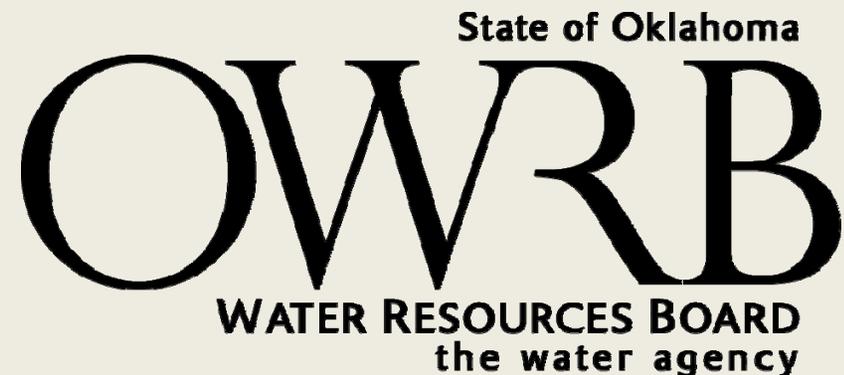


Arbuckle Simpson Study Surface Water Technical Advisory Group Recommendations

Derek Smithee

Division Chief

Water Quality Programs Division



Surface water working group

Barry Bolton - ODWC

Scott Christenson - USGS

Kim Winton - USGS

Ken Collins - USFW

Jon Craig - ODEQ

Bill Fisher - OSU

Dick Scalf

Ellen Tejan - TNC

Bill Clark - Land Owner

Jack Keeley - OWRB
(Board Member)

Sue Braumiller - NPS

Hayley Dikeman - USFWS

Darryl Carter - CPASA

Paul Mauck - ODWC

Collin Balcombe - BOR

Noel Osborn - OWRB

Phil Moershel - OWRB

Derek Smithee - OWRB

Charge to working group...

Determine what is:

- not likely to degrade or interfere with springs or streams.
- will not reduce the natural flow of water from springs or streams emanating from said basin or subbasin.

Working group recommendation

Groundwater management should be based upon a target of 10 to 25% maximum reduction in baseflow

Workgroup Initial Discussion

Surface water work group discussion:

- Recreation
- Water Supply
- Fishing
- Ecological Integrity
- Water Quality
- Spring Flow
- Stream Flow

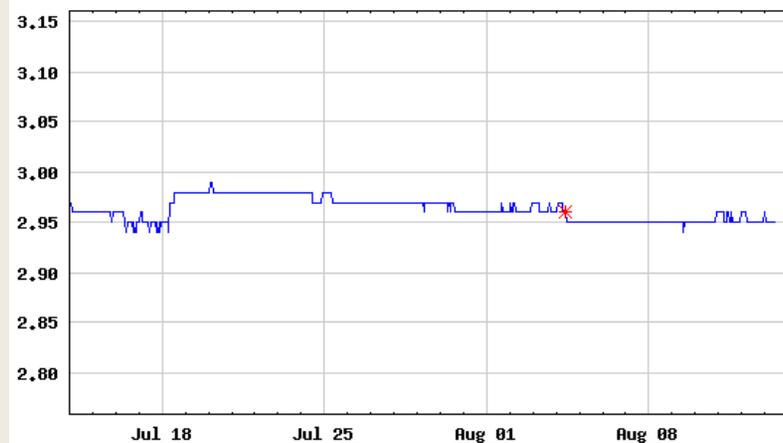
Work group study recommendations:

IHA- Nature Conservancy – evaluate historical flows and variability

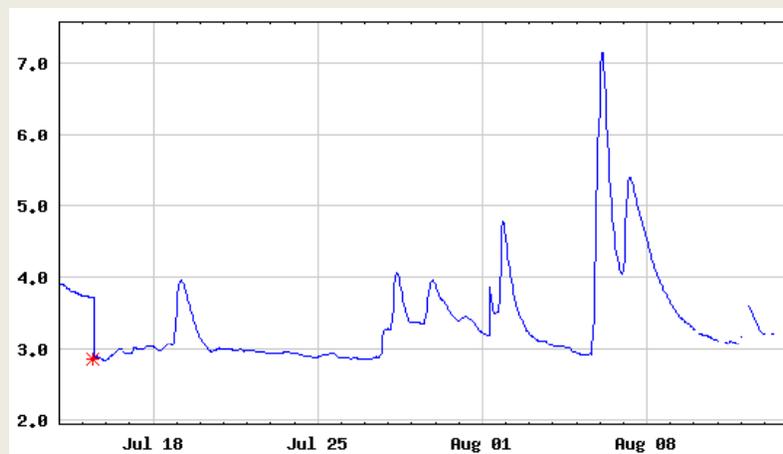
IFIM- USGS OSU Coop - assess impacts to spring fauna

Not all hydrographs are created equal

Typical Spring
Discharge



Typical Stream
Discharge



INDICATORS OF HYDROLOGIC ALTERATION (IHA) ANALYSIS OF SELECTED STREAMS ON THE ARBUCKLE-SIMPSON AQUIFER, SOUTH CENTRAL OKLAHOMA

Ellen C. Tejan

C. Stephen Haase

The Nature Conservancy

Available for review at:

http://www.owrb.ok.gov/studies/groundwater/arbuckle_simpson/pdf/IHAReport.pdf

IHA Study:

Indicators of Hydrologic Alteration (IHA) analysis

- Examined
 - least altered flow regimes
 - existing alterations and
 - trends
- Will serve as a baseline study to evaluate impacts from flow alteration.
- Recommended continued monitoring of streams flows.

INSTREAM FLOW ASSESSMENT OF STREAMS DRAINING THE ARBUCKLE-SIMPSON AQUIFER

William L. Fisher,

Titus S. Seilheimer

U. S. Geological Survey

Oklahoma Cooperative Fish and Wildlife

Research Unit

Available for review at:

http://www.owrb.ok.gov/studies/groundwater/arbuckle_simpson/pdf/Arbuckle-SimpsonInstreamFlow.pdf

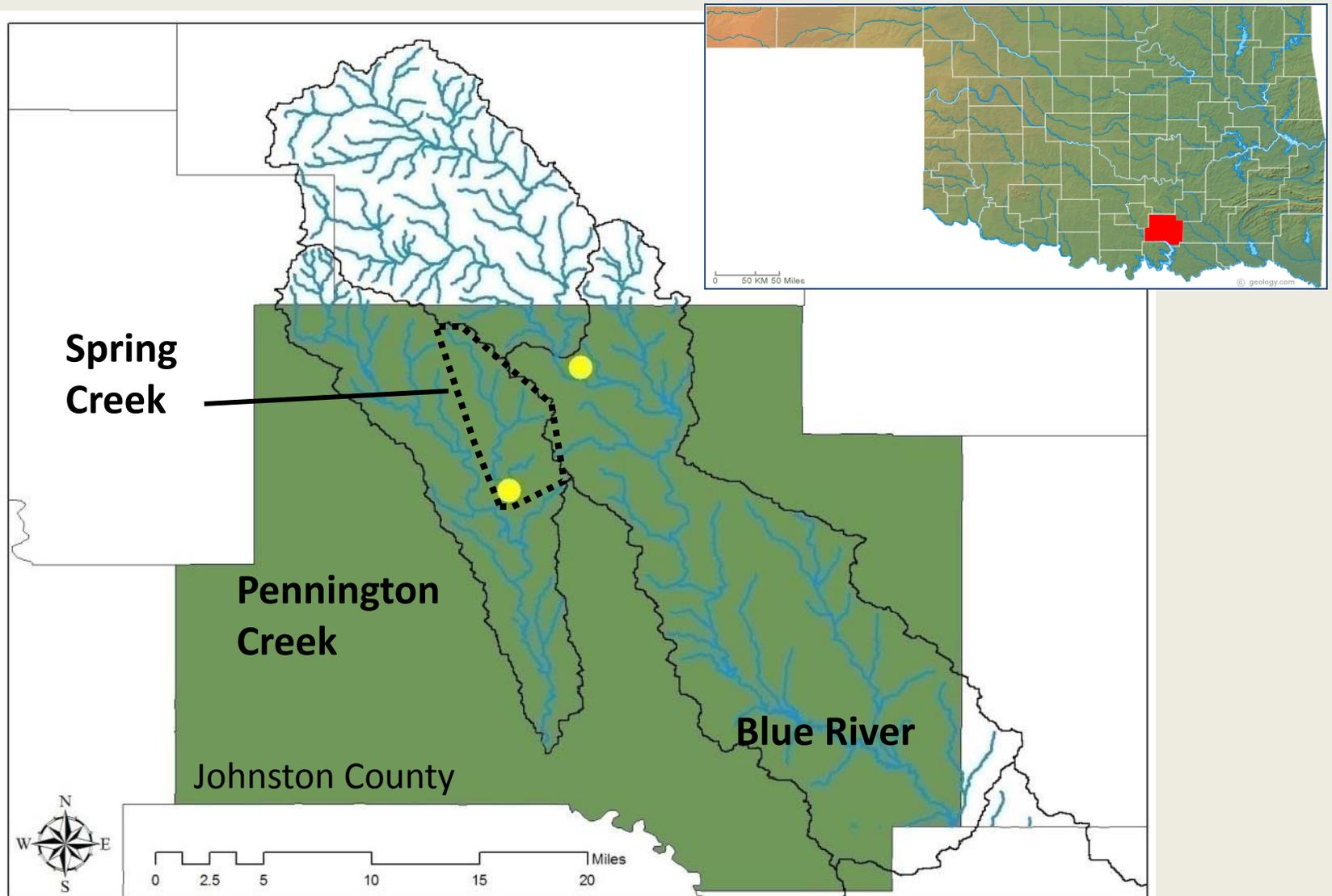
Objectives

How will groundwater withdrawal affect spring-dependent fish species?

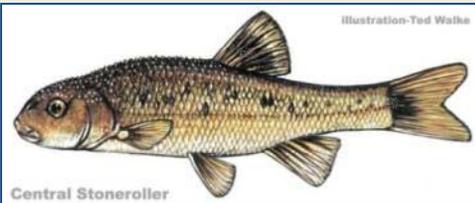
1. Field measure quality and quantity of fish habitat
2. Model impacts of different flow scenarios on fish habitat



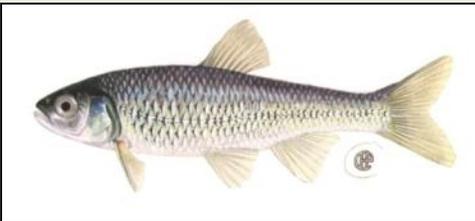
Study Sites



Spring Fish Species Selection



Central stoneroller
Campostoma anomalum



Striped shiner
Luxilus chrysocephalus



Southern redbelly dace
Phoxinus erythrogaster



Redspot chub
Nocomis asper



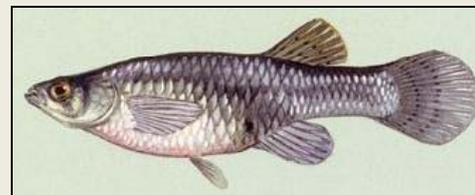
Orangethroat darter
Etheostoma spectabile



Least darter
Etheostoma microperca

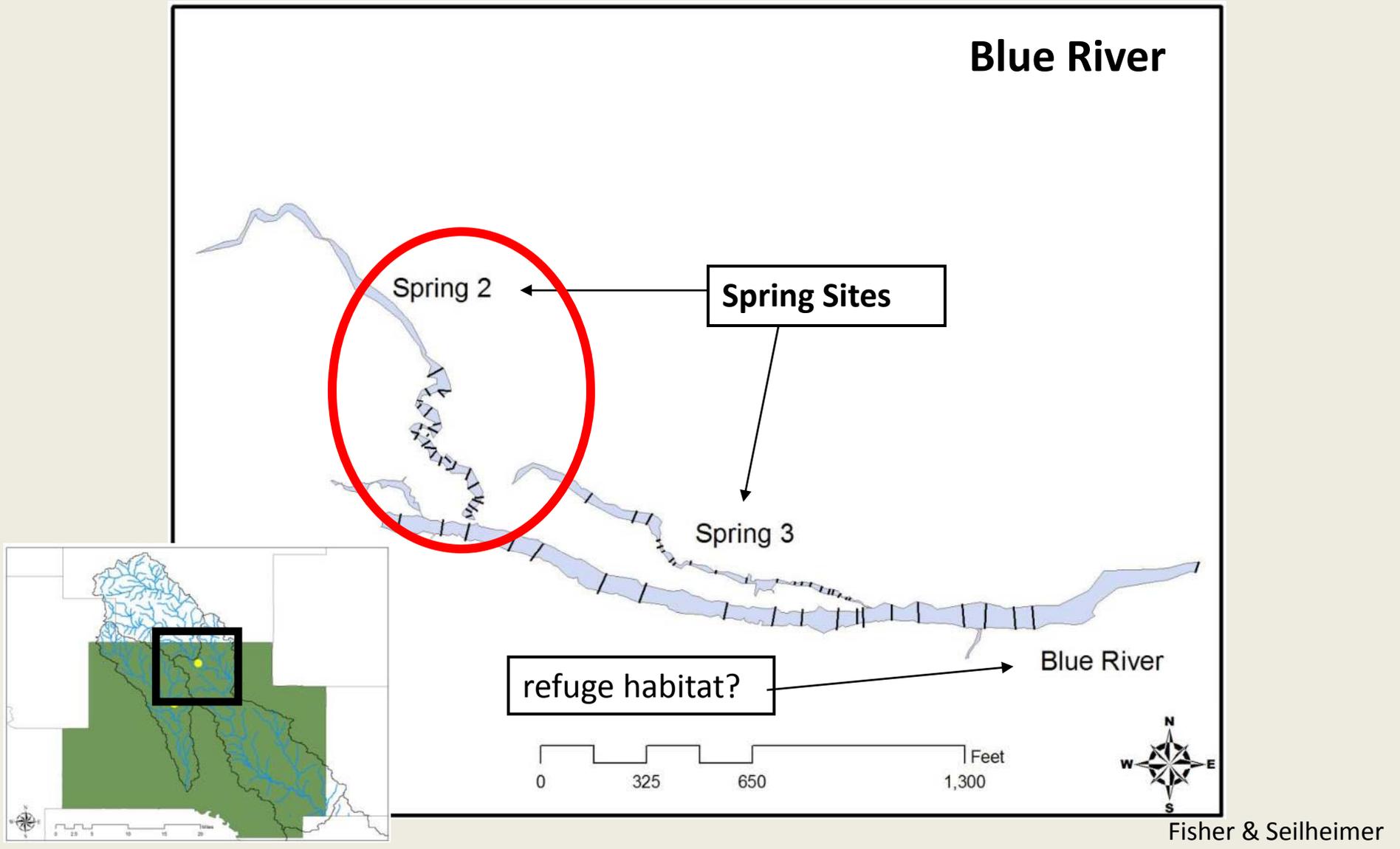


Largemouth bass
Micropterus salmoides



Western mosquitofish
Gambusia affinis

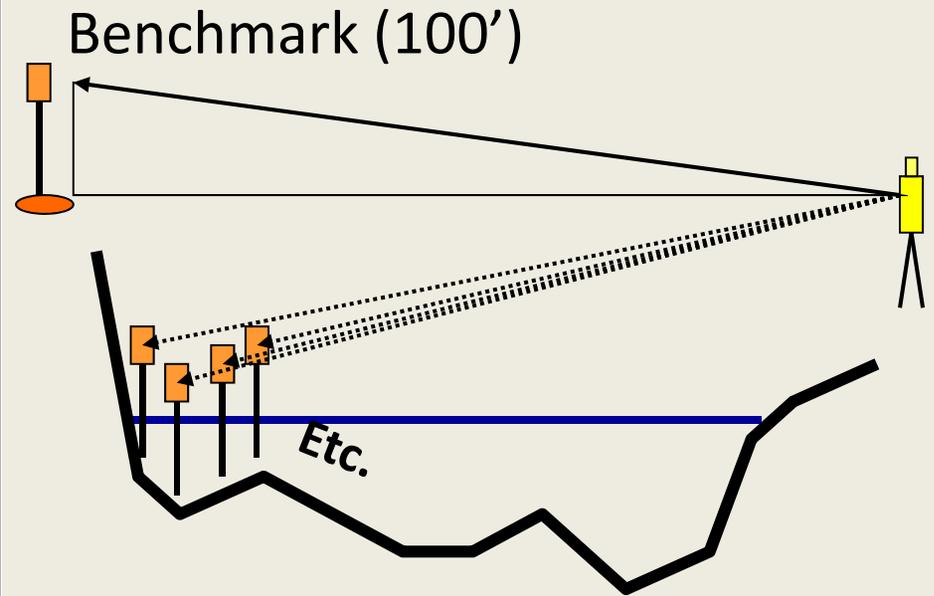
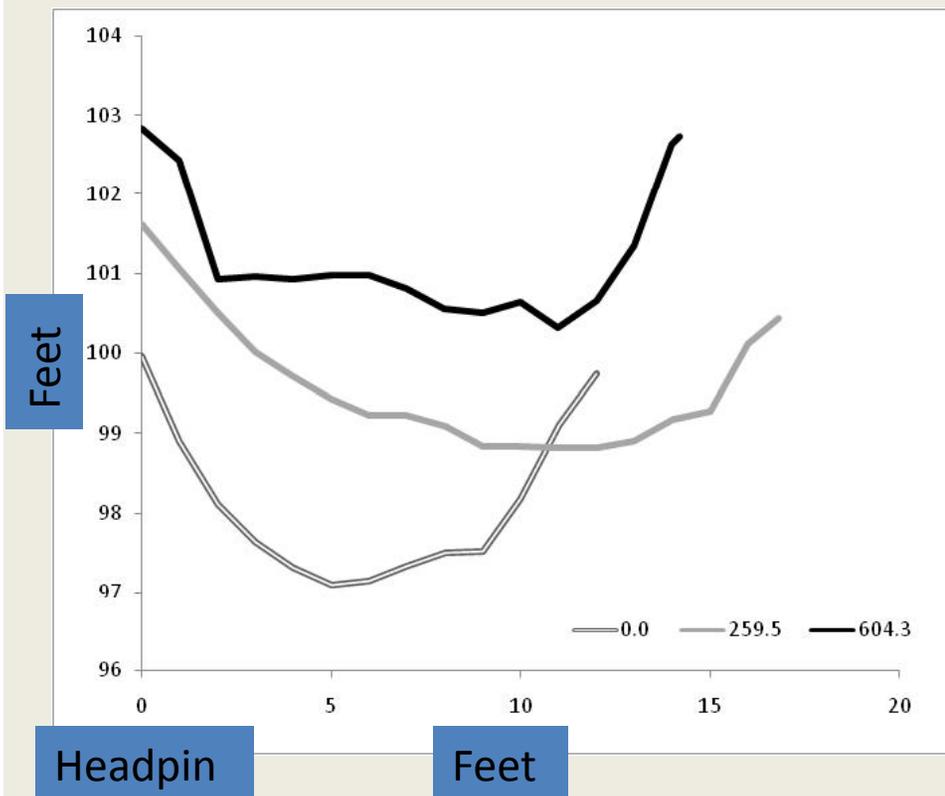
How is habitat quantified?

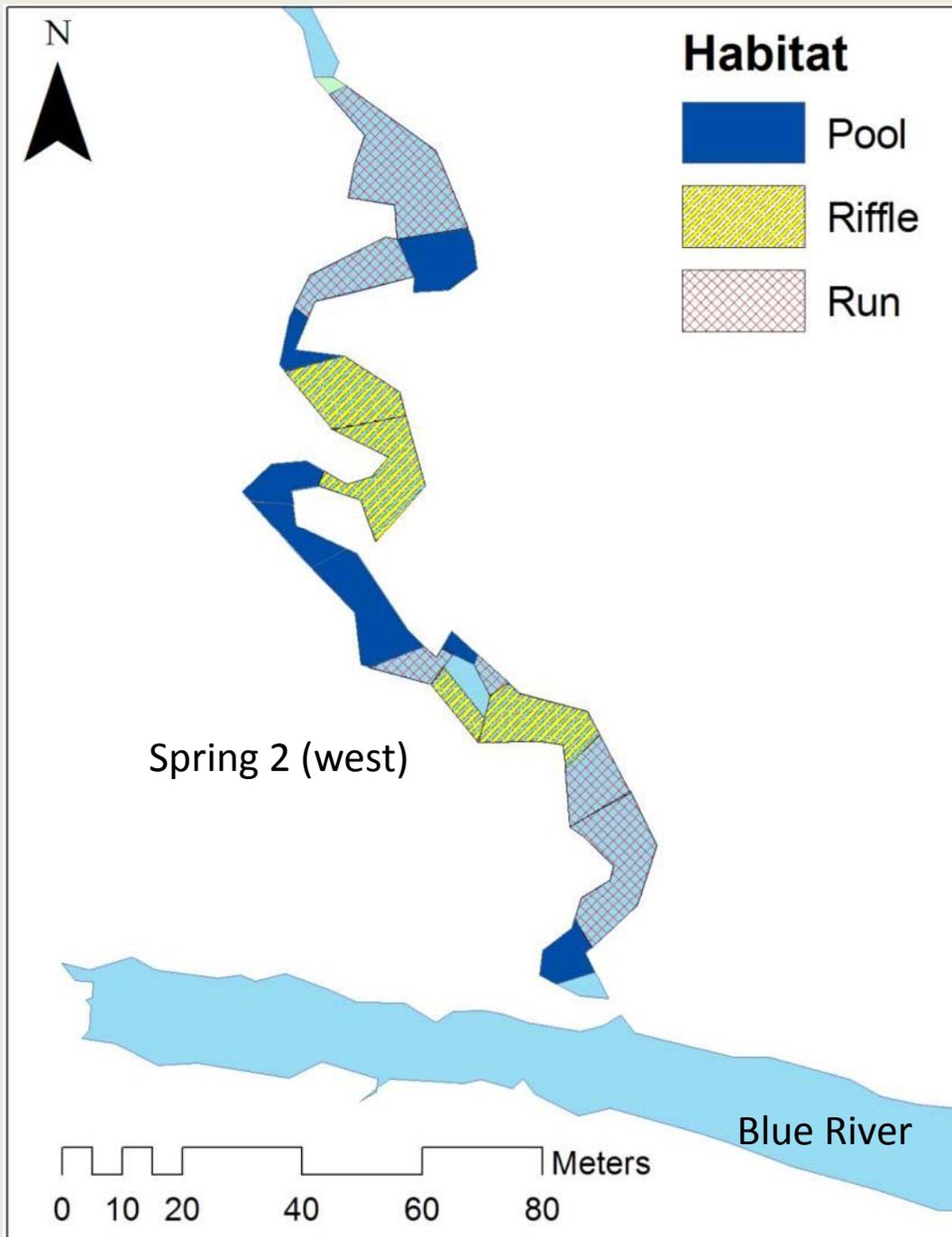


Methods



1. Channel structure – Elevation survey





Fisher & Seilheimer

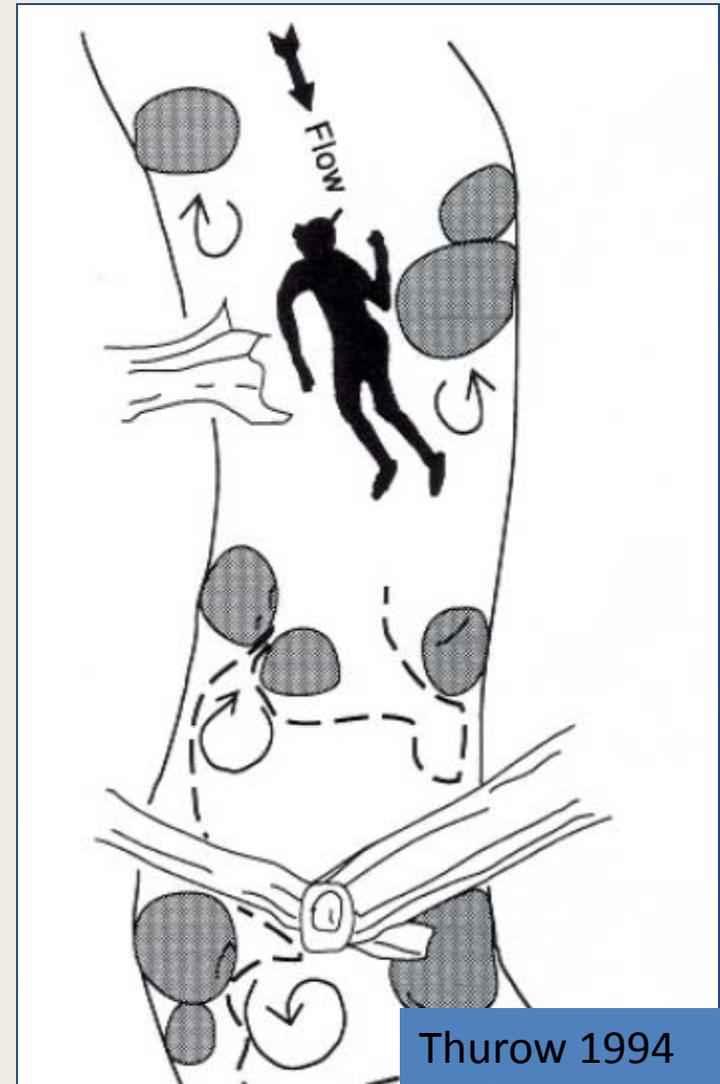
Habitat Suitability

Habitat use

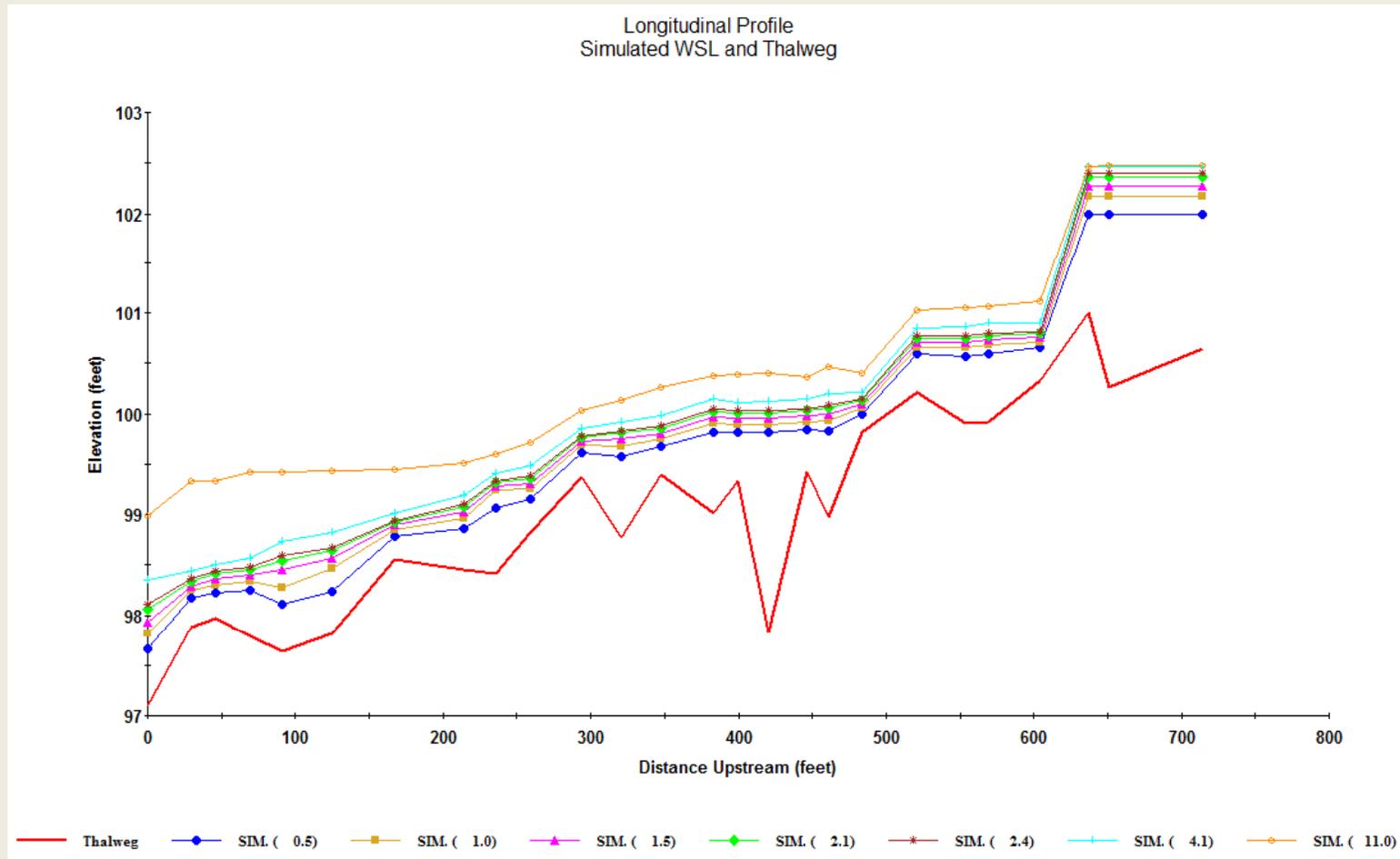
- Visual observation

Habitat type

- Velocity
- Depth
- Cover
- Substrate



Simulated Water Elevation



Step-backwater (WSP) model – pools
Manning's equation model – riffles/runs

Physical Habitat Simulation(PHABSIM)

Simulated Depth



Simulated Velocity

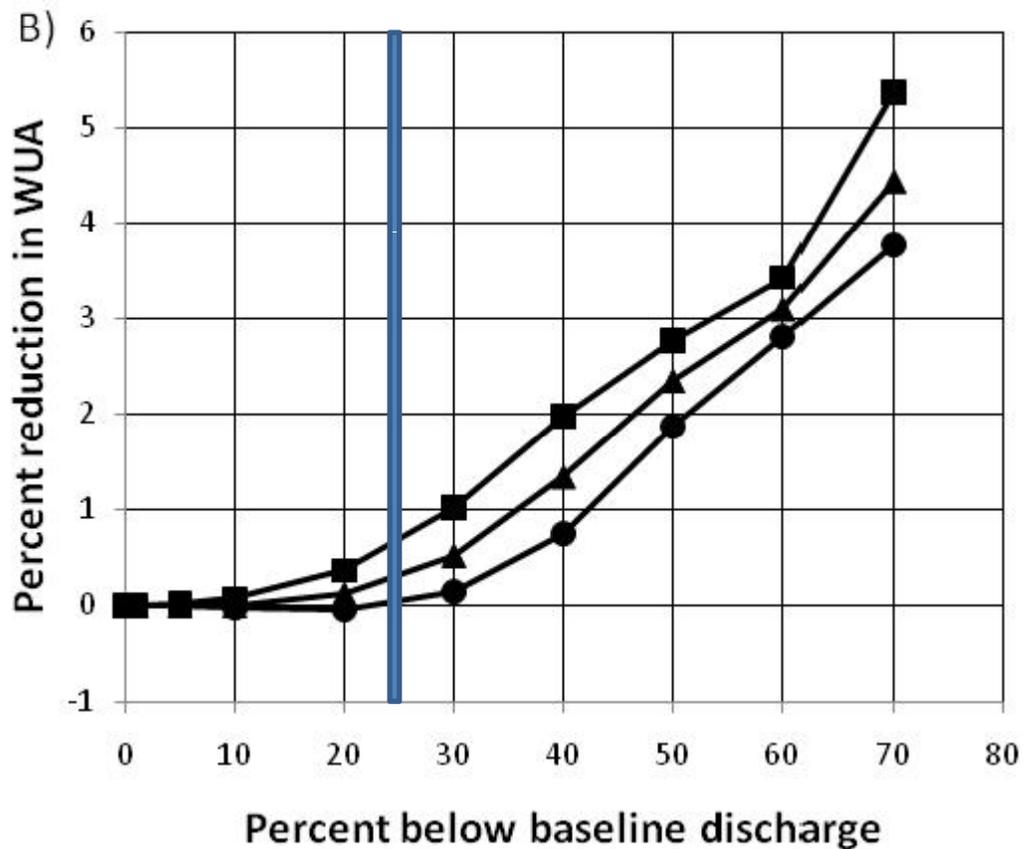
+

Habitat Suitability

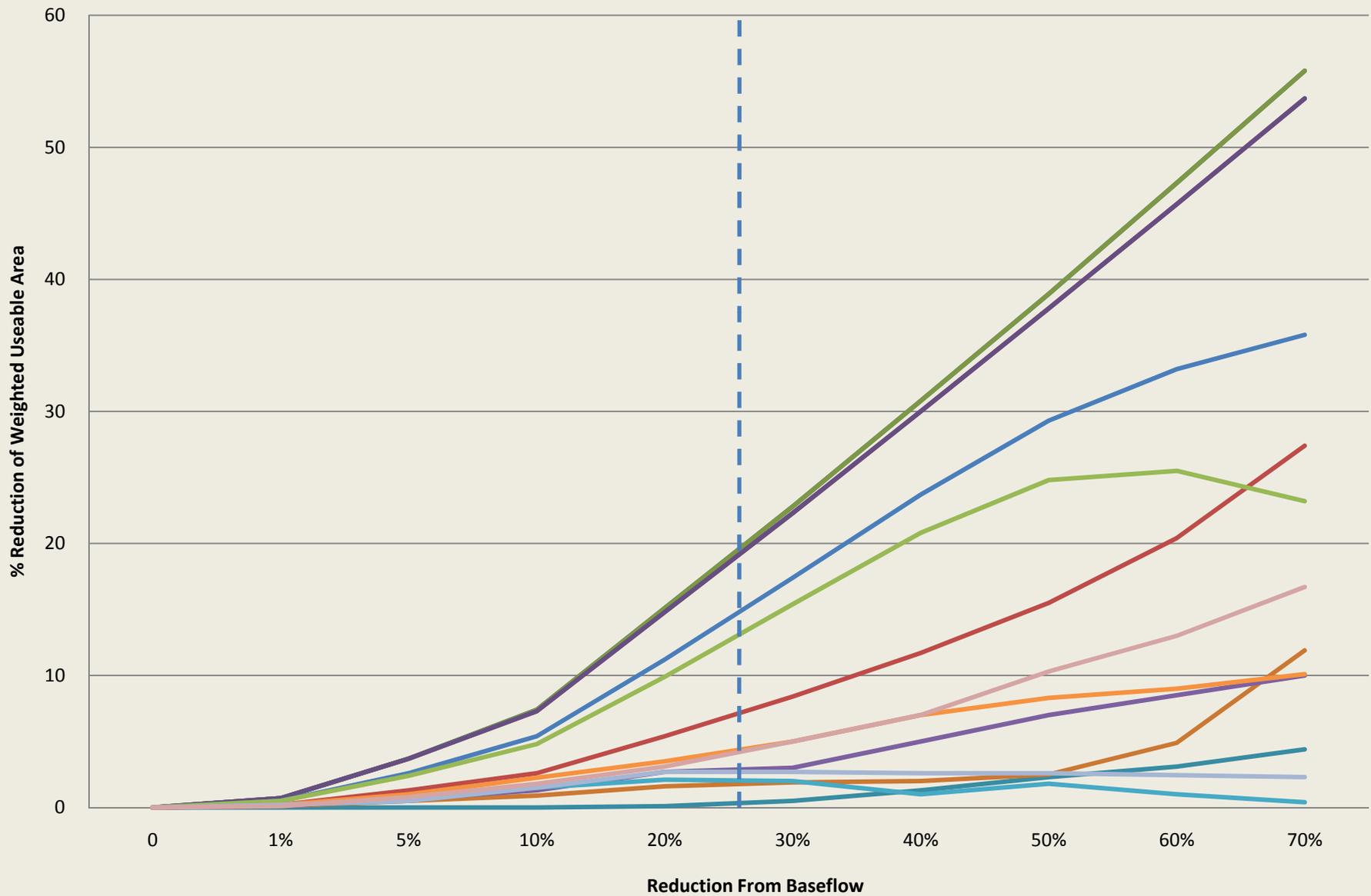


Weighted Usable Area
(WUA)
(Fish Habitat)

Spring 3 dace



Site and Species WUA Impacts at 25% Flow



Conclusion

- From a technical perspective, it was generally agreed that no substantial impact would occur if the 75% exceedance of total flow were reduced between 10 and 25%.
- The group encouraged adaptive management and a spring, stream and groundwater monitoring program to assure that these resources react as expected post implementation.
- There was also some discussion about possibly establishing buffer zones or special protection areas.

In Simple Terms

A maximum of 25% reduction in baseflow should result in limited impact to spring and stream habitat

Special Thanks

- Working group
- Bill Fisher & Titus Seilheimer
- Ellen Tejan & C. Stephen Haase
- Landowners who provided access

Questions???

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