

Technical Leadership Group (TLG)

Meeting Summary Notes

July 21, 2021, 9:00 a.m. – 11:30 a.m.

Zoom Meeting

(These summary notes are intended to capture key topics, conclusions, and next steps and not every detail of the presentations or discussions.)

Welcome/Introductions (List of those in attendance)

Andy Helkey IDEQ; Terry Harwood BEIPC; Gail Yost (BEIPC – note taker); Rebecca Stevens (CDA Tribe) Kim Prestbo (EPA); Sandra Treccani (Washington State); Jerry Boyd (CCC Chair); Patrick Hickey (EPA); Ed Moreen (EPA); Mary Rehnberg (PHD); Scott Fields (CDA Tribe); Jamie Brunner (IDEQ); Dan McCracken (IDEQ); Craig Cooper (IDEQ); Christy Johnson-Hughes (USFWS); Aubrey Hoxie (NRCS); Kajsa Van deRiet (IDEQ); Tamara Langton (EPA); Lauren Zinsser (USGS); Dave Leptich (IDFG); Jamie Sturgess (Kootenai County); C. Stevenson (BLM); Robin Fox (NOAA); Mark Jankowski (EPA); Tom Nelson; Aditi Padhye (KETOS Inc.); Brandon Perkins; Ryan Arnold; Lee Groeschl (NIC)

SmartChar Presentation – Vermont; Joachim Roesler

Natura Solve Presentation - Jennifer Mitchell; Kyle Mitchell; Dr. Bryon Tarbet; Stephan Prokay

Flood Analysis Presentation – Derek Forseth (Alta Science & Engineering)

Lower Basin Update on Gray's Meadow, Lane Research Studies, Swan Fecal Study, Lower Basin WCAs and Dudley Reach Pilot. EPA Presenters: Kim Prestbo, Ed Moreen, PatrickHickey, Shannon Plunkett, Chris Eckley, Mark Jankowski

Kim Prestbo, EPA RPM, gave an overview on the Gray's Meadow project, which is formerly known as the Black Lake Ranch. It is almost 700 acres owned by IDFG, which was previously drained for agriculture and is contaminated with heavy metals. EPA, IDFG and the Restoration Partnership are collaborating to remediate and restore the site toward a healthy and historic wetland condition. The goals are to reduce metal contamination, improve water quality and eliminate nutrient loading from agricultural practices. We also think this will provide clean recreational, educational and cultural opportunities for public use. The meadow is located west of Hwy 3 and south of the CDA River, consists of two floodplain areas (Lamb Peak and Cave Lake wetlands), and separated by Black Lake and the channel that connects the lake to the CDA River. The Trail of the CDA runs along the north side and provides hydraulic isolation from the river. These fields were historically drained and pumped to Black Lake to two pump house locations – one in Lamb Peak and one in Cave Lake. Significant field investigations were completed in April to December of 2020, including borings and lab analysis to assess the horizontal and vertical extent; comparing data to the benchmark criterion of 530 ppm as stated in the ROD for protection of water fowl; 26 geotechnical locations; and installation of 5 ground monitoring wells and 10 piezometers to establish the relationship between ground water and surface water. Cultural resource monitoring also took place on potentially significant sensitive areas on the land. Lambs Peak is the more contaminated of the two fields, with higher concentrations on the east end of the site. Dewatering was conducted on both fields in order to conduct these investigations which took place in the spring and extended through June. This renewed concerns from Black Lake property owners on the nutrient load to the lake. EPA, CDA Trust, IDEQ and the CDA Tribe evaluated these concerns and potential solutions in how they might sequence their work. At the same time, EPA evaluated the applicability of Clean Water Act and determined that the wetlands and adjacent and downstream waters continue to be Waters of the United States (WOTUS). Any reroute of hydrologic connections would not change this status and that the Water Transfer Rule would still apply.

The CDA Trust reprioritized the infrastructure upgrades to relocate the de-watering discharge points from the meadows to the CDA River starting with Cave Lake. Close coordination was required from Idaho Parks & Rec to install the outlet structure to the Trail of the CDA, which was started in March and completed in May. Pump improvements will also move forward on the Lamb Peak Wetlands with final design this month and construction hopefully starting in September. This will be a challenge as there is a limited construction window and area in which to work. Improvements will include a new pump house outlet to the CDA River, installing a gravity discharge and bridge replacement to Black Lake tie channel and widening the Lamb Peak access road. Goals will be to perform remedial actions on all the soils that are above 530 ppm and retain and repurpose all the clean and contaminated soils on-site. Higher concentration material will be excavated and set aside to be reused as habitat grading. Lower concentration material will be tilled to decrease the concentration, which is much of Cave Lake wetland. Pilot studies this fall will use two different tilling methods to see if this is adequate and cost effective. Restoration Design - is based on six wetland cells throughout the Cave Lake and Lamb Peak, 3 cells in each. This will allow water surface elevations to flux +/- 3 feet of the typical management pool elevation. It will also provide infrastructure for water management and maintenance – inlet and outlet controls within each cell and each wetland. They will develop habitat grading to represent IDFG wetland depth-area targets and incorporate variable and diverse topography with varying edge habitat into the grading to provide hydrological variability in depth and duration. Their wetland water management will have pump discharges to the CDA River during the cooler months (January – May) to lower wetland water surface elevations for long term maintenance and for annual water level management; and gravity discharges will operate when the river elevations allow it to occur – two locations in Lamb Peak and one in Cave Lake.

Dave Leptich from IDFG updated us on the spring activities – Dewatering has been an important resource and social issue at Black Lake due to the wetland discharge into the lake, which contributes to nutrient loading and possible algae blooms that impact summer recreational use. This was bad in 2020 as there wasn't any discharge in 2019, so they did not finish dewatering until July. In 2021, dewatering began earlier and was finished up by Memorial Day which was good for the impact on recreational use of the lake. Dry fields - are needed to allow agricultural equipment access early in summer to control Reed Canary Grass and to reduce or eliminate direct application of herbicides to surface water; also, to conduct tilling studies to be completed this summer; and finally with the Lambs Peak infrastructure improvements they will be cutting into soil surface down to the water table to increase constructability. In collaboration with IDL, IDFG conducted a spring control burn at Lambs Peak in preparation for the chemical control of Reed Canary Grass. This grass leaves a heavy thatch at the end of the growing season that persists with the next growing season creating a barrier to the chemical spray. Burning exposes the new growth to the herbicide application, which was applied 6 weeks after the fire for best treatment. In wetland restoration, Reed Canary Grass is a challenge on two fronts – it is an aggressive non-native grass that displaces native wetland species and makes establishment of new plant communities difficult; it also produces a thick sod layer complicating and increasing the cost of construction. By treating over multiple years, they are hoping to decrease the post restoration competition and improve their success of establishing new plant communities.

Kim shared their schedule for the upcoming work that is planned – the Lamb Peak Wetland infrastructure construction will begin Fall/Winter 2021; Cave Lake tilling pilot project in late September; the 60% basis of Design Report/Remedial Action and Restoration Work Plan should be complete in September; and Remediation and Restoration construction is scheduled to begin in 2022-2023.

Kim continued with an update on the Lane Marsh incremental thin layer capping project, which was started back in 2015, and has been monitored for the past 5 years. This project evaluates placing Incremental layers to sensitive wetlands which cannot sustain a heavy cap. Lane Marsh has high metal concentrations and a lot of waterfowl use. Clean native material has been placed in increments to reduce lead exposure to waterfowl while maintaining the integrity of local wetland vegetation. In 2020, sediment sampling results showed evidence of recontamination most likely due to flooding and erosion from wind and wave action. Vegetation monitoring results were very promising – up to 6 inches of clean soil within 1 to 2 years; plant species reestablished to similar percent cover and diversity after treatment without increasing noxious weeds; and the cap reduces lead exposure without adversely affecting marsh vegetation.

Mark Jankowski presented on waterfowl monitoring and replicating past studies of measuring lead in swan fecal samples to discover what their contamination levels are and what they actually consume. In the spring they went out with the CDA Tribe Biologists, Idaho F&G, EPA, US Fish & Wildlife and Mike Schlepp to collect samples. As we have more habitats cleaned up, it is unclear how the changes in sediment lead concentrations are affecting aggregate swan exposures over time. Feeding habits differ with vegetation type which can vary across different sites making sediment sampling an uncertain representation of swan exposures specifically. This pilot season indicated similar patterns of what was found in studies from 1998. Fecal and sediment samples were collected from Hepton, Robinson, Schleps and Strobel sites – with higher concentrations of sediment in the fecal samples taken from Hepton and Robinson. Pilot data also supported a way to normalize fecal lead concentrations in order to compare across sites more appropriately. Future work in 2022 include: sampling these four sites again; compare fecal, sediment and blood lead for biological relevance; examine DNA in fecal samples for species verification and plants consumed; examine isotope ratios to determine contribution of CDA lead in samples; examine lead speciation to determine whether swans may alter sediment lead speciation to a more bioavailable fraction; and linking lead concentration measurements to swan individual and population health using a modeling approach.

Kim went over the presentation for the Biochar Incubation Trials as she was having trouble with Shannon Plunkett's slides and sound, she is a one of their grad students from EPA's Office of Research and Development. The research questions asked were how to best quantify soil lead bio accessibility in a wetland environment; and how do biochar amendments impact soil lead bio accessibility? First, they wanted to evaluate how bio accessible the control samples were – she studied Lane Marsh and two other areas that were not Bunker Hill with drier environments. They learned when collecting samples that it depended on how the samples were assayed to how bio accessible they were – exposing the sediment to oxygen nearly doubled estimated bioavailable lead from 41% to 74%. Looking at the geochemistry in these samples they also found that low oxygen samples were staying as a lead sulfide, and when air dried (exposed to oxygen), the majority of the lead in the samples was sorbed to iron oxides. Sixteen biochars were evaluated as treatments. The biochars were made from manure (30%) and plant material (70%) and produced at 4 temperatures (300, 500, 700, 900° C). Through the whole process they concluded that the treatment strategy using the biochar in wetland soils did not have any measurable effect compared to the effect of changing redox conditions. This will be something to keep in mind as they select remediation strategies at additional sites, but also for assaying samples for exposure to waterfowl.

Patrick Hickey covered Waste Consolidation Areas (WCA) and possible locations as wastes are generated from remedial cleanups in the Lower Basin. WCA's are much like repositories as they help protect human health and the environment and are uniquely engineered to hold waste securely. Once filled and closed they are monitored into perpetuity. Differences from repositories – project and waste specific, close to

the project area, they help reduce loads on regional repositories and do not contain ICP waste. Careful consideration is taken when locating a WCA such as – designed and sited for specific remedial action; minimize any leaching into ground and surface water; and must be reasonably flat and accessible from existing roads or the river. In 2009, the public was consulted about concerns they had for siting a WCA and from that created a list of citizen criteria. We revisited last year and asked for any updates the public had and they include impact to wetlands, surface water, fish and wildlife; impact on flood plains, proximity to faults and landslide areas and where people living and working nearby; impact to businesses along truck haul routes, trucking costs and potential for economic redevelopment once WCA is complete. These concerns were added into the Trust technical aspects used in helping locate a site. Two Trust properties are currently undergoing sampling and surveying for possible project use and WCA locations – one at Dredge Road property and the other at South River Road. The challenge to locate other potential sites increases as more people are moving into the area for housing and recreation. The CDA Trust will continue to look for sites as WCA's will be a crucial and fundamental tool in the remediation of the Lower Basin.

Ed Moreen presented a slide show that was also given to the NAS meeting on Monday the 19th covering Dudley Reach and Source Control in the Lower Basin. EPA is currently in the planning phases of implementing a pilot project to address riverbed contamination, specifically at Dudley Reach which is located at river mile 159. Cataldo Reach, which is upstream from Dudley Reach, will also be the future focus of riverbed stabilization. About 73% of lead source comes from the CDA riverbed; inflow and bank erosion are relatively minor contributors. Widespread contamination exists throughout Dudley Reach both at the surface and in depth as explained through sampling that was conducted. Suspended sediment monitoring has also highlighted a step increase in lead during high flow events. The exact location of the pilot project will be adaptively managed based on collection and data analysis, with the current viable approach to be a combination of dredging and capping. Dredging will only be used as necessary to minimize adverse system responses like increases in water surface elevations. This technology may be adjusted to commensurate with site specific conditions and the remedial location, additional data collection, or evolution of the enhanced Conceptual Site Model for the Lower Basin or during design. There are many challenges to this in-channel pilot project: dredging requires a disposal site to be constructed in the Lower Basin; deep water channel remediation requires additional measures/skills; data set is limited as additional data could result in adjustment to location or technology; upstream sources pose a risk of recontamination; measurement of the reduction of the transport of lead contaminated sediments into Lake CDA will be difficult to measure; and seek minimizing adverse impacts. EPA is currently in this planning stage 2021; with design and compliance with ARARs in 2022-2023; and implementation would then follow in 2024-2025. Characterization of the riverbanks in the Cataldo Reach is planned to commence in 2022, with the goal to begin first set by 2026 after planning and design. A second in-channel pilot and riverbank stabilization are planned to follow characterization beginning in roughly 2026 and 2027.

Rebecca's question pertained to Lane Marsh, did you analyze the water potato tubers for metal concentrations since the thin layer capping? I am curious as to how this data will better inform us where tundra swans are ingesting contaminated sediment given all the NRDA blood lead data that has been collected over the last 25 plus years– Kim replied they have not analyzed water potato tubers for metal concentrations at Lane Marsh or Gray's Meadow, although she believes there have been some analyses conducted in the past. Previous risk analyses have determined that the primary pathway is through direct ingestion of the sediment while foraging, but I agree there is a need to collect more data on water potato metal concentrations.

Jamie Sturgess had a question for Ed – can they expedite the bank stabilization at Dudley Reach during this interim period since the technology is established and much has already been done on the lower river. Ed stated they were focusing their efforts on better information and characterization of the river banks so stabilization can be prioritized. They have talked about how to accelerate this process but have determined they have work to do first, addressing the sources and spending dollars wisely.

Rebecca also commented since the riverbed contributes ~ 70% of the contaminant transport, stabilizing the banks seems secondary as per priority- Ed noted that it was equivalent to what was coming in from upstream as well as what's coming from the riverbanks basin wide looking at lead contributions to Lake CDA. Andy asked if their bank stabilization method also determine whether you are dredging or capping that stretch of the river - and Ed replied absolutely, when they are doing any work in-channel they will be addressing the riverbanks at that time if they are a contributing lead source.

Idaho Renewables - Using SmartChar to Biologically Isolate Heavy Metals – Dr. Joe Roesler gave a presentation on SmartChar which is biochar that has been amended. Any organic substance will burn when exposed to high heat and sufficient oxygen – what is left behind is ash. When exposed to high heat but no oxygen it will be reduced to Char, which is defined both by its chemical composition as well as its physical structure. Quality biochar is mostly pure carbon with high surface area, and when manufactured and applied as an absorbent for toxins, can be a functional and less expensive alternative to activated carbon. It can be produced locally from standard biomass and has a much friendlier carbon footprint than most activated carbons. It can also be a cost saving and green filler for polymers; clean and green carbon delivery device for the steel and silicon industry; a bedding amendment for the poultry industry (binding ammonium); a food additive to many farmed animals; the main ingredient of products which bind oil in the presence of water; and a soil amendment for agriculture for improving poor soils. SmartChar is biochar that has been produced and modified in order to accomplish a more specific purpose to customize solutions at a higher performance. It has been intensely researched in the last ten years and has documented success in lab environments. One example was given, they prepared a 100 gram sample consisting of biochar and zerovalent iron (SmartChar #5) and submitted it to SVL lab in Kellogg for leachate testing (extraction test for arsenic, cadmium, lead and zinc). SVL found that SmartChar #5 removed 99% of all four element contaminations simultaneously. It also had the effect of nearly neutralizing (pH 6.2) the very acidic test medium (pH 2.4). Idaho Renewables SmartChar is looking to develop a family of absorbent based solutions, customized to address specific environmental issues with best possible efficiency.

Vermont added that they can provide the SVL data as needed, and the studies referenced at the end of the presentation. They clearly show the strong remediation potential engineered char has for lead, cadmium, arsenic & zinc. As Dr. Roesler demonstrated, not all chars are the same and the best results come from properly prepared, high-quality char. He also stated that most of these studies reference were from 2020-2021.

Kim Prestbo said it would be interesting to see the results on the acid mine drainage results from SVL. Can they point to any specific research where biochar has been successful in sequestering lead or acid in mine waste soils either in dry environments or wet/dry as in the Lower Basin? Joe said there have been several studies and referenced the list of those that were in his presentation for Kim to go look at; he stated they have been very successful. Ed posted that it would be most helpful if they would provide the list of publications on those metals – Dr. Roesler will try putting them into a zip file.

Natura Solve – Remediation of contaminated soil and water –Jennifer Mitchell introduced her team, and stated she was just in the Kellogg area and collected some water samples from the Bunker Hill that they will analyze. Kyle Mitchell gave a brief overview; their application concept for Natura Solve will utilize bioremediation products and custom growth medium tanks to treat large waterways in Idaho for:

- Heavy metals – Watermix by Natura Solve is a safe and natural blend of microorganisms that removes an array of heavy metals that are potentially hazardous to ecosystems. It can handle zinc, arsenic, lead, calcium, mercury, iron, cadmium and phosphorus. By encapsulating and rendering harmful materials inert in a membrane shell, Natura Solve’s biology captures harmful materials dissolved in fluid and places them safely at the base of a system.
- Chemicals – renders complex chemicals inert by breaking their complex bonds. The non-genetically modified materials in our mix are effective in one to two treatments, or through custom treatment options.
- Organic Materials – Natura Solve’s base is an EPA listed, safe and natural blend of biology that removes 30% or more of volatile solid waste, biological waste products, and all pathogens. The natural solution of microorganisms eliminates odors as well and rapidly reduces algae and other organic materials from waterways.

Bioremediation is not something new and has been used by EPA in other projects going back to 1992. They are confident that their product will work on situations here in North Idaho.

Stephan Prokay a former resident of the Silver Valley and very aware of the lead issues. He works for a company in Utah called Eden Tech, which developed a reverse-osmosis (RO) centrifuge that eliminates the need for power intensive pumps during the filtration process. They are the first ones to have a working RO centrifuge model and can significantly reduce the amount of energy it takes to do a greater amount of osmosis. The fresh water return is about 85-95%; how this helps in the Natura Solve process is by creating a more concentrated brine stream, it reduces the amount of volume that Natura Solve would have to treat. They will also be using a KETOS testing system which is the dosing unit for the Natura Solve compound that will allow the user to have a real-time water quality monitoring and well as monitor any pumps and filters. Their filters are rated to last about 3 years while reducing the need for any high-powered pumps like on most filtration systems.

Dr. Bryon Tarbet talked specifically about the Natura Solve process. The plan is to let the microbial agents help us remove and make insoluble compounds. The process starts by providing them with food then they begin to consume what is in the water. As they use the compounds in the water, they are able to draw in many of the undesirable metals and sequester those. Now with the samples Jennifer was able to collect, we will first show that the metals of interest can be removed from the water column quickly and effectively; and second, the sequestration prevents uptake of these metals by the plants growing in the soil or by any other organisms that may come in contact with these sediments. Results in the past have been exciting; we should have our results back in 5-6 weeks.

Rebecca asked if they were contracted with one of the governments working on the Superfund site at Bunker Hill – and Jennifer replied that were not. They have just started outlining how they would move forward on this project and initial testing, and will be looking for different layers of support.

Status of flood analysis Elizabeth Park to Smelterville- Derek Forseth, Alta Science &Engineering

Derek updated the status of the flood study and analysis from Elizabeth Park to Smelterville. This section is within the original 21-square mile “Box” and is a little different river system than what is in the Lower

Basin. There are also different concerns as far as hydrology and flooding characteristics; and the entire scope of the study is within the ICP boundary. A flood study was commissioned by a flood working group made up of the City of Kellogg, the Basin Commission (BEIPC), Shoshone County, and the City of Smelterville. The findings are showing that we have a significantly different understanding of the flood forecast from what FEMA had on their maps. The study was performed by the Corp. of Engineers through their floodplain management services after the request was made in 2017. Data collection started in 2018, which included a lot of local input and background, with completion of the study in 2020. Initial study objectives were to quantify the risk posed by SFCDA River to Kellogg vicinity. These included updating the hydrology; build 1-D baseline hydraulic model (based on existing data); simulate range of flows and document impacts; and to recommend mitigation options to reduce flood risk. A comparison representing the channel in its current state, looking back to the original flood impact study, and thru the updates in used in 2001, 2006 and 2009 to compare channel geometry. They did see some bed change in terms of depths at most of the 26 cross-sections. Large hydrology events occurred with floods in 1933, 1974 and 1996, which were used for model validation. Looking at the two key gauges at Elizabeth Park and near Pinehurst, the 2008 Flood Impact Study (FIS) were based on 14years of data (1988-2002). What lead to the current study and changes or different outcomes in analytics were based on 30 years of data. A 2-D Model was built by the Corp. of Engineers to look at the overbank flooding. They were anticipating a model that would show widespread flooding for both Kellogg and Smelterville, but his model gave them the information they needed to really look at the flows, where flooding was occurring, to give them some alternatives, and being able to come up with some mitigation projects. The Flood Risk Assessment Report for the SFCDA River came out in May 2020 showing quite a difference in the 100-year and 500-Year flow rates for both Elizabeth Park and Pinehurst. This was also the case comparing impacted parcels and acres of floodplain, as both dropped significantly.

Study conclusions:

Hydrology – 100-year flow is currently 60% of what it was calculated to be in 2008;

Hydraulic Results – 2020 vs 2008 water surface elevations were consistently 4-6 feet lower due to updated hydrology;

Flood Risk – Yes, it is important to remember that nothing physically has changed between yesterday and today, no levee upgrades or added channel capacity.

Lessons learned:

Additional gage data improved understanding of Upper Basin hydrology;

Still very limited understanding of hydrologic relationships between smaller side drainages and the SFCDA River;

From a capital project standpoint, this was once seemingly a problem of unsurmountable scale – problem and potential solutions are ‘reasonable’. The flood risk is still real but seems to be more manageable.

Next steps:

Flood study is complete - LOMR application is in process, first round of comments came back with reply coming in August;

New FIRMs issued;

Flood mitigation options/costing/design -> construction.

The City of Pinehurst wrote a similar request to the Corp. of Engineers, same program for the same type of study, which is currently in process. Early results are showing similar trends on Pine Creek.

Rebecca asked if they utilized snow pack, precipitation, frechette data in the modeling efforts as well as

climate change predictions and modeling. Derek replied yes, they did on snowpack and precipitation but not on climate change predictions and modeling. As a result of this study, we have the tools in place and the makings of a comprehensive model if someone wanted to do that. They could stitch together a nice 2-D Model integrating the models developed for Remedy Protection for a contemporary look at watershed hydrology and flood impacts.

Robin Foxx (NOAA) was very interested hearing about the study in Pinehurst. The NOAA does not have any flood stages for Kellogg or forecast on the SFCDA River. Maybe this is something they could work on for the future and with Pinehurst as well.

Dave Leptich from F&G asked if the smaller footprint is largely an artifact of increased sample size and lower variance or was there actual difference in the additional data – did it have a lower range. Derek said the change in forecasted flow rates is the result of the statistical analysis on a larger period of flow data.

Lee Groeschl from NIC wants to know who the best person at Alta would be to connect with regarding material science or field trial work. Derek gave him his email information.

Terry wanted to explain that the original NAS report from years ago had some criticism for us because we weren't trying to deal with flooding and damage to the remedy. The funding came from the City of Kellogg, Shoshone County, Silver Mountain and the BEIPC to file the FEMA requests. We didn't originally think about the maps changing, but how best to deal with flooding and if levies needed rebuilding to protect the remedy. The results from this study did show that we only have to spend a little on capital for levy protection on this reach; we could also save property owners a lot on flood insurance. Terry said they would have to do a lot of the same work for Pine Creek. He is also hoping that upstream from Wallace to Elizabeth Park will be able to do this work as well.

Ed Moreen had a follow-up to Dave Leptich's question – better data for the model are you talking about imagery and topography or more flow data for the river itself. Derek explained that the big difference and what influenced the results was the gauge data at Elizabeth Park and Pinehurst. Having the additional 17 years of record and expanding those statistics that could have backed out some of the conservatism that was needed with the smaller data set. The river itself and comparing elevations did not drive the outcomes of this study.

Dan McCracken was curious if Derek had a sense for how the new water surface elevations in the proposed model compared to some of the well-known historic events – and Derek said they don't know how well they compare as there weren't high water marks to compare to at the time. They did run some of those historical events for calibration; he would love to do this and take the model that is built now and stitch it together with Pinehurst.

Meeting adjourned at 11:28