

ELK RIVER ROWD – APPENDIX F

HRC Aquatic Trends Monitoring (ATM) Program Property-Wide and Specific to Elk River

September 22, 2014

- 1) **Pebble Counts:** Continue to measure surface sediment through grid counts, measuring 200 pebbles at the each of the first 3 riffles spanning the bankfull channel width. Data analysis will be expanded to determine D₈₄, D₁₆ and D₅ as three new parameters measured and tracked, in addition to D₅₀. Results will be reported as mean values within the APFC matrix (Figure 1), as well as cumulative frequency plots, which serve to provide a visual aid for improved interpretation (Figure 2).

Site 14 North Fork Elk River	Parameter	Target Value
Bed Surface	D84 mm	#
	D50 mm	65-95
	D16 mm	#
	D5 mm	#
Pool Characteristics	Pool Area (%)	≥ 25%
	Pool Spacing	< 6 CW/pool
	Residual Pool Depth (m)	> .91 m
	% Pools Assoc. w/wood	> 50%
Large Woody Debris	Total Piece Frequency #/100 ft	> 7.82
	Total Piece Count	#
Water Temperature	MWAT °C	≤ 16.8
Riparian Overstory	% Canopy Over Stream	≥ 90
	% Canopy of Rip Forest	> 85%

Figure 1. Example of Modified Aquatic Properly Functioning Condition Matrix

Property-wide

- 2) **Bulk Sampling:** Discontinue bulk sediment (subsurface) sampling. This method of sampling is costly and time consuming when done correctly and although it provides important information related to incubation and emergence, the cost-benefit of bulk sampling is too low to continue. Fining of the streambed is a primary concern in Elk River and property-wide, and is a process which can be observed through pebble counts alone. If fining of the bed surface is observed one can assume that a similar trend is occurring in the subsurface and vice versa.

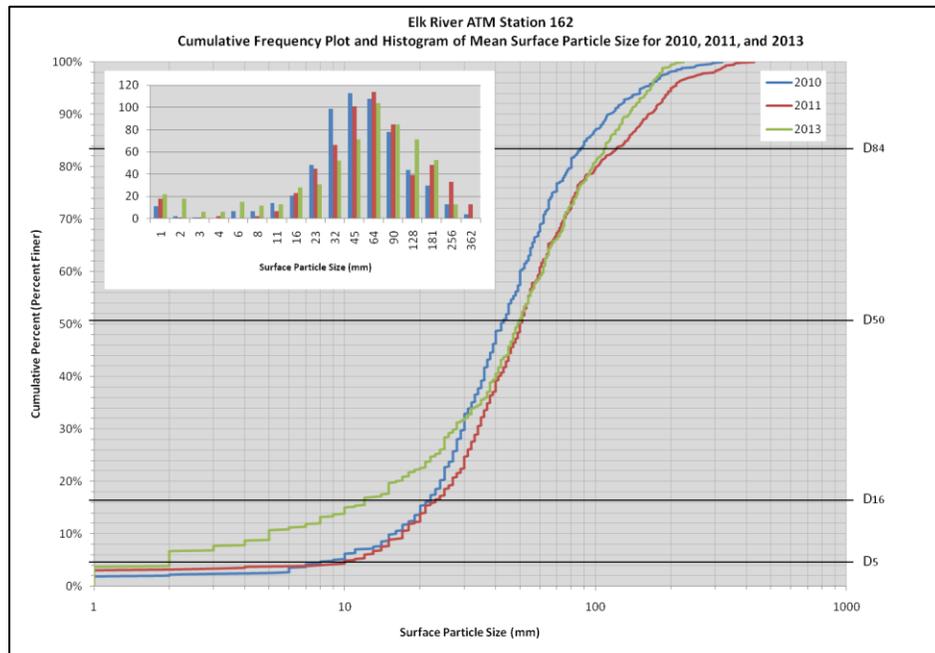


Figure 2. Cumulative Frequency Plot and Histogram of Surface Particle Size at ATM Station 162 in Elk River for 2010, 2011, and 2013

Property-wide

- 3) **Pools:** Continue to measure pool habitat (all 4 parameters) with no changes to sampling protocol. Current protocol requires pool inventory of entire ATM reach which is resulting in 3-11 pools per station being inventoried, and 5-6 on average.

Property-wide

- 4) **LWD:** Discontinue measurements of diameter, length, volume, and key pieces except during extended river wood surveys to be conducted once every 6 years. Total piece frequency per 100ft would remain a monitored ATM station parameter providing a general sense of wood loading.

- a. LWD values are highly variable and poor trend indicators due to:
 - i. the transient nature of wood in the river system
 - ii. the confounding effects of log jams (inaccurate frequency values)
 - iii. inconsistent identification of bankfull boundaries and other surveyor bias
- b. During ATM surveys LWD pieces will be counted, and distances (location within the ATM reach) will be recorded for each piece. The % pools associated with wood parameter will continue to be collected as part of pool habitat (item 3 above). As it is already known that wood is a key formative feature for pools in Elk River, collecting a basic count by distance provides an easy and accurate measure of the total number of pieces per reach, frequency, and distribution.
- c. A periodic extended river reach wood survey of the North Fork will provide a detailed measure of LWD characteristics and distribution which can then be compared to annual values collected during ATM surveys (Figure 3).

Property-wide; designation of extended river reach surveys which will be determined during WA revisit and limited to watersheds/sub-basins where wood is most critical in habitat development, typically less consolidated geologies, e.g. Wildcat Formation found in Humboldt Bay Tributaries, Van Duzen, and Eel River WAUs.

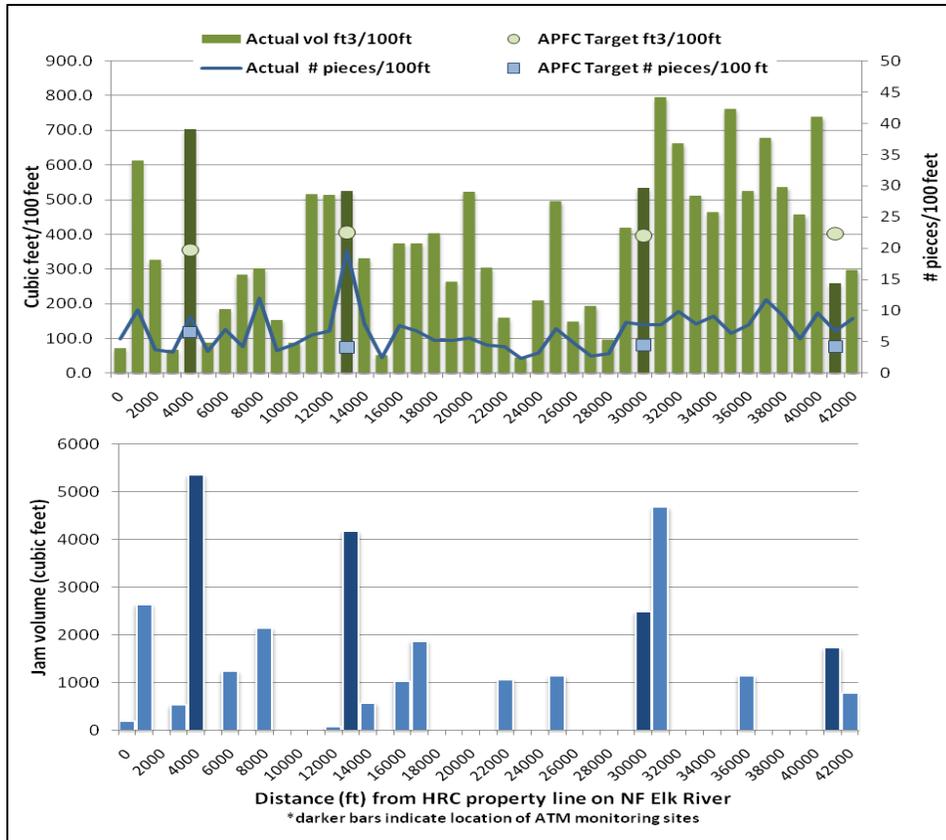


Figure 3. Results from a Full River LWD Survey (top) and an ATM LWD Survey (bottom) from Elk River.

5) **Riparian and Overstream Canopy and Stream Temperature:**

- a. Riparian Forest Canopy Closure - Limit riparian forest canopy closure measurements to ATM riparian stands reporting less than 85% in prior ATM survey. No survey required in stands where $\geq 85\%$ riparian forest closure was documented in prior ATM survey *unless* significant disturbance (i.e. timber harvest, blow down, landslide, high mortality, fire) is evident reducing canopy closure to $< 85\%$. Continue to use existing survey protocol.
- b. Overstream Canopy Cover – Continue this measurement using existing protocols.
- c. Stream Temperature – Continue this measurement *annually* (as currently done) using existing protocols.

Property-wide

- 6) **Fish Surveys:** Continue double pass snorkel presence/absence/relative abundance surveys *annually* at ATM locations.

Property-wide

- 7) **Cross Section Surveys:** Continue to measure cross sections at all ATM stations. Through cross-section measurements and pebble counts we can track changes in the streambed.

Property-wide

- 8) **Thalweg Surveys:** Discontinue thalweg surveys. Bedform changes can be tracked through cross-sections.

Property-wide

- 9) **Stations and Sampling Frequency:** Reduce number of overall ATM stations from 10 to 6 (3 on the North Fork, 2 on the South Fork, and 1 on the mainstem – Figure 4). Sample on a 3 year cycle, rather than annually (existing WQ requirement), consistent with property-wide approach.
- a. Stations: We are monitoring at more stations than necessary to capture long term trends in Elk River and property-wide. Although more data is often assumed better, at some point our returns diminish and what we gain in sheer data volume, we lose in resolution and analysis. Also staffing reduction commensurate with reduction in timber harvest and associated watershed disturbance since transition of ownership from PALCO to HRC, a continued emphasis on larger more complex effectiveness monitoring study designs (i.e. Becks, Railroad Gulch, Yager, and Mattole), and a desire to be proactive with in-stream restoration, and additional biological monitoring, requires adjustment in how and where staff hours are used. We also note that hydrologic monitoring of SSC and turbidity suggests annual basin wide sediment yields are closely related to precipitation, local geology and uplift rates, and not so much harvest rates, suggesting in-channel trends monitoring to get at long term HCP hillslope effectiveness should not be over-emphasized (i.e. room for downsizing current program).
 - b. Sampling Frequency: The annual sampling regime currently applied in Elk River is not necessary to capture *long-term trends*. A sampling frequency of 3 years, as is applied elsewhere property-wide, will provide adequate resolution to detect changes in river processes over at this time scale.
 - i. Note: *Stream temperature* and *fish surveys* at ATM stations are excluded from change in sampling frequency and *will continue on an annual basis*.

- ii. Note: Per a verbal request from staff at CDFW, we will sample ATM station 104 every 9 years.

ATM Site #	Stream Name	Upstream Drainage Acreage	Reach Gradient (%)	Elevation (ft)	Water Temp. (annual)	Streambed, Habitat, Canopy, Sediment and LWD	Property-Wide Rotation Schedule		
							Year 1	Year 2	Year 3
91	North Branch	2,581	1.5	410	X	X			X
104	South Branch	1,207	2.8	360	X	X			X
90	Upper North	2,766	2.1	419	X	X			X
167	North Fork Elk	7,230	2.1	262	X	X			X
162	North Fork Elk	8,738	0.6	134	X	X			X
214	North Fork Elk	12,302	0.2	80	X	X			X
217	South Fork Elk	4,030	1.6	510	X	X			X
14	North Fork Elk	12,521	0.1	62	X	X			X
175	South Fork Elk	12,200	0.0	39	X	X			X
166	Mainstem Elk	26,393	0.1	39	X	X			X

Figure 4. Elk River ATM Station List. Stations highlighted with dark grey will no longer be monitored beginning with the next sampling rotation, *except for Station 104 which will be sampled every 9 years per request from CDFW.*

Elk River Specific; Any ATM station total number or location changes elsewhere on HCP covered lands will be considered watershed by watershed during WA Revisit

Property-wide: 3 year survey frequency interval for all habitat measurements excluding annual temp and fish

- 10) **Hydrology Trends Monitoring:** Will continue at similar levels in Elk River as over the last decade with some adjustment being recommended including elimination of stations 509 (Elk River mainstem) and 533 (Toms Gulch), restart of station 522 (Corrigan Crk), and downstream location shift of 534 (Little SF Elk River). These adjustments require consultation with the NCRWQCB.