

# Hangman Creek Stabilization & Restoration: Methods to the Madness

**Presenter:**  
**Dan Ross**













# Hangman Creek Contributing Factors to Volatility

- Transboundary watershed (ID/WA, 4 counties)
- Water quality - 303(d) List: fecal coliform, pH, temperature, dissolved oxygen, turbidity (complications to Spokane River)
- Water quantity – flashy hydrology (range of over 20,000 cfs to less than 1 cfs), low critical period flow
- Habitat - heavy agricultural land use (260,000 acres), woody riparian habitat is characterized as absent, highly eroding vertical banks.
- Water Storage Issues – land use changes
- Urban/residential Development









**UNDER CUTTING**



## February 2017 - 10K CFS Runoff Event



**Mobilized approximately 16,000 tons of stream bank material from the site... In one event!!!**



# **Erosion Inventory and Assessment - 2003 & 2022**





**Table 5.** Hangman Creek Active Erosion Inventory Results (2003 & 2022)

Reach ID	Reach Length (mi)	Erosion Class I 3-9 (ft)		Erosion Class II 10-28 (ft)		Erosion Class III 29-65 (ft)		Erosion Class IV 66-125 (ft)		Erosion Class V 126-300 (ft)		Total Active Erosion length (ft.)	
		2003	2022	2003	2022	2003	2022	2003	2022	2003	2022	2003	2022
1	4.7	456 (3)	520 (4)	0	0	0	0	0	0	0	0	456 (3)	520 (4)
2	0.4	211(1)	320 (1)	0	0	0	0	0	0	0	0	211 (1)	320 (1)
3	2.6	422 (1)	0	0	0	0	0	0	0	0	0	422 (1)	0
4	0.5	158 (1)	662 (3)	0	0	0	0	0	0	0	0	158 (1)	662 (3)
5	3.6	898 (3)	1,217 (8)	0	0	0	0	0	0	0	0	898 (3)	1,217(8)
6	5.3	3,115 (9)	2,355 (12)	0	0	0	0	0	0	0	0	3,115 (9)	2,355 (12)
7	1.4	1,478 (5)	220 (1)	0	0	0	0	0	0	0	0	1,478 (5)	220 (1)
8	2.0	1,742 (6)	680 (3)	0	0	0	0	0	0	0	0	1,742 (6)	680 (3)
9	1.5	2,323 (6)	320 (2)	0	550 (1)	0	0	0	0	0	0	2,323 (6)	870 (3)
10	1.1	475 (3)	80 (1)	0	700 (1)	0	0	0	0	0	0	475 (3)	780 (2)
11	1.2	845 (5)	1,210 (2)	201 (1)	120 (1)	0	0	0	0	0	0	1,046 (6)	1,330 (3)
12	2.1	1,320 (3)	750 (3)	0	0	0	0	0	0	0	0	1,320 (3)	750 (3)
13	7.4	2,376 (16)	2,505 (9)	370 (1)	750 (2)	0	0	0	0	0	0	2,746 (17)	3,255 (11)
14A	1.9	1,531 (3)	1,415 (2)	264 (1)	900 (1)	0	0	0	0	0	0	1,795 (4)	2,315 (3)
14B	1.1	2,059 (4)	1,220 (3)	241 (2)	500 (1)	0	430 (2)	0	0	0	0	2,300 (6)	2,150 (6)
15	2.3	1,543 (6)	2,335 (8)	3188 (6)	1,660 (4)	0	400 (1)	0	0	0	0	4,731 (12)	4,395 (13)
16	0.8	0	0	0	0	0	0	0	0	0	0	0	0
17	0.7	0	1,100 (2)	0	0	0	0	0	0	0	0	0	1,100 (2)
18	3.3	739 (1)	390 (5)	2,218 (12)	2,675 (9)	2,112 (3)	2,900 (6)	0	0	0	0	5,069 (16)	5,965 (20)
19	4.1	0	0	950 (6)	1,710 (7)	475 (3)	1,090 (3)	370 (1)	250 (1)	0	0	1,795 (10)	3,050 (11)
20	2.4	0	0	1,214 (4)	1,810 (6)	475 (1)	640 (1)	0	0	0	0	1,689 (5)	2,450 (7)
21A	1.3	0	0	1,056 (2)	740 (2)	0	400 (1)	1,531(3)	0	0	0	2,587 (5)	1,140 (3)
21B	1.0	0	0	100 (1)	0	164 (1)	250 (1)	0	0	0	0	264 (2)	250 (1)
21C	3.8	211 (1)	0	739 (2)	180 (1)	650 (2)	325 (1)	2,218 (2)	400 (1)	0	0	3,818 (7)	905 (3)
22	2.0	0	0	202 (1)	0	0	450 (1)	686 (1)	0	0	0	888 (2)	450 (1)
Totals	58.5	21,902 (77)	17,299 (69)	10,743 (39)	12,295 (36)	3,876 (10)	6,885 (17)	4,805 (7)	650 (2)	0	0	41,326 (133)	37,129 (124)









**Prioritization**



**Stabilization**



**Restoration**







# **Stabilization Timeline**

- Site Assessment & Cost Estimate (1-2 Months)
- Funding Request(s) (4-6 Months)
- Hire Design Engineer (1 Month)
- Prelim. Design Development (2-3 Months)
- Prelim. Design Review w/Agencies (2-3 Months)
- Finalize 90% (Permit Ready) design (1-2 Months)
- Submit Permit Applications (1 Month)
- Obtain Permits (6-8 Months)
- Bidding process (1 Month)
- Construction Phase (1-3 Months)

**Implementation Process Can Take up to 2.5 years!**





# Restoration Timeline

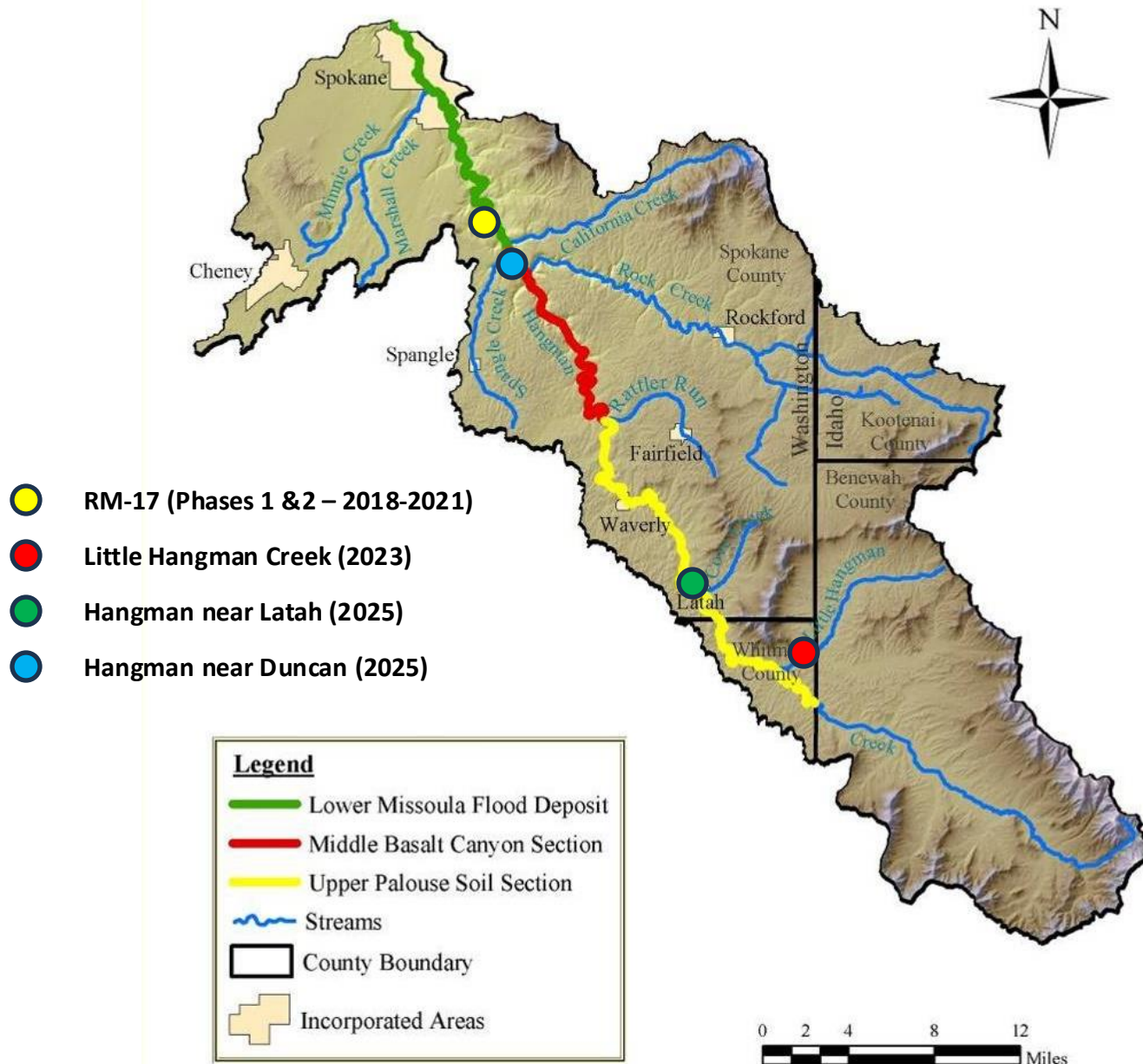
- Native grass seeding - Year 1
- Weed maintenance - Year 2
- Tree/shrub installation - Year 3
- Maintenance - 3 to 5 years

**Randy Baker**

Riparian Program Lead

509-535-7274 Ext. 220







# Hangman Creek RM-17 - Phase 1 (2018-19)







**Rock Toe Protection**

**Coir Erosion Fabric**



A photograph of a river with a woody revetment bank. The bank is constructed from a large pile of logs and branches, extending into the water. A dark pickup truck is parked on the muddy bank in the background. The river flows through a landscape with a dense forest of evergreen trees in the distance and some houses visible on a hill. The water is murky and brown. The sky is overcast with grey clouds.

## Woody Revetment Bank











# RM-17 Phase 1 - Construction Completed July 2019

Log Jam Revetment Bank





A wide-angle photograph of a construction site for a water management project. In the foreground, a large area of brown, disturbed earth is visible. To the right, a body of water, possibly a reservoir or pond, is bordered by a black plastic liner. A line of green reeds or grasses grows along the water's edge. In the middle ground, an orange excavator is positioned on a dirt path, with its arm raised. A red and white dump truck is parked nearby. A person in an orange shirt stands near the truck. The background features a steep, eroded hillside with exposed soil and a line of tall evergreen trees. The sky is blue with scattered white clouds.

**RM-17 Phase 2**  
**Started Construction:**  
**June 2022**

















**Fabric Encapsulated Soil Lift – FESL**















A photograph showing a riverbank with a steep, eroded soil bank. The bank is covered with dry, yellowish-brown grass and some exposed roots. In the background, there is a white house with a grey roof, partially obscured by several tall, dark green evergreen trees. The sky is blue with some light clouds. The river water is calm and reflects the surrounding landscape.

# **Bank 1 Before**





**Bank 1**  
**After**



# Bank 2 Before





# Bank 2 After





# Bank 3 Before





# Bank 3 After

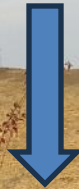




**Streambank  
Stabilization**



**Riparian  
Restoration**







## Hangman Creek River Mile 17 Restoration

- 4 landowners
- 2 Phases (5 years)
- > 1 mile of bank treatments
- Restoration planting/maintenance - Ongoing
- \$788.5K Combined Initial Investment



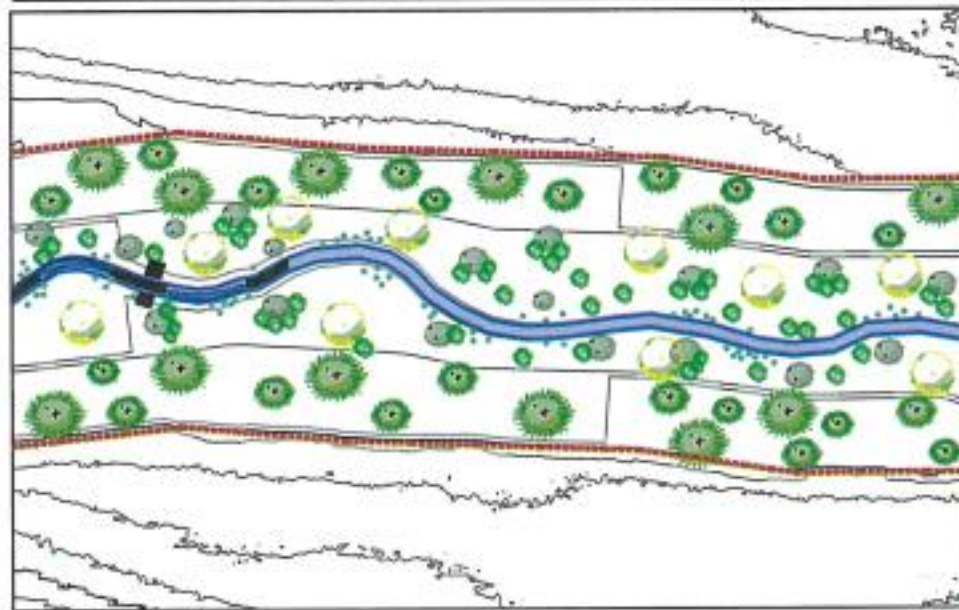
# Little Hangman Creek Restoration - 2023

## Cause & Effect:

Straightened & Incised Channel (Human Influenced) =  
No floodplain access = Active Bank Erosion =  
Instability & Sediment Contributions = Poor Habitat



## FLOODPLAIN & TERRACE REVEGETATION AND ROUGHNESS - PLAN VIEW



Stream Corridor  
110' Typical

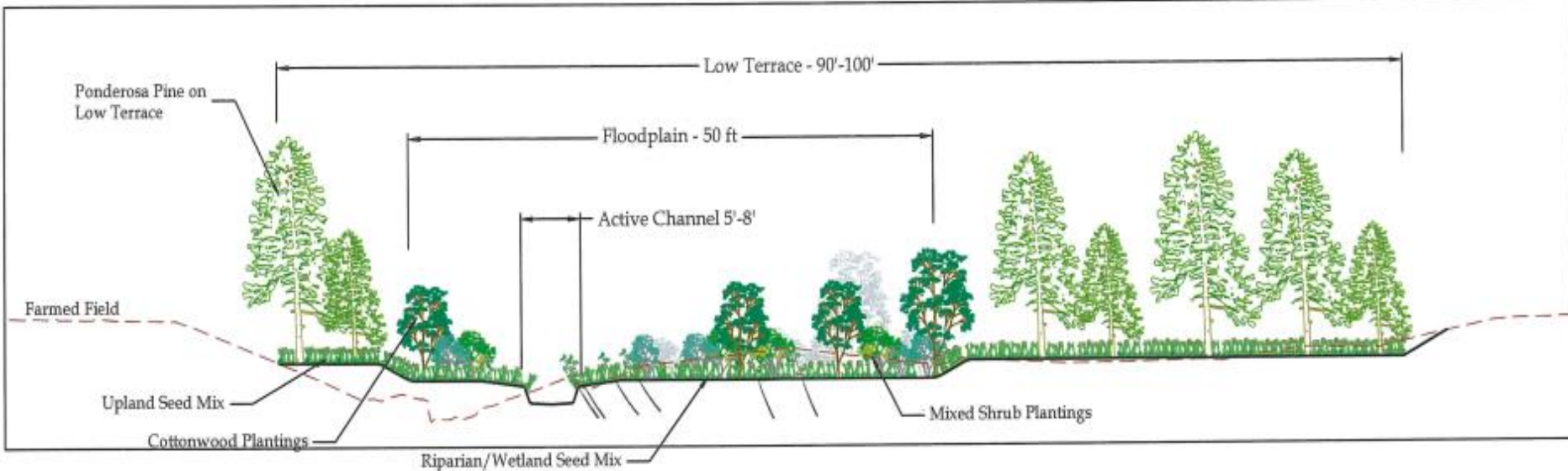
Low Terrace  
90'-100'

Floodplain  
50'

**Planting Area:**

**Floodplain = 4.3 Ac.**

**Low Terrace = 3.8 Ac.**










**Corridor Excavation = Approximately 30,400 YD<sup>3</sup>  
(3,040 Standard Dump Truck Loads)**







## Channel Re-establishment: Meanders & Floodplain Access



# CHANNEL CROSS SECTION DETAIL

Outer Layer - Woven Coir Matting  
(GEOCOIR® / DeKoWe® 900 or  
equivalent - 6.56' X 164' rolls

18" Length Diagonal Cut  
Dimensional 2 X 4  
Lumber Stakes

Inverted Reed Canary  
Grass Sod Wrapped in Coir

Active Channel 5'-8'

1.5'

0.5'

Streambed material salvaged from  
existing channel or at Vertical  
Gravel Controls with Streambed  
Gradation

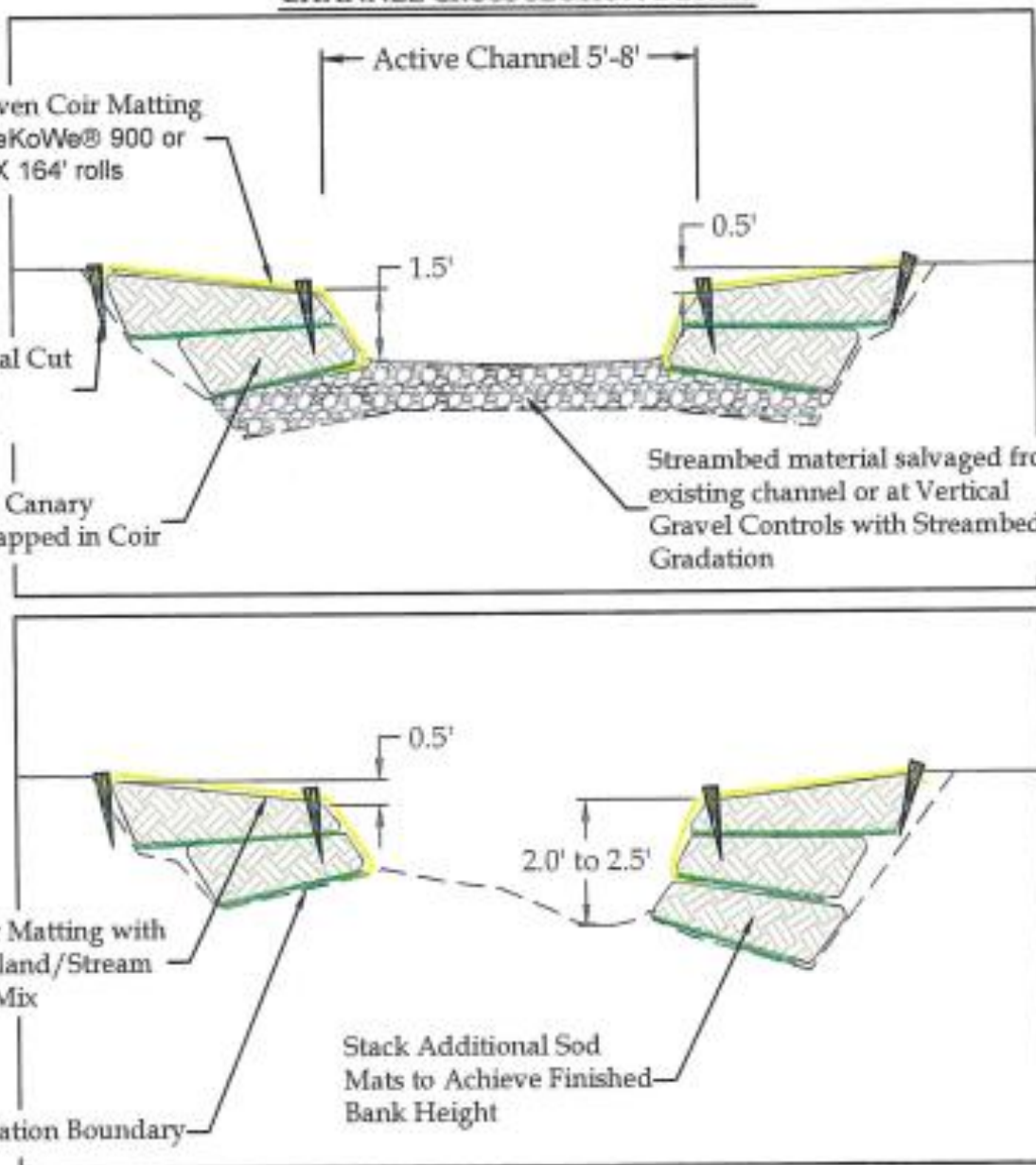
Seed Under Matting with  
Native Wetland/Stream  
bank Seed Mix

Sub-Excavation Boundary

Stack Additional Sod  
Mats to Achieve Finished  
Bank Height

2.0' to 2.5'

0.5'























## **Little Hangman Creek Restoration:**

- **Construction Completed October 2023**
- **Restoration planting/maintenance – Ongoing**
- **4,570 L.F. of Stream Stabilization**
- **\$690K Combined Initial Investment**



# Questions?



Dan Ross  
Spokane Conservation District  
[dan-ross@spokanecd.org](mailto:dan-ross@spokanecd.org)  
509-535-7274 x229