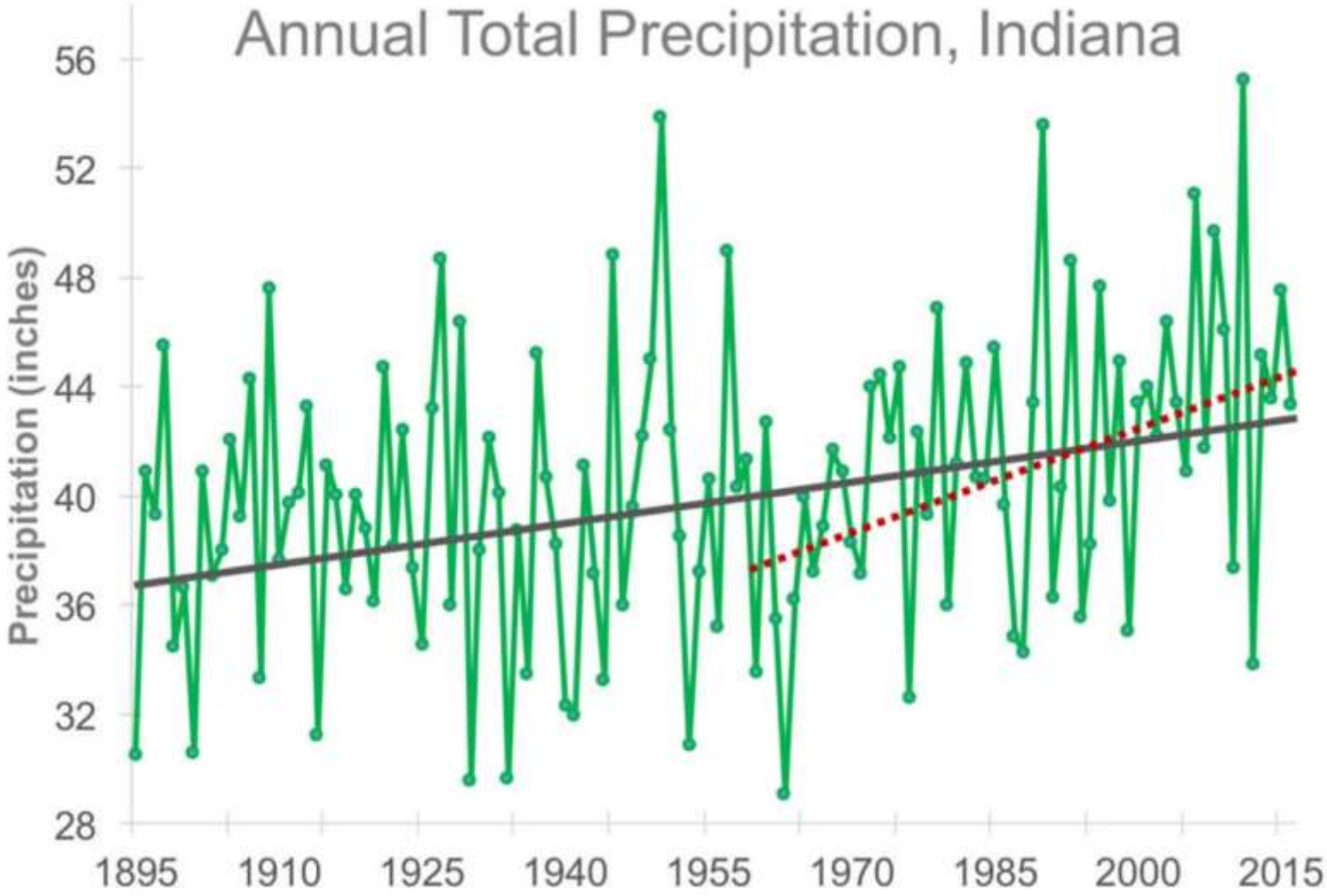
Understanding Floodplain Connectivity in Indiana

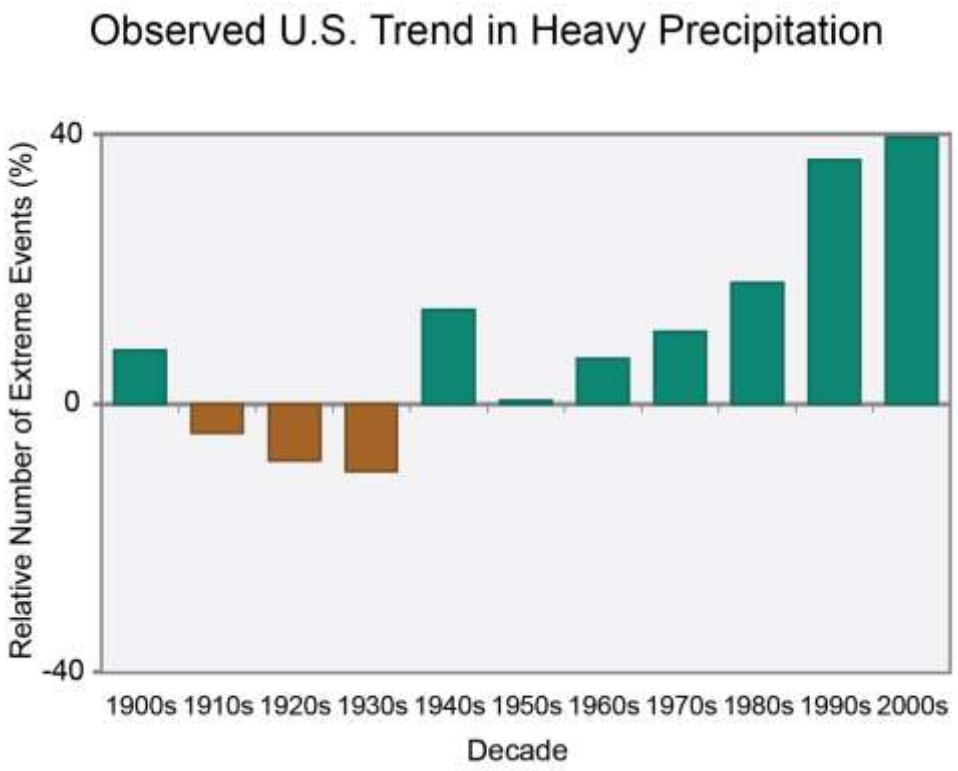
Robert Barr, Michael Dunn, Ian Hahus, Cassie Hauswald

National Stream Restoration Conference
Aug 21-23,2023



Source: Indiana's Past & Future Climate: A Report from the Indiana Climate Change Impacts Assessment. Purdue Climate Change Research Center, March 2018

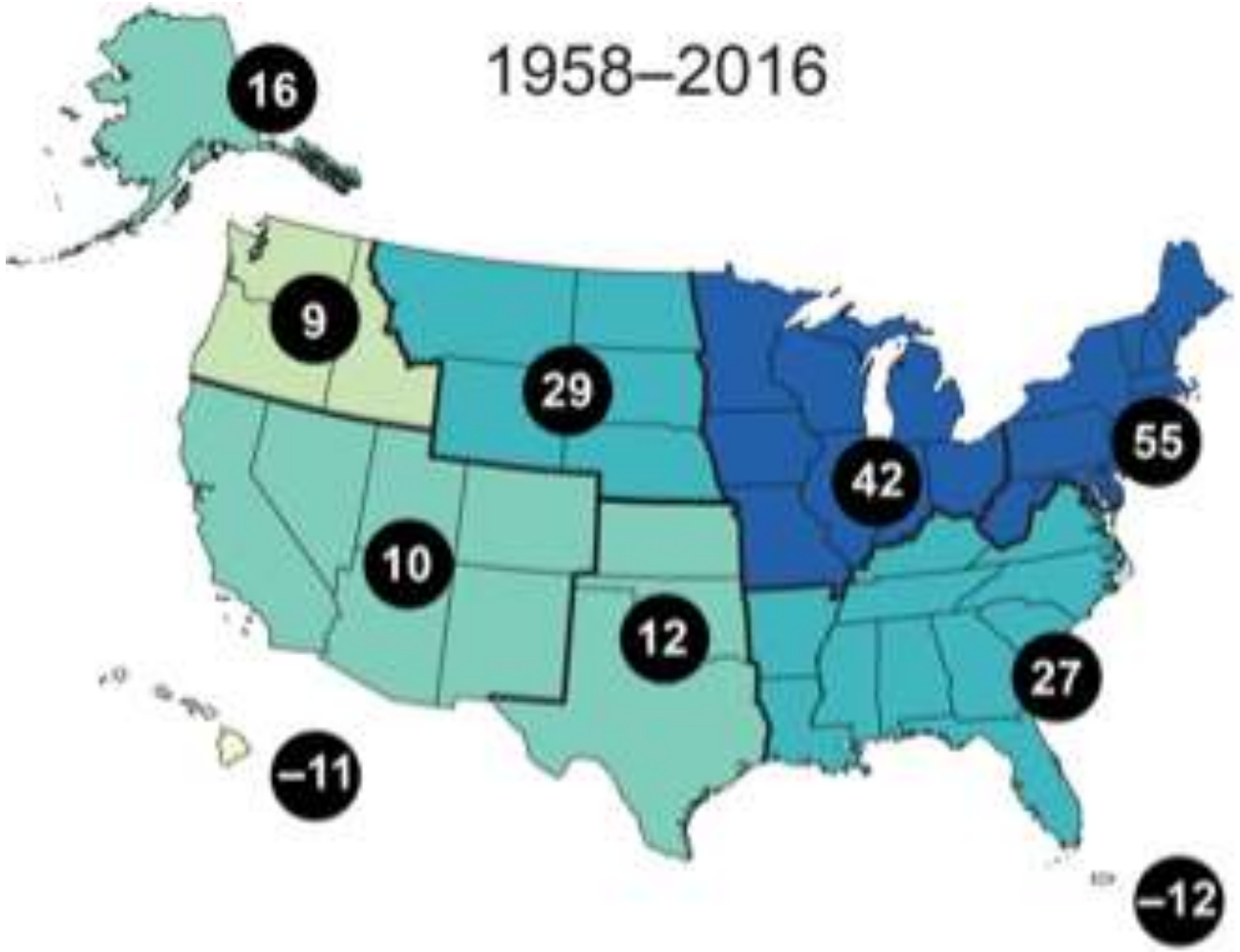
Observed Decadal Trend of Heavy Precipitation (2-day, 5-year RI) in Midwest (1901-2012 compared with 1901-1960)



Source: USGRP, 2014, Third National Climate Assessment (adapted from Kunkel et al. 2013)

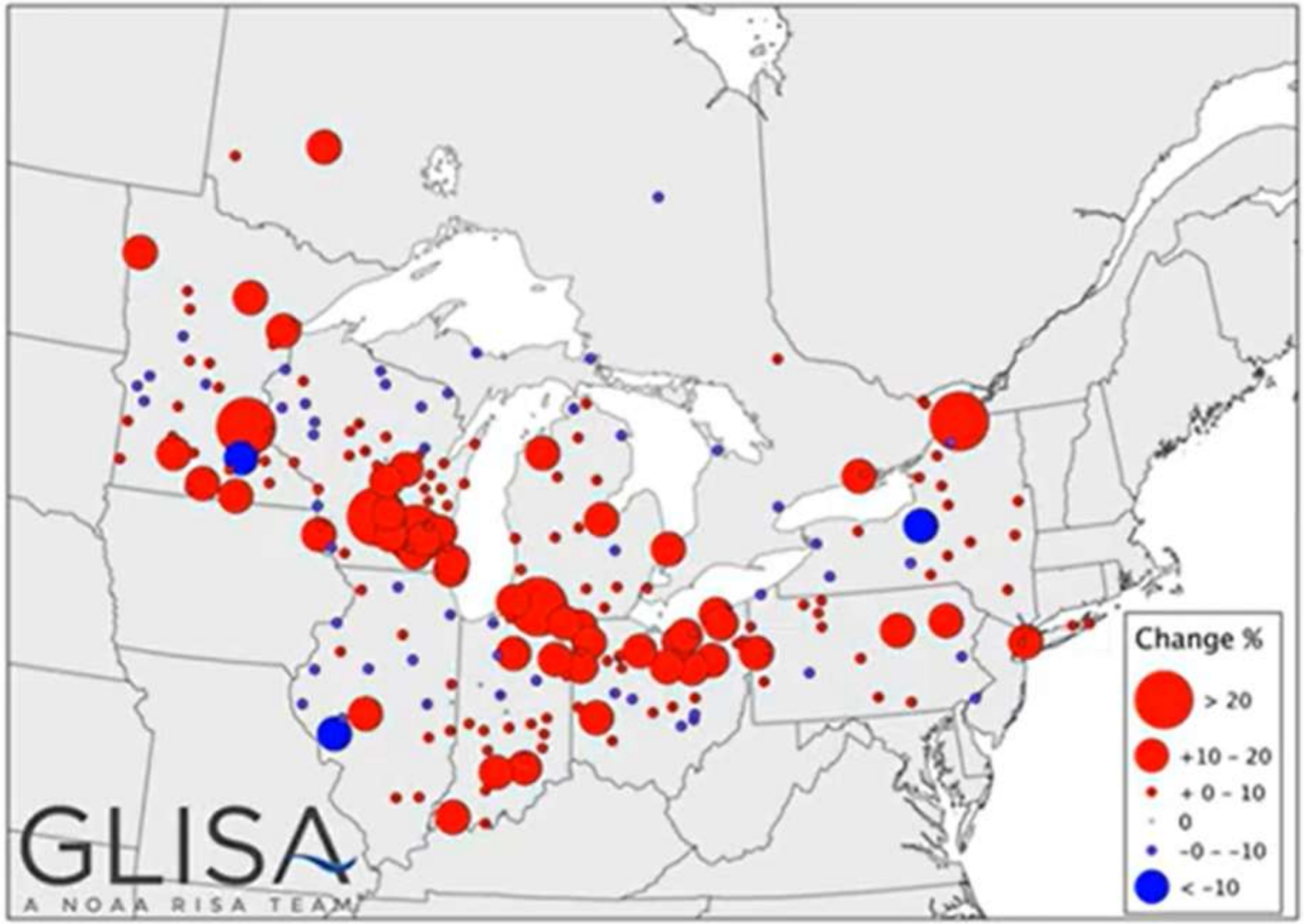
Observed % Change in Total Annual Precipitation Falling in the Heaviest 1% of Events (1958 – 2016)

τ



Source: USGRP, 2018, Fourth National Climate Assessment.

Observed Changes (%) in the Intensity of the 1% Heaviest Precipitation Days
(1951-1980 vs. 1981-2010)



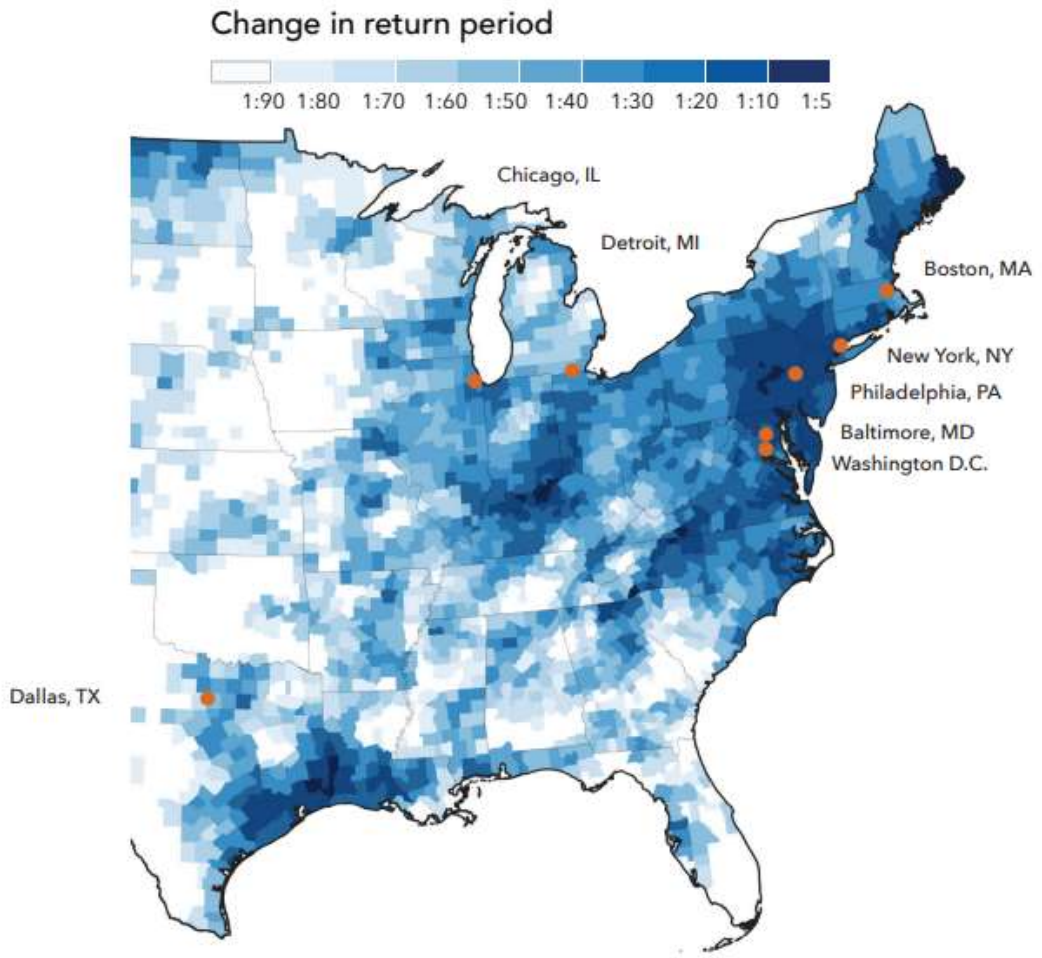


Figure 5: Major cities at more frequent risk of severe flooding compared to NOAA Atlas 14 100 year estimates

Source: June 2023 First Street Foundation 8th National Risk Assessment

Table 2: Counties and population at risk by increased frequency of current 1-in-100-year flood event (FSF-PM vs. Atlas 14 comparison)

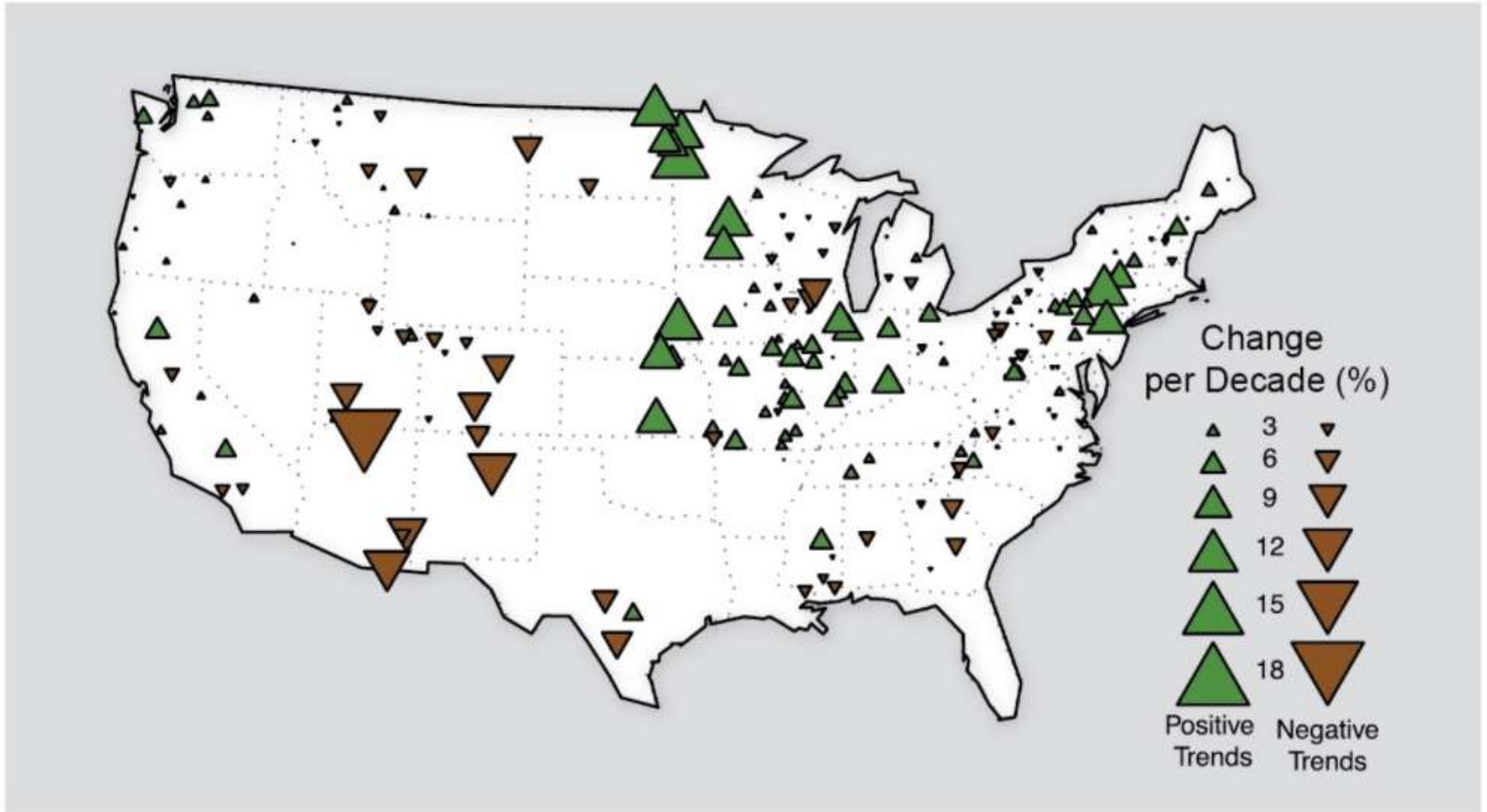
1 in 100 is (times more likely)	# of counties impacted	Population impacted (millions)	Percent of counties impacted (%)	Percent of popualtion impacted (%)
1 in 50 year or lower (+200%)	1128	167.2	36.3%	51.1%
1 in 25 year or lower (+400%)	367	69.8	11.8%	21.3%
1 in 20 year or lower (+500%)	221	43.6	7.1%	13.3%
1 in 15 year or lower (+667%)	95	22.4	3.1%	6.8%
1 in 10 year or lower (+1,000%)	20	1.3	0.6%	0.4%
Total US	3107	327.5		

Table 3: Selected highly populated cities impacted by Atlas 14 to FSF-PM corrections

City	Atlas 14	Corrected for today	30 year correction
Baltimore, Maryland	1 in 100	1 in 14 (+614%)	1 in 12 (+733%)
Dallas, Texas	1 in 100	1 in 21 (+376%)	1 in 18 (+456%)
Washington, D.C.	1 in 100	1 in 21 (+376%)	1 in 19 (+426%)
New York City, New York	1 in 100	1 in 23 (+335%)	1 in 19 (+426%)
Philadelphia, Pennsylvania	1 in 100	1 in 29 (+245%)	1 in 20 (+400%)
Chicago, Illinois	1 in 100	1 in 29 (+245%)	1 in 26 (+285%)
Detroit, Michigan	1 in 100	1 in 34 (+194%)	1 in 16 (+525%)
Boston, Massachusetts	1 in 100	1 in 37 (+170%)	1 in 33 (+203%)

Atlas 14 100-year Rainfall is More Like a 30-year Rainfall!
(i.e., the More Accurate 100-year Rainfall is ~ 25% Higher!)

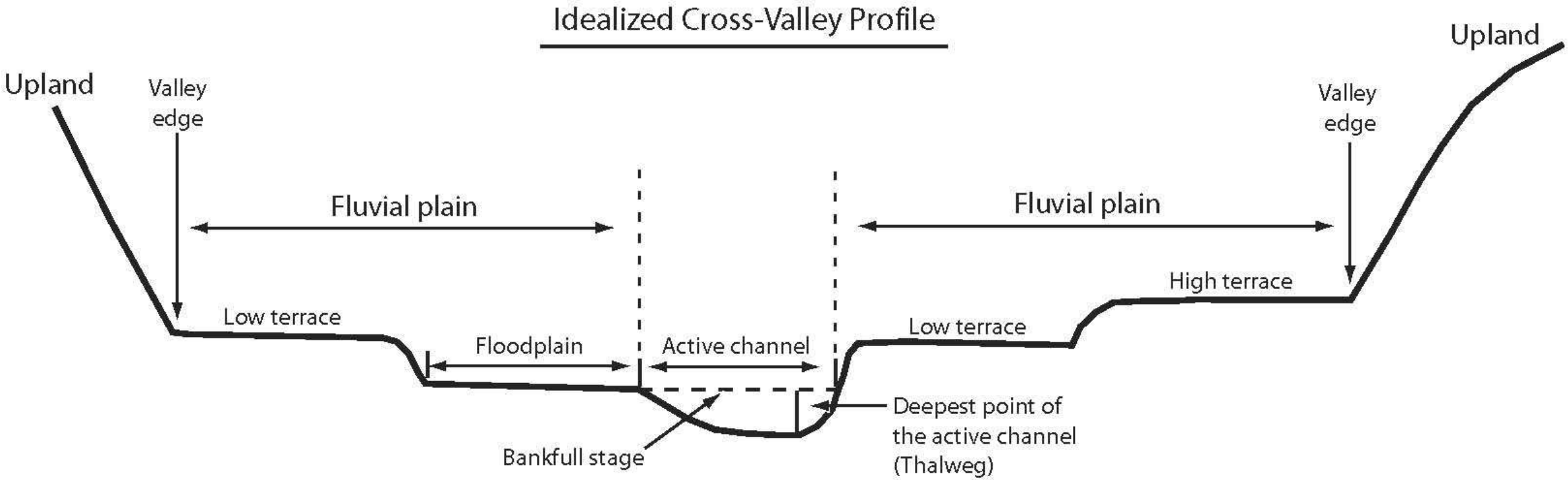
Trends in Flood Magnitude



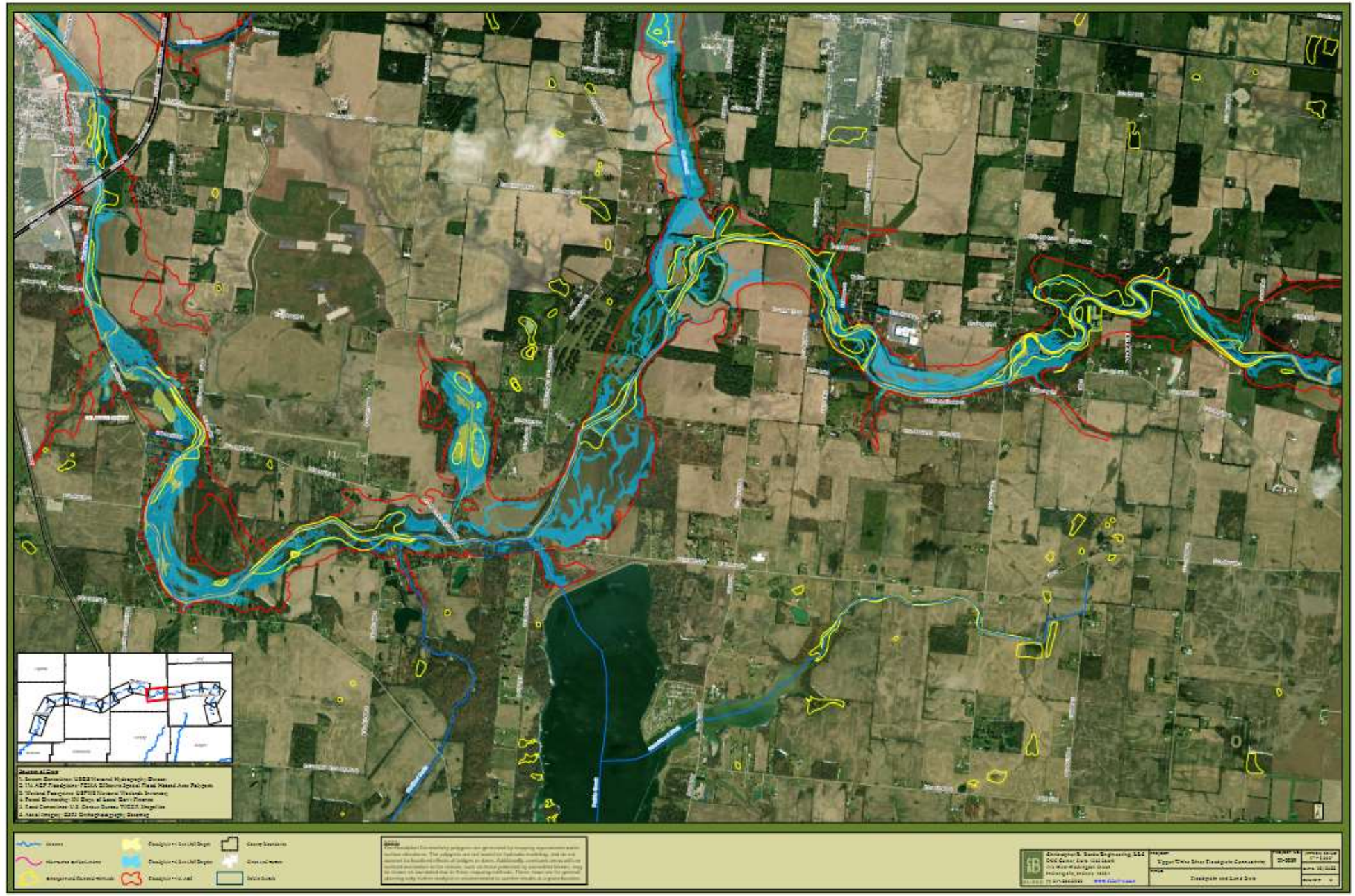
nca2014.globalchange.gov

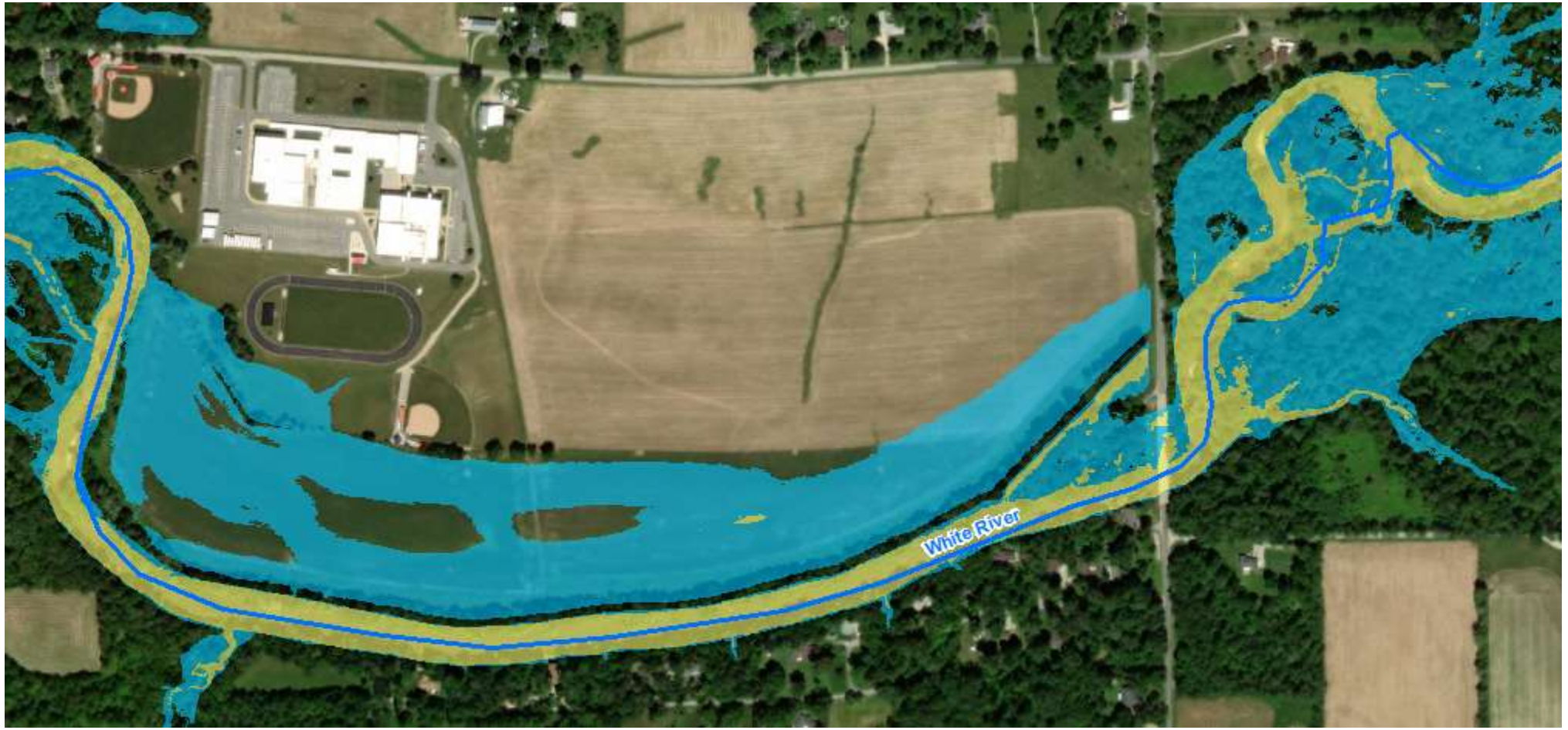
West Fork Indian Creek, Switzerland County, IN 2022

Elkhart River at Goshen, Indiana 2018 (The Goshen News)



B. A. Robinson, USGS, 2012

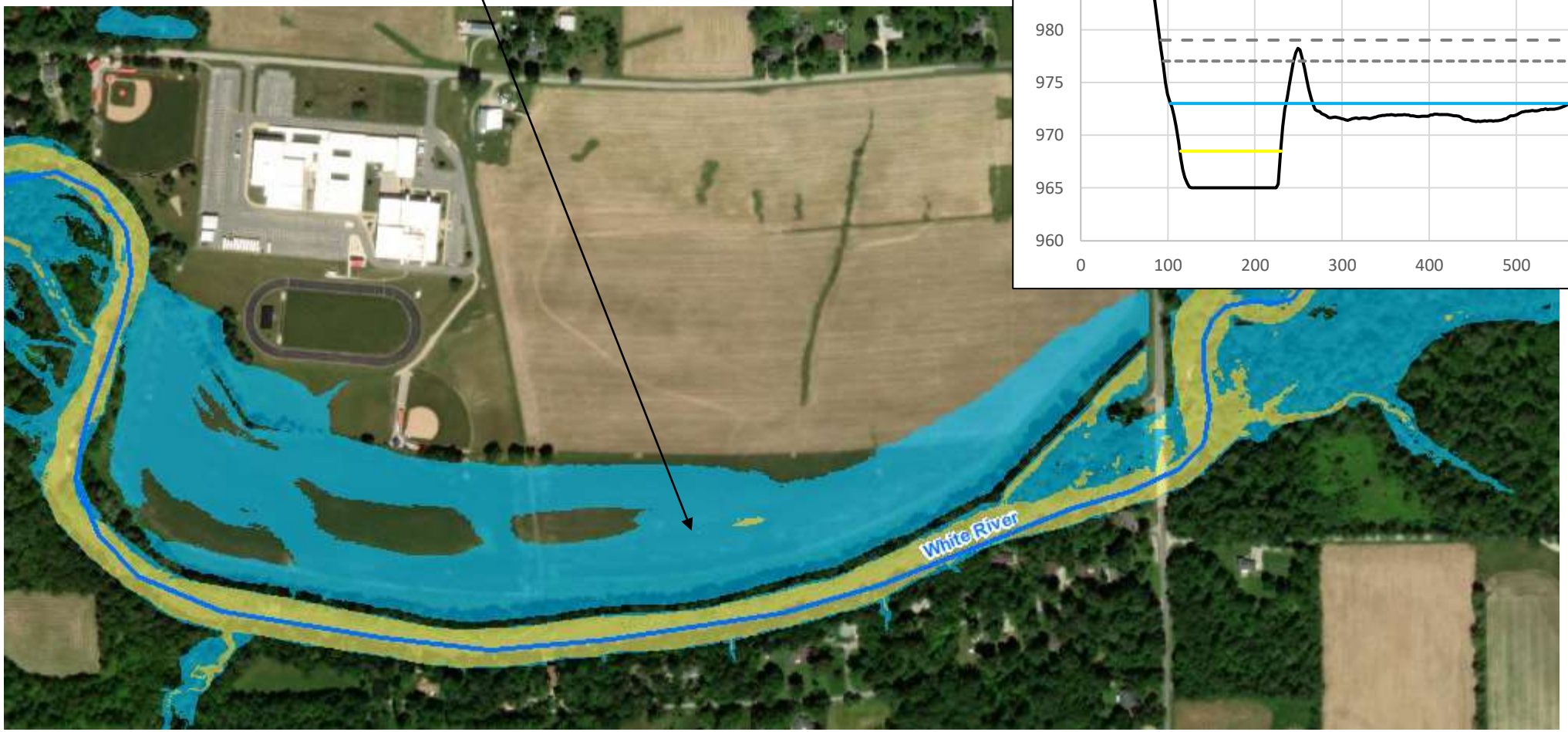


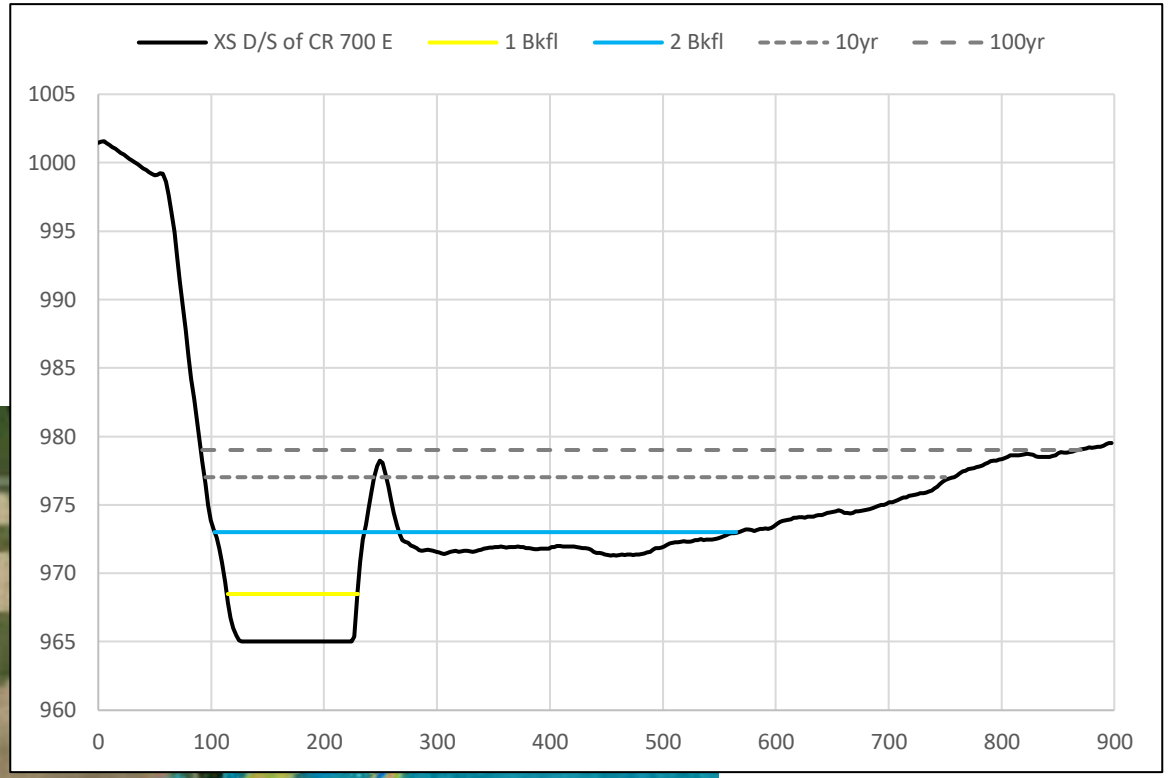


Floodplain Connectivity Mapping, White River, Delaware County

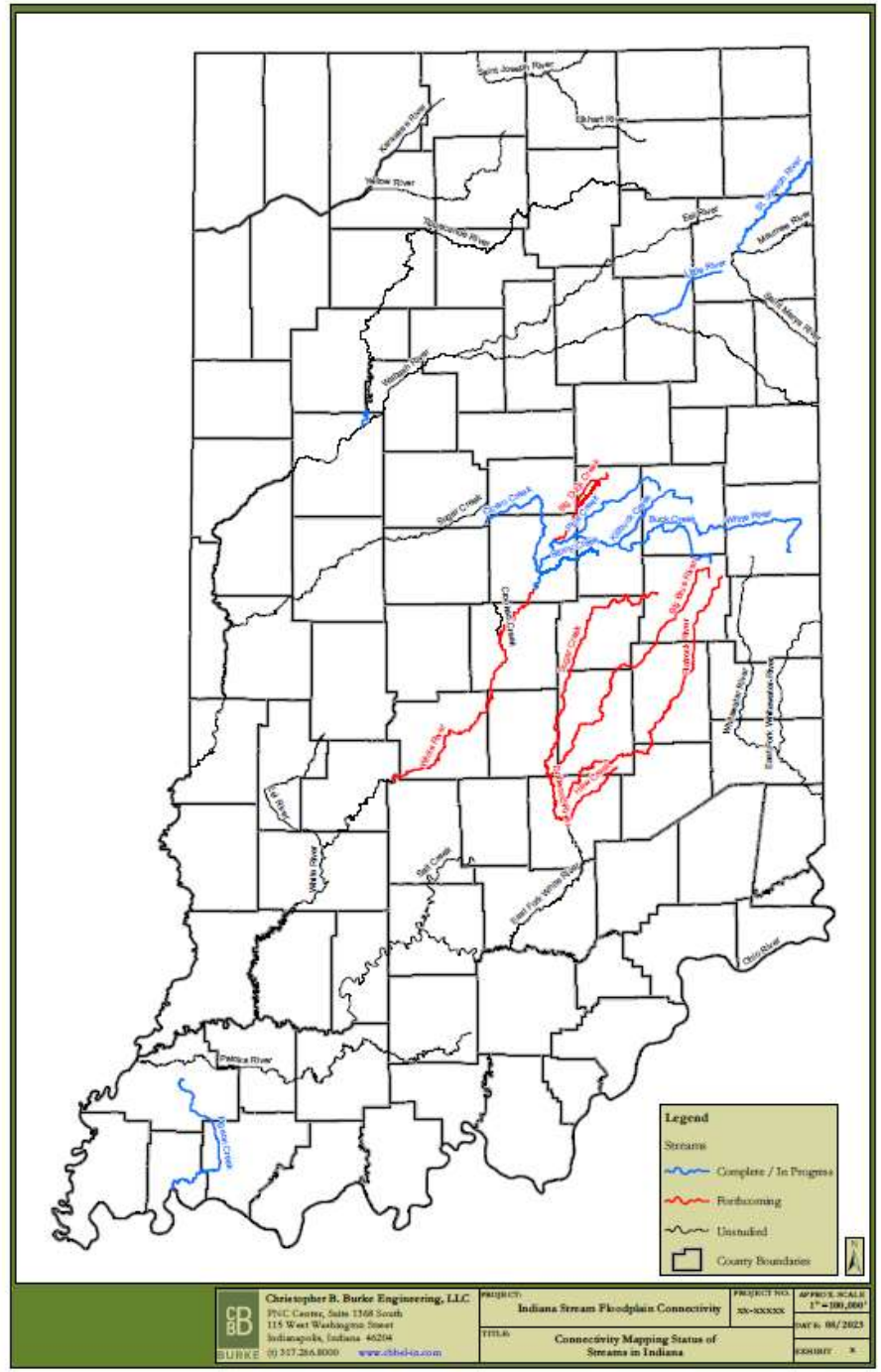
I. Hahus, Burke

XS Location

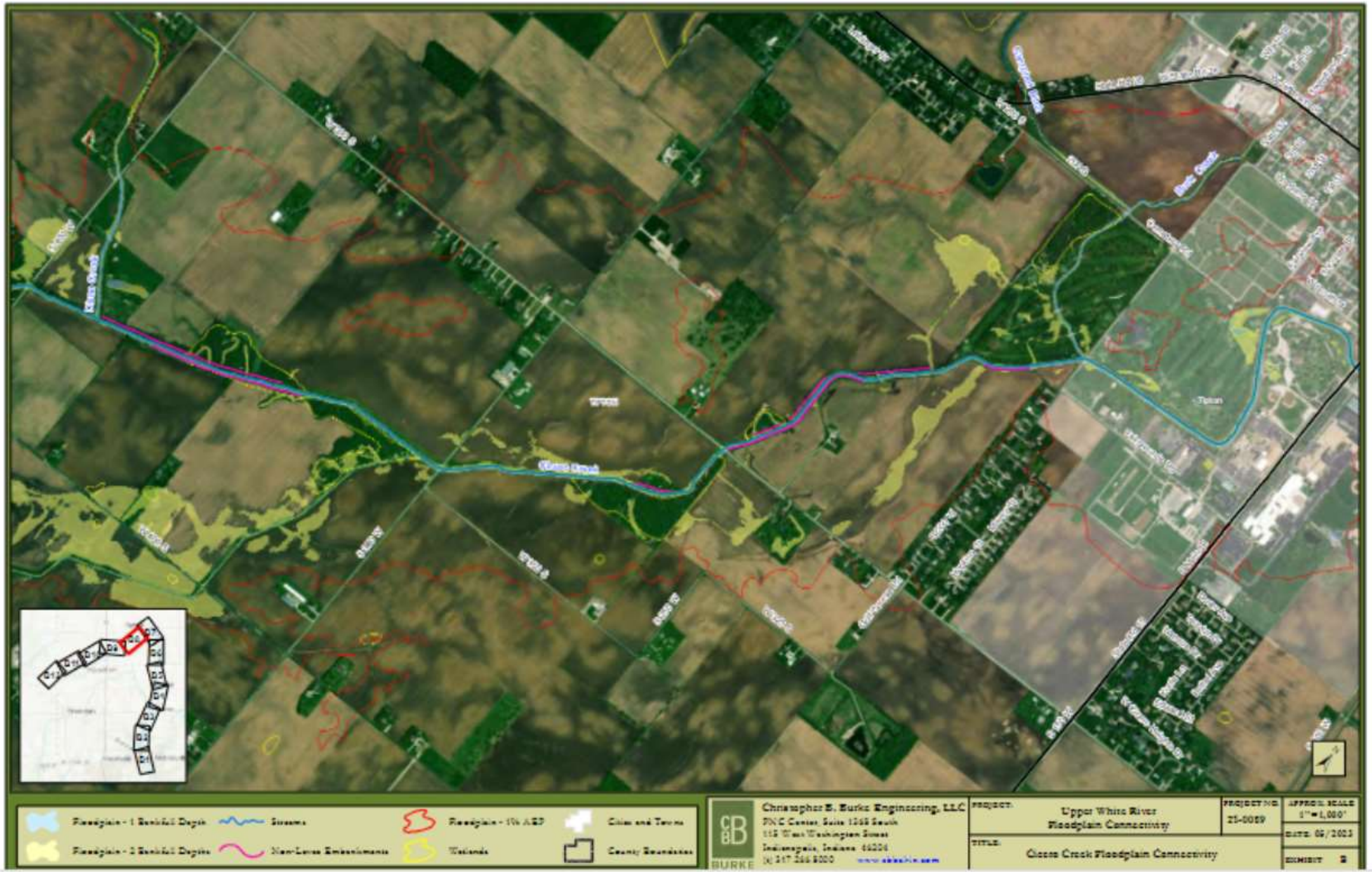




Hahus, 2023



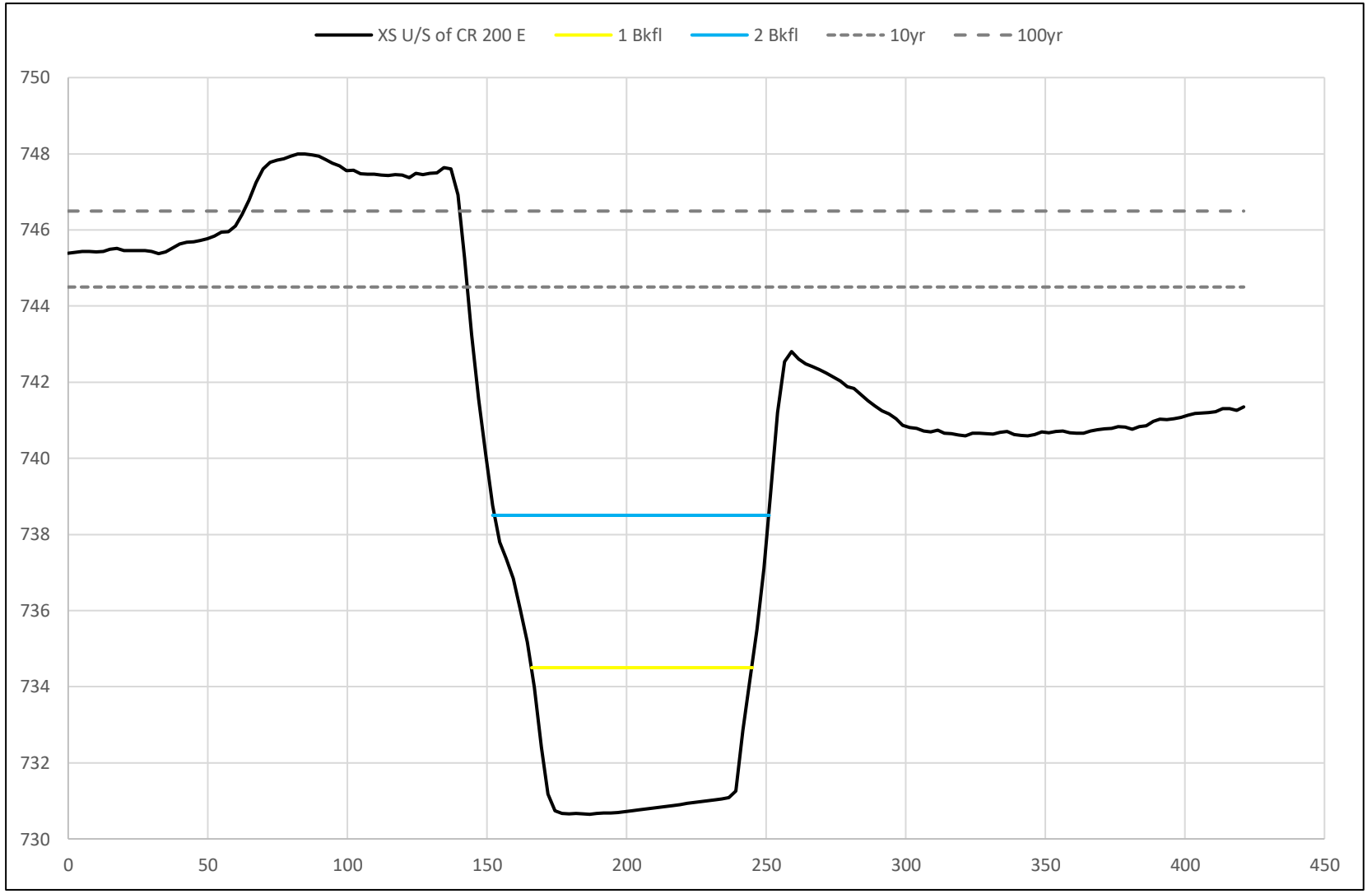
Status of Connectivity Mapping


Floodplain - 1 Foot Fall Depth
Floodplain - 2 Foot Fall Depth
Streams
Non-Levee Embankments
Floodplain - 1% ANN
Wetlands
Cities and Towns
County Boundaries
Christopher B. Burke Engineering, LLC
PROJECT:
Upper White River
Floodplain Connectivity
PROJECT NO.
TITLE:
Cicero Creek Floodplain Connectivity
APPROX. SCALE
1" = 1,000'
DATE:
EXHIBIT

Tipton, IN

April 19, 2013

Little River, Huntington County, IN



Little River at CR 200 E

Hahus, 2023

QUESTIONS?

Ian Hahus, PhD, PE, CFM
Water Resources Engineer
(he/him)
Christopher B. Burke
Engineering, LLC
317.266.8000 o | 812.619.0495
c | cbbel-in.com
ihahus@cbbel-in.com

Robert Barr

Research Scientist

Center for Earth and Environmental Science

Department of Earth Sciences
IUPUI
317.278.6911 (office)
317.332.5463 (mobile)

e-mail: rcbarr@iu.edu