

# Illinois River Instream Flow Pilot Study Public/Stakeholder Meeting

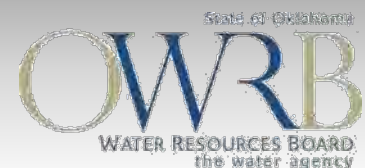
*January 21, 2016*

*Municipal Armory*

*Tahlequah, Oklahoma*



US Army Corps  
of Engineers.



# Housekeeping items



# Agenda for Tonight's Discussion

## Welcome and Introductions

*Derek Smithee, Division Chief, OWRB*

## Recap of January 2015 Public/Stakeholder Meeting

*John Rehring, Carollo Engineers*

## Technical Presentation: "Updates on the Illinois River Instream Flow Pilot Study and Next Steps"

*Forrest Olson, CH2M*

## Public comment / Questions and Answers

## Next steps

# OCWP “Big 8” Priority Recommendations



Infrastructure Financing



Conservation, Reuse, Recycling



Monitoring



Supply Reliability



Instream Flows



Excess/Surplus



State/Tribal Resolution



Regional Planning





# ISF Advisory Group: Process for Assessing Instream Flow

<b>J.D. Strong (Chair)</b> • OWRB	<b>Tom Creider</b> • Oklahoma State Parks	<b>Mark Derichsweiler</b> • ODEQ	<b>Tom Elkins</b> • Cherokee Nation
<b>Mike Fuhr</b> • The Nature Conservancy	<b>James Gammill</b> • Oklahoma Rural Water Association	<b>Bud Ground</b> • Public Service Company of Oklahoma	<b>Charlette Hearne</b> • ORWP
<b>Arnella Karges</b> • State Chamber of Oklahoma	<b>Michael Kelsey</b> • Okla. Cattlemen's Association	<b>Mike Mathis</b> • Continental Resources	<b>Diane Pedicord</b> • Okla. Municipal League
<b>Maria Peek</b> • Oklahoma Farm Bureau	<b>Tyler Powell</b> • Office of the Sec. of Energy & Environment	<b>Marsha Slaughter</b> • OKC Water Utilities Trust	<b>Kevin Stubbs</b> • US Fish & Wildlife Service
<b>Jeff Tompkins</b> • Bureau of Reclamation	<b>Brooks Trammell</b> • Okla. Conservation Comm.	<b>Brian Woodard</b> • OK Independent Petroleum Assoc.	<b>Support</b> • OWRB Staff • CH2M Hill • Carollo Engineers

✓ Address the legal and policy questions.

✓ Study other mechanisms for protecting instream flows.

? Develop a draft methodology for instream flow studies in Oklahoma.

? Conduct a study on the economic impacts of instream flows in Oklahoma.

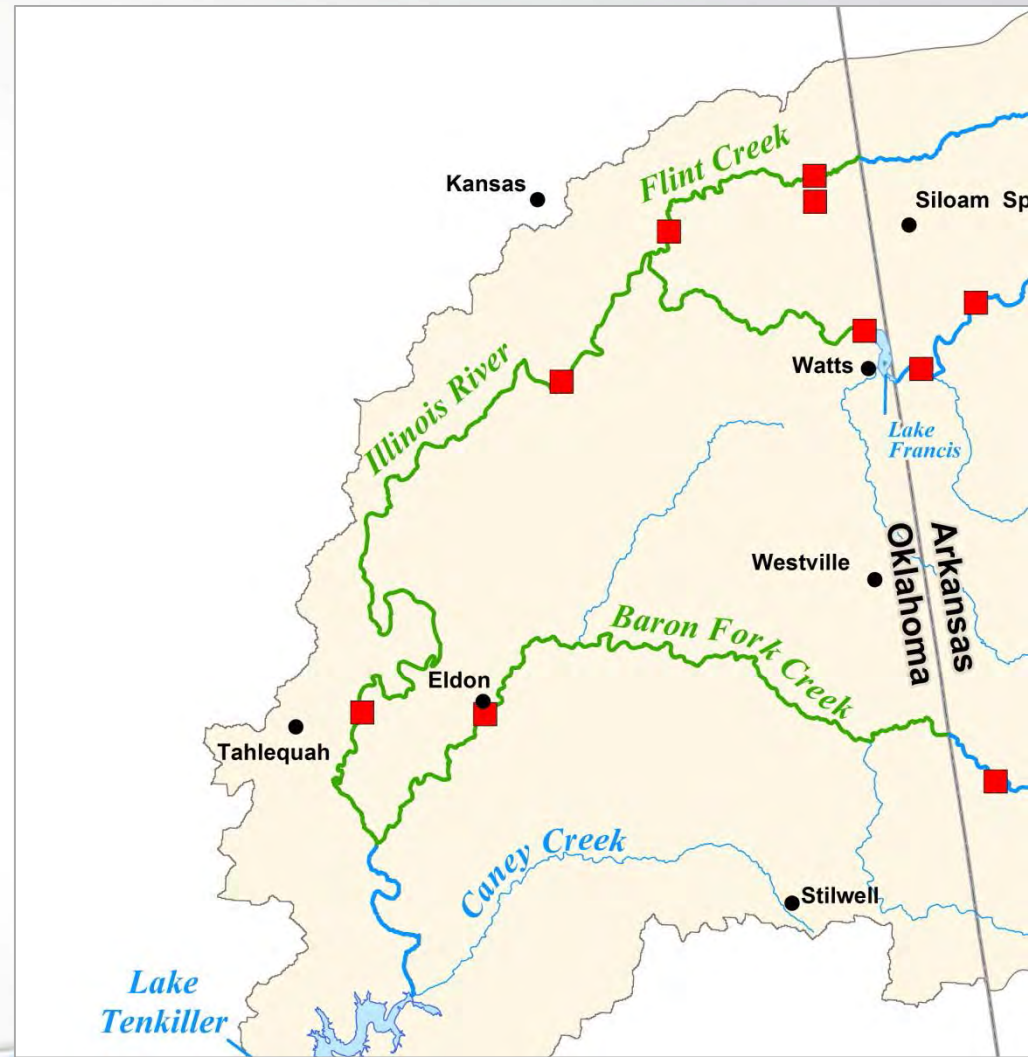
5. Perform an instream flow pilot study in a scenic river.

✓ Preserve the Instream Flow Workgroup.

Illinois River  
Instream Flow  
Pilot Study

# Focus of Tonight's Discussion

- **Instream (or environmental) flows** are those necessary to provide for a **healthy ecosystem** and support **water-related recreation** (such as fishing, hunting, swimming, and boating) as well as **tourism**.



# Goals for Tonight's Meeting

Recap feedback  
from 2015  
public meeting

Learn about  
Illinois River  
resource values

Learn about  
2015 Instream  
Flow fieldwork

Ask questions  
and look ahead  
to next steps

# Keeping in Touch

[www.owrb.ok.gov/ISF](http://www.owrb.ok.gov/ISF)



Provide E-mail address on Sign-in Sheet

Derek.Smithee@owrb.ok.gov



**Derek Smithee**  
**(405) 530-8800**



# Examples of feedback shared at the first ISF Pilot Study stakeholder meeting (1/22/15)

## Suggested Considerations

- Instream Recreation (boating, rafting)
- Related Recreation (hunting, camping, birding)
- Wetlands and Oxbows
- Stream/groundwater interactions
- Flow patterns
- Variability beyond historical data
- Potential maximum flows
- Cherokee Nation involvement
- Summer critical low-flows
- Changing erosion and channel dynamics
- Impact of recreation on landowners
- Tenkiller allocation impacts
- Interstate Compact conflicts

- Questions about the field work?
- Questions about the technical studies and how that fits into the overall Instream Flow Pilot Study?
- Discussion of other river/stream uses on the Upper Illinois River and tributaries above Tenkiller
- Any other Instream flow questions?

[www.owrb.ok.gov/ISF](http://www.owrb.ok.gov/ISF)



Provide E-mail address on Sign-in Sheet

Derek.Smithee@owrb.ok.gov



**Derek Smithee**  
**(405) 530-8800**

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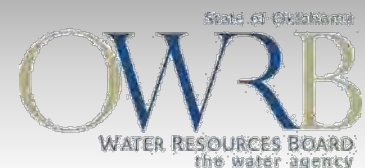
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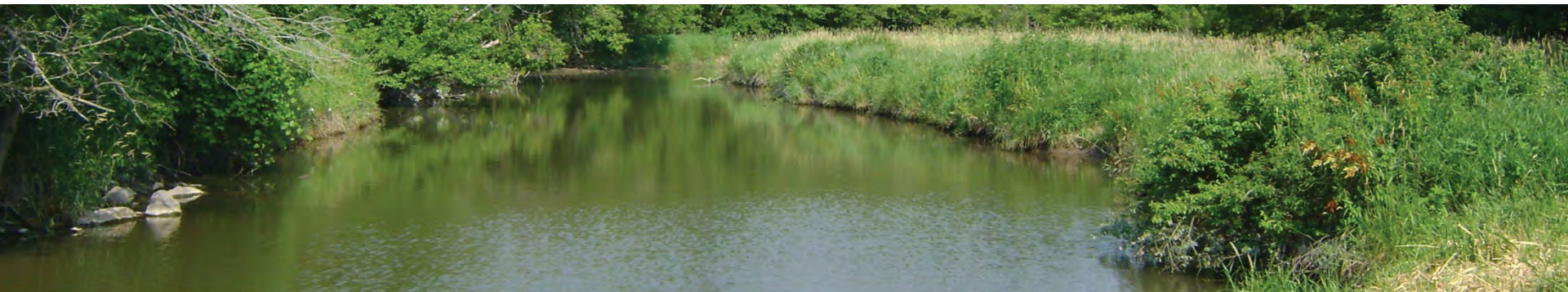


# Instream Flow Assessment of the Illinois River, OK Study Update and Next Steps

Presented to  
Public Stakeholder Meeting in Tahlequah, OK

Presented by  
Forrest Olson, CH2M HILL

January 21, 2016



US Army Corps  
of Engineers



ch2m.

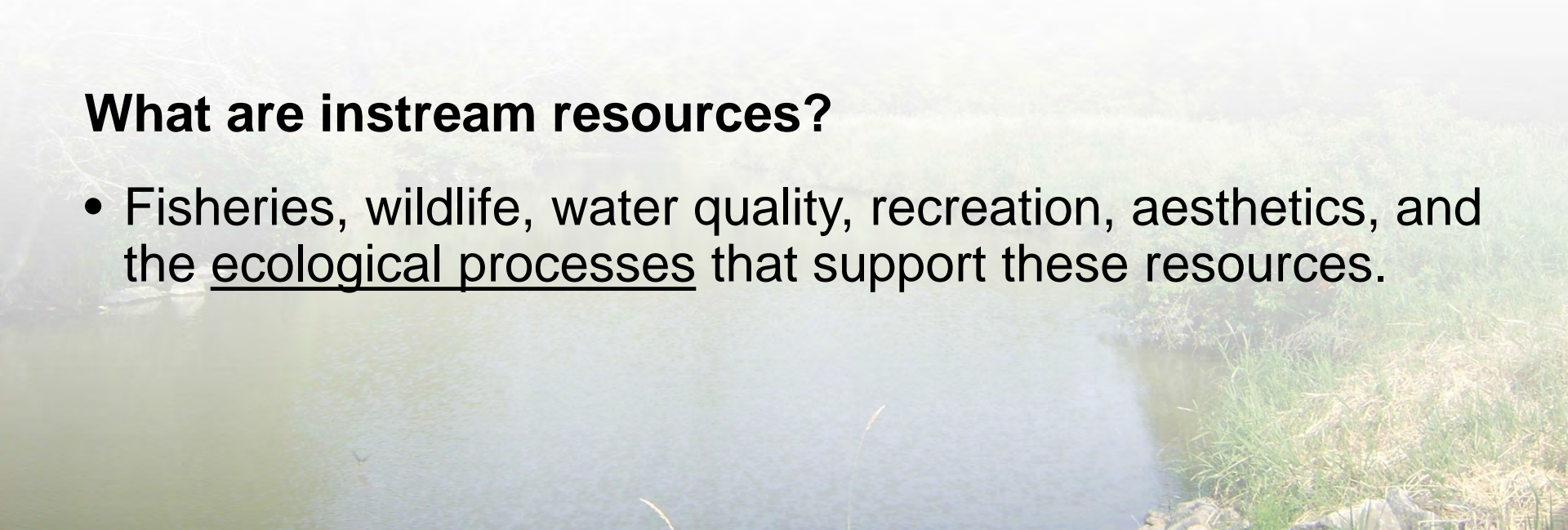
# What is an instream flow?

## **OWRB working definition of instream flow:**

“Flows necessary to provide for a healthy ecosystem and support water-related recreation (such as fishing, hunting, swimming and boating) as well as tourism.”

## **What are instream resources?**

- Fisheries, wildlife, water quality, recreation, aesthetics, and the ecological processes that support these resources.

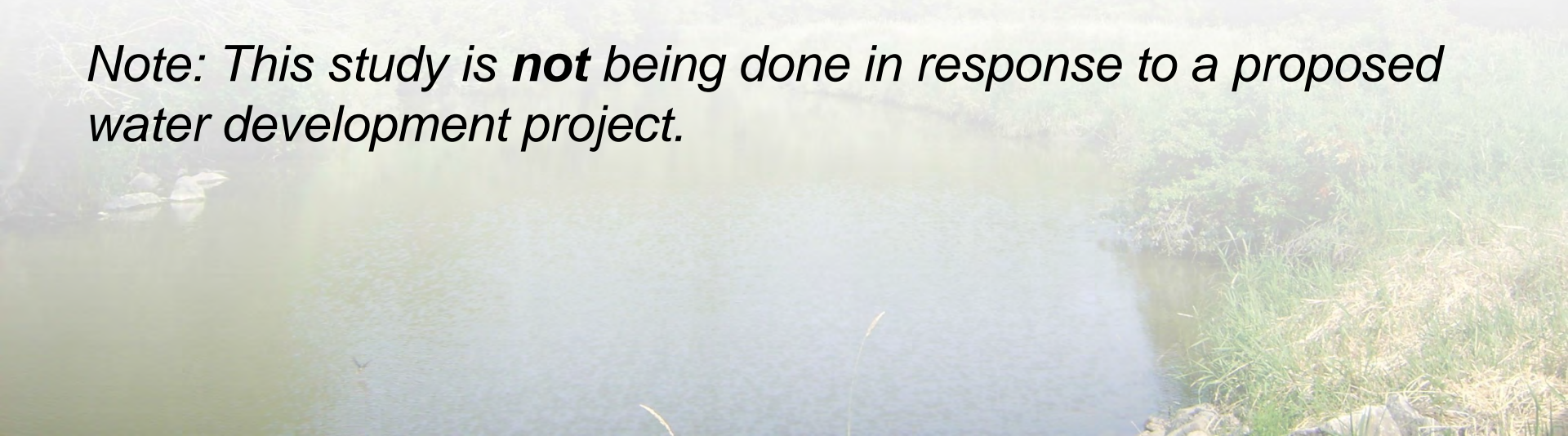




# Primary Study Goals:

- Gain a better understanding of the implications of a process to deal with instream flow issues consistent with the overall goal of managing water resources in Oklahoma for multiple uses. The study would help define a conceptual framework and study process that could be used statewide.
- Develop seasonal instream flow recommendations for the Illinois River including Barren Fork and Flint creeks.

*Note: This study is **not** being done in response to a proposed water development project.*

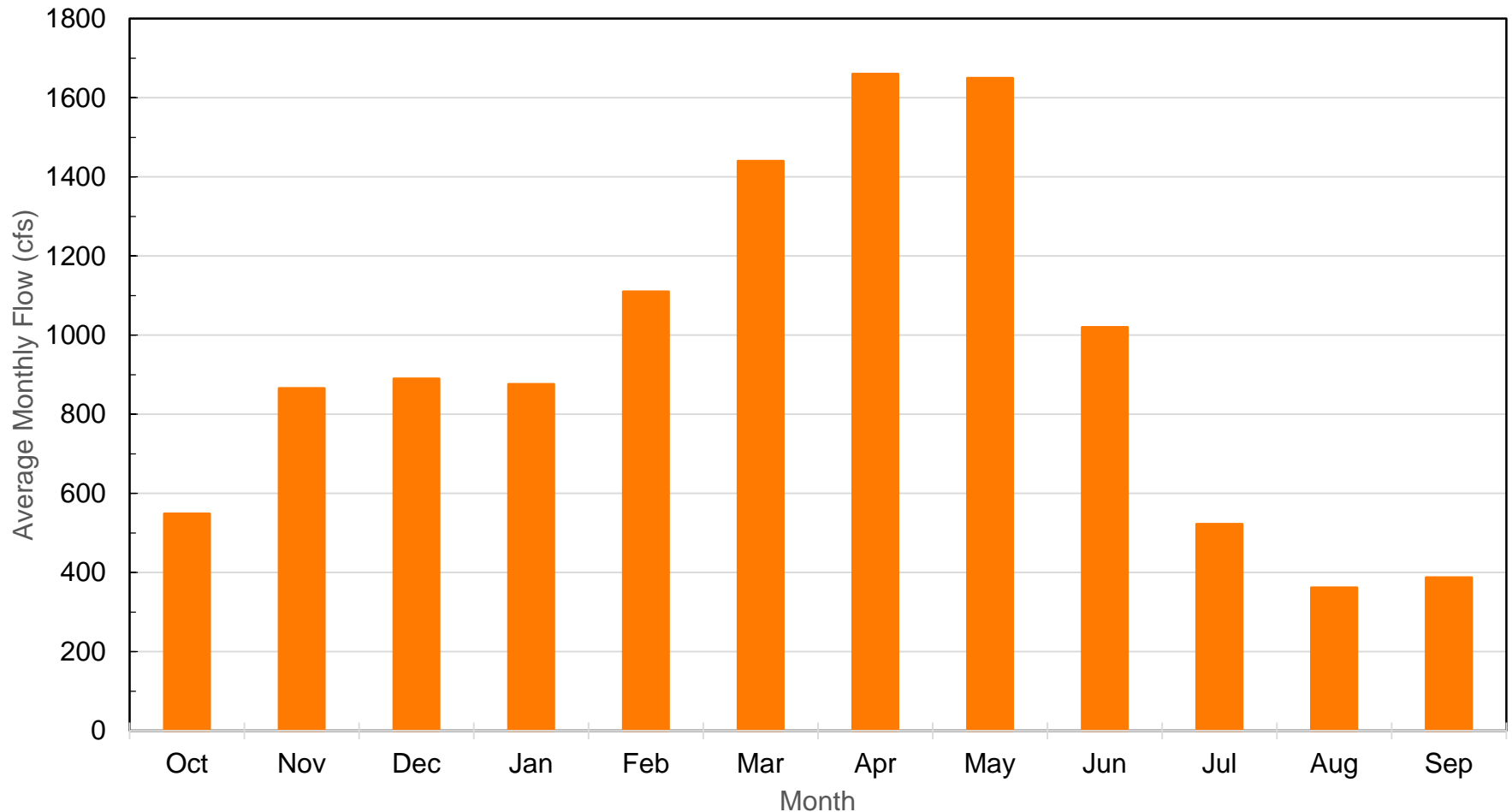


# Study Area



# Illinois River Average Monthly Flows

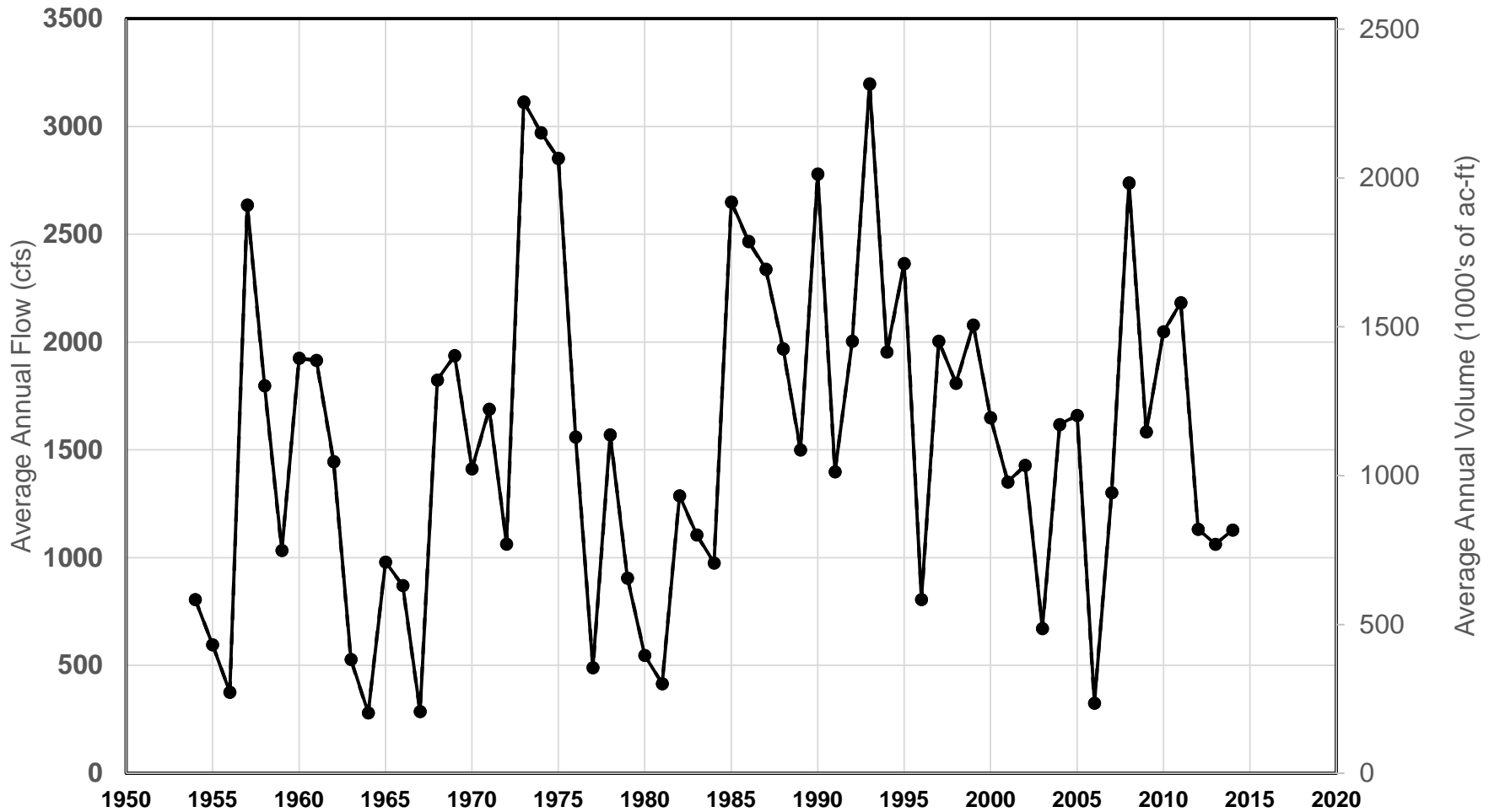
Illinois River near Tahlequah (gage 07196500)





# Average Annual Flows for the Illinois River near Gore

Average Annual Flow (cfs) and Volume (1000's of ac-ft)



# Illinois River December 27, 2015





# Peak Flow Recurrence Intervals

Peak Flow Return Period (Year)	Probability (%)	Flow (cfs)		
		Illinois River near Tahlequah	Illinois River near Watts	Barren Fork at Eldon
2	50	19,535	18,868	16,250
5	20	38,289	33,947	29,836
10	10	53,919	45,185	37,328
25	4	77,173	60,390	44,675
50	2	96,925	72,233	48,789
100	1	118,643	84,362	51,962

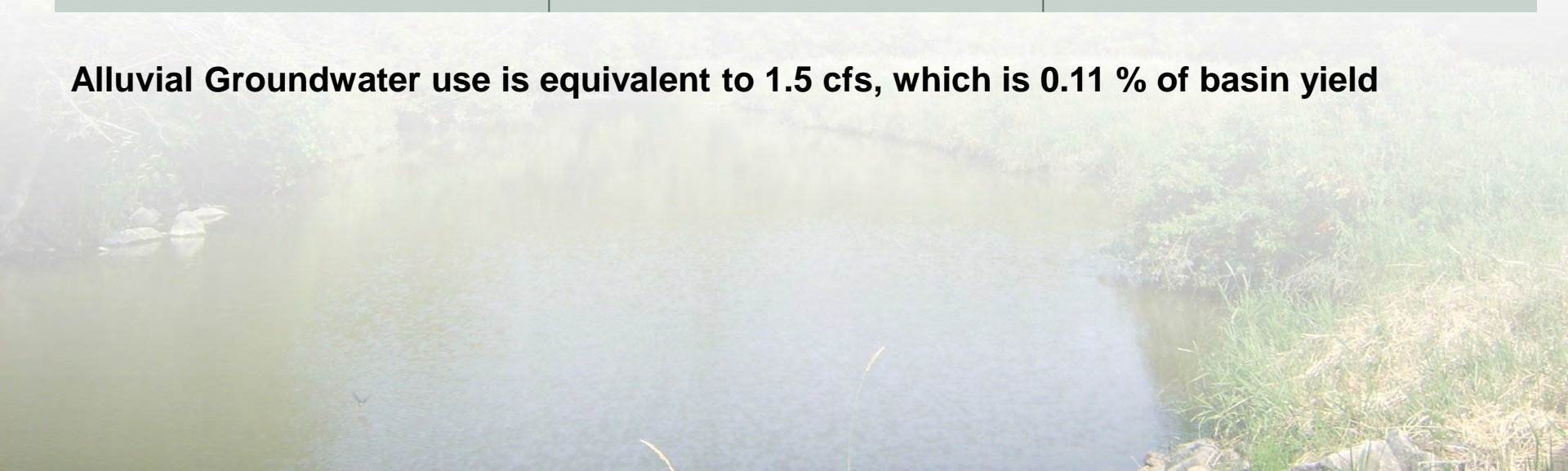
# Average Annual Surface Water Usage (acre-feet) in the Upper Illinois River Basin (OK) above and including Barren Fork

Water Use	Total
Irrigation	1,301.4
Agriculture	0
Public Supply	10,751.4
Rec, Fish, & Wildlife	0
Commercial	0
Industrial	0
Mining	0
Other	35.1
<b>Total</b>	<b>12,087.9</b>

# Groundwater Usage

Deep Bedrock Aquifer	3,900 acre-feet (water right)	Little effect on streamflows
Shallow Alluvial Aquifer	1,050 acre feet (est. usage)	Direct but delayed effect on stream

**Alluvial Groundwater use is equivalent to 1.5 cfs, which is 0.11 % of basin yield**



# Water Use Summary:

1. Surface water use in Oklahoma portion of Illinois River above Barren Fork is only 1.3 % of the average annual basin yield
2. Most water use is for public supply – mostly Tahlequah
3. Basin water use in Arkansas is similar to Oklahoma in quantity and use category
4. White River water for Fayetteville area municipal use augments flows in Illinois River
5. Flow augmentation from White River may totally offset other surface water withdrawals in both states on annual average basis
6. Ground water use has minimal effect on streamflows



# Water Quality

- Basin's major water quality concern is nutrient loading, primarily phosphorus
- Phosphorus affects the Illinois River and Lake Tenkiller
- Phosphorus loading is trending downward in Illinois River and Barren Fork Creek, not in Flint Creek





# Fisheries

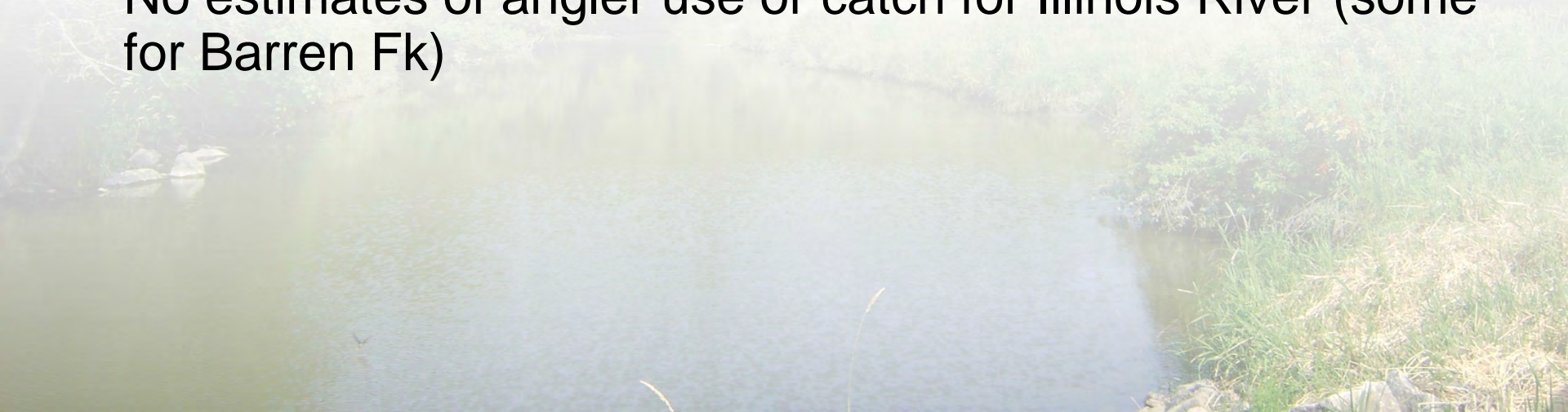
1. Highly diverse fish community of >72 species
2. Most fish species are native to the basin
3. Smallmouth bass is the most sought-after game fish
4. The Neosho smallmouth bass and sunfish are of high conservation value
5. No fish species are listed as federal or state threatened or endangered





# Recreational Use

- Annual visitation ~400,000 to Scenic section
- Approximately 25 Commercial Floatation Device Operators
- Annual floaters (canoe, raft, kayak) ~100,000
- Annual recreational economic value (above Tenkiller)  
~ \$12 million
- Fishing is a popular activity, primarily for bass and sunfish.  
No estimates of angler use or catch for Illinois River (some for Barren Fk)





# Illinois River Monthly Float Users, Average Annual for 2003-2008

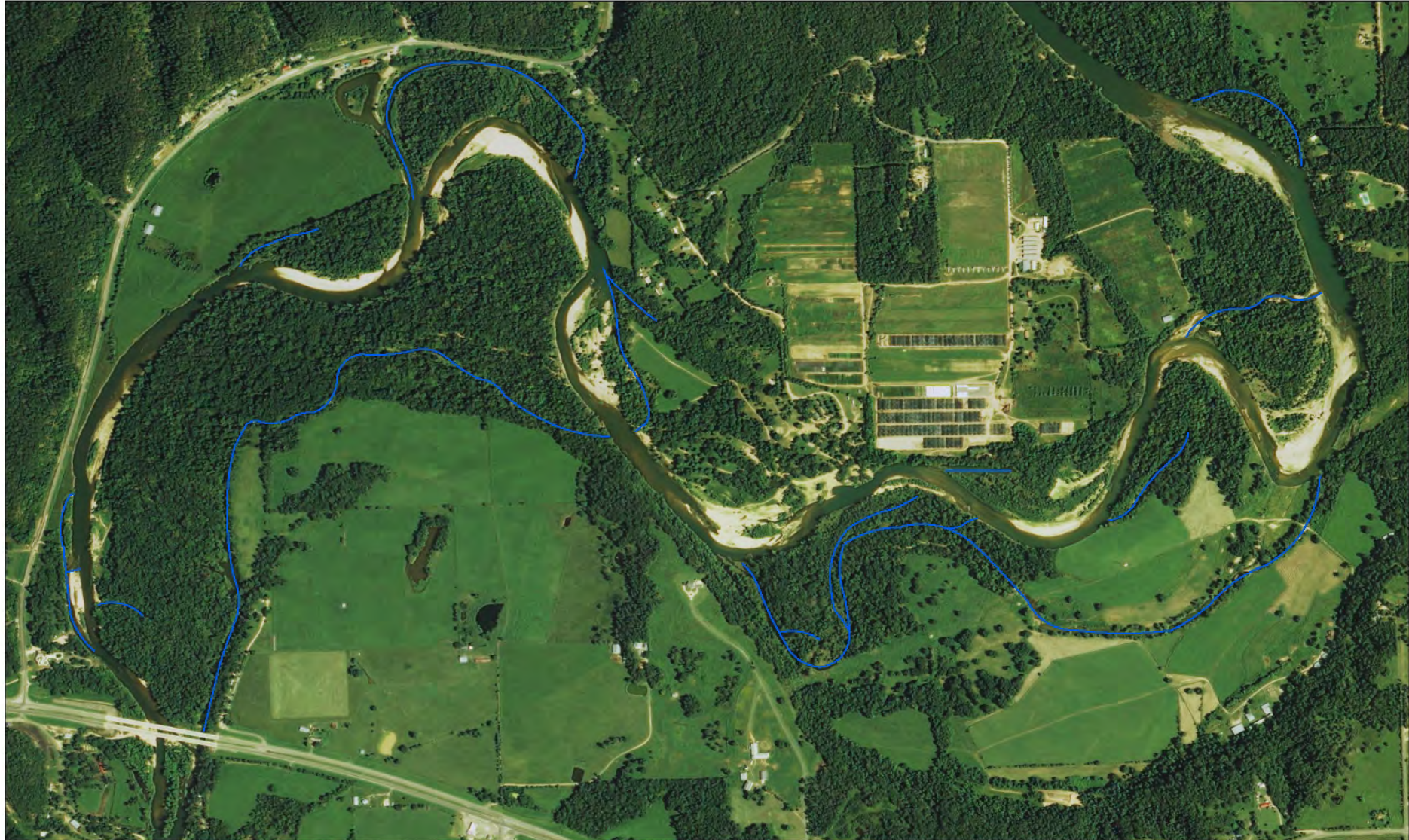
Month	Commercial	Private	Total
January	1	35	36
February	2	34	36
March	110	19	129
April	348	81	429
May	9,938	411	10,349
June	22,734	681	23,415
July	37,441	1,094	38,535
August	24,540	804	25,344
September	8,657	400	9,057
October	878	93	971
November	76	24	100
December	6	48	54
<b>Total</b>	<b>104,731</b>	<b>3,724</b>	<b>108,455</b>

# Flow Ranges for Recreational Floating (Tahlequah Gage) (source: OSRC)

Preferred range	400 – 1,200 cfs
Minimum for canoeing & kayaking	150 cfs
Minimum for rafting	250 cfs
Maximum for general safety	1,200 cfs
Maximum for experienced boaters	4,000 cfs



# Secondary Channels



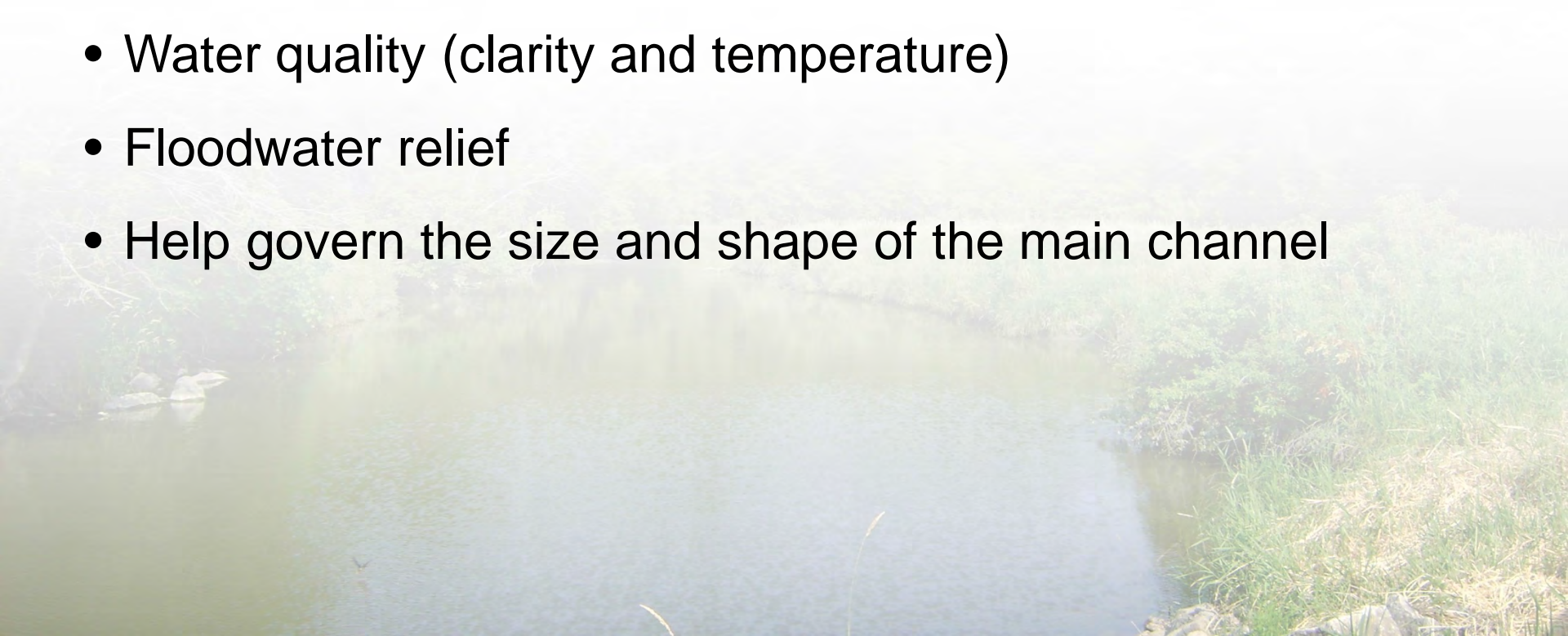


# Ratio of secondary channel length to the main channel length in the Illinois River between Watts and Tahlequah, Oklahoma.

River Reach	Watts to Flint Creek	Flint Creek to Peavine	Peavine to Tahlequah	Total
River Reach Length (mi)	13.3	16.3	22.9	53
Secondary Channel Length (mi)	5.3	6.3	18.3	30.5
Ratio of 2 <sup>nd</sup> ary channel to main channel length	<b>44.4 %</b>	<b>38.7%</b>	<b>80.0%</b>	<b>57.5%</b>

# Importance of Secondary Channels

- Rearing and refuge habitat for fish
- Support of many wildlife species that don't tend to use the main channel
- Water quality (clarity and temperature)
- Floodwater relief
- Help govern the size and shape of the main channel



# How to Protect Secondary Channels:

- Preserve bank-full/channel maintenance flows (frequency and magnitude)
- Typically equates to the 1.5- or 2-year recurrence flow
- Approximately 15,000 – 20,000 cfs for Illinois River at Tahlequah

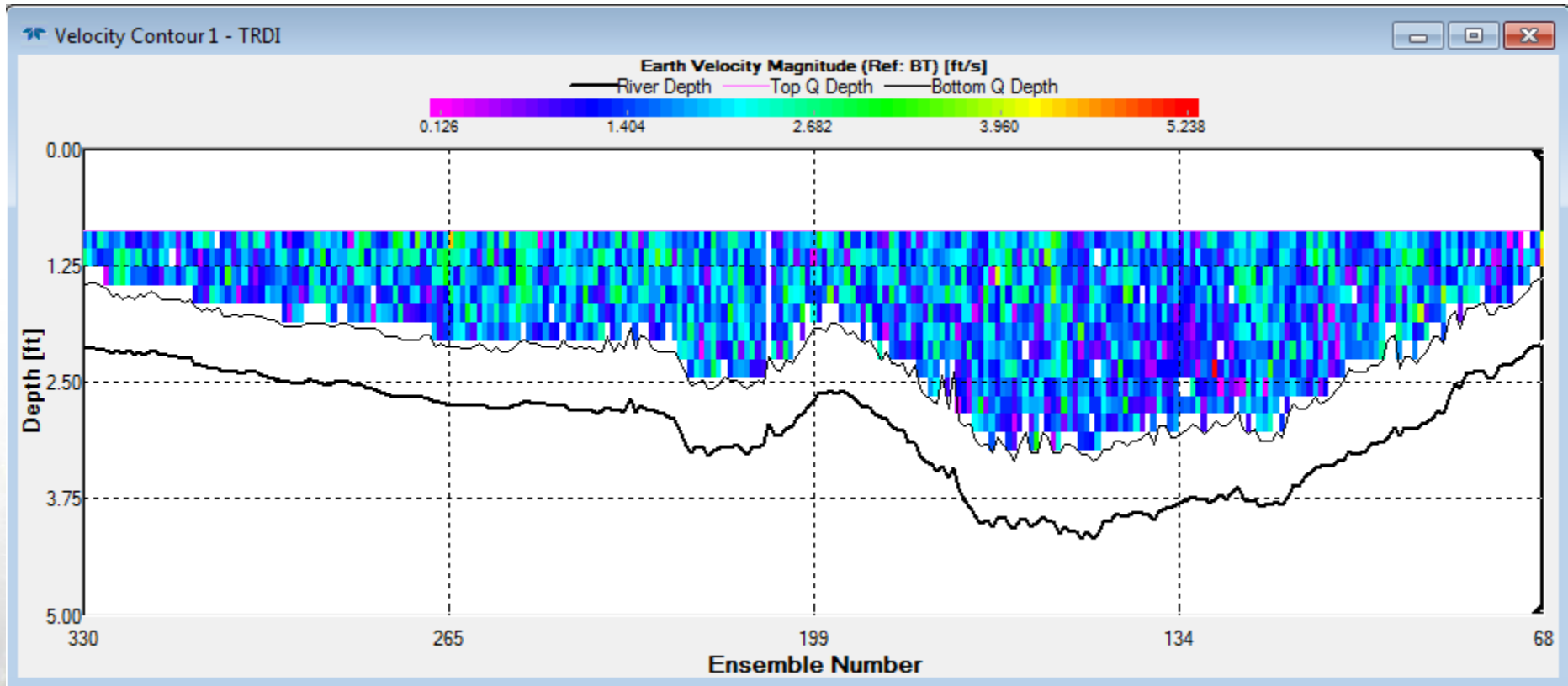




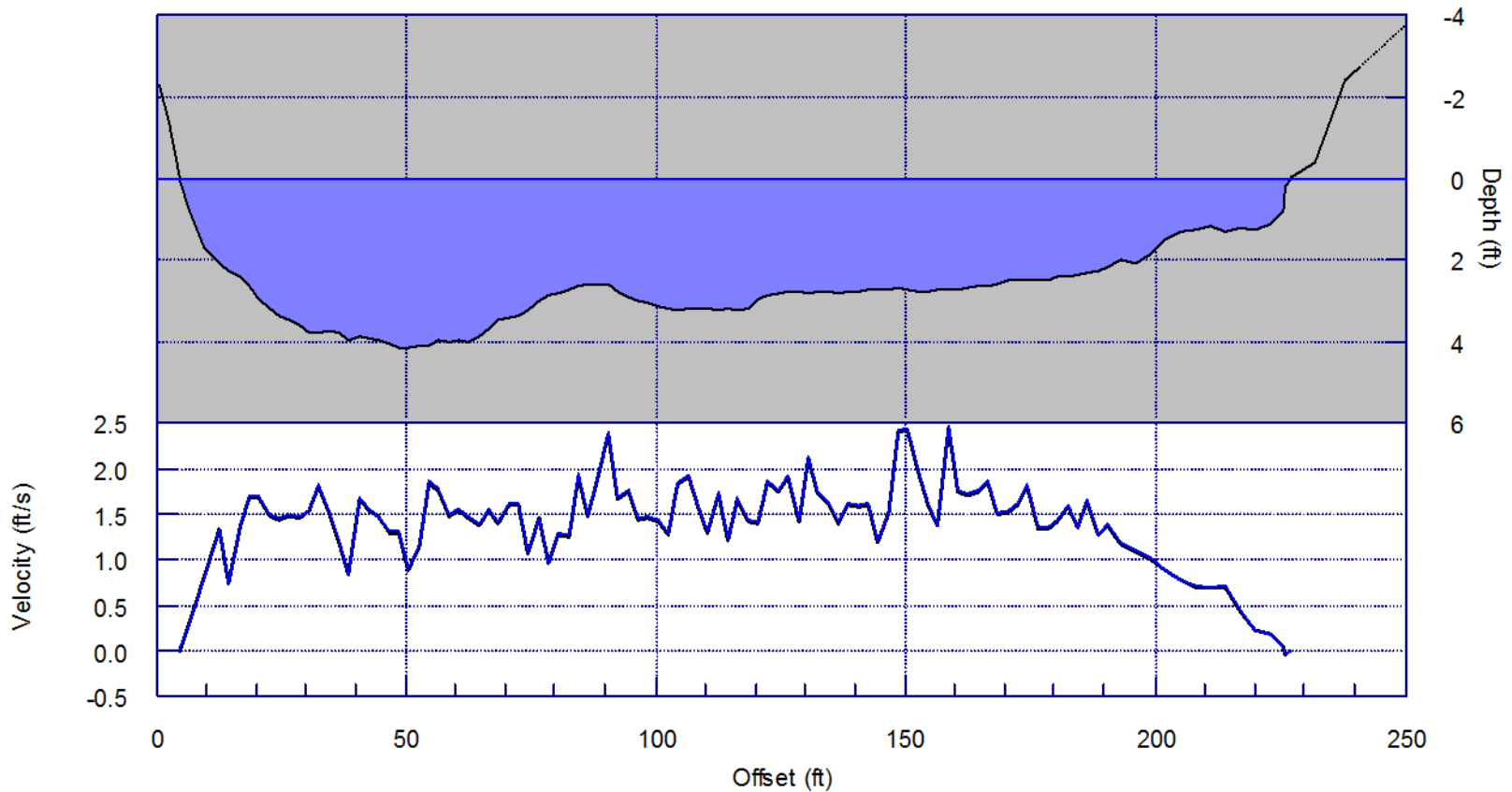
# Fish Habitat Modeling

- Simple explanation of model
- Study sites (map with transects)
- Photos
- Example results (Barren Fork)

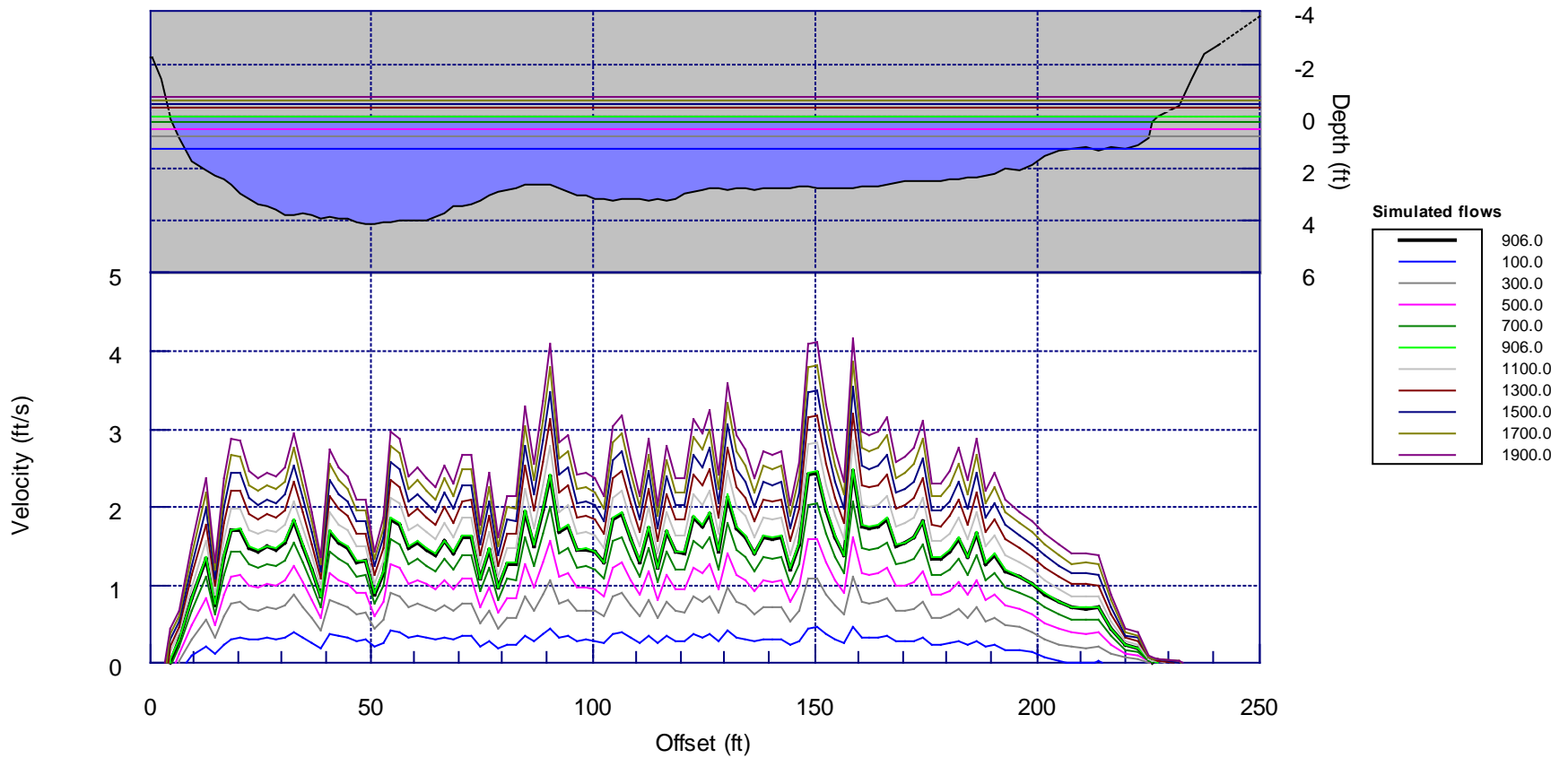




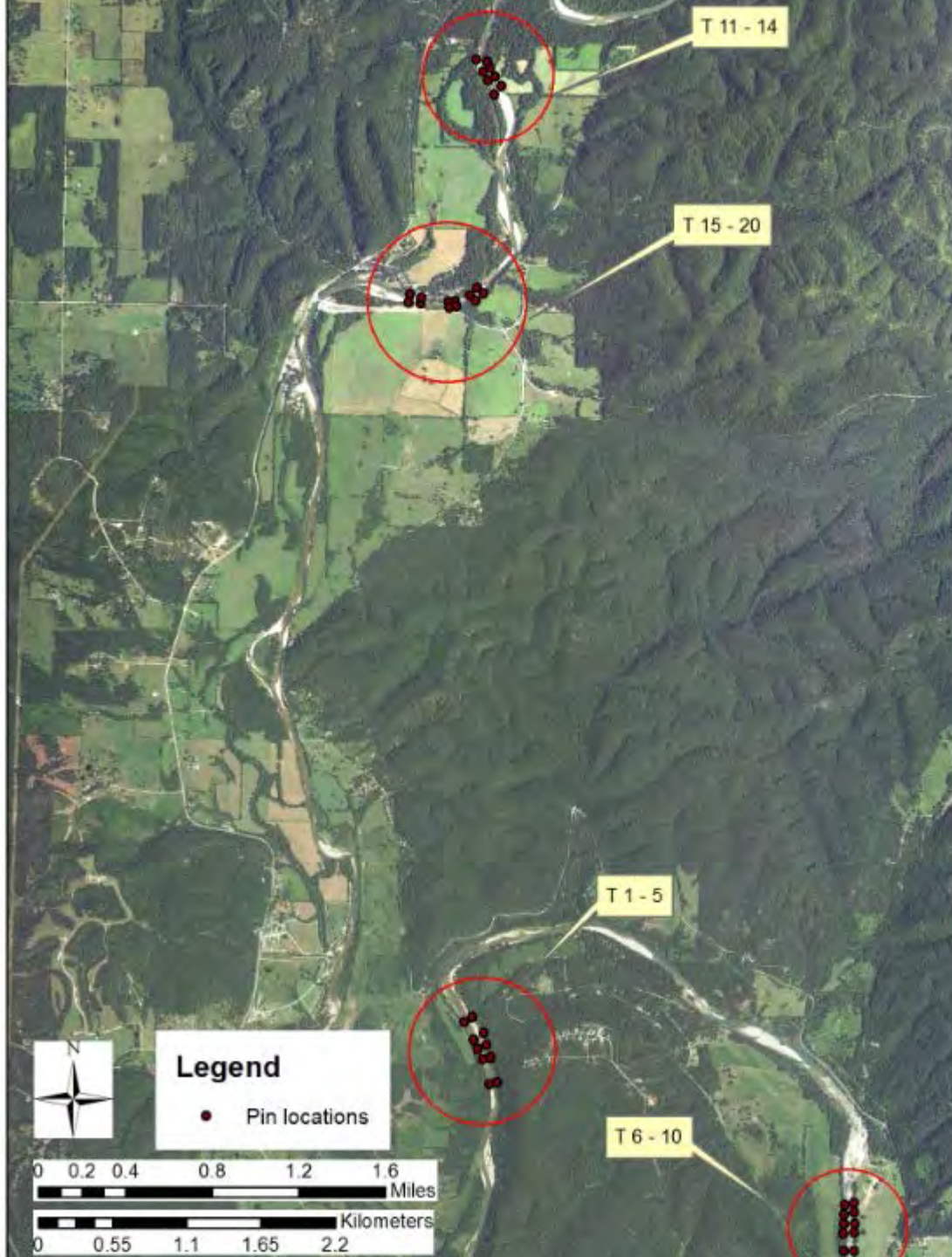
### Cross-section: T7 Pool: Manning Ns applied IFG4 method



## Cross-section: T7 Pool: Manning Ns applied IFG4 method









# Lower Flint Creek





# Flint Creek Study Transect





# Lower Illinois River

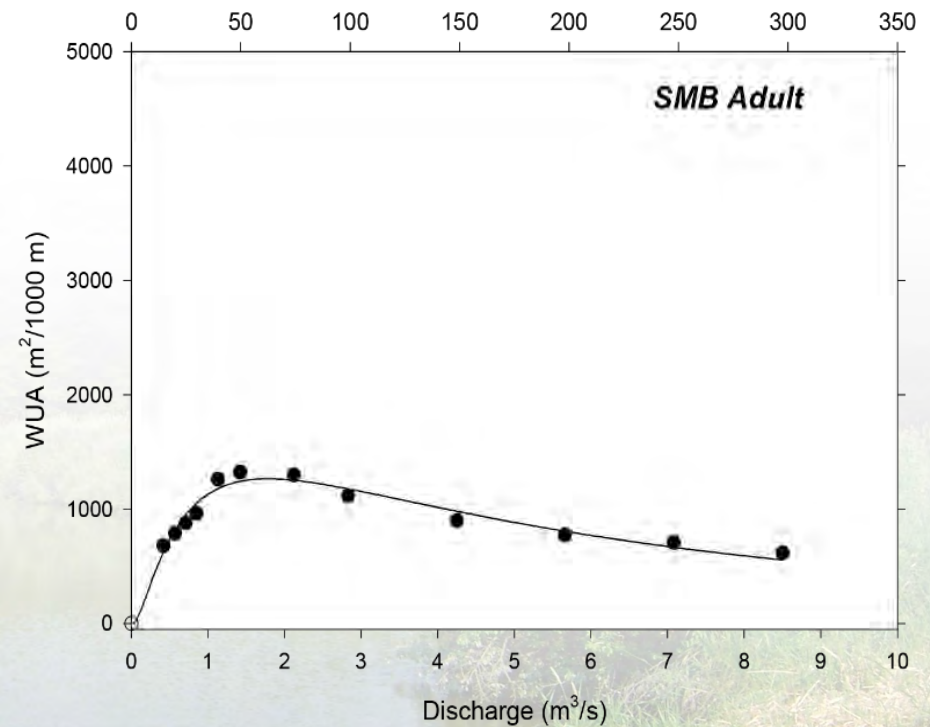
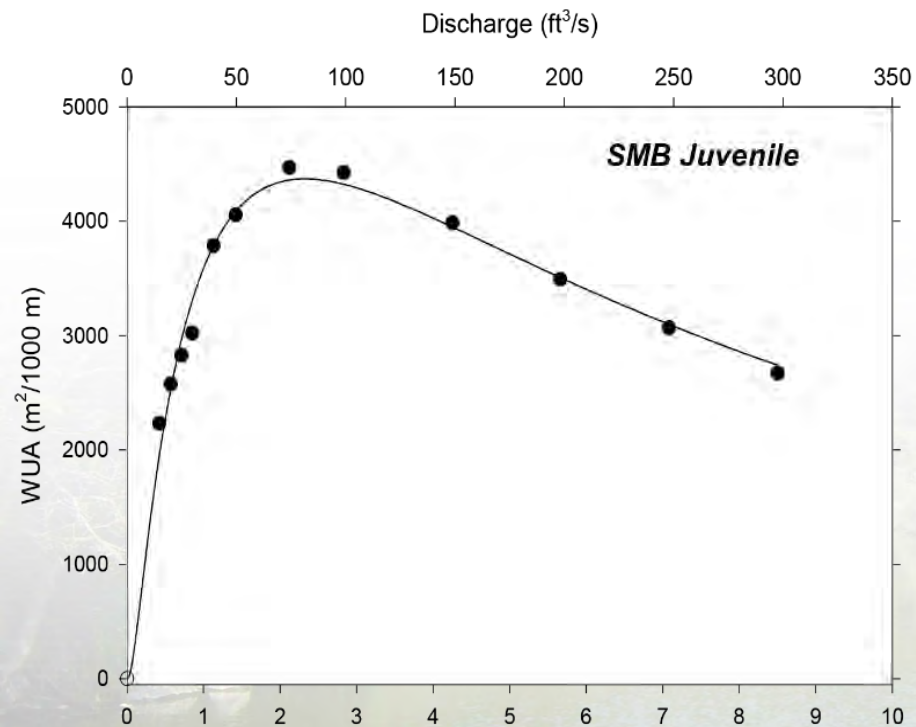




# Upper Illinois River Bedrock Pool Transect



# Example (Barren Fork) of Fish Habitat Modeling Results









# Implication of recent flood on study

- Fish habitat model extrapolation limited to  $< 1,000$  cfs for Illinois River,  $<150$  cfs for Flint Creek
- Upper Illinois River site above Flint Creek – insufficient data; site washed out.



# Next Steps.

- Finish habitat modeling
- Complete Technical Report (late spring 2016)
- Final public/stakeholder meeting to present results of the technical studies





# Future Work.

- Results will be provided to the Instream Flow Advisory Group
- Begin policy dialogue to determine how these flows fit into upper Illinois River water quantity management
- Assess applicability to other streams in Oklahoma

