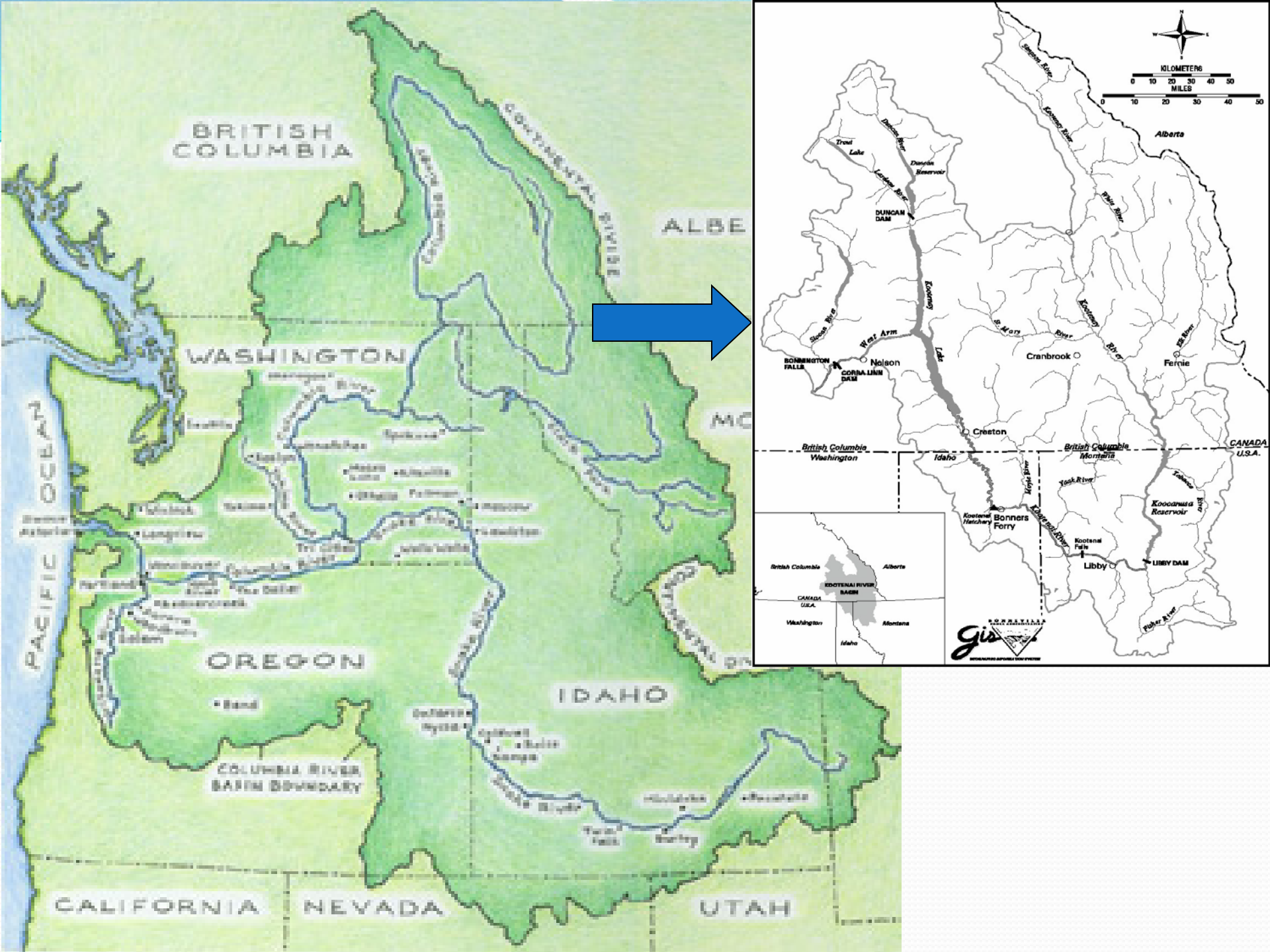
Reconnect Kootenai River with Historic Floodplain

2002-008-00

Kootenai Tribe of Idaho
Fish and Wildlife Dept.
Bonners Ferry, Idaho

Presentation to NPCC and ISRP
Portland, OR Jan. 2012


BRITISH COLUMBIA
ALBE
WASHINGTON
OREGON
IDAHO
CALIFORNIA
NEVADA
UTAH
PACIFIC OCEAN
COLUMBIA RIVER BASIN BOUNDARY
Trout Lake
Duncan River
Duncan Reservoir
Lardeau River
DUNCAN DAM
Kootenay River
Slocan River
Slocan River
West Arm
Nelson
BONNINGTON FALLS
CORRA LINN DAM
Lake
S. Fork
Cranbrook
Fernie
Elk River
White River
Alberta
Creston
British Columbia
Washington
Idaho
British Columbia
Montana
CANADA
U.S.A.
Moyie River
Yaak River
Kootenai Hatchery
Bonners Ferry
Kootenai River
Kootenai Falls
Libby
LIBBY DAM
Koocanusa Reservoir
Fisher River
Yahk
KILOMETERS
MILES
British Columbia
Alberta
KOOTENAI RIVER BASIN
CANADA
U.S.A.
Washington
Montana
Idaho

History and Background

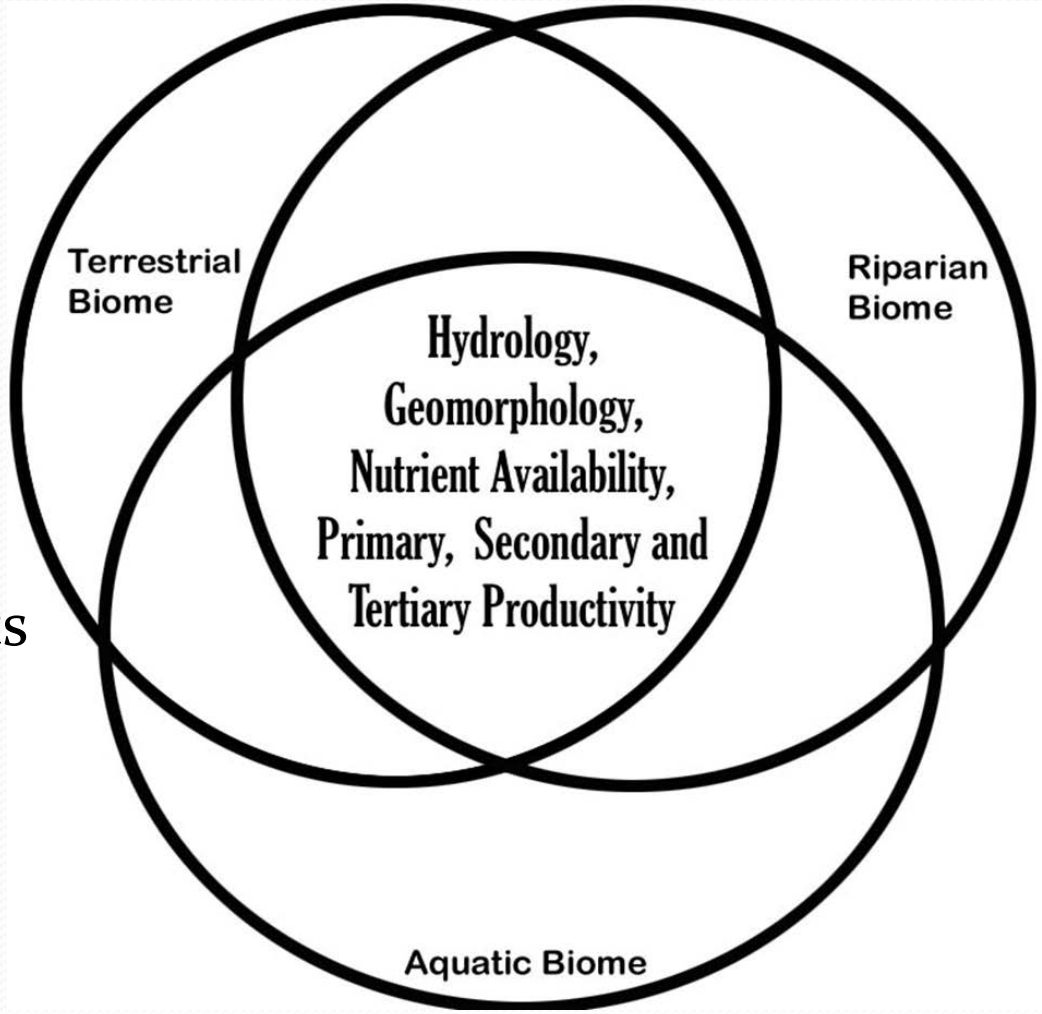
- Began in 2002 as a floodplain ecosystem project geared toward improving sturgeon and burbot aquatic habitat connectivity while realizing improvements to terrestrial and wildlife habitats.

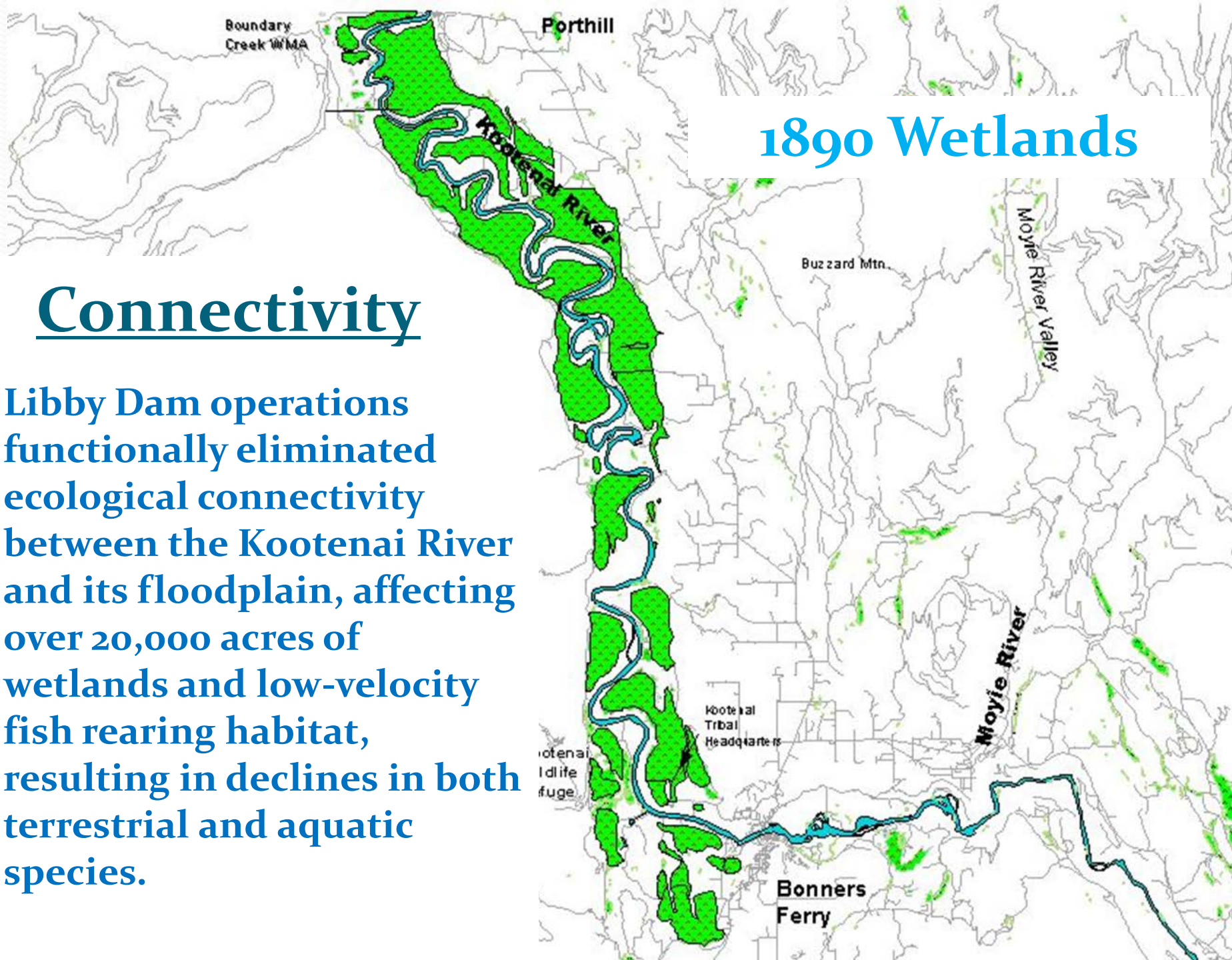
- Project history reflects a systematic approach to a complex problem by
  - defining the problem,
  - understanding ecological functions and processes,
  - identifying restoration alternatives, and
  - designing an implementation project with the greatest benefits and least cost.

History and Background

- Incorporates floodplain ecosystem connectivity components, including nutrients, fish and wildlife habitats, feasibility and design.

- Investigates and implements actions to reconnect the Kootenai River with its historic floodplain.



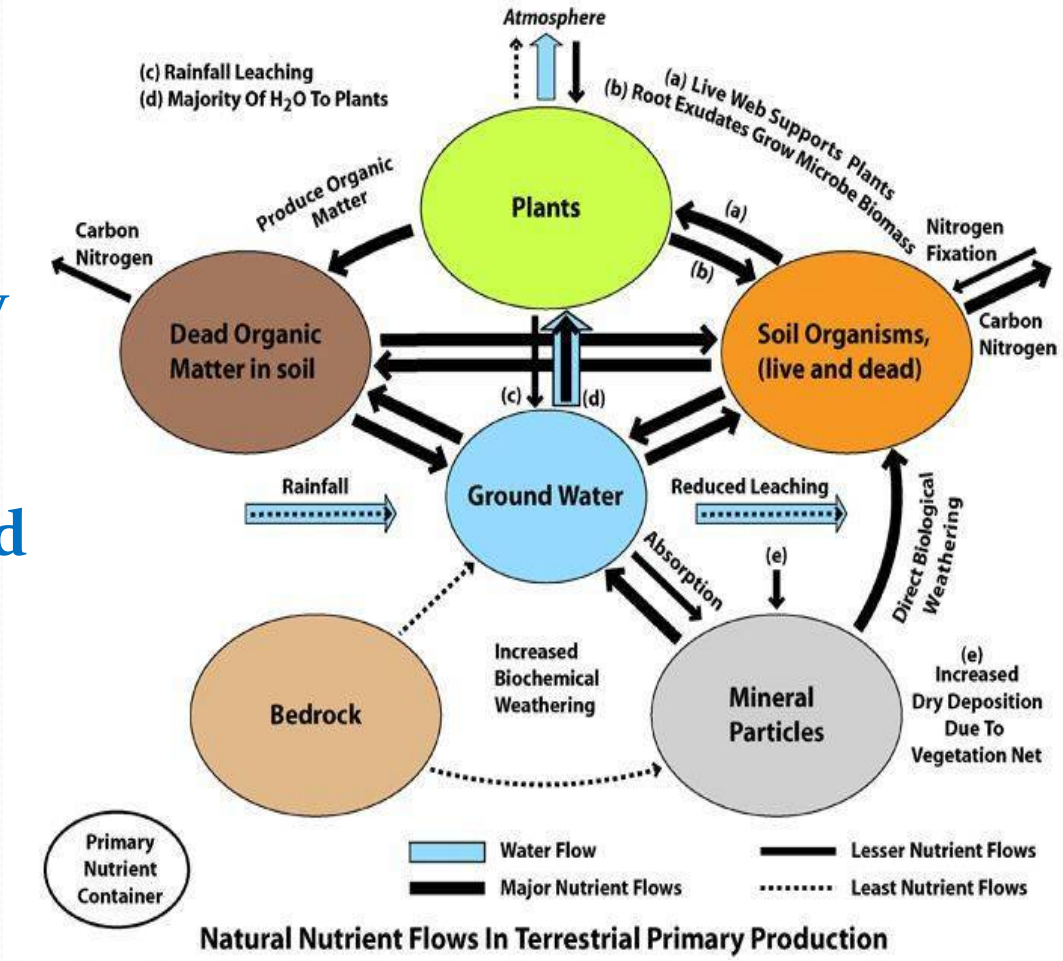


Connectivity

- Libby Dam operations functionally eliminated ecological connectivity between the Kootenai River and its floodplain, affecting over 20,000 acres of wetlands and low-velocity fish rearing habitat, resulting in declines in both terrestrial and aquatic species.

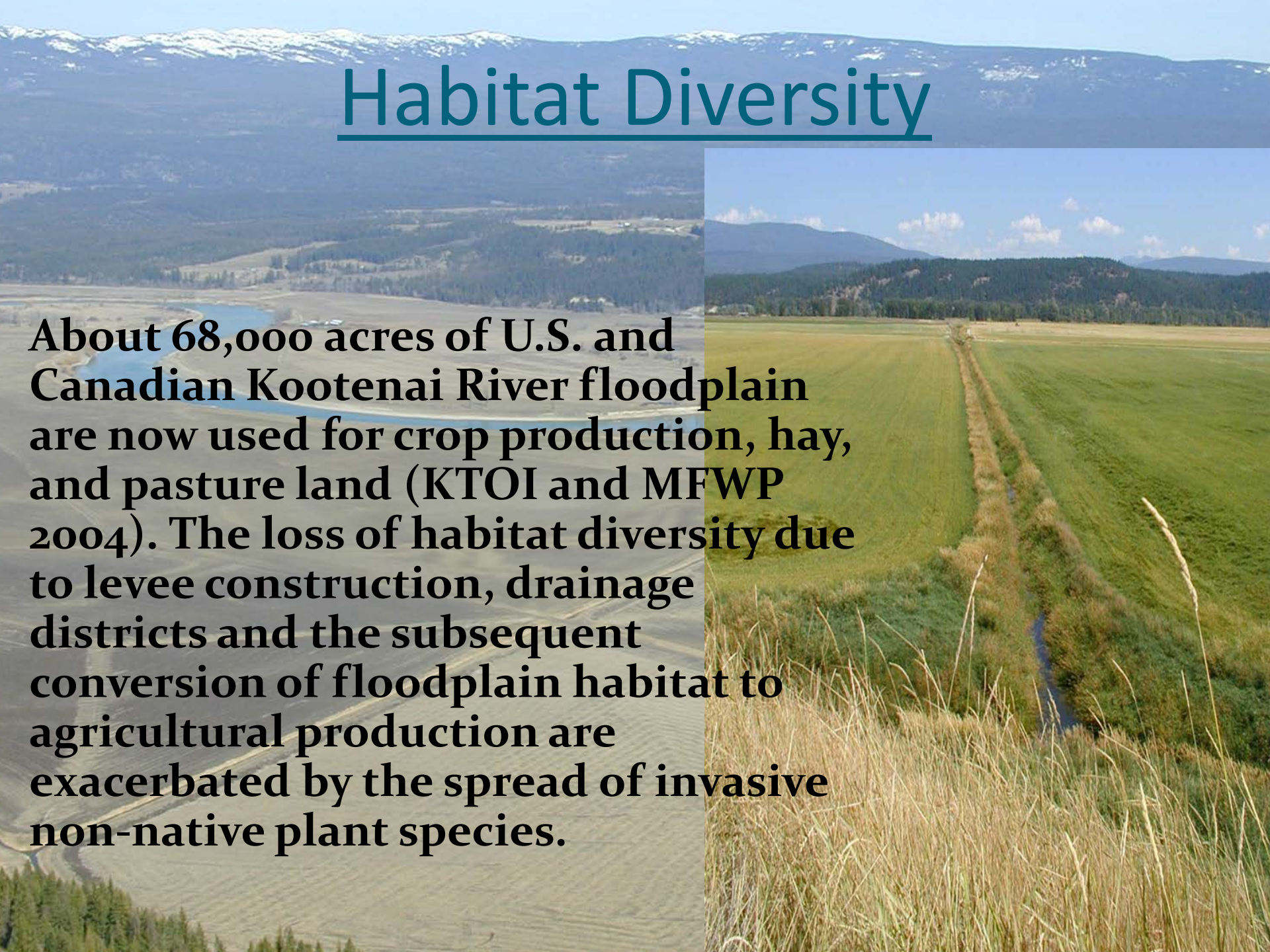
Nutrients

Collectively, these perturbations eliminated the ecological connectivity and altered biological and ecological processes that were historically supported by nutrients supplied by the natural flood pulse of the Kootenai River.



Natural Nutrient Flows In Terrestrial Primary Production

Habitat Diversity

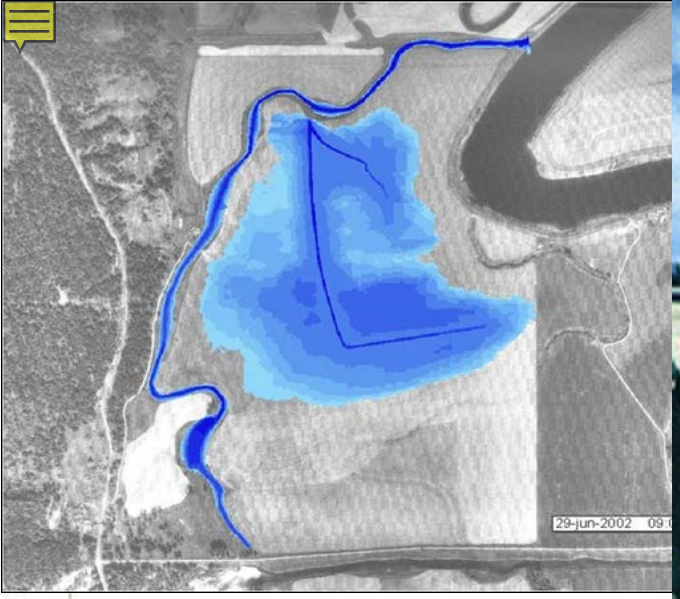


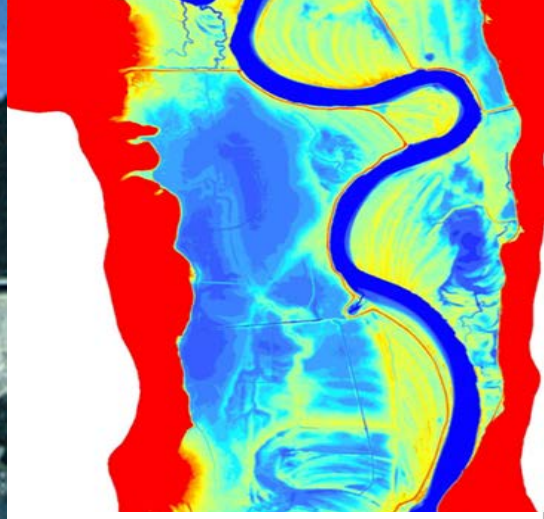
About 68,000 acres of U.S. and Canadian Kootenai River floodplain are now used for crop production, hay, and pasture land (KTOI and MFWP 2004). The loss of habitat diversity due to levee construction, drainage districts and the subsequent conversion of floodplain habitat to agricultural production are exacerbated by the spread of invasive non-native plant species.

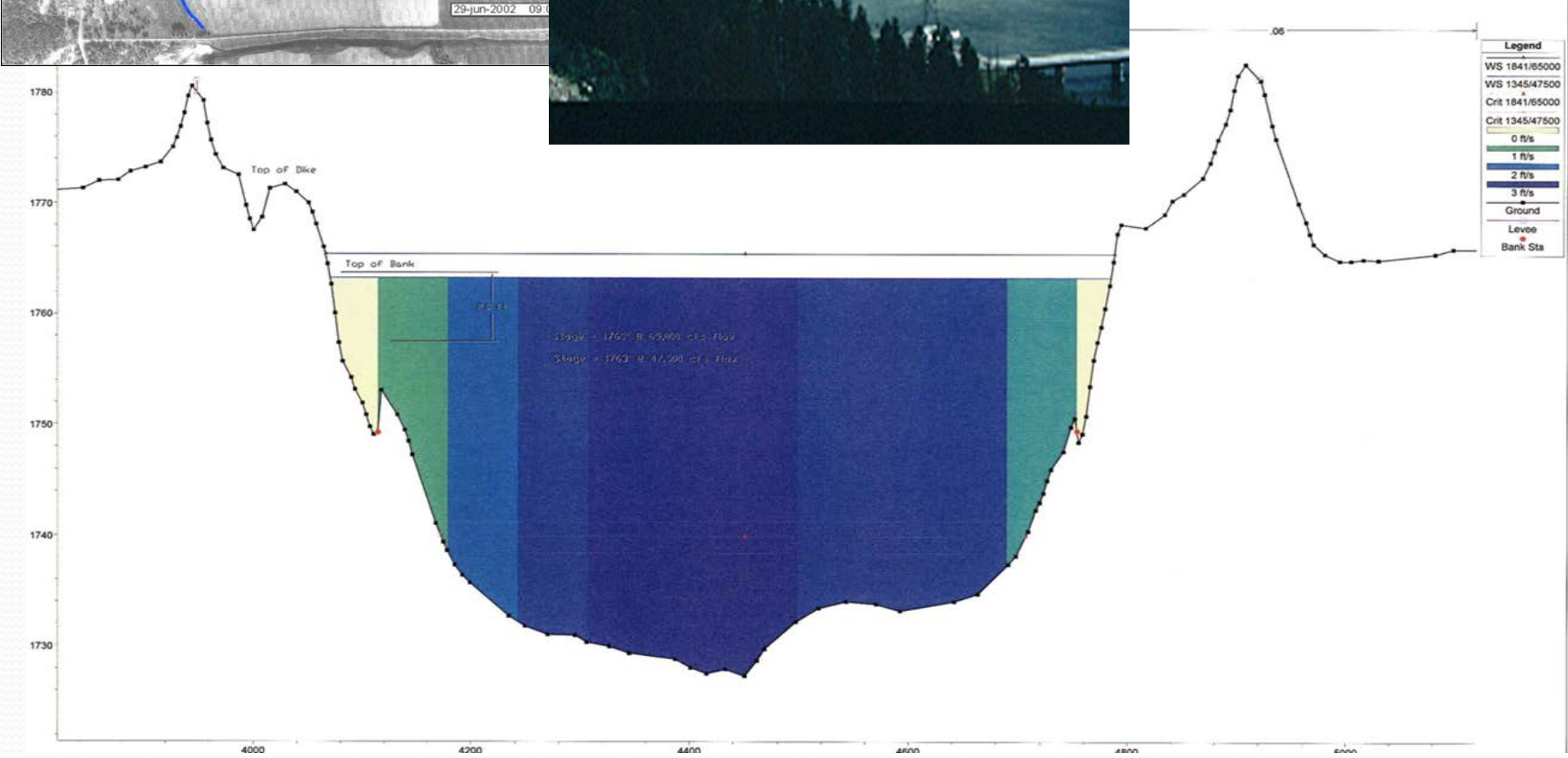
Background/Present Status

The lessons learned provide valuable information, data and results, making it possible to refine and identify future floodplain reconnection opportunities.

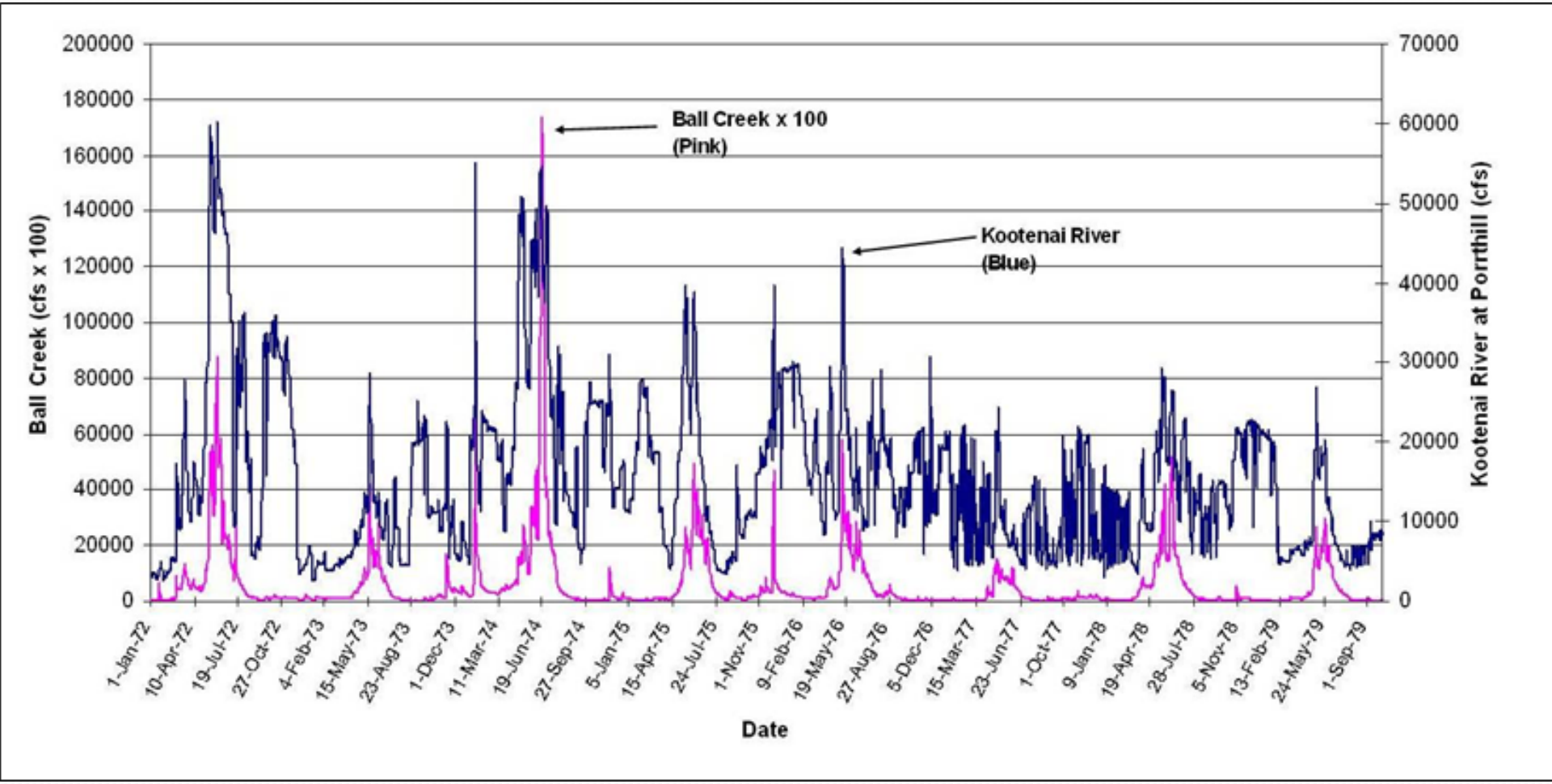
1. Breaching the levee might not achieve the desired benefit.
2. River stage is regulated by Libby/Corra Linn Dam operations.
3. Constructed levees in the lower meander reach are rarely necessary to prevent floodplain inundation (Aver. H2O yr.).
4. Tributary hydrology is a suitable surrogate to mimic the Kootenai River flood pulse.
5. Historic channels and wetland depressions are still evident and can be reconnected to mimic the natural landscape.
6. Groundwater and hyporheic benefits will be realized after the project is implemented.

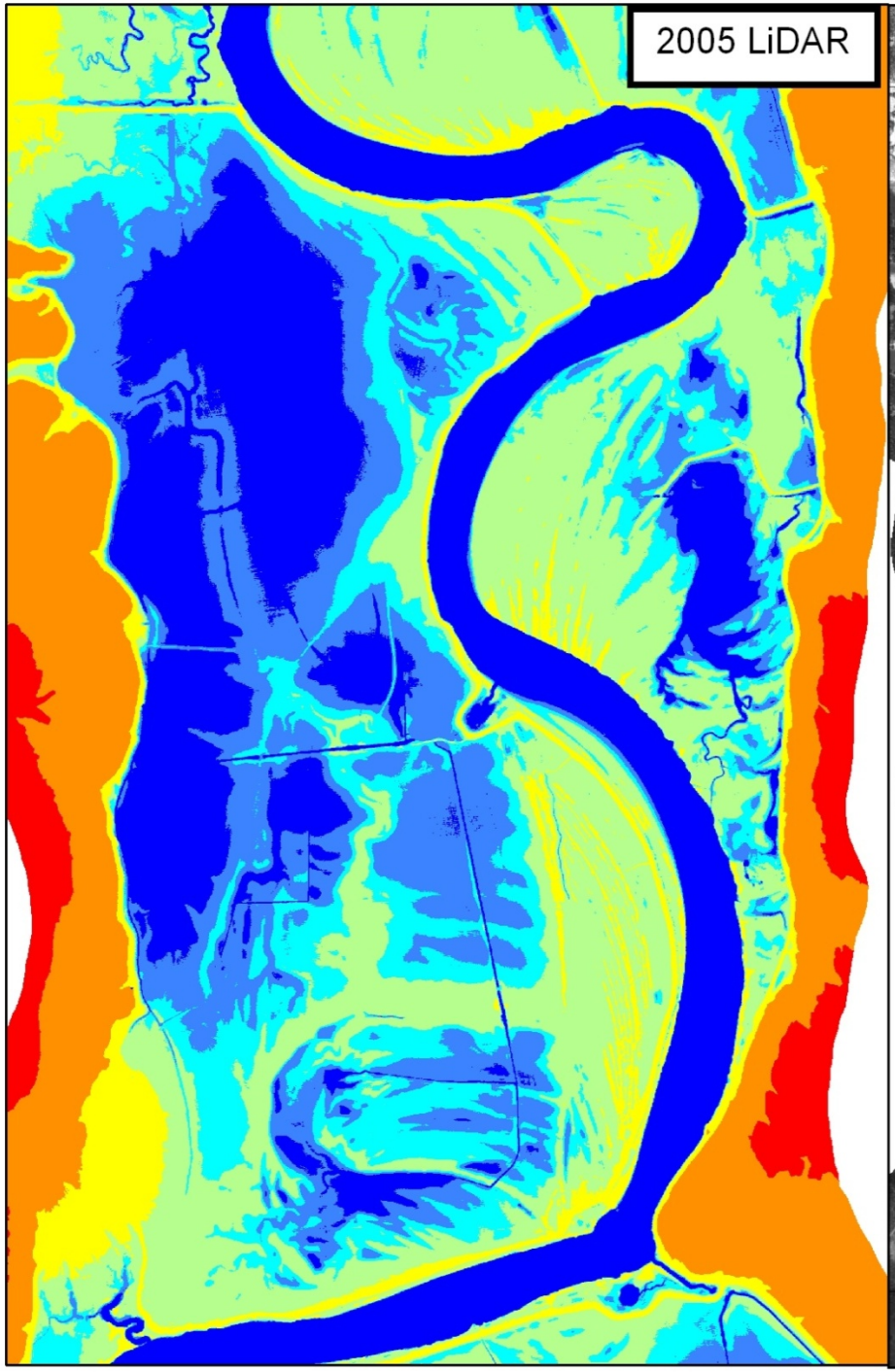

29-jun-2002




Top of Dike
Top of Bank
Legend
WS 1841/65000
WS 1345/47500
Crit 1841/65000
Crit 1345/47500
0 ft/s
1 ft/s
2 ft/s
3 ft/s
Ground
Levee
Bank Sta
1780
1770
1760
1750
1740
1730
4000
4200
4400
4600
4800
5000

#4) Tributary hydrology is a suitable surrogate to mimic the Kootenai River flood pulse.

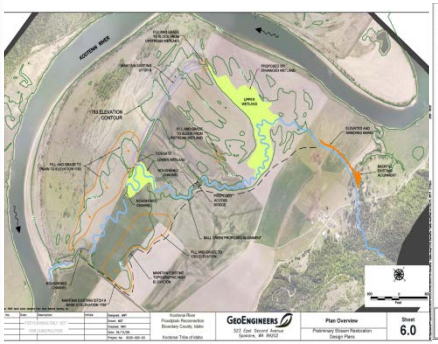


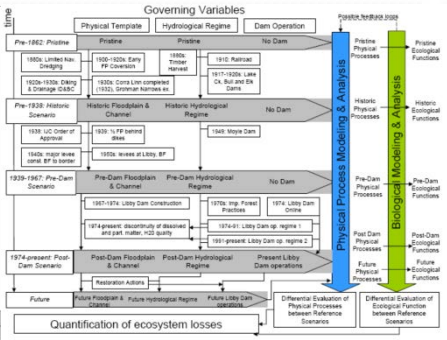

2005 LiDAR


1934 Aerial
12
7
13
18
24
19

The Tribe has addressed ISRP comments appropriately to all prior requests for additional information, including

- design and review of plans by fluvial geomorphologists,
- completion of project design plans,
- completion of a cost-effectiveness and cost-benefit analysis,
- initiation of an ecosystem productivity assessments,
- evidence of The Nature Conservancy support, and
- development of an RM&E Plan.





Proposed Objectives

Proposed objectives are informed by project's history and continue a natural progression toward

- implementation of floodplain reconnection,
- filling critical information gaps,
- addressing crucial threats,
- community information sharing,
- ongoing scientific peer review (RDRT, IKERT), and
- evaluation of new opportunities and incentives to create long-term, sustainable floodplain restoration.

Proposed Objectives

1. **By 2017, complete implementation of ISRP approved Ball Creek reconnection project.**

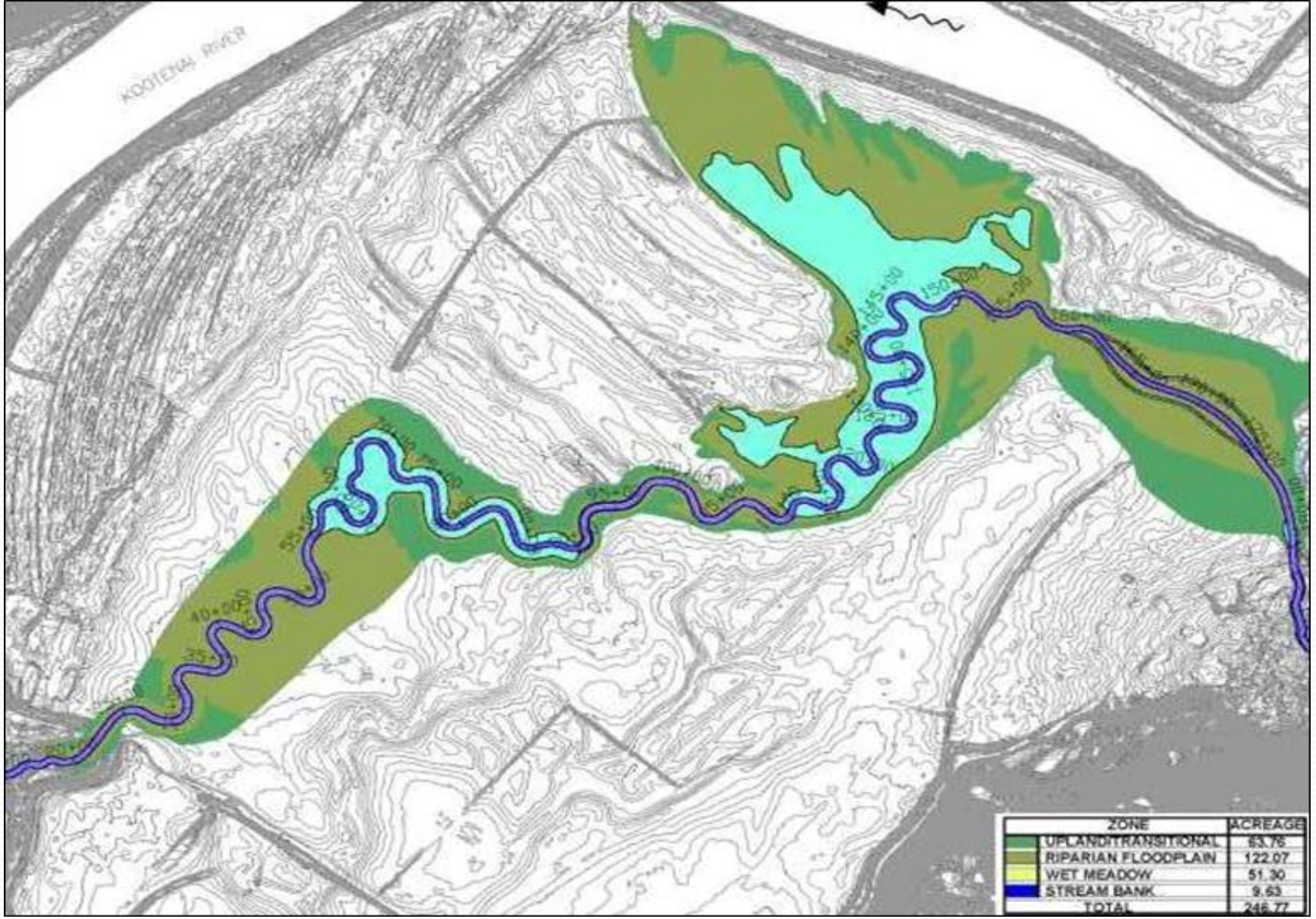
2. **By 2021, implement floodplain reconnection activities in conjunction with BPA mitigation projects (1992-061-05 and mitigation phase of 2002-011-00).**

3. **By 2015, implement invasive species control management techniques in floodplain habitats.**

4. **By 2015, develop RM&E Plan to assess interaction of nutrient dynamics and multi-trophic communities between floodplain lentic systems and the Kootenai River.**

5. **By 2015, develop a GIS-based opportunities and constraints analysis for floodplain reconnection, wetland restoration and tribal wildlife mitigation opportunities.**

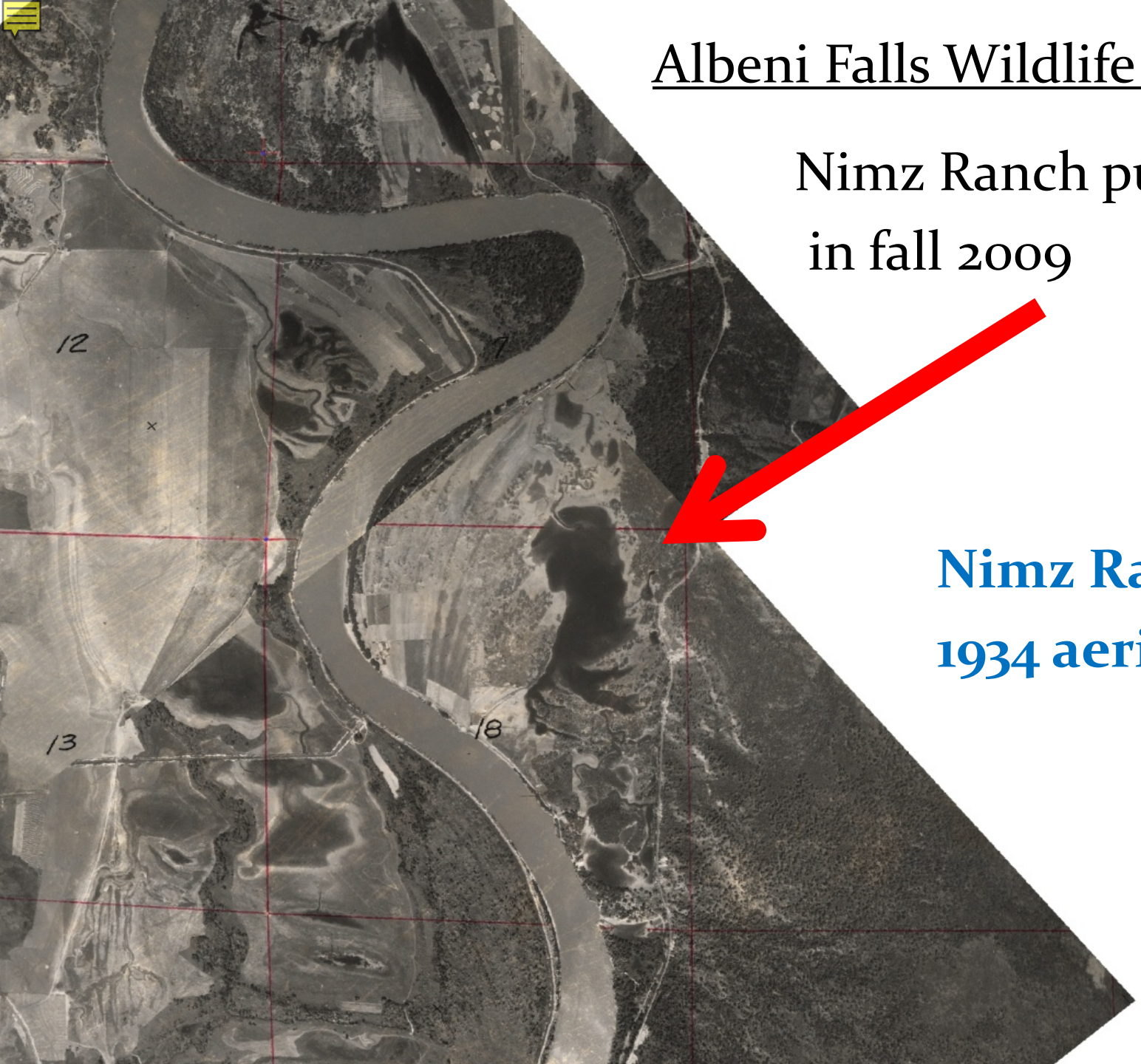
6. **By 2016, investigate opportunities to create biological, social and economic benefits utilizing flood flows and/or groundwater storage and implement pilot project by 2018.**



By 2017, complete implementation of ISRP approved Ball Creek reconnection project.

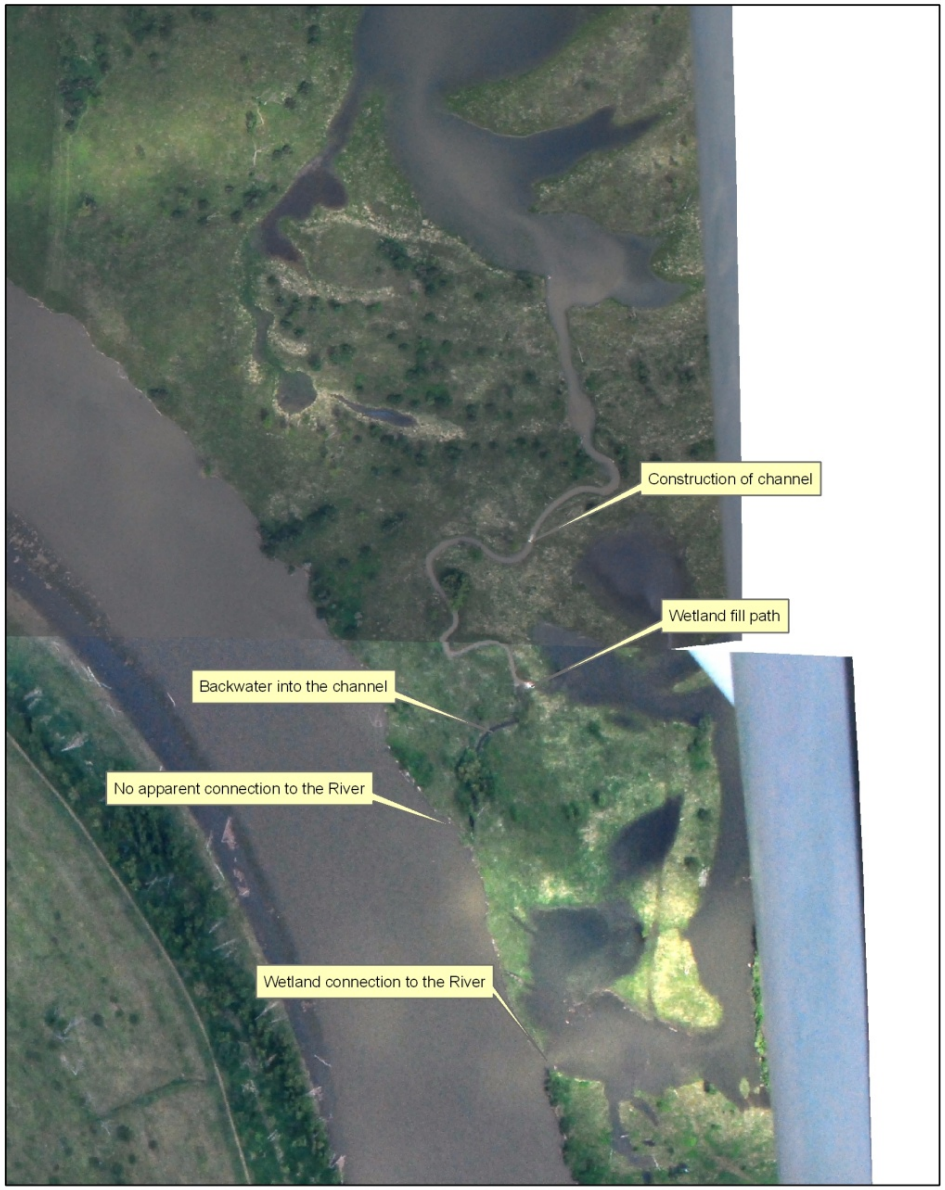
Albeni Falls Wildlife Mitigation

Nimz Ranch purchase
in fall 2009

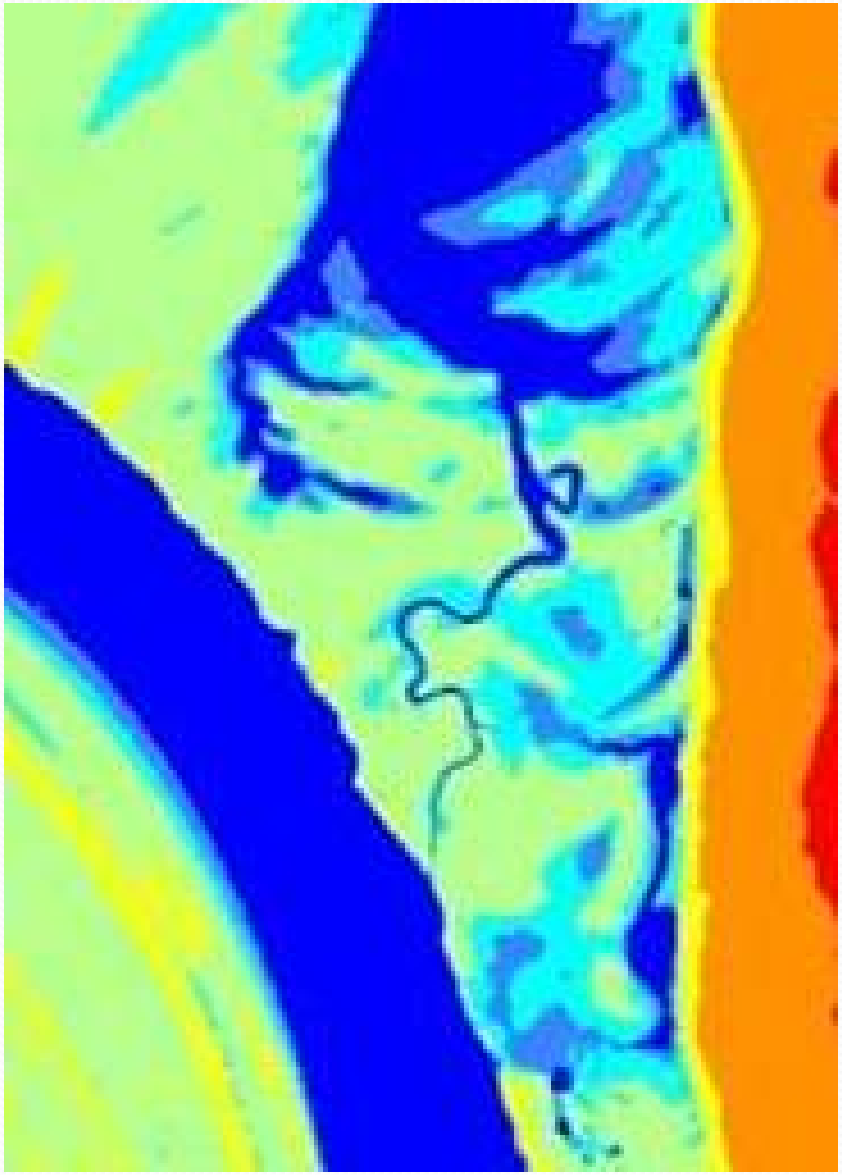


Nimz Ranch
1934 aerial photo

2011

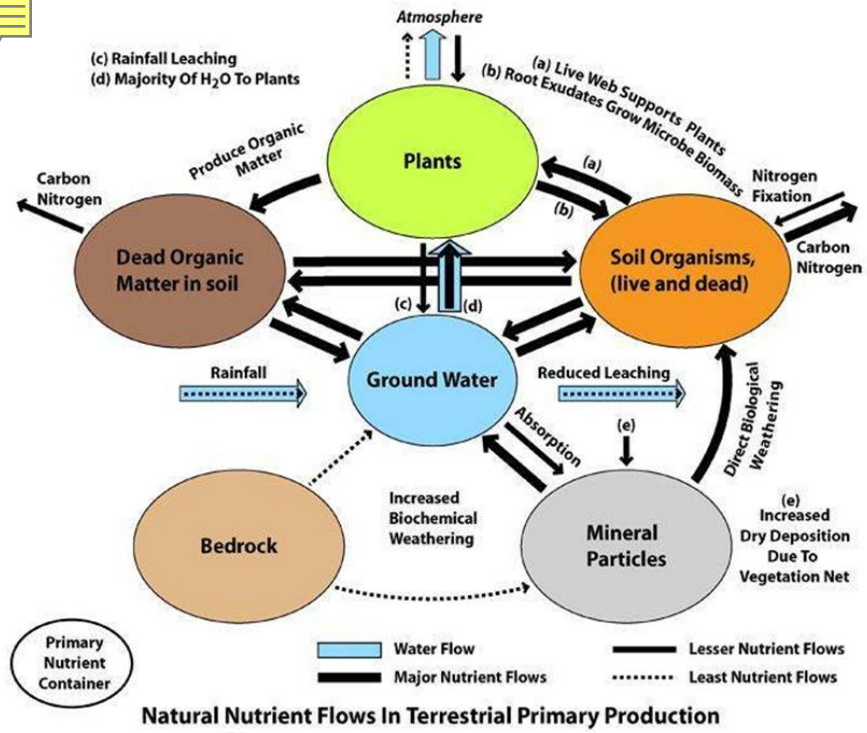


2005 LiDAR

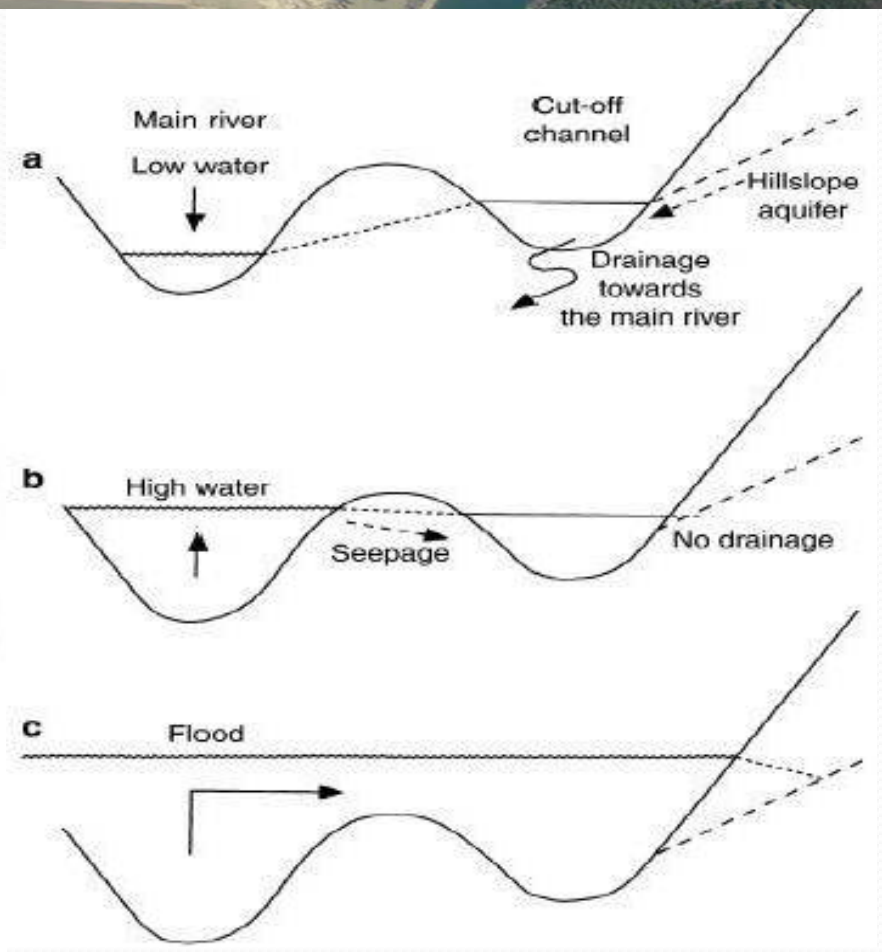


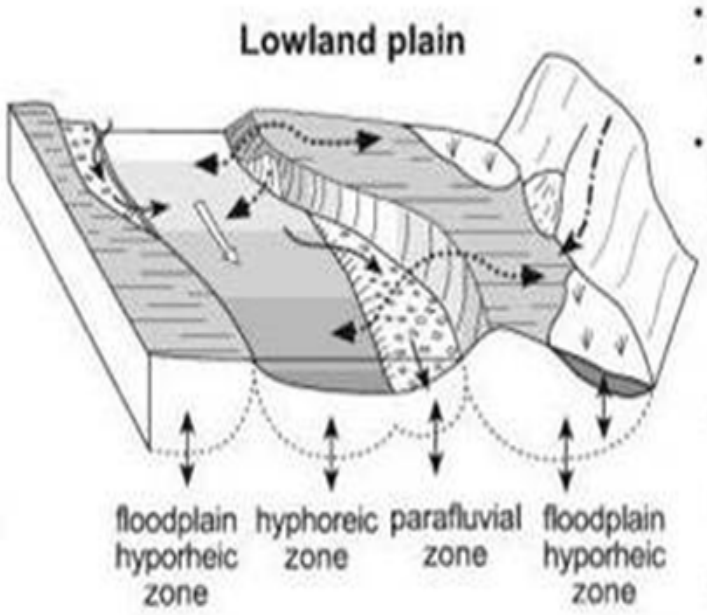

Reed canary grass


‘Wetland’ – mitigation site
Invasion by reed canary grass
= few suitable SITES
Reed canary grass



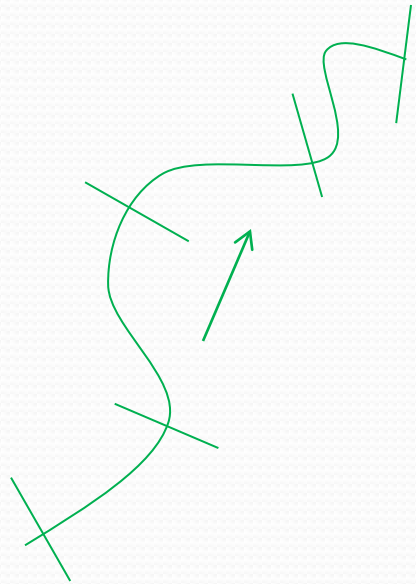
Natural Nutrient Flows In Terrestrial Primary Production



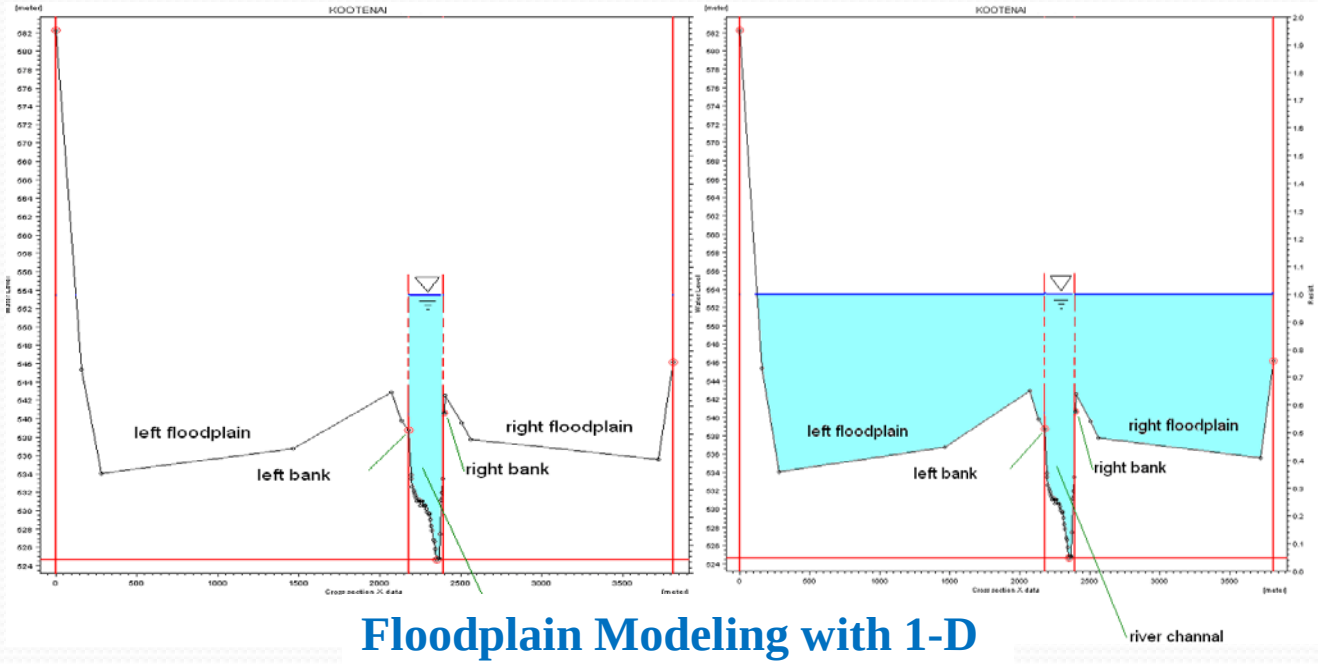


- Accumulation zone
- Slopes and channels decoupled
- Tributaries may be trapped or disconnected from the trunk system
- Sediment storage occurs and longitudinal sediment transfer is inefficient
- Organic matter dominantly FPOM
- Channel floodplain connectivity is high
- Vertical exchanges extensive

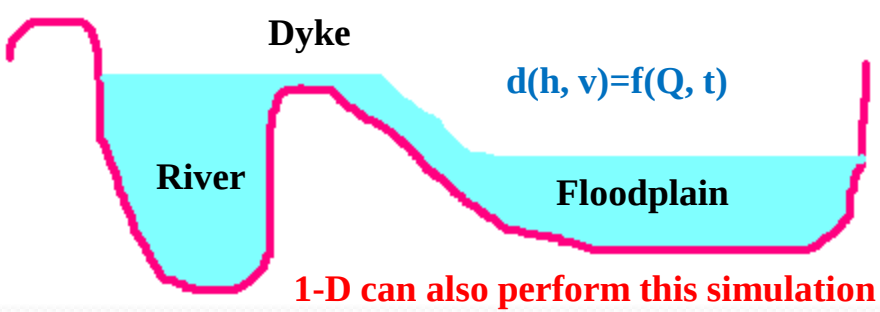
HD models (1-D and 2-D)



1-D river network and X-section locations

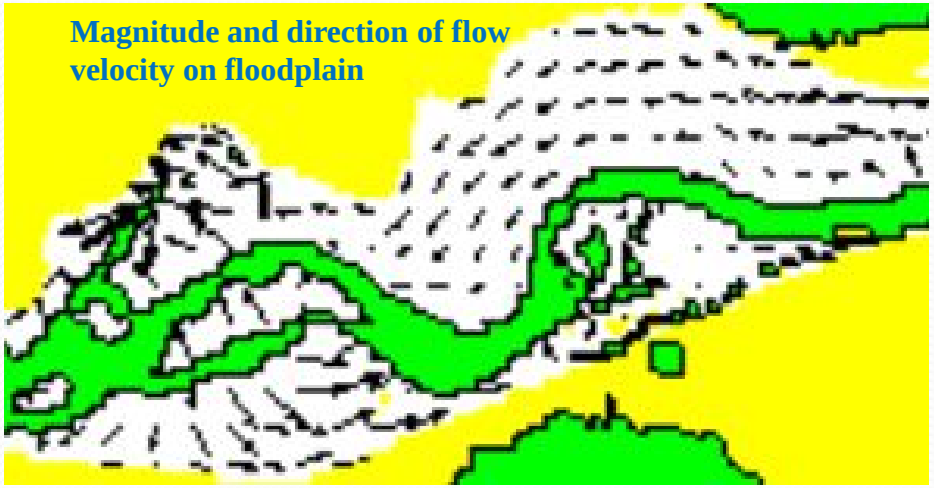


Floodplain Modeling with 1-D

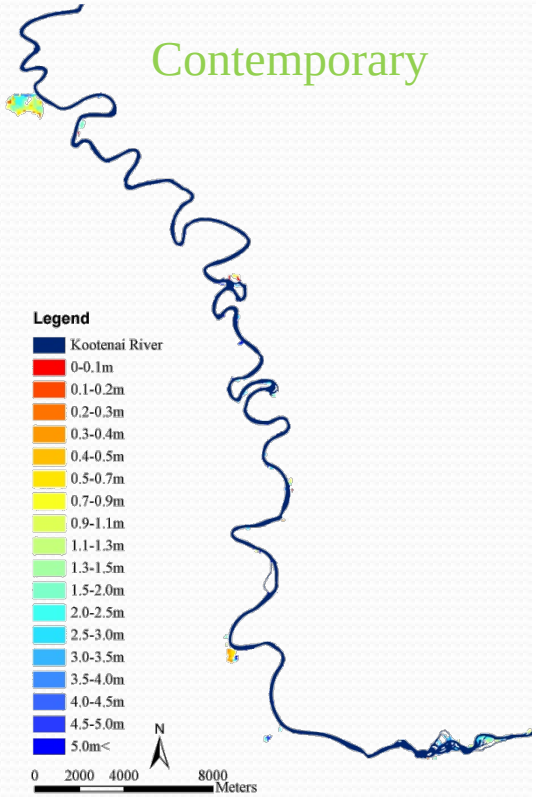


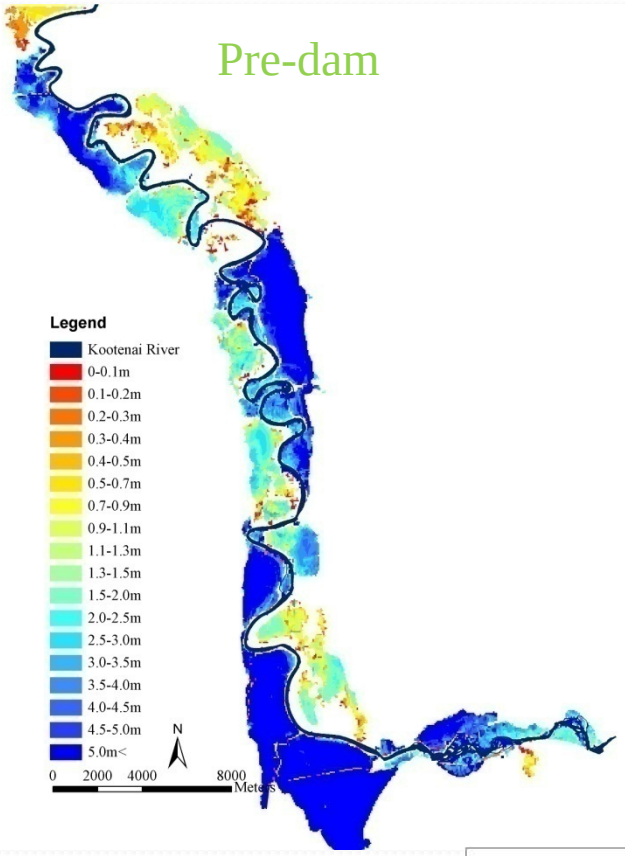
1-D can also perform this simulation

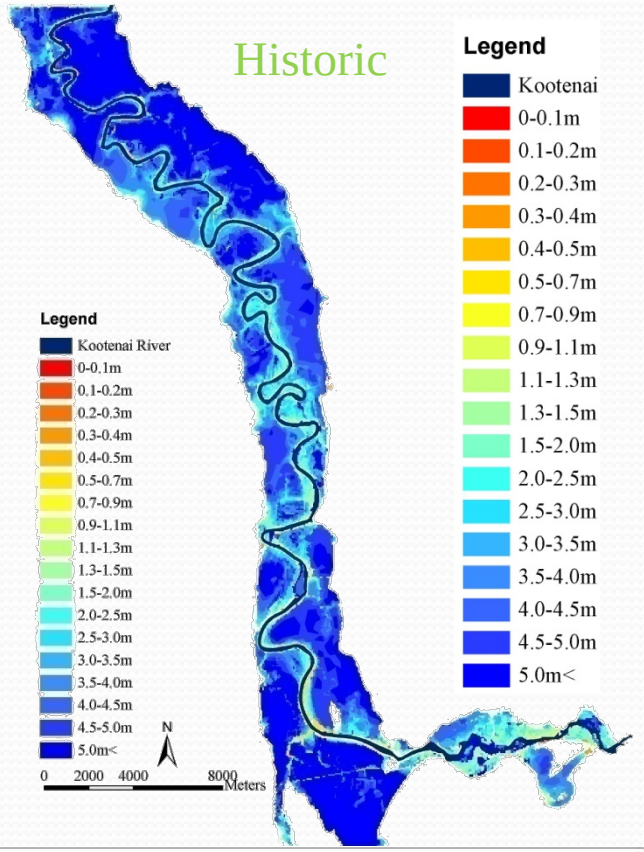
Floodplain Modeling with 2-D



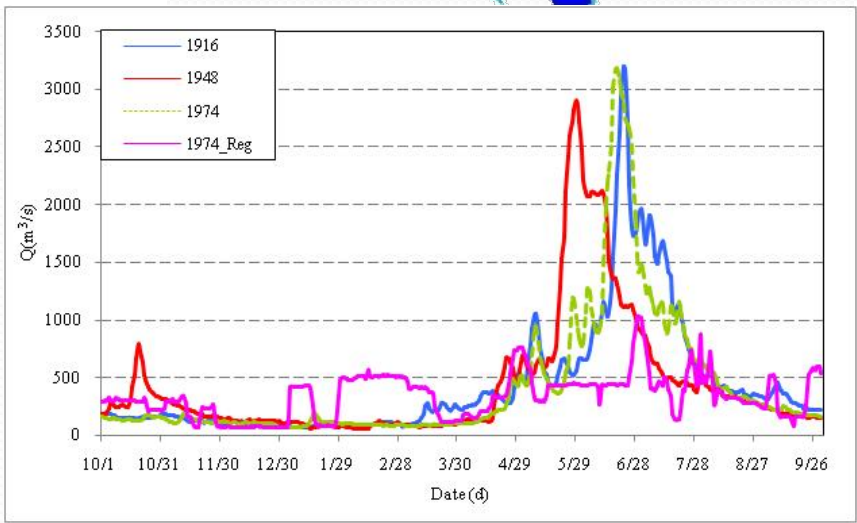
Simulated Inundation extent for climatic condition W_3





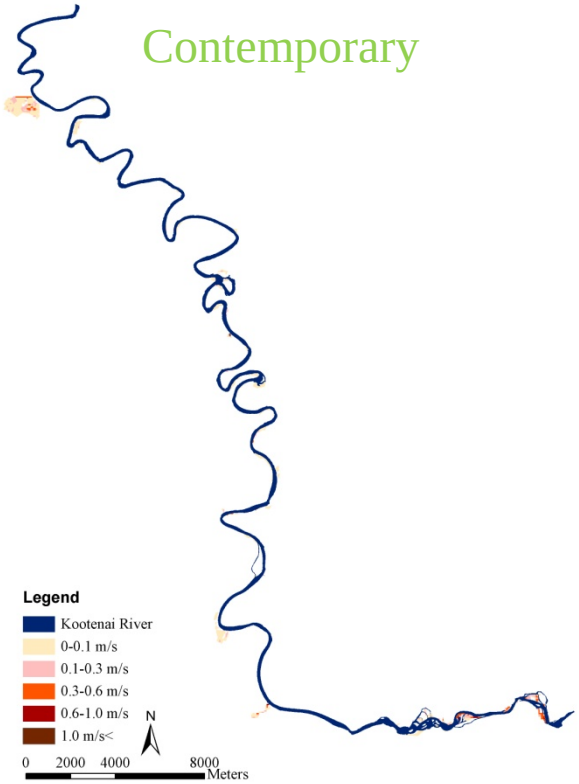


Year		Yearly Maximum (m^3/s)	Recurrence Interval (~)	Yearly Average (m^3/s)	Recurrence Interval (~)
1916	Historic	3200	100	438	25
1948	Pre-dam	2906	100	437	25
1974	Contemporary	3183	100	422	25

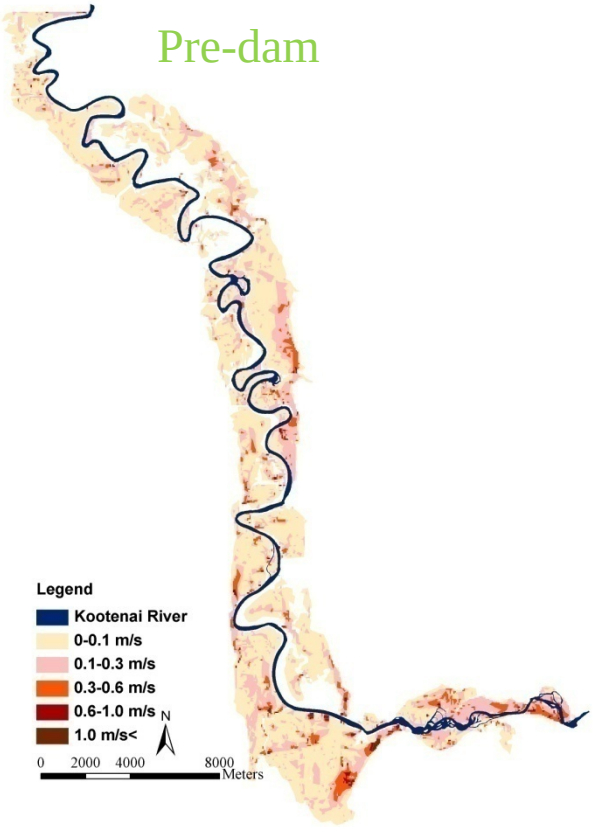


Simulated velocity distribution for climatic condition W_3

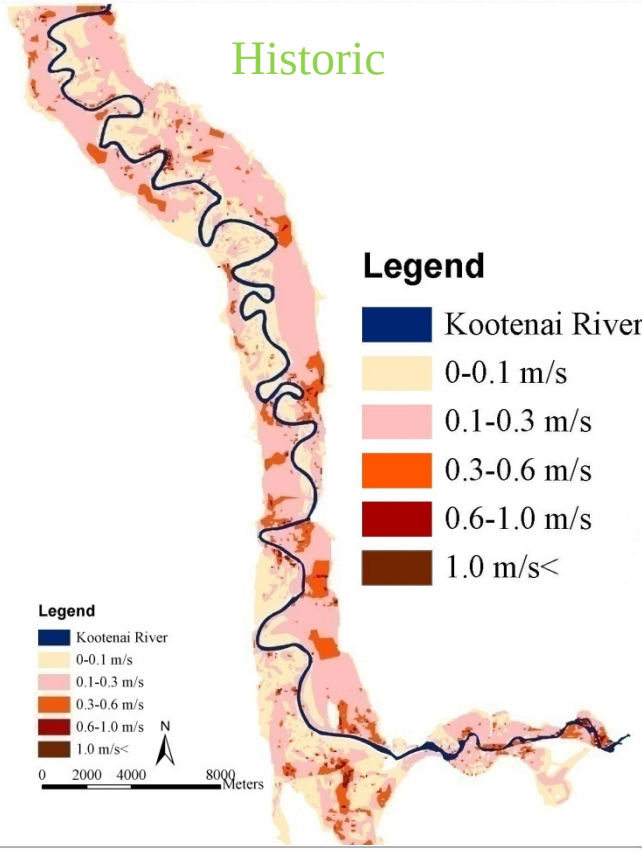
Contemporary

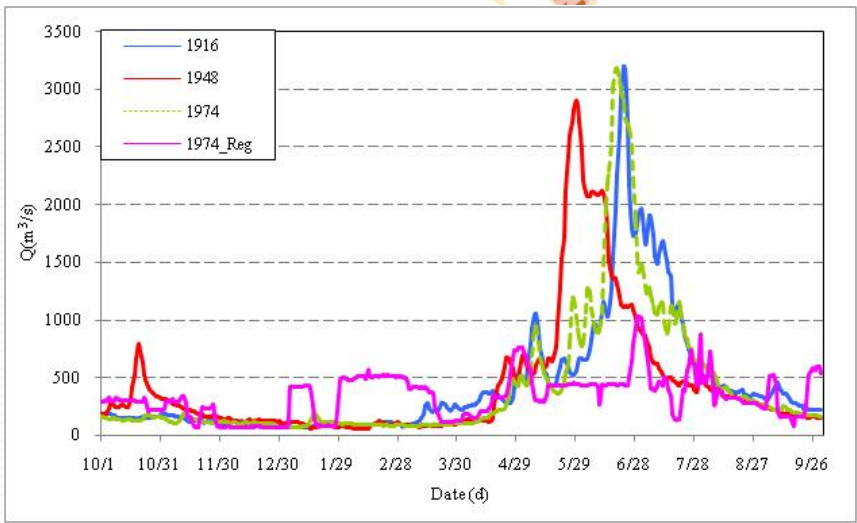


Pre-dam



Historic

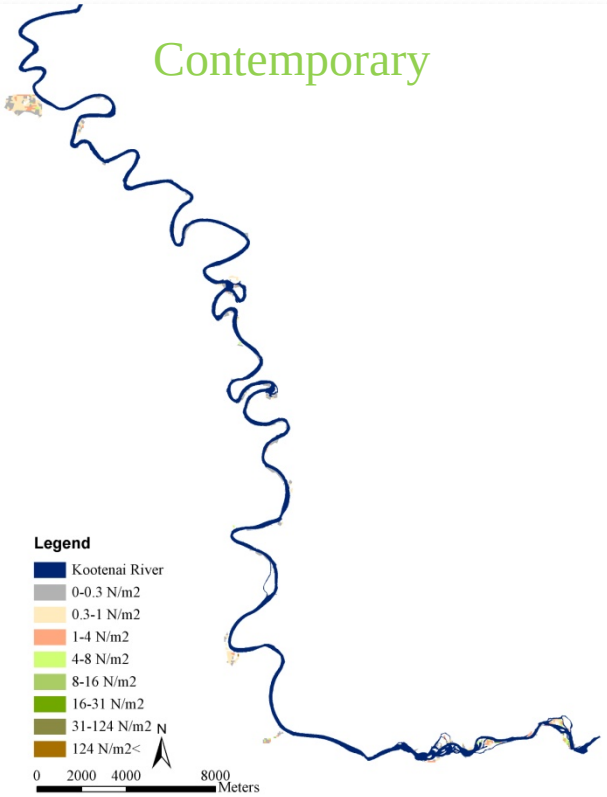




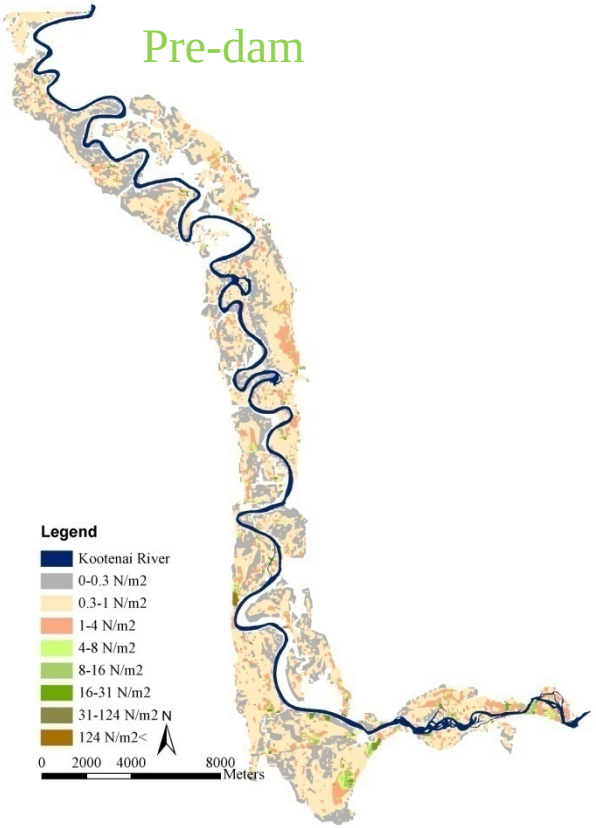
Year		Yearly Maximum (m^3/s)	Recurrence Interval (~)	Yearly Average (m^3/s)	Recurrence Interval (~)
1916	Historic	3200	100	438	25
1948	Pre-dam	2906	100	437	25
1974	Contemporary	3183	100	422	25

Simulated shear stress distribution for climatic condition W_3

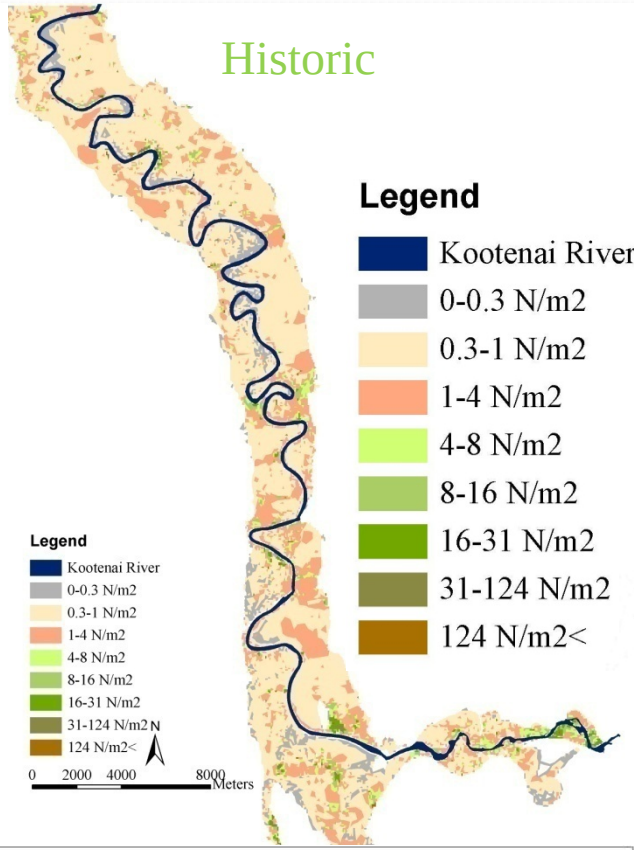
Contemporary



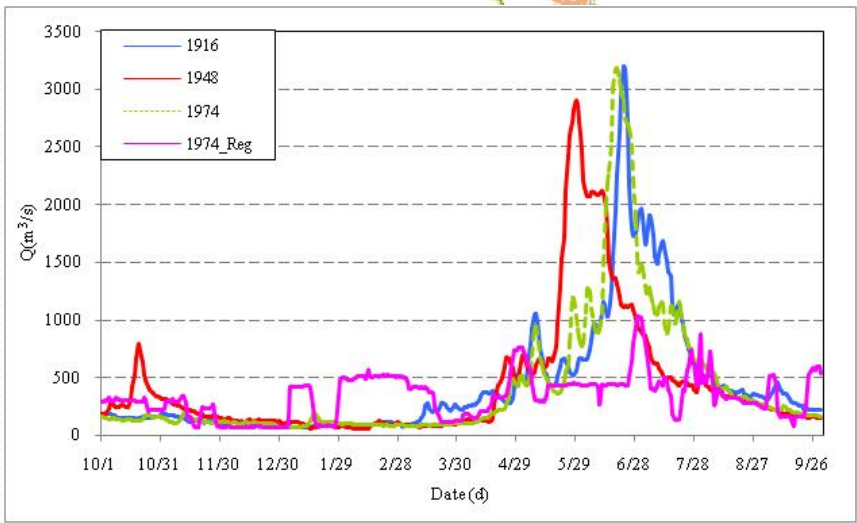
Pre-dam

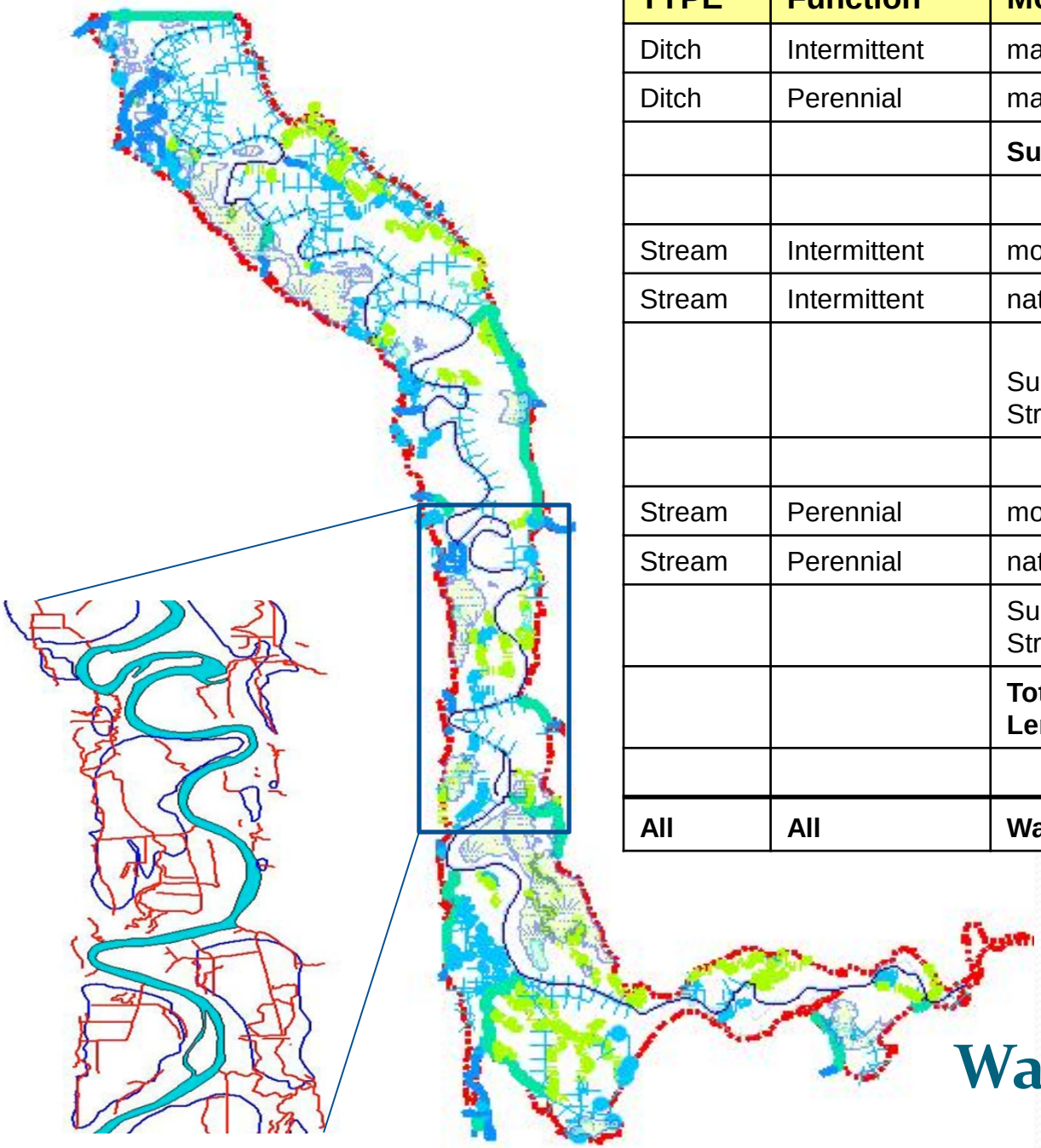


Historic



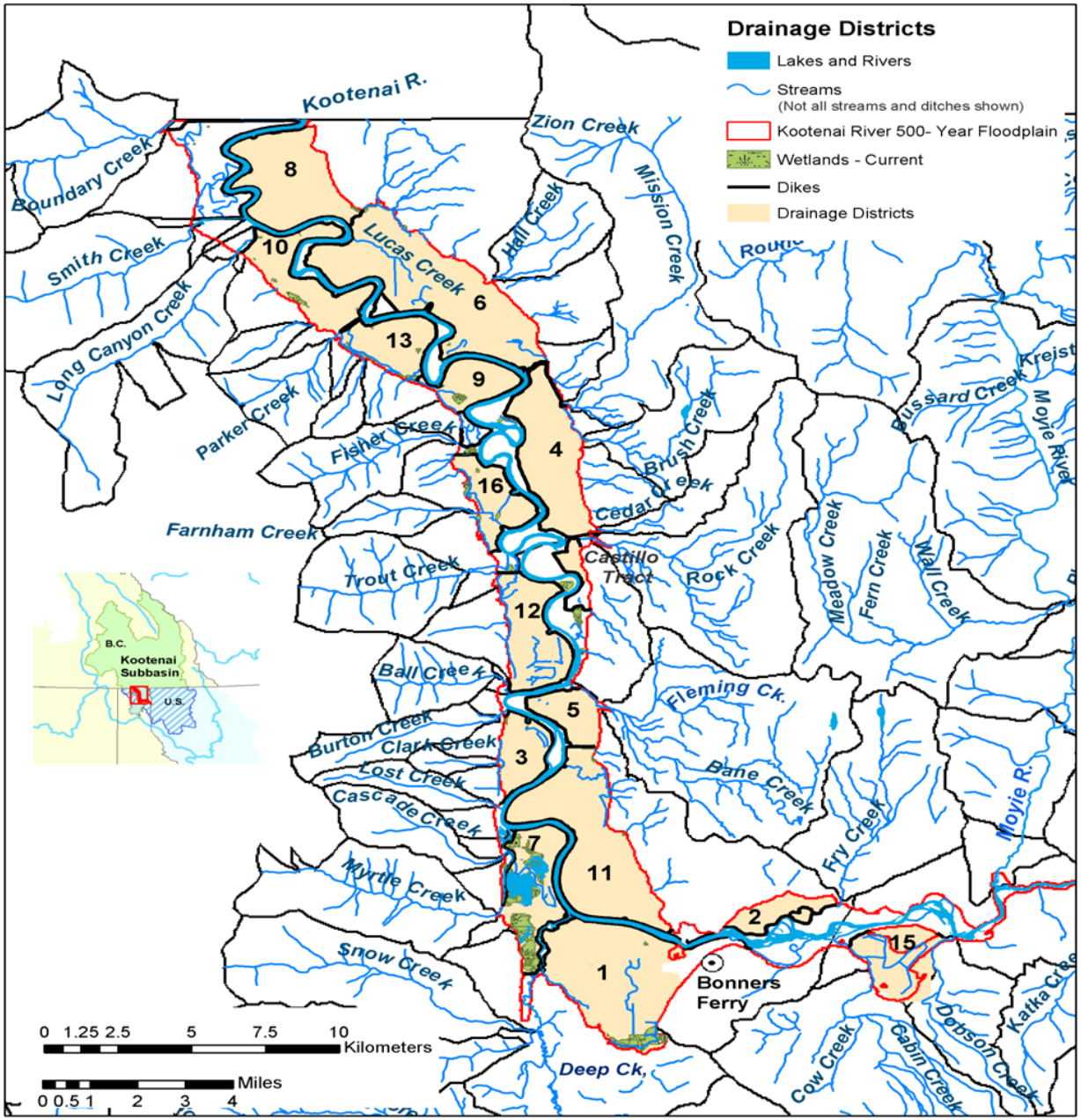
Year		Yearly Maximum (m^3/s)	Recurrence Interval (~)	Yearly Average (m^3/s)	Recurrence Interval (~)
1916	Historic	3200	100	438	25
1948	Pre-dam	2906	100	437	25
1974	Contemporary	3183	100	422	25





TYPE	Function	Modified	1928	1985
Ditch	Intermittent	manmade	64.66	91.99
Ditch	Perennial	manmade	7.81	51.75
		Subtotal Ditches	**72.47**	**143.74**
Stream	Intermittent	modified natural	50.49	77.66
Stream	Intermittent	natural	24.67	5.6
		Subtotal Intermittent Streams	75.16	83.26
Stream	Perennial	modified natural	20.01	23.02
Stream	Perennial	natural	14.53	15.29
		Subtotal Perennial Streams	34.54	38.31
		Total Stream Length	**109.7**	**121.57**
All	**All**	**Waterway Miles**	**182.17**	**265.31**

Waterway Change


Drainage Districts
Lakes and Rivers
Streams
(Not all streams and ditches shown)
Kootenai River 500- Year Floodplain
Wetlands - Current
Dikes
Drainage Districts
Kootenai R.
Boundary Creek
Smith Creek
Long Canyon Creek
Parker Creek
Fisher Creek
Farnham Creek
Trout Creek
Ball Creek
Burton Creek
Clark Creek
Lost Creek
Cascade Creek
Myrtle Creek
Snow Creek
Deep Ck.
Zion Creek
Hall Creek
Mission Creek
Lucas Creek
Brush Creek
Cedar Creek
Castillo Tract
Rock Creek
Meadow Creek
Fern Creek
Wall Creek
Brussard Creek
Moyie River
Fleming Ck.
Pane Creek
Fry Creek
Moyie R.
Bonners Ferry
Cow Creek
Cabin Creek
Debson Creek
Katka Creek
8
10
6
13
9
4
16
12
5
3
7
11
1
2
15
B.C.
Kootenai Subbasin
U.S.
0 1.25 2.5 5 7.5 10 Kilometers
0 0.5 1 2 3 4 Miles

Objective #6) By 2016, investigate opportunities to create biological, social and economic benefits utilizing flood flows and/or groundwater storage and implement pilot project by 2018.

- Create short-term (5-10 years) incentives for landowner to participate in floodplain reconnection and groundwater storage.
- Participating landowners would allow flood flows to inundate private lands to enhance floodplain processes.