Kootenai River Habitat Restoration Program

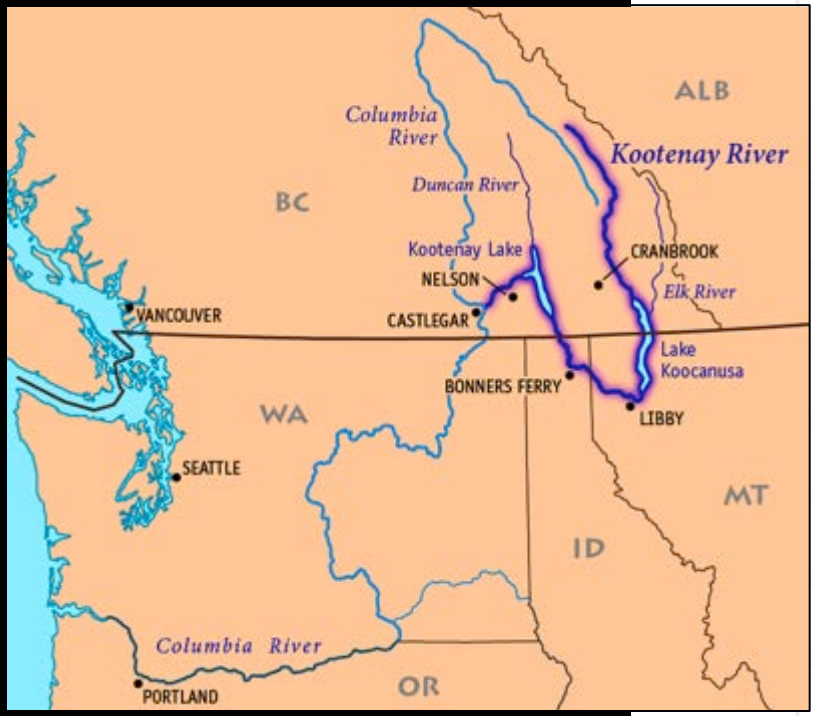
BPA Project 2002-002-00

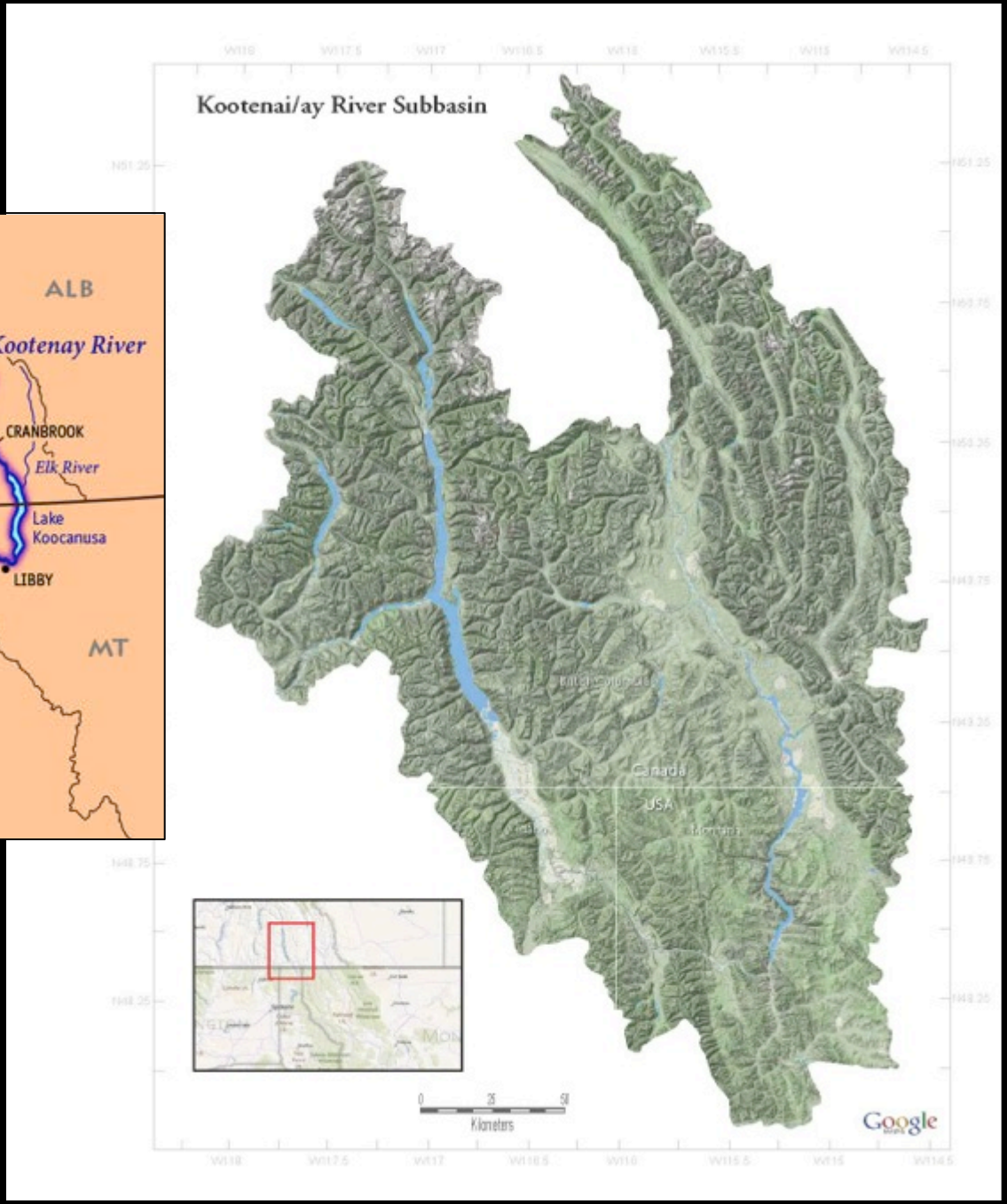
Kootenai Tribe of Idaho

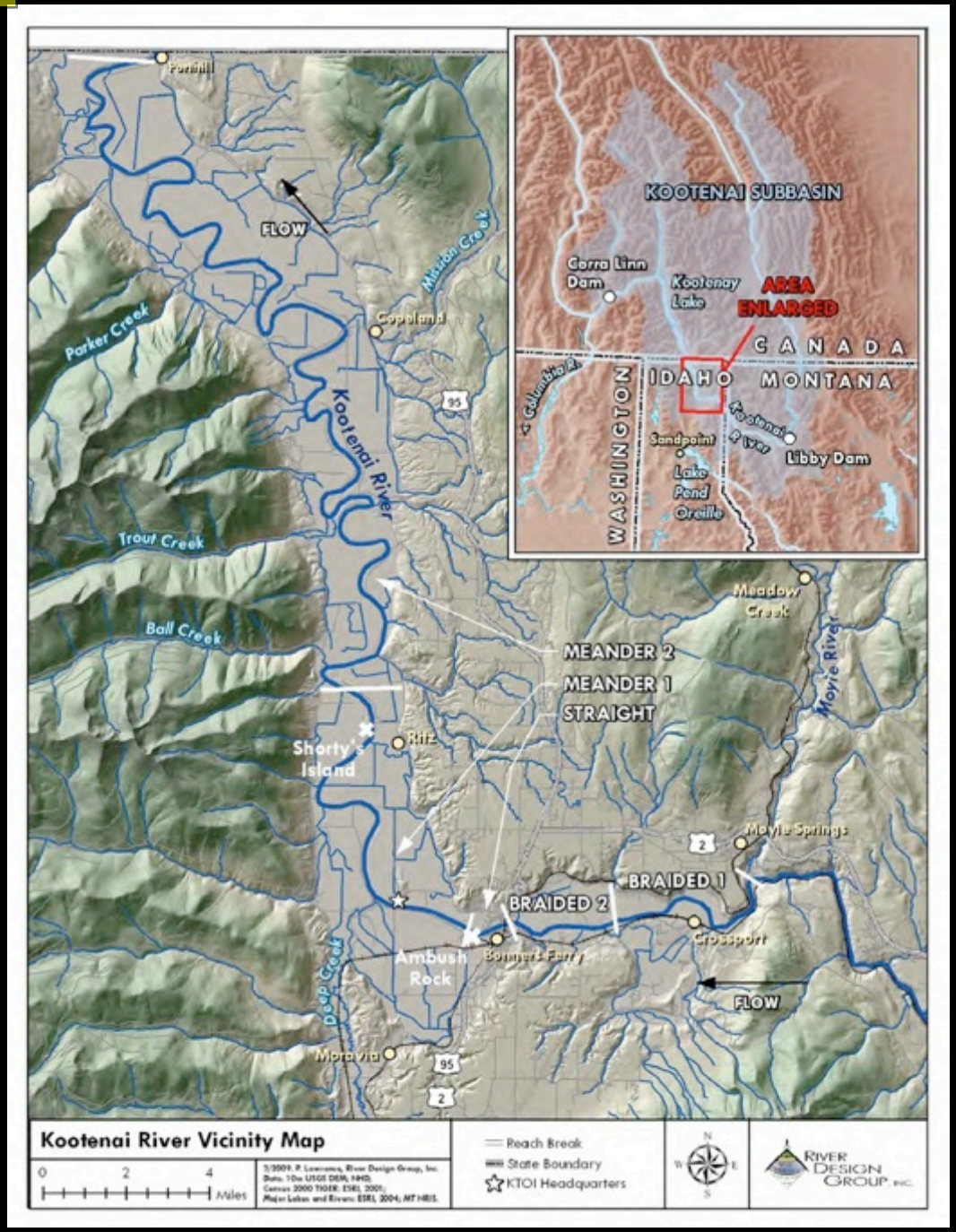
Presentation to Northwest Power and Conservation Council

and Independent Science Review Panel

Portland, Oregon January 18, 2012


ALB
Columbia River
Kootenay River
Duncan River
BC
Kootenay Lake
NELSON
CRANBROOK
Elk River
VANCOUVER
CASTLEGAR
Lake Koocanusa
BONNERS FERRY
LIBBY
WA
SEATTLE
MT
ID
Columbia River
PORTLAND
OR


Kootenai/ay River Subbasin
Canada
USA
Kilometers
Google



KRHRP

- Ecosystem-based restoration program in 55-mile reach of Kootenai River in Idaho
- 3 Phases, multiple projects
  - Braided Reaches
  - Straight Reach
  - Meander Reaches

Objectives

1. Restore and maintain Kootenai River habitat conditions that support all life stages of Endangered Species Act listed Kootenai River white sturgeon.
2. Restore and maintain Kootenai River habitat conditions that support all life stages of native burbot, westslope cutthroat, kokanee, bull trout, interior redband trout, mountain whitefish and other native fish.

Changes to Ecosystem

Beaver trapping

1800s

Floodplain diking

Non native species

Commercial fish harvest

1900s

Infrastructure development

Fertilizer plant

1950s

Libby Dam operations

1970s

Mining

Logging

Conversion of wetlands to agriculture

Libby Dam construction

Native fish restoration & conservation aquaculture program	198806400 (KTOI)	Prevent extinction of Kootenai sturgeon; burbot reintroduction
Kootenai River resident fish mitigation project	198806500 (IDFG)	Monitoring and evaluation, & coordination
Kootenai River ecosystem improvement project	199404900 (KTOI)	Nutrient restoration & trend monitoring, provides data and information
Reconnect Kootenai River with historic floodplain	200200800 (KTOI)	Tributary reconnection, terrestrial floodplain restoration
Kootenai River floodplain ecosystem operational loss assessment	200201100 (KTOI)	Provides data and information used in design
Mitigation for construction & operation of Libby Dam	199500400 (MFWP)	Status of fish assemblages upstream, monitoring coordination

Kootenai River white sturgeon

Listed as Endangered 1994:

- Aging population
- Current spawning in meander reach
- 1st bottleneck - virtually no new recruitment
  - Egg suffocation (sand)
  - Incomplete incubation
  - Failure to complete life cycle
  - Larval predation
- 2nd bottleneck larval food limitation / starvation

Kootenai River white Sturgeon
ENDANGERED

Burbot
PETITIONED

Bull trout
THREATENED

West Slope Cutthroat
PETITIONED

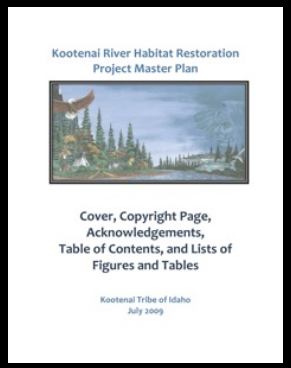
South Arm Kokanee
FUNCTIONALLY EXTINCT

Project Accomplishments

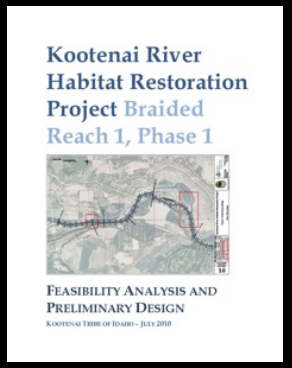
2002-2004: Initial data collection & analysis; 1D model

2005-2006: Targeted data collection & analysis; 1D & 2D models; videography

2007-2009: Data collection for Master Plan & design work; early life stage research



Master Plan



Phase 1 Feasibility Assessment

2002 | 2006 | 2007 | 2008 | 2009 | 2010 | 2011

Pilot rock placement project

Rosgen concept design

Initiate work on Master Plan; establish Design Team, PRAT, CMART, Policy Team, workshops

Settlement Agreement

Phase 1 – 1a and 1b Project Implementation

www.restoringthekootenai.org

Kootenai River Habitat Restoration Program Goals

Morphology: Restore physical habitat

Riparian: Restore riparian vegetation

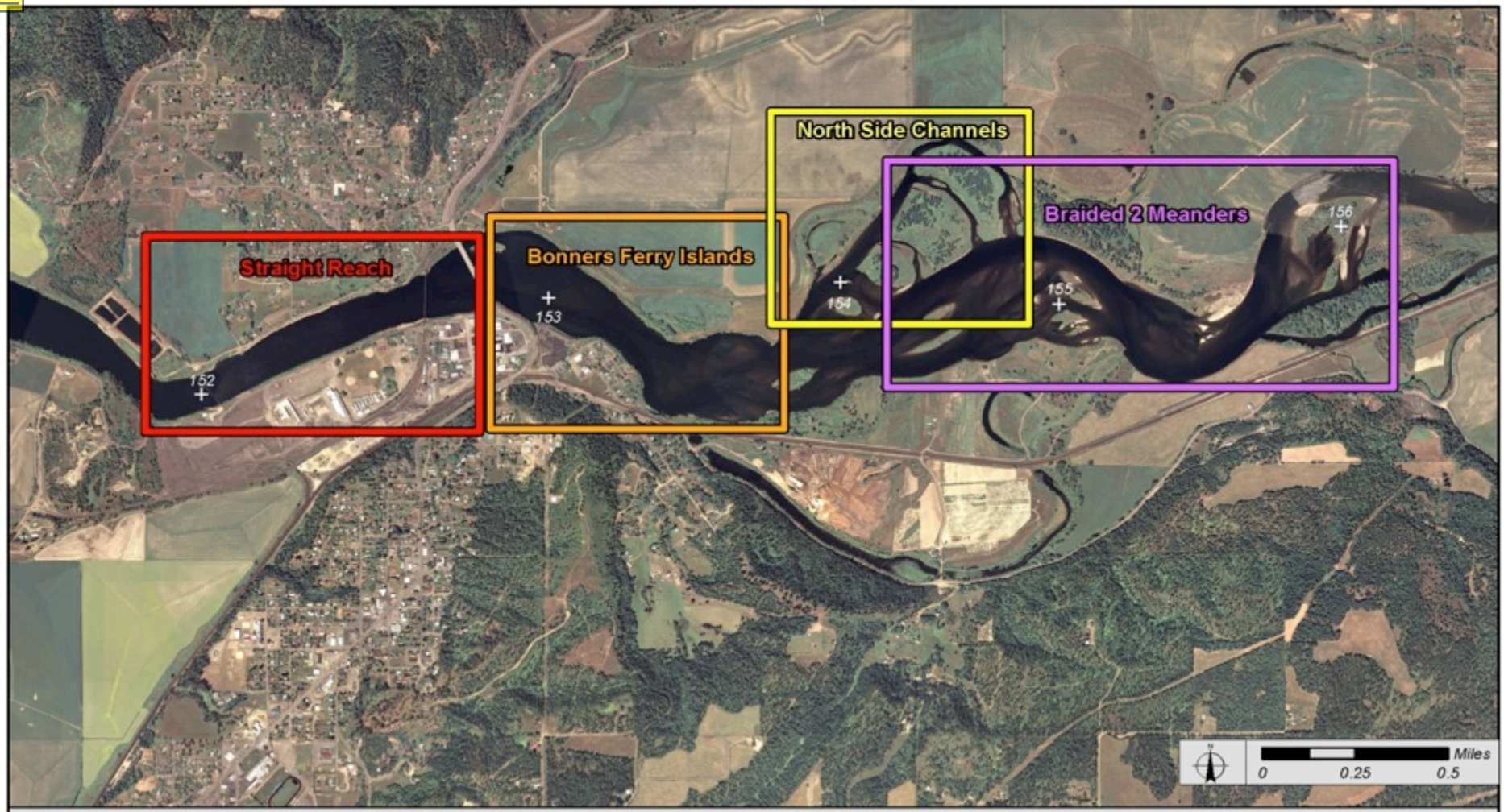
Aquatic: Restore aquatic habitat conditions that support all life stages of native fish

Stewardship: Create opportunities for river and floodplain stewardship

Master Plan

- Restoration framework
- Technical analysis and synthesis of data for morphology, aquatic habitat, riparian habitat & constraints
- Limiting factors related to each category
- Restoration treatments to address limiting factors
- Monitoring and adaptive management framework
- Funding strategy
- Environmental compliance strategy

Phase 2 Project Concept Locations



Straight Reach

Treatments pool enhancement structures, spawning substrate placement, bioengineering bank restoration, riparian buffer development, and eddy/alcove habitat creation.

Bonners Ferry Islands

Treatments include placing fill on existing bars, installing large woody debris roughness elements, microtopography grading, trash removal, and revegetation.

North Side Channels

Treatments include restoring off-channel habitat, installing large woody debris structures, revegetation, managing side channel connectivity, and addressing weeds/invasive species.

Braided 2 Meanders

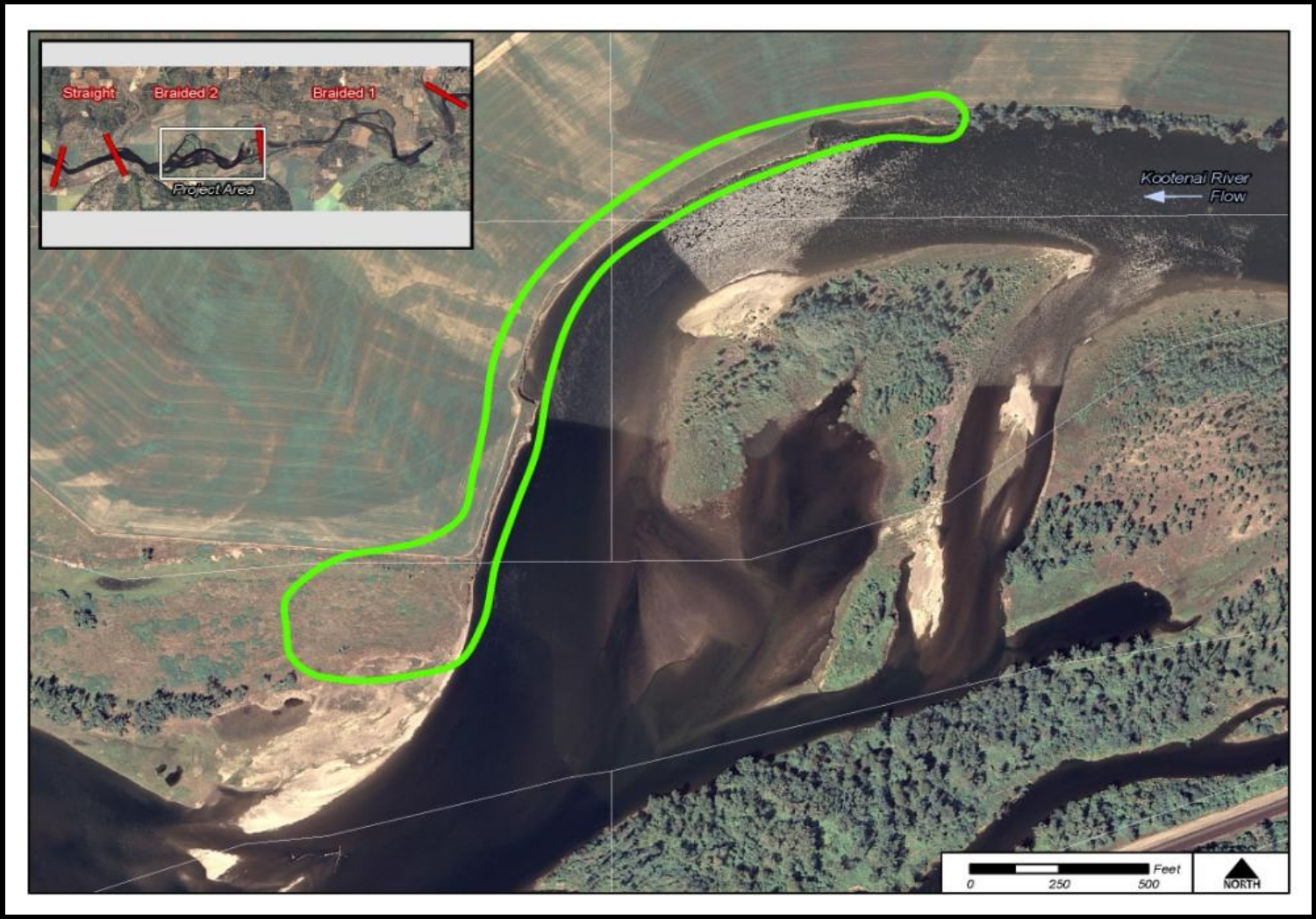
Treatments include bank protection structures, pool enhancement structures, bioengineering bank restoration, large woody debris roughness elements, and eddy/alcove habitat creation.

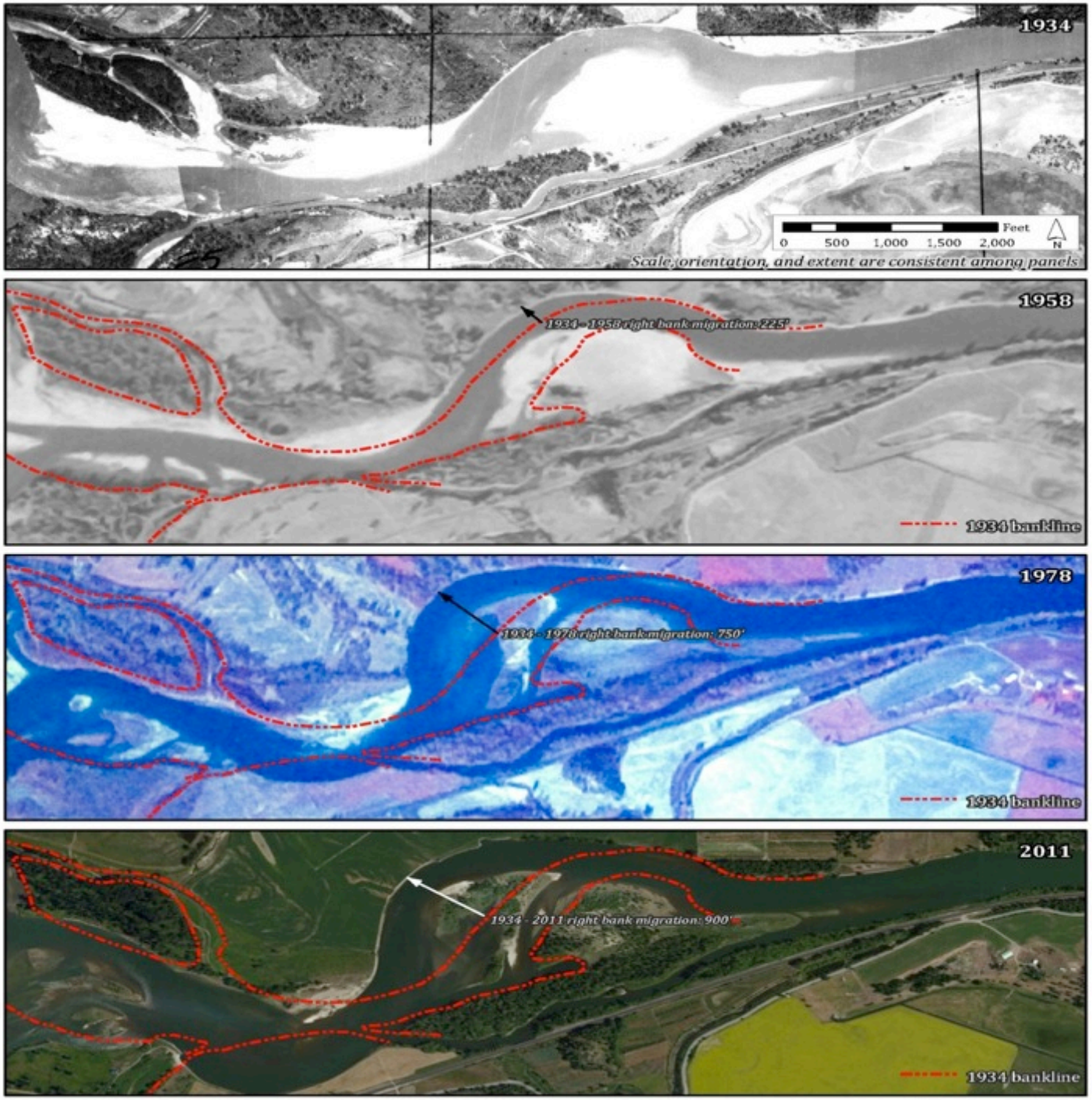
Summary of Phase 2 Actions

Habitat Action	Quantity	Limiting Factor Addressed
Mainstem bank restoration	26,100 linear ft.	- Lack of cover - Bank erosion and fine sediment inputs to downstream reaches
Side channel restoration	31,700 linear ft.	- Lack of cover for juvenile fish - Lack of off-channel habitat for rearing
Mainstem pool establishment/enhancement	16 pools	- Insufficient depth for Kootenai sturgeon migration preference - Lack of mainstem hydraulic complexity in the form of variable depth and velocity
Large wood placement	82 structures	- Lack of off-channel hydraulic complexity in the form of variable depth and velocity - Insufficient pool frequency - Lack of cover

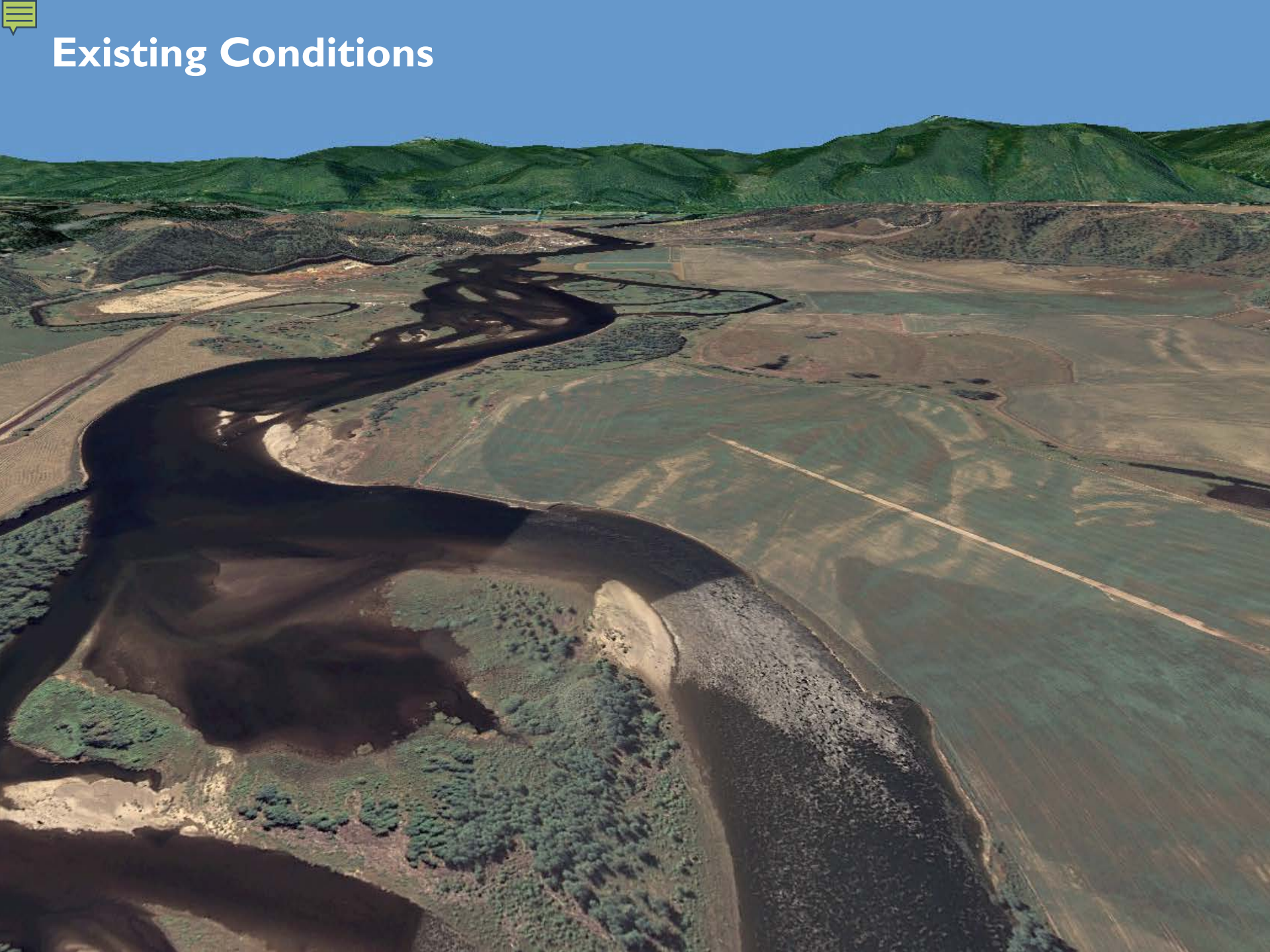
Habitat Action	Quantity	Limiting Factor Addressed
Floodplain and wetlands construction and restoration	96.4 acres	- Simplified food web from lack of nutrients - Lack of surfaces that support riparian recruitment - Loss of floodplain connection
Spawning substrate enhancement	14,000 sq ft.	- Lack of coarse substrate for Kootenai sturgeon egg attachment and larval hiding
Revegetation	52,000 plants	- Lack of bank vegetation
Tributary restoration	11,700 linear ft.	- Lack of off-channel habitat
Fish passage barrier removal	4 culverts	- Lack of fish passage into tributaries
Riparian buffer fencing	11.7 miles	- Grazing and floodplain land use

Project Example: Upper Meander

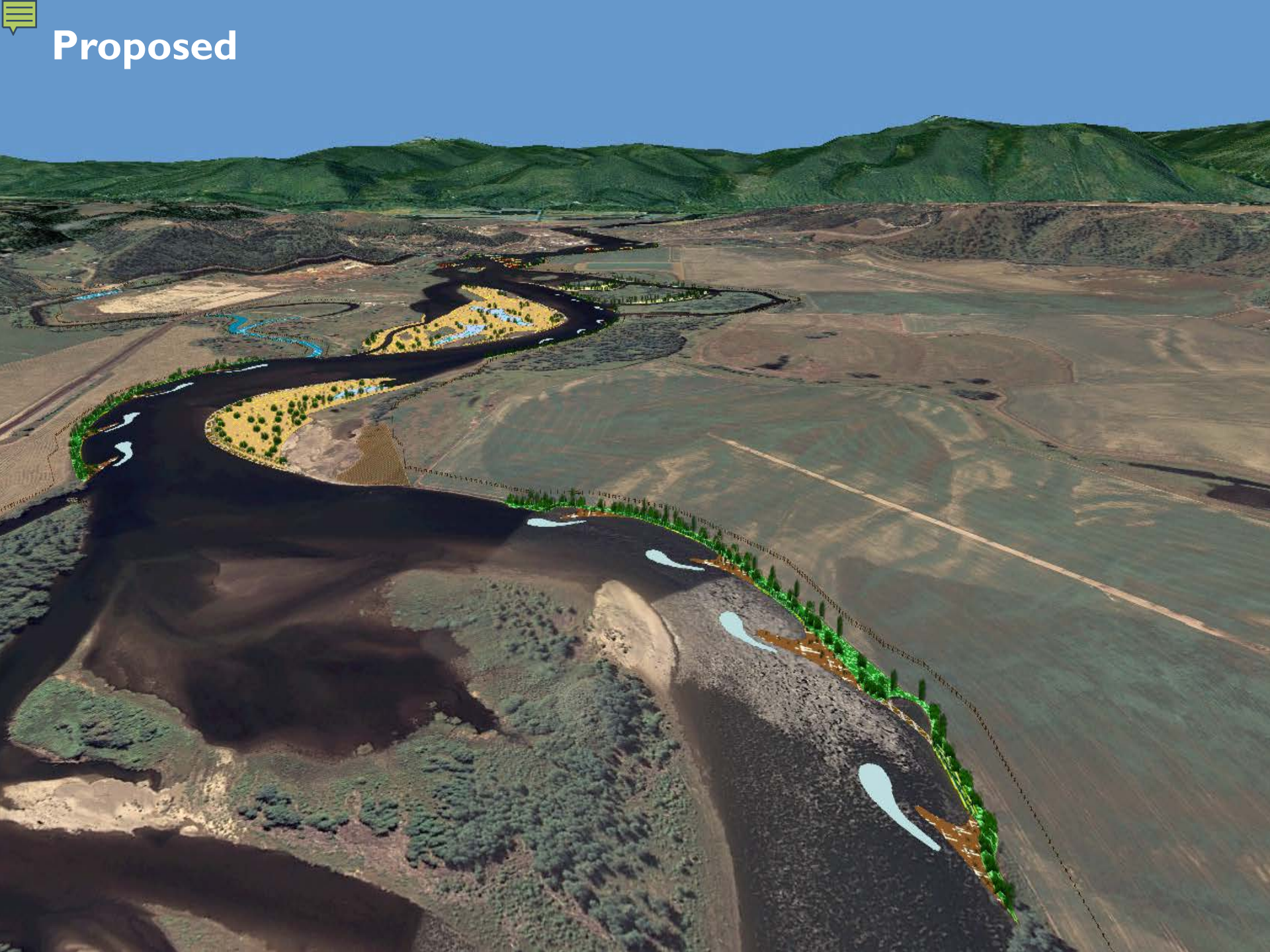



1934
Feet
0 500 1,000 1,500 2,000
N
Scale, orientation, and extent are consistent among panels
1958
1934 - 1958 right bank migration: 225'
1934 bankline
1978
1934 - 1978 right bank migration: 750'
1934 bankline
2011
1934 - 2011 right bank migration: 900'
1934 bankline

Existing Conditions



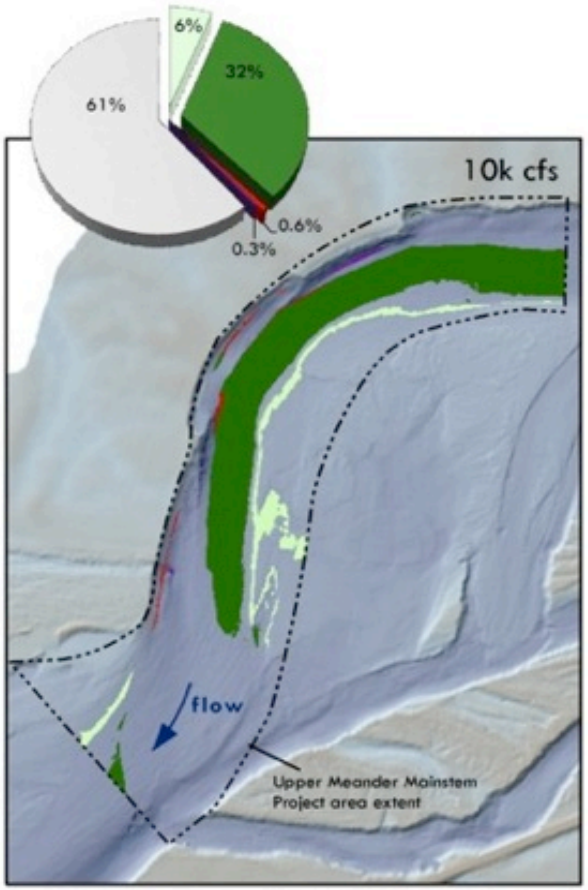
Proposed

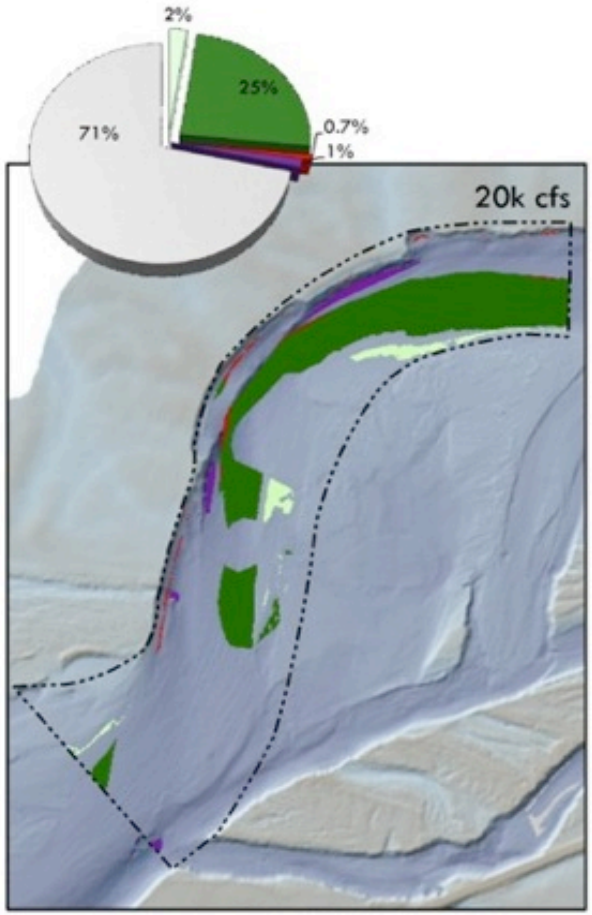


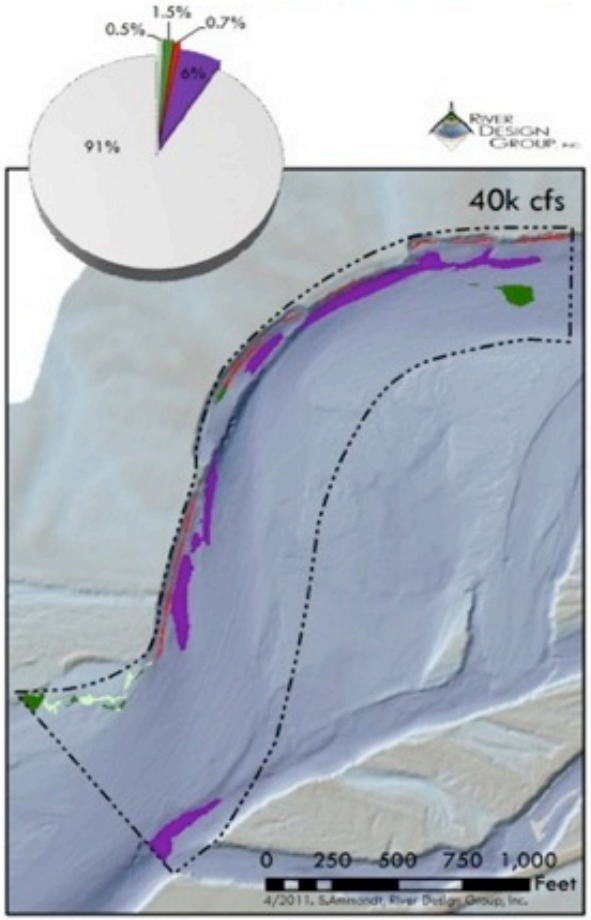
Kootenai River - Upper Meander Project Area

Upper Meander Mainstem
Existing Habitat - 1D Model

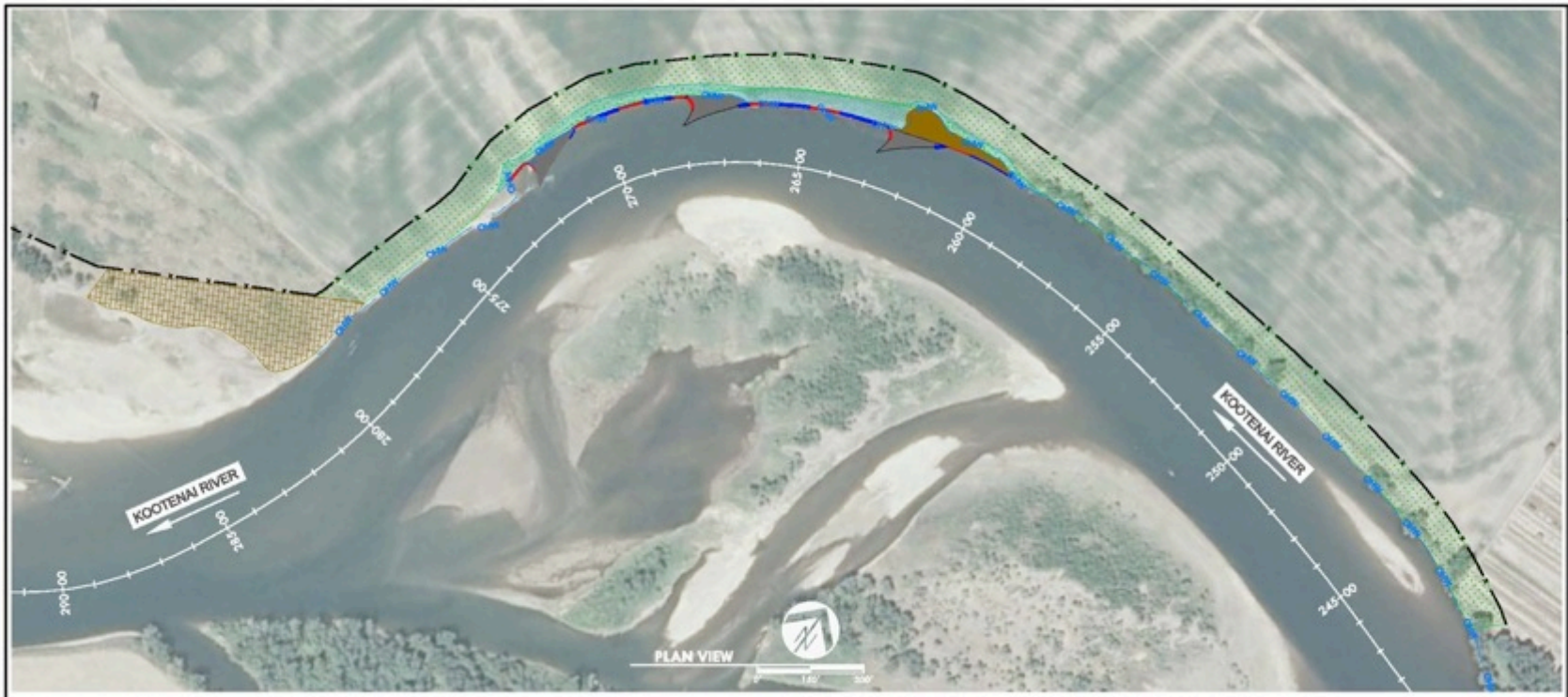
Habitat Type	Habitat Description	10k cfs (ft^2)	20k cfs (ft^2)	40k cfs (ft^2)
Juvenile salmonid rearing	Depth <1ft & Velocity <1fps.	65,675	31,375	8,050
Adult salmonid holding	Depth >3ft & Velocity <1fps.	369,925	332,775	22,550
Hydraulic complexity	ΔV from <1fps to >3fps in ≤20ft.	6,770	9,529	11,257
Sturgeon spawning	Depth >16.5ft & Velocity >3.3ft.	2,825	16,150	89,375
Other (not shown on map)		698,455	973,496	1,396,093








Kootenai River
mainstem flow
Eddy recirculation
zone
Habitat Type
Habitat Description
Juvenile salmonid rearing
Depth < 1ft & Velocity < 1fps
Adult salmonid holding
Depth > 3ft & Velocity < 1 fps
Hydraulic complexity
△V from <1 fps to > 3fps in ≤ 20ft
Sturgeon spawning
Depth > 16.5ft & Velocity > 3.3 fps



LEGEND

- PLANTING
- BANK STRUCTURE
- BANK GRADING
- EXCAVATION
- BACKFILL
- LOWER BANK TREATMENT
- VEGETATED SOIL LIFT
- RIPARIAN EXCLOSURE FENCE
- OHW — ORDINARY HIGH WATER ELEVATION

STRUCTURE 1 MATERIAL QUANTITIES

WOOD	QUANTITY	DIAMETER	LENGTH	ROOTWAD	LIMBS
LARGE LOGS	40	18-24 IN	40-60 FT	YES	YES
LARGE LOGS	40	18-24 IN	40-60 FT	YES	YES
LARGE LOGS	40	18-24 IN	40-60 FT	YES	YES
LARGE LOGS	40	18-24 IN	40-60 FT	YES	YES

STRUCTURE 2 MATERIAL QUANTITIES

WOOD	QUANTITY	DIAMETER	LENGTH	ROOTWAD	LIMBS
LARGE LOGS	40	18-24 IN	40-60 FT	YES	YES
LARGE LOGS	40	18-24 IN	40-60 FT	YES	YES
LARGE LOGS	40	18-24 IN	40-60 FT	YES	YES
LARGE LOGS	40	18-24 IN	40-60 FT	YES	YES

STRUCTURE 3 MATERIAL QUANTITIES

WOOD	QUANTITY	DIAMETER	LENGTH	ROOTWAD	LIMBS
LARGE LOGS	40	18-24 IN	40-60 FT	YES	YES
LARGE LOGS	40	18-24 IN	40-60 FT	YES	YES
LARGE LOGS	40	18-24 IN	40-60 FT	YES	YES
LARGE LOGS	40	18-24 IN	40-60 FT	YES	YES

VEGETATED SOIL LIFT TYPE 1 QUANTITIES

WOOD	QUANTITY	DIAMETER	LENGTH
LARGE LOGS	40	18-24 IN	40-60 FT
LARGE LOGS	40	18-24 IN	40-60 FT

VEGETATED SOIL LIFT TYPE 2 QUANTITIES

WOOD	QUANTITY	DIAMETER	LENGTH
LARGE LOGS	40	18-24 IN	40-60 FT
LARGE LOGS	40	18-24 IN	40-60 FT

LOWER BANK TREATMENT MATERIAL QUANTITIES

WOOD	QUANTITY	DIAMETER	LENGTH	ROOTWAD	LIMBS
LARGE LOGS	40	18-24 IN	40-60 FT	YES	YES
LARGE LOGS	40	18-24 IN	40-60 FT	YES	YES

FENCE	5,900	LF

MICROTOPOGRAPHY MATERIAL QUANTITIES

WOOD	QUANTITY	DIAMETER	LENGTH	ROOTWAD	LIMBS
SMALL LOGS	87	6-12 IN	10-15 FT	OPTIONAL	YES
BRUSH	280	3-6 IN	10-15 FT	OPTIONAL	YES

RIVER DESIGN GROUP, INC.

Kootenai River Habitat Restoration Project

Upper Meander Restoration Design

Upper Meander Restoration Plan

preliminary

not for construction

NO.	DATE	BY	DESCRIPTION	CHK
3	8-16-11	KW	Internal Draft	MD

PROJECT NUMBER
EDG-11-006

SHEET NUMBER
3.0

Results & Implications

- Master Plan = synthesis of data collection & analysis, identified limiting factors & suite of treatments to address limiting factors
- Ongoing M&E and early life stage research improving understanding of current habitat use & behavior of native fish populations
- Concerns with initial efforts to design restoration projects for one life stage of one species (risk, additional bottlenecks, appropriate scale, costs and benefits)

Conclusions & Adaptive Mgmt.

- Ecosystem-based approach to maximize benefits to multiple life-stages & species and to reduce risks
- An interdisciplinary, coordinated & collaborative approach is critical at every stage of analysis, design & implementation
- Landowner buy-in & participation is essential
- Adaptive management needs to occur at the planning, design, & implementation stages
- Results relative to short- and long-term success criteria monitored through project scale & subbasin scale adaptive management programs

Questions