

Missouri River PFC Assessment

Past...Present...Future

Background Information

- Upper Missouri National Wild and Scenic River (UMNWSR)
- Montana/Dakotas Standards for Rangeland Health and Guidelines for Livestock Grazing Management
 - Lewistown Standard #2 is that riparian and wetland areas are in proper functioning condition (PFC).
 - Lewistown Standard #3 states that water quality meets Montana State standards.
- Upper Missouri River Breaks National Monument (UMRBNM)

How Did We Get Here?

- Public concern of riparian-wetland area management along BLM lands on the Upper Missouri River
- Social conflict surrounding riparian-wetland management and livestock grazing within the UMRBNM
- BLM requested assistance from the National Riparian Service Team (NRST)

National Riparian Service Team (NRST)

- Interagency group of specialists who assist with technical and social problem solving around riparian issues
- Fall of 2008 NRST begins involvement
 - conducting situation assessments
 - holding riparian workshops
 - helping to facilitate flow management discussions
 - supporting the Upper Missouri PFC assessment

Goals & Objectives

- Complete a PFC assessment for all BLM administered lands on the Upper Missouri within the UMRBNM
- Identify issues/concerns and general management recommendations for addressing them
- Address water quality concerns
- Provide a basis and rationale for future monitoring

Methods – 3 Major Steps

- Step 1 - Substantial pre-work which included review of existing documentation
- Step 2 - Field evaluation of all BLM administered lands on the Upper Missouri within the UMRBNM
- **Step 3 - Development of final PFC checklists, report, and general management recommendations**

Step 1 – Prework

Interdisciplinary (ID) Team:

- Hydrologist(s)
- Range Technician(s)
- Wildlife Biologist
- Soil Scientist(s)
- Riparian Ecologist
- Riparian Specialist
- NRST Leader
- Range Management Specialist(s)



Together the team has 200 years of experience!

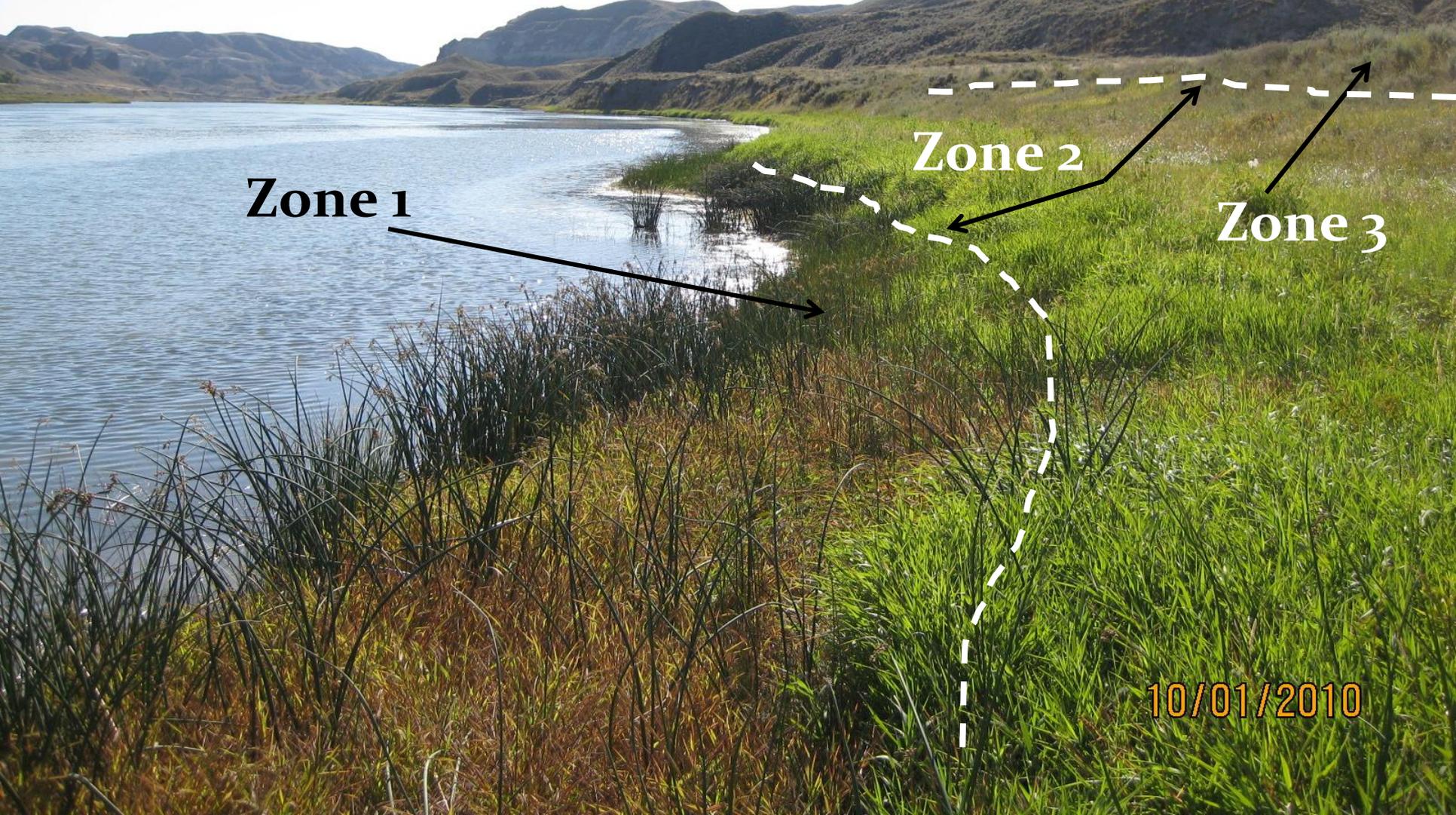
Step 1 – Prework

- Establish reach breaks based on stretches that share similar geomorphic and vegetative characteristics
 - 6 Reaches established with input from ID Team, Surface Water Specialist, USGS Scientist, & U of M Scientist
- Determined stops (assessment locations) based on representative sites of larger stretches of river, unique or critical areas, grazing allotments, reach breaks, and existing monitoring locations with historic documentation and photographs
- Pre-Assessment Community Workshops
 - Lewistown, Winifred, & Fort Benton

Step 2 – Field Evaluation

- May 2010 – ID Team standardized PFC assessment procedures
- July 2010 - ID Team completed PFC assessments for all 6 reaches from CMR Boundary to Fort Benton
 - Interested Parties, Livestock Grazing Permittees, other BLM Staff, and Public invited & encouraged to participate
 - 46 Stops (Assessment Locations) & 83 Photo Points
- Early September 2010 - ID Team revisited reaches 3 thru 6 to validate assessments at lower water levels
- Late Sept & Early Oct 2010 - BLM Staff repeated several assessment photos after grazing & during low water

- **Zone 1** (closest to water) – scourline to bankfull discharge (2 year flood stage)
- **Zone 2** (middle area) – bankfull to 10 year flood stage
- **Zone 3** (upper area) – 10 year flood stage to uplands



Zone 1

Zone 2

Zone 3

10/01/2010

Wetland Plant Indicator Categories

Riparian-Wetland refers to Obligate & Facultative Wetland Plants

- **Obligate (OBL)** - almost always occurs in wetlands (99% of time)
- **Facultative Wetland (FACW)** - usually occur in wetlands (66% of time)

“Plants tell the story”

Plant Information

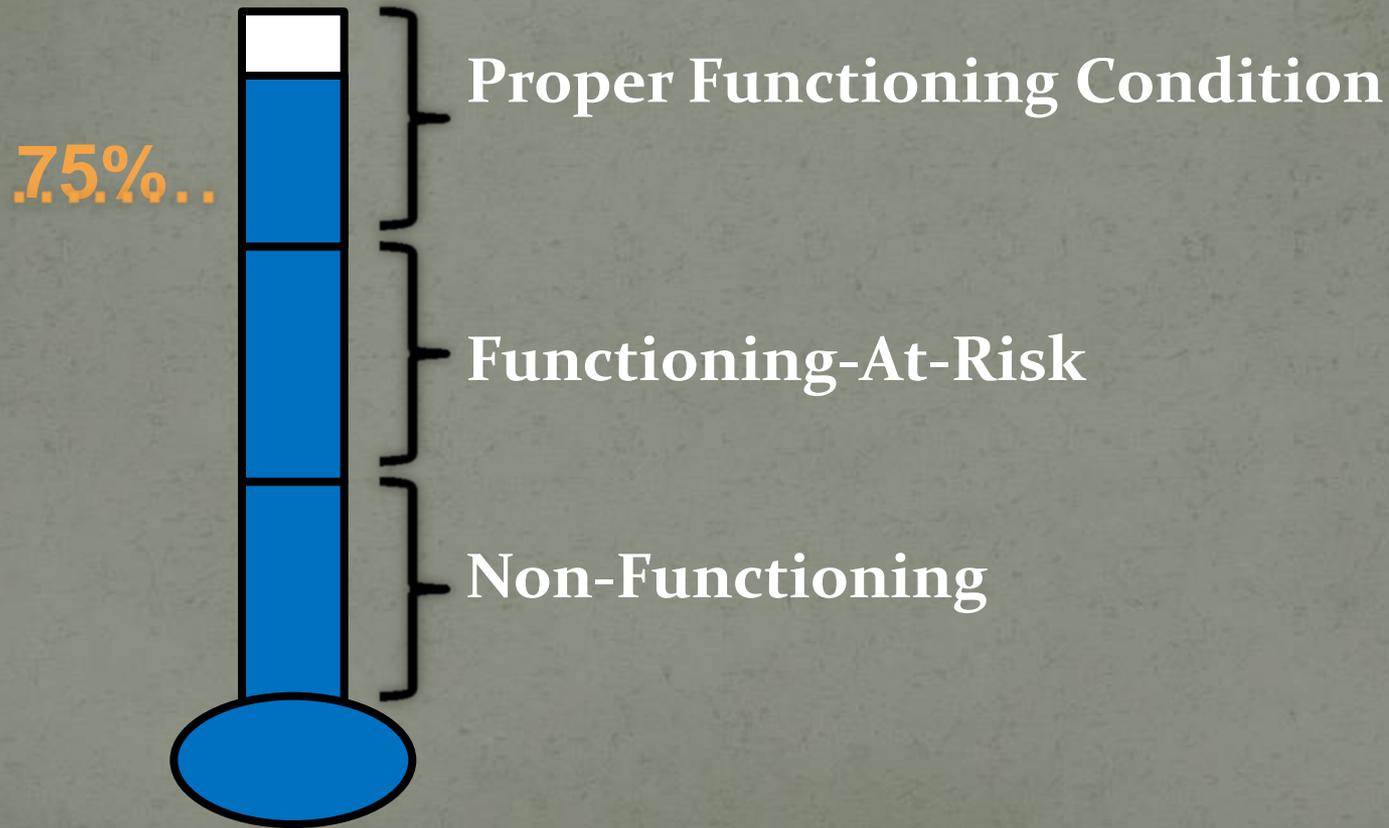
- **Dominant Plants** - canopy cover greater than 25% or when only a single plant occurred in an area.
- **Vegetation Stability Class**
 - Low (shallow rooted plants)
 - Medium (rhizomatous, spreading roots)
 - High (deep, binding root masses, multi-species)

Functional Rating

- **Proper Functioning Condition (PFC)** – When a riparian-wetland has adequate vegetation, landform, or large woody material to dissipate stream energy, reduce erosion, improve water quality, filter sediment, capture bedload, create floodplains, hold water, stabilize stream banks, develop diverse wildlife habitat, and support greater biodiversity.
- **Functional – At Risk (FAR)** - When riparian-wetland areas are in a functional condition, but an existing soil, water, or vegetation attribute makes it susceptible to degradation.
- **Nonfunctional (NF)** – When a riparian-wetland area is clearly not providing those items of PFC.

Functional Rating

Potential Natural Community



Soil Pits

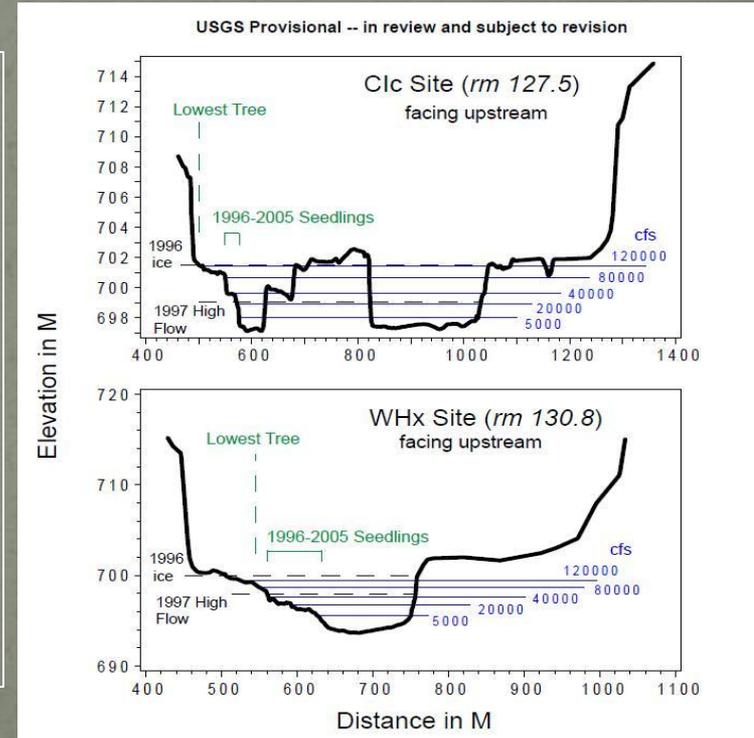
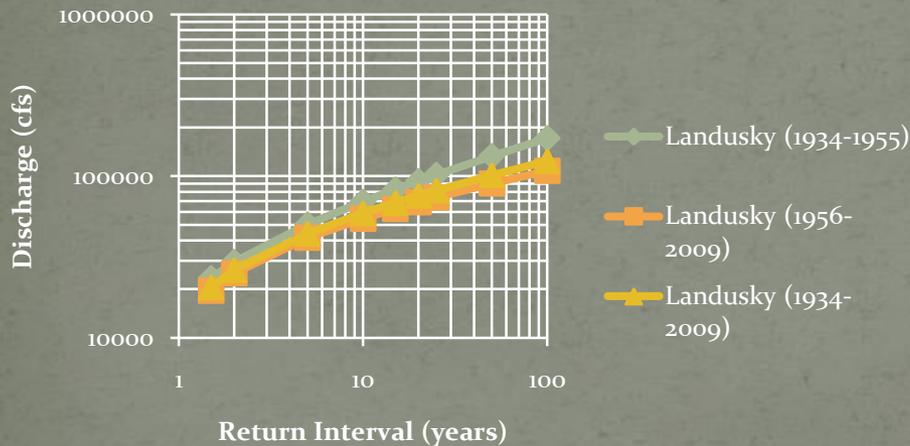
- Help mark the seasonal high water table
- Used to determine soil texture (clay, silt, sand)

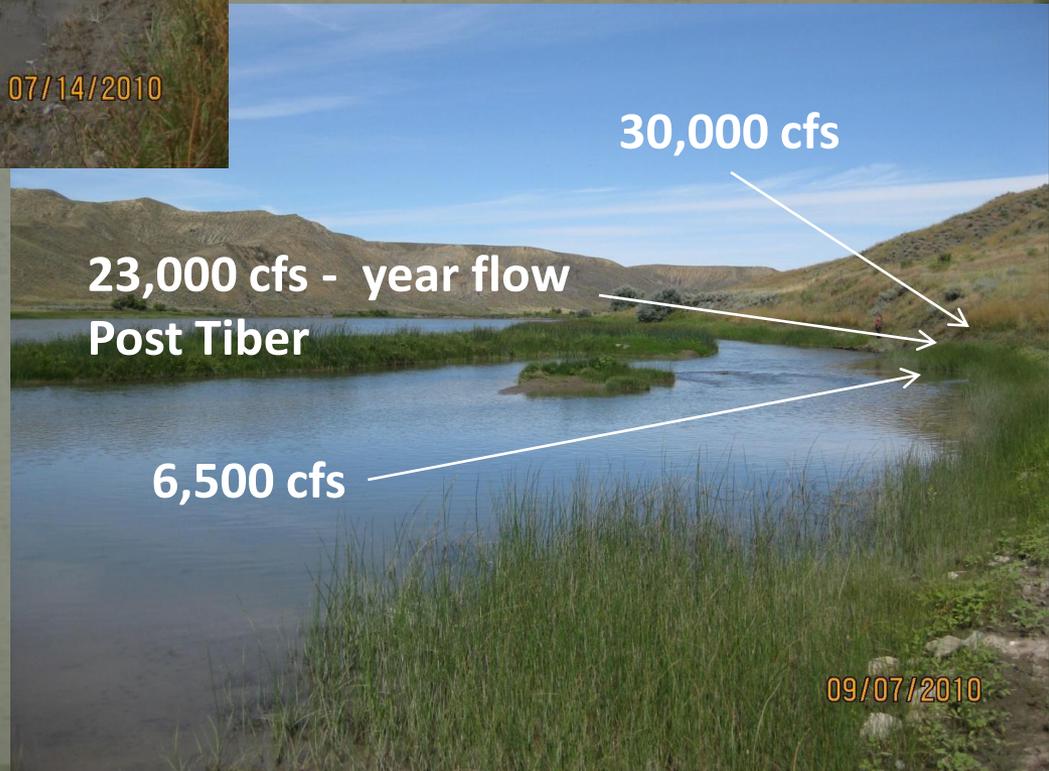
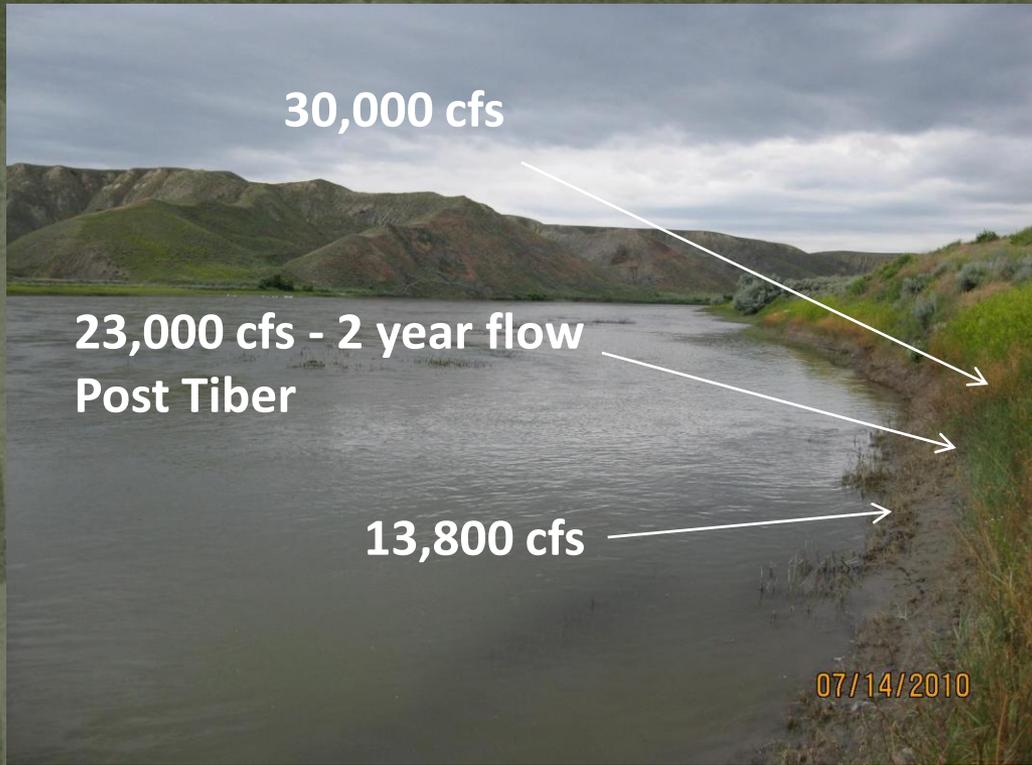


Hydrology

- Flood frequency curves and inundating discharges were reviewed at stops to help the team determine how often areas were inundated.

Flood Frequency for Missouri River at Landusky





Vegetation Attributes

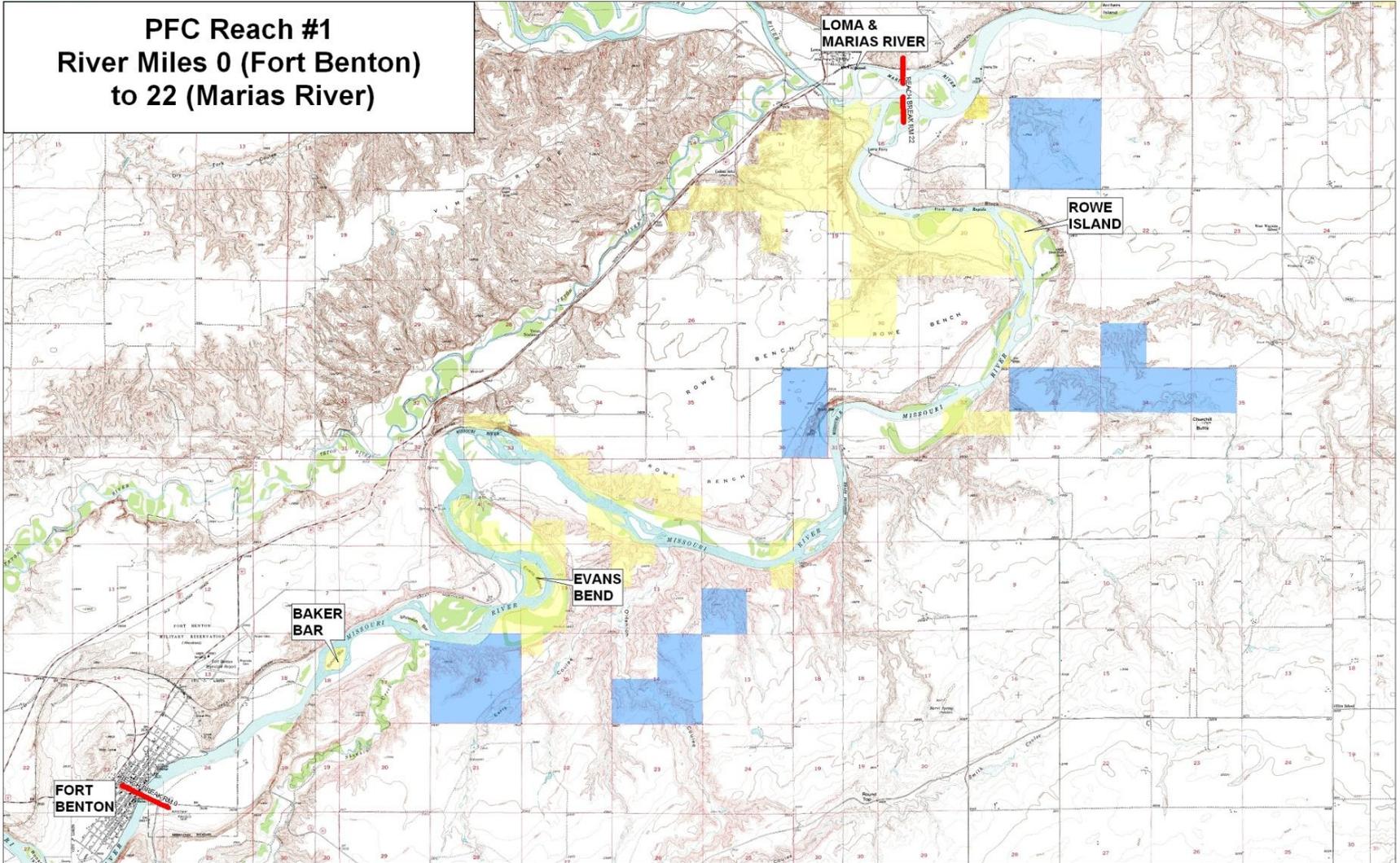
- Diverse age class of riparian-wetland plants?
- Diverse composition – more than one species?
- Species present – composed of riparian plants?
- Streambank vegetation – type of root system?
- Vigor – healthy, robust, stressed?
- Streambank Cover – enough and type of plants?

Reach #1

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XMap® 7

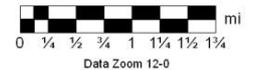
PFC Reach #1
River Miles 0 (Fort Benton)
to 22 (Marias River)



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Reach #1

- 44 - River Bank Miles
- 10 - River Banks Miles BLM Land
- 24% - River Bank Miles BLM Land
- 7 - Stops (Assessment Locations)
- 4 - Photo Points

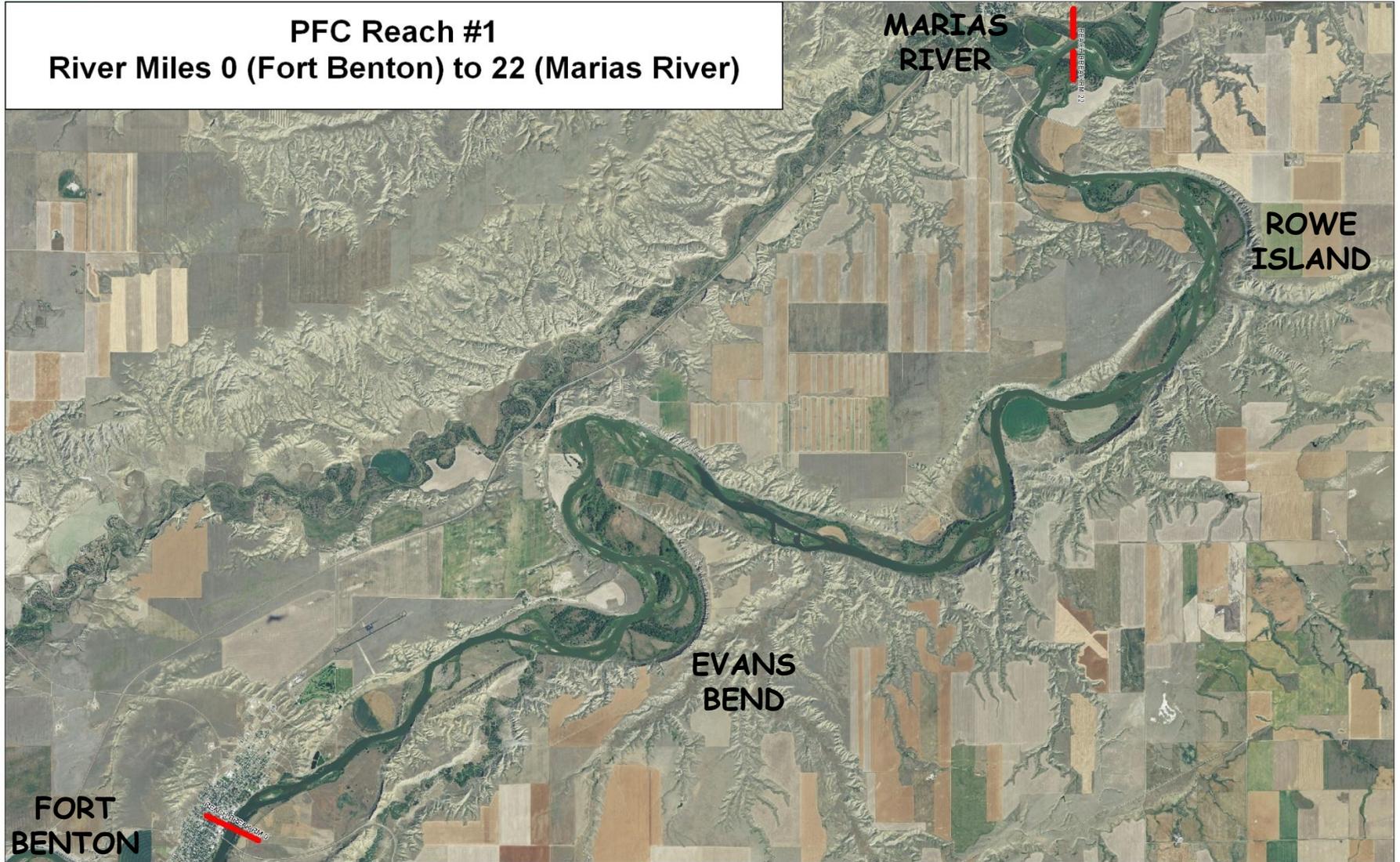
Reach Potential

- Located in the older, preglacial Missouri River Valley.
- Relatively higher sinuosity, wide valleys, and more rapid channel migrations



Reach #1

PFC Reach #1
River Miles 0 (Fort Benton) to 22 (Marias River)



Vegetation

- Zone 1 and 2 described as steep, nearly vertical banks with narrow, discontinuous floodplain
- Grasses and grass-like plants (sedges, bulrush, spikeweed) is the dominant plant community
- Diverse mix of riparian - wetland plants
- Good bank stabilizers – rhizomatous
- Late successional plants - didn't just show up

Vegetation

- Gravel and cobble common in Zones 1 and 2
- Trees and shrubs in Zones 1 and 2 showed damage from ice and water scouring
- More trees and shrubs present in back channel areas
- No unusual bank erosion or bare areas
- Noxious weeds, non-native grasses, including reed canarygrass, common in Zone 2

Evan's Bend



05/20/2010

Above O'Hanlon Coulee



Senieur's Reach

05/20/2010



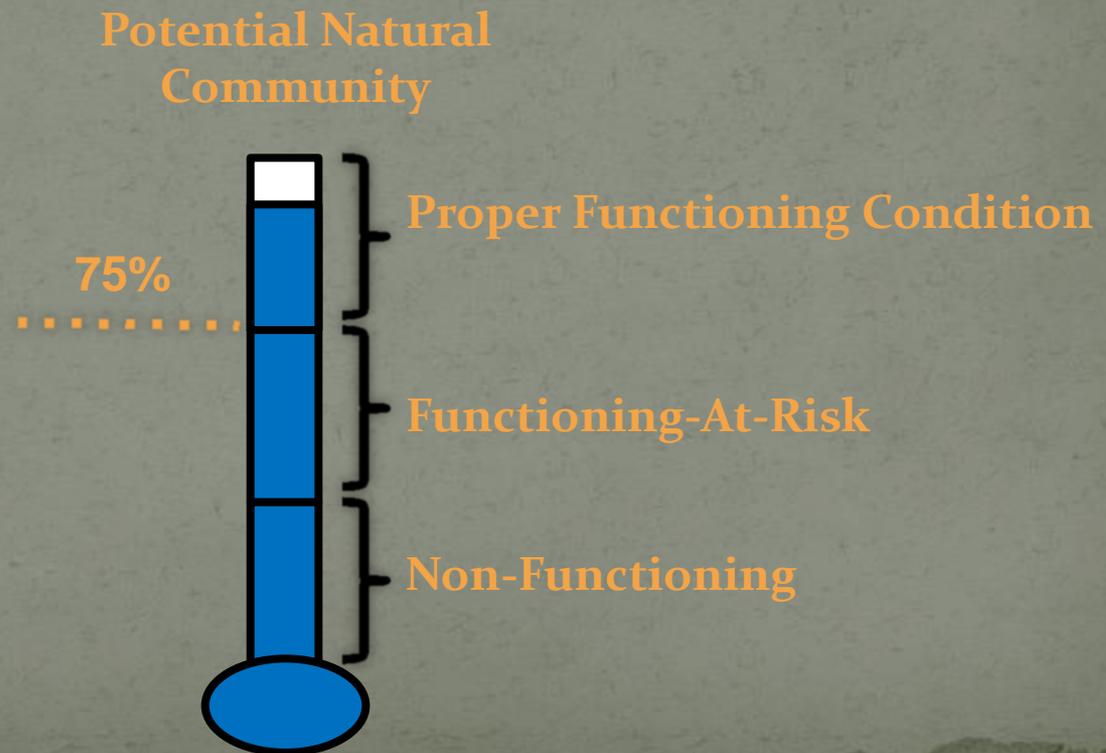
Rowe Island



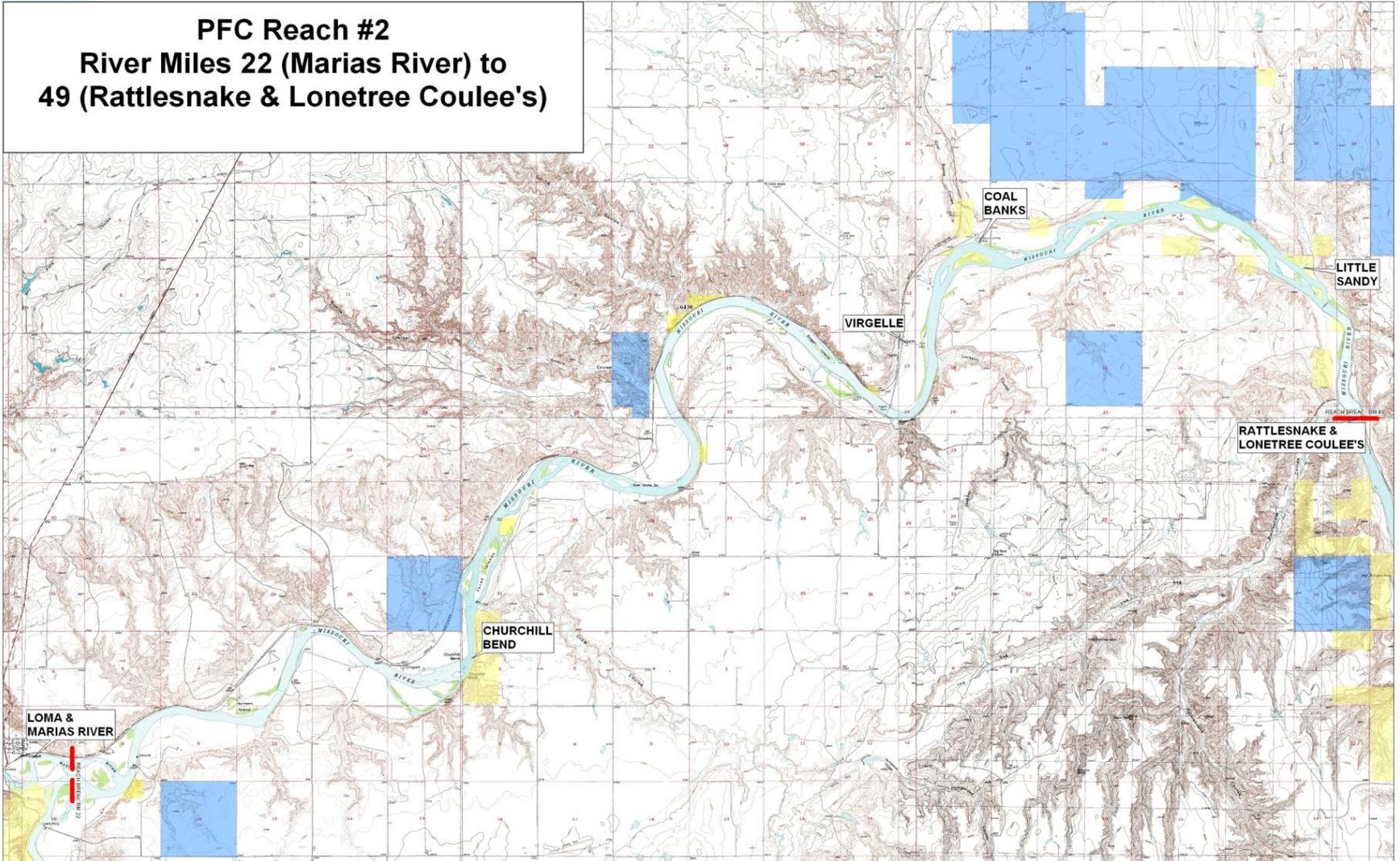
05/20/2010

Reach #1 Summary Determination

- Proper Functioning Condition
- Rated well above proper functioning condition and nearly at potential based on vigor, diverse mix of riparian-wetland species, well vegetated banks and expected channel shape



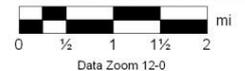
Reach #2



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Reach #2

- 54 - River Bank Miles
- 4 - River Banks Miles BLM Land
- 7% - River Bank Miles BLM Land
- 4 - Stops (Assessment Locations)
- 6 - Photo Points

Reach Potential

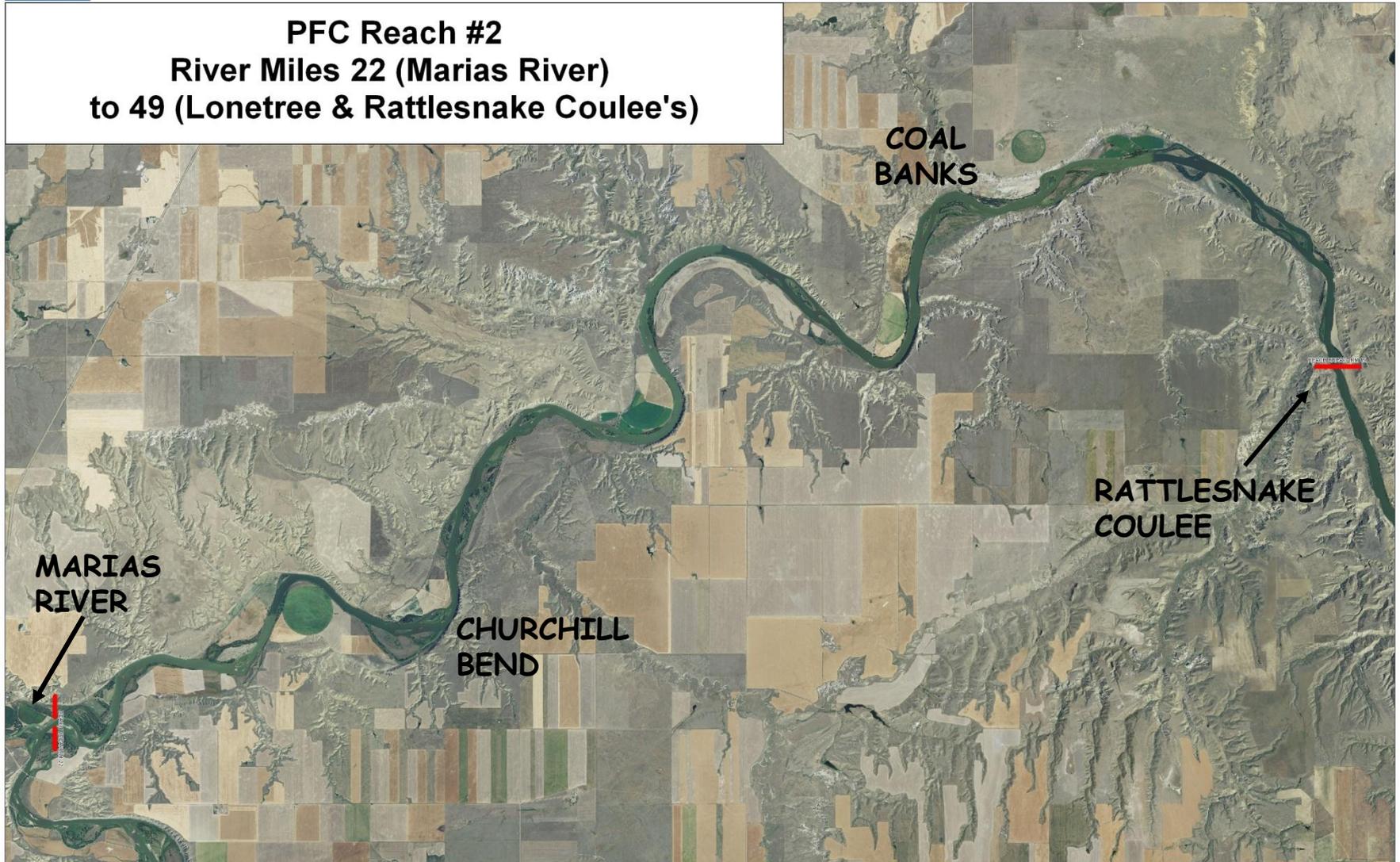
- 
- Located in the older, preglacial Missouri River Valley
 - Relatively high sinuosity, wide valleys, and more rapid channel migrations
 - Transition reach

Reach #2

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PFC Reach #2
River Miles 22 (Marias River)
to 49 (Lonetree & Rattlesnake Coulee's)



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Vegetation

- Riparian zones steep and narrow
- Grasses and grass-like plants (sedges, bulrush, spikeweed) is the dominant plant community
- Trace amounts of woody plants
- Sites well vegetated with diverse mix of riparian-wetland plants

Vegetation

- No unusual signs of bank erosion, exposed banks or sparsely vegetated areas
- Non-native grasses, Russian olive, reed canarygrass and noxious weeds were common
- Woody plants severely impacted by beavers and ice; affecting tree and shrub survival
- Largest deposition areas at tributary junctions

Churchill Bend



07/15/2010

Tributary Junction



07/15/2010

Island



Upriver from Little Sandy

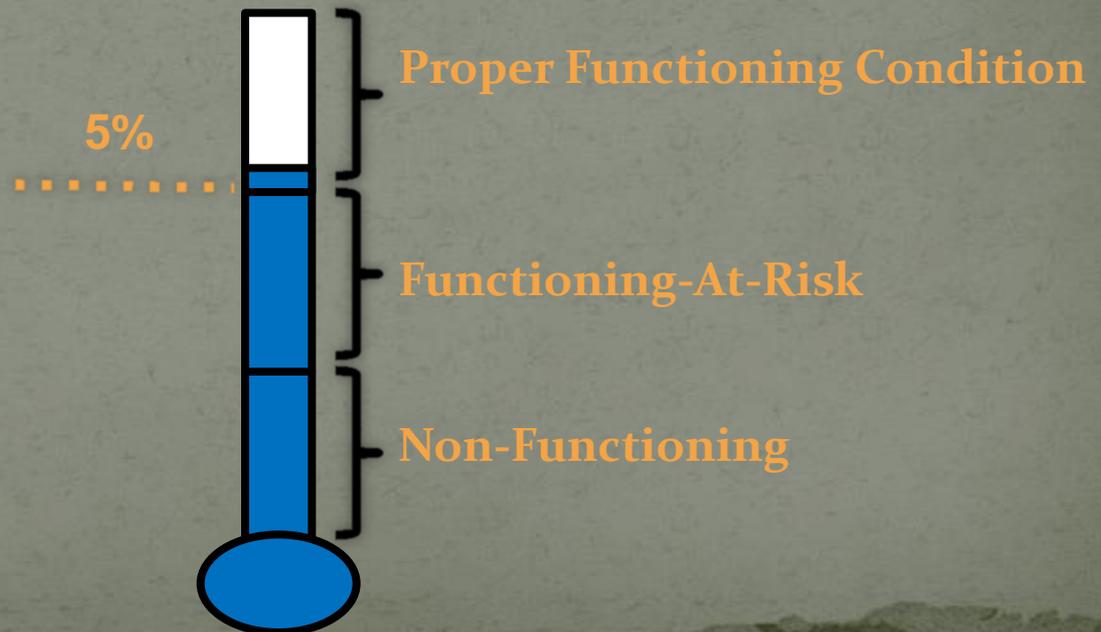


07/15/2010

Reach #2 Summary Determination

- Proper Functioning Condition
- Sites well vegetated with diverse riparian-wetland plants. Streambank stability affected by invasive species and noxious weeds

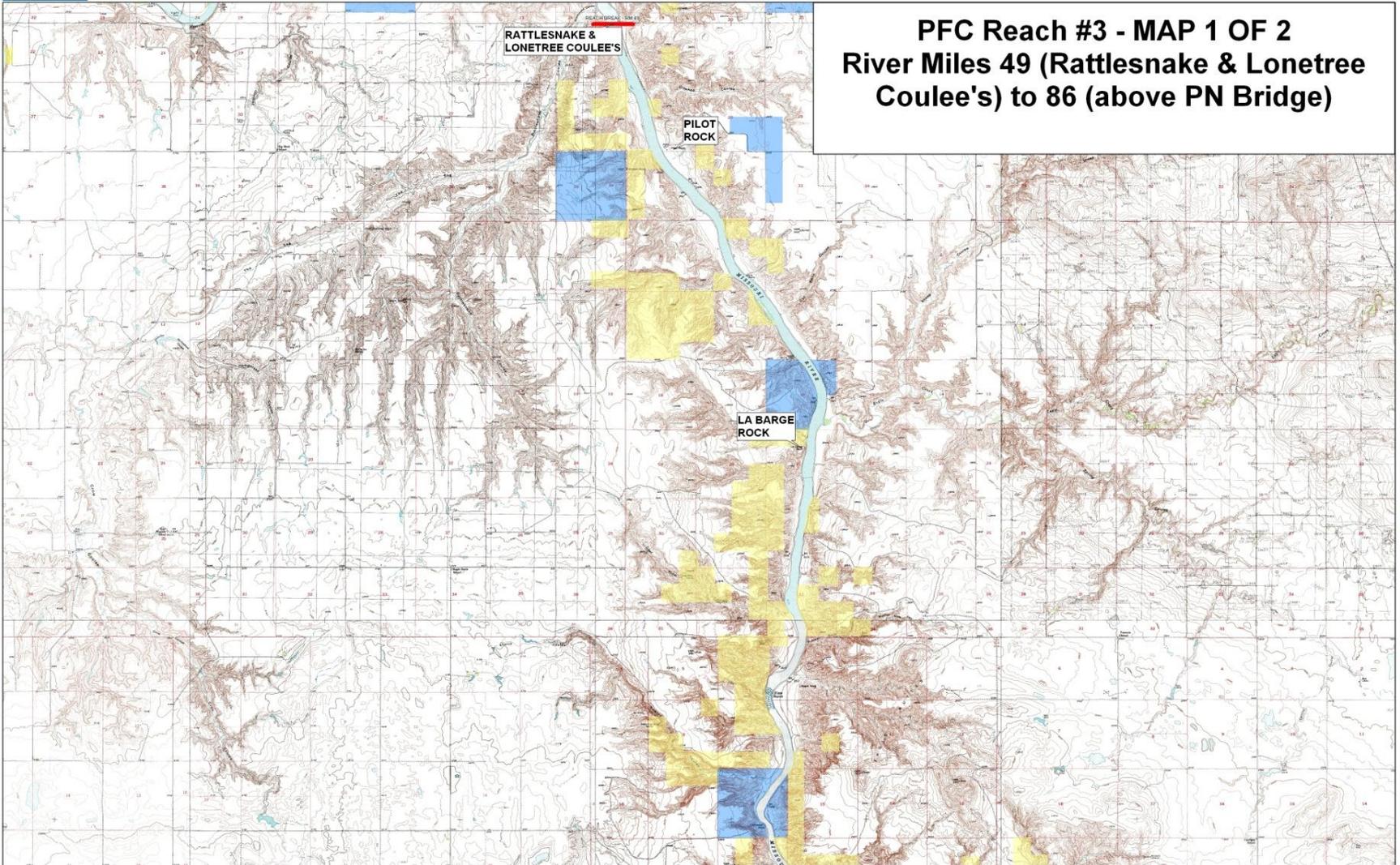
Potential Natural Community



Reach #3 - Map 1 of 2

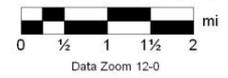
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PFC Reach #3 - MAP 1 OF 2
River Miles 49 (Rattlesnake & Lonetree Coulee's) to 86 (above PN Bridge)

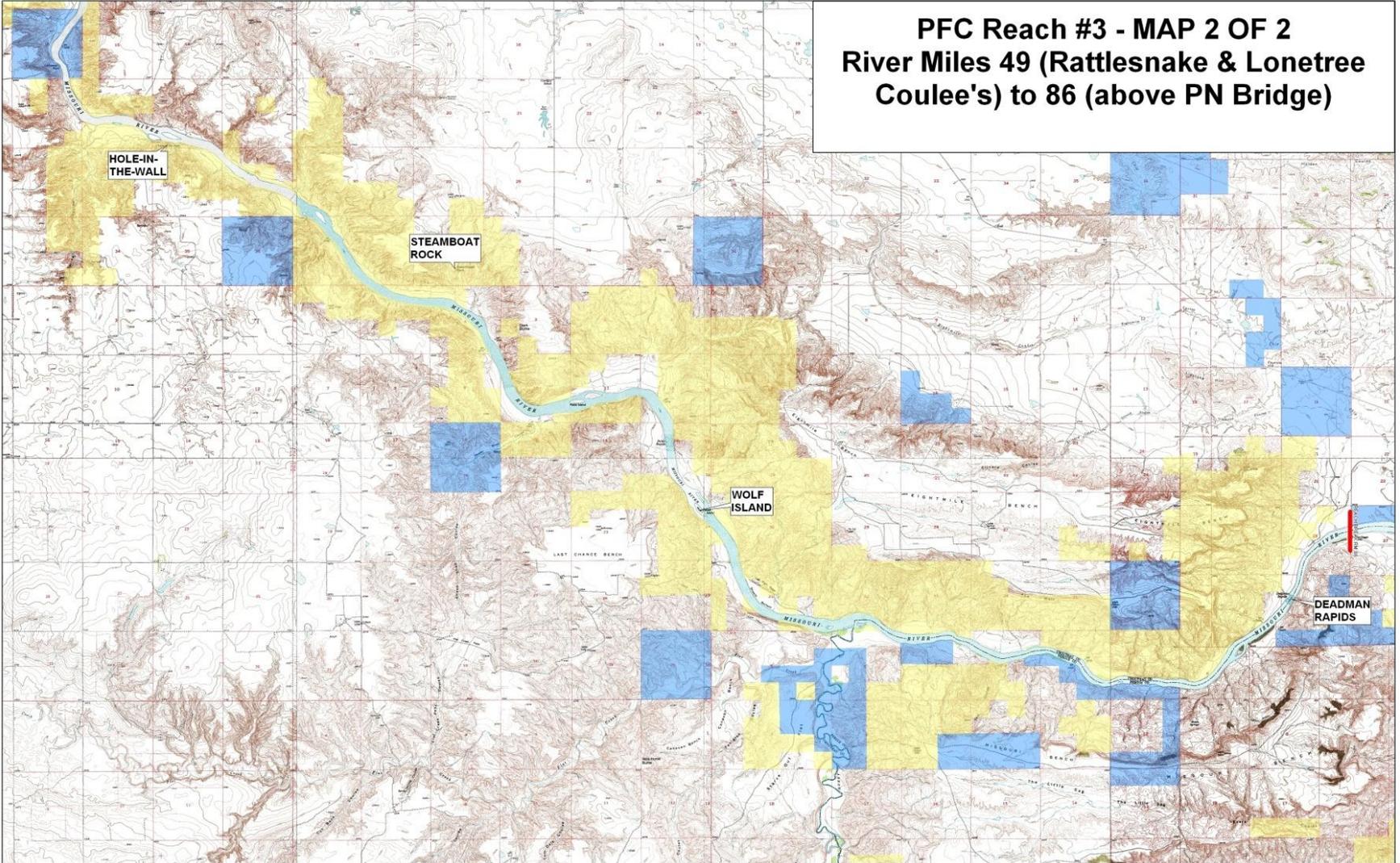
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Reach #3 – Map 2 of 2

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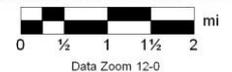


PFC Reach #3 - MAP 2 OF 2
River Miles 49 (Rattlesnake & Lonetree
Coulee's) to 86 (above PN Bridge)

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Reach #3

- 74 - River Bank Miles
- 31 - River Banks Miles BLM Land
- 42% - River Bank Miles BLM Land
- 14 - Stops (Assessment Locations)
- 14 - Photo Points

Reach Potential

- Young, postglacial channel exhibiting low sinuosity and highly constrained by landform

- Transport Reach
- Entrenched meanders constrained by exposures of sandstone and shale badlands
- Little channel migration has occurred in the last 100 years

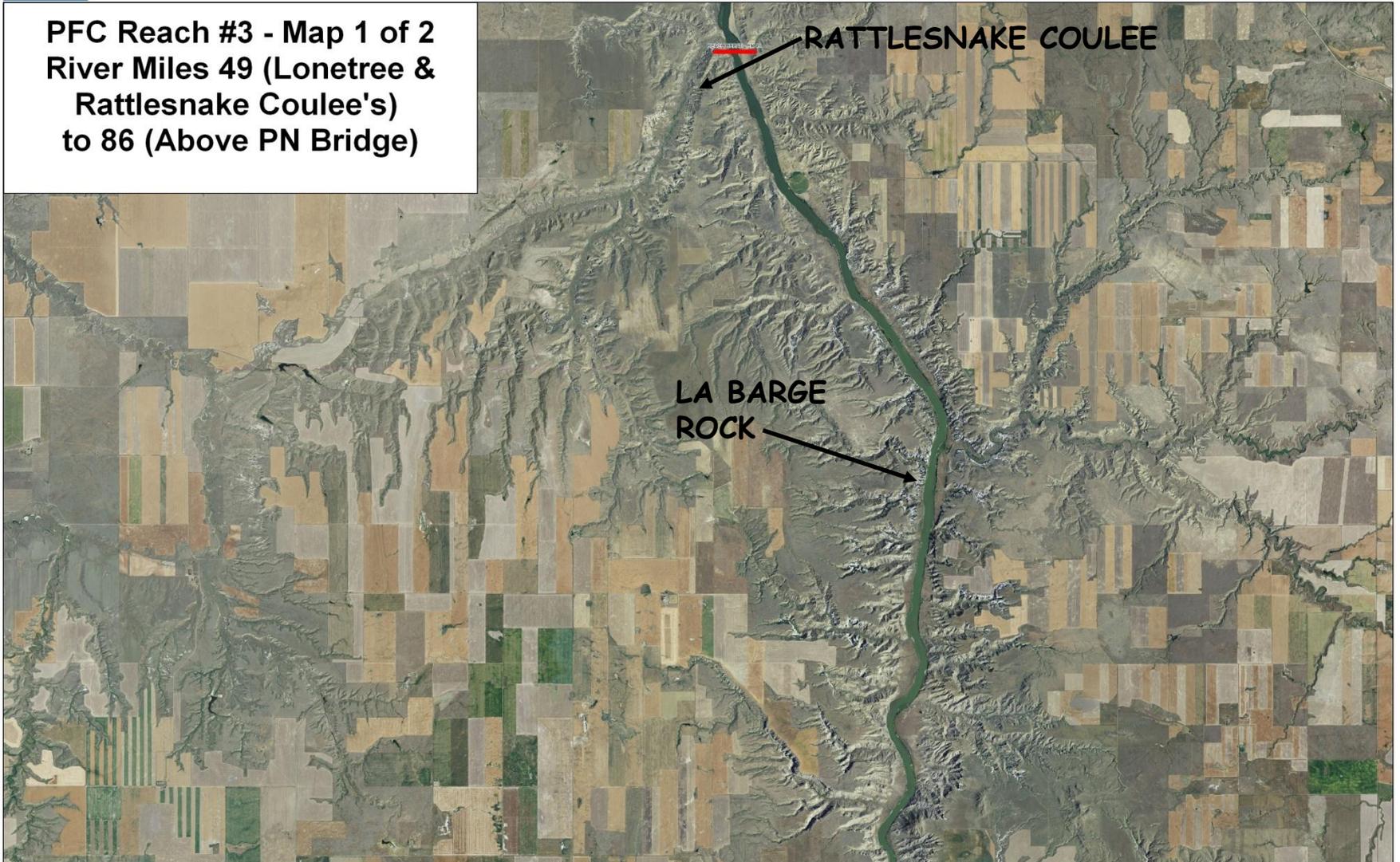


Reach #3 – Map 1 of 2

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PFC Reach #3 - Map 1 of 2
River Miles 49 (Lonetree &
Rattlesnake Coulee's)
to 86 (Above PN Bridge)



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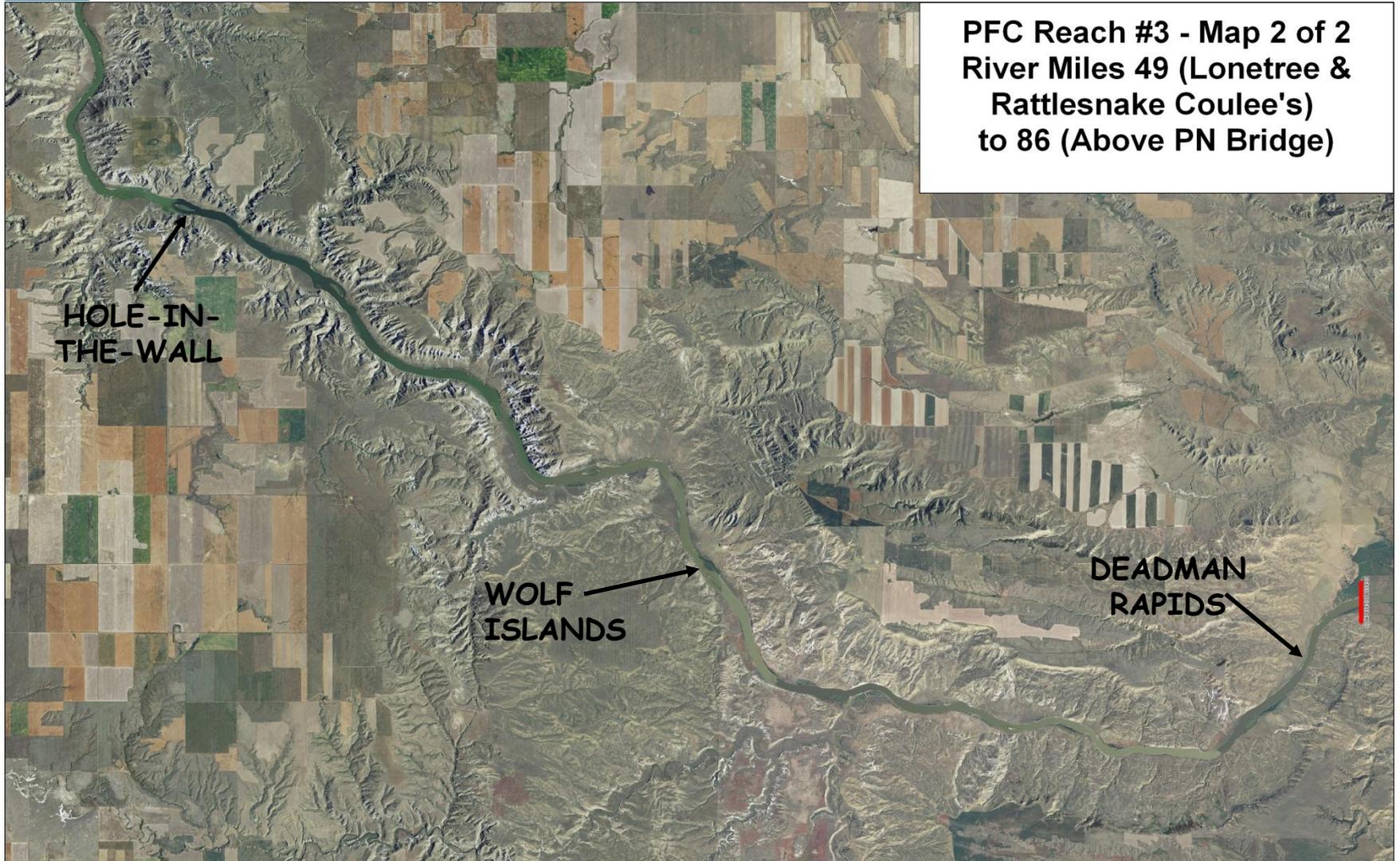


Reach #3 - Map 2 of 2

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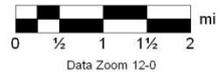
PFC Reach #3 - Map 2 of 2
River Miles 49 (Lonetree &
Rattlesnake Coulee's)
to 86 (Above PN Bridge)

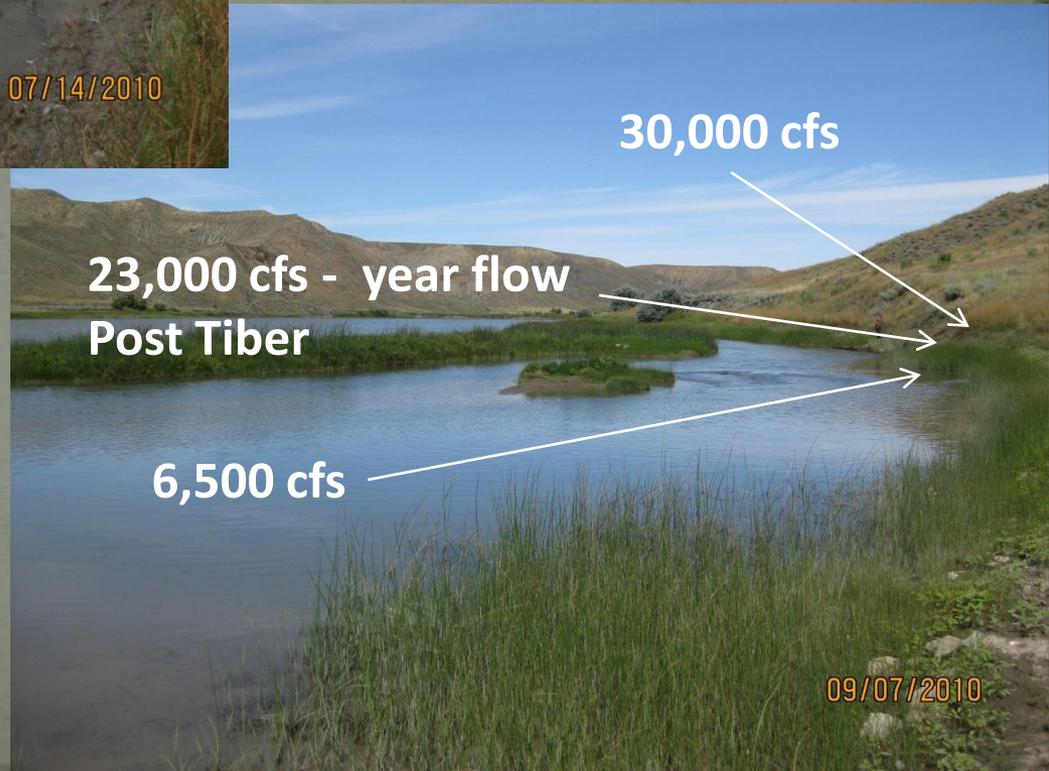
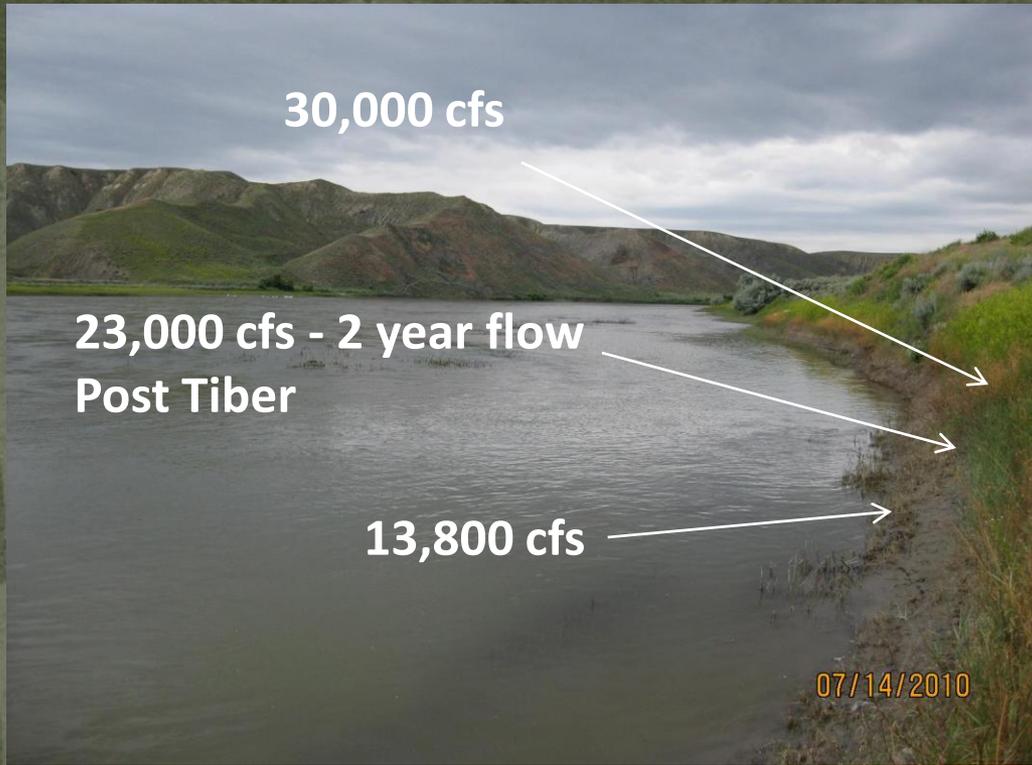


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Vegetation

- Limited floodplain development
- Grass and grass-like plants (sedges, bulrush, spikeweed) is the dominant vegetation type
- River bank well vegetated with high stability plants
- No unusual bank erosion, banks stable, few bare areas
- Plant growth vigorous after being submerged for a long period of time

Vegetation

- Tributary junctions forming larger deposition areas
- Reed canarygrass, yellow sweetclover, noxious weeds, and Russian olive present in Zone 2
- Trees and shrubs in trace amounts, re-sprouting from the base following ice & beaver damage
- Mechanical ice drives strongly influencing vegetation through reach

Near Hole-in-the-Wall



10/01/2010

Dark Butte



The Wall



07/12/2010

Above Deadman Rapids



09/24/2010

Response of vegetation following high water



Spring 1995



Spring 2003



Summer 2010



Pablo Rapids

Winter 1996



Spring 2003



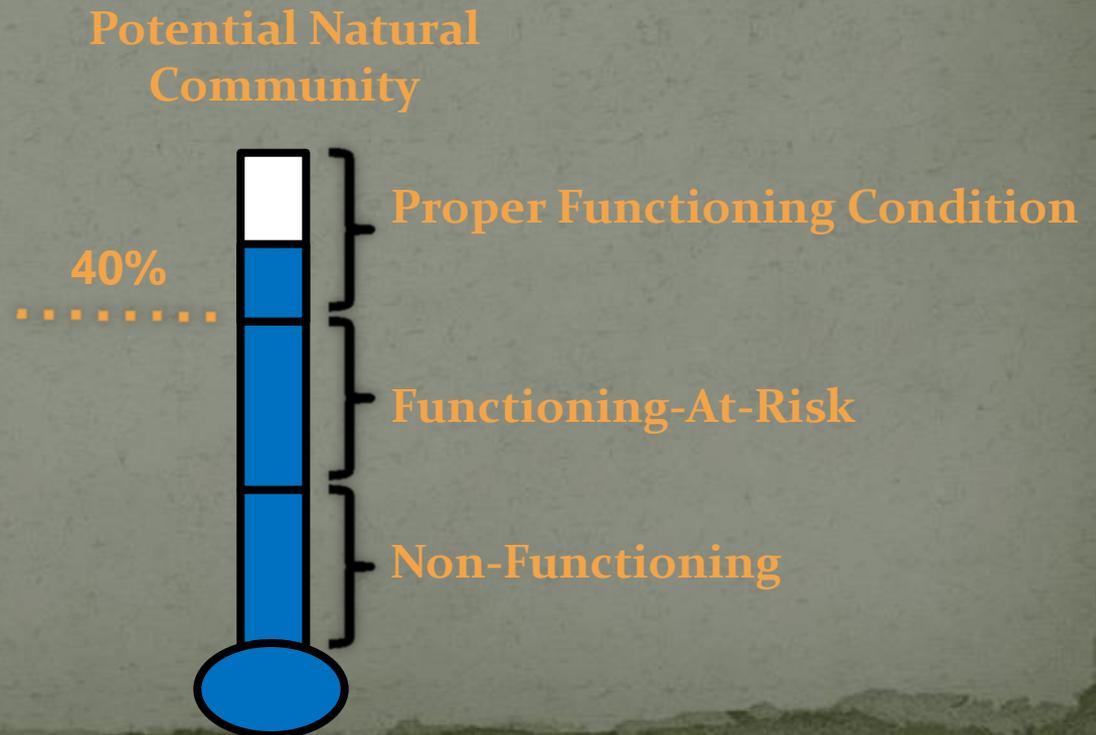
Summer 2010



Pablo Rapids

Reach #3 Summary Determination

- Proper Functioning Condition
- Banks well vegetated, moderate to high stability plants, healthy and robust, good response after water levels dropped. Invasive species and noxious weeds competing with more desirable vegetation at some sites

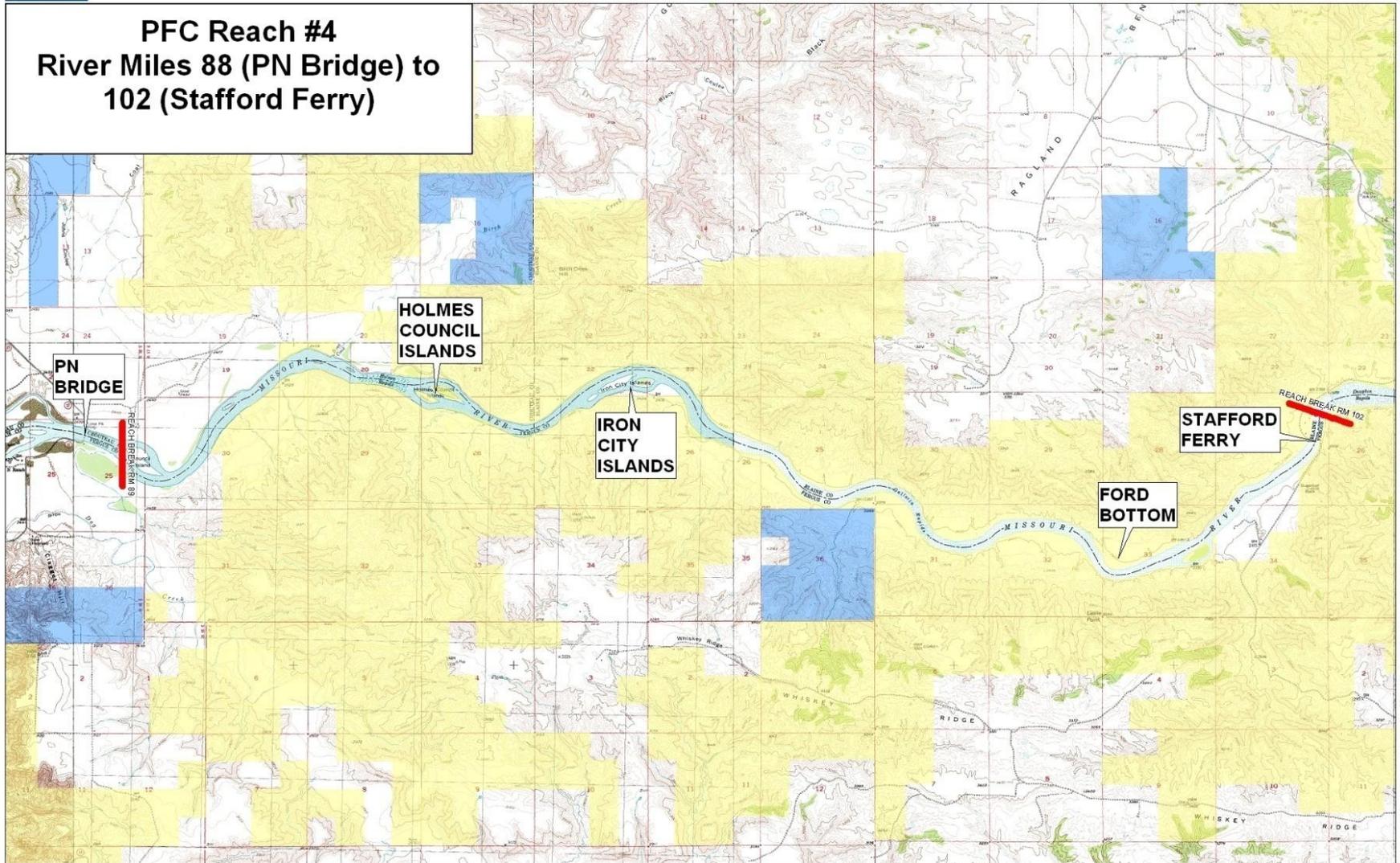


Reach #4

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PFC Reach #4
River Miles 88 (PN Bridge) to
102 (Stafford Ferry)



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Reach #4

- 26 - River Bank Miles
- 21 - River Banks Miles BLM Land
- 81% - River Bank Miles BLM Land
- 6 - Stops (Assessment Locations)
- 24 - Photo Points

Reach Potential

A wide, brownish river flows through a mountainous landscape. The mountains are covered in green vegetation and have a rugged, eroded appearance. The sky is clear and blue. The river is in the foreground, and the mountains rise in the background.

- Young, postglacial channel with low sinuosity and constrained by landform
- Series of entrenched meanders
- Limited floodplain

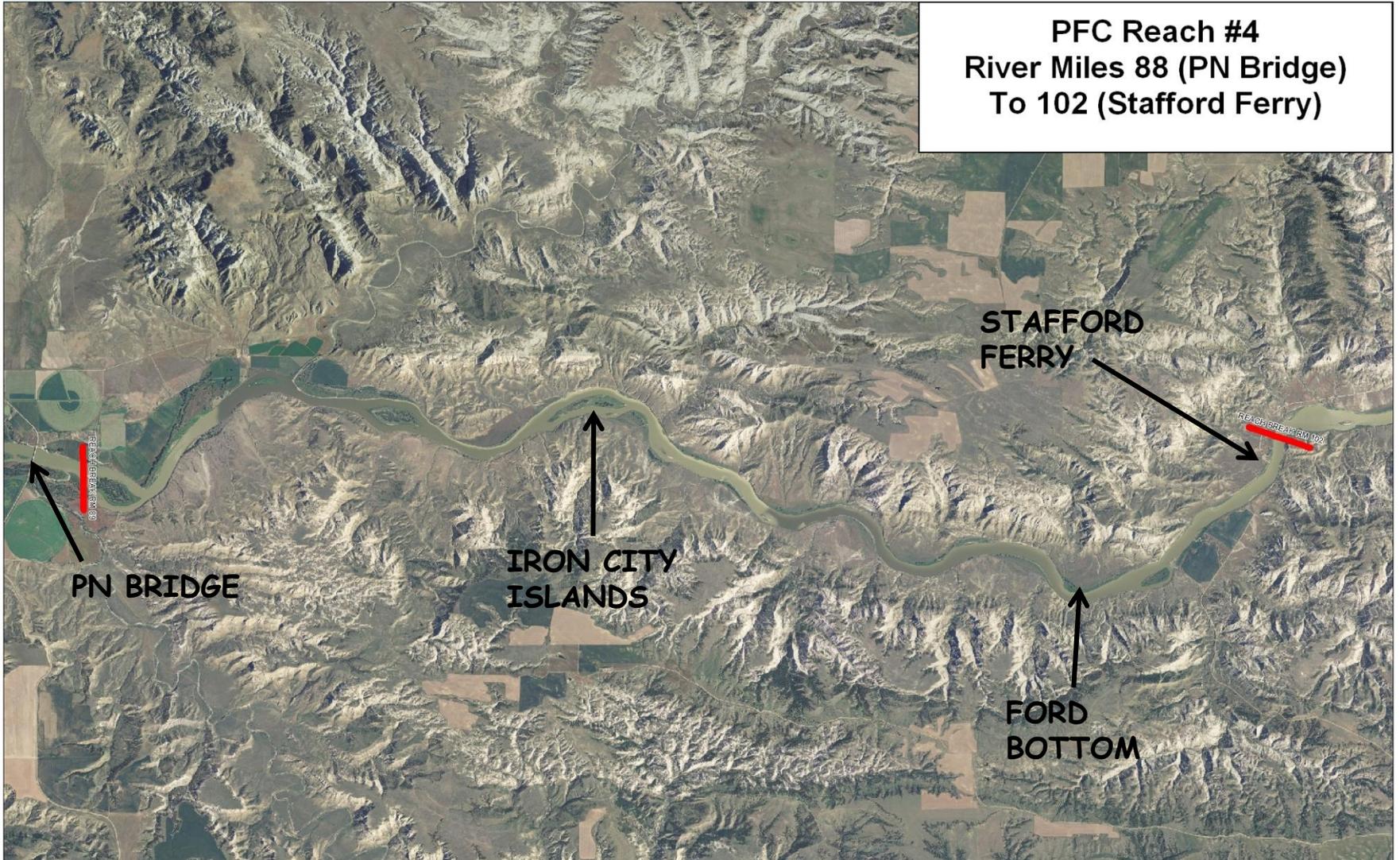
07/08/2010

Reach #4

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PFC Reach #4
River Miles 88 (PN Bridge)
To 102 (Stafford Ferry)



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Vegetation

- Grasses and grass-like plants (sedges, bulrush, spikeweed) is the dominant vegetation type
- River banks well vegetated with diverse mix of bank stabilizing plants (woolly sedge)
- Riparian-wetland plants appear healthy and robust emerging from sediment and water

Vegetation

- Trace amounts of woody plants
- Dense sandbar willow communities found at tributary junction and back channel area
- Reed canarygrass present but not as common
- Noxious weeds & non-native plants were common in Zone 2



UNSTABLE BANK

07/12/2010

Gallatin Rapids



09/30/2010

Gallatin Rapids



09/30/2010

Ford Bottom



07/08/2010



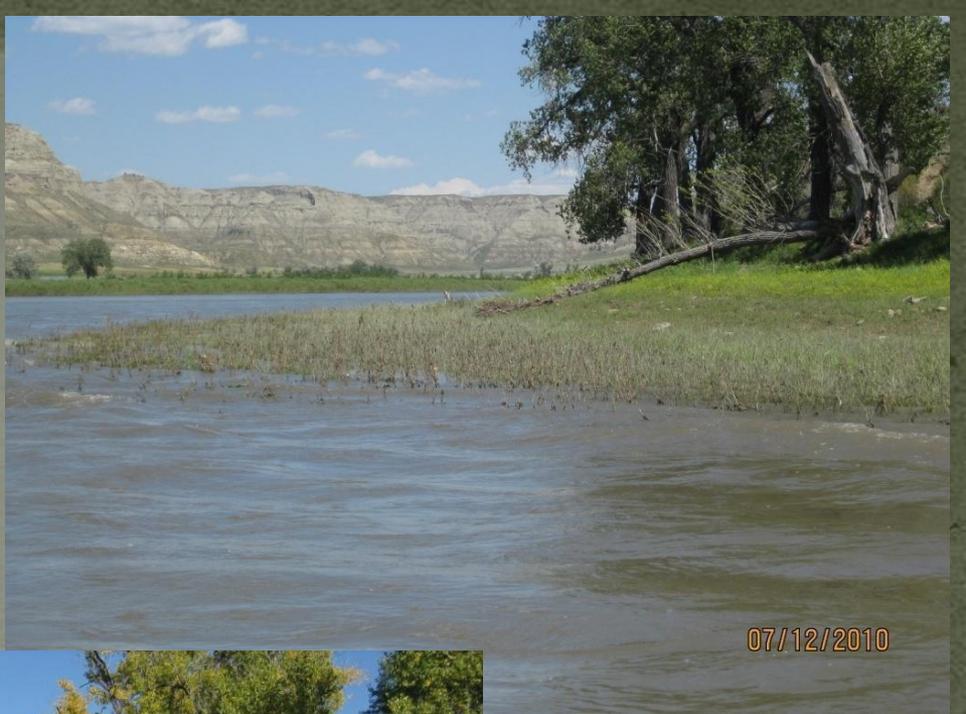
July 8th



4 Days Later

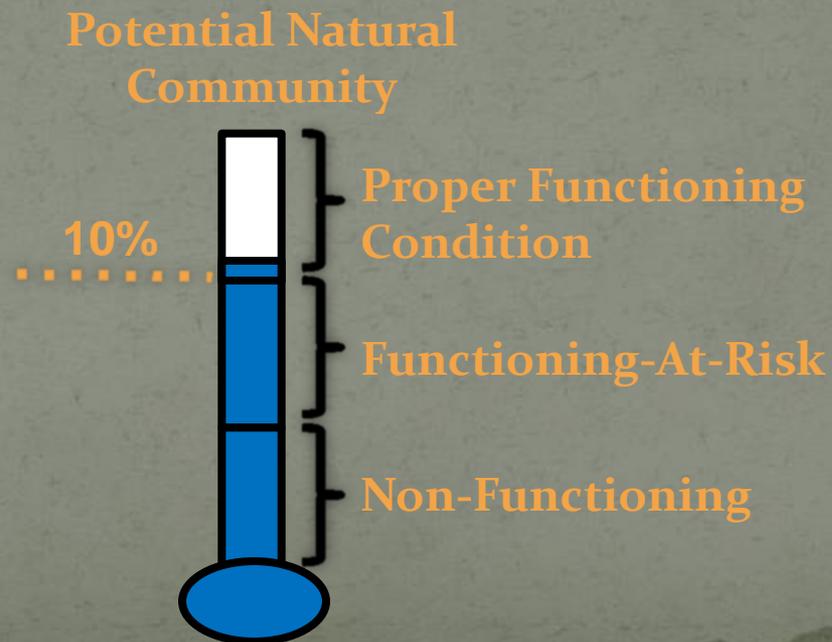


2 ½ Months Later



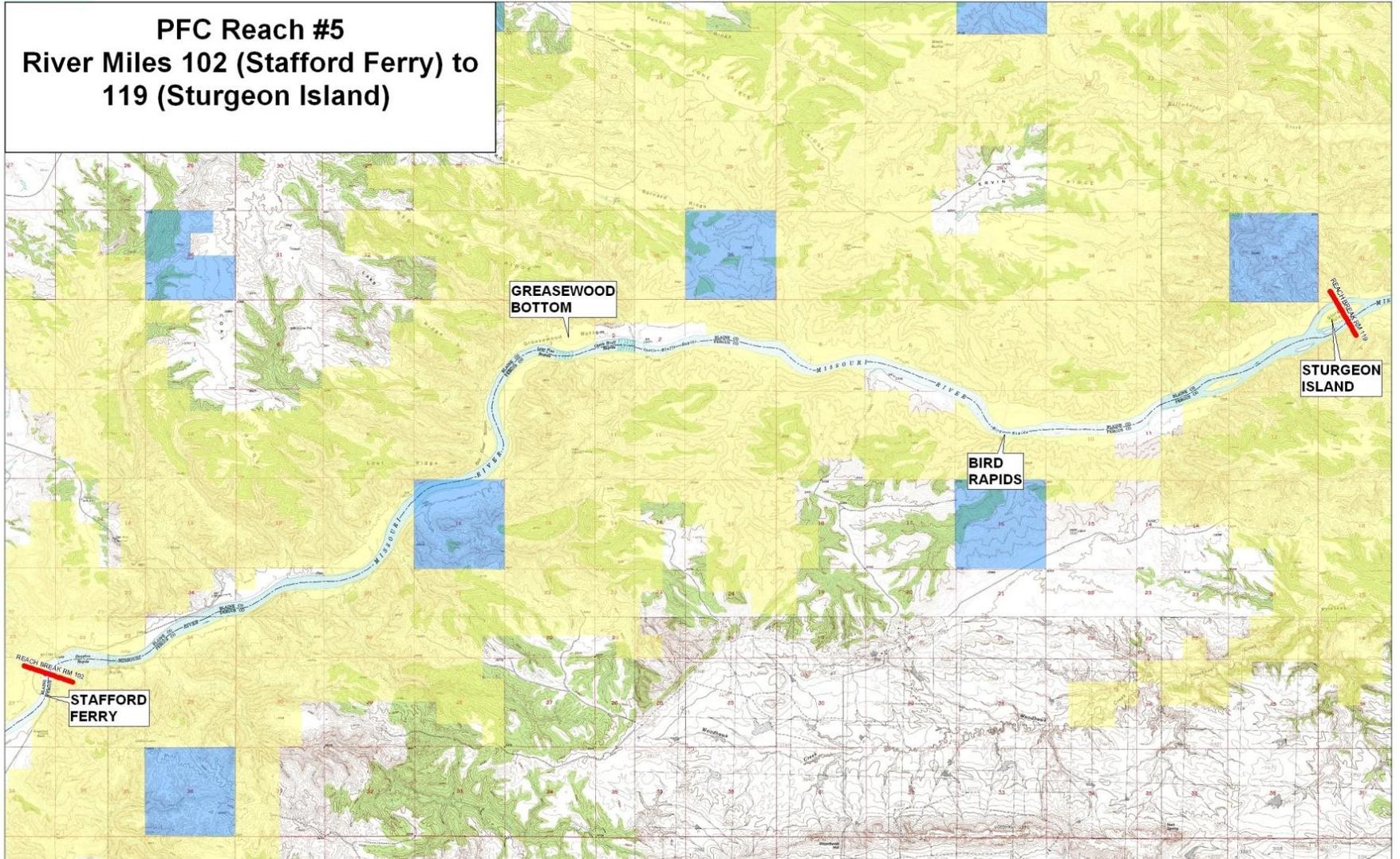
Reach #4 Summary Determination

- Proper Functioning Condition
- River banks well vegetated with diverse mix of bank stabilizing plants. At some sites noxious weeds and non-native plants affecting bank stability



Reach #5

PFC Reach #5
River Miles 102 (Stafford Ferry) to
119 (Sturgeon Island)



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Reach #5

- 34 - River Bank Miles
- 28 - River Banks Miles BLM Land
- 82% - River Bank Miles BLM Land
- 5 – Stops (Assessment Locations)
- 12 - Photo Points

Reach Potential

- Young, postglacial channel with low sinuosity & constrained by landform
- Entrenched meanders

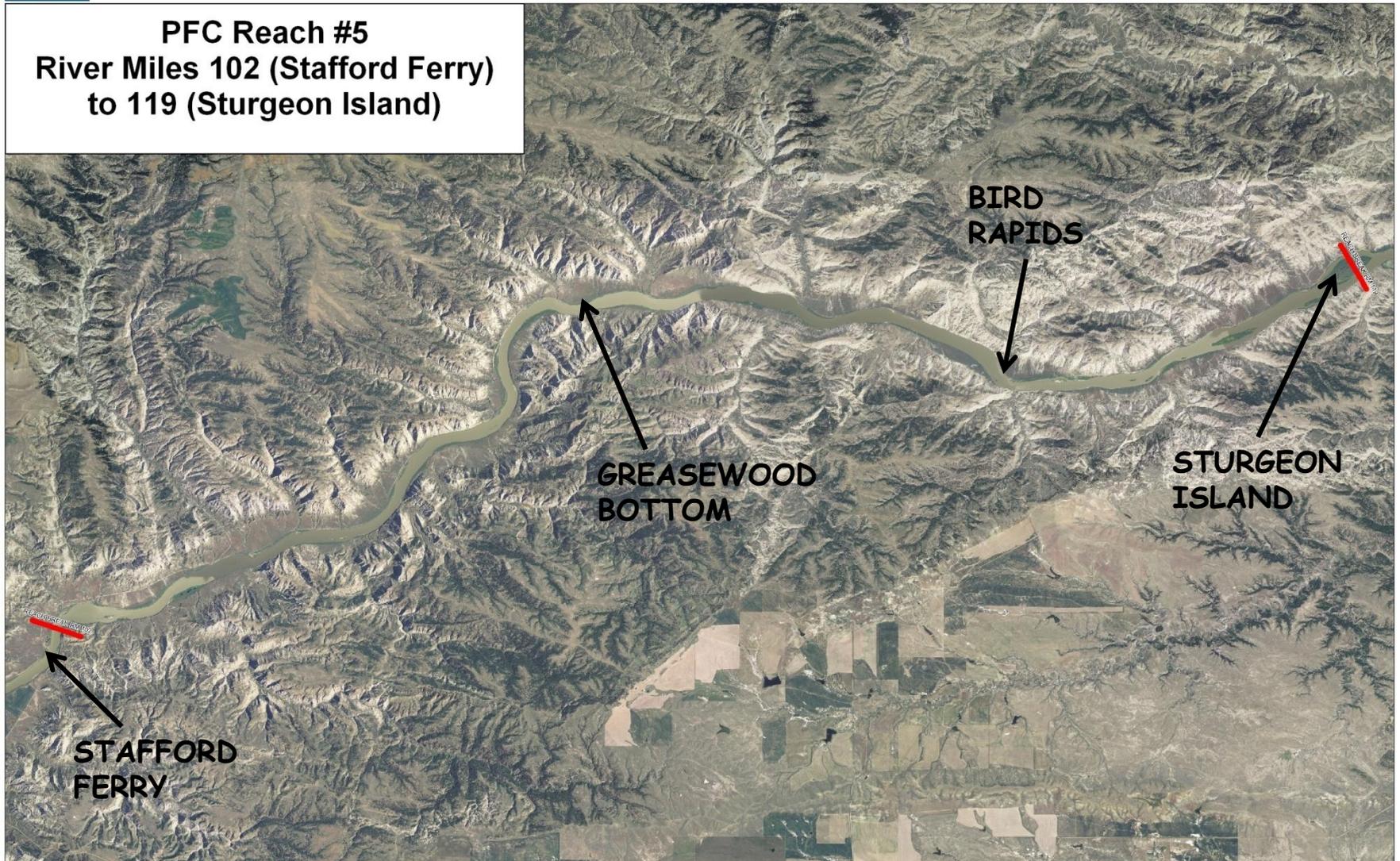
07/09/2010

Reach #5

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PFC Reach #5
River Miles 102 (Stafford Ferry)
to 119 (Sturgeon Island)



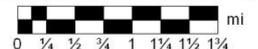
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MN (12.1° E)



Data Zoom 12-0

Vegetation

- Grasses and grass-like plants (sedges, bulrush, spikeweed) most common plant community
- River bank well vegetated, good diversity, late successional species, good bank stability
- Trees and shrubs present in trace amounts - low position on the bank subjecting them to ice and water scour

Vegetation

- Limited floodprone areas
- Two dense sandbar willow communities were found on large deposition areas (McGarry Bar & Round Bottom) and are the only examples of widening riparian zones
- Fewer reed canarygrass communities
- Noxious weeds and non-native grasses common in Zone 2

McGarry Bar

Tributary
Junction



07/09/2010

McGarry Bar

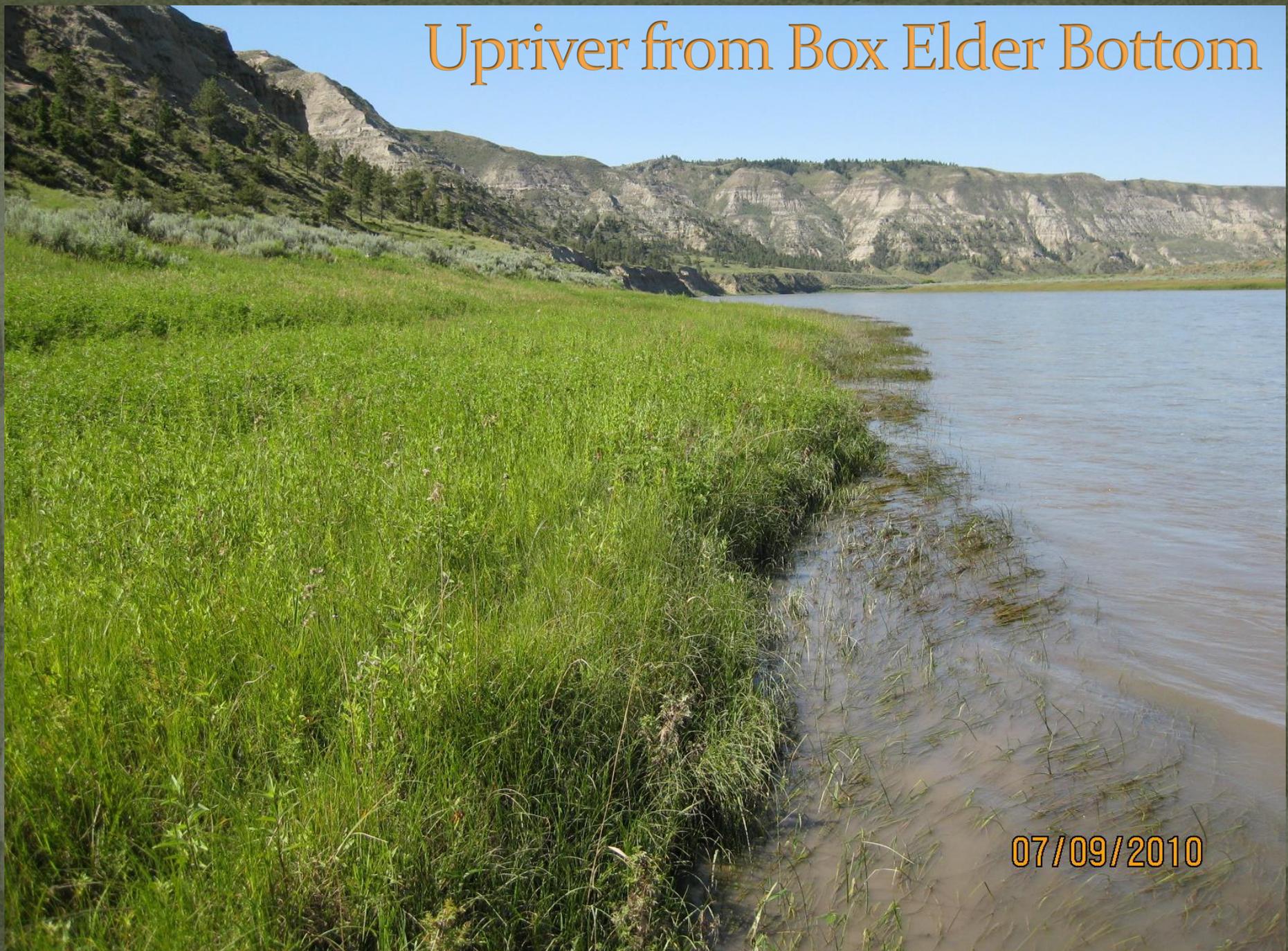


Developing Lateral Bar



07/09/2010

Upriver from Box Elder Bottom



07/09/2010



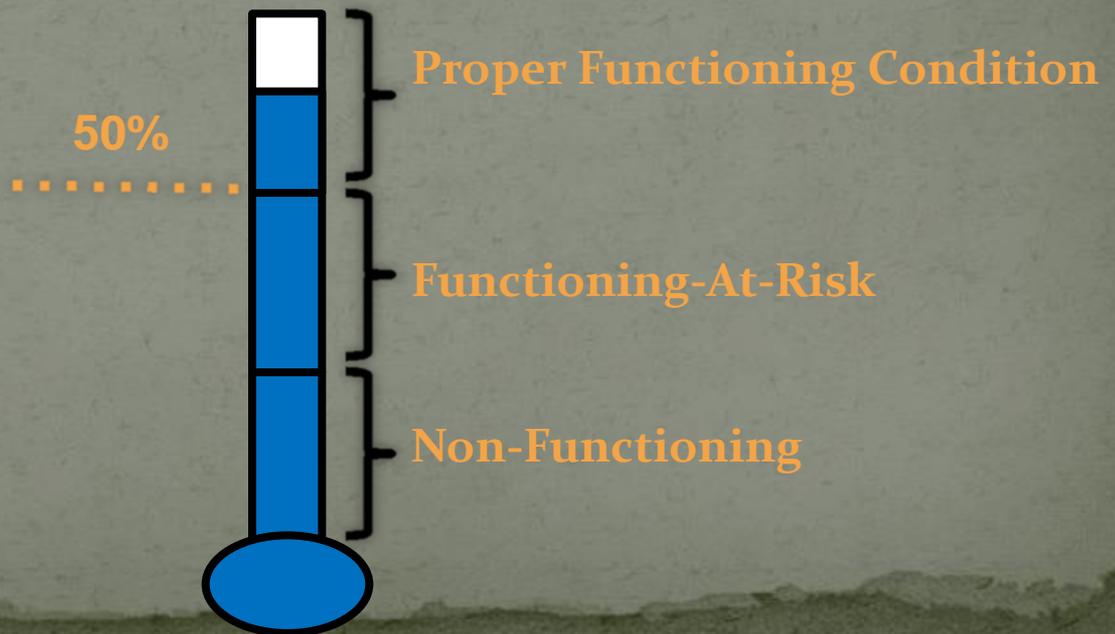
07/09/2010

Multi-Stemmed or Clump Growth Form Cottonwood

Reach #5 Summary Determination

- Proper Functioning Condition
- Diverse mix of riparian-wetland plants, banks well vegetated, healthy and vigorous, noxious weeds and invasive plants affecting bank stability at some sites

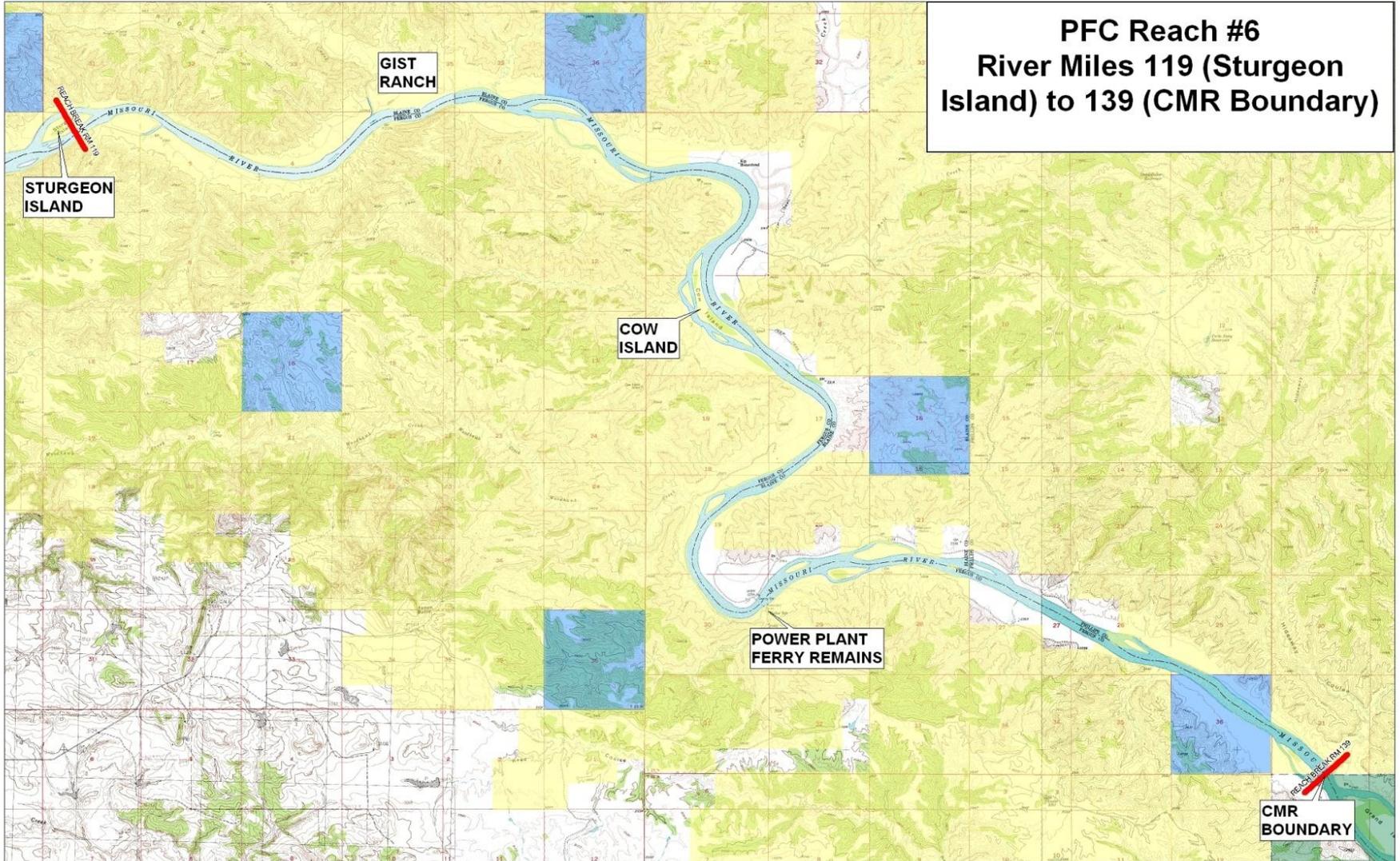
Potential Natural Community



Reach #6

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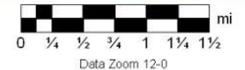
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Reach #6

- 40 - River Bank Miles
- 29 - River Bank Miles BLM Land
- 72% - River Bank Miles BLM Land
- 10 - Stops (Assessment Locations)
- 23 - Photo Points

Reach Potential

An aerial photograph of a river system. The river flows from the top left towards the bottom right, forming a large, prominent meander loop. Several small, green, vegetated islands are situated within the meander. The surrounding landscape is a mix of brownish, eroded soil and patches of green vegetation. In the background, there are dark, rugged hills or mountains. The overall scene illustrates a river reach with specific geomorphic features.

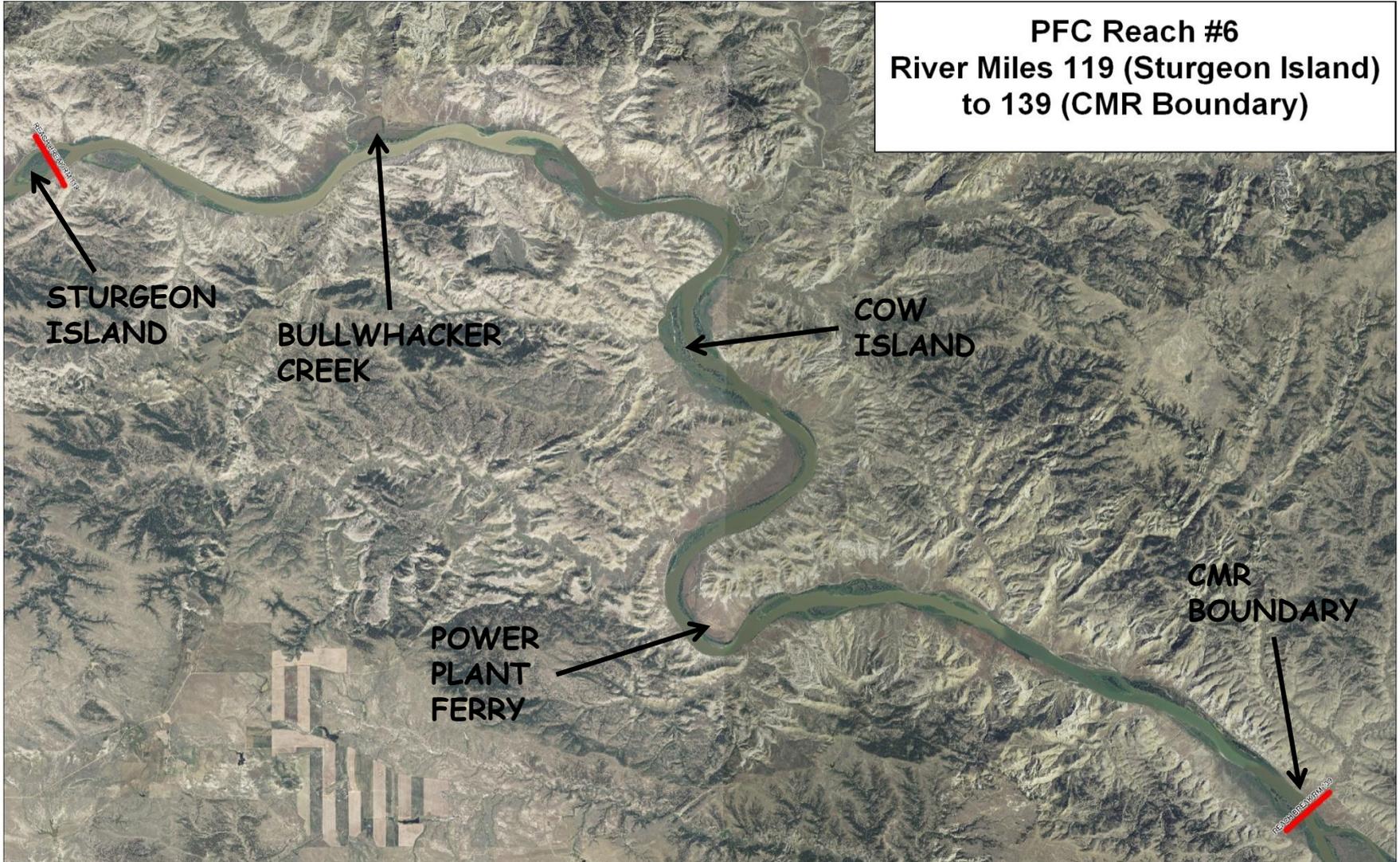
- **Young, postglacial channel with low sinuosity and constrained by landform**
- **Increased sinuosity and depositional features compared to other reaches**
- **Entrenched meanders**
- **Transitional zone before a geomorphic break where the valley widens substantially**

Reach #6

DeLORME

XMap® 7

PFC Reach #6
River Miles 119 (Sturgeon Island)
to 139 (CMR Boundary)



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Vegetation

- River bank well vegetated with strongly rhizomatous mid to late successional riparian-wetland plants
- Robust medium to high stability rated plants present with adequate stored root reserves to emerge through standing water and sediment deposits
- On 7 of 9 sites sampled, sandbar willow was very well developed in dense, multi-aged stands

Vegetation

- Cottonwood, peachleaf and yellow willow present in Zones 1 & 2 in trace amounts; appear to be reproducing from older plants damaged by ice & beaver
- No signs of bank damage
- Colonies of common reed grass present at several locations
- Non-native, invasive plants, noxious weeds common in both Zones 1 & 2

Below Sturgeon Island



07/07/2010

Island



07/07/2010

Cow Island Area



07/07/2010

Mouth of Bullwhacker Creek



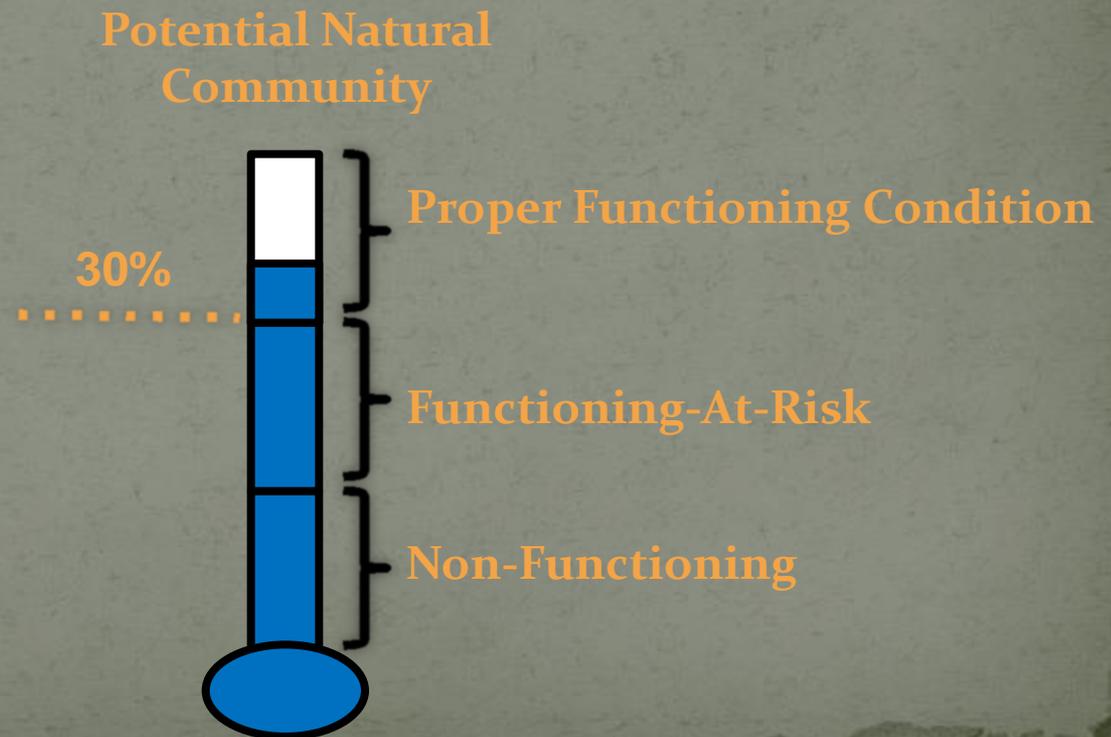
October 1998



September 2010

Reach #6 Summary Determination

- Proper Functioning Condition
- Diverse plant communities, banks well vegetated, healthy and vigorous, noxious weeds and invasive plants affecting bank stability



Wildlife Observations

- Light browsing by deer on some woody species
- Evidence of recreational impacts to wildlife at campsites; nesting, resting, & feeding disturbances
- Amphibians and reptiles are utilizing herbaceous habitat in Zones 1, 2 and 3
- Spiny softshell turtles are utilizing bare areas created by scour or deposition for loafing and nesting

Leopard Frog



Spiny Softshell Turtle & Habitat



Wildlife Observations

- Bald eagles and other raptors using large cottonwoods for nesting
- Abundant migratory bird species; highest density occurring away from campsites; using mature woodland areas with shrub understory
- High amount of beaver activity affecting shrub & tree survival (multi-stemmed growth form)



Eagles at McGarry Bar



QUESTIONS?