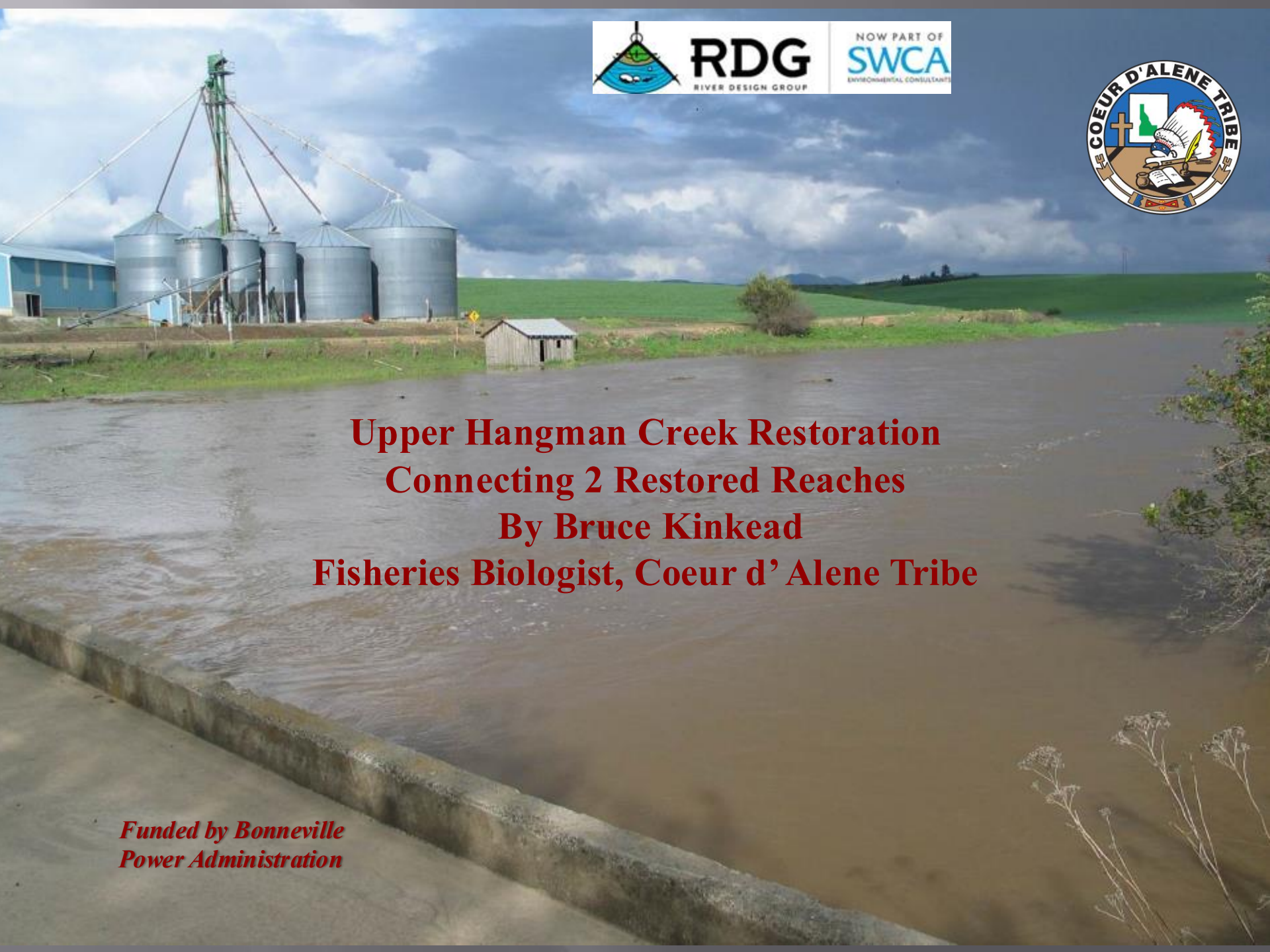
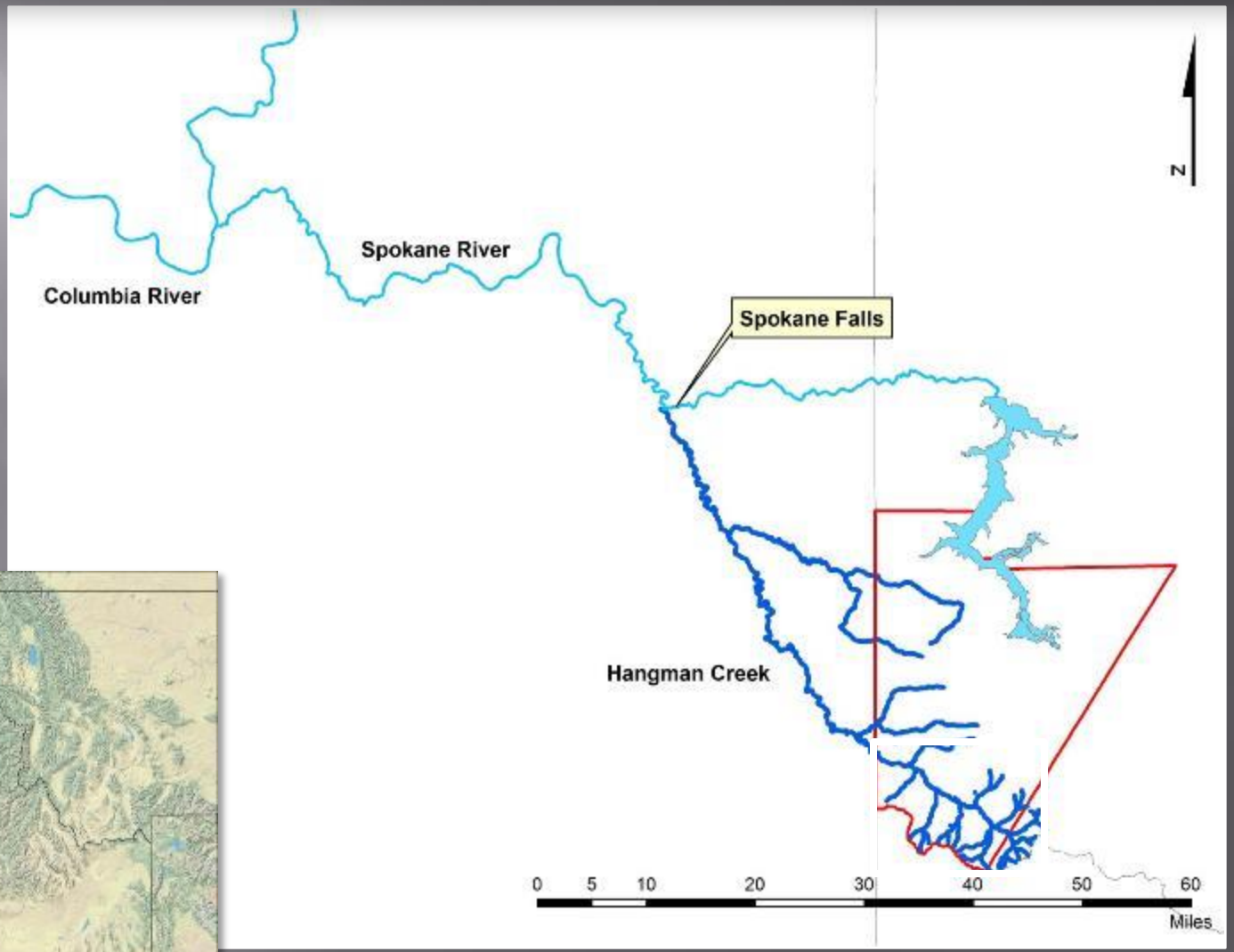


Upper Hangman Creek Restoration
Connecting 2 Restored Reaches

By Bruce Kinkead
Fisheries Biologist, Coeur d' Alene Tribe

Funded by Bonneville Power Administration

Hangman Creek Watershed



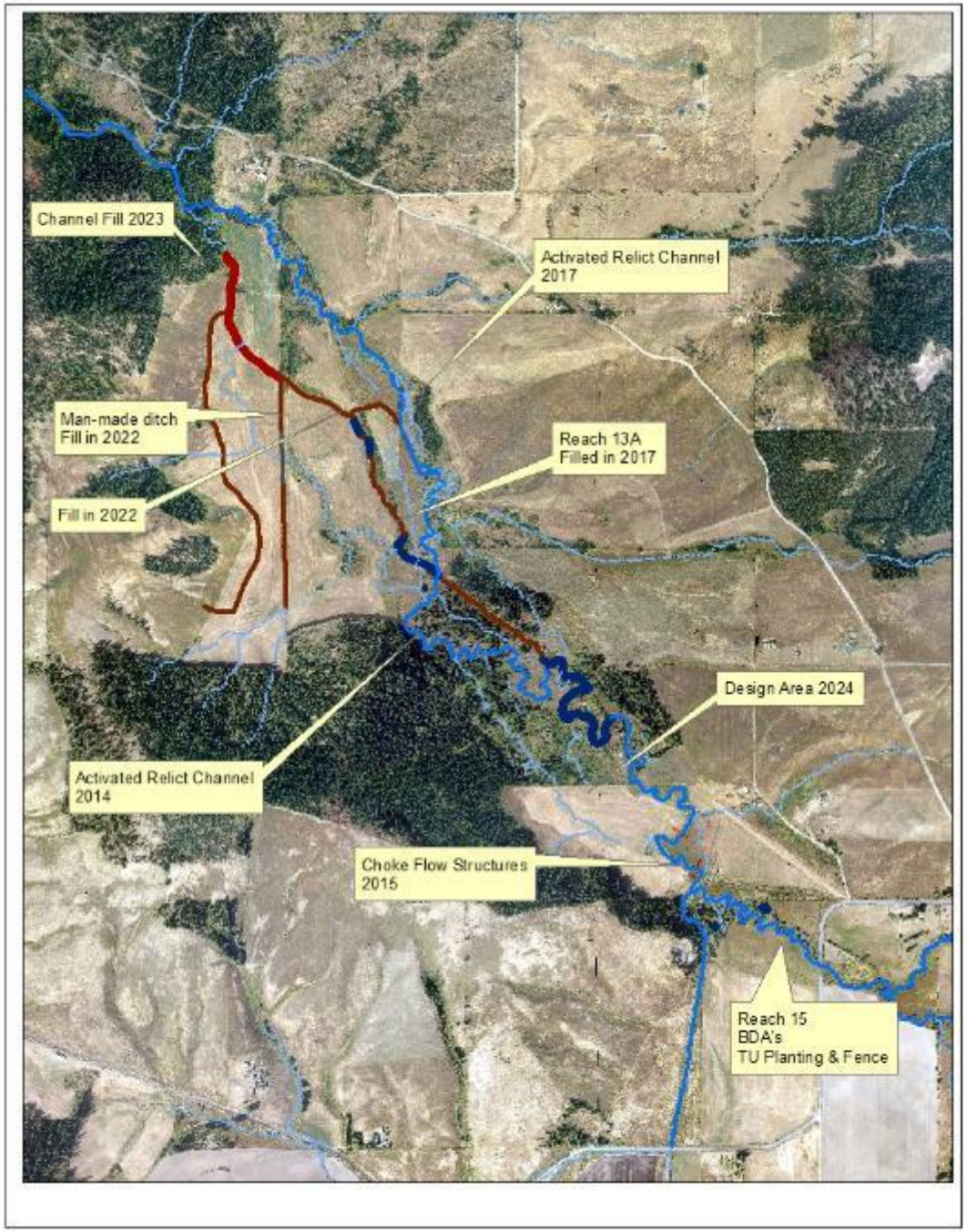
Sanders, Idaho 1905

Railroad line laid down and the channel excavated to prevent flooding out of the channel during 1930's – 1940's.

Similar excavations in the 1960's west of HWY 95 by the Army Corps of Engineers to prevent flooding onto dryland farms

Summary of K'wne' 'ulchiyark'wmtsut

- Purchased 3 miles of Valley bottom properties
- Activate Relict Channels & Fill Existing
- Choke Structures
- Beaver Dam Analogs
- Fill Man-made drainage ditches
- Re-enforce existing beaver dams
- Systematic riparian enhancement based on elevation zones



Phase I:
Before and
After
Relict Channel Activation

Phase 2: ChokeFlow Structures

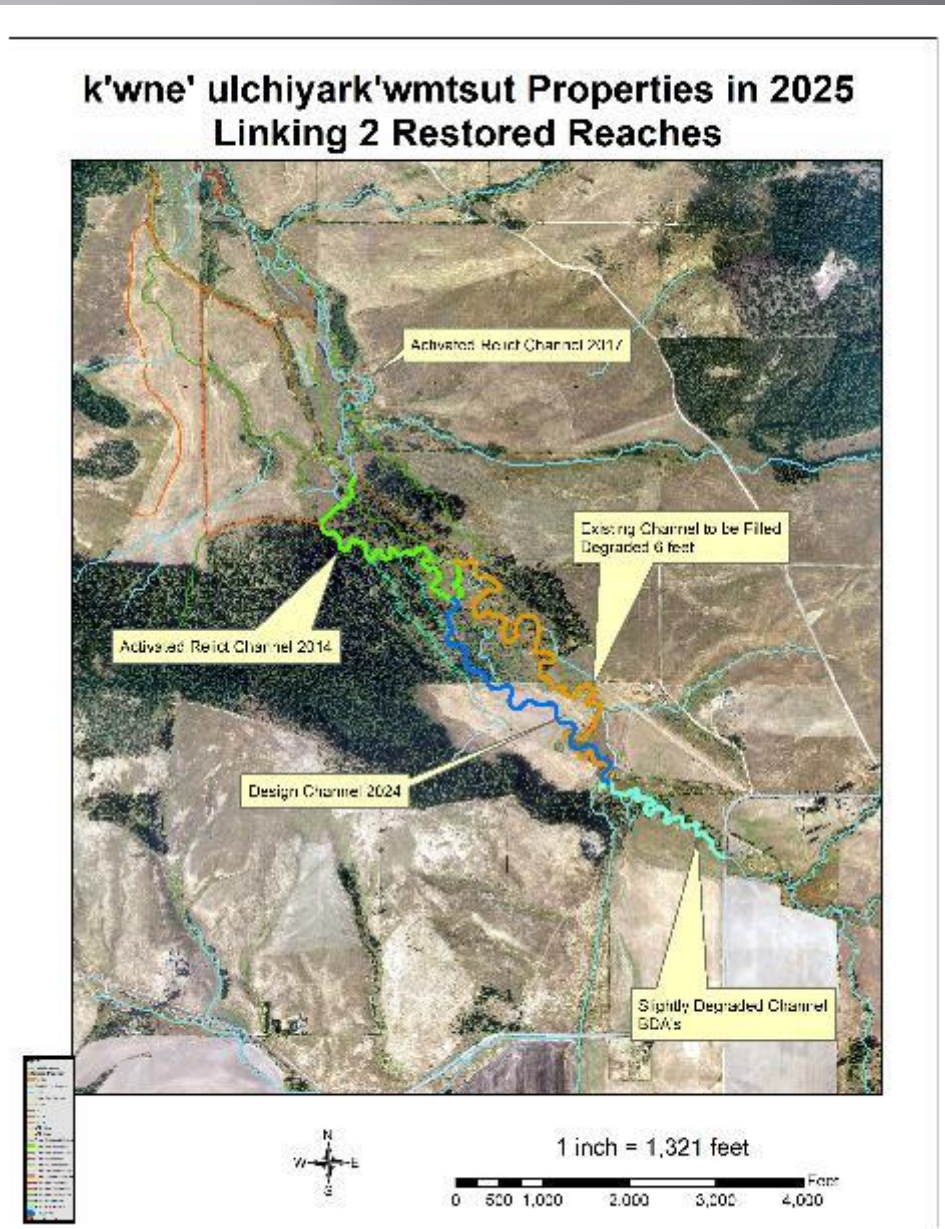
Phase 3: Before and After Relict Channel Activation

Phase 4: Moderately Impacted Channel

- Beaver Dam Analogs
-
-

Grazing is the major impact in the Sanders area.

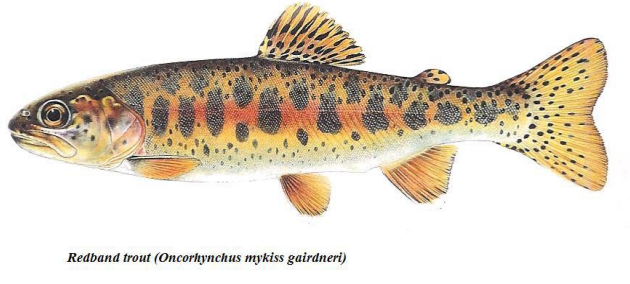
Current Design Area



PROJECT OBJECTIVES

- Improve valley floodplain connectivity and allow for natural processes to occur where possible
- Reestablish a channel network that conveys year-round flow and allows for frequent flooding.
- Enhance off-channel habitats that will function naturally and in conjunction with Beaver activity.
- Create conditions for native wetland plant communities to flourish.
- Remediate perennial deep-water habitat that are oxygen deficient and unsuitable for native redband trout.

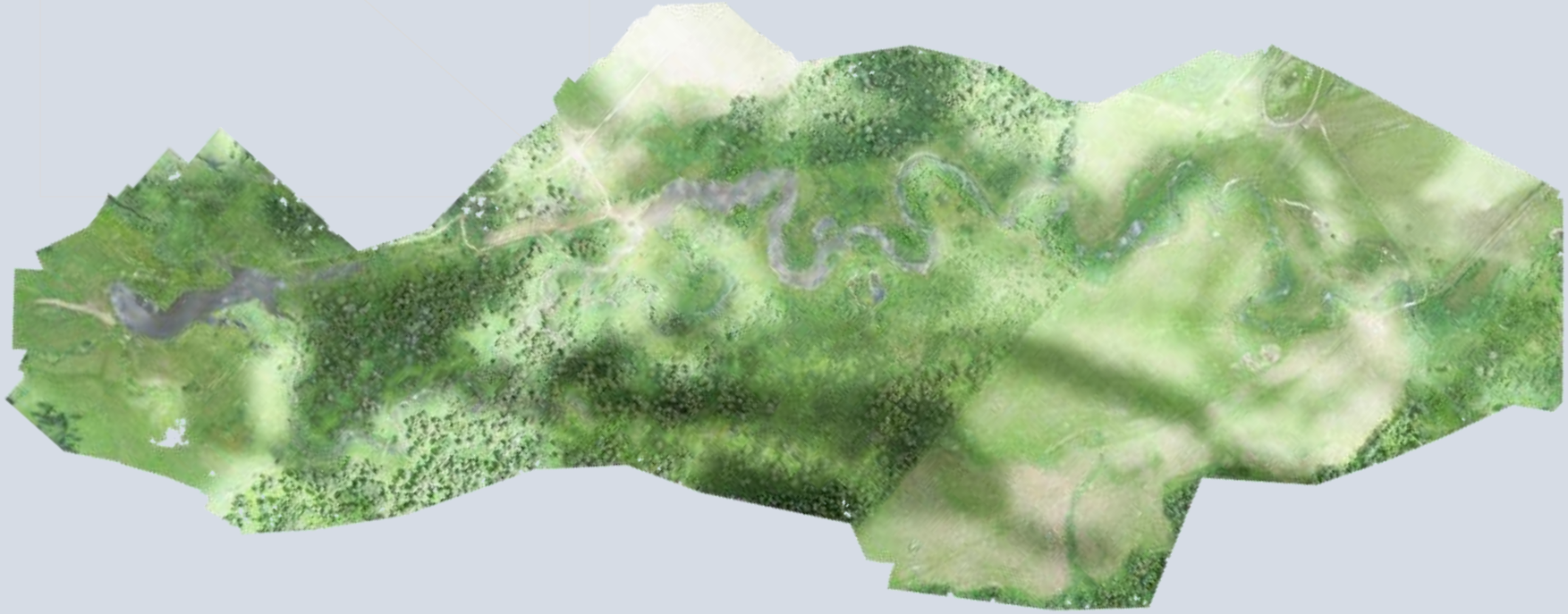
Target Species: redband trout



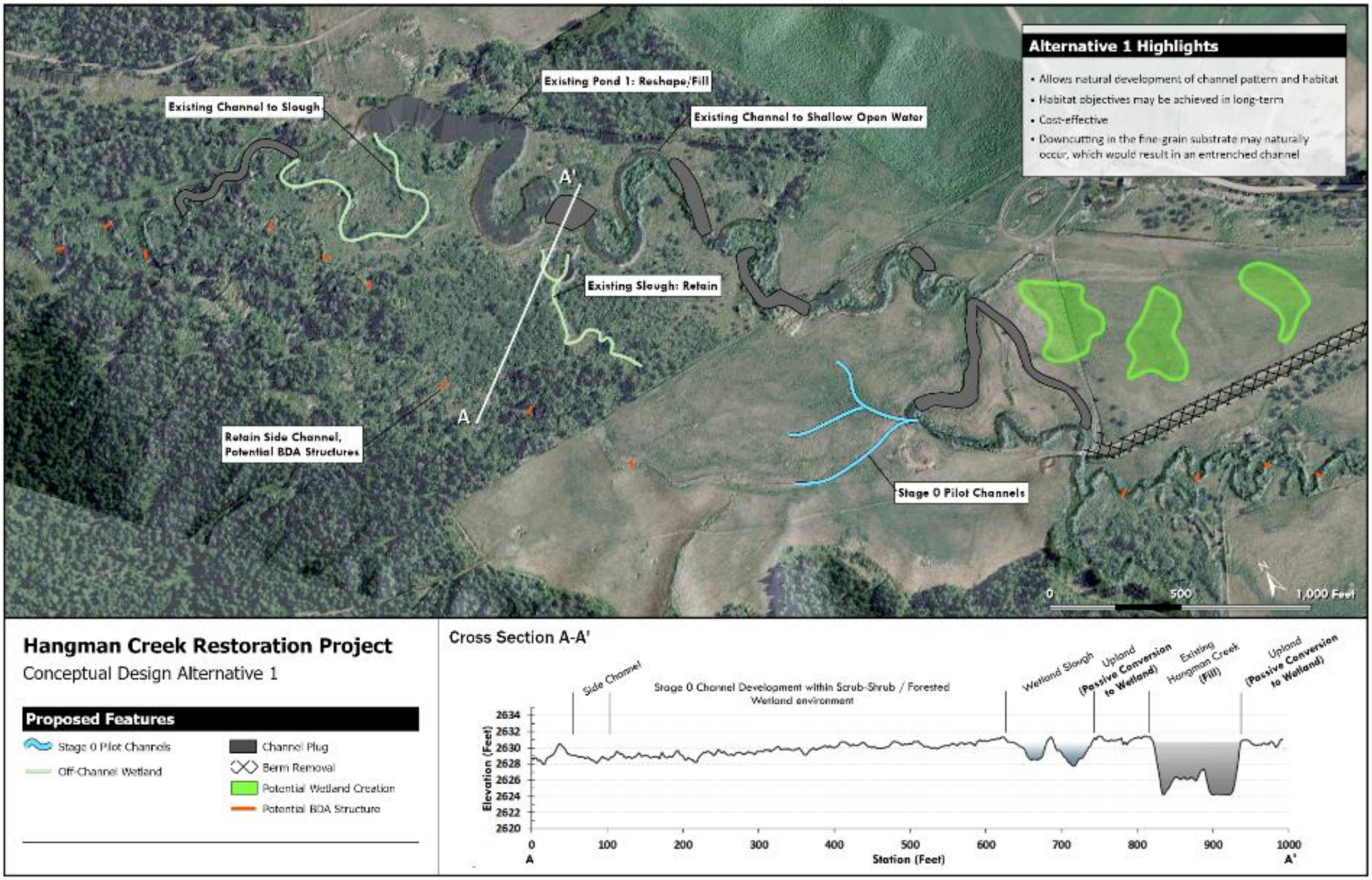
Redband trout (Oncorhynchus mykiss gairdneri)

CONCEPTUAL DESIGN ALTERNATIVES

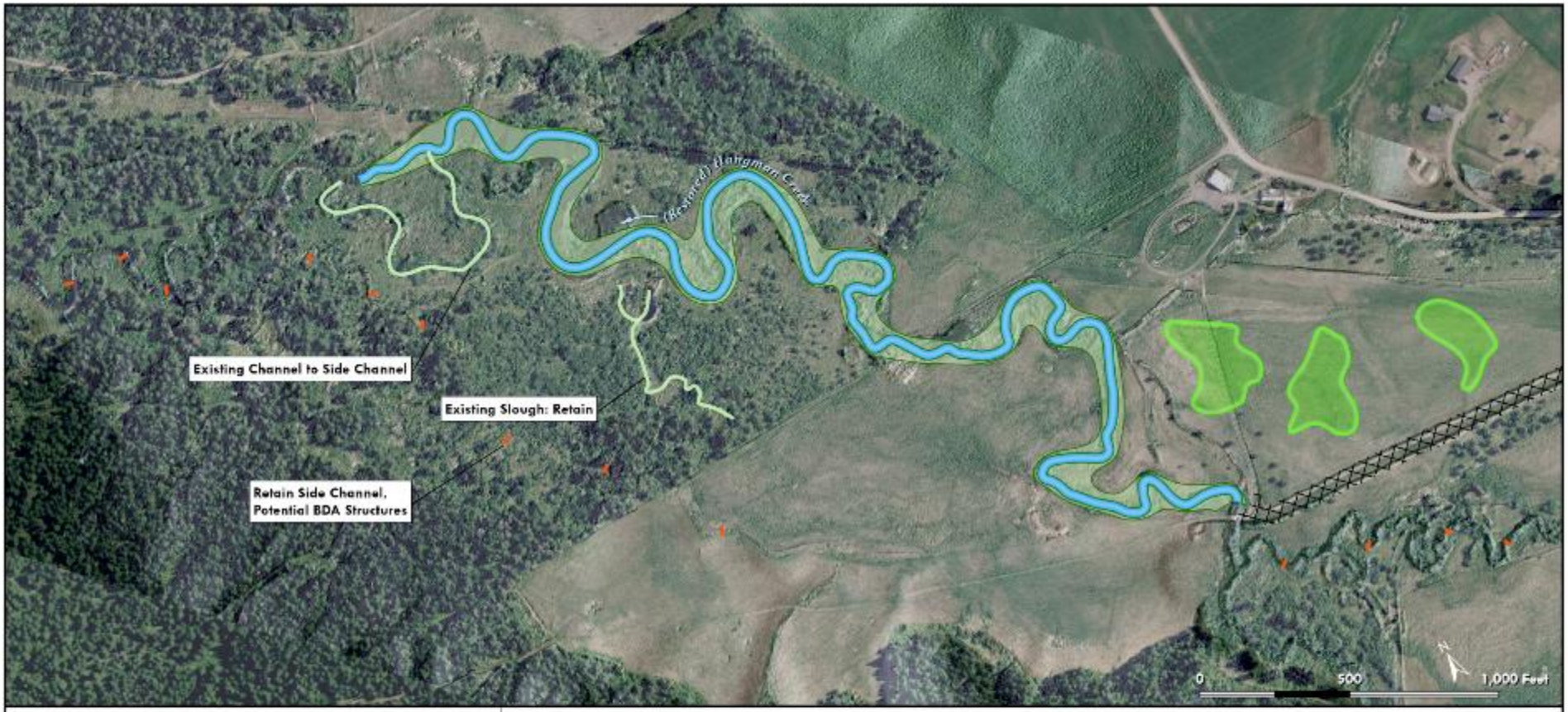
- Alternative 1 – Processed Based Approach (stage zero)
- Alternative 2 – Restore Existing Channel in Current Location
- Alternative 3 – Construct New Channel



Alternative 1 – Processed Based Approach (stage zero)



Alternative 2 – Restore Existing Channel in Current Location



Hangman Creek Restoration Project

Conceptual Design Alternative 2

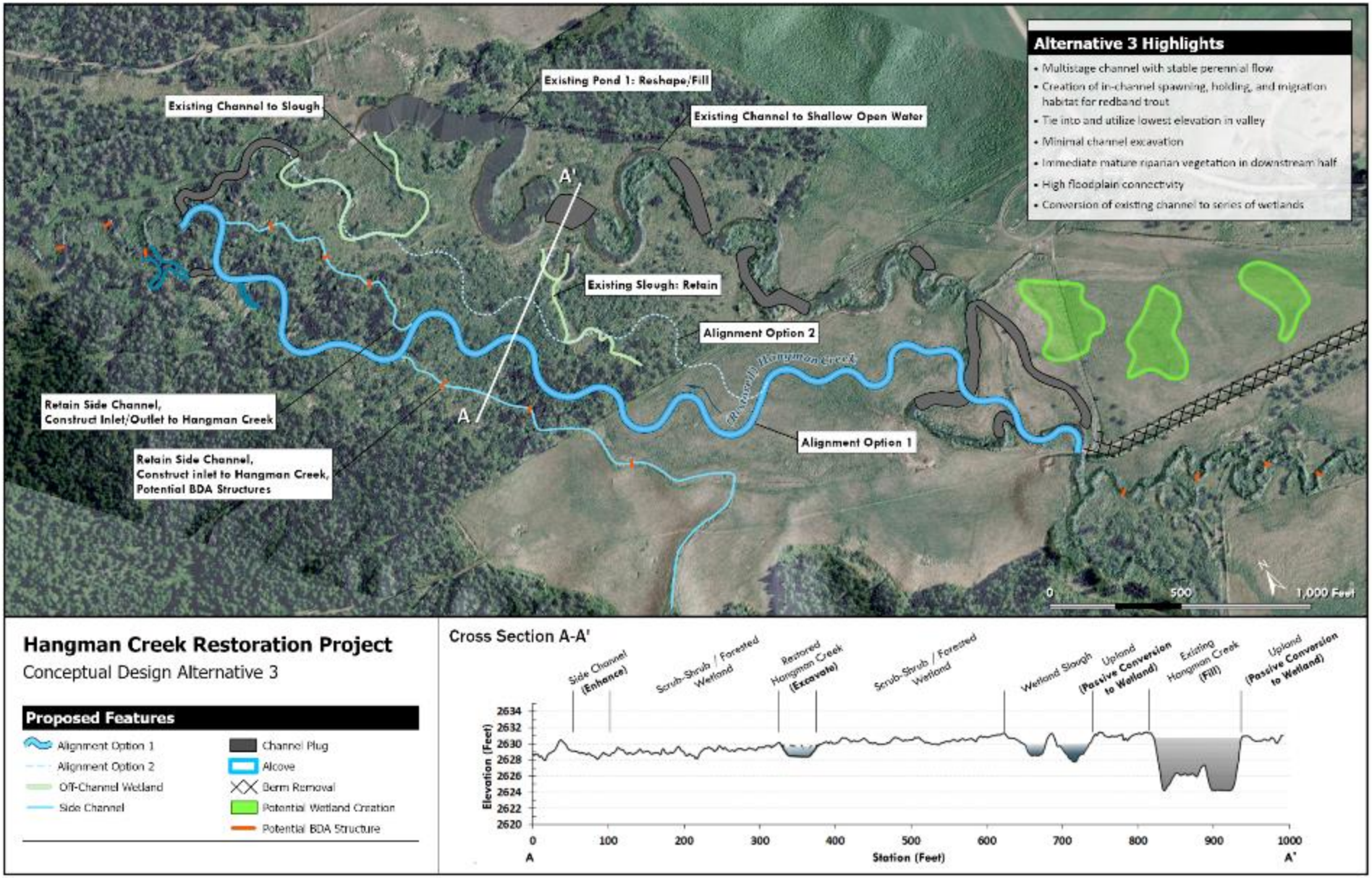
Proposed Features

- Channel Restoration
- Inset Floodplain
- Off-Channel Wetland
- Channel Plug
- Berm Removal
- Potential Wetland Creation
- Potential BDA Structure

Alternative 2 Highlights

- Extensive earthwork
- No hydraulic connection to valley floor
- Repository for excess earthwork volume needed
- Improved aquatic and riparian habitat conditions

Alternative 3 – Construct New Channel



Hangman Creek Restoration Project

Conceptual Design Alternative 3

Proposed Features

- Alignment Option 1
- Alignment Option 2
- Off-Channel Wetland
- Side Channel
- Channel Plug
- Alcove
- Berm Removal
- Potential Wetland Creation
- Potential BDA Structure

FEASIBILITY CONSIDERATIONS

Alternative 1 – Processed Based Approach (stage zero)

- Passive approach using pilot channels to re-activate historical floodplain
- Lower implementation cost and higher adaptive management/maintenance cost
- High uncertainty – may lead to additional degradation or unforeseen maintenance
- Risk of not meeting project goals
- Borrow source required to fill existing channel and reduce risk of recapture

Alternative 2 – Restore Existing Channel in Current Location

- Create an inset floodplain at current channel elevation
- Address channel geometry using geomorphic criteria
- Habitat would be limited to inset floodplain
- Ground water table would remain below the valley floodplain
- There would not be valley-wide flooding or interaction with forested wetland
- Will require a repository for large amounts of cut

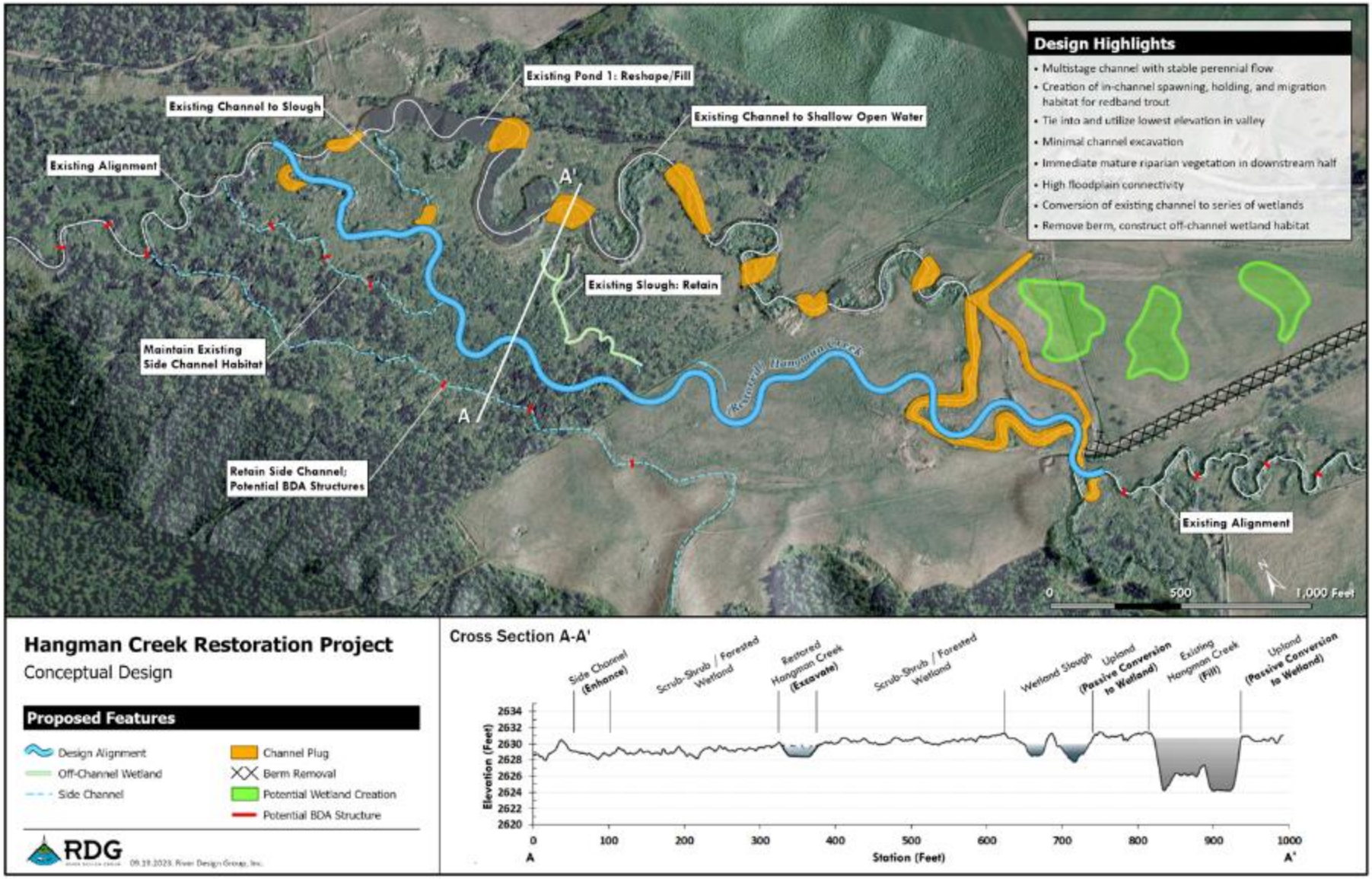
Alternative 3 – Construct New Channel

- New under-sized multistage channel would have a perennial connection to the floodplain
- Hybrid of active and passive approaches.
- Forested wetland preservation/enhancement
- With the addition of BDAs side channels will be enhanced and may attract beaver activity
- Convert existing channel to shallow open water wetland habitat

SUMMARY OF ALTERNATIVES

Project Goal	Alternative 1	Alternative 2	Alternative 3
Improve valley floodplain connectivity and allow for natural processes to occur where possible?	Yes	No	Yes
Reestablish a channel network that conveys year-round flow and allows for frequent flooding?	?	No	Yes
Enhance off-channel habitats that will function naturally and in conjunction with Beaver activity?	?	No	Yes
Create conditions for native wetland plant communities to flourish?	?	Yes (but limited)	Yes
Remediate perennial deep-water habitat that are oxygen deficient and unsuitable for native redband trout?	Yes	Yes	Yes
Cost Estimate (-20% – +35%)	**$620,000** ($496,000 – $837,000)	**$1,550,500** ($1,240,400 – $2,093,175)	**$945,500** ($756,400 – $1,276,425)

Glacier Excavating, Eureka MT contracted to Implement River Design Group's Design

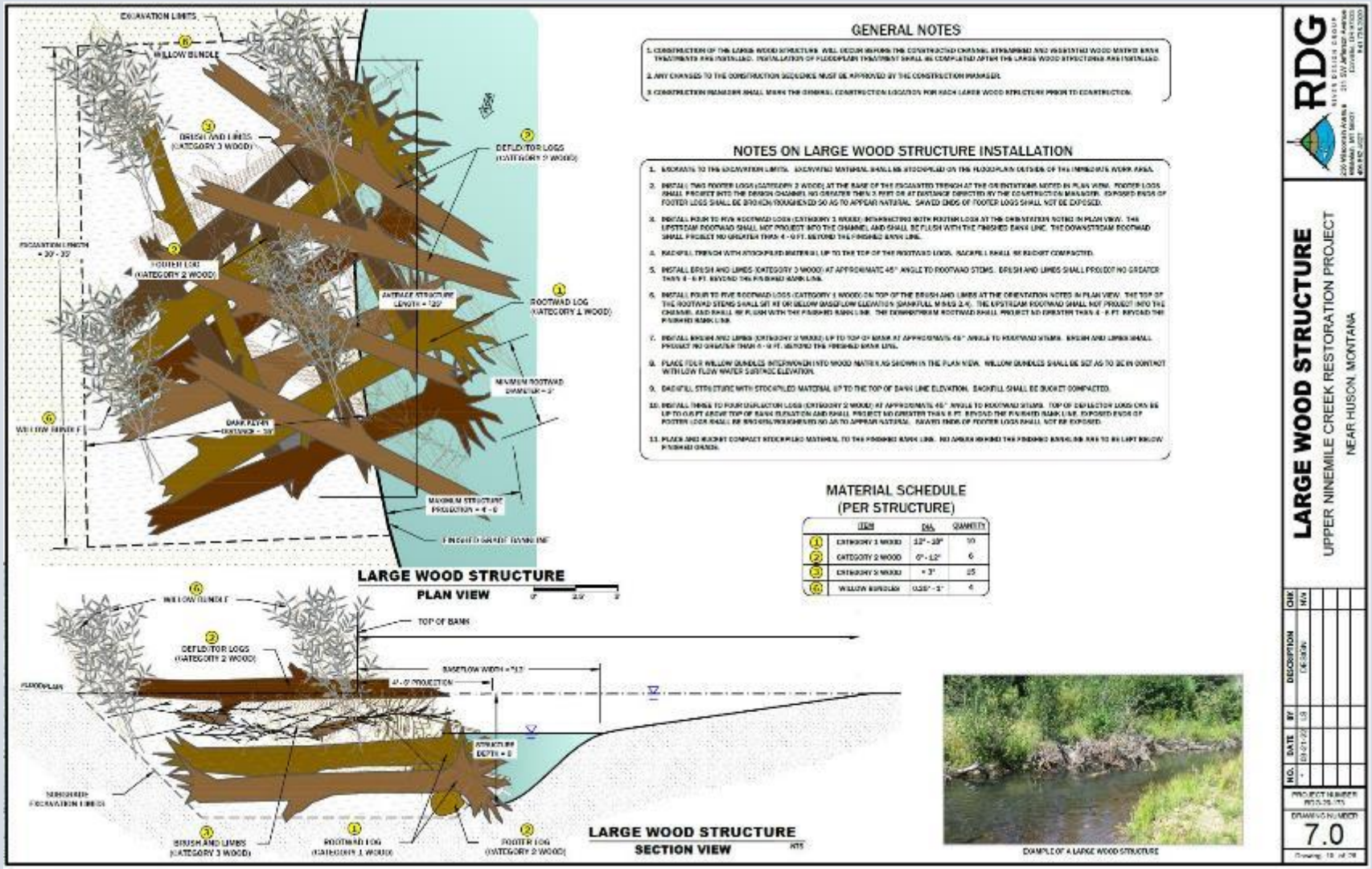


Roughing Out the Channel

Excavating the 3 Wetlands

Salvaged Rock and Sod, & LWD Staged

Large Wood Structure Detail



GENERAL NOTES

1. CONSTRUCTION OF THE LARGE WOOD STRUCTURE WILL OCCUR WITHIN THE CONSTRUCTED CHANNEL, STREAMBED AND VEGETATED WOOD MATTRESS BANK TREATMENTS ARE INSTALLED. INSTALLATION OF FLOODPLAIN TREATMENT SHALL BE COMPLETED AFTER THE LARGE WOOD STRUCTURES ARE INSTALLED.
2. ANY CHANGES TO THE CONSTRUCTION SEQUENCE MUST BE APPROVED BY THE CONSTRUCTION MANAGER.
3. CONSTRUCTION MANAGER SHALL MARK THE CHANNEL CONSTRUCTION LOCATION FOR EACH LARGE WOOD STRUCTURE PRIOR TO CONSTRUCTION.

NOTES ON LARGE WOOD STRUCTURE INSTALLATION

1. EXCAVATE TO THE EXCAVATION LIMITS. EXCAVATED MATERIAL SHALL BE STOCKPILED ON THE FLOODPLAIN OUTSIDE OF THE IMMEDIATE WORK AREA.
2. INSTALL TWO FOOTER LOGS (CATEGORY 2 WOOD) AT THE BASE OF THE EXCAVATED TRENCH AT THE ORIENTATIONS NOTED IN PLAN VIEW. FOOTER LOGS SHALL PROJECT INTO THE DESIGN CHANNEL NO GREATER THAN 3 FEET OR AT DISTANCE DIRECTED BY THE CONSTRUCTION MANAGER. EXPOSED ENDS OF FOOTER LOGS SHALL BE BROKEN/ROUGHENED SO AS TO APPEAR NATURAL. SAWED ENDS OF FOOTER LOGS SHALL NOT BE EXPOSED.
3. INSTALL FOUR TO FIVE ROOTWAD LOGS (CATEGORY 1 WOOD), INTERSECTING BOTH FOOTER LOGS AT THE ORIENTATION NOTED IN PLAN VIEW. THE UPSTREAM ROOTWAD SHALL NOT PROJECT INTO THE CHANNEL AND SHALL BE FLUSH WITH THE FINISHED BANK LINE. THE DOWNSTREAM ROOTWAD SHALL PROJECT NO GREATER THAN 4 - 0 FT. BEYOND THE FINISHED BANK LINE.
4. BACKFILL TRENCH WITH STOCKPILED MATERIAL UP TO THE TOP OF THE ROOTWAD LOGS. BACKFILL SHALL BE BUCKET COMPACTED.
5. INSTALL BRUSH AND LIMBS (CATEGORY 3 WOOD) AT APPROXIMATE 45° ANGLE TO ROOTWAD STEMS. BRUSH AND LIMBS SHALL PROJECT NO GREATER THAN 6 - 0 FT. BEYOND THE FINISHED BANK LINE.
6. INSTALL FOUR TO FIVE ROOTWAD LOGS (CATEGORY 1 WOOD) ON TOP OF THE BRUSH AND LIMBS AT THE ORIENTATION NOTED IN PLAN VIEW. THE TOP OF THE ROOTWAD STEMS SHALL SIT AT OR BELOW BASEFLOW ELEVATION (BANKFULL MINUS 2.4'). THE UPSTREAM ROOTWAD SHALL NOT PROJECT INTO THE CHANNEL AND SHALL BE FLUSH WITH THE FINISHED BANK LINE. THE DOWNSTREAM ROOTWAD SHALL PROJECT NO GREATER THAN 4 - 0 FT. BEYOND THE FINISHED BANK LINE.
7. INSTALL BRUSH AND LIMBS (CATEGORY 3 WOOD) UP TO TOP OF BANK AT APPROXIMATE 45° ANGLE TO ROOTWAD STEMS. BRUSH AND LIMBS SHALL PROJECT NO GREATER THAN 6 - 0 FT. BEYOND THE FINISHED BANK LINE.
8. PLACE FOUR WILLOW BUNDLES INTERWOVEN INTO WOOD MATERIAL AS SHOWN IN THE PLAN VIEW. WILLOW BUNDLES SHALL BE SET AS TO BE IN CONTACT WITH LOW FLOW WATER SURFACE ELEVATION.
9. BACKFILL STRUCTURE WITH STOCKPILED MATERIAL UP TO THE TOP OF BANK LINE ELEVATION. BACKFILL SHALL BE BUCKET COMPACTED.
10. INSTALL THREE TO FOUR DEFLECTOR LOGS (CATEGORY 2 WOOD) AT APPROXIMATE 45° ANGLE TO ROOTWAD STEMS. TOP OF DEFLECTOR LOGS CAN BE UP TO 0.5 FT ABOVE TOP OF BANK ELEVATION AND SHALL PROJECT NO GREATER THAN 6 FT. BEYOND THE FINISHED BANK LINE. EXPOSED ENDS OF FOOTER LOGS SHALL BE BROKEN/ROUGHENED SO AS TO APPEAR NATURAL. SAWED ENDS OF FOOTER LOGS SHALL NOT BE EXPOSED.
11. PLACE AND BUCKET COMPACT STOCKPILED MATERIAL TO THE FINISHED BANK LINE. NO VOIDS BEHIND THE FINISHED BANKLINE ARE TO BE LEFT BELOW FINISHED GRADE.

MATERIAL SCHEDULE (PER STRUCTURE)

	ITEM	DIA.	QUANTITY
1	CATEGORY 1 WOOD	12" - 20"	10
2	CATEGORY 2 WOOD	6" - 12"	6
3	CATEGORY 3 WOOD	< 3"	25
6	WILLOW BUNDLES	0.25" - 1"	4

EXAMPLE OF A LARGE WOOD STRUCTURE

RDG

LARGE WOOD STRUCTURE

UPPER NINEMILE CREEK RESTORATION PROJECT

NEAR HUSON, MONTANA

NO.	DATE	BY	DESCRIPTION	CHK
1	09-01-22	LS	CR Strdtn	HW

PROJECT NUMBER

DRAWING NUMBER

7.0

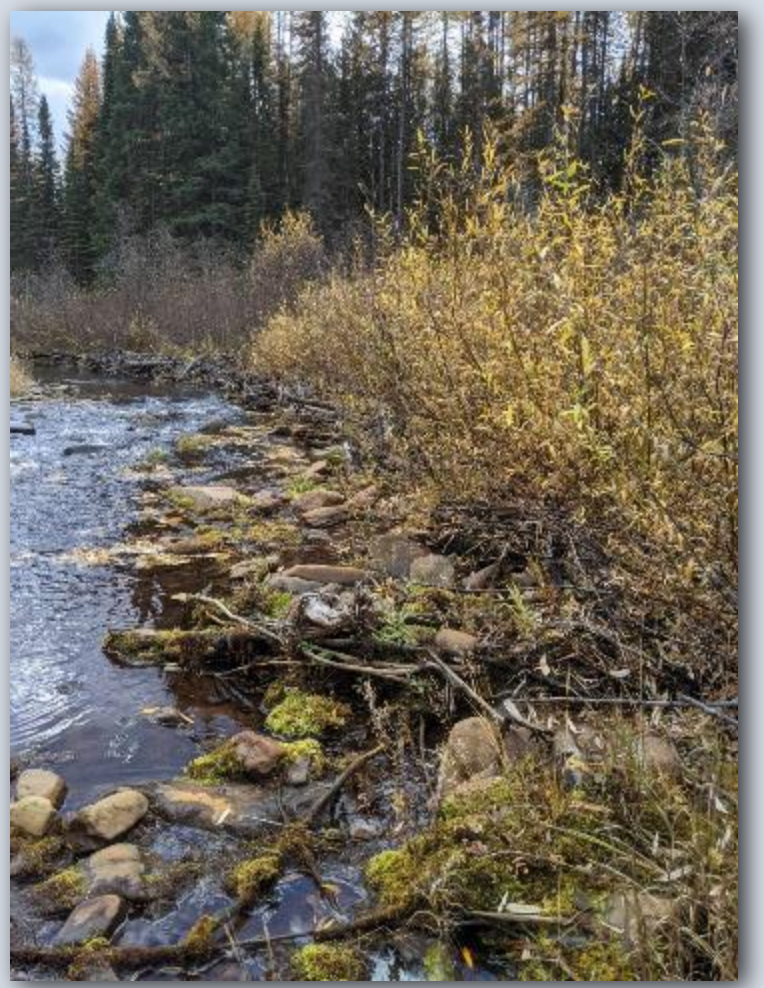
Obtaining LWD

Constructing Streambed & Installing 3 Classes of LWD

VISION FOR THE FUTURE

Vegetated Wood Matrix

- Used on streambanks to provide stability
- Provide energy dissipation by minimizing near bank stress
- Brush provides bank protection while vegetation reestablishes
- Brush and small wood create roughness and habitat complexity for aquatic habitat



Acknowledgements:

- ***Coeur d'Alene Tribe***
- **Bonneville Power Administration**
- **Western Native Trout Initiative** (Rock and Plants)
- **Spokane Falls Chapter Trout Unlimited** (Riparian Grant)
- **Environmental Protection Agency** (3 grants for Riparian)
- **River Design Group**
- **Glacier Excavating**

Build it and they will come