

POTENTIAL RESOURCE ISSUE:

- Macroinvertebrate community composition and abundance.

PROJECT NEXUS:

- Project operations modify the flow regimes and water quality (including water temperature) in the bypass reaches, potentially affecting the macroinvertebrate community and food availability for fish.

POTENTIAL LICENSE CONDITIONS:

- Instream flow releases.
- Site-specific water quality measures.

STUDY OBJECTIVES:

- Document the density and size distribution of drifting macroinvertebrates in selected bypass river reaches for input to bioenergetics growth analysis.
- Document the benthic macroinvertebrate community in the bypass reaches and reference reaches to characterize general habitat conditions.

EXTENT OF STUDY AREA:

- The study area includes the bypass river segments and comparison reaches identified in Table AQ 3-1 and Map AQ 3-1.

STUDY APPROACH:Macroinvertebrate Drift Sampling for Input to Bioenergetics Analysis

- Collect drift samples at select AQ 1 – Instream Flow TSP sites (Table AQ 3-1 and Map AQ 3-1). Identify two representative riffles and sample drift at the downstream end of each riffle. Collect three drift samples at each riffle using a sampling methodology similar to that used in Hayes et al. 2000. Daytime only drift samples will be collected.
- Collect drift samples two times during the late summer/fall (August-October) to identify base invertebrate drift densities. Process samples based on average drift density (number/m³) at each site by 2 mm prey size classes (e.g., lengths 1-3 mm, 3-5 mm, 5-7 mm, etc.). Use general aquatic invertebrate length versus weight relationships to convert macroinvertebrate drift to energy equivalents (joules/m³/size class) for bioenergetics analysis.
- Compare/contrast drift density and size between the study reaches and with the literature.
- Use the drift density information as an input to bioenergetics growth analysis to assist in the identification of limiting factors related to fish growth (food, water temperature, habitat).

Benthic Macroinvertebrate Sampling for General Habitat Conditions

In the bypass and comparison reaches collect benthic samples and inventory data following the Surface Water Ambient Monitoring Program (SWAMP) (Ode 2007) protocols. Collect the composite benthic samples and physical habitat assessment data using the SWAMP methodology and process macroinvertebrate taxonomy to Southwest Association of Freshwater Invertebrate Taxonomists (SAFIT) level 2 (Richards and Rogers 2006). Include in the analysis

available historical benthic macroinvertebrate data. Report benthic macroinvertebrate metrics as outlined in Rehn et al. (2007) as part of the data summary and provide other benthic macroinvertebrate metrics as requested by the resource agencies. Statistically compare/contrast SWAMP and historical sampling results between reaches and with data reported in the literature. Proposed sampling sites for benthic macroinvertebrates are identified in Table AQ 3-1 and Map AQ 3-1.

Data

All data (drift and benthic invertebrate) will be provided to BLM, resource agencies, and interested stakeholders in an Excel spreadsheet electronic format.

SCHEDULE:

Date	Activity
June 2018	Select macroinvertebrate sampling sites in consultation with interested resource agencies
August–October 2018	Conduct benthic and drift sampling
November 2018–February 2019	Analyze data and prepare draft report
February 2019	Distribute draft report to the stakeholders
March–May 2019	Stakeholders review and provide comments on draft report (90 days)
June–July 2019	Resolve comments and prepare final report
August 2019	Distribute final report in Draft License Application

REFERENCES:

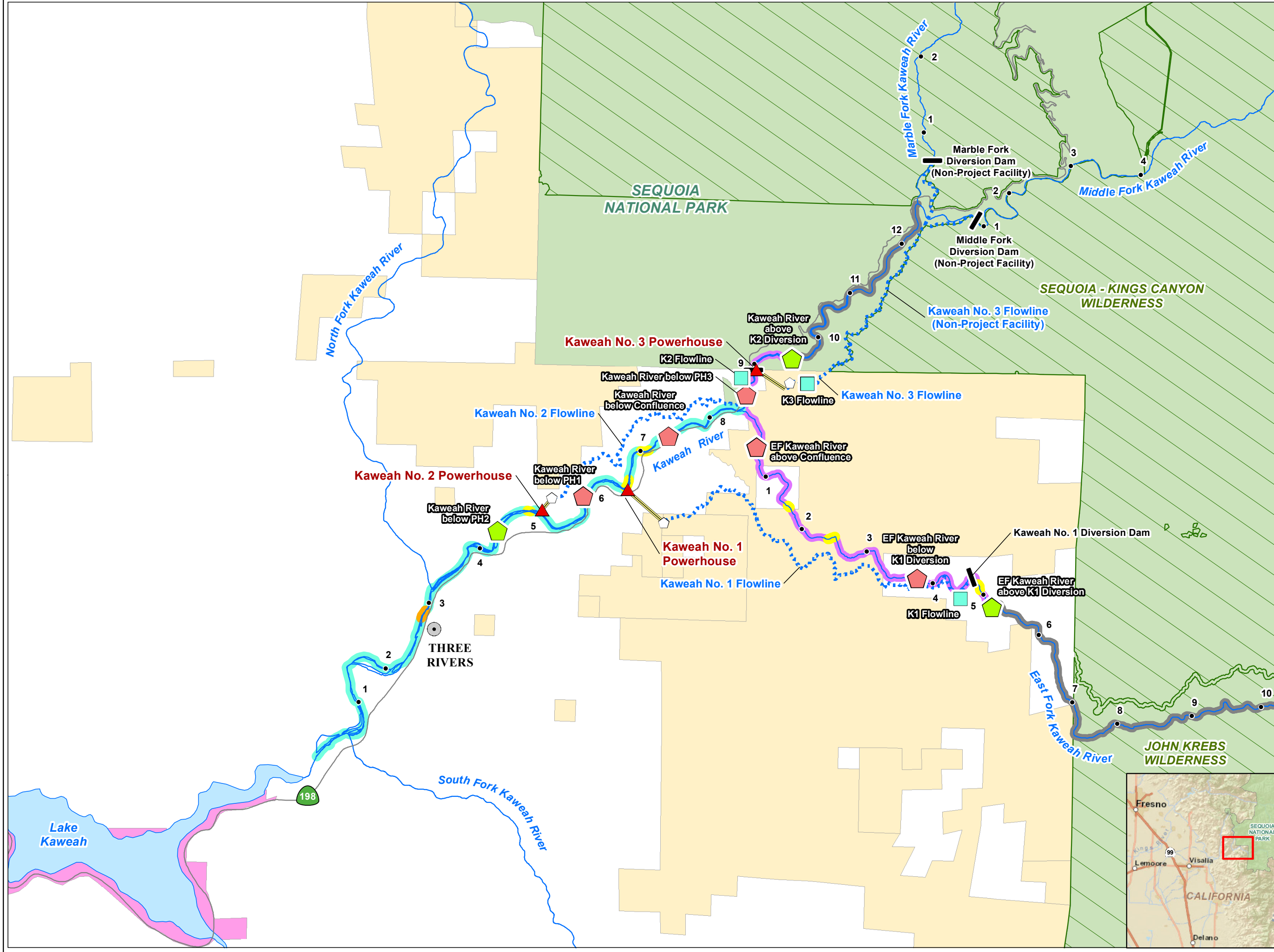
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- Richards, A. B. and D. C. Rogers. 2006. List of Freshwater Macroinvertebrate Taxa from California and Adjacent States including Standard Taxonomic Effort Levels. Southwest Association of Freshwater Invertebrate Taxonomists (SAFIT). 215 pp.

TABLE

Table AQ 3-1. Macroinvertebrate Sampling Reaches.

Study Reach	Site ID	Bypass Reaches	Reaches Upstream of Project Facilities or Comparison Reaches	Number of SWAMP Benthic Macroinvertebrate Sample Locations	Number of Drift Macroinvertebrate Sample Locations
Kaweah River					
Kaweah River Upstream of Kaweah No. 3 Powerhouse	K9.5		●	1	1
Kaweah River Downstream of Kaweah No. 3 Powerhouse and Upstream of the East Fork Kaweah River Confluence	K8.7	●		1	1
Kaweah River Downstream of East Fork Kaweah Confluence and Upstream of Kaweah No. 1 Powerhouse	K7.3	●		1	1
Kaweah River Downstream of Kaweah No. 1 Powerhouse and Upstream of Kaweah No. 2 Powerhouse	K6.9	●		1	1
Kaweah River Downstream of Kaweah No. 2 Powerhouse	K4.3		●	1	1
East Fork Kaweah River					
East Fork Kaweah River Upstream of the Kaweah No. 1 Diversion	EFK5.2		●	1	1
East Fork Kaweah River Downstream of the Kaweah No. 1 Diversion	EFK3.8	●		1	1
East Fork Kaweah River Upstream of Confluence with Kaweah River	EFK0.7	●		1	1

MAP



Facilities

- ▲ Powerhouse
- ▬ Diversion
- ◻ Forebay
- ⋯ Flowline
- ▬ Penstock

Other Features

- City/Town
- Highway/Road
- Watercourse
- ▭ Water Body
- River Mile

Land Jurisdiction*

- ▭ Bureau of Land Management
- ▭ U.S. Army Corps of Engineers
- ▭ National Park Service
- ▭ Private

*SOURCE: BLM 2012

Land Management


- ▭ National Wilderness Area

Channel Characterization

- ▬ NA
- ▬ bedrock
- ▬ bedrock/cascade
- ▬ bedrock/step-pool/cascade
- ▬ pool-riffle/plane-bed

Sampling Locations


- ▭ Entrapment Monitoring (flowlines)
- ▭ Fish, BMI, FYLF, Riparian
- ▭ Fish, BMI, FYLF, Riparian, Instream Flow




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Map AQ 3-1
Kaweah Project
Aquatic and Riparian Sampling Locations



Date: 12/8/2015



Projection: UTM Zone 11
Datum: NAD 83

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