

## **Savage Rapids Dam Removal – Monitoring Scope of Work**

### *Pre-removal: Summary of activities*

Pre-removal monitoring will be implemented in two phases. Year -1 (2007-2008) will be used to map the study reaches and geomorphic units, collect sediment and invertebrate samples, and assess habitat conditions. This reconnaissance effort will both establish the baseline condition and be used to perform power analysis to evaluate sampling requirements for statistically valid change detection. The sampling strategy for Year 0 (2008-2009) and beyond will then be modified to meet minimum statistical power.

Specific activities recommended for preliminary instrumentation and pre-removal monitoring include:

- aggregate relevant, existing data from various agencies, especially long-term data
- produce GIS maps of existing monitoring data
- create project website for photos and data dissemination, field data sheets
- articulate and revise field methods and analysis
- establish a GPS control network along the river corridor
- establish photo points
- establish permanent cross sections and survey points, and survey in monuments
- survey of the upstream reservoir and downstream river channel and floodplains
- characterize the bed-material size distribution upstream and downstream of the dam at cross sections and along geomorphically and ecologically significant facies/features
- estimate the volume of sediment stored behind the dam
- estimate the average annual sediment transport of the river
- benthic macroinvertebrate sampling
- assessment of habitat quality

### *Drawdown and removal monitoring: Summary of activities*

Greater intensity monitoring will occur during the drawdown and removal of Savage Rapids Dam.

Proposed activities include:

- continued turbidity and temperature observations should occur during drawdown, through removal
- bathymetric resurvey of reservoir (delta front, channel, longitudinal, terraces) following removal and prior to 2009-2010 water year

All sampling and surveying will occur during the low flow season (summer) and after leaf out for safety and consistency.

### *Post-removal monitoring : Summary of activities*

The post removal monitoring strategy will be used to address questions regarding the outcomes of the Savage Rapids dam removal and to contribute to state of the science for future dam removals in Oregon.

The post removal strategy will complement data collected in the prior two stages of sampling.

*Short-term (2 years post removal) - Data collected during this period include:*

- continuous turbidity, temperature, and discharge observations and analysis
- annual channel surveys (targeted cross sections, longitudinal profile, bed material)
- annual invertebrate sampling and habitat assessment
- monitoring of photo points
- continuous update of GIS maps and website

### *Project deliverables*

A fundamental outcome of the proposed research is the documentation of physical and biological responses of the Rogue River to dam removal, for which 4 dam removals are at some level of implementation. As a “medium” sized dam removal, the proposed monitoring strategy is critical as this removal represents an important learning opportunity. Our approach will be to inform and engage local stakeholders in an assessment of river recovery while addressing important research questions of interest to the broader science community. Our analyses and documentation will articulate and test procedures for reliability in predicting responses to dam removal, making tools more accessible for future dam removals. Thus, in combination with monitoring activities occurring at the Brownsville dam removal site, this monitoring program will document the outcomes of the a small and medium dam removal, as well as demonstrate, test, and document effectiveness monitoring procedures for future dam removals. This will occur through the release of a public-access website () on effectiveness monitoring for dam removal as a guidance document, including (1) example monitoring plans, study designs, and data analysis approaches or systematic effectiveness monitoring, (2) detailed cost estimates (per-hours/year) and features of various methods for future monitoring planning, and (3) development and documentation of monitoring and prediction methods, such as estimating stored sediment volumes behind dams. Additional deliverables from the combined dam removal program include annual presentation and documentation of findings to OWEB and local stakeholders, a master’s thesis and PhD dissertation, and peer-reviewed publications advancing dam removal science.

Table 1 - Project budget

Item	Annual Rate	Unit	No. of Units	No. of Years	Annual increase	year 1 (2007-2008)	year 2 (2008-2009)	year 3 (2009-2010)	year 4 (2010-2011)	OWEB
<b>PROJECT MANAGEMENT</b>										
Investigator (Tullos)	\$73,000	1	0.04	3	0.04		\$3,037	\$3,158	\$3,285	\$9,480
<b>IN-HOUSE PERSONNEL</b>										
FRA	\$45,000	1	0.5	4	0.04	\$11,250	\$22,500	\$23,400	\$22,500	\$79,650
FRA (Gerth)	\$36,000	1	0.02	4	0.04	\$720	\$749	\$779	\$810	\$3,057
URA	\$20,800	1	0.25	4	0.04	\$5,200	\$5,408	\$5,624	\$5,849	\$22,082
<i>Fringe Benefits</i>										
Investigator (Tullos)	0.47				-		\$1,427	\$1,484	\$1,544	\$4,456
FRA	0.60				-	\$6,750	\$13,500	\$14,040	\$13,500	\$47,790
FRA (Gerth)	0.67				-	\$432	\$482	\$522	\$543	\$1,979
URA	NA									
<b>CONTRACTED SERVICES</b>										
<b>SUPPLIES AND MATERIALS</b>										
Misc. field supplies				4		\$1,500	\$500	\$500	\$500	\$3,000
<b>TRAVEL</b>										
to-from project sites and Salem	\$0.54	mile	1250	4		\$675	\$675	\$675	\$675	\$2,700
to national conference	\$1,000	year		1						\$1,000
<b>FISCAL ADMINISTRATION</b>										
<b>Total direct costs</b>										<b>\$175,194</b>
<b>OWEB</b>	10%				OPE=					\$17,519
<b>Total indirect costs</b>										
other direct costs										
<b>Total Other direct costs</b>										
<b>TOTAL ESTIMATED COSTS</b>										
										<b>\$192,713</b>

Table 2 – Tentative Timeline for Monitoring of Brownsville and Savage Rapids Dam removals

	2007												2008												2009												2010												2011											
	J	F	M	A	M	J	J	A	S	O	N	D	J	F	M	A	M	J	J	A	S	O	N	D	J	F	M	A	M	J	J	A	S	O	N	D	J	F	M	A	M	J	J	A	S	O	N	D	J	F	M	A	M	J	J	A	S	O	N	D
Brownsville Dam Year 0 Monitoring																																																												
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