebay.

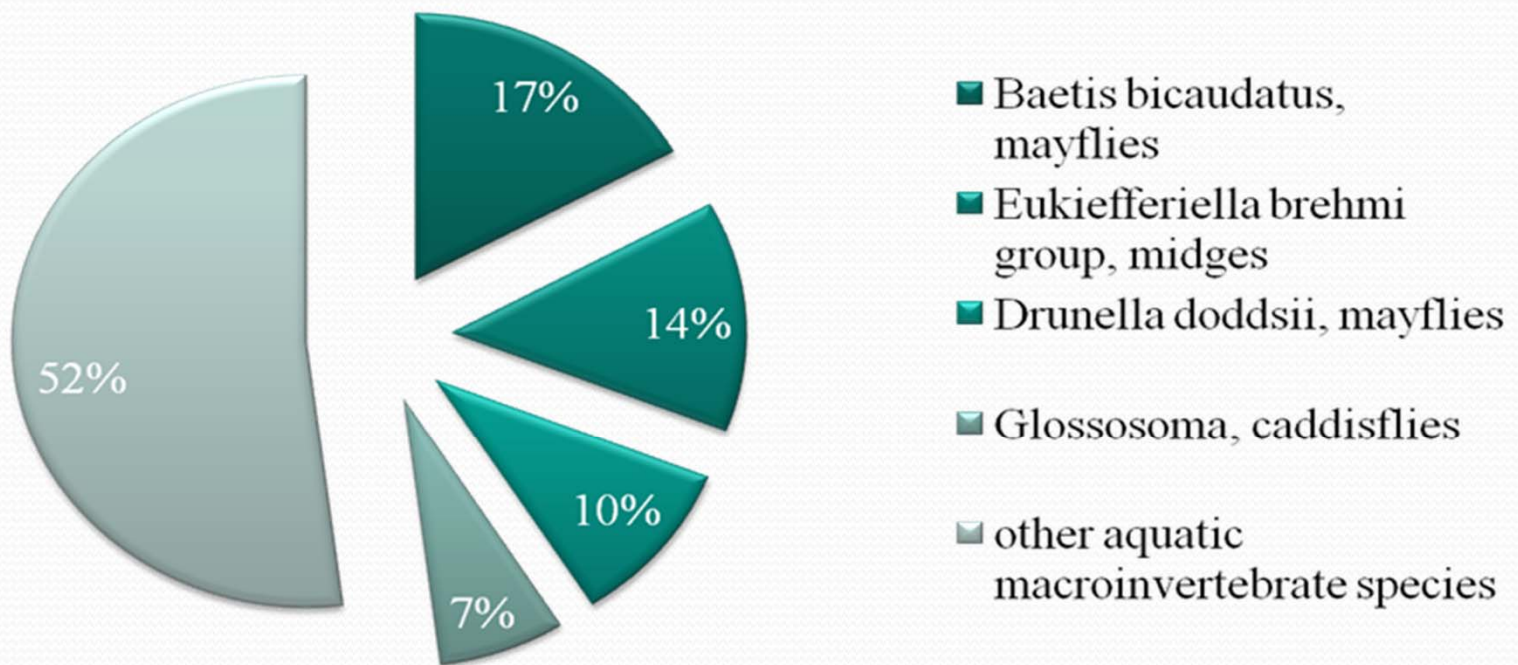


Macroinvertebrate Surveys

- Taxon richness and diversity increased within the three samples collected the further downstream the sample location. Percent composition of species intolerant to higher water temperatures and lower dissolved oxygen levels also increased in the downstream sample when compared to the samples taken from upstream.
- Though tolerant taxon increased in samples taken from lower in the stream reach, all three samples collected had high levels of moderate to highly intolerant aquatic macroinvertebrate species, indicative of high water quality.

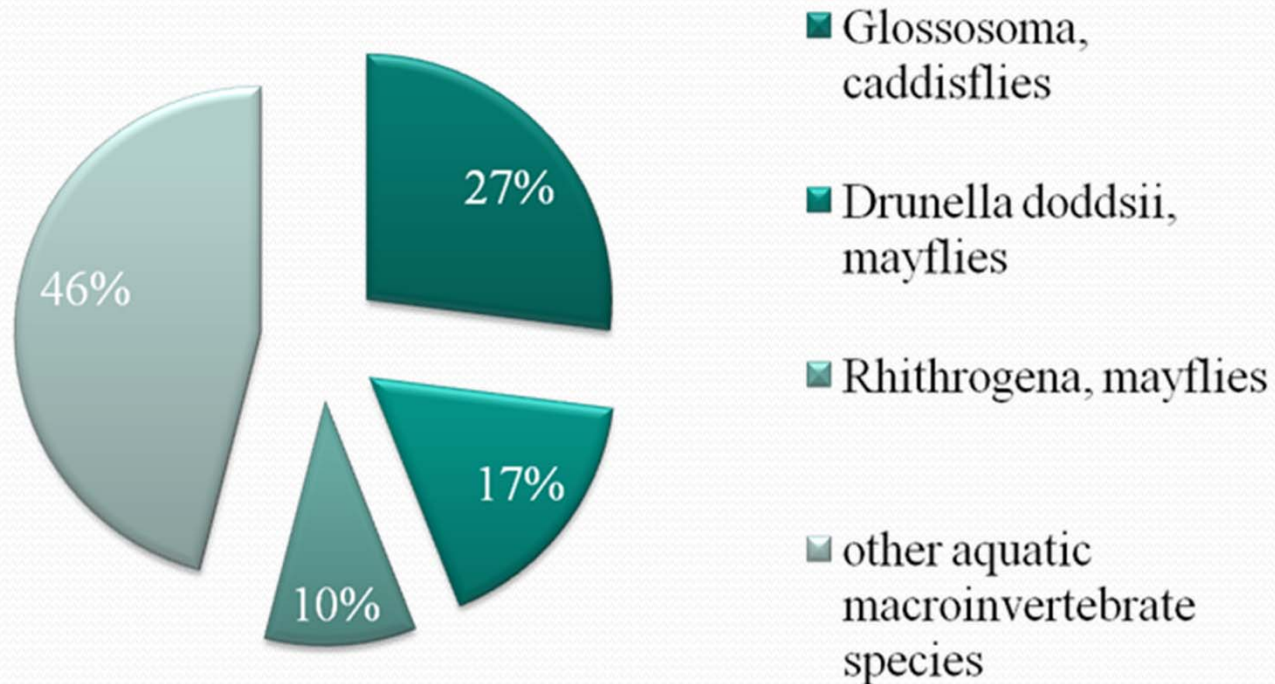
Macroinvertebrate Surveys

Dominant Aquatic Macroinvertebrate Species Observed EF Wallowa River Above Forebay Site - 2013



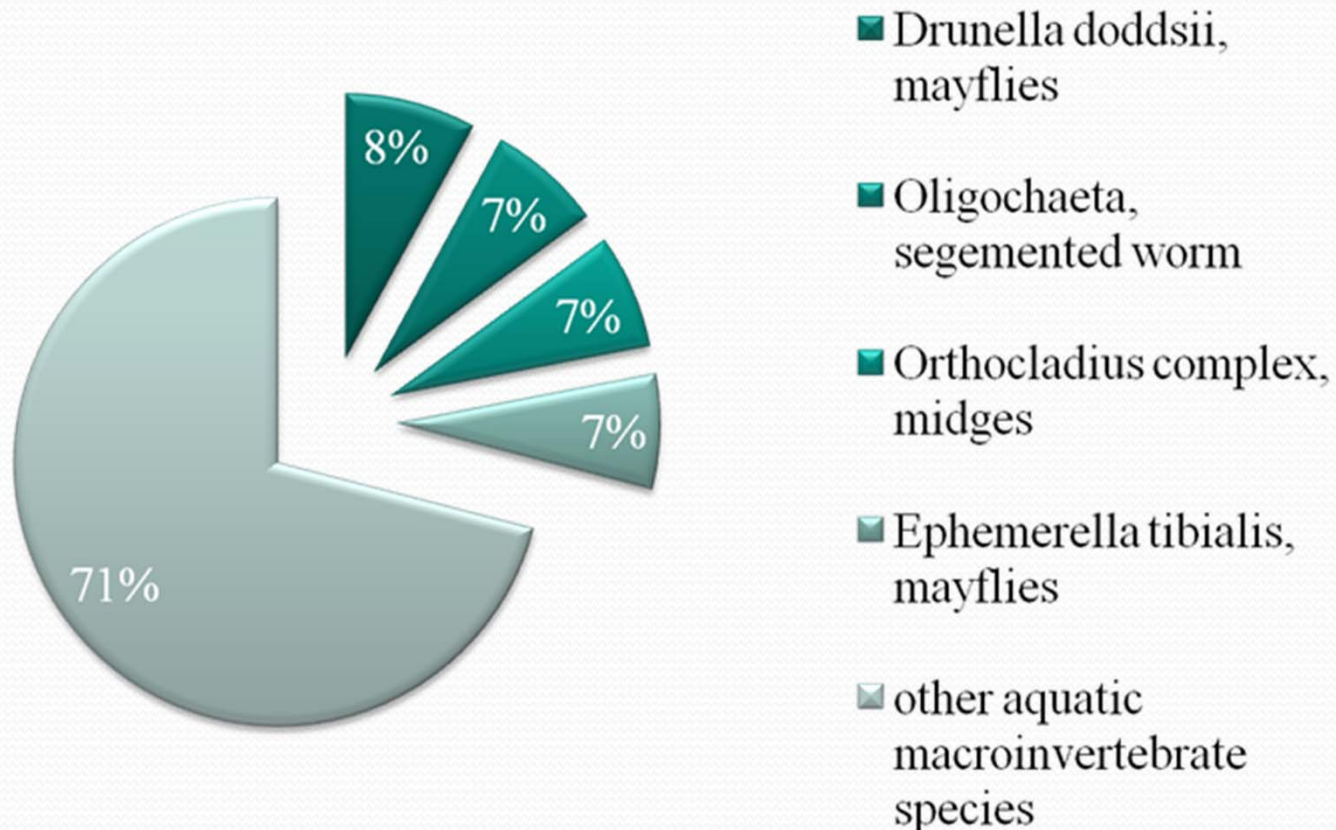
Macroinvertebrate Surveys

Dominant Species Observed EF Wallowa River Middle Site - 2013



Macroinvertebrate Surveys

Dominant Species Observed EF Wallowa River Lower Site - 2013





Macroinvertebrate Surveys

Additional Work Proposed:

- No additional data collection or analyses are proposed
- The study methodology and results are fully described in the Updated Study Report (Final Technical Report)
- Results and recommendations will be summarized in the Final License Application

Instream Flow Study

Kaylea Foster
Aquatic Scientist
PacifiCorp



Instream Flow Study

Objectives:

- Simulate relationships between fish habitat and flow in the East Fork Wallowa River bypassed reach
- Perform a habitat duration analysis for important life stages of bull trout and kokanee over a variety of potential minimum flows
- Provide objective, scientifically-grounded information to guide environmental flow decision making

Study Area:

- East Fork Wallowa bypassed reach



Instream Flow Study

Study Status: Study completion was marked by 5 milestones

- Habitat Survey
- Stakeholder Meetings to:
 - Develop Habitat Suitability Criteria
 - Identify Study Area
 - Identify Transect Locations
- Field Data Collection
- Habitat Simulation with Physical Habitat Simulation (PHABSIM) model
- Habitat Duration Analysis



Instream Flow Study

Study Status:

MILESTONE	COMPLETION DATE
Mesohabitat Survey	April 2012
Stakeholder Meetings	June 2012
Field Data Collection	August 2012
Habitat Simulation*	February 2013
Habitat Duration Analysis	May 2013

*included consultation with ODFW



Instream Flow Study

IFIM-Based Methods:

- Meso-habitat survey
- Stakeholder meetings
- Hydraulic survey
- PHABSIM modeling

Instream Flow Study

Variance to Study Plan

- Field work was generally consistent with study plan
- Study target flows compared to gaged flows:

Study Plan Target Q		Gaged Flows
High Flow:	16 cfs	15 cfs
Medium Flow:	8 cfs	7.5 cfs
Low Flow:	4 cfs	5.3 cfs



Instream Flow Study

Variance to Study Plan

Rainbow trout were omitted from analysis:

Rainbow trout in the bypassed reach are likely either the triploid (infertile) Cape Cod strain routinely stocked in Wallowa Lake, or downstream migrants from Aneroid Lake, where ODFW stocks diploid (fertile) Cape Cod rainbow trout. The diploid strain is a fall spawner, and therefore unlikely to establish a self-sustaining population due to the shortage of thermal degree-days necessary for successful egg incubation. In either case, the rainbow trout in the bypass reach appear to be products of a routine stocking schedule, unable to reproduce. We considered it biologically prudent to focus the study efforts on ESA-listed bull trout and kokanee. Stakeholders provided no objection.



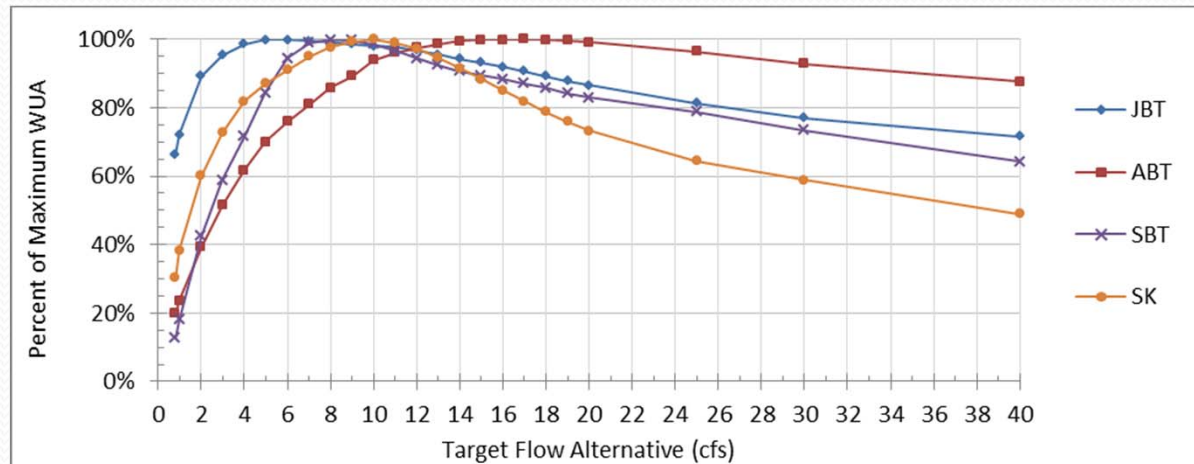
Instream Flow Study

Existing Conditions

- East Fork bypass reach is approximately 1.7 miles long
- The lower half of the bypass supports an adfluvial bull trout population, hatchery-reared rainbow trout, and brook trout
- The lowest 600 to 800 feet of the bypass supports kokanee spawning
- The current FERC minimum flow requirement is 0.5 cfs
- PacifiCorp maintains a minimum flow of 0.5 to 0.8 cfs

Instream Flow Study

Results and Discussion



- Greatest rate of habitat increase occurs as flows increase from 0.8 cfs and 2 cfs.

Instream Flow Study

Results and Discussion

- Peak WUA values occur at:
 - 5 cfs to 6 cfs for juvenile bull trout (JBT)
 - 8 cfs for spawning bull trout (SBT)
 - 18 to 19 cfs for adult bull trout (ABT)
 - 10 cfs for spawning kokanee (SK)

Q: Why not stop the analysis at habitat-flow relationships (previous slide)?

A: WUA curves illustrate how habitat changes with flow, but do not incorporate the actual range of flows that are known to occur in the bypass reach. Habitat duration analysis incorporates actual flows and temporal variation



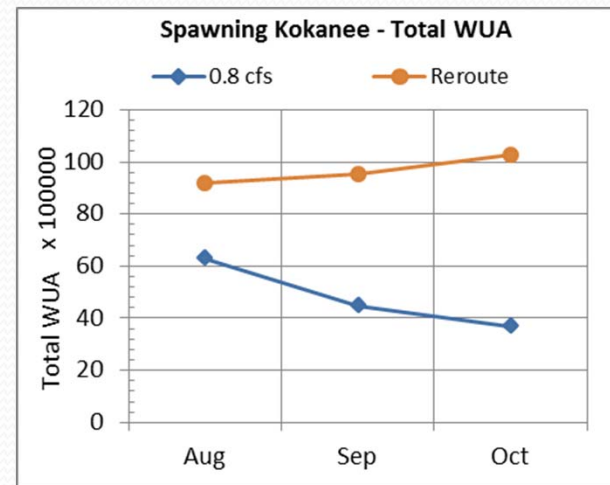
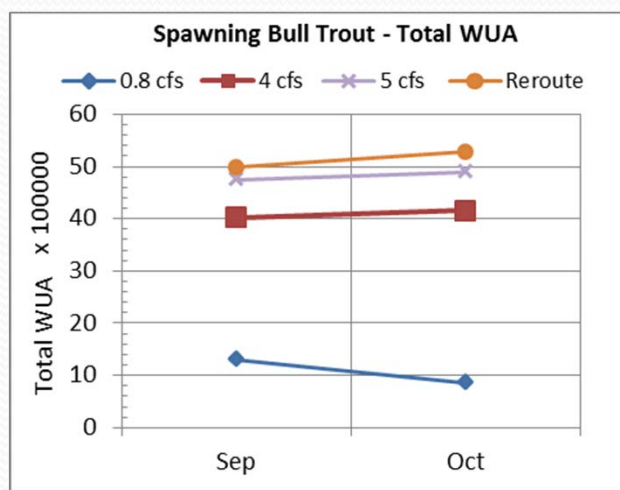
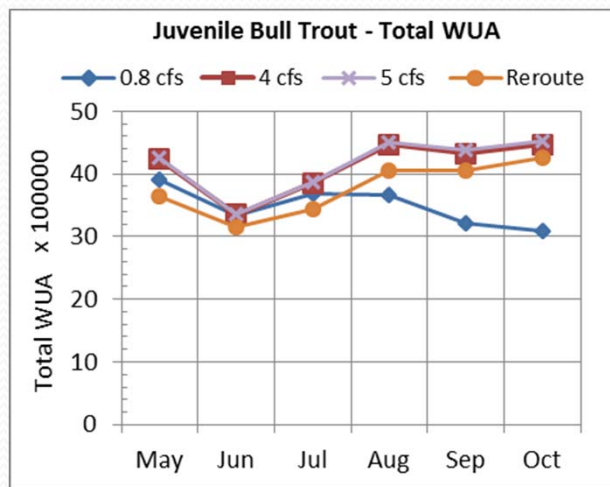
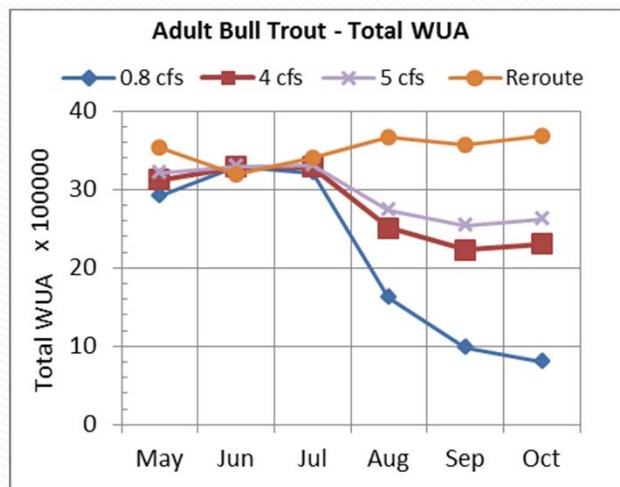
Instream Flow Study

Results and Discussion

- Duration analysis were performed for minimum flow alternatives between 0.8 cfs and 10 cfs. An unimpaired alternative was also analyzed to represent the tailrace reroute proposal.
- Selected results are presented, including:
 - 0.8 cfs (existing conditions)
 - 4 cfs (PacifiCorp's proposal)
 - 5 cfs (Stakeholder recommendation)
 - Unimpaired Flow (Proposed tailrace reroute)

Instream Flow Study

Results and Discussion: Habitat Duration Analysis



Kokanee only spawn in the lowest reaches, below the proposed tailrace reroute outfall. They will not be affected by minimum flow alternatives



Instream Flow Study

Additional Work Proposed:

- No additional data collection or analyses are proposed
- Results and recommendations are summarized in greater detail in the Preliminary License Proposal
- The study methodology and results are fully described in the Updated Study Report (Final Technical Report)



Next Steps

- Parking lot items from today
- Additional comments or questions on material discussed?
- Identify unresolved issues and path for follow-up
- Adjourn