Remote Sampler Options for Pilot Testing in WY 2015

The STLS wishes to explore pilot testing of remote samplers in WY2015. Remote samplers are devices that that collect contaminants in situ and have strong advantages over manual and automated sampling techniques. In WY2015, one or more remote sampling technologies will be applied in addition to manual composite/discrete sampling at several of the WY2015 sampling locations. The primary goal of this pilot study is to ascertain whether remote samplers may be used to idenitify heavily polluted watersheds and relatively rank high versus medium versus low pollution watersheds. Additionally, logistical usage of the remote sampler(s) will be documented for improved understanding of the conditions in which the sampler may be used. Below are 5 remote sampling options to consider for testing in WY 2015.

Sampling Method	**Single-stage siphon sampler**	**Walling Tube Sediment Trap**	**SIFT (Screened Inline Flow Through Sediment Trap)**	**Hamlin Sediment Trap Sampler**	**CLAM (continuous low-level aquatic monitoring sampler)**
Description of method	Sampler collects a discrete grab samples which may be composited if desired. On the rising stage, when water rises above a certain level, a siphon is created and a grab sample is collected.	A time-integrated suspended sediment trap. Stormwater flows into the tube (not quite iso-kinetic due to drag forces on the inlet walls) and drops out into the tube. Can be left in for a whole storm or longer.	City of Portland developed. Susp sediment is filtered in-situ through a 226 um screen; test results shows that it captures finer particles as well.	Washington Dept of Ecology developed. Low-profile suspended sediment trap shown to be more efficient than traditional bottle traps.	A submersible, low-flow-rate micro-pump sampler that continuously and actively draws water through filtration and solid-phase extraction (SPE) media. Can use a variety of media to collect a range of less- to more-polar organic contaminants.
Analytes targeted	All	Particulate-associated	Particulate-associated	Particulate-associated	Organics only
Advantages of method	Simple technology. Mimics discrete grab sampling of the rising stage. Total fractions analyzed.	Simple technology. Can be deployed for a whole storm or longer.			Can filter up to 100 L of water (less in turbid conditions); large sample volumes results in lower RLs (by up to 100x). The large sample volume may mean that we can use a cheaper analytical method with higher MDLs.
Disadvantages of method	Only collects samples on the rising stage and biases toward the silt/clay size fraction. Represents only specific time points in storm. Subject to damage from rapid flow and floating debris. Questions around contamination from open tubing into bottles.	Particulates only and may bias towards larger fractions. Accumulation rate will depend on watershed, but may have to be depoloyed longer than one storm event to get enough material to analyze (testing of Hamlin at 3 sites resulted in avg daily accumulation rates of 29 g/day; testing of SIFTat 17 locations resulted in avg daily accumulation of 1.8 g/day).			Susceptible to clogging in turbid environments and still some questions about accuracy of flow measurement.
Results of empirical tests of sampler type	Compares well to grab samples collected with ISCO (http://wi.water.usgs.gov/pubs/FS-067-00/FS-067-00.pdf)	Could not find comparison study. Has been used to collect fine fluvial suspended sediment for sediment fingerprinting (e.g. Fox and Papanicolaou 2007; Collins, Walling et al. 2010; Fukuyama, Onda et al. 2010; Martínez-Carreras, Krein et al. 2010) and has t oestimate the relative suspended sediment yield of a river (Bolland, Bracken et al. 2010).	Tests were simply done to see how much sediment was trapped versus a traditional settling bottle sampler. Yields of trapped sediment were much higher. Approximately 20-25% of the sediment was in the clay/silt fraction.	Performed relatively well compared to other two in-line sediment samplers tested (against a continuous centrifuge method) by capturing mostly fines and sand, and grain size distribution varying between sites. Fines comprised between 10-70% of the sediment. However, contaminant concentrations were lower than the cetrifuge reflecting a larger proportional capture of sands over finer silts/clays, thus concetrations may be biased low.	Published study by Coes et al., conclusion: In our view this study validates that the C.L.A.M technology can provide a large volume time integrative extraction event. This event captured on standard laboratory SPE media can be extracted under routine procedures, and analysis methodologies to produce both qualitative and quantitative defensible data. Spokane River Toxics study (PCBs, PBDEs, Dioxins): Detection limits down to sub pg/l level. RSD of triplicate field samples was ~10-20% (high precision). Spokane River study going to spend a year determining the error bars on the CLAMs. A lot not known about the CLAMs. (pers comm w/R.Grace, AXYS)
How easy to deploy in confined space	Likely not possible in storm drain	Easy	Easy - attached to a storm drain ring	Moderate - supposedly requires bolting into storm drain, but possible attachment to ring	Unknown but possible attachment to ring
Deployment Locations	Channels, but unlikely in storm drains/pump stations	All except unlikely in pump stations	All except unlikely in pump stations	All except unlikely in pump stations	All except pump stations
Cost of sampling device	$300-400	$200-300	$700	$600	$2,600
Photo of device