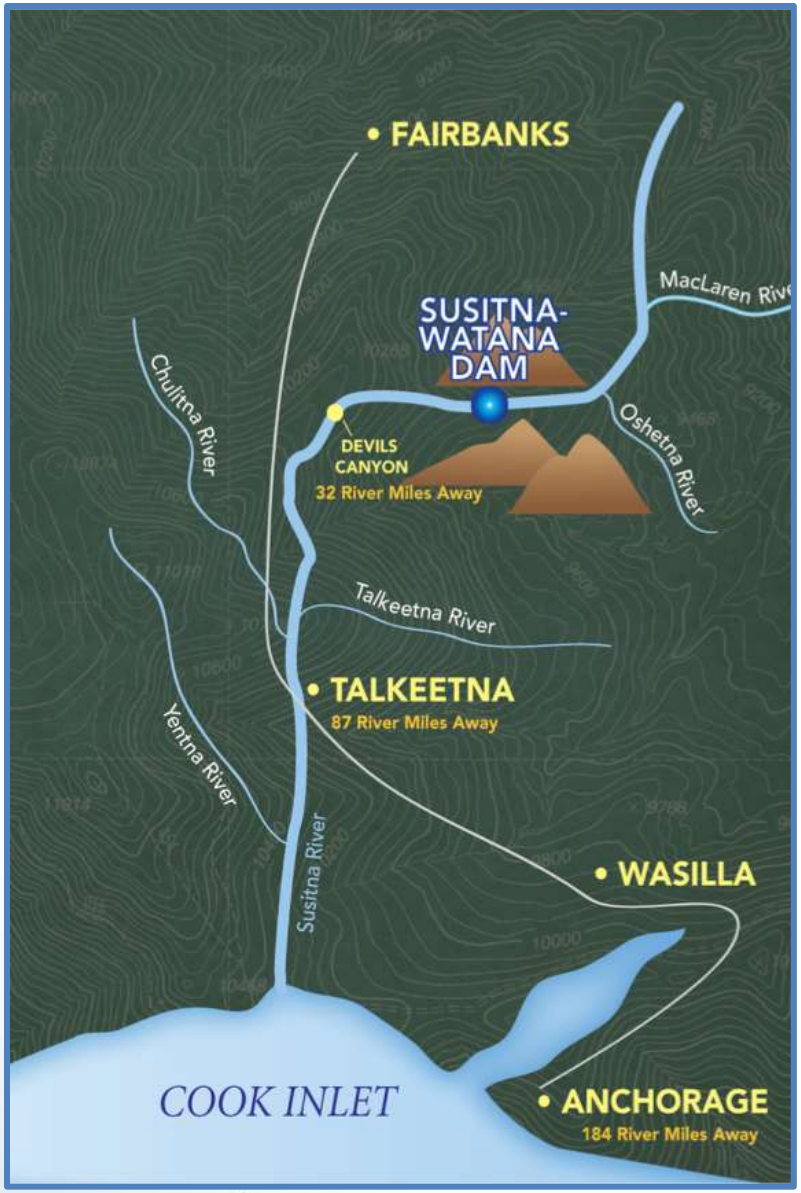

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Technical Team Meeting

Proof of Concept Meeting

Open water 1-D Fish Habitat Analysis Lower River

April 15-17, 2014

Prepared by Golder Associates

Overview

- Presentation overview:
  - Describe the 1-D habitat objectives
  - Describe the modeling approach
  - Present metrics for coho salmon spawning and juvenile rearing
- Note: The examples shown are for illustration of the process - model inputs and outputs and are based on preliminary draft results and are subject to revision

1-D Fish Habitat Modeling Objectives

- Compute weighted usable area (square feet / 1000 feet) for current open water conditions
  - Habitat in terms of WUA for species and life stage of interest (open water) based on depth, velocity and substrate/cover
- Compute WUA for project operation open water conditions
  - Same as above
- Inundation (breaching) of lateral habitats in open water
- Compare project operation to current conditions to determine change

Review of 1-D Based Habitat Model

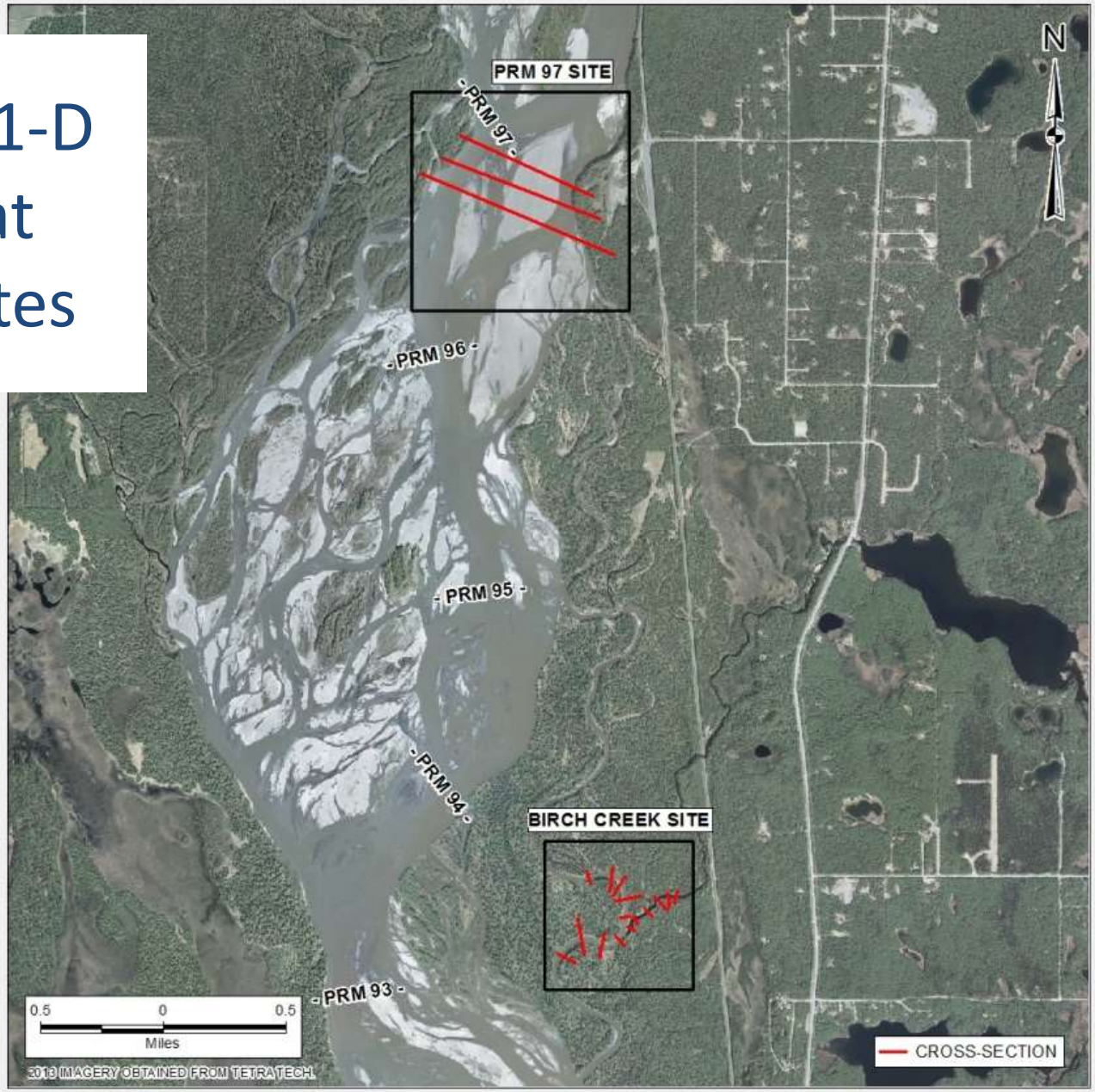
- Traditional PHABSIM/IFIM approach
  - Hydraulics and suitability criteria
  - Calculates weighted usable area
  - Open water conditions only
- Data dependencies from the following: 2013 LiDAR, hydraulic models for open water, substrate and cover data from field data collection, HSC and HSI analysis
- Groundwater and water quality assessed and integrated external to habitat model

Review of 1-D Based Habitat Model

- No attempt to generate whole-channel model due to channel complexity
  - Multiple smaller study sites and models to represent major habitat units
- HEC-RAS used for hydraulic modeling
  - Incorporates tributary inflows, split channels
  - Allows use of the 1-D open water flow routing model results for model set-up and calibration
  - Predict proportional flow within study sites

Lower River 1-D Fish Habitat PHABSIM Sites

- 2 of 5 Lower River Fish Habitat IFS Sites shown for POC



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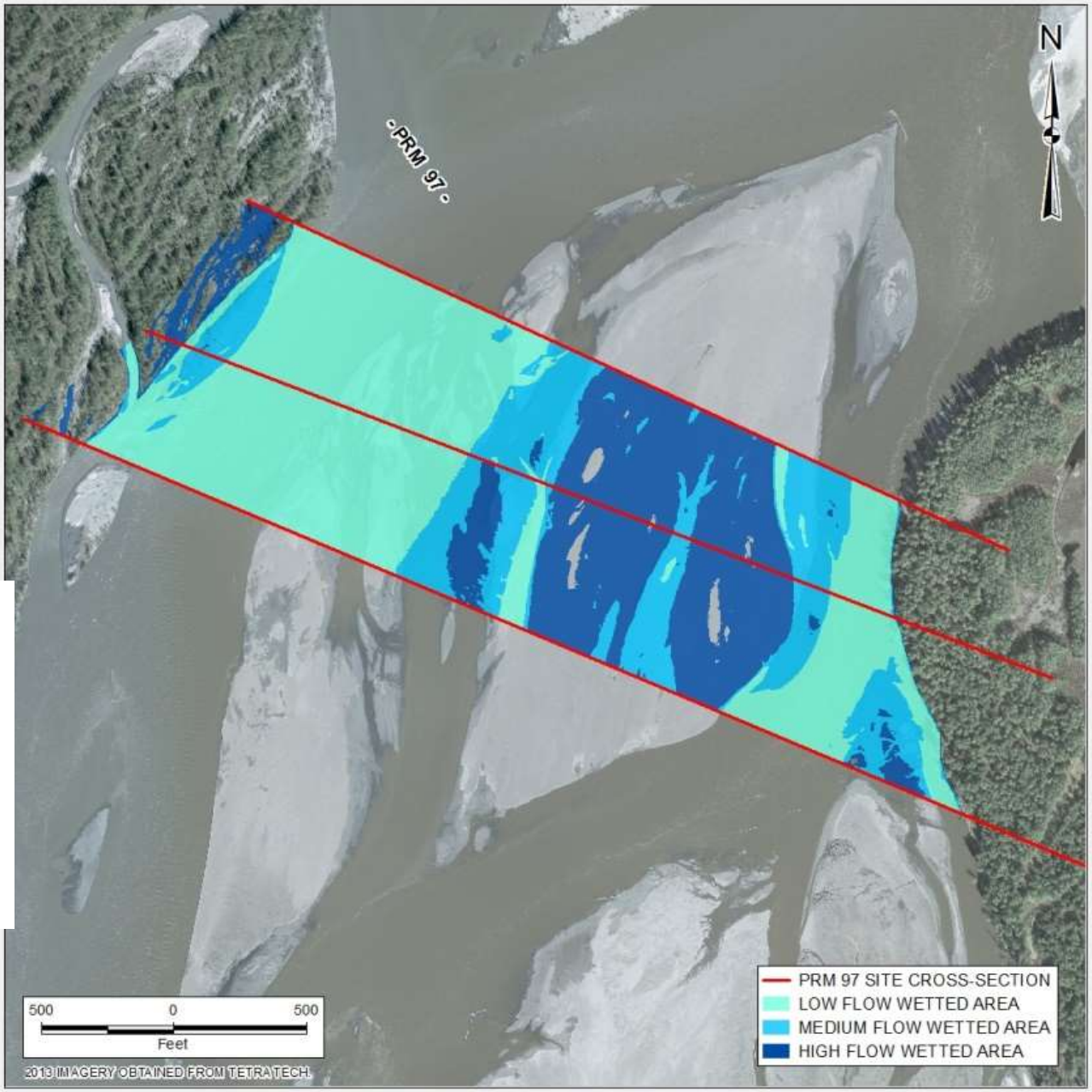
Lower River 1-D HEC-RAS Results - PRM97 Site

- Wetted area based on LiDAR ,simulated water level and mainstem flow at PRM 97
- Low Flow – 30,000 cfs
- Medium Flow – 60,000 cfs
- High Flow – 120,000 cfs



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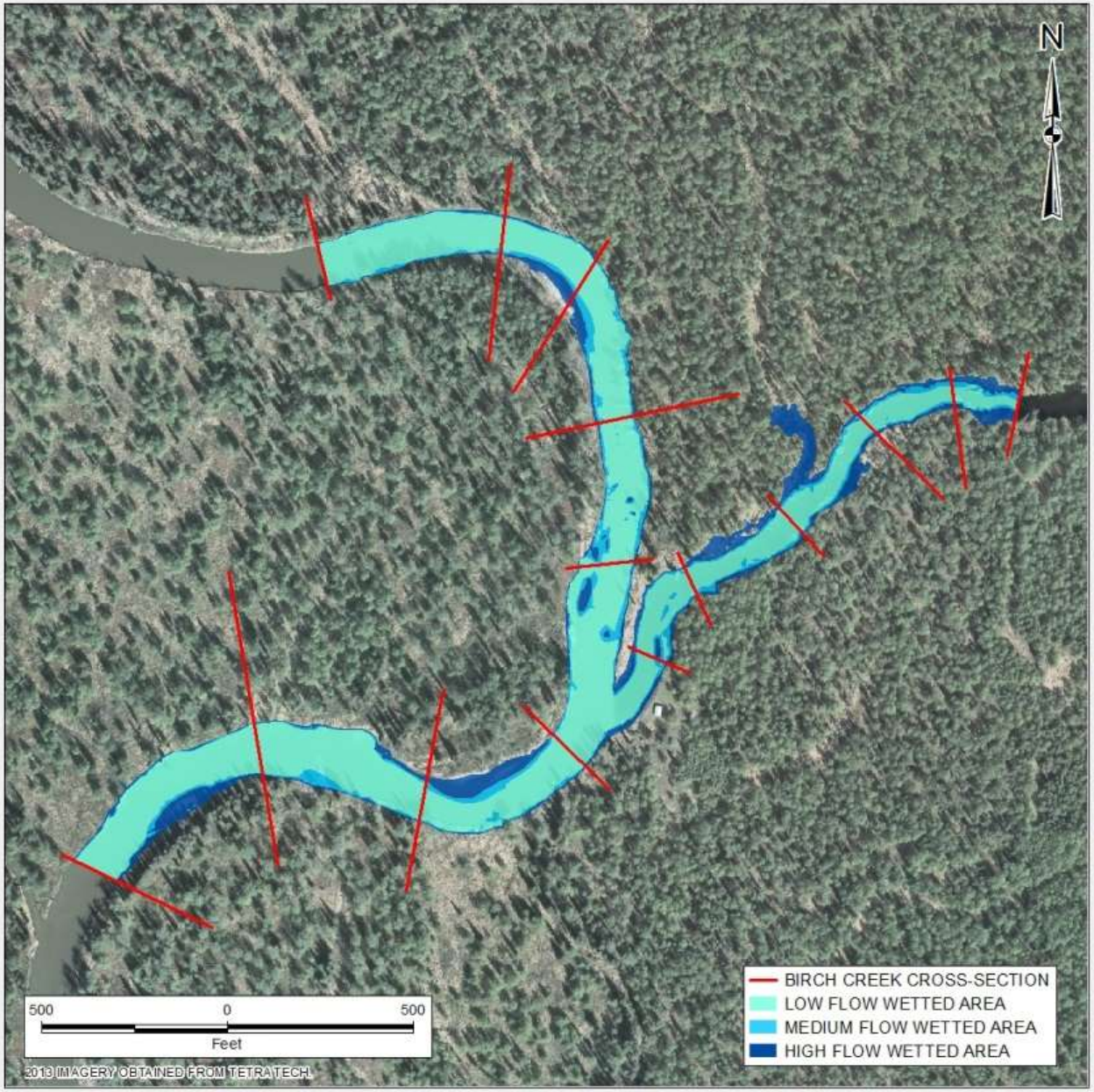
Lower River 1-D HEC-RAS Results - Birch Creek Site

- Wetted area based on LiDAR , simulated water level and Birch Creek Slough Flow
- Low Flow – 300 cfs
- Medium Flow – 650 cfs
- High Flow – 2,800 cfs



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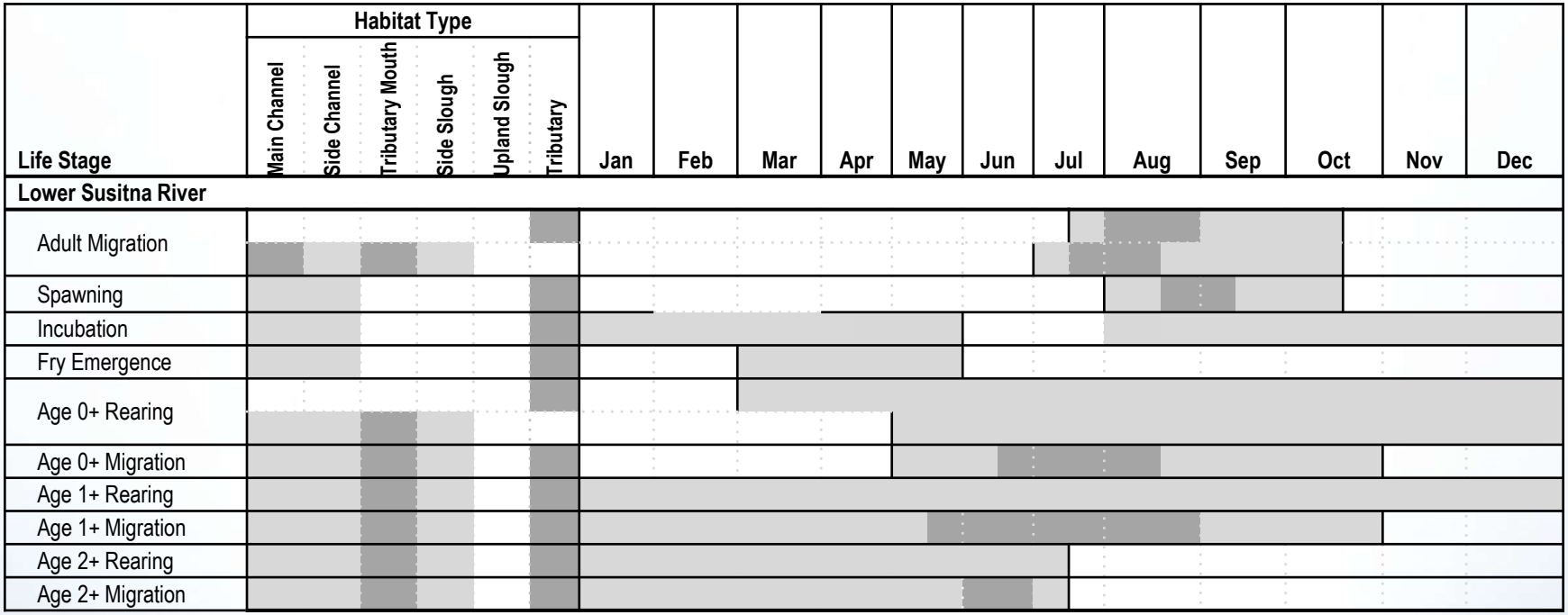
Review of 1-D Based Habitat Model

- PHABSIM used for velocity and habitat modeling
  - Single velocity calibration data set collected at high flow in 2013
- Model uses HSC and HSI analysis for evaluation
  - Current iteration using 1980s HSC curves

POC – Spawning Habitat Analysis

Periodicity of sockeye salmon utilization among macro-habitat types in Lower (PRM 102 – 0.0) segments of the Susitna River by life history stage. Shaded areas indicate timing of utilization by macro-habitat type and dark gray areas represent areas and timing of peak use.



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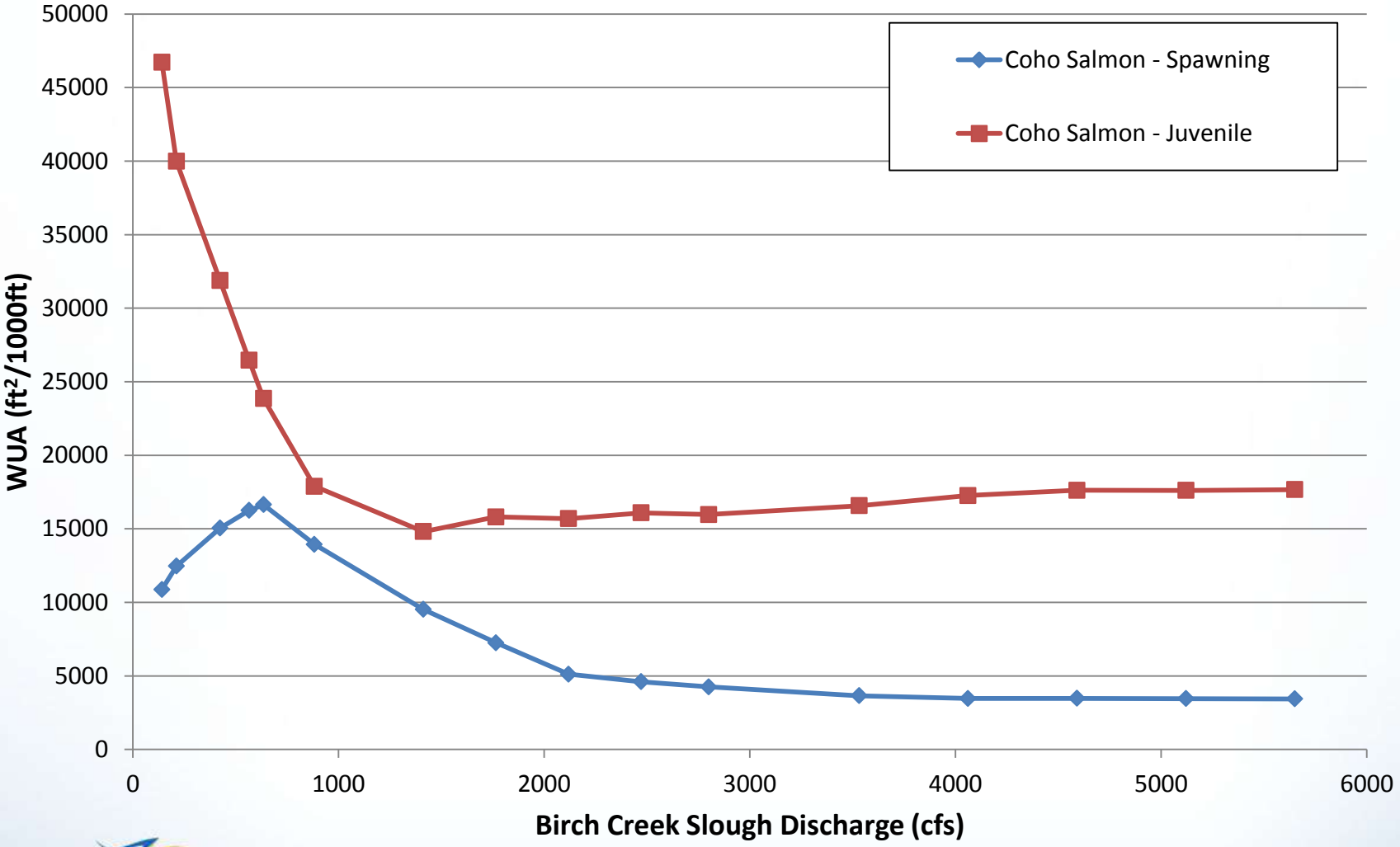
Birch Creek Slough (PRM 94.8) Weighted Useable Area



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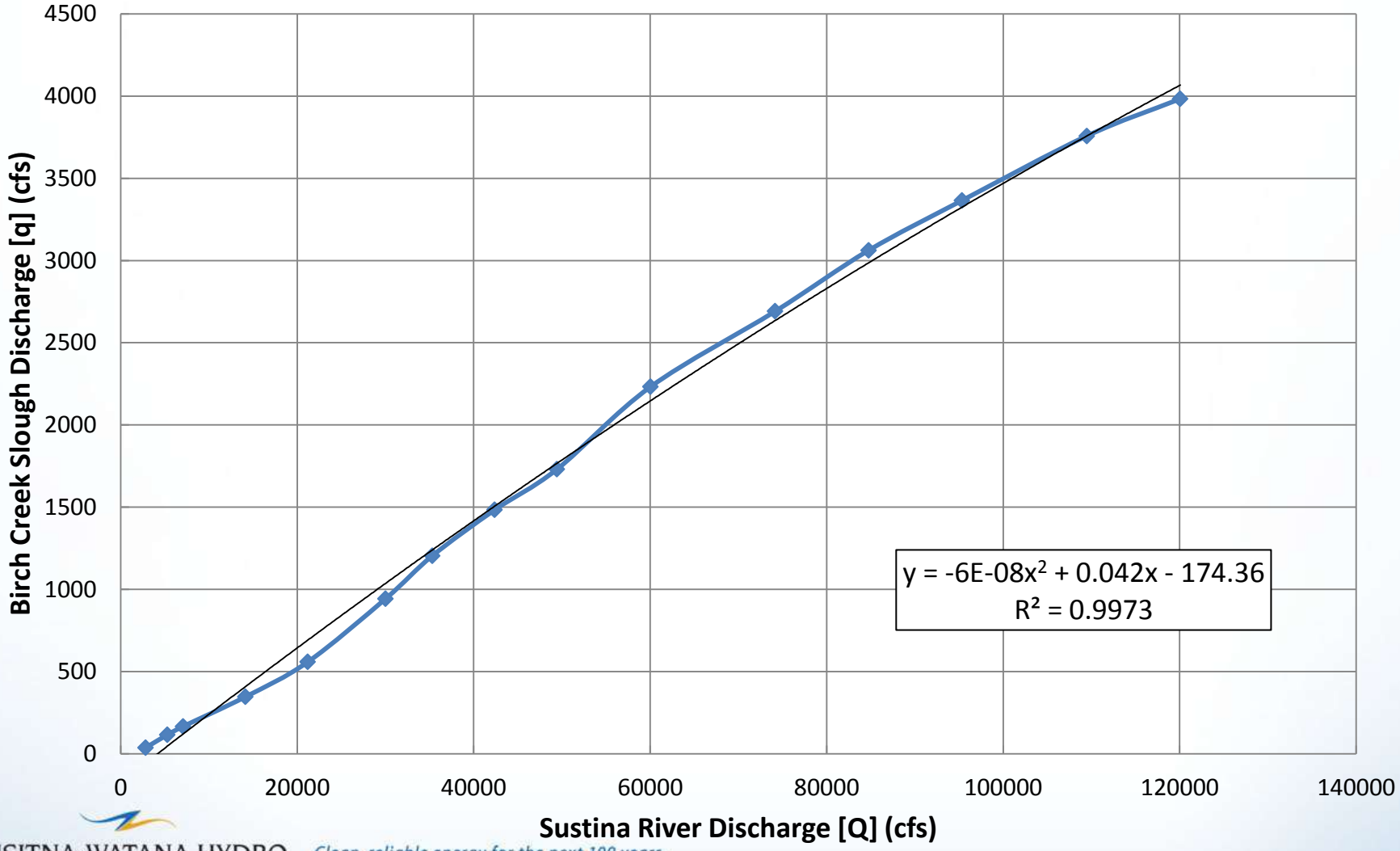
Q-q Relationship between Susitna River at PRM 94.8 and Birch Creek Slough



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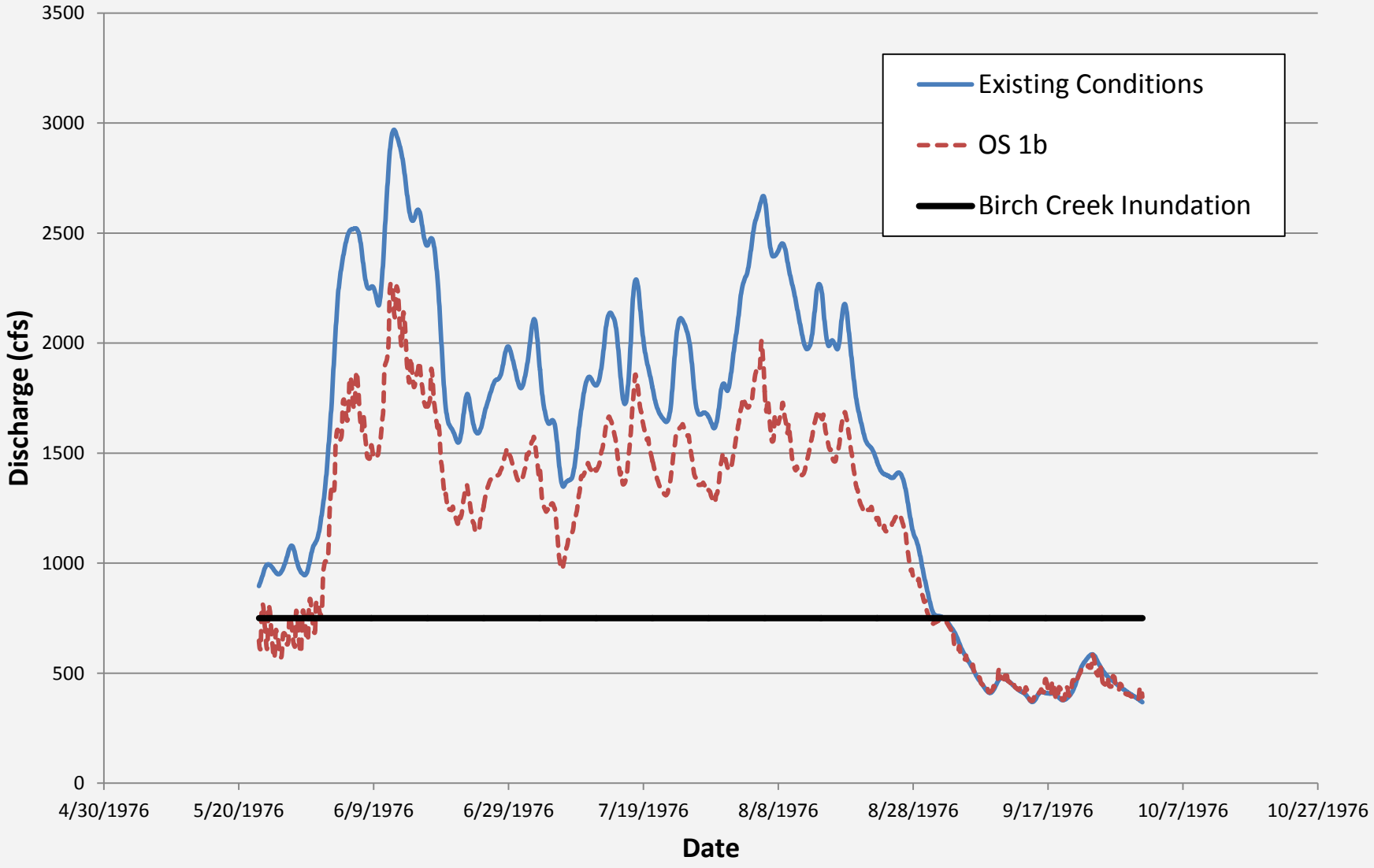
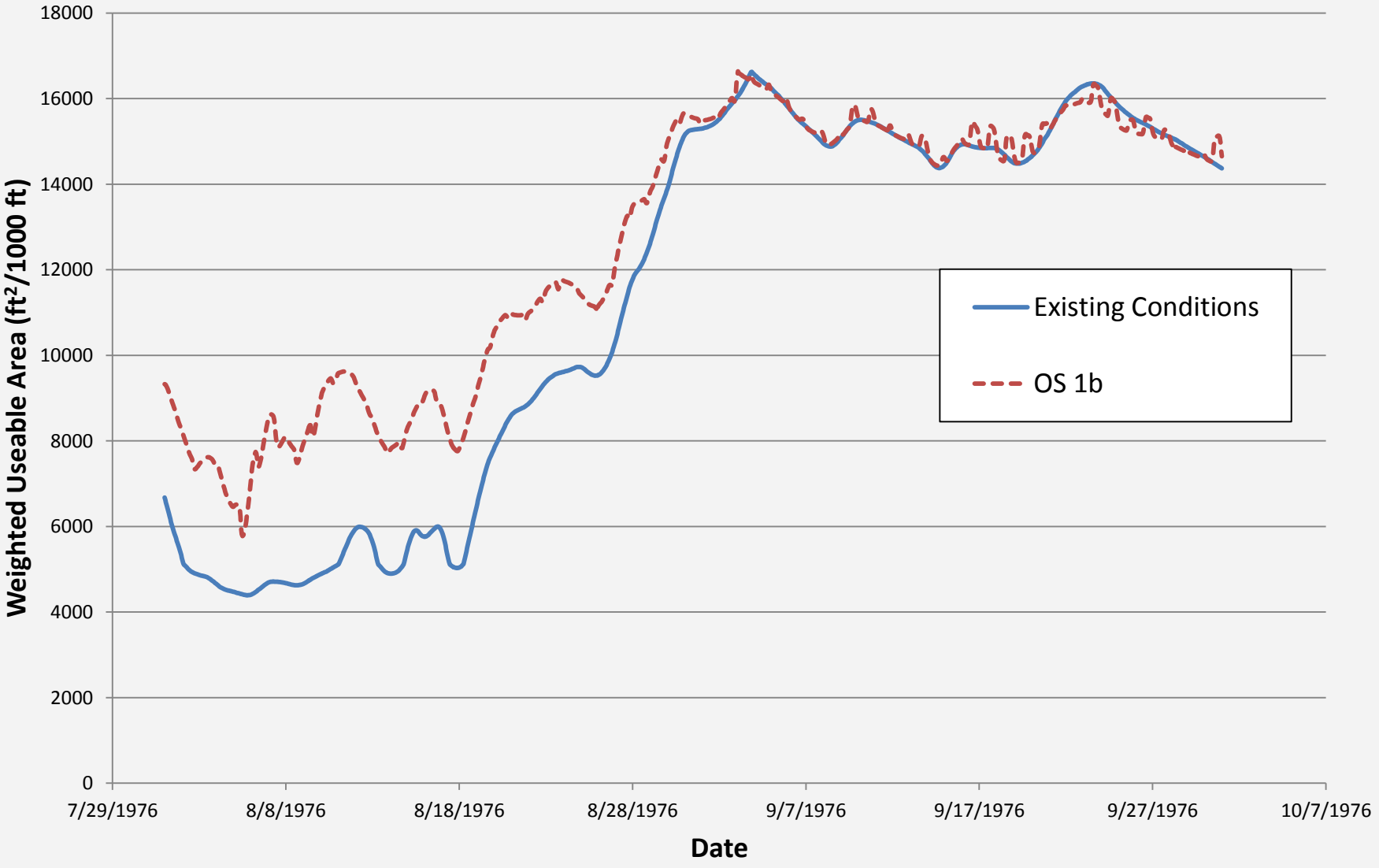
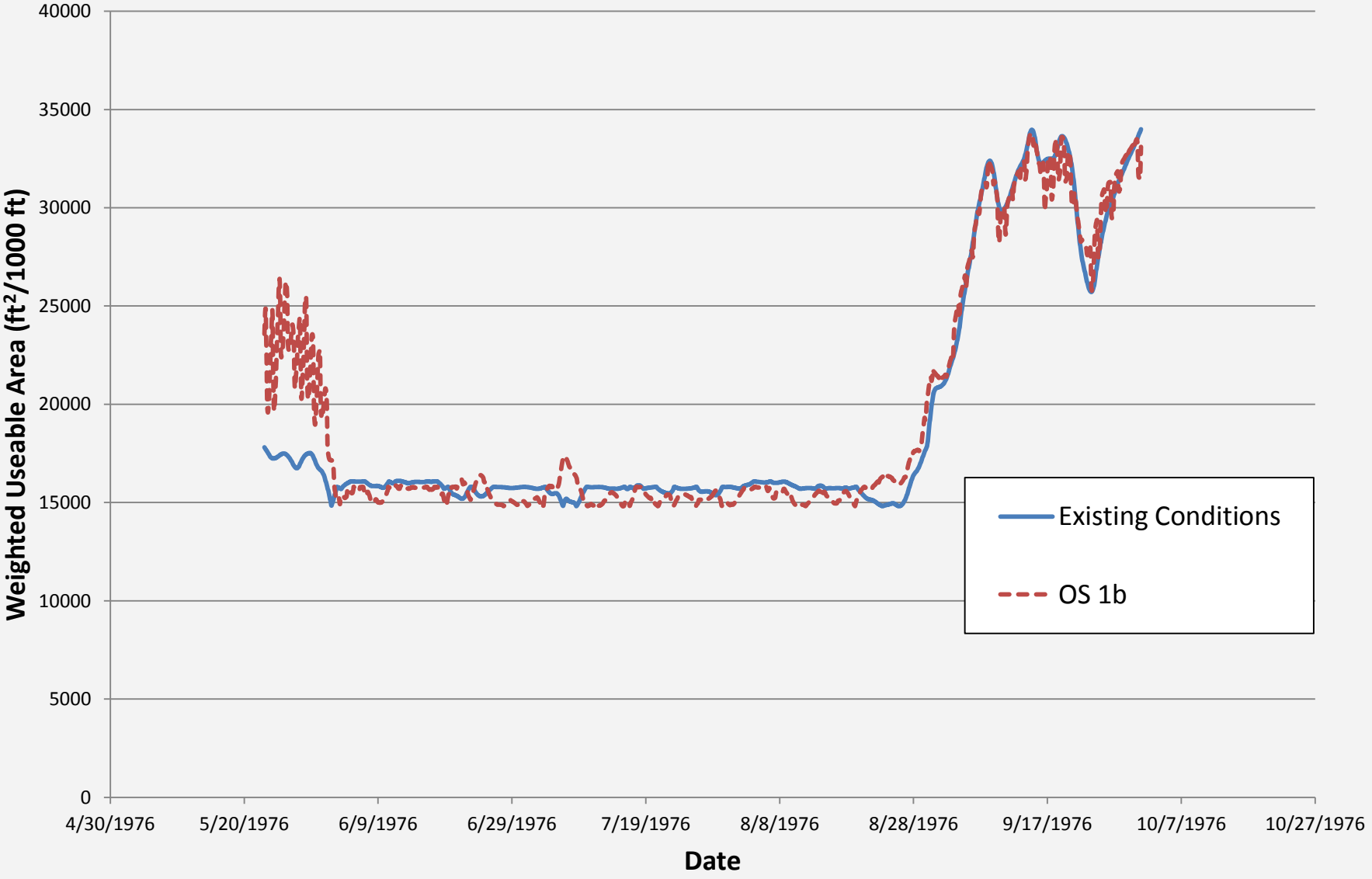
Dry Year (1976) - Birch Creek Slough (PRM 94.8) Flows



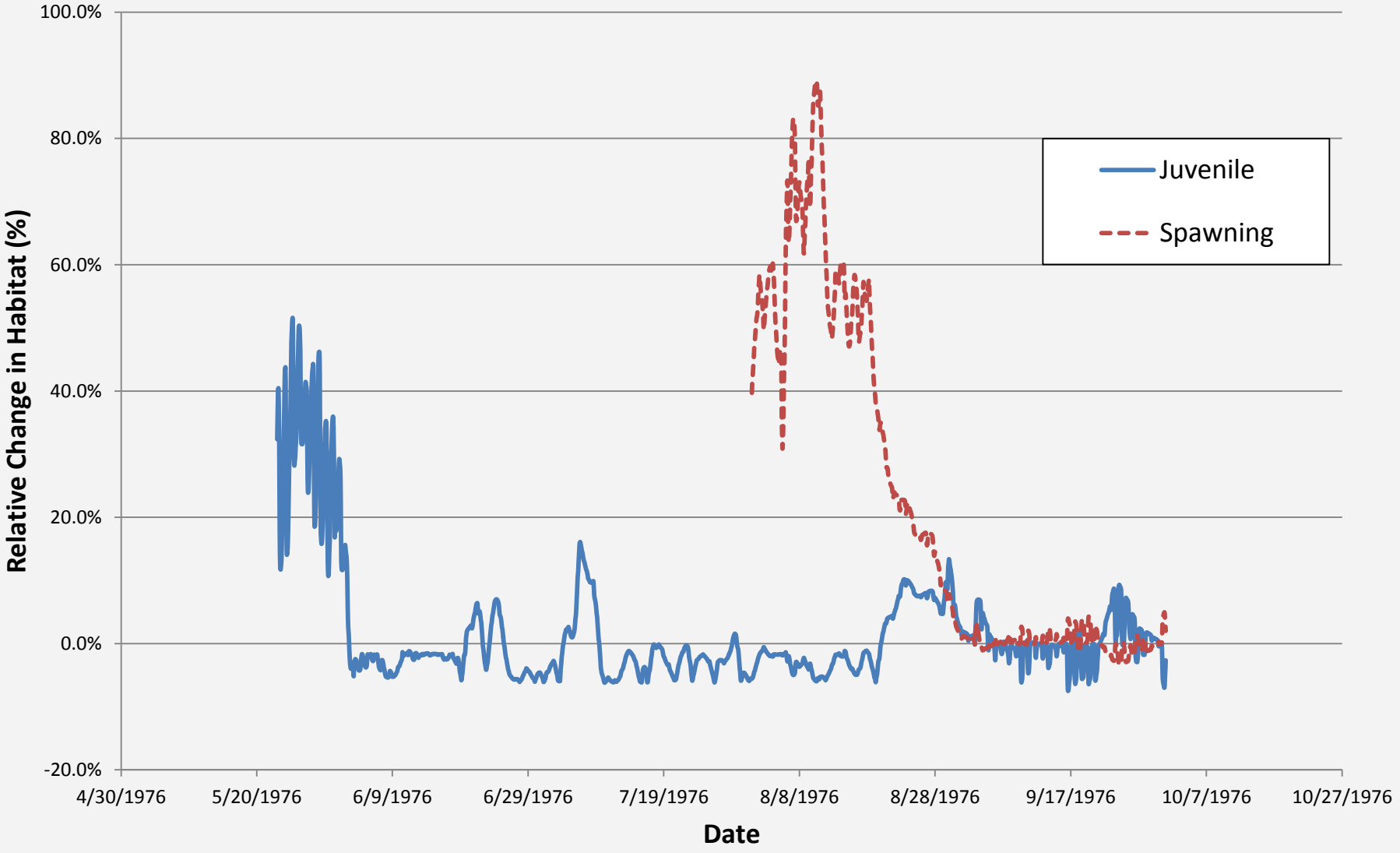
Dry Year (1976) - Birch Creek Slough (PRM 94.8) Hourly Coho Salmon Spawning Habitat



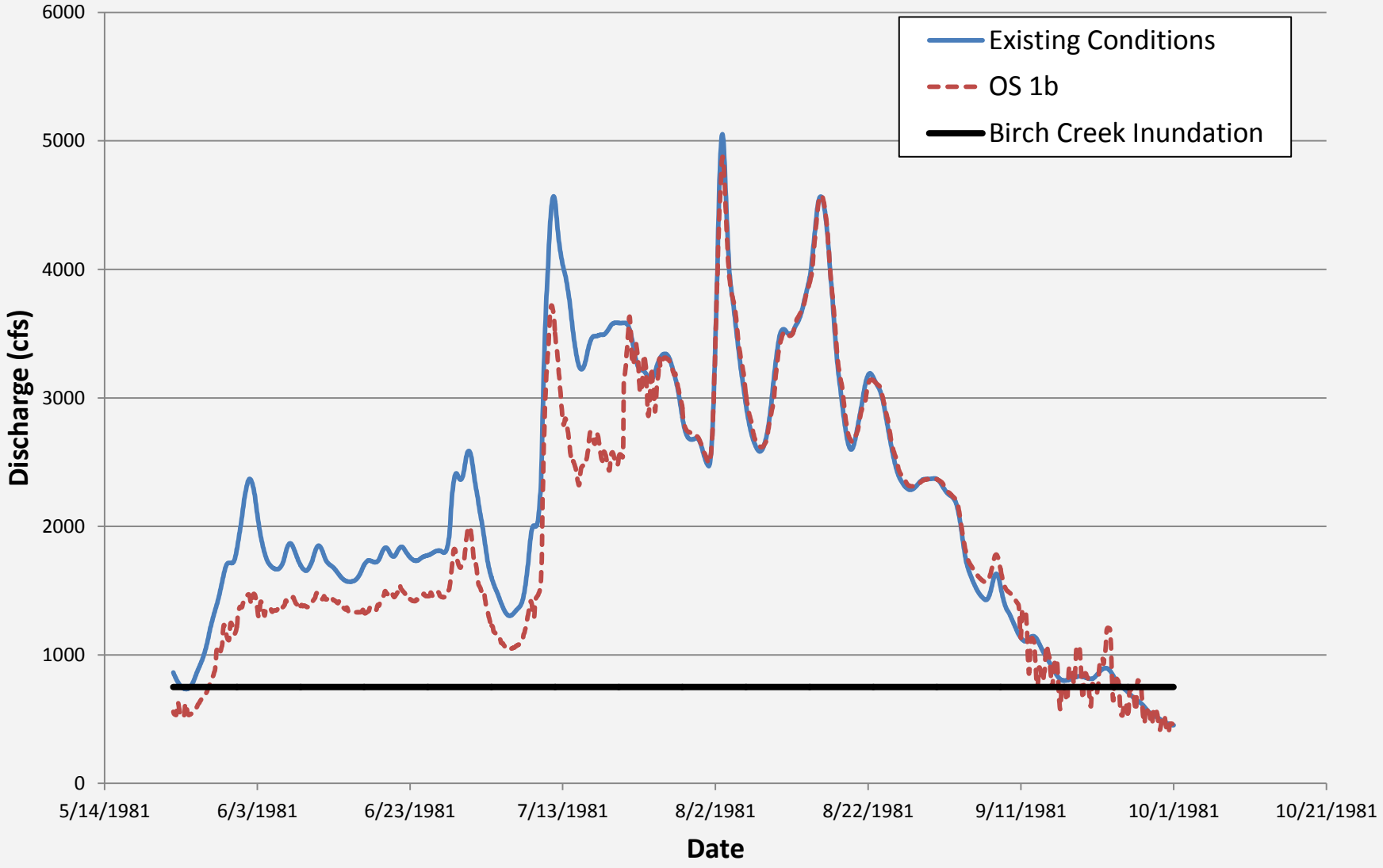
Dry Year (1976) - Birch Creek Slough (PRM 94.8) Hourly Coho Salmon Juvenile Habitat



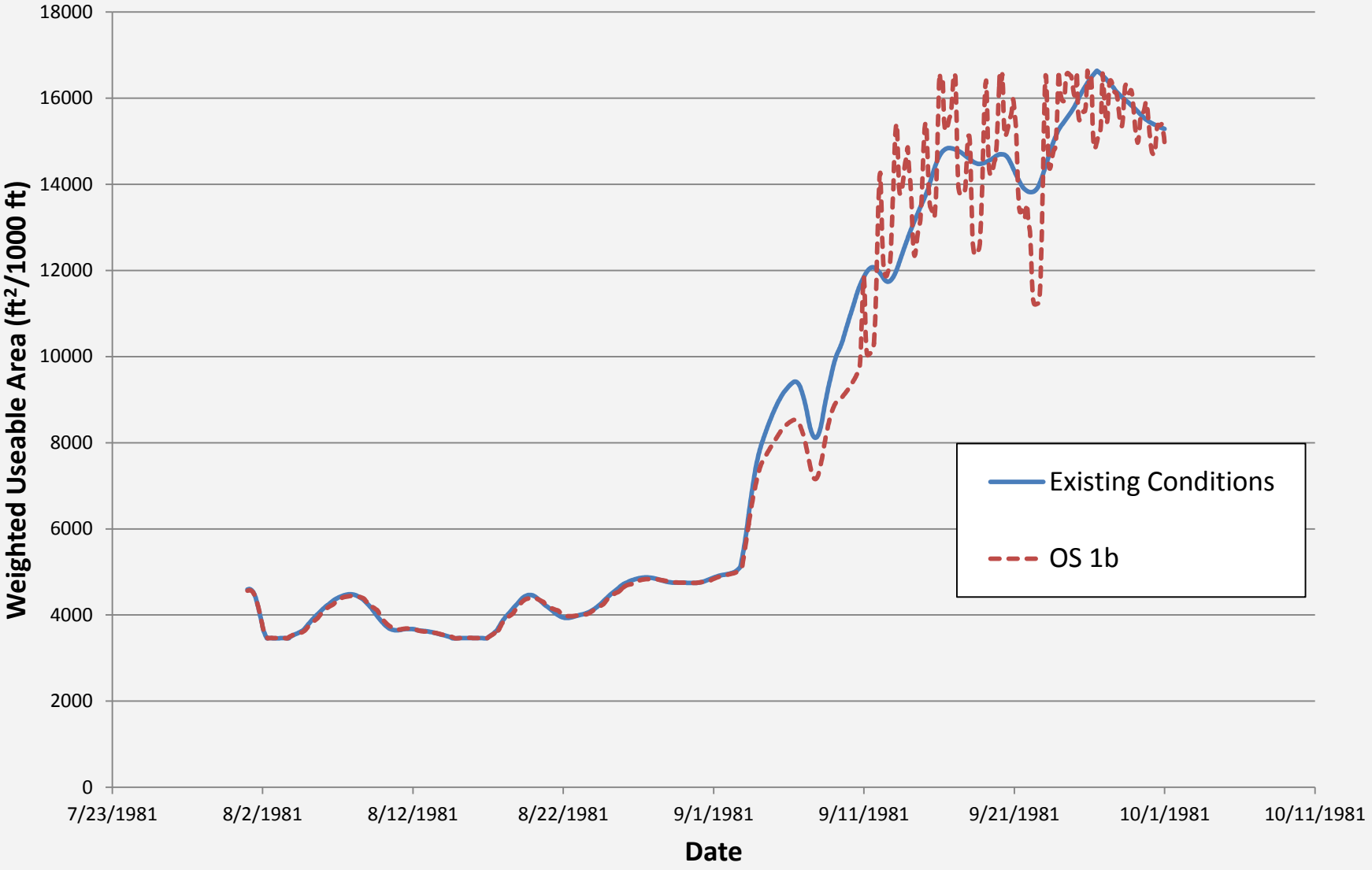
Dry Year (1976) - Birch Creek Slough (PRM 94.8) Percent Change in Coho Salmon Habitat between OS 1b from Existing Conditions



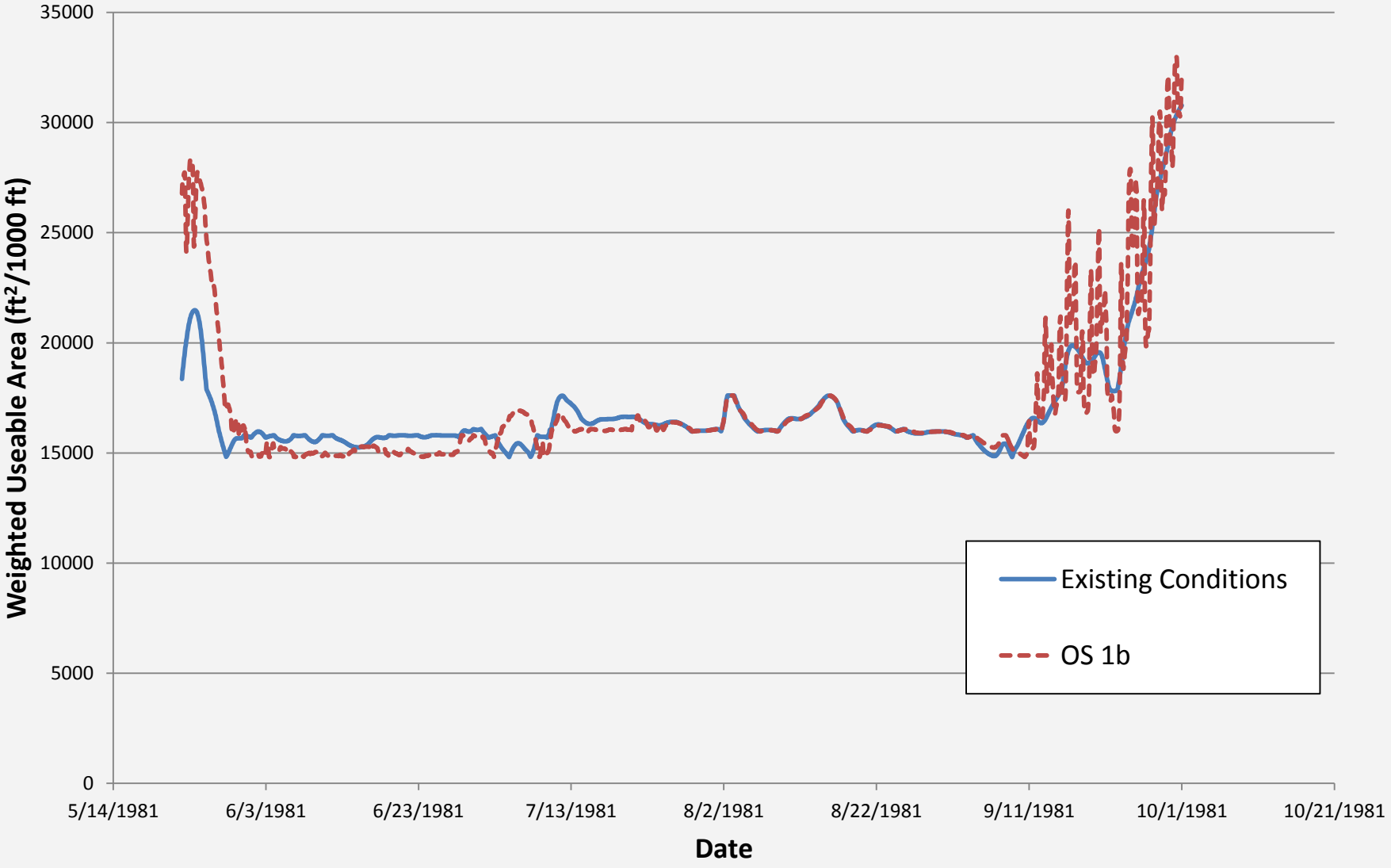
Wet Year (1981) - Birch Creek Slough (PRM 94.8) Flows



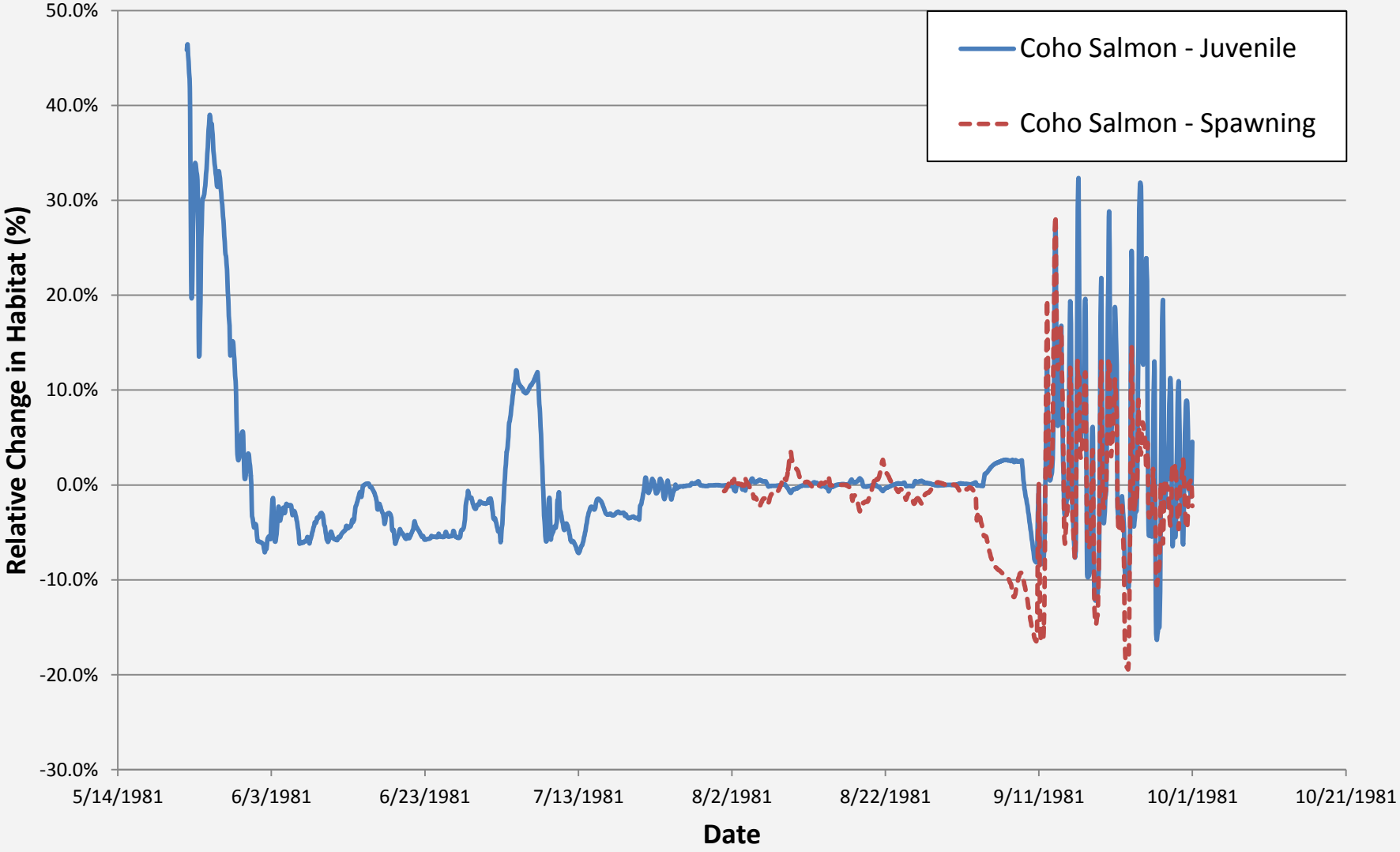
Wet Year (1981) - Birch Creek Slough (PRM 94.8) Coho Spawning Habitat Time Series



Wet Year (1981) - Birch Creek Slough (PRM 94.8) Coho Juvenile Habitat Time Series



Wet Year (1981) - Birch Creek Slough (PRM 94.8) Percent Change in Coho Habitat between OS 1b from Existing Conditions



Evaluation Metrics

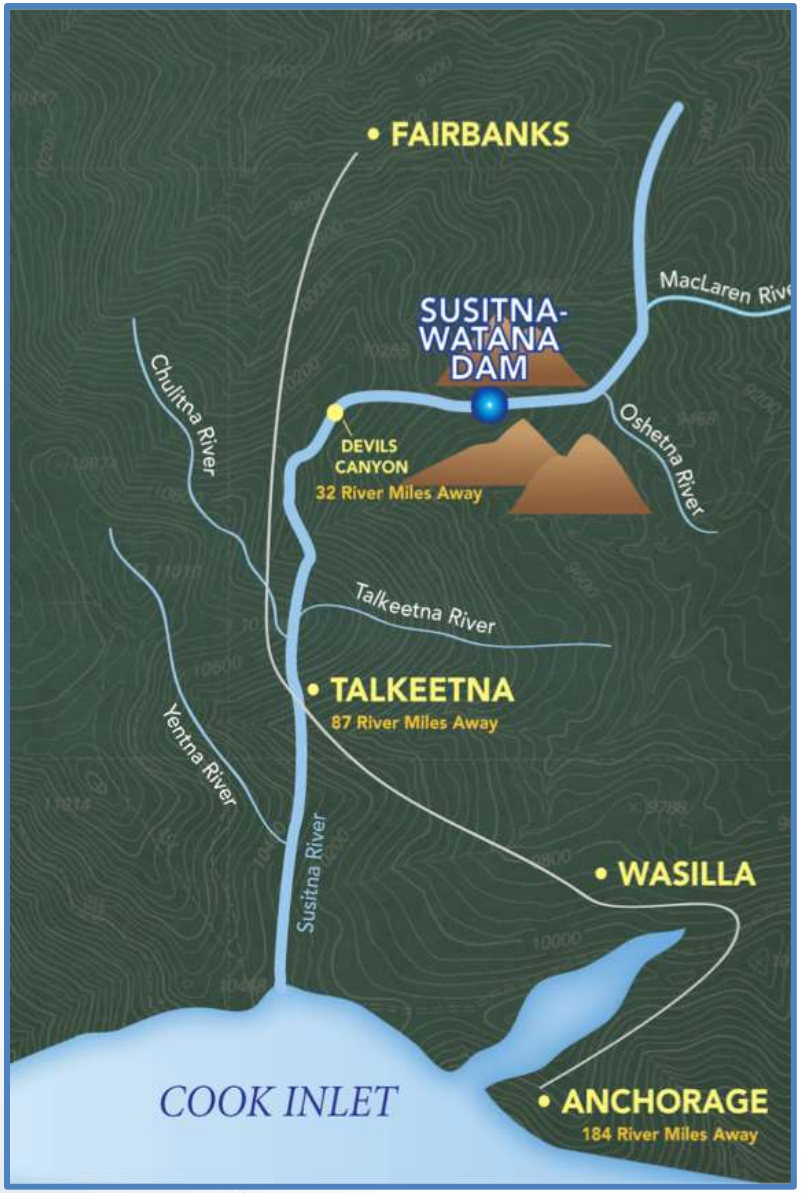
- Range of metrics available from time series analysis based on WUA results
  - Percent change statistics
- Breaching Analysis
  - Frequency, duration and timing
  - Connectivity and flow depth at tributary mouths
  - Breaching of side channels, side sloughs, etc.

Extrapolation of Results for Lower River

- Similar series of habitat results for each study site will be generated
  - Each site represents different habitat unit
  - Follow approaches discussed for middle river to extrapolate habitat results
- Option to focus on major tributary mouth connectivity
  - Sites have focused on tributary mouth locations
  - Site-specific results to each tributary mouth studied, no extrapolation necessary

Summary

- Open water fish habitat results only
- Approach provides tabular outputs for input to DSS or other decision processes
- Groundwater and water quality integrated independently
- A similar approach will be used on other species and life stages of interest for each Lower River fish habitat IFS site



1-D Fish Habitat Lower River

Questions

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