



**Niobrara Instream Flows Public
Informational Meetings**

December 8- Chadron

December 9- Valentine

December 10- Butte

December 16- Lincoln



Meeting Agenda

- Introductions
- Overview of Meeting Structure
 - Purpose of Meeting
 - Review of Instream Flows
 - Review Completed Studies
 - Wrap Up

All photos in presentation are courtesy of National Park Service and NE Game and Parks

Want to see the Studies or this Presentation?
Go to: <http://outdoornebraska.org/Niobrara>



Introduction of Staff

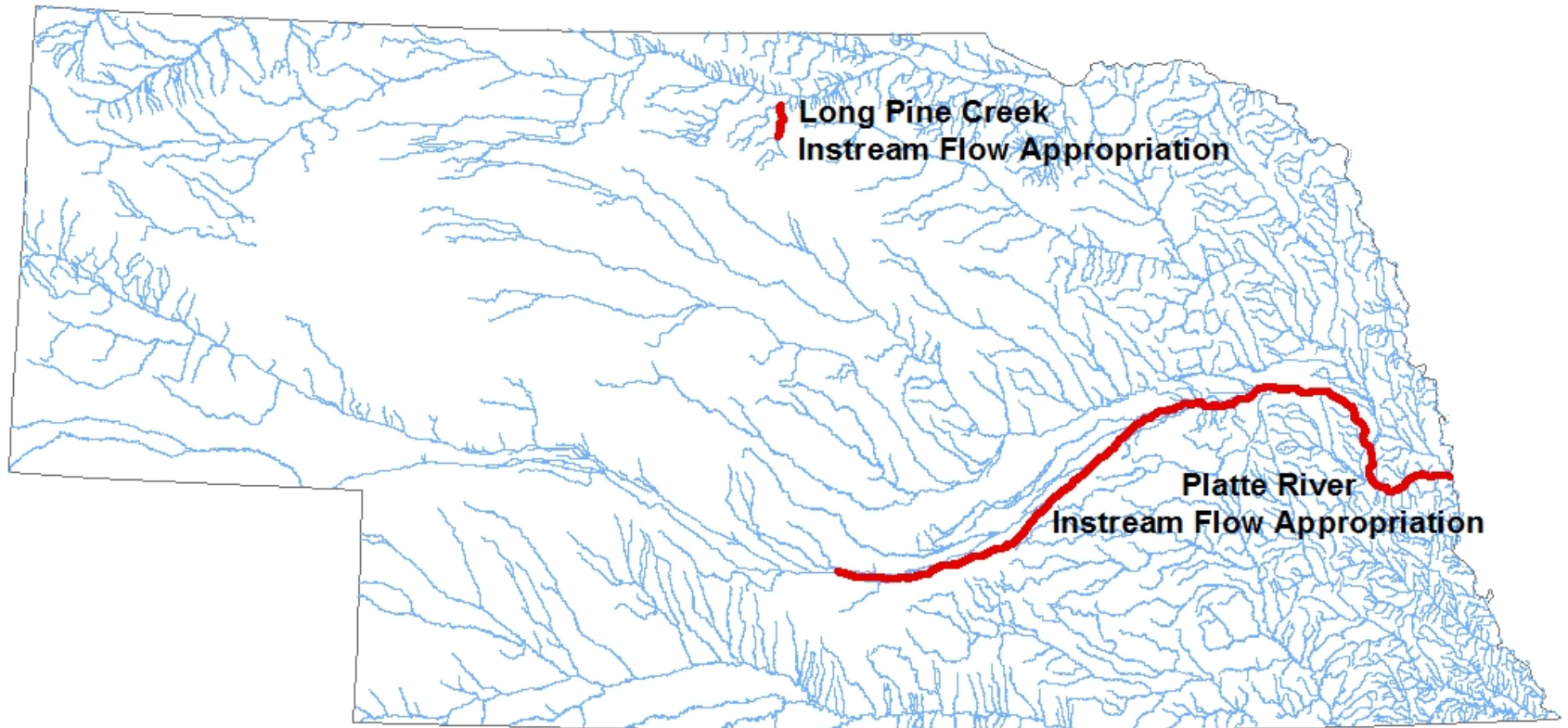
- Michelle Stryker-Facilitator
- Michelle Koch- River Characteristics
 - Carey Grell- River Characteristics
 - Kirk Nelson- Recreational Floating
- Craig Wacker-Economic & Social Benefits of River
 - Gene Zuerlein- Fish & Wildlife
 - Frank Albrecht- Fish & Wildlife
 - Local Staff

Purpose of Meeting

- In 2006, the Board of Commissioners at that time directed staff to look at instream flow recommendations for the Niobrara River.
- NE Game and Parks has undertaken multiple studies on the Niobrara River.
- Studies are complete and it's time to share the results.



Review of Instream Flows



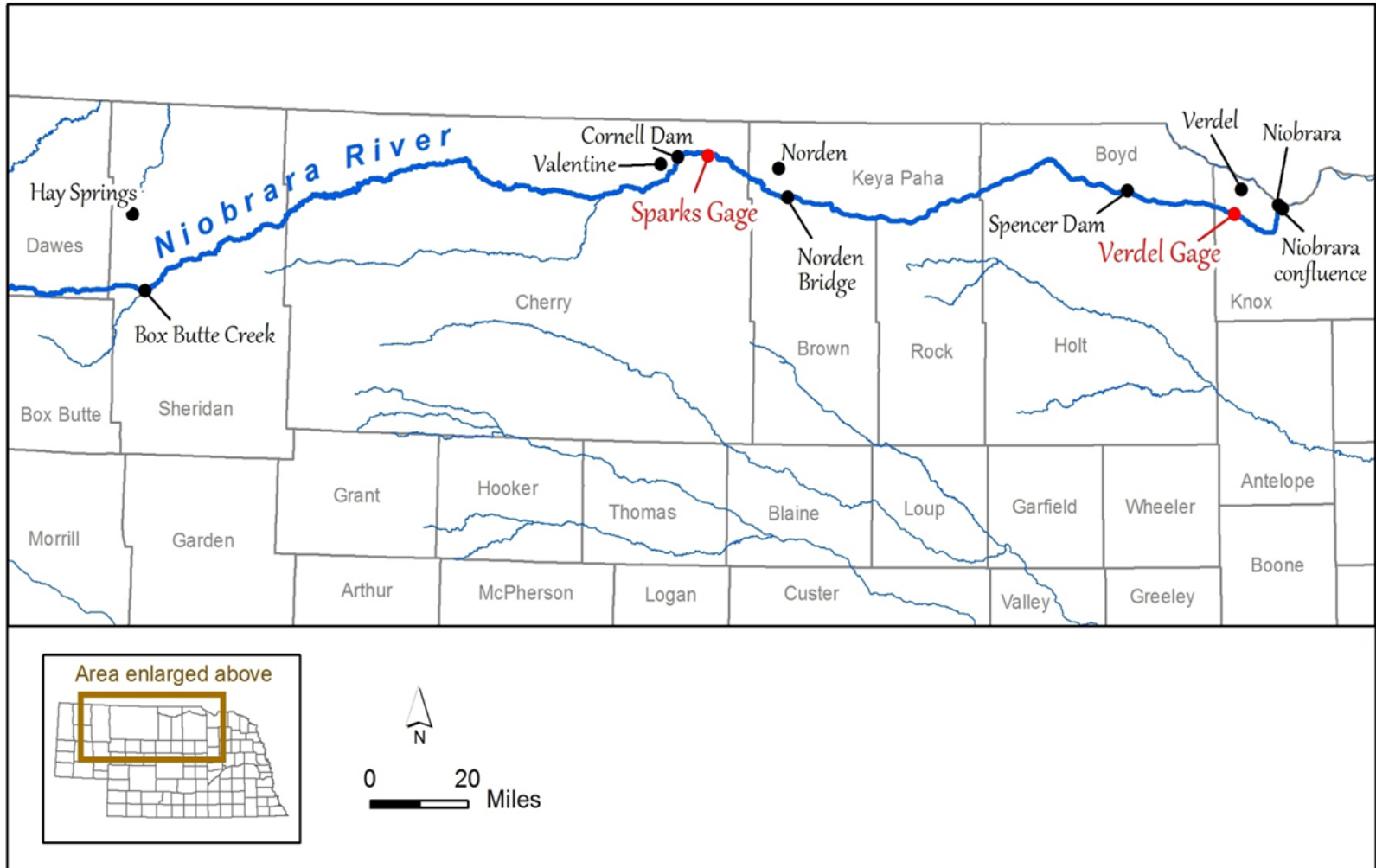


Niobrara River Studies Completed

- River Characteristics
- Recreational Floating
- Economic & Social Benefits-
Instream
- Economic & Social Benefits-
Out of Stream
- Fish and Wildlife



Niobrara River Study Area







Niobrara River Characteristics

Michelle Koch
Carey Grell



Interactions

Geology

Soil

Sediment

Climate

Water

Plants

Animals

Humans



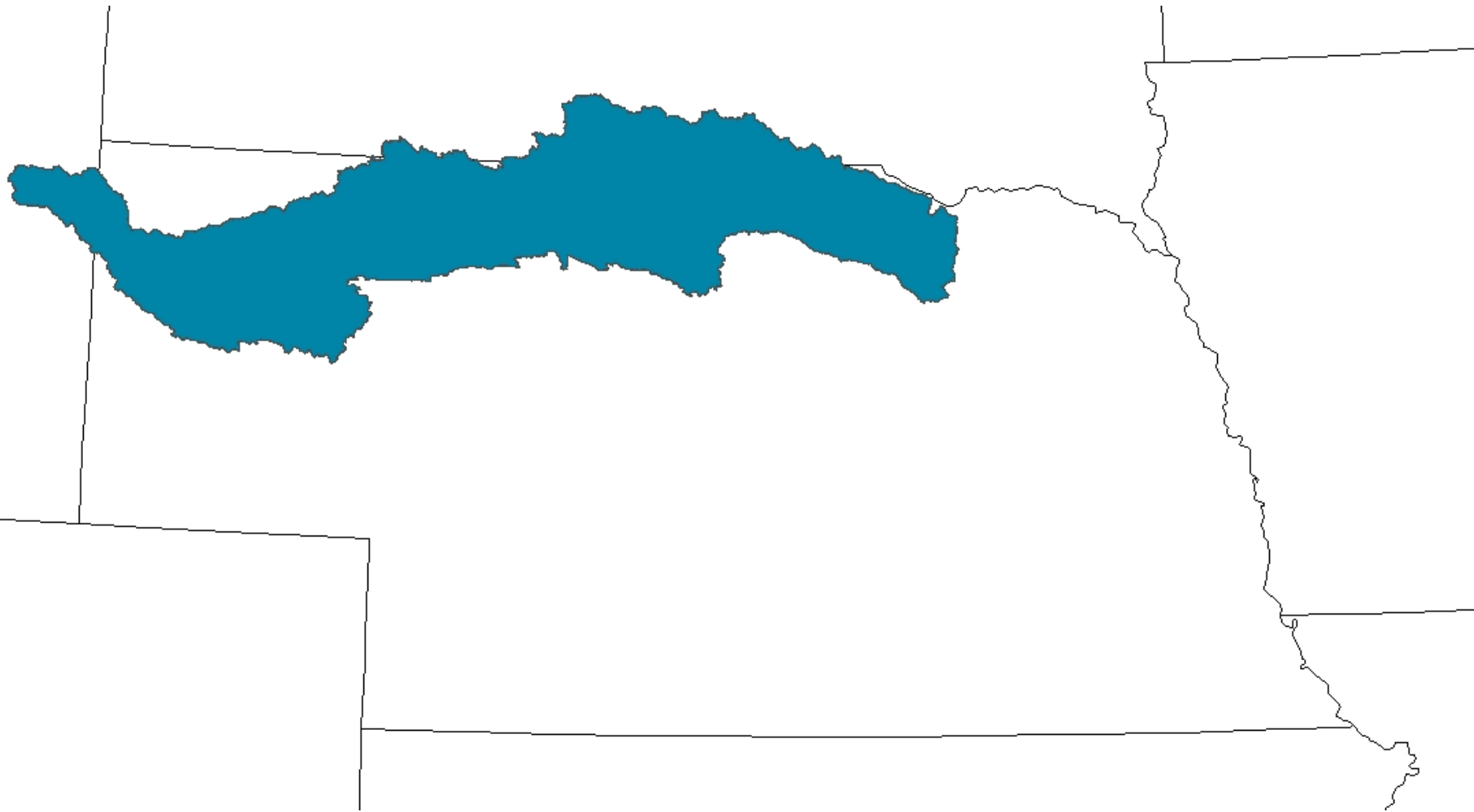
Study #1: Purpose

- Understand influence of human infrastructure on Niobrara River stream flow

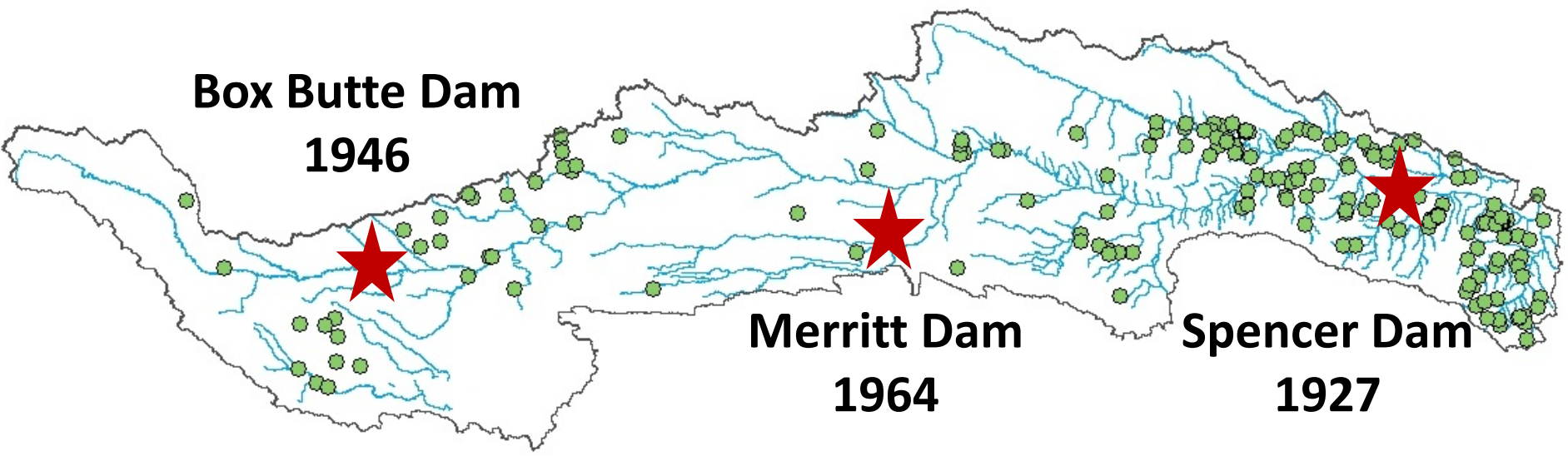




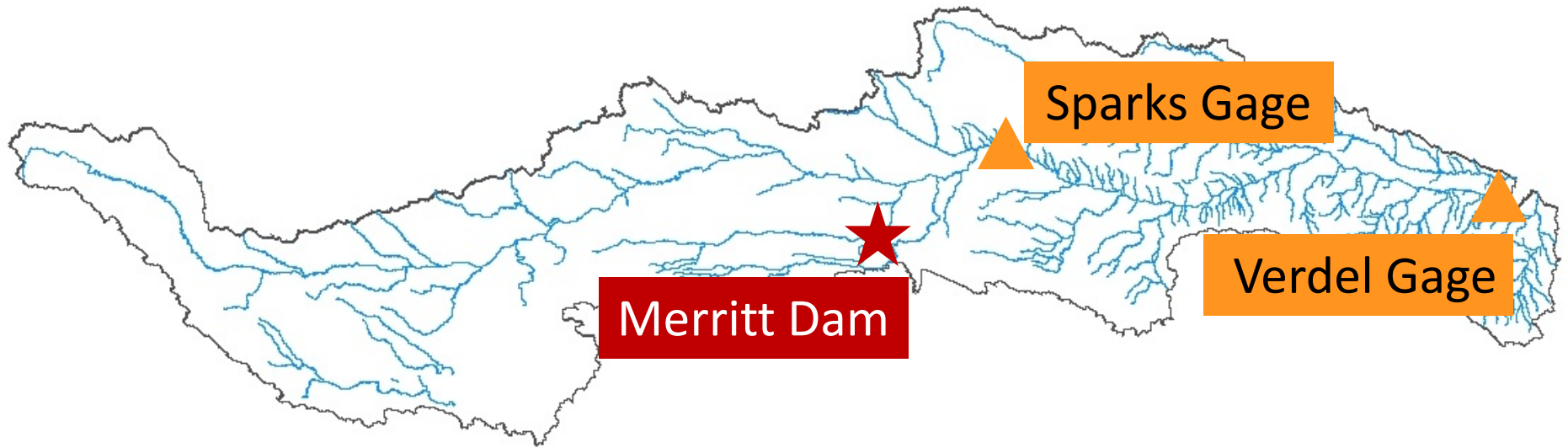
Niobrara River Watershed



Dams in Niobrara Watershed



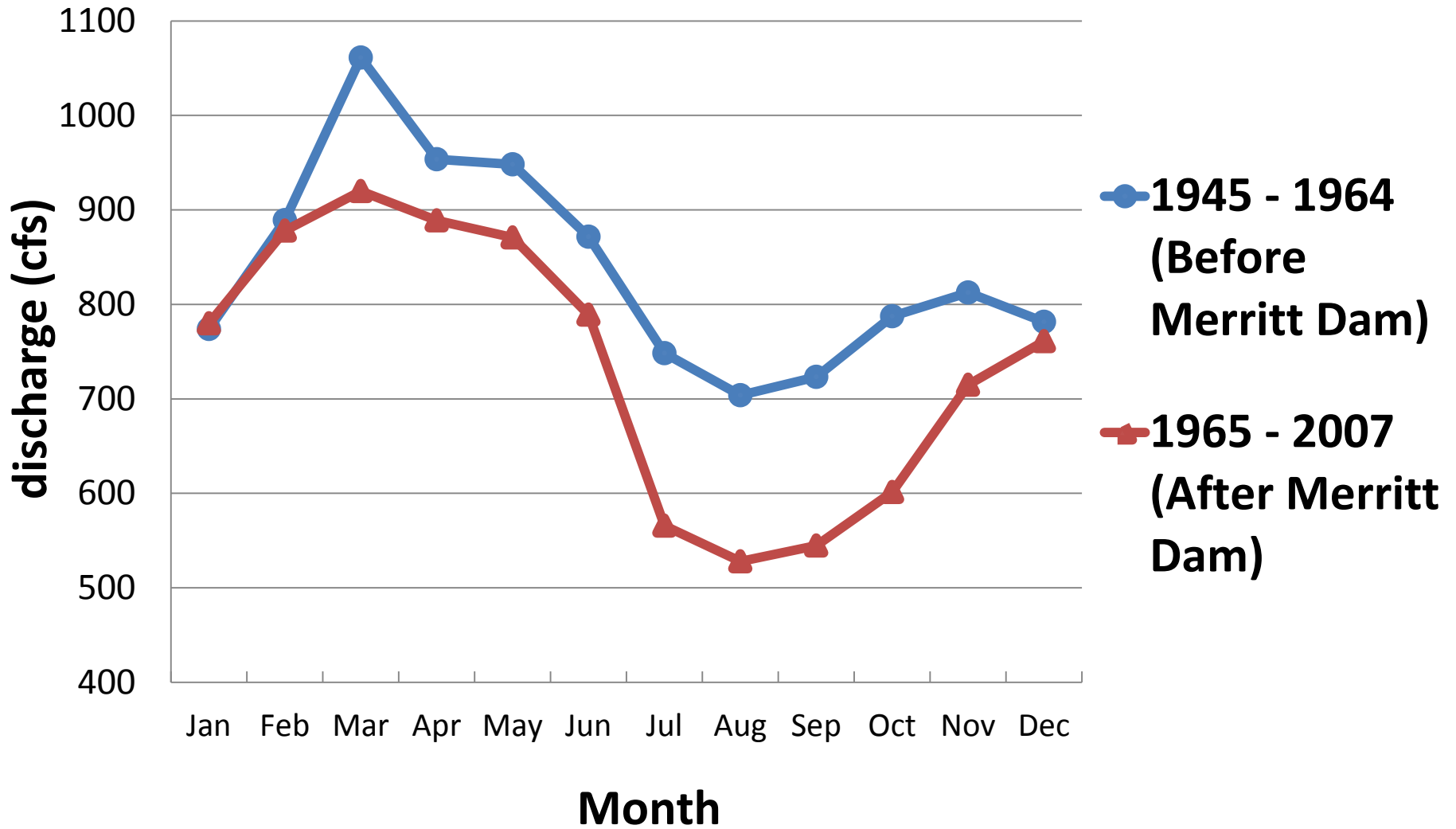
Comparing Water Data



- No change in average annual precipitation
- Decrease in daily, monthly and annual flows for time periods before and after Merritt Dam was constructed

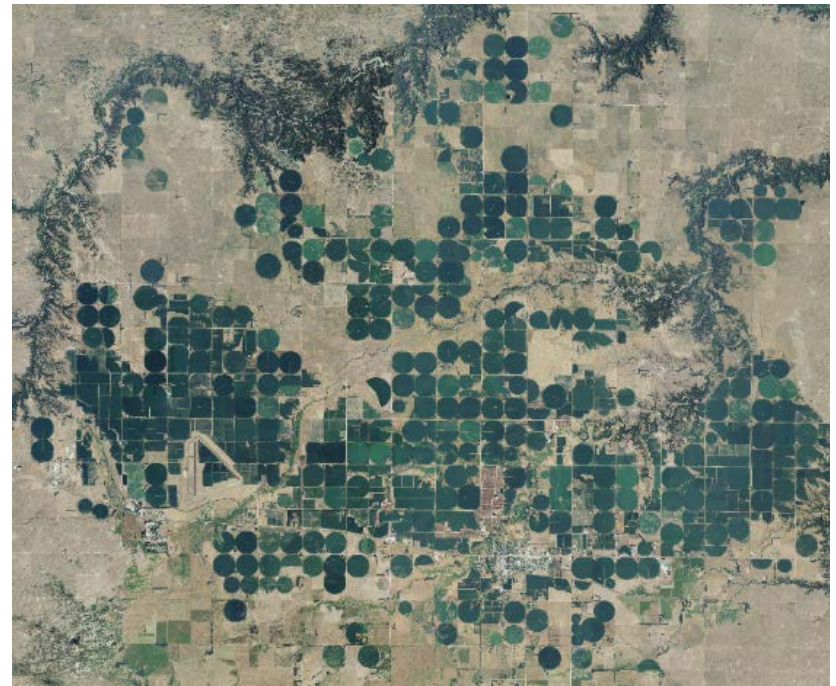


Change in Monthly Stream Flow at Sparks Gage



Application

- We must understand human influence on stream flow in order to manage the Niobrara River for multiple benefits and users.





Interactions

Geology

Soil

Sediment

Climate

Water

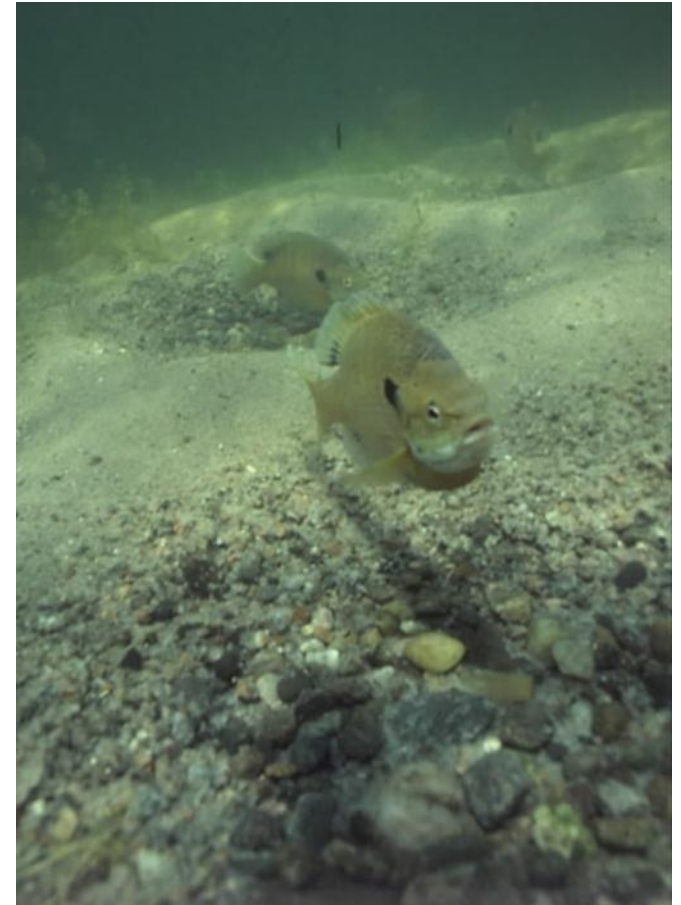
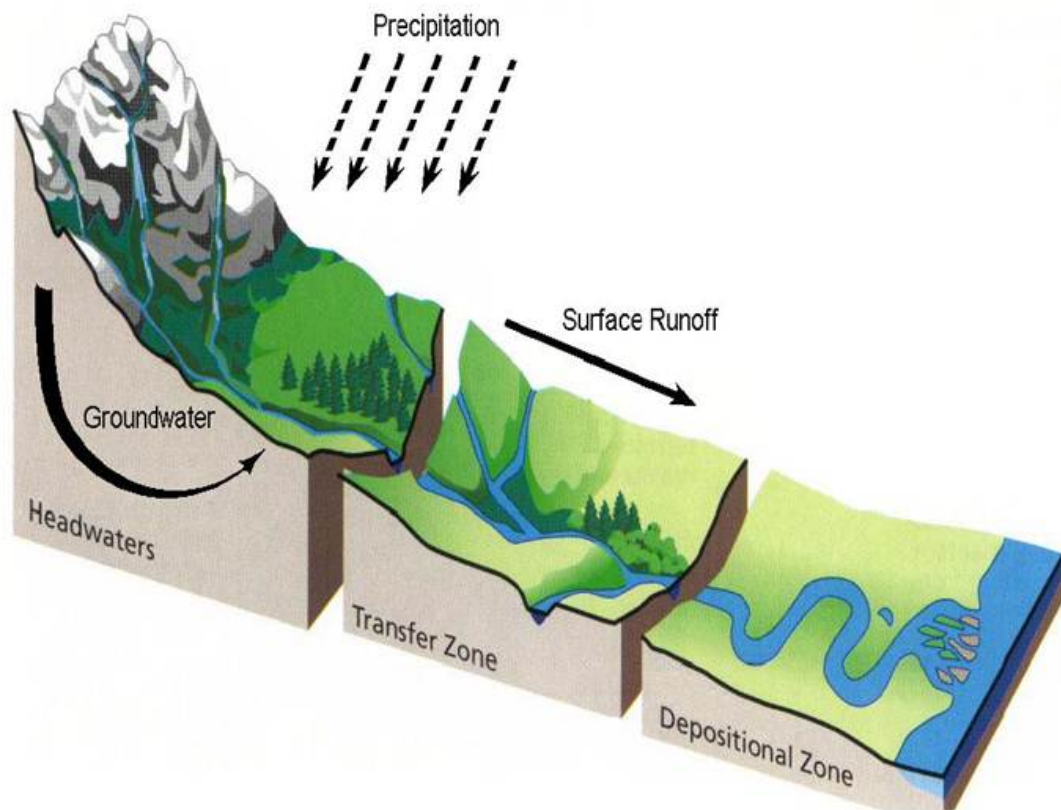
Plants

Animals

Humans

Study #2: Purpose

- Understand connection between physical characteristics and river habitat



River Functions

- Transport water
- Transport sediment
 - 900 cubic feet per second (cfs)



Meandering Bottoms



Canyons and Restricted Bottoms







Braided Bottoms



Diversity of Habitats & Species

		Water Velocity		
		Slow	Moderate	Swift
Water Depth	Shallow			
	Intermediate			
	Deep			

Application

- Different flow depths and velocities create a diversity of habitat, making the Niobrara River system more resilient and creating a wider range of benefits and functions over the long term.







**Flows and Recreational Floating
on the
Niobrara National Scenic River**

Kirk Nelson

Study Goals and Objectives

- One of the goals of the study was to assess relationships between flows & recreation opportunities.
- **Specific Objectives include:**
 - Identify flow-dependent recreation opportunities with a focus on scenic floating in canoes, kayaks, and tubes
 - Describe flow-quality relationships and flow ranges for each type of opportunity





Survey Findings

Information from a 2007 National Park Service user survey regarding floating on the Niobrara River from Cornell Dam to the Norden Bridge shows:

- Most Niobrara floaters are from Nebraska, are part of family groups who have little experience on the Niobrara and rudimentary boating skills.
- About 90% rent canoes, kayaks, or tubes from one of 13 outfitters, about 56% use canoes and kayaks and 42% use tubes.
- Annual use ranges from 33,000 to 44,000 people in recent years.
- Nearly 80% of use occurs on Saturdays, 10% on Sundays, and the remaining 10% through the rest of the week. Most use occurs from Memorial Day through Labor Day, although there is some use from early May through October.

Fieldwork and Interviews



- Fieldwork was conducted in May 2006 and July 2007, allowing observations at about 440 and 800 cfs (at the USGS Sparks gage).
- An outfitter focus group & phone interviews were conducted in 2007.
- The interview panel included 27 outfitters, agency staff, and experienced users who had taken many trips on the river at different flows.



List of Flow-dependent Trip Attributes

- Taken together with information from fieldwork and findings from other flow-recreation studies, the following four attributes appear most relevant for assessing flows for Niobrara floating opportunities.

1. Boatability
2. Safety
3. Aesthetics
4. Rate of Travel



- Interviewees were asked to specify flows that provide boatable conditions and identify acceptable and optimal flow ranges.

Flows & Ranges for Recreation Opportunities on Niobrara NSR

Specified flow for floating opportunities	(cfs)	Flow Ranges
Lowest flow that allows use of the river for transportation (minimum boatable flow)	340	319 to 346
Lowest flow that provides an acceptable quality “scenic trip”	460	450 to 500
Lowest flow that provides an optimal quality “scenic trip”	600	550 to 600
Highest flow that provides an optimal quality “scenic trip”	900	750 to 1,000
Highest flow that provides an acceptable quality “scenic trip”	1,200	1,050 to 1,200
Lowest flow that provides optimal whitewater in the three Class II-III rapids	800	740 to 1,000



In Summary

Based on interview information and supported by fieldwork

- Flows higher than 460 cfs provide acceptable boating opportunities.
- Flows between 600-900 cfs provide optimal boating opportunities.
- Tubing flows are similar except at the high end of the optimal range.
- Whitewater at the Class II-III rapids becomes optimal above 800 cfs.
- Flows between 340 cfs and 460 cfs are boatable and tubable, but offer lower quality opportunities.
- Flows below 340 cfs (rarely observed in the period of record) are considered “unboatable.”



River Flow Scenarios

- The remainder of this study involves the analysis of various factors influenced by wet and dry precipitation years including estimated impacts from past and potential future water development projects on river flows.





Economic and Social Values of Recreational Floating on the Niobrara River

Craig Wacker

Use of Niobrara River

- 73% of Nebraskan's are familiar with the Niobrara River.
- 33% have floated it.
- 53% have recreated on it (including floating, camping, and fishing).
- 92% know of friends or family who have recreated on the river.



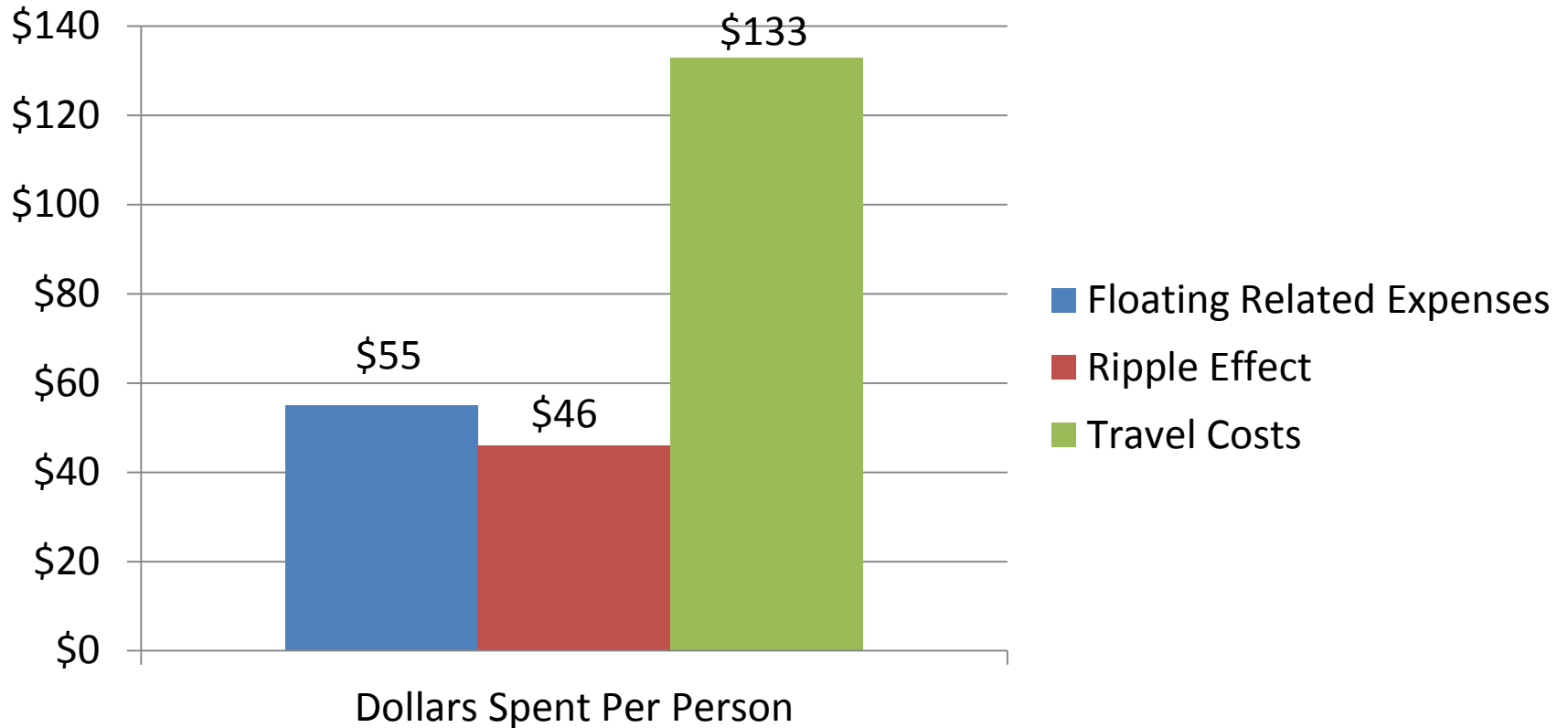


Recreational Floating on the Niobrara River

- Floating on the river increased 8.5% per year from 2005 to 2008.
- 73% of the people floating the river are from Nebraska.
- Tubes are by far the most popular device used.
- Typical floaters make 3 trips every 4 years.
- Typical trips last 2 days with 1.3 days floating.
- 98% of floaters camp or stay in local hotels during their trip.
- 87% rent equipment or use shuttle services of local outfitters.
- 33% buy groceries at local stores and 23% eat meals at local restaurants.



Economic Values Associated with Floating the River



Total values in 2008 were \$234 per river floating day or \$10.9 million for the year.



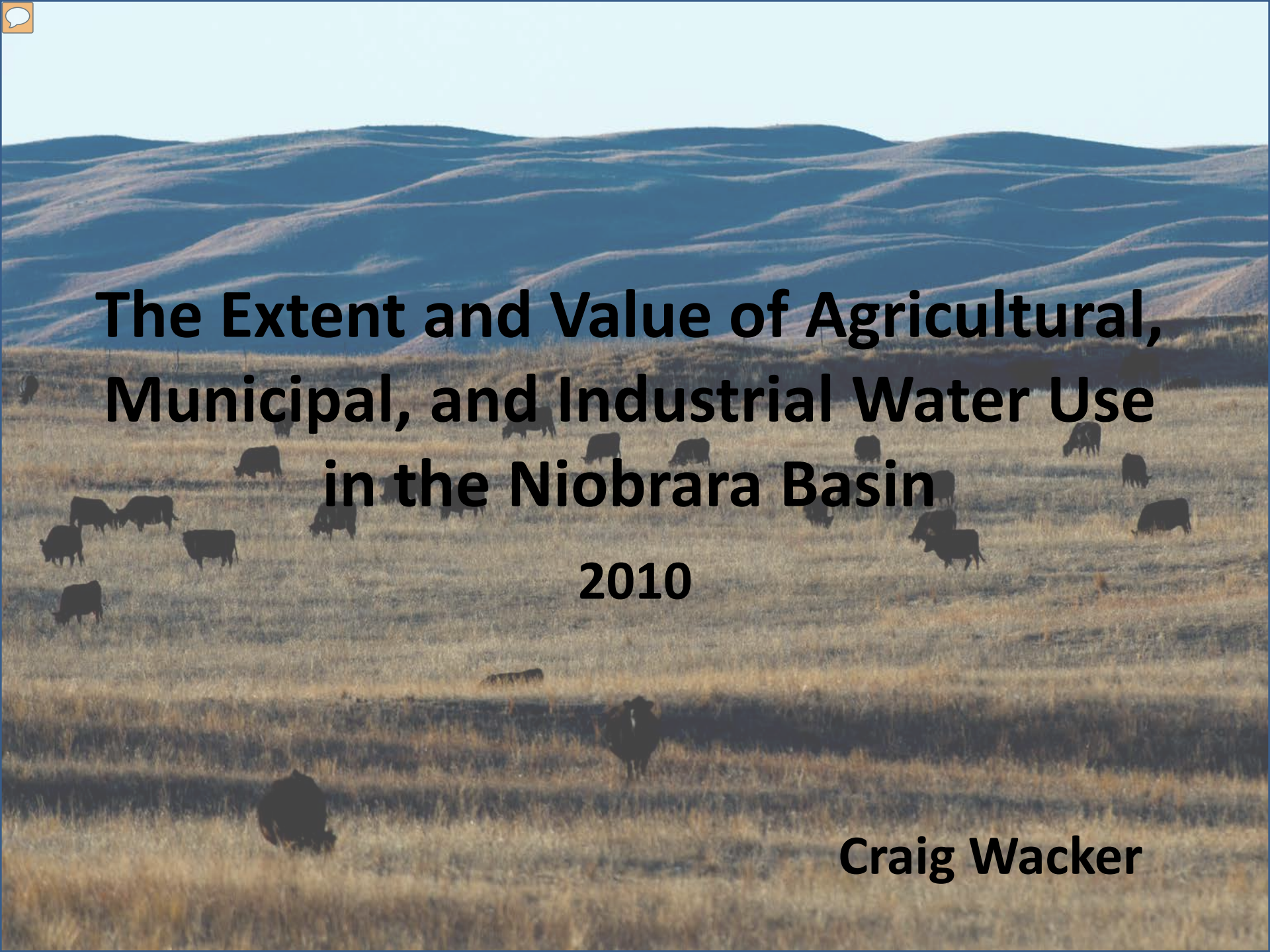
Floaters Perceptions of Water Flows

- 23% of floaters felt low flows were a primary concern/threat.
- 11% were most concerned with litter and water quality issues.
- 35% consider flow levels while planning trips.
- 66% check on flows in advance of a trip.

Current and Potential Economic Losses Due to Low River Flows

- 4.5% of floaters would not return due to the low flows they experienced.
- That 4.5% loss equates to \$488,446 per year.
- Over the next decade these losses are predicted to range from \$471,000 to \$659,000 per year.





**The Extent and Value of Agricultural,
Municipal, and Industrial Water Use
in the Niobrara Basin
2010**

Craig Wacker



Municipal and Industrial Water Uses

- Drinking Water needs are low and not expected to increase in the future.
- Industrial needs are also low and not expected to increase.
- Hydro-electricity generation at Spencer Dam has a historical water right of 2,035 cfs (1.4 million acre-feet per year) and an average use of 1,207.23 cfs.
- This report estimates the Hydro-electric values to be \$0.48/acre-foot.



Irrigated Agriculture Usage

- 794,500 acres are irrigated in the basin.
- 84% of irrigation is from groundwater.
- Estimated potential for additional irrigated land is 106,000 acres or a 13.3% increase.



Economic Value of Irrigation

- Price modeling for this study showed irrigation values of \$827/acre.
- Irrigation increased property values by 63% across the region with variances from 51% to 89%.
- When comparing irrigated v. non-irrigated land values, irrigated land added \$44 million of economic value to the basin per year.





Conclusion

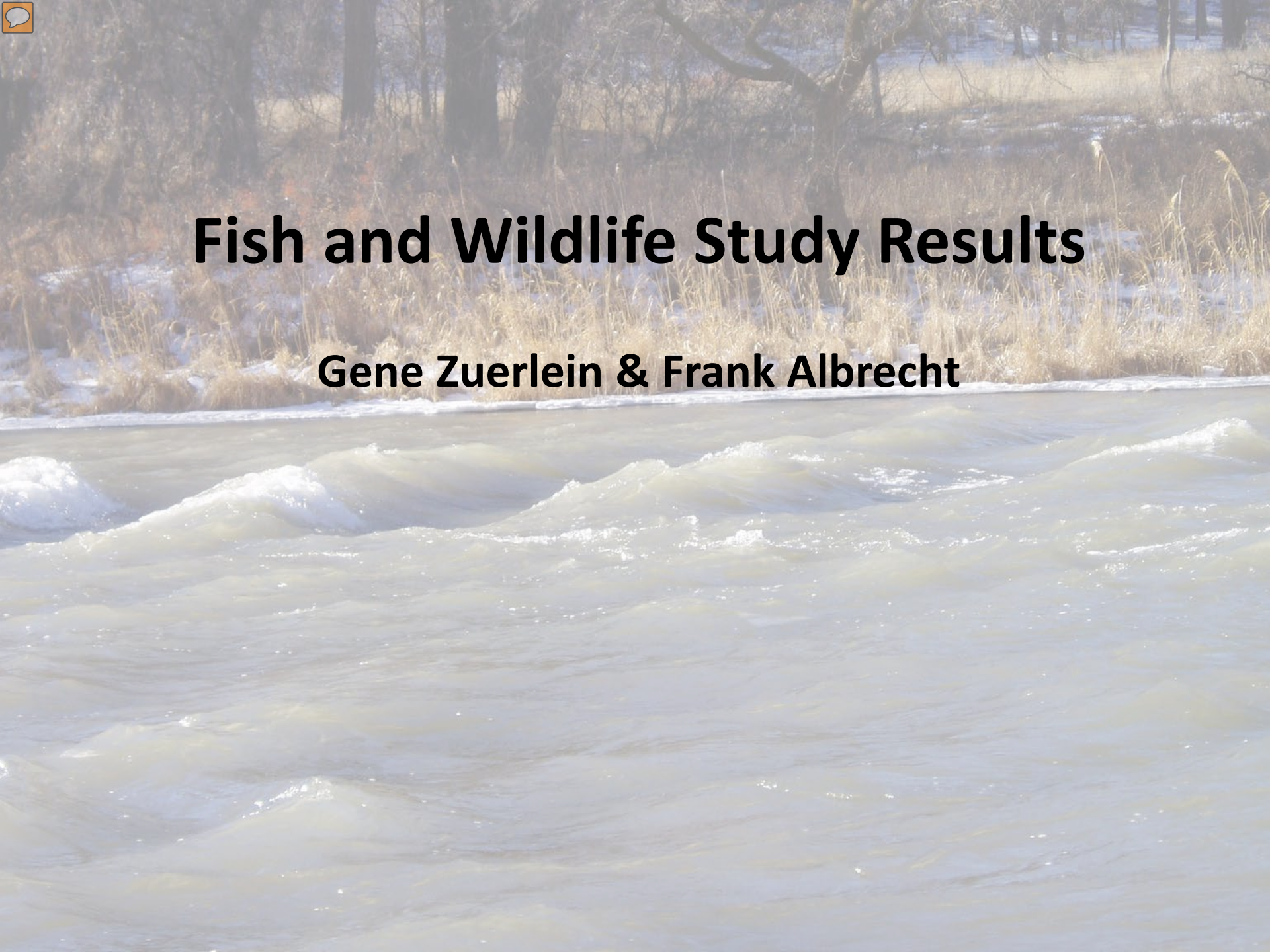
- Irrigation and Recreation are the largest economic drivers within the Niobrara basin
- Irrigation is largely from groundwater sources
 - Only 16% comes from surface water





Fish and Wildlife Study Results

Gene Zuerlein & Frank Albrecht





Fish and Wildlife Species on the Niobrara

Fish species included in five riverine habitats types

Bigmouth Shiner

Red Shiner

Plains Topminnow

Largemouth Bass

Fathead Minnow

Brook Stickleback

YOY Channel Catfish

River Carpsucker

Emerald Shiner

Sand Shiner

Bluegill

Brassy Minnow

Central Stone Roller

Longnose Dace

River Shiner

Green Sunfish

Yellow Perch

Creek Chub

White Sucker

Shorthead Redhorse

Species of Special Interest

Paddlefish

Pallid Sturgeon

Shovelnose Sturgeon

Sauger

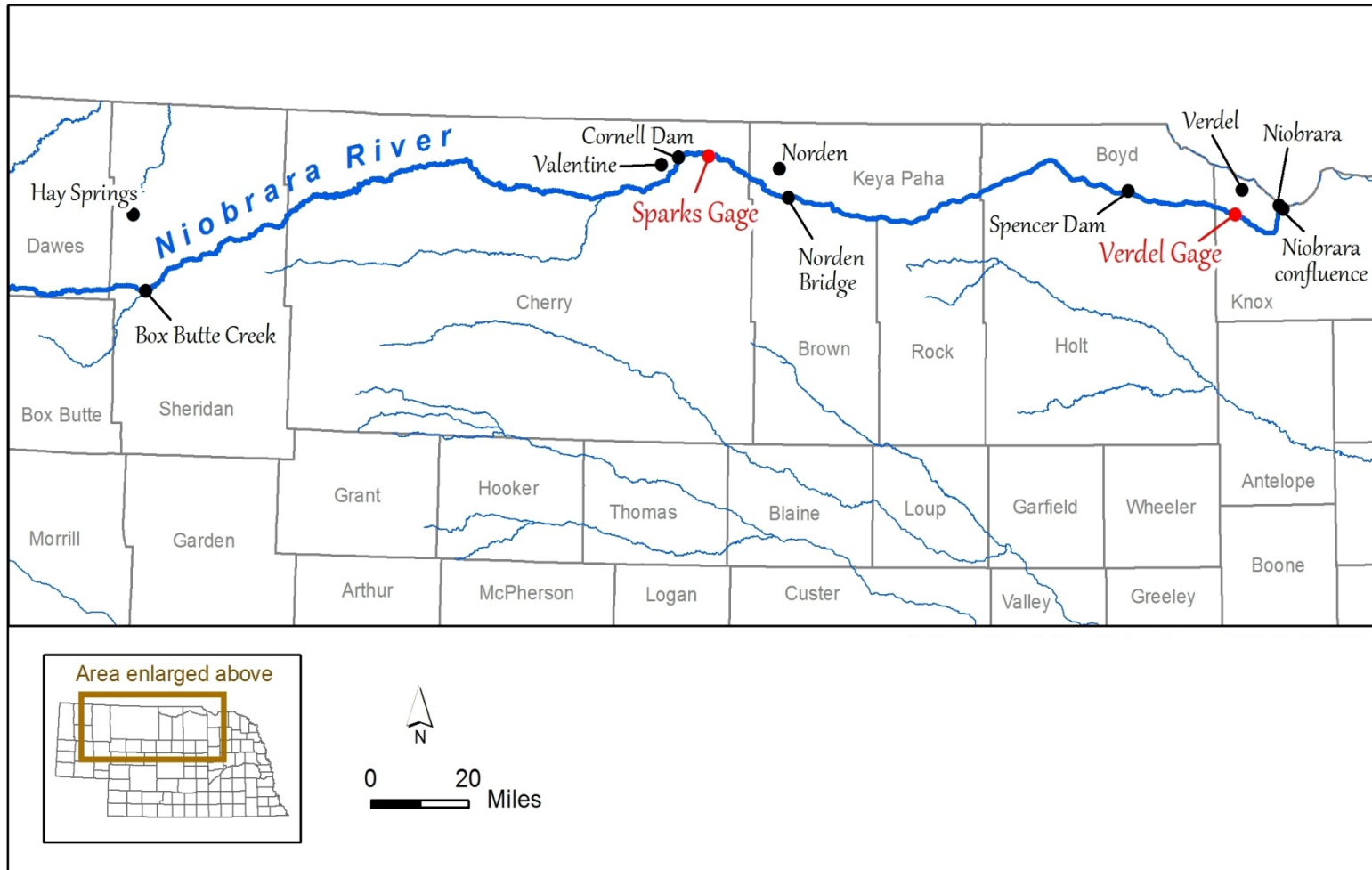
Adult Channel Catfish

Interior Least Tern

Piping Plover

Whooping Crane

Niobrara Reach with Stream Flow



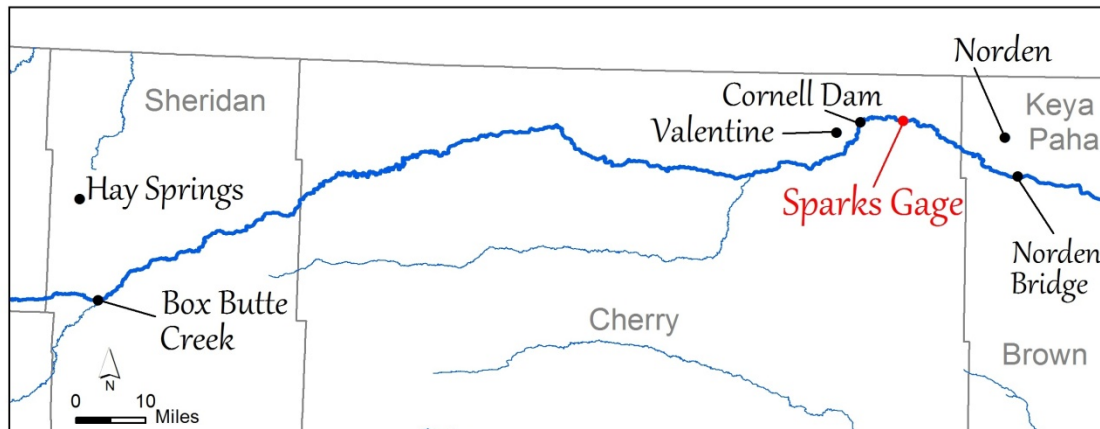
1. Fish Community Flows (Sparks gage)

Study Results:

Purpose: To maintain the fish community

Reach: Box Butte Creek confluence downstream to Norden Bridge (185 miles)
(Sheridan Co. to Brown Co.)

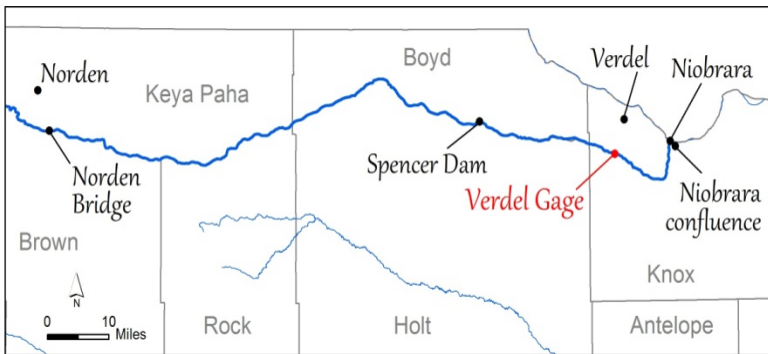
Bioperiod: January 1 - February 28(29), for overwintering late habitat **965 cfs**
March 1 - May 14, for early spawning habitat **701 cfs**
May 15 – June 30, for late spawning habitat **701 cfs**
July 1 – September 30, for summer rearing and growth habitat **665 cfs**
October 1 – December 31, for overwintering early habitat **894 cfs**



2. Fish Community Flows (Verdel gage)

Study Results:

- Purpose: To maintain the fish community
- Reach: Norden Bridge downstream to Niobrara confluence (125 river miles)
(Brown Co. to Knox Co.)
- Bioperiod: January 1 - February 28(29), for overwintering late habitat ... **2,084 cfs**
March 1 - May 14, for early spawning habitat **2,270 cfs**
May 15 - June 30, for late spawning habitat **2,270 cfs**
July 1 - September 30, for summer rearing & growth (1,725)
July 1 - September 30, for rearing and growth habitat (1,806) **1,765 cfs**
avg.
- (Includes paddlefish, pallid sturgeon, sauger, adult channel catfish)**
- October 1 - December 31, for overwintering early habitat **1,969 cfs**





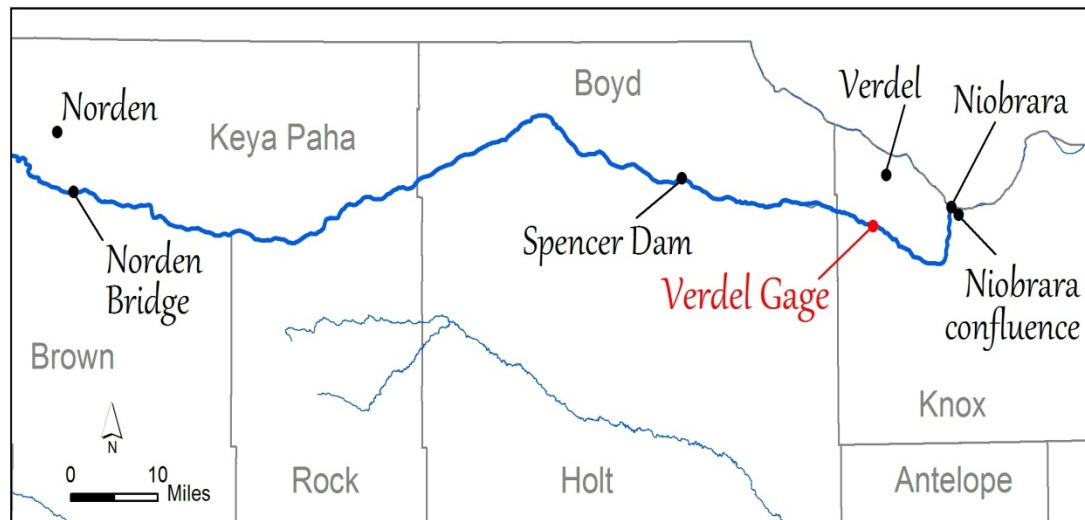
3. Whooping Crane Roosting Flows (Verdel gage)

Study Results:

Purpose: To maintain spring and fall roosting habitat

Reach: Norden Bridge downstream to Niobrara confluence (125 river miles)
(Brown Co. to Knox Co.)

Bioperiod: April 1 - April 30, for spring migration habitat **1,806 cfs**
October 1 - October 31, for fall migration habitat ... **1,714 cfs**



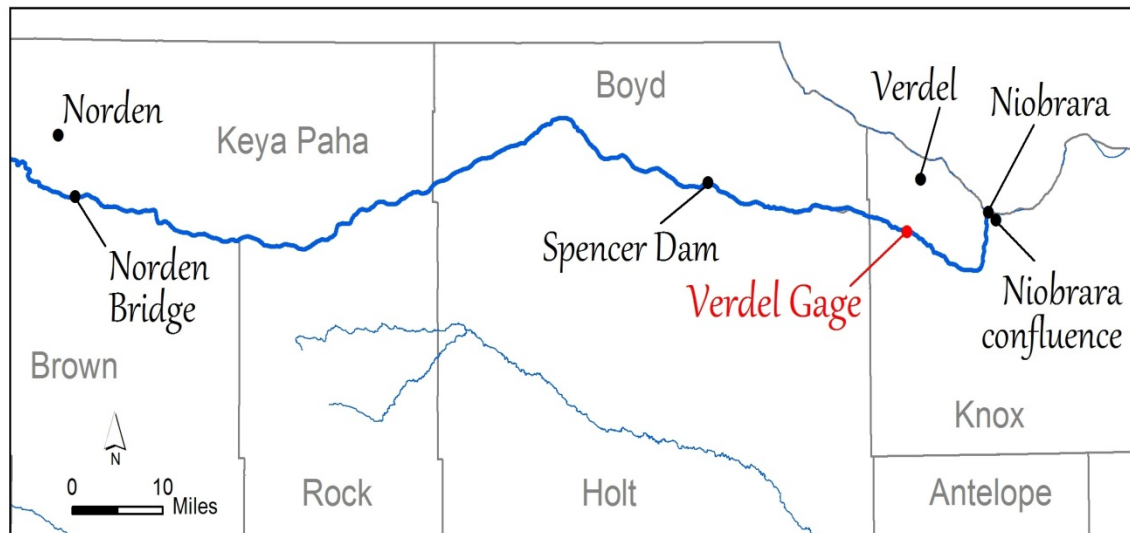
#4. Least Tern Nesting Flows (Verdel gage)

Study Results:

Purpose: To maintain nesting habitat

Reach: Norden Bridge downstream to the Niobrara confluence (125 miles)
(Brown Co. to Knox Co.)

Bioperiod: May 1 – August 31, for nesting habitat**1,818 cfs**



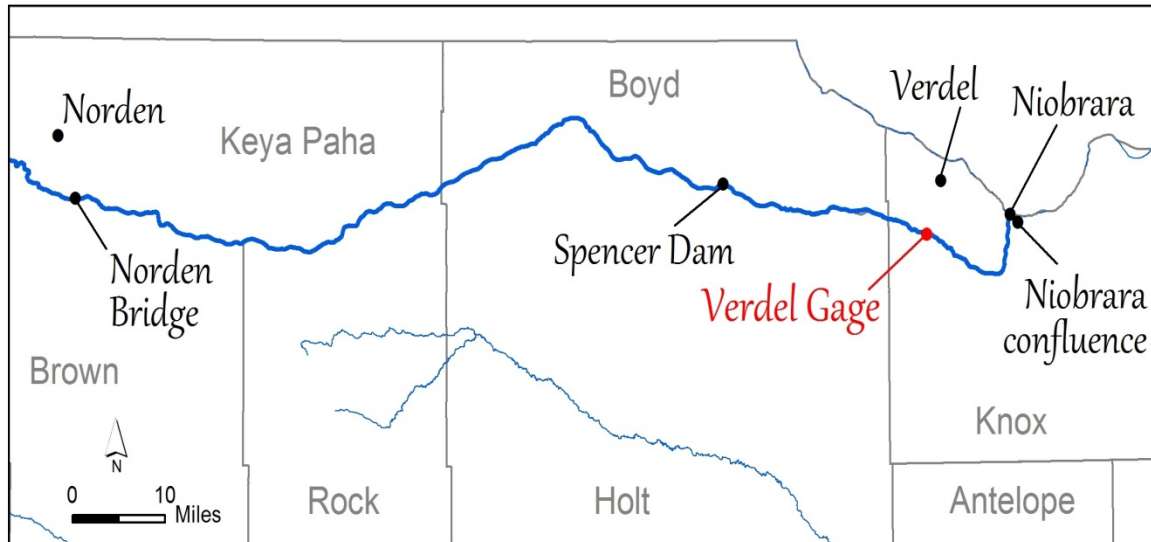
5. Piping Plover Nesting Flows (Verdel gage)

Study Results:

Purpose: To maintain nesting habitat

Reach: Norden Bridge downstream to the Niobrara confluence (125 miles)
(Brown Co. to Knox Co.)

Bioperiod: May 1 – August 31, for nesting habitat**1,424 cfs**





Summary

- Fish and wildlife are public trust natural resources important to stakeholders across the state of Nebraska.
- The pallid sturgeon, whooping crane, and least tern are state and federal listed endangered species, the piping plover is a state and federal listed threatened species.
- A healthy river will not only support fish and wildlife, but multiple benefits including groundwater recharge, water quality, recreational floating pursuits, distribution of nutrients relied upon by the entire aquatic food chain, etc.
- The Niobrara River is the gem of northern Nebraska. We can all work together to help protect this tremendous resource.





Wrap Up

The studies show that keeping water in the River can benefit...

- The health and diversity of the area
- The local economy
- Habitat for Threatened and Endangered Species
- The aesthetic value of the river

Thanks for coming!

To view this PowerPoint or the Studies,
please go to

<http://outdoornebraska.org/Niobrara>

Questions?

Feel free to call Gene Zuerlein at (402) 471-1542

Niobrara River Study Area

