Copper River EVOS Hydrology Field Work Report
9/4 – 9/6/2018

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This report includes the discharge data collected and field notes on gage installation for Copper River EVOS sites between 9/4 and 9/6/2018. Additional information is provided on the goals for the hydrology work and on the Saddlebag Outwash Area because of its upcoming design work. Some additional data entry and analysis is still required for gage surveys and the 8/21/2018 flood debris survey. During the fieldwork 8 water level logger gages were installed in 8 streams and 11 discharge measurements were collected. Luca Adelfio, USFS assisted on 9/4 & 9/5 and Chantel Adelfio & Shae Bowman, CRWP assisted on 9/6, thanks everyone!

Discharge and Gaging Goals

Discharge measurements can be used for design in two ways. First, once a few measurements are taken they can be correlated to the active USGS gage (#15215900) and a rough flood frequency table can be created. A rough flood frequency table may be more reliable than the available regression equations or at a minimum help interpret regression equation estimates. The second purpose of the discharge measurements is to relate stream stage to discharge at the water level logger gages. A reliable stage – discharge rating curve will take a number of discharge measurements at various flows to create, but it will create a yearlong record of discharge at 30 min intervals. A discharge record from the water level logger gages will be needed to assess flood frequency at sites that do not correlate well to the USGS gage. The local discharge record from these gages will also be better for assessing low flow conditions.

Saddlebag Outwash Area

The Saddlebag Outwash Area includes the Cop 43, 44 and 44 EVOS sites. After assessing the sites in the field we determined that due to beaver dam activity flow was related between Cop 42, Sad 1, Cop 43, 44 and 45 (Figure 1). Luca also reported that the Saddlebag Glacier River occasionally overflows and reaches this system adding intermittent discharge to the primarily groundwater fed system. Depending on beaver activity it is possible that all the flow in the area could flow through any one of the Copper River Highway culverts, although risk of this would be reduced with fish passage culverts. To aid with design decisions we measured all flow coming out of this system, which is why discharge was measured at Cop42 even though it is not a culvert in this project. A benchmark was also installed for measuring pond levels upstream of Cop 42 and 43 to monitor change over time (Table 1, Figure 1).

Table 1. Water levels at Cop 42 and 43 Ponds (Figure 1)

Cop 42 & 43 Pond Level Survey	
FS	**Elv (ft)**
Benchmark behind FS sign	100
Sad 1 Culvert Top U/S	100.07
WSE Pond U/S Cop42 & Sad 1	99.59
Cop 43 Culvert Top U/S	99.54
WSE Pond U/S Cop 43	98.2

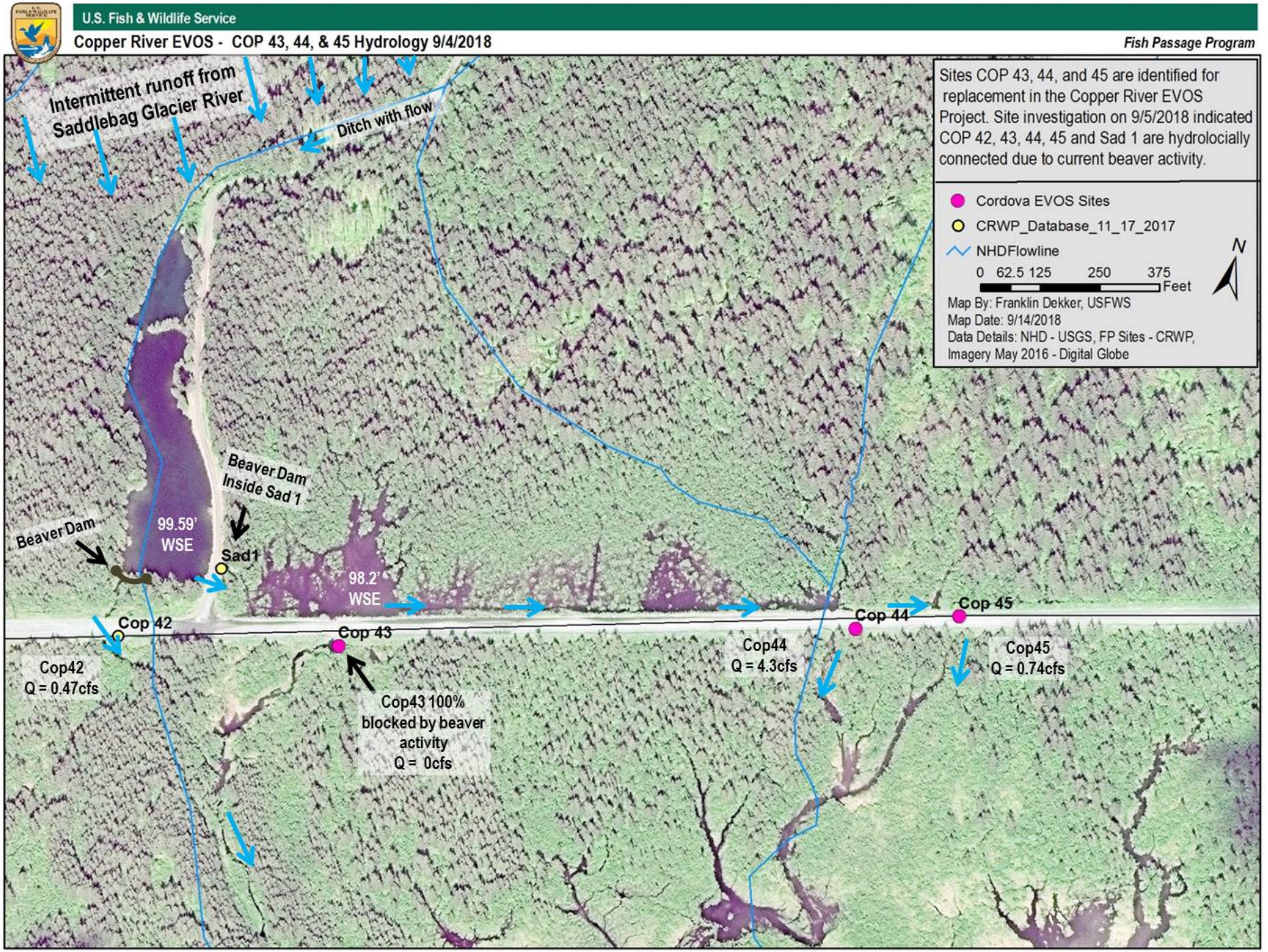

Figure 1. Characterization of the connected hydrology of sites Cop 42, 43, 44, 45 and Sad 1.

Discharge and Stream Gage Data by Area

Area names and characterization from Luca Adelfio, USFS descriptions 8/20/2018

Sheridan Terrace-Airport Group

Flashy system draining lower elevations near the airport

CRWP ID	AKID	EVOS Project Culvert	Plan	Discharge (cfs)	Discharge Date Time	Logger Installed	Logger S/N	Watershed Area Estimate (mi^2)
Cop 1	20100467	YES	improvement	5.78	09:58:41 09.06.2018	Yes @ 10:00am 9/6/2018	20402430	0.8
Cab 1	20101904	YES	removal	Same as Cab2	N/A			0.7
Cab 2	20101905	YES	improvement	1.20	08:50:08 09.06.2018	Yes @ 8:45am 9/6/2018	20381489	0.7

Sheridan Outwash East Group

Groundwater fed streams where discharge measurement is only possible downstream of COP9

CRWP ID	AKID	EVOS Project Culvert	Plan	Discharge (cfs)	Discharge Date Time	Logger Installed	Logger S/N	Watershed Area Estimate (mi^2)
Cop 9	20100475	YES	improvement	1.66	16:00:00 09.04.2018	Yes @ 2:45pm 9/4/2018	20413019	1.0
Sher 1	20101903	YES	improvement	Same as Cop9	N/A			1.0
Sher 2	20101902	YES	removal	Channeless Wetland- Q not measurable	N/A			0.0

18 Mile System

Flashy streams with some beaver activity, this area was separated from Sheridan River outwash system by dike in 1970

CRWP ID	AKID	EVOS Project Culvert	Plan	Discharge (cfs)	Discharge Date Time	Logger Installed	Logger S/N	Watershed Area Estimate (mi^2)
Cop 22	20100488	YES	improvement	6.93	15:48:01 09.05.2018	Yes @ 16:40 9/5/2018	20440859	1.9
Cop 25	20100491	YES	improvement	5.55	14:29:28 09.05.2018	Yes @ 3:01pm 9/5/2018	20430812	2.5
Cop 20	20100486	YES	improvement	2.98	16:34:04 09.05.2018	No - correlate to 25 or 22	N/A	2.1

Piedmont

Flashy stream systems with tidal influence on downstream side of culverts (Cop37 is not a project culvert, but is a temporary by emergency Habitat Permit)

CRWP ID	AKID	EVOS Project Culvert	Plan	Discharge (cfs)	Discharge Date Time	Logger Installed	Logger S/N	Watershed Area Estimate (mi^2)
Cop 33	20100499	YES	improvement	2.96	11:24:59 09.06.2018	Yes @ 11:47am 9/6/2018	20430811	1.2
Cop37		NO	N/A	0.30	12:10:19 09.06.2018	No - Correlate to Cop33	N/A	

Saddlebag Outwash Area

Primarily groundwater fed beaver impacted streams with intermittent glacier river over wash (Cop 42 is not a project culvert but hydrologically connected to Cop43, 44, and 45)

CRWP ID	AKID	EVOS Project Culvert	Plan	Discharge (cfs)	Discharge Date Time	Logger Installed	Logger S/N	Watershed Area Estimate (mi^2)
Cop 45	20100511	YES	improvement	0.74	10:27:40 09.05.2018	No - correlate to 44 or 42	N/A	0.1
Cop 43	20100508	YES	improvement	No Flow	N/A	No - correlate to 44 or 42	N/A	0.1
Cop 44	20100510	YES	improvement	4.20	10:52:41 09.05.2018	Yes @ 11:04am 9/5/2018	20430810	1.0
Cop 42		NO	N/A	0.49	11:24:19 09.05.2018	Yes @ 12:15pm 9/5/2018	20430817	