



Least Tern chick



A proposal to investigate spatial and temporal dynamics of sandbars in the LPR

A proposed cooperative partnership between the USGS, Nebraska Tern and Plover Conservation Partnership, Lower Platte River Corridor Alliance, and Lower Platte South Natural Resources District.

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Recent work on sandbar dynamics in LPR...

1. Tern and Plover Conservation Partnership:

- systematic sampling of sandbar height and area every 3 miles from near Loup River confluence to Missouri River (2008-2010).

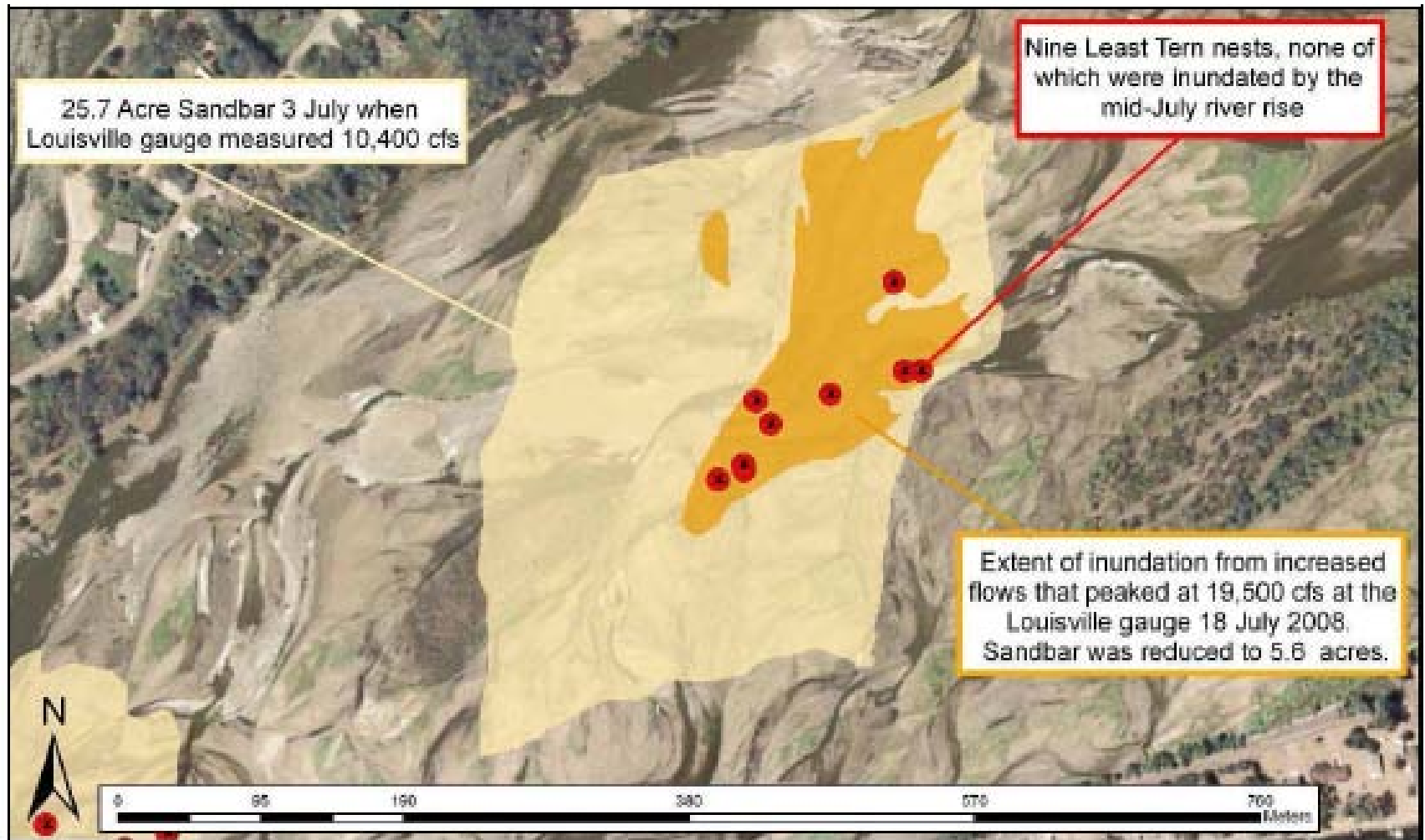
2. J.E. Parham (2007)

- modeling of interactions between hydrology and sandbar habitat quality and quantity at three locations in the LPR.

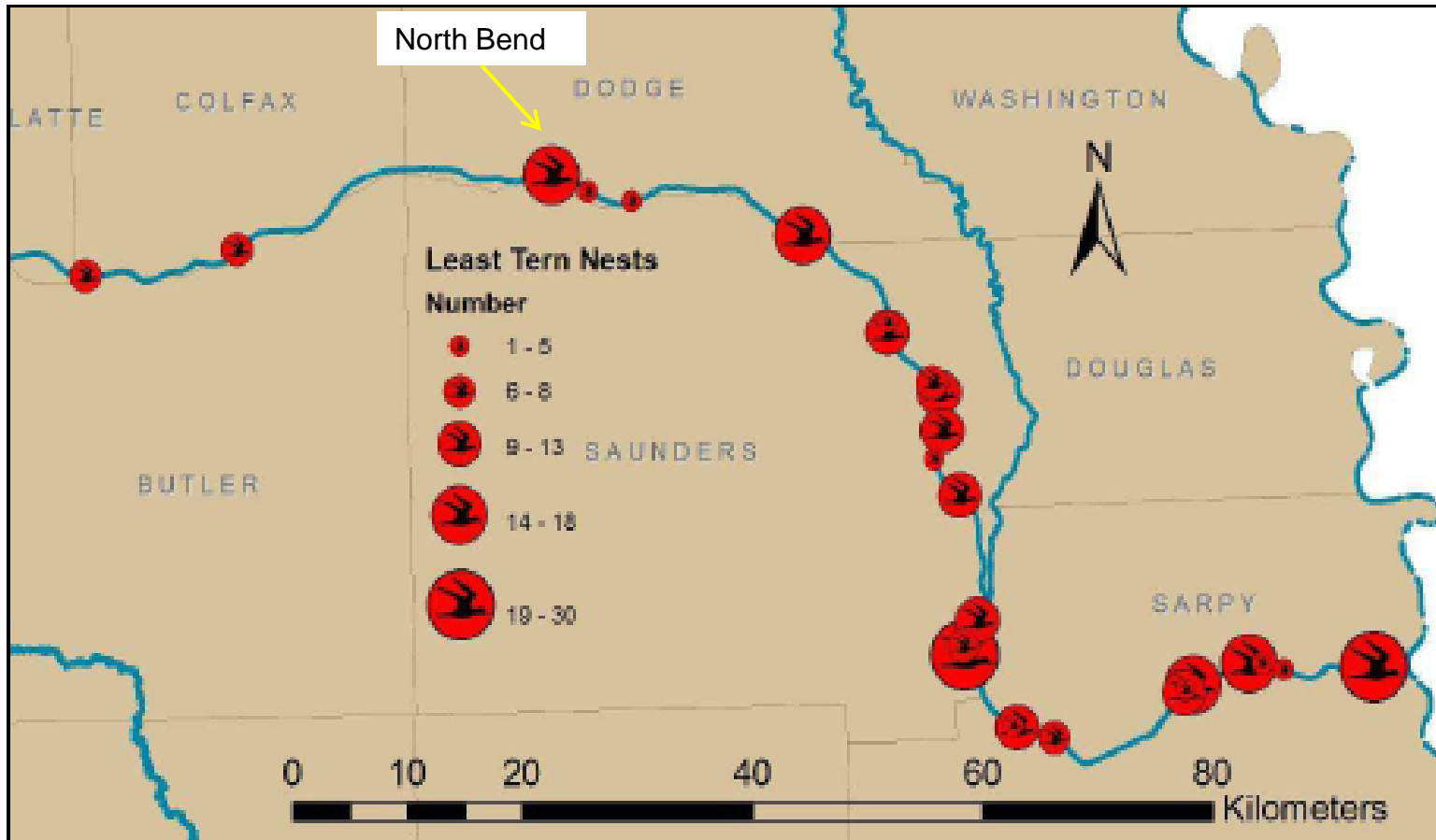
What do we know (or think we know) about sandbars in LPR?

- Larger floods build higher sandbars.
- Sandbars that are higher, in general, provide better nesting habitat quality...reducing probability of late season nest inundation.
- Sandbars in LPR generally increase in height in the downstream direction--> sandbar quality generally increases in downstream direction.

Importance of Sandbar Height

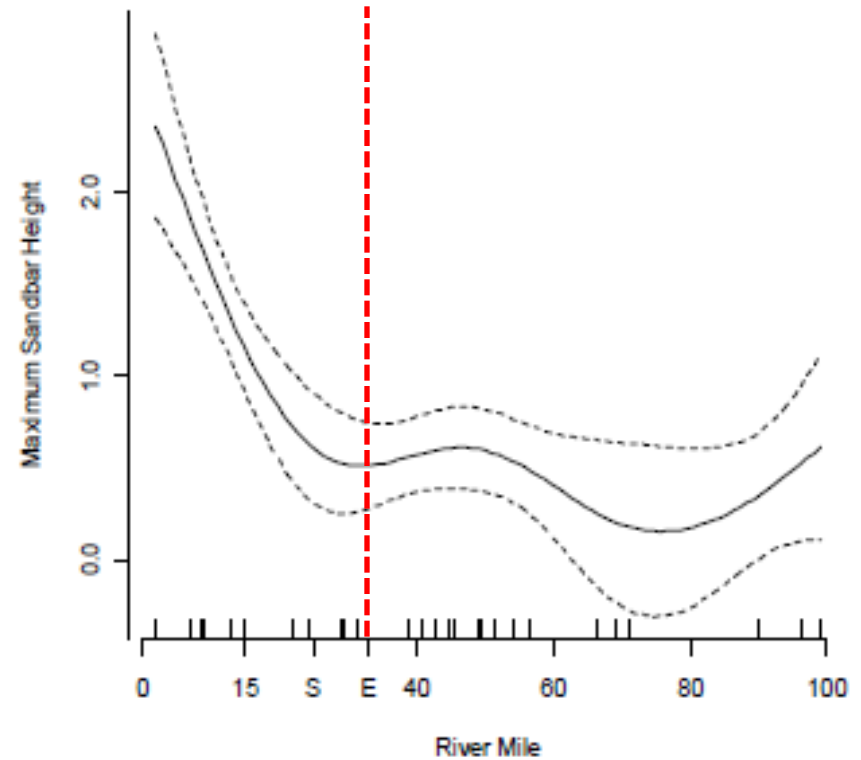
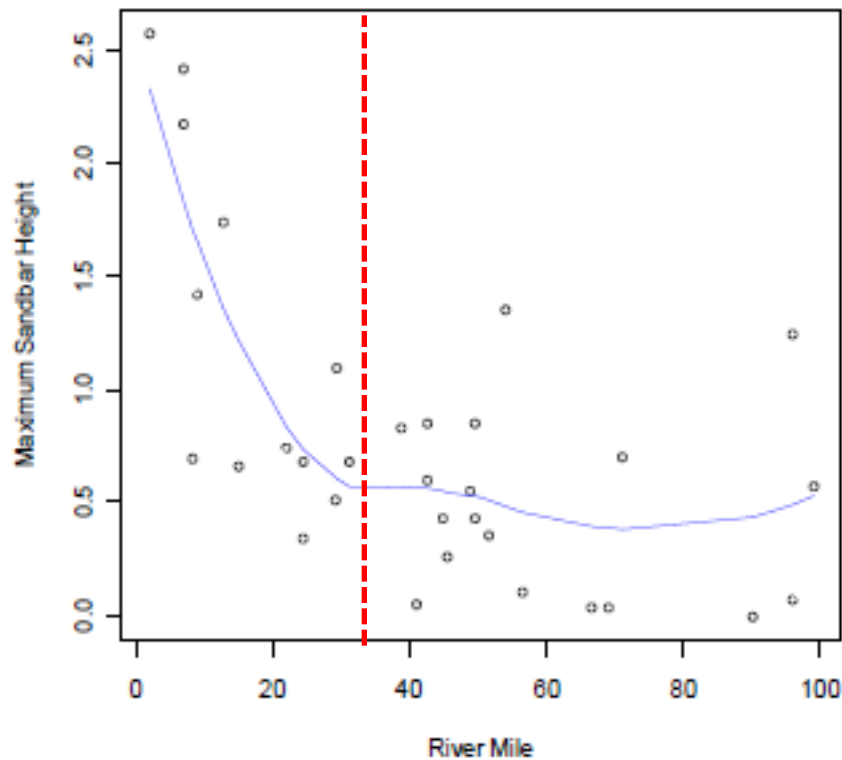


Nesting in Lower Platte River- Least Tern (2009)



From Jorgensen and Brown, 2009

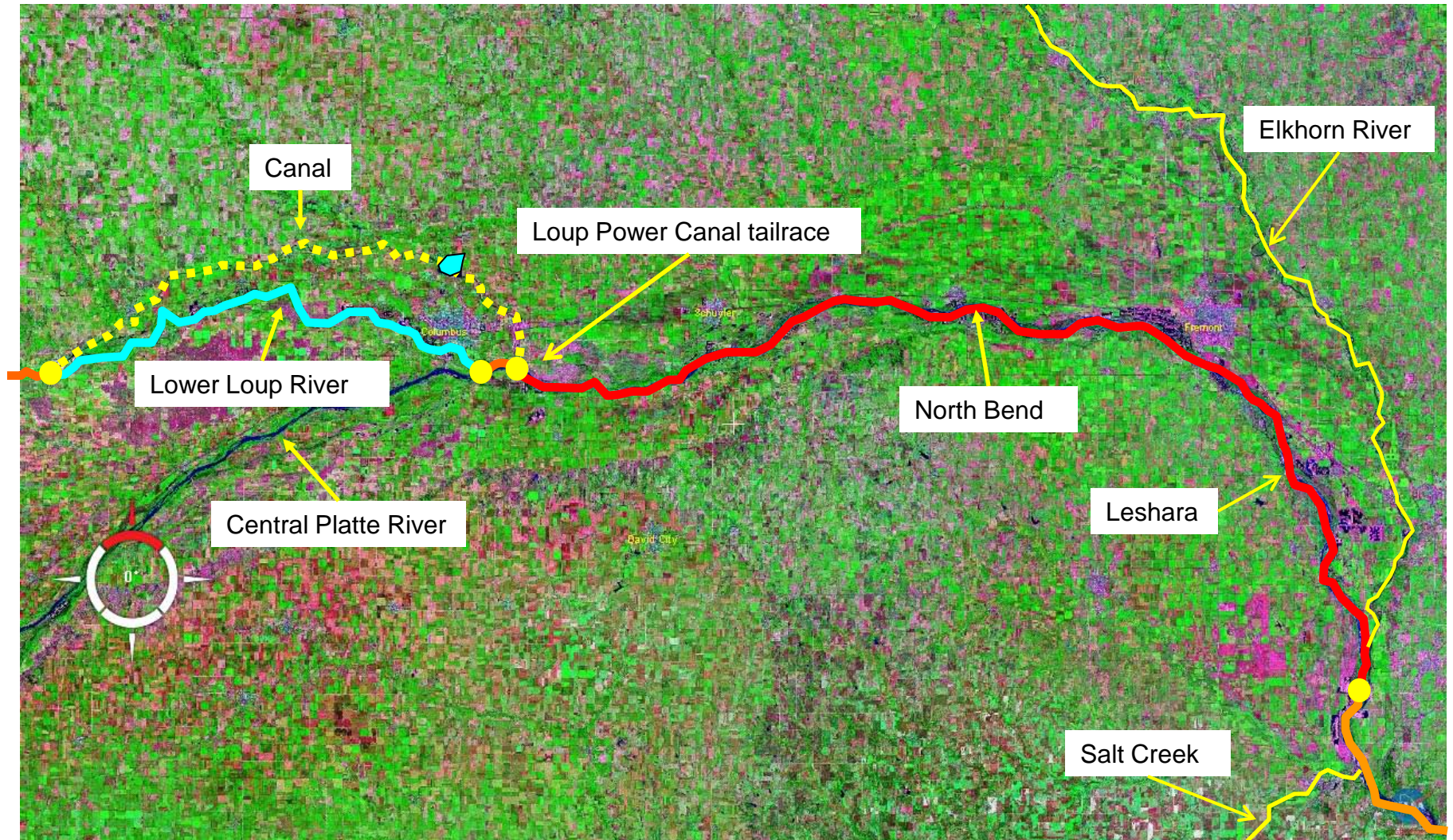
Empirical Sandbar Data - Breeding Season Inundation Risk (2009)



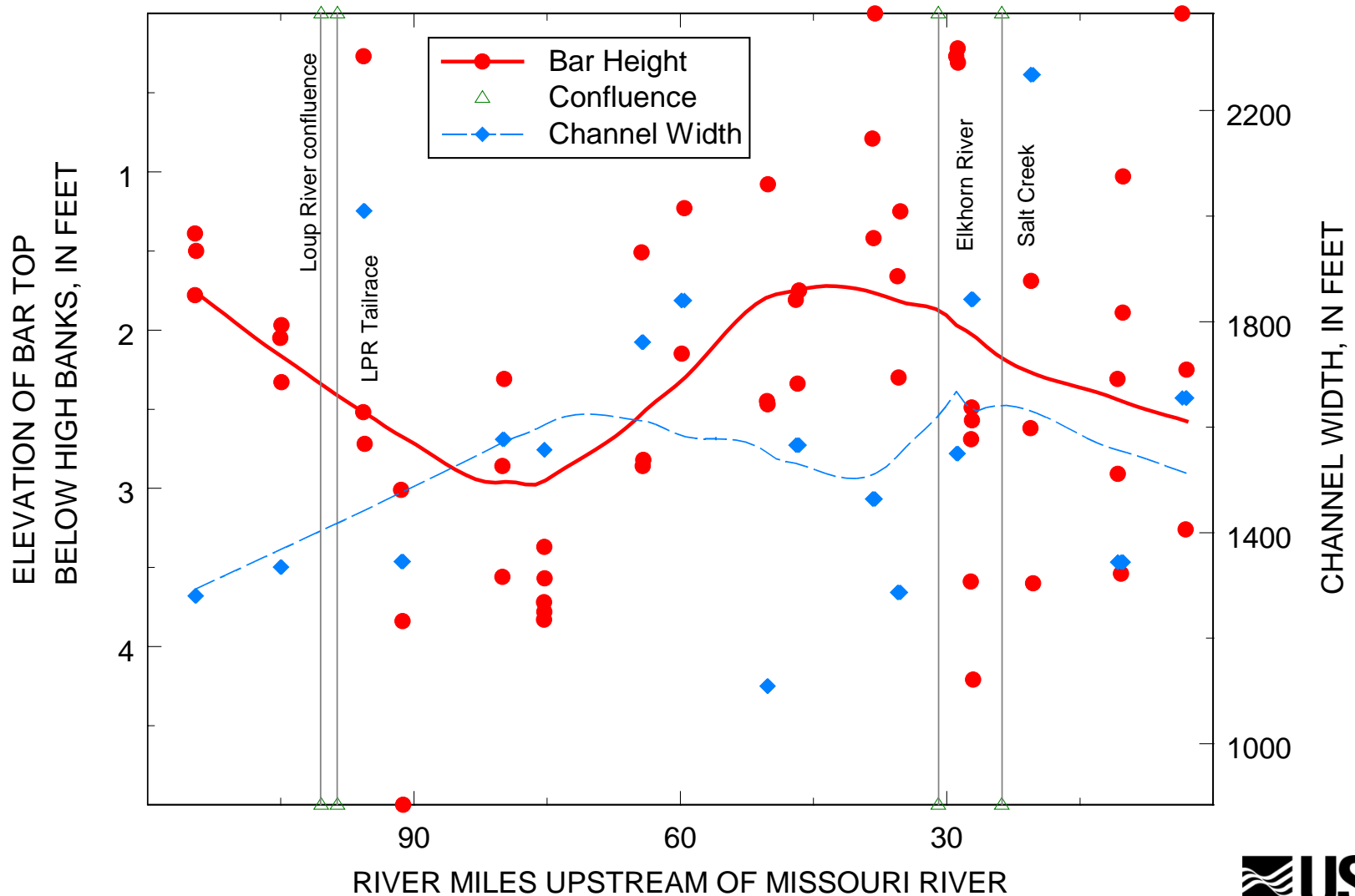
What are (some) important unknowns?

- Effects of geomorphic controls on bar geometry.
- Effects of sediment supply, hydrology, hydraulics on sandbar frequency and location.
- Effects of ice, hydrocycling, and low flows on bar persistence.
- Effects of previous geometries and locations of bars on bar formation, location, geometry and persistence.

Geomorphic Framework of Lower Platte River



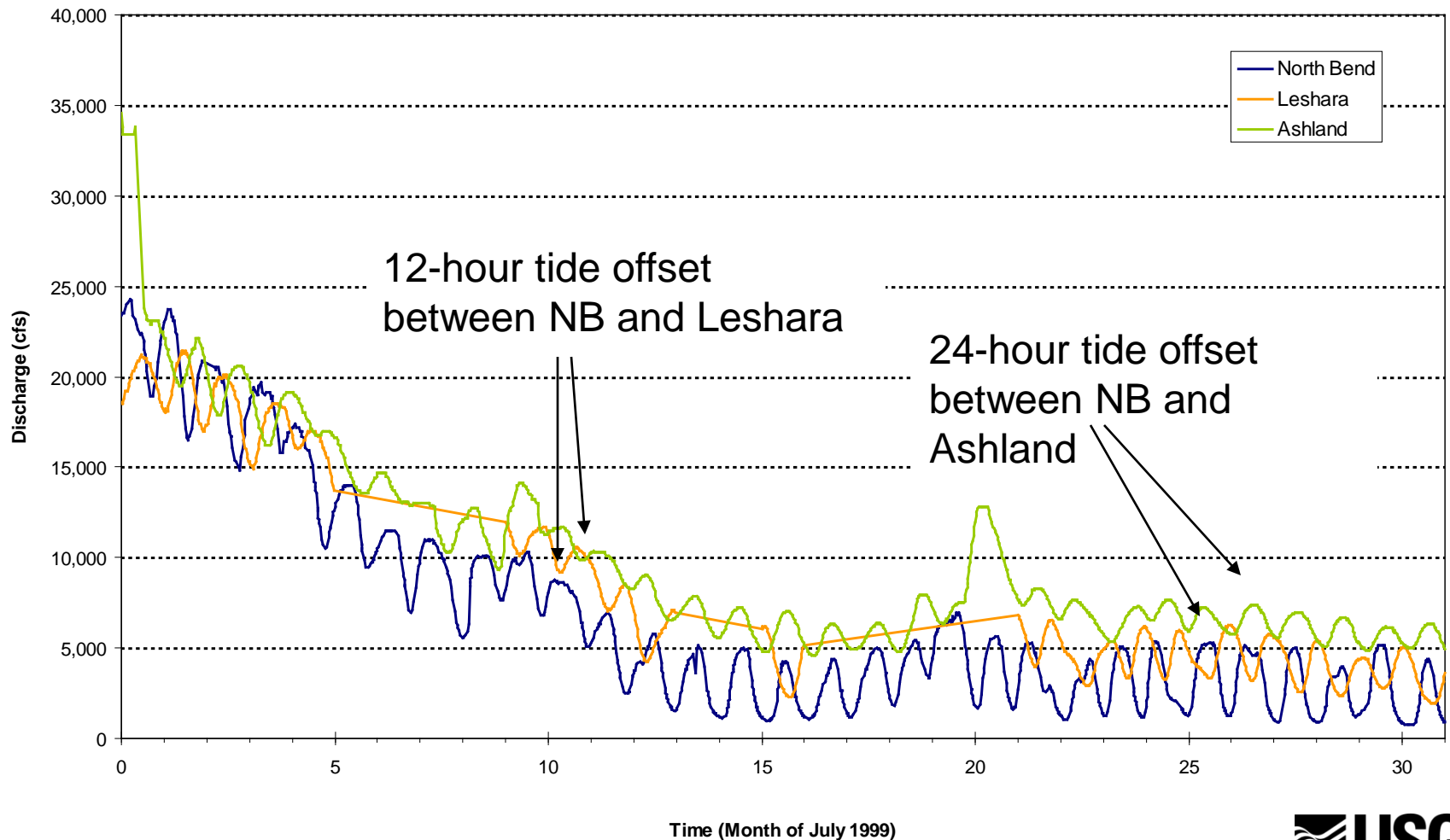
Bar Height Relative to Flow Frequency and Channel Width (PROVISIONAL)



Lower Platte River Hydrology- Hydrocycling

-24 miles from NB to Leshara

-20.5 miles from Leshara to Ashland



Study Questions

- 1. What controls the geometry (in particular height and area) of sandbars in the LPR?**
- 2. What controls the abundance and spatial distribution of sandbars?**
- 3. What controls the seasonal to sub-decadal persistence of sandbars?**

Annual Monitoring Framework (core)

- **Comprehensive sandbar survey 3 times annually..including sandbar number, height, area, percent vegetation cover (all bars over 0.5 acres).**
 - from Duncan to the Missouri River on the LPR;
 - Fullerton to Merchiston on the Loup River;
 - Waterloo to Hwy 275 on Elkhorn River.
- **Year-round remote camera monitoring of river stage and sandbar depositional and erosional processes at select reaches.**
- **Development of 1D hydraulic model to assist in refining resolution of annual bar surveys.**

Analysis Framework

Sandbar prediction variables (initial)

stage of annual flood

active channel width

DS channel expansion contraction ratio

daily hydrocycling amplitude (daily stage change)

vegetation cover

ice cover /stage

distance from sediment source

local channel slope

legacy sandbar location

legacy sandbar size

other hydrologic factors

sandbar response variables

sandbar height + area

sandbar persistence

sandbar abundance/ location

Proposed Products

- **Host of spatially and temporally robust dataset available for TPCP or other researchers.**
- **1D hydraulic model available for TPCP, other researchers, and general public.**
- **USGS Scientific Investigations Report documenting monitoring data and statistical analysis.**

CONTACT INFORMATION

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