

# MRERP



## Missouri River Ecosystem Restoration Plan and Environmental Impact Statement

A Component of the Missouri River Recovery Program



## Development of the Natural Resource Baseline Assessment

### NCER

### August 2, 2011



# Objective

## Share Missouri River Ecosystem Restoration Plan Natural Resources Baseline Assessment:

- Process
- Provisional results
- Technical expert input/participation
- Opportunities



## Missouri River Basin



-  Channelized
-  Inter-Reservoir
-  Reservoir



# MRRERP Background

## 2007 Water Resources Development Act

The Missouri River Ecosystem Restoration Plan (MRRERP) is authorized by the 2007 Water Resources Development Act (WRDA):

The Secretary of the Army, in consultation with the Missouri River Recovery Implementation Committee, shall conduct a study of the Missouri River and its tributaries to determine actions required

- To mitigate losses of aquatic and terrestrial habitat;
- To recover federally listed species; and
- To restore the ecosystem to prevent further declines among other native species.





## Collaboration and Transparency

- US Army Corps of Engineers and US Fish & Wildlife Service
- Cooperating Agencies
- Tribes
- Missouri River Recovery Implementation Committee (MRRIC)





# Technical Teams

Assembled to provide information for Focal Natural Resource baseline assessment over 15 months:

- 11 days of meetings
- 86 hours of conference calls
- Contribute
  - Content
  - Information
  - Reviews



# Technical Teams: Cumulative Knowledge

- 56 Technical Experts
  - 30 river ecosystems and species experts
  - 29 floodplain ecosystem and species experts
- Multi-discipline
- Multi-agency and academia





# Cumulative Knowledge

- Collectively Technical Teams have
  - 663 years of specialized experience
  - 457 years of experience with the Missouri River ecosystem
- On average Technical Team members have
  - 20 years experience in area of expertise
  - 14 years experience specifically with the Missouri River





## Planning Roadmap

### *Initiate Planning*

- 1) Develop Partnerships and Prepare for the Study
- 2) Establish Study Rationale and Focus

### *Study the Affected Environment*

- 3) Assess Resource Conditions (Inventory)
- 4) Evaluate Future Issues and Situation (Forecast)

### *Consider Alternatives*

- 5) Formulate Restoration and Adaptive Management Alternatives
- 6) Compare Impacts of Alternatives
- 7) Consider Preferred Alternative

### *Select the Plan*

- 8) Develop Draft MRERP-EIS
- 9) Develop Final MRERP-EIS
- 10) Develop Record of Decision





# Focal Natural Resource Baseline Assessment

**Purpose: To evaluate the existing condition of natural resources in the study area and provide a scientific foundation for establishment of goals, objectives and alternatives development.**

## Key Components:

- Focal Natural Resources
- Key Ecological Attributes
- Indicators
- Ecological Condition Gradient
- Current Condition Ratings/Scorecard



## Focal Natural Resources

Ecological systems and specific species that characterize the natural resources and ecological diversity of the Missouri River system

### Ecosystem FNRs

- Rocky Mountain Foothills
- Upper Great Plains
- Middle Great Plains
- Lower Great Plains
- Central Lowlands

### Species FNRs

- Pallid Sturgeon
- Least Tern
- Piping Plover

# Missouri River Ecosystem Restoration Plan and EIS



## Ecosystem Focal Natural Resources



- Focal Natural Resources**
- Rocky Mountain Foothills Ecosystem
  - Upper Great Plains Ecosystem
  - Middle Great Plains Ecosystem
  - Lower Great Plains Ecosystem
  - Central Lowlands Ecosystem







# Species Focal Natural Resources

Pallid Sturgeon



Least Tern



Piping Plover





## Key Ecological Attributes

The critical biological or physical attributes that are required for long-term viability and sustainability of a Focal Natural Resource



## MRRERP Draft Key Ecological Attributes

### Hydrology

- River Flows

### Connectivity

- River-Floodplain Connectivity
- Floodplain Habitat Size and Connectivity
- River Habitat Size and Connectivity

### Geomorphology

- Sediment
- River Habitat Quality
- Floodplain **Soil and** Habitat Quality
- River-Floodplain Habitat Turnover

### Fire

- Fire

### Hydrochemistry

- River Water Chemistry
- River Water Temperature

### Biota

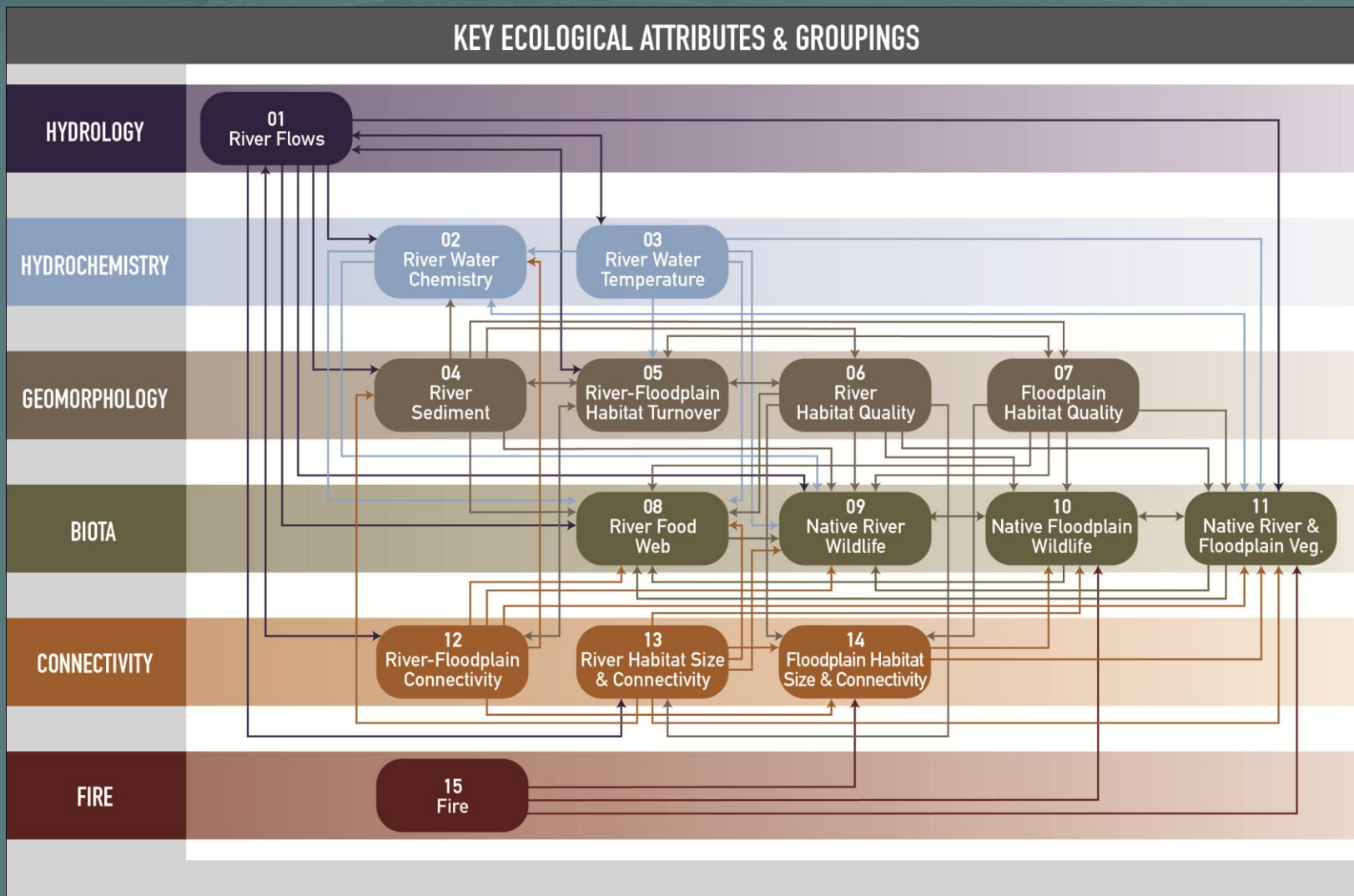
- River Food Web
- Native River and Floodplain Vegetation
- Native Floodplain Wildlife
- Native River Wildlife

### Pallid, Tern and Plover Key Ecological Attributes:

- Population Size
- Reproductive Success
- Survivorship
- Food Availability
- Organismal Condition
- Growth



## Ecosystem KEA Direct Relationships







## Indicators

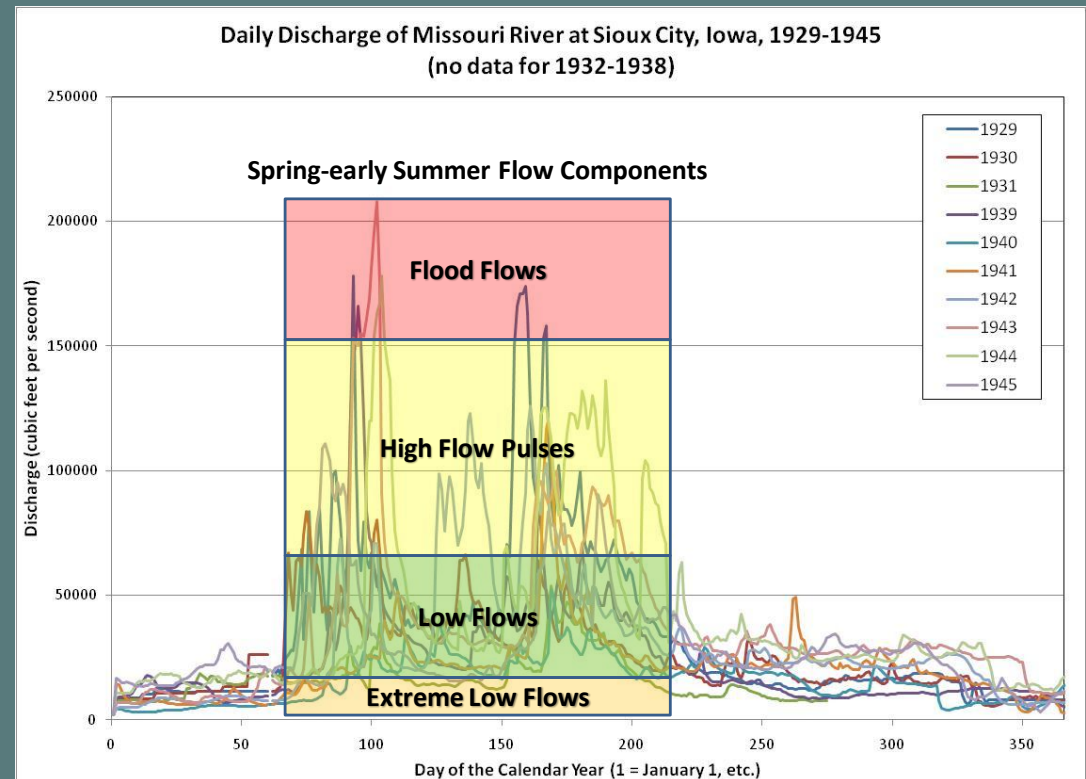
Ecological or biological information that provides a quantitative and/or qualitative assessment of the condition or status of the significant features of a KEA



## Indicators

Ecological or biological information that provides a quantitative and/or qualitative assessment of the condition or status of the significant features

- River Flows
  - Low Flows
  - Extreme Low Flows
  - High Flow Pulses
  - Flood Flows





## Rating Tiers for Key Ecological Attributes

Tier 1	Tier 2	Tier 3	Tier 4	Tier 5	Tier 6
No departure from range of natural variation	Minor departure from range of natural variation	Moderate departure from range of natural variation	Major departure from range of natural variation	Severe departure from range of natural variation	Extreme to <b>complete</b> departure from range of natural variation



## Sediment Current Condition Rating

Suspended sediment load + Suspended sediment size composition + Substrate sediment size composition

Tier 1	Tier 2	Tier 3	Tier 4	Tier 5	Tier 6
	X				

Tier 1	Tier 2	Tier 3	Tier 4	Tier 5	Tier 6
			X		

Tier 1	Tier 2	Tier 3	Tier 4	Tier 5	Tier 6
					X

Tier 1	Tier 2	Tier 3	Tier 4	Tier 5	Tier 6
				X	

Tier 1	Tier 2	Tier 3	Tier 4	Tier 5	Tier 6
			X		





## Rocky Mountain Foothills

Tier 1

Tier 2

Tier 3

Tier 4

Tier 5

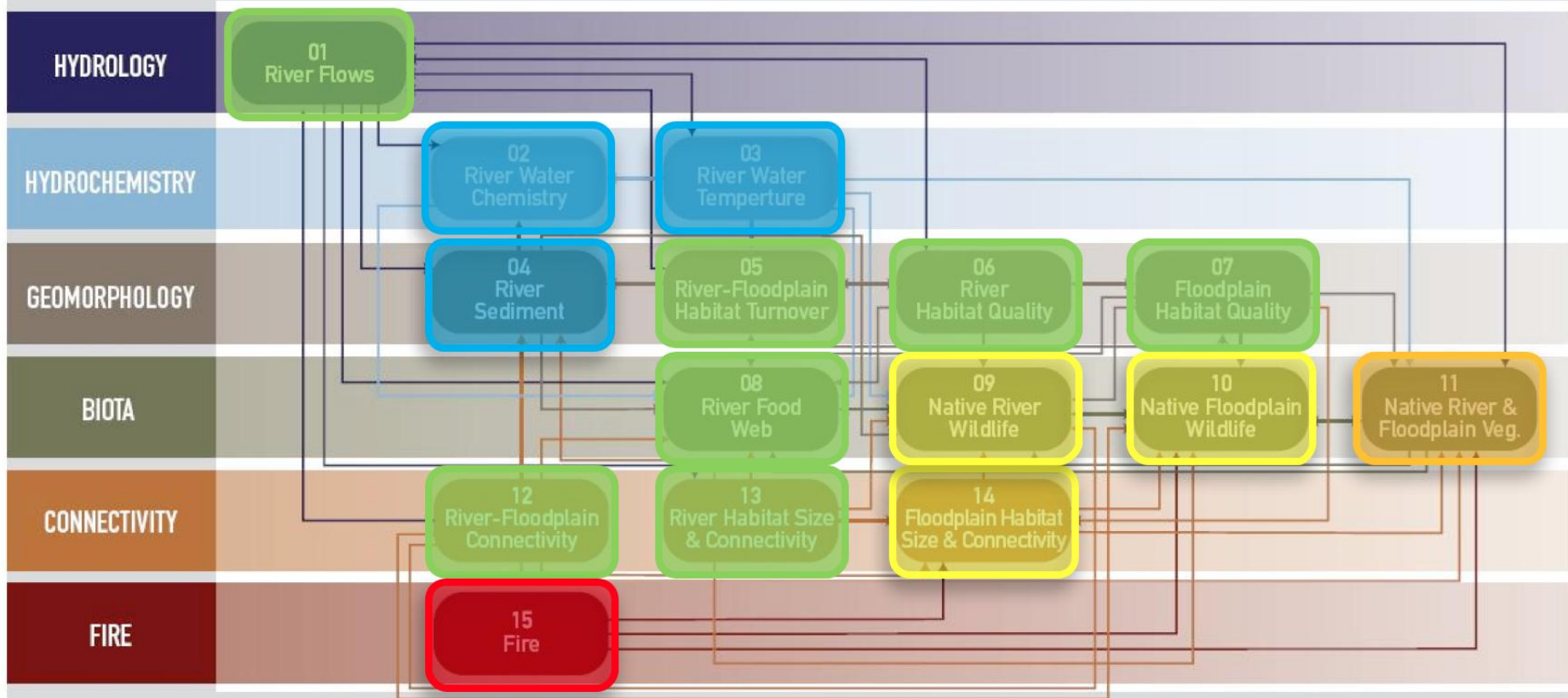
Tier 6



### KEY ECOLOGICAL ATTRIBUTES & GROUPINGS

DRIVERS

OUTCOMES



# Missouri River Ecosystem Restoration Plan and EIS

## Middle Great Plains

Tier 1

Tier 2

Tier 3

Tier 4

Tier 5

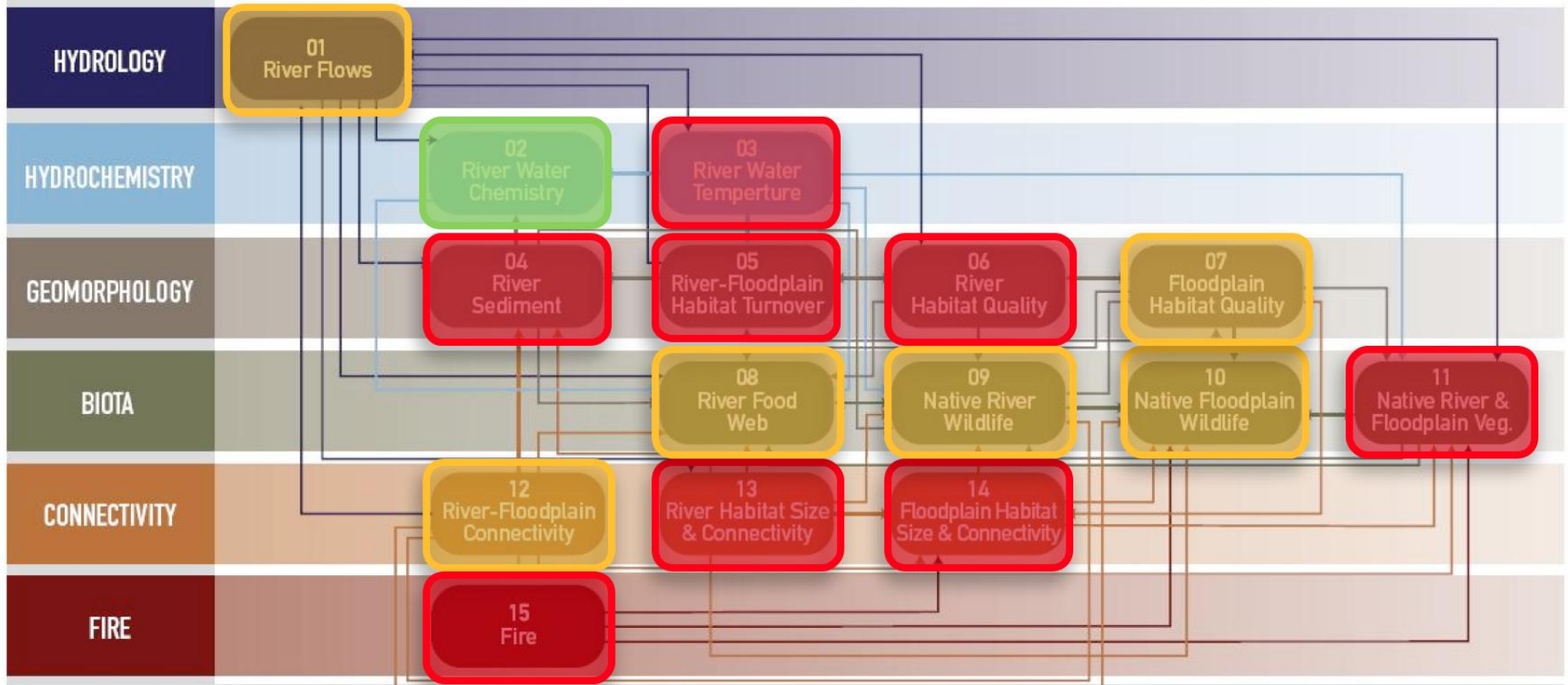
Tier 6



### KEY ECOLOGICAL ATTRIBUTES & GROUPINGS

DRIVERS

OUTCOMES



# Missouri River Ecosystem Restoration Plan and EIS

## Central Lowlands

Tier 1

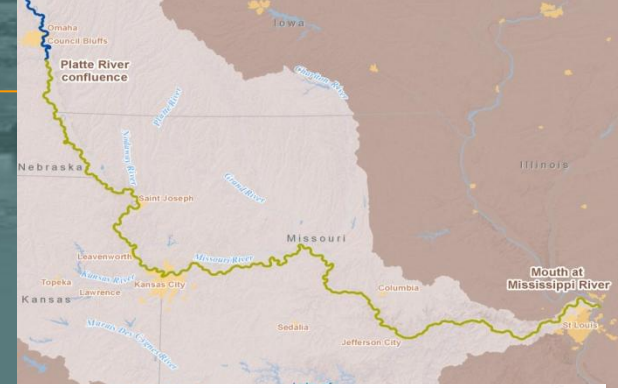
Tier 2

Tier 3

Tier 4

Tier 5

Tier 6



### KEY ECOLOGICAL ATTRIBUTES & GROUPINGS

DRIVERS

OUTCOMES

HYDROLOGY

01 River Flows

HYDROCHEMISTRY

02 River Water Chemistry

03 River Water Temperature

GEOMORPHOLOGY

04 River Sediment

05 River-Floodplain Habitat Turnover

06 River Habitat Quality

07 Floodplain Habitat Quality

BIOTA

08 River Food Web

09 Native River Wildlife

10 Native Floodplain Wildlife

11 Native River & Floodplain Veg.

CONNECTIVITY

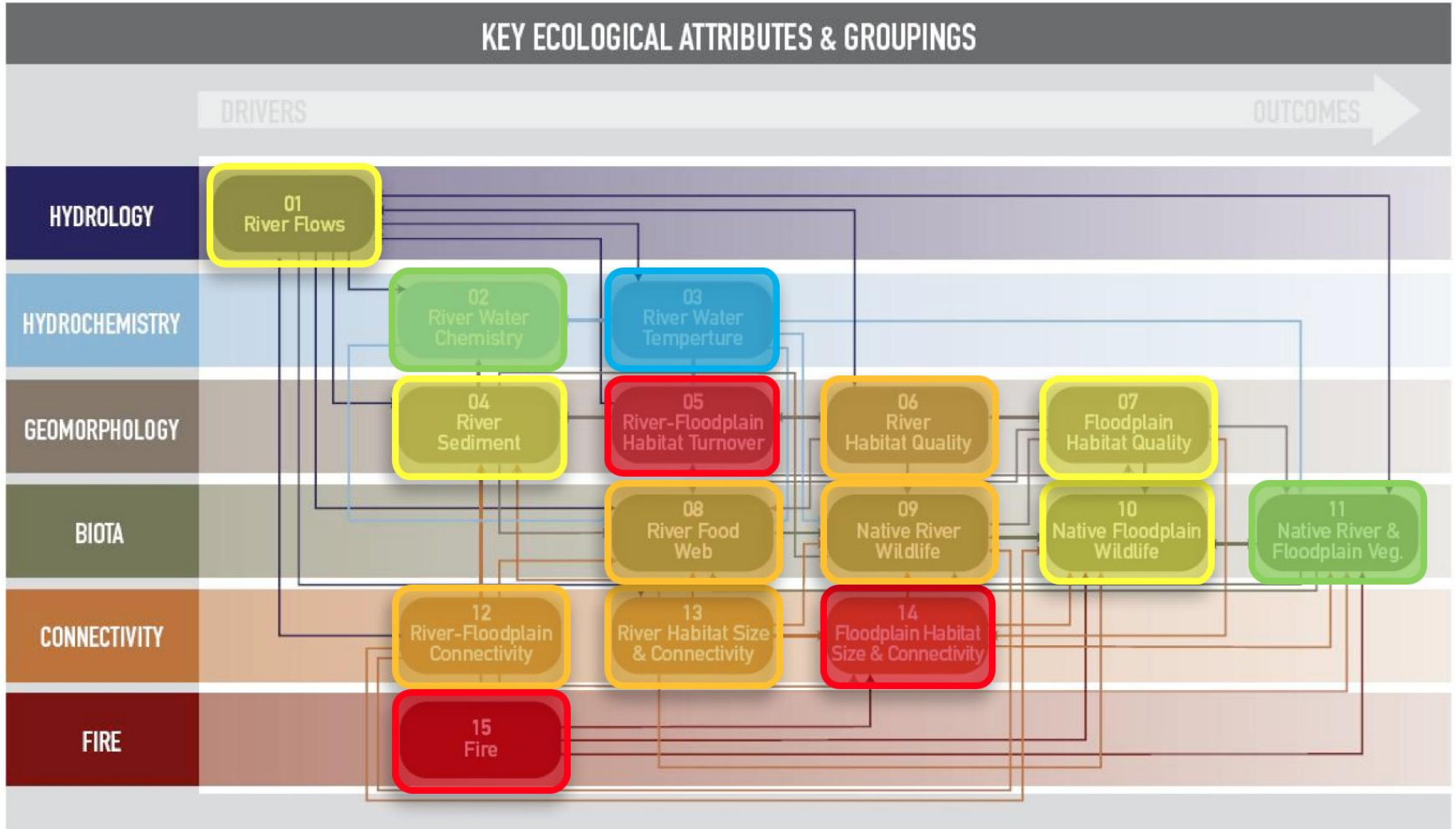
12 River-Floodplain Connectivity

13 River Habitat Size & Connectivity

14 Floodplain Habitat Size & Connectivity

FIRE

15 Fire





# Missouri River Ecosystem Restoration Plan and EIS



## Summary

Tier 1

Tier 2

Tier 3

Tier 4

Tier 5

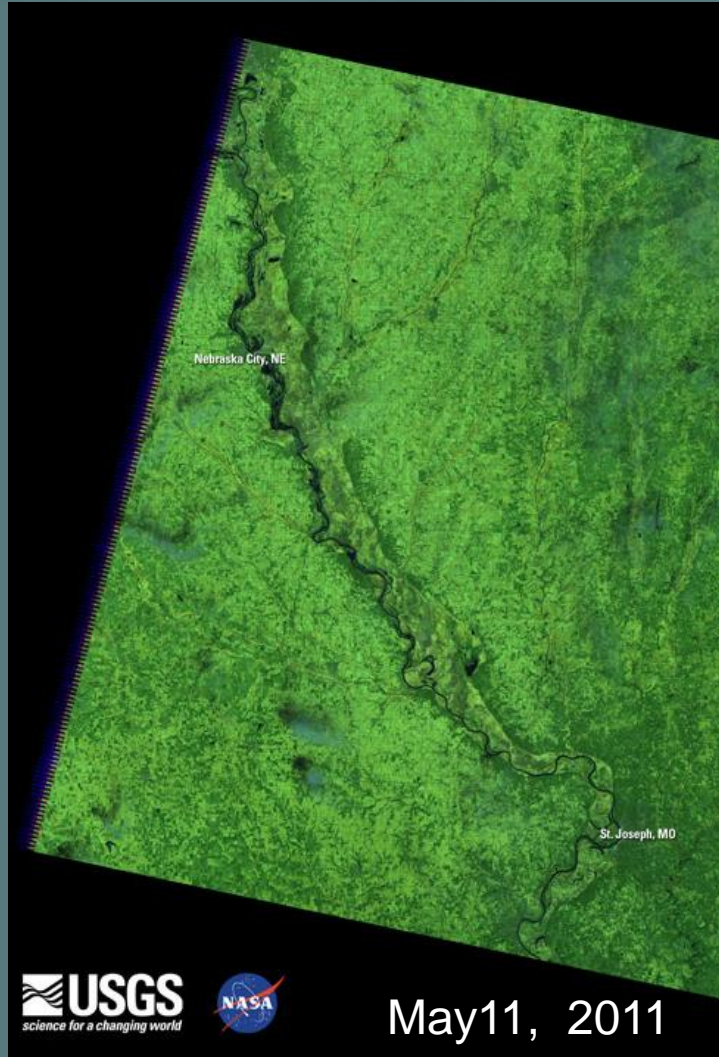
Tier 6

Indicator	Rocky Mountain Foothills	Upper Great Plains	Middle Great Plains	Lower Great Plains	Central Lowlands	River-wide
01 River Flows						N/A
02 River Water Chemistry						N/A
03 River Water Temperature						N/A
04 River Sediment						N/A
05 River-Floodplain Habitat Turnover						N/A
06 River Habitat Quality						N/A
07 Floodplain Habitat Quality						N/A
08 River Food Web						N/A
09 Native River Wildlife						N/A
10 Native Floodplain Wildlife						N/A
11 Native River and Floodplain Vegetation						N/A
12 River-Floodplain Connectivity						N/A
13 River Habitat Size and Connectivity						N/A
14 Floodplain Habitat Size and Connectivity						N/A
15 Fire						N/A
16a Pallid sturgeon Organismal Condition	N/A					N/A
16b Pallid Sturgeon Growth	N/A					N/A
16d Pallid Sturgeon Population Size	N/A					N/A
16e Pallid Sturgeon Reproductive Success	N/A					N/A
17b Piping Plover Population Size	N/A				N/A	
17c Piping Plover Reproductive Success	N/A				N/A	
17d Piping Plover Survivorship	N/A	(future only)			N/A	
18b Least Tern Population Size	N/A					
18c Least Tern Reproductive Success	N/A					





## Missouri River Flood - 2011



















# Opportunities, Questions & Decisions?

To contact me after my presentation – text

**7A4 to INTRO (46876)**

**or email**

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# Missouri River Ecosystem Restoration Plan and EIS



One River • One Vision

# Missouri River Ecosystem Restoration Plan and EIS



One River • One Vision



## Additional Slides (all current as of July 13, 2011)



## Locations and Agencies of Technical Team

### Members

#### **Fort Collins, CO**

Michael Scott, USGS

#### **Des Moines, IA**

Doug Chafa, IA DNR  
Karen Kinkead, IA DNR

#### **Iowa City, IA**

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E Arthur Bettis, USFWS/U of IA

#### **Onawa, IA**

Van Sterner, IA DNR

#### **Emporia, KS**

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Steve Schaff, USEPA  
Gary Welker, USEPA

#### **Manhattan, KS**

Dave Bruton, KS FS

#### **Duluth, MN**

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Clayton Ridenour, USFWS

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Emily Tracy-Smith, MO DNR

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Todd Gemeinhardt, USACE  
Heather Hill, USACE  
Allen Tool, USACE

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#### **Rolla, MO**

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Dale Blevins, USGS

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Dave Ode, SD GF&P  
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#### **Vermillion, SD**

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Mark Dixon, Cont./ USD

#### **Yankton, SD**

Coral Huber, USACE  
Greg Pavelka, USACE  
Tim Welker, USACE

#### **Fort Worth, TX**

William Hohman, USDA-NRCS

#### **Blacksburg, VA**

Dan Catlin, USACE/VA Tech  
Aaron Delonay, USGS





## Hydrology

### River Flows

- The magnitude, frequency, timing, duration, and rates of change of high- and low-flow events in the Missouri River



## Connectivity

### River–Floodplain Connectivity

- The ability of the river to inundate its floodplain, backwaters, side channels and shallow water areas, including the extent of floodplain inundation

### River Habitat Size & Connectivity

- The size and extent of specific habitat types, and the longitudinal connectivity between different parts of the mainstem, or between the mainstem and its tributaries.

### Floodplain Habitat Connectivity

- The size and spatial patterning of specific floodplain habitat types, and the longitudinal and lateral connectivity between these floodplain habitat types.



# Geomorphology

## River Habitat Quality and Floodplain Habitat Quality

- The diversity of landforms serving as habitat for organisms living in the river or floodplain

## River and Floodplain Habitat Turnover

- The dynamic shifts in habitat availability and habitat type brought about by erosion, accretion, and other geomorphic changes in the river channel.

## Sediment

- The mass of sediment eroded, transported, and redeposited by river water.



## Fire

- The process of fire in the floodplain ecosystem. Refers to the frequency, season, area, and intensity of fire



## Hydrochemistry

### River Water Chemistry

- The chemical properties of the Missouri River water important to its natural ecological character. Includes dissolved and suspended components of water; primarily includes nutrients, dissolved oxygen, turbidity, and pollutants

### River Water Temperature

- The water temperature conditions in the Missouri River; includes extreme high and low temperature conditions.





## Biota

### River Food Web

- The trophic dynamics of organismal energy production and consumption. Includes all levels of biological energy transfer and storage, including biomass from photosynthetic organisms at the lowest trophic levels (primary production), organisms that feed on particulate organic matter (secondary production), and organisms that consume other organisms (consumers).



# Biota (continued)

## Native Floodplain Wildlife and Native River Wildlife

- The animals living in the river channel and its backwaters or the animals dependent on naturally functioning floodplain ecosystems. Includes abundance, composition, and diversity of animals.

## Native River and Floodplain Vegetation

- The plant species dependent on naturally functioning floodplain ecosystems. Includes the spatial extent, abundance, size, and age classes of native flora community types and their constituent species, found within aquatic and terrestrial environments.



## Key Ecological Attributes for Species FNRs: (Pallid Sturgeon, Least Tern, and Piping Plover)

- Definition
  - **Population size:** number of individuals present at a given time and place
  - **Reproductive success:** ability of an organism to produce offspring
  - **Survivorship:** the likelihood that an individual will escape predation, starvation, disease, and disasters to live to a certain age
  - **Food availability, organismal condition, and growth:** the abundance of suitable food items and the ability of an organism to find food successfully; the general health of an organism

## Upper Great Plains

Tier 1

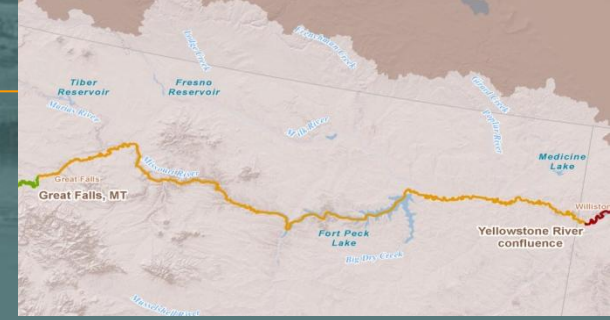
Tier 2

Tier 3

Tier 4

Tier 5

Tier 6



### KEY ECOLOGICAL ATTRIBUTES & GROUPINGS

DRIVERS

OUTCOMES

HYDROLOGY

01  
River Flows

HYDROCHEMISTRY

02  
River Water  
Chemistry

03  
River Water  
Temperature

GEOMORPHOLOGY

04  
River  
Sediment

05  
River-Floodplain  
Habitat Turnover

06  
River  
Habitat Quality

07  
Floodplain  
Habitat Quality

BIOTA

08  
River Food  
Web

09  
Native River  
Wildlife

10  
Native Floodplain  
Wildlife

11  
Native River &  
Floodplain Veg.

CONNECTIVITY

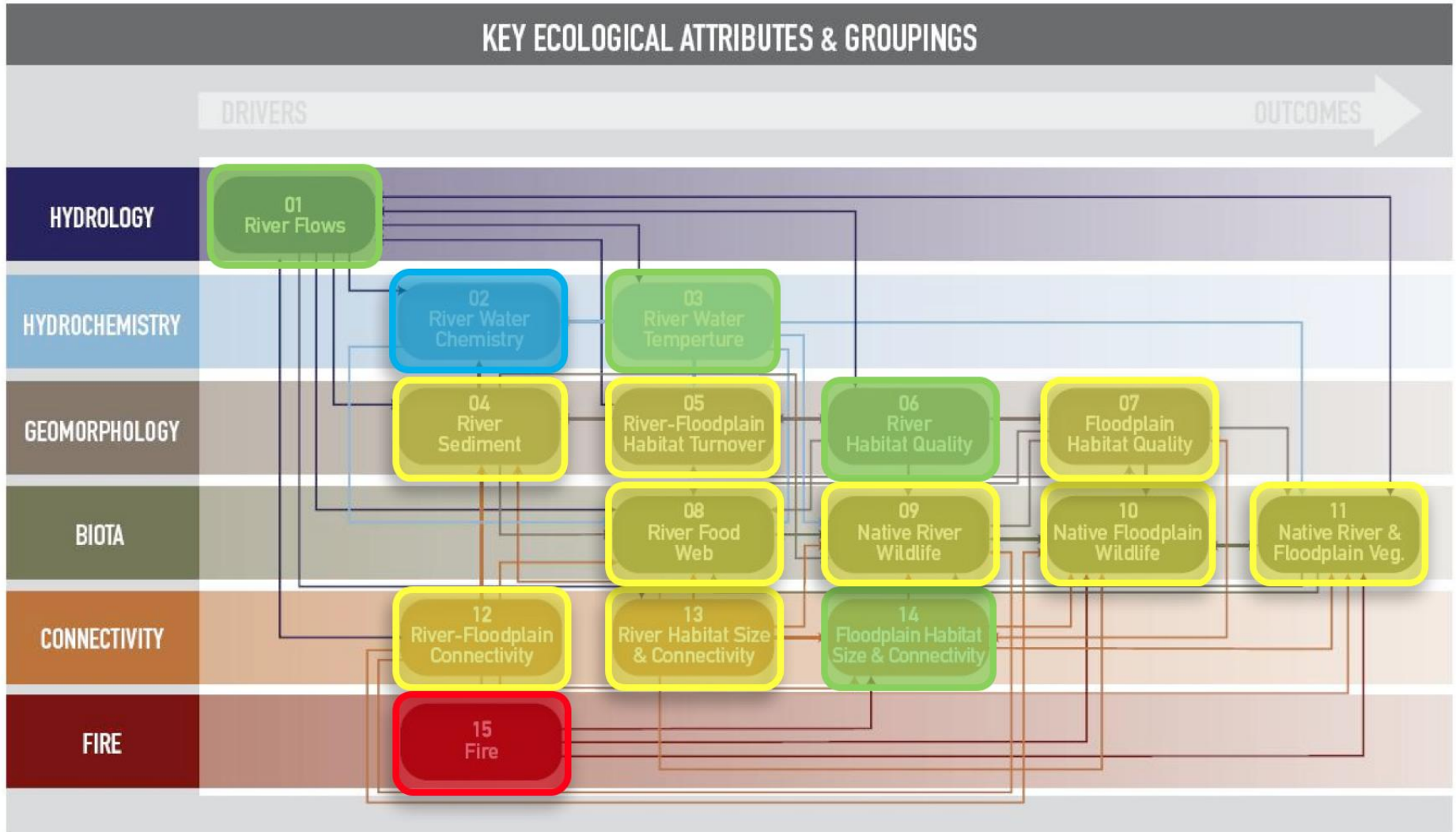
12  
River-Floodplain  
Connectivity

13  
River Habitat Size  
& Connectivity

14  
Floodplain Habitat  
Size & Connectivity

FIRE

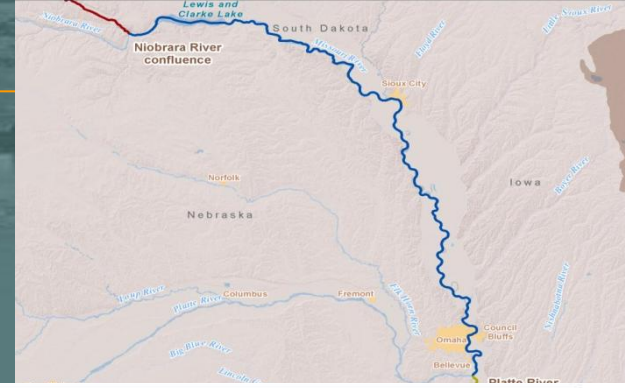
15  
Fire





# Missouri River Ecosystem Restoration Plan and EIS

## Lower Great Plains



- Tier 1
- Tier 2
- Tier 3
- Tier 4
- Tier 5
- Tier 6

### KEY ECOLOGICAL ATTRIBUTES & GROUPINGS

DRIVERS

OUTCOMES

