Memorandum

To: Samantha Owen, McMillen Jacobs Associates

From: Kathy Dubé

Date: August 14, 2020

Re: Recommended Eklutna River sediment transport monitoring transects and scour monitors

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Purpose:

- Establish transects and install scour monitors to aid in assessing erosion and sediment transport through the Eklutna River downstream from Eklutna Lake and to help calibrate a sediment transport model.

Timing:

- Since large spill events are unplanned and infrequent, establishing monitoring transects and installing scour monitoring devices ASAP will allow for data collection following any planned or unplanned spill event(s) that occur over the course of the Eklutna River study program. Proposed installation is the week of August 24, 2020.

Proposed Methods:

River Monitoring Transects

Establish (or use existing) 1-2 monitoring transects in each geomorphic reach of the Eklutna River as shown in Figure 1 below, except "Below RR Bridge" (note that these geomorphic reaches are in draft form and may be altered or added to after field reconnaissance). Existing ADFG transects Eklutna 6, 8 and 10 in the lower "Canyon" geomorphic reach and "DS Thunderbird" geomorphic reaches will be used if possible.

New transects would consist of a benchmark (temporary brass survey marker, large nail in a tree or rock bolt in any bedrock reaches); two headpins (18" plastic stake pounded in to ground level) at each end of a transect; flagging to help mark pins for future use. Benchmarks and headpins would remain in place throughout the study period (2020-2022) and could be left in place longer if future monitoring is desired.

Survey a cross section at each transect using a fiberglass tape, laser level and survey rod; stations along the tape/transect would be 1-3 feet apart as appropriate for each location. Record grain size of substrate (using a gravelometer with phi scale e.g., <2mm, 2-2.8 mm, 2.8-4mm, 4-5.6 mm, 4.5-8mm, etc.) at each station within the bankfull channel for a minimum of 100 points. If the bankfull width of a cross section is less than 100 feet long (e.g. less than 100 points), move downstream 5 feet and repeat across channel so that at least 100 clasts are recorded.

Take photographs across each transect and looking upstream and downstream.

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Figure 1. DRAFT Eklutna River Geomorphic Reaches

Note: Transect locations will be determined following field reconnaissance and based on channel conditions and access considerations. Existing ADFG monitoring transects will be used if at all possible (no scour monitor will be placed on existing monitoring transects to avoid disturbing transects, but scour monitors may be placed downstream from existing transects).

Scour Monitors

At one transect per geomorphic reach, install 1-2 scour monitors and/or an accelerometer (as appropriate) to record scour/fill and timing of substrate movement. Scour monitors will consist of sliding bead monitors, slightly modified from Figure 2 (Schuett-Hames et al. 1999). Accelerometers will consist of a Hobo Pendant G accelerometer enclosed in a 2.5-inch black PVC holder attached to a cable and anchor as shown in Figure 3. Both devices will be installed using a 1.5-inch steel pipe that is pounded into the substrate; the monitor will be inserted into the pipe and the pipe removed from the substrate. The scour monitor or accelerometer will remain in place until after a spill event, then it will be checked and reset as appropriate.

The sliding bead scour monitors record any scour and fill that takes place. The top bead is set approximately level with the bottom of the rive bed. If the bed scours, beads are exposed and float to the top of the cable. Depth of scour is determined by number of beads exposed. If fill occurs, beads will be buried and depth of fill can be determined by burial depth. The

accelerometer records x-y-z position every 30 minutes. This allows the timing of any bed movement to be recorded which can be correlated to flow when bed movement occurs.

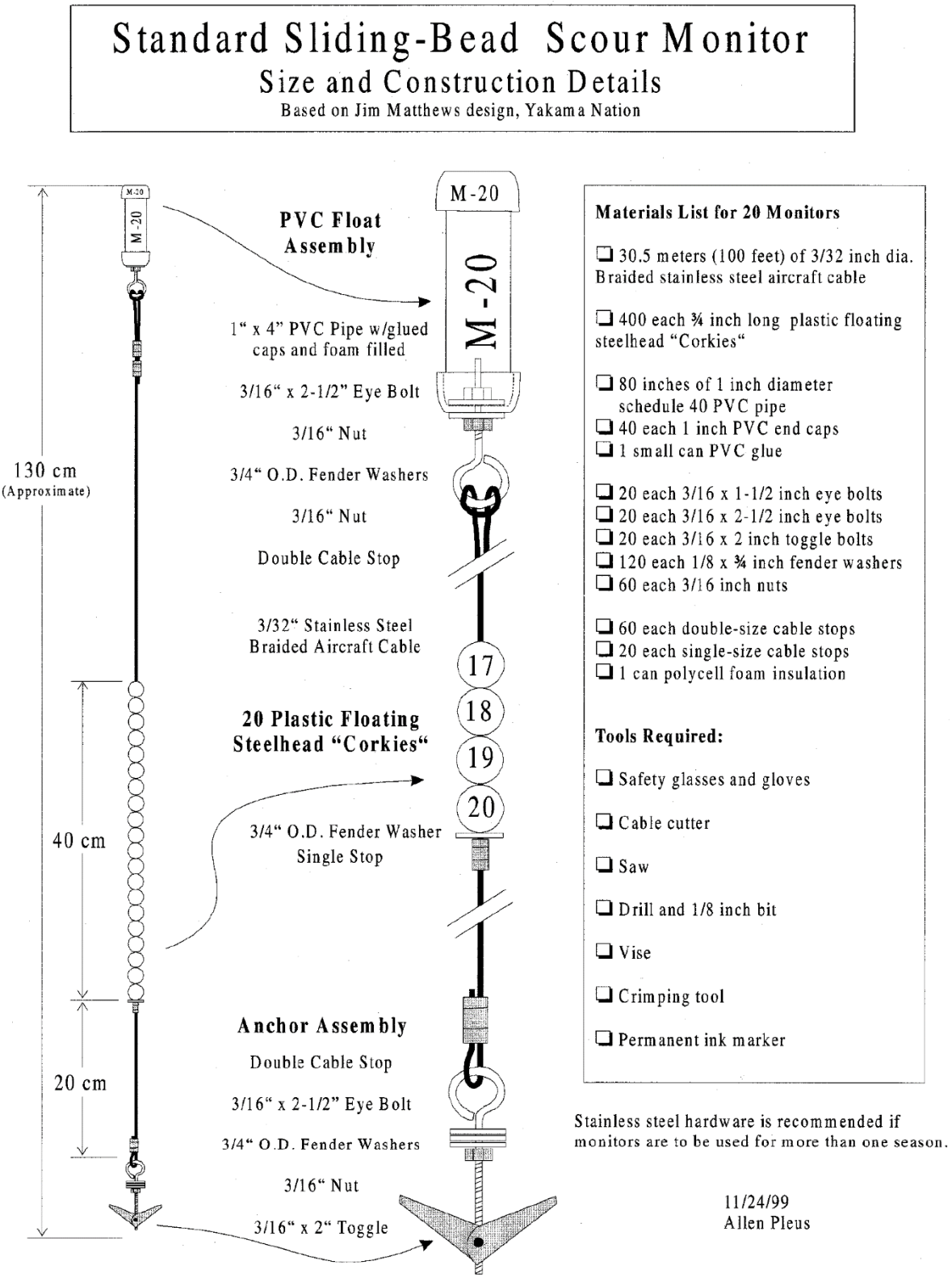

Figure 2. Sliding Bead Scour Monitor (from Schuett-Hames et al. 1999)

Note: a 1.5 inch diameter plastic ball with a PIT tag will be used in place of the PVC float since these have been found to be less visible and more stable during high flows.

Figure 3. Accelerometer before Deployment

Sediment Source Erosion Monitoring

There are several large alluvial fans that are suspected of being potential substantial sediment sources during high flow events in the "Below Eklutna Lake" and "Downstream Sediment Source" geomorphic reaches. These fans have not been visited by the geomorphologist (Kathy Dubé) to ascertain the best way to monitor erosion at these locations, but one (or more) of three potential erosion monitoring methods is proposed (the best method will be selected during site reconnaissance on August 21-22 based on site conditions and assumed erosion mechanism):

- Establish photo points for before/after photographs (qualitative assessment)
- Establish monitoring transect(s) and survey before/after any spill, similar to river transects, to quantify changes in ground surface
- Place several rows of painted rocks perpendicular to channel along river edge of fans to determine fan erosion (faster than surveying transects; multiple rows can be placed quickly, but only provides a measure of erosion/no erosion rather than quantitative change in profile)

Potential Resource Impacts:

Establishing transects will result in benchmarks and endpins being left in the ground at each transect location for the duration of the study. These will be visible to passersby but will not be a safety hazard since they will be level with the ground surface. Endpins will be plastic.

Scour monitor installation will leave scour monitors/accelerometers buried in the river substrate. Pounding in the installation pipe will result in loud noises (hammering) for approximately 10 minutes per monitor. The pipe will be removed; the scour monitor/accelerometer will remain in the streambed for the duration of the study. If scour occurs, beads will be visible on the streambed.

If painted rocks are used, these will be visible on the side of the alluvial fans.

References

Schuett-Hames, D., R. Conrad, A. Pleus, and K. Lautz. 1999. TFW Monitoring Program Method Manual for Salmonid Spawning Gravel Scour Survey. Prepared for the Washington State Department of Natural Resources under the Timber, Fish, and Wildlife Agreement. TWF-AM9-99-008; DNR#110. December 1999.