# Geospatial assessment of invasive Bighead carp in Oklahoma reservoirs

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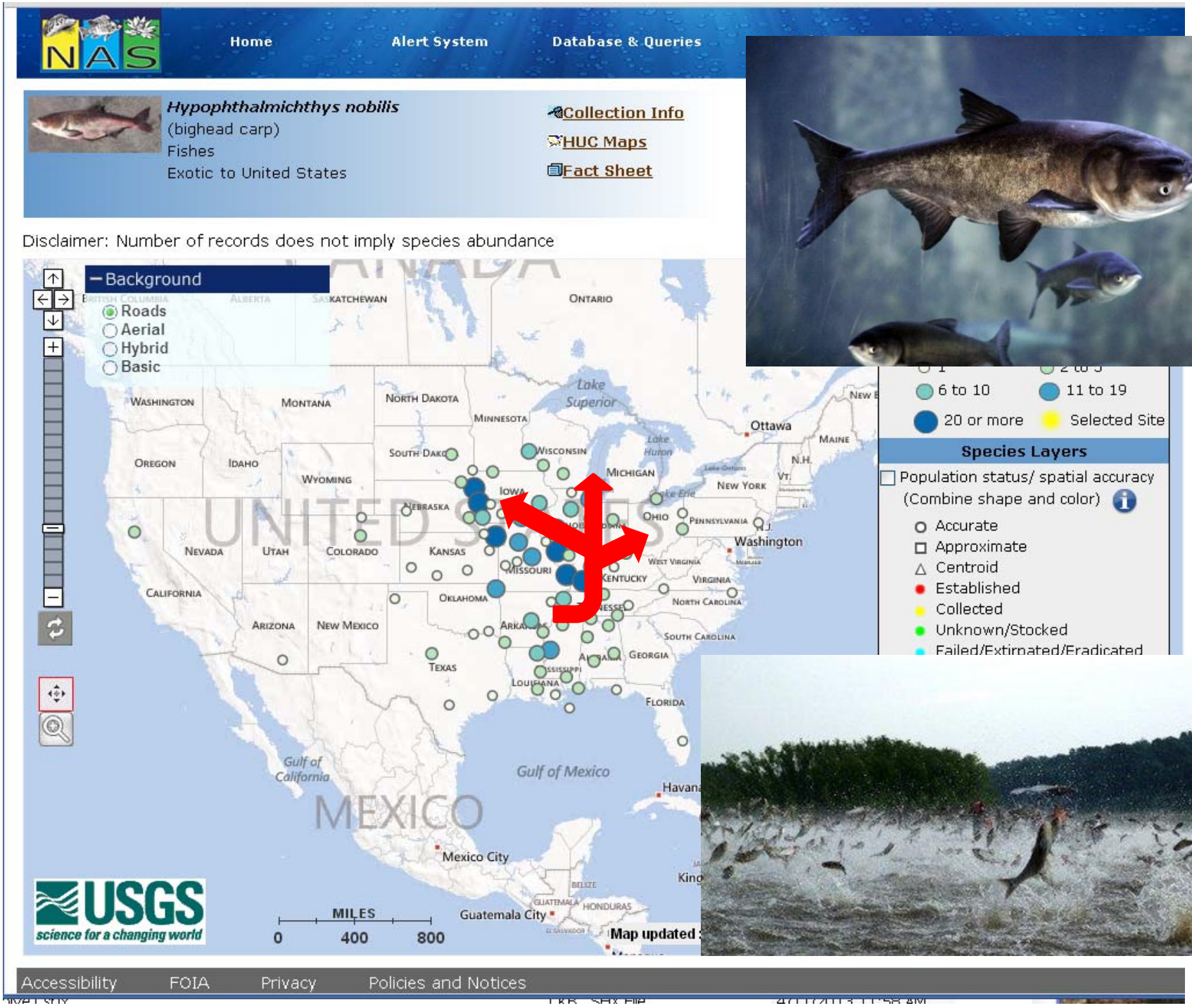
NAS
Home
Alert System
Database & Queries
Hypophthalmichthys nobilis
(bighead carp)
Fishes
Exotic to United States
Collection Info
HUC Maps
Fact Sheet
Disclaimer: Number of records does not imply species abundance
Background
Roads
Aerial
Hybrid
Basic
6 to 10
11 to 19
20 or more
Selected Site
Species Layers
Population status/ spatial accuracy
(Combine shape and color)
Accurate
Approximate
Centroid
Established
Collected
Unknown/Stocked
Failed/Extirpated/Eradicated
UNITED STATES
MEXICO
Gulf of California
Gulf of Mexico
Mexico City
Guatemala City
Ottawa
Washington
Havana
MILES
0
400
800
USGS
science for a changing world
Accessibility
FOIA
Privacy
Policies and Notices

# Two Potential Sources of Exotic Fish in Oklahoma

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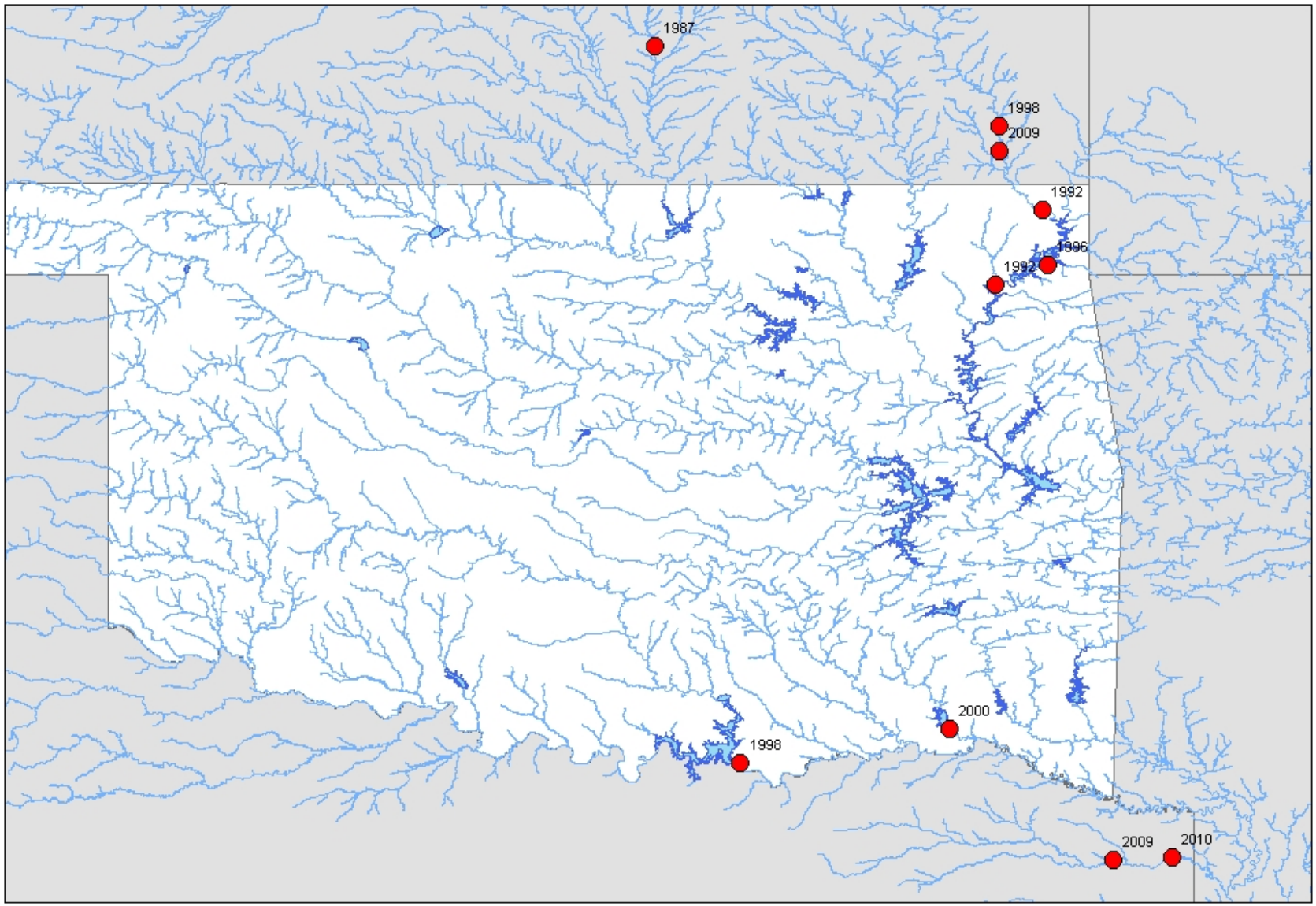
In the summer of 1991 a commercial bait dealer delivered a shipment of fathead minnows to the Byron State Fish Hatchery near Byron, OK; the shipment originated in Minnesota. Mixed with the fatheads were five brook stickleback, *Culaea inconstans*. This occurrence illustrates how this exotic fish could be introduced into Oklahoma waters. The collected specimens were deposited in the Oklahoma State University Collection of Vertebrates (OSUS #253510).

On April 20, 1992, two bighead carp *(Hypophthalmichthys nobilis),* each weighting 18 kg, were snagged by fisher persons in the Neosho (Grand) River at Miami Riverview Park, 0.5 km S of Miami (T27N, R22E, S3), Ottawa County. Photographs of these fish were displayed in the Miami bait shop.

# OKLAHOMA
# AQUATIC NUISANCE SPECIES
# MANAGEMENT PLAN

Small silver carp *Hypophthalmichthys molitrix* and bighead carp resemble gizzard shad *Dorosoma cepedianum*. Cast-netting for bait in tailwaters below some major reservoirs in Oklahoma has the potential to introduce Asian carp into some of the premier sport fishing lakes in the state. Anglers routinely cast net for bait below the Dennison Dam at Lake Texoma and use the bait to fish for striped bass or catfish in Lake Texoma. Asian carp can be accidentally introduced into the lake through this practice. Bighead and silver carp have reproductive requirements similar to those of striped bass. There is a real potential to establish a reproducing population of Asian carp in Lake Texoma which could be devastating to the striped bass fishery and paddlefish *Polyodon spathula* recovery efforts.

# Temporal Distribution of Bighead Carp in Oklahoma




2010

by Ryan Liang

# Bighead Carp Invasion Ecology

Introduction + Establishment = Invasion

Introduction factors unknown
Establishment factors fairly well known

Thus, we sought to determine those reservoirs most at risk for establishment should introduction occur

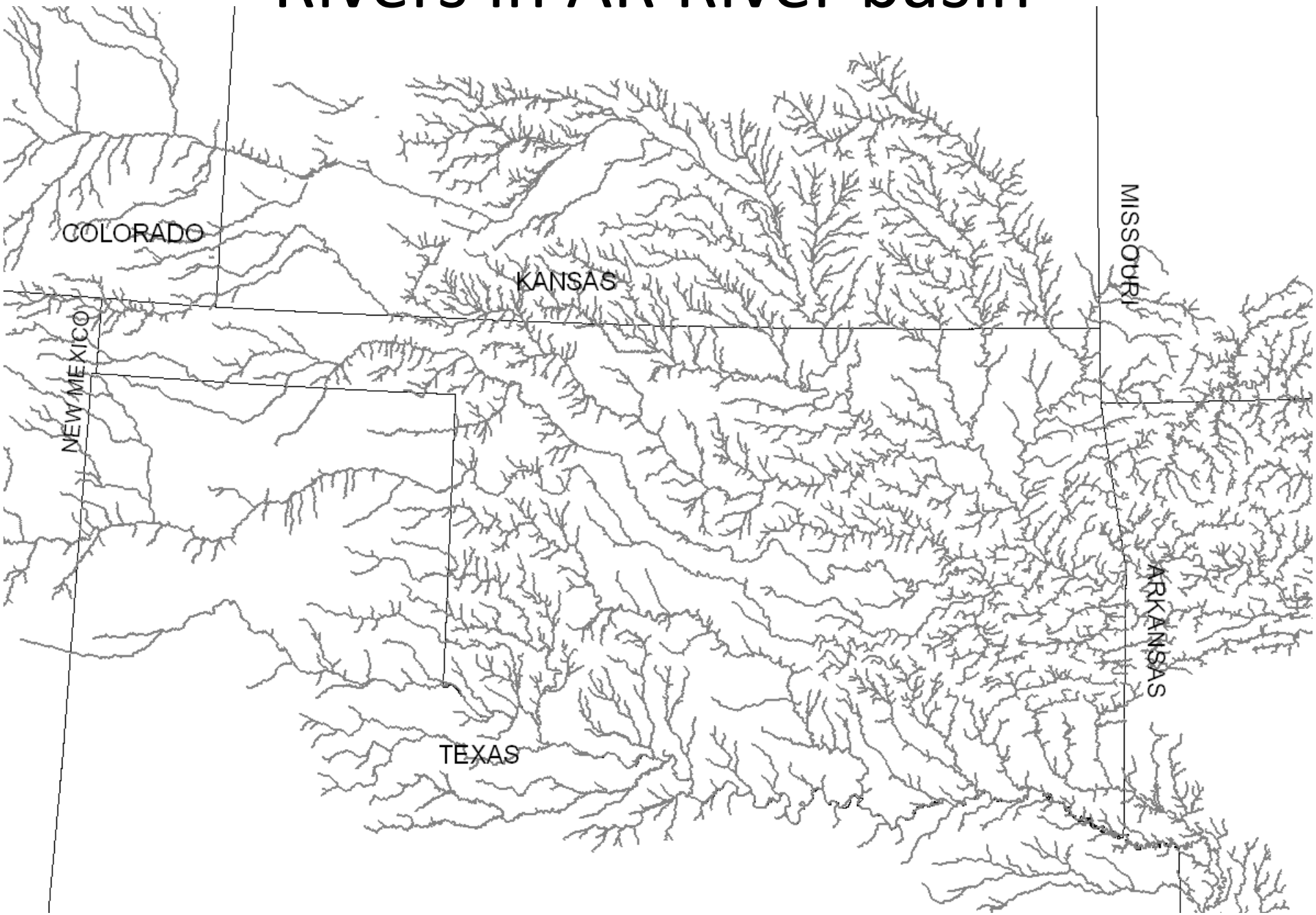
# Bighead Carp Reproduction

- Requirements for establishment:
  - Large river
  - 100 km free-flowing
  - Suitable hydrology
    - Sufficient flow to maintain egg buoyancy
- Suitable for spatial assessment

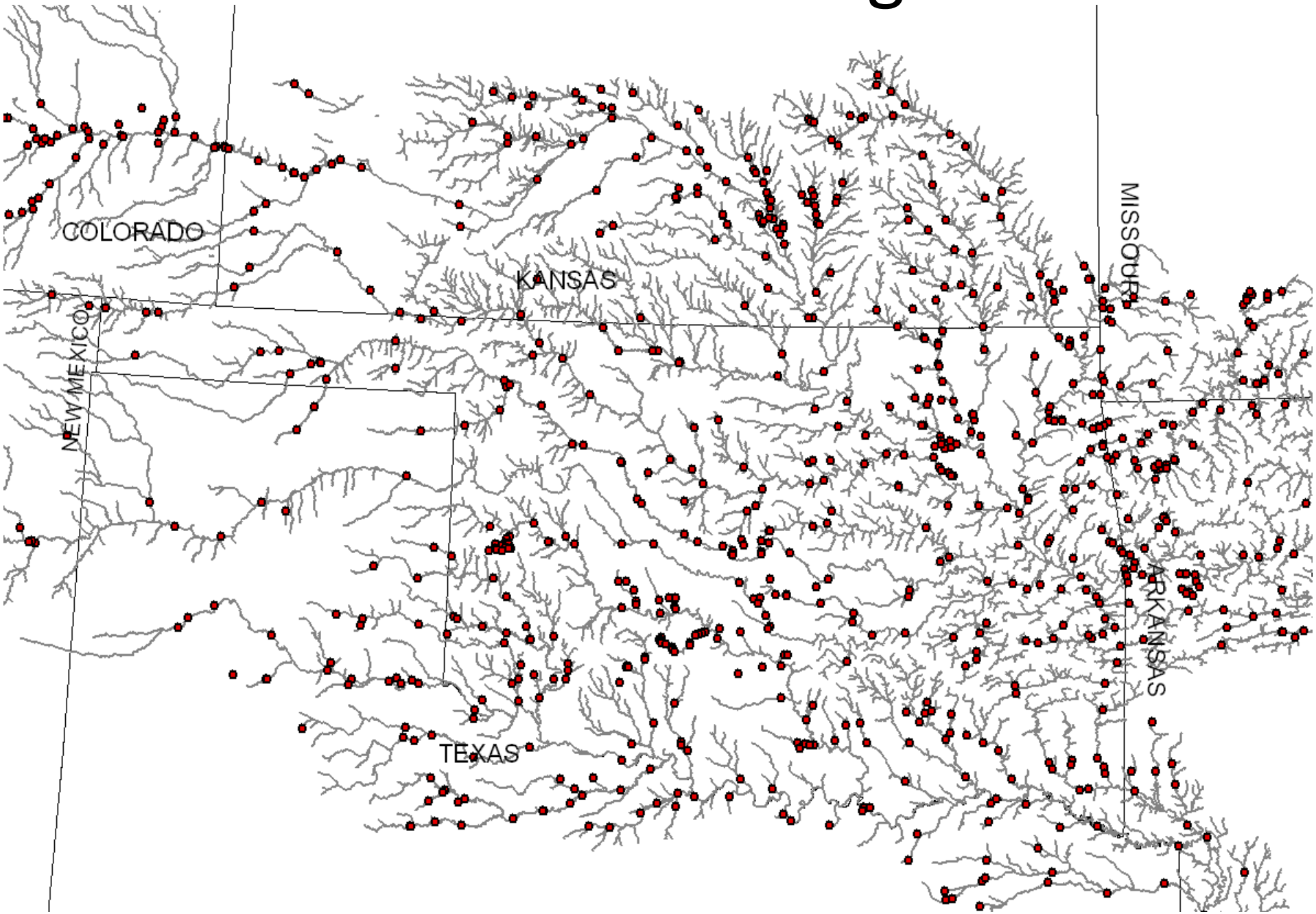
# Bighead Carp Reproduction

- Large river
  - No database on which rivers support reproduction
  - Missouri, Mississippi rivers obviously
  - Big Muddy, Kaskaskia, and Cache River consistently reported
  - Cache is the smallest at 300 mean annual cfs

# Rivers in AR River basin

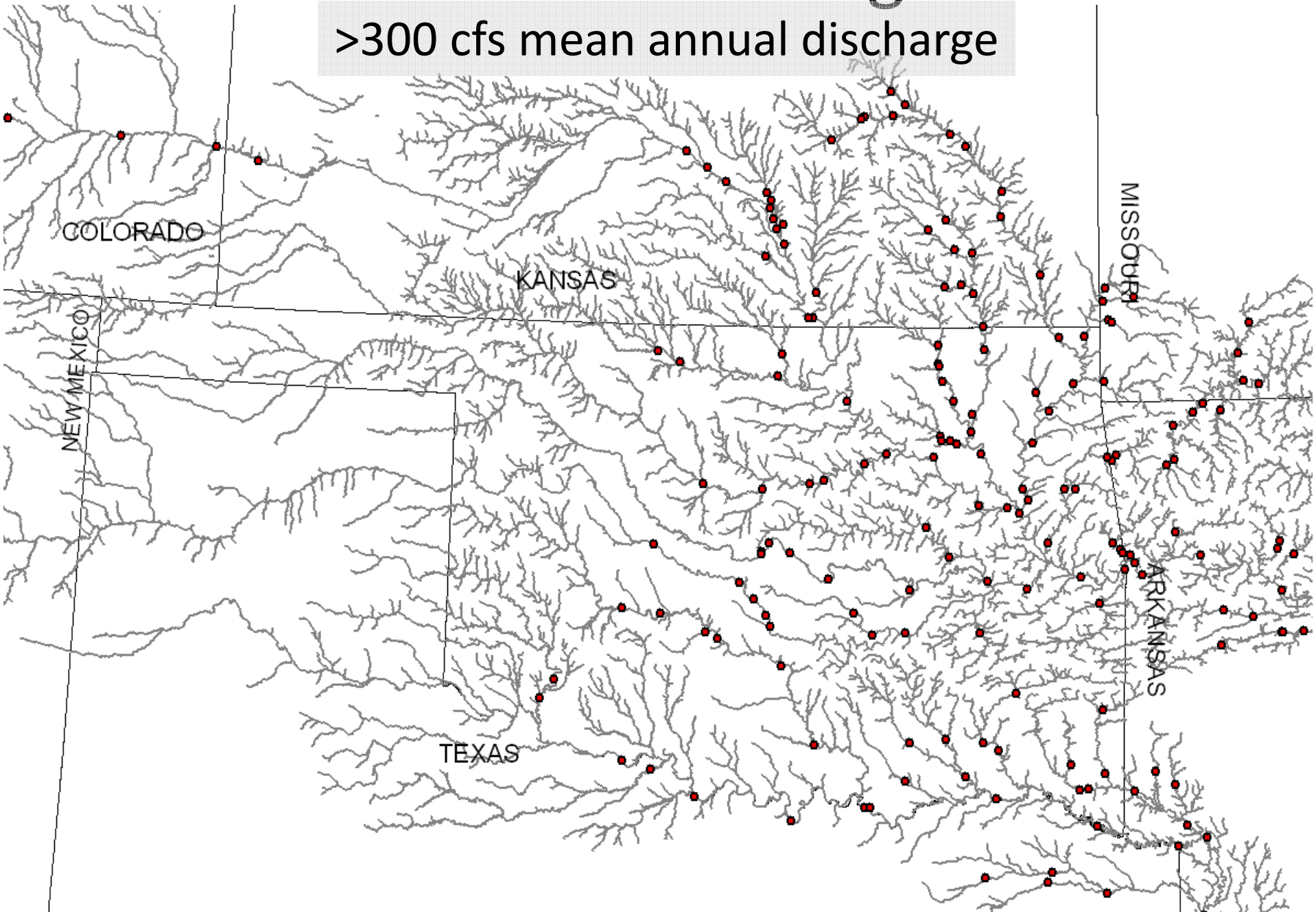


# USGS Stream Gages



# USGS Stream Gages

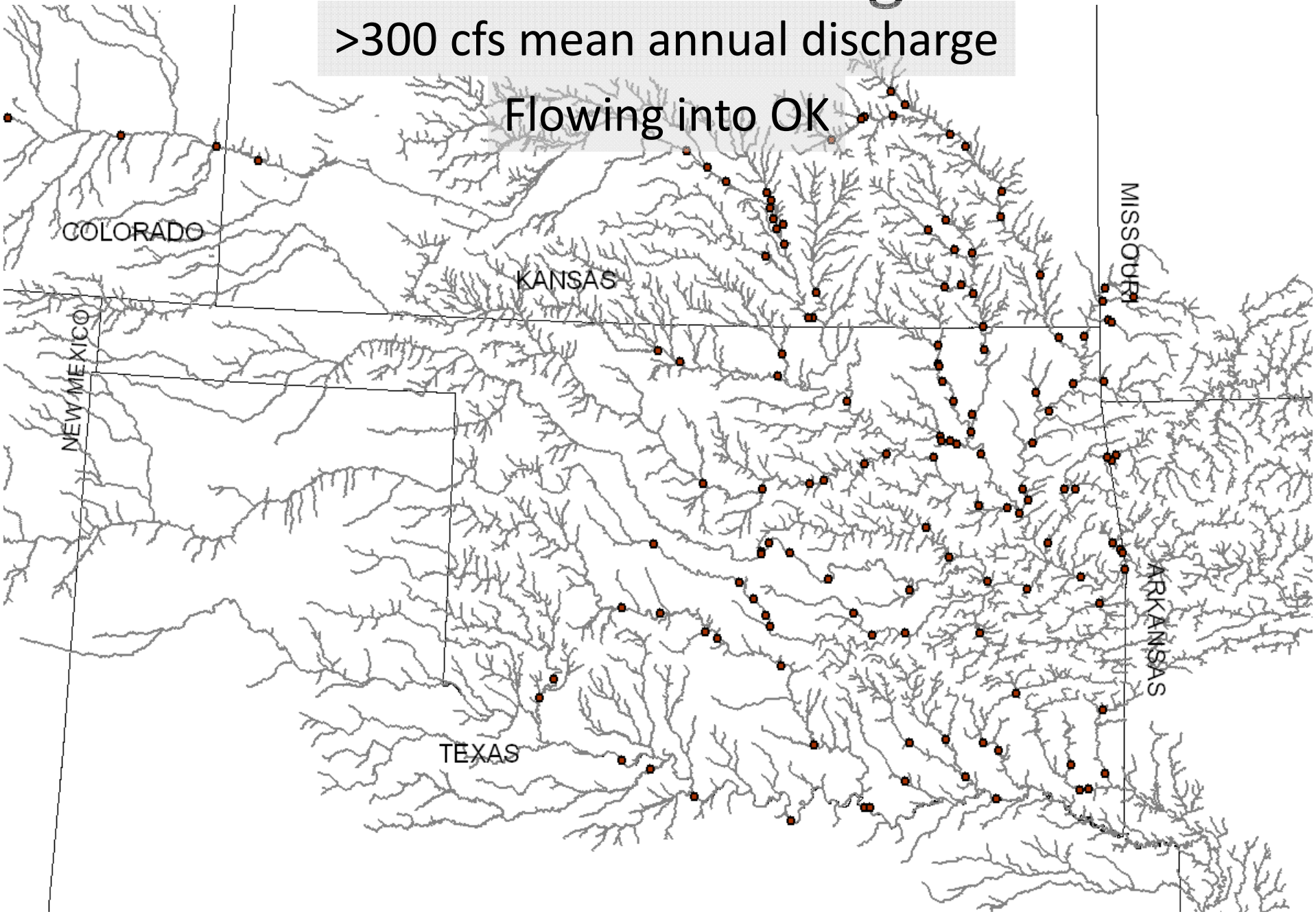
>300 cfs mean annual discharge



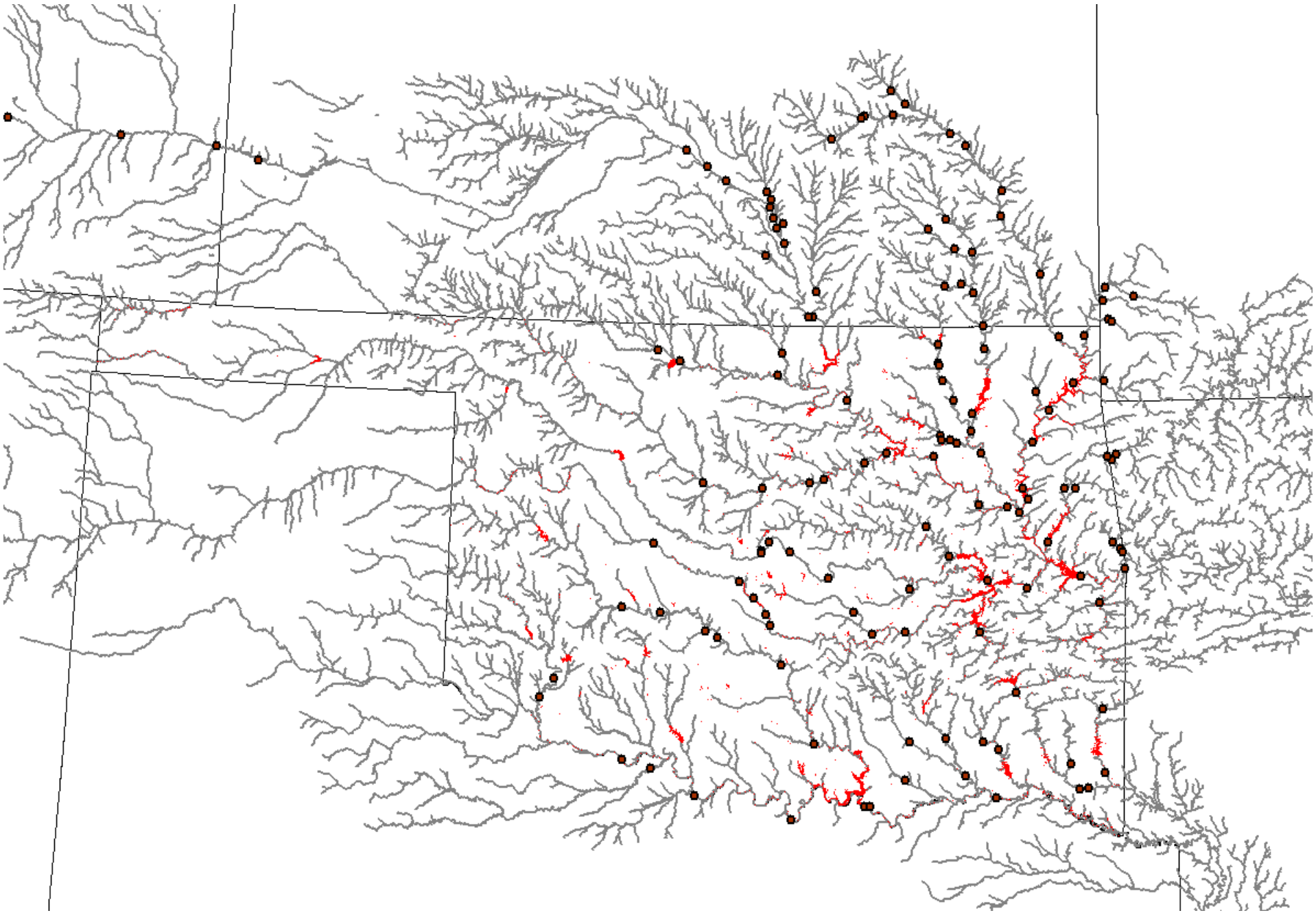
# USGS Stream Gages

>300 cfs mean annual discharge

Flowing into OK

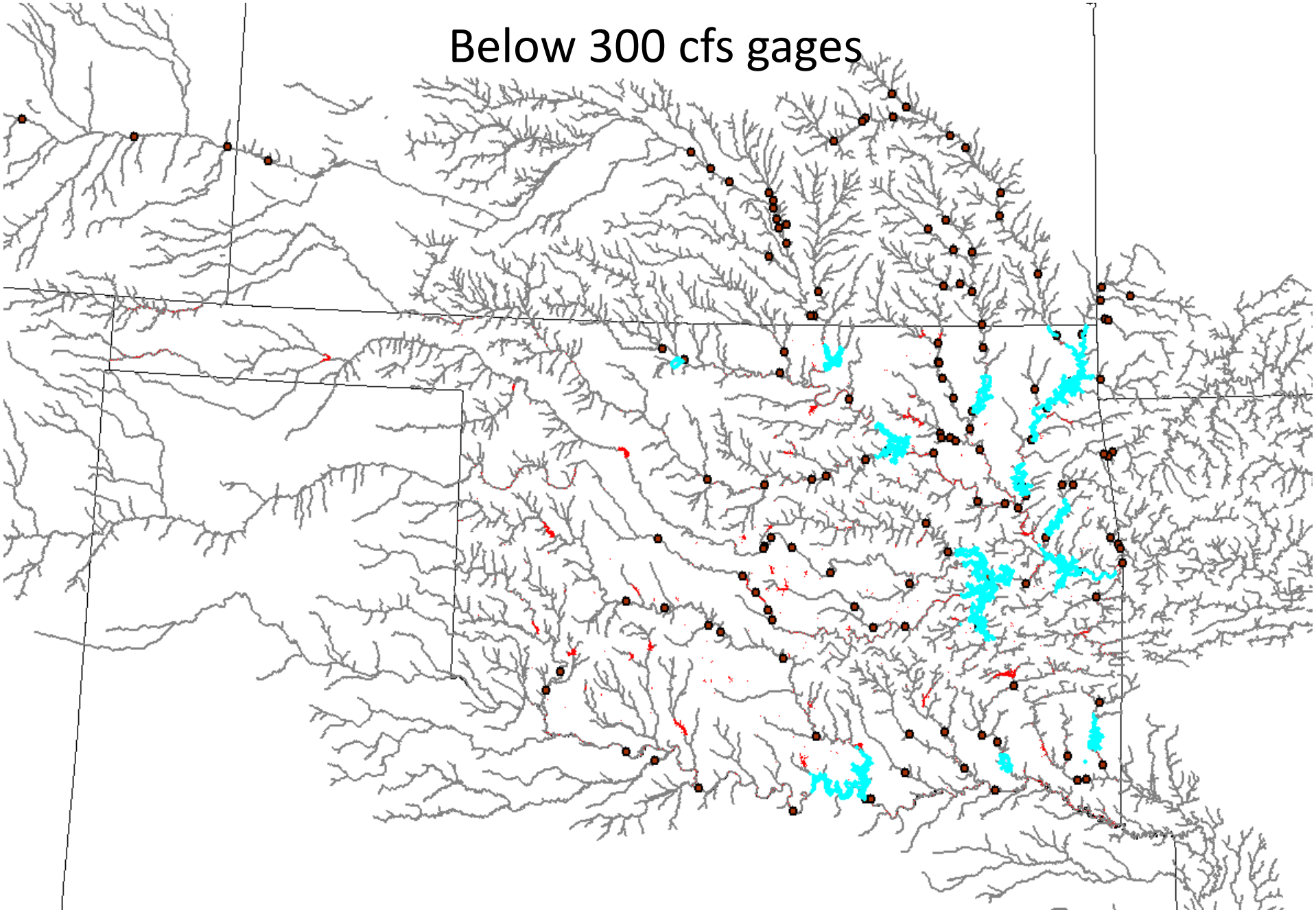


# Reservoirs in OK



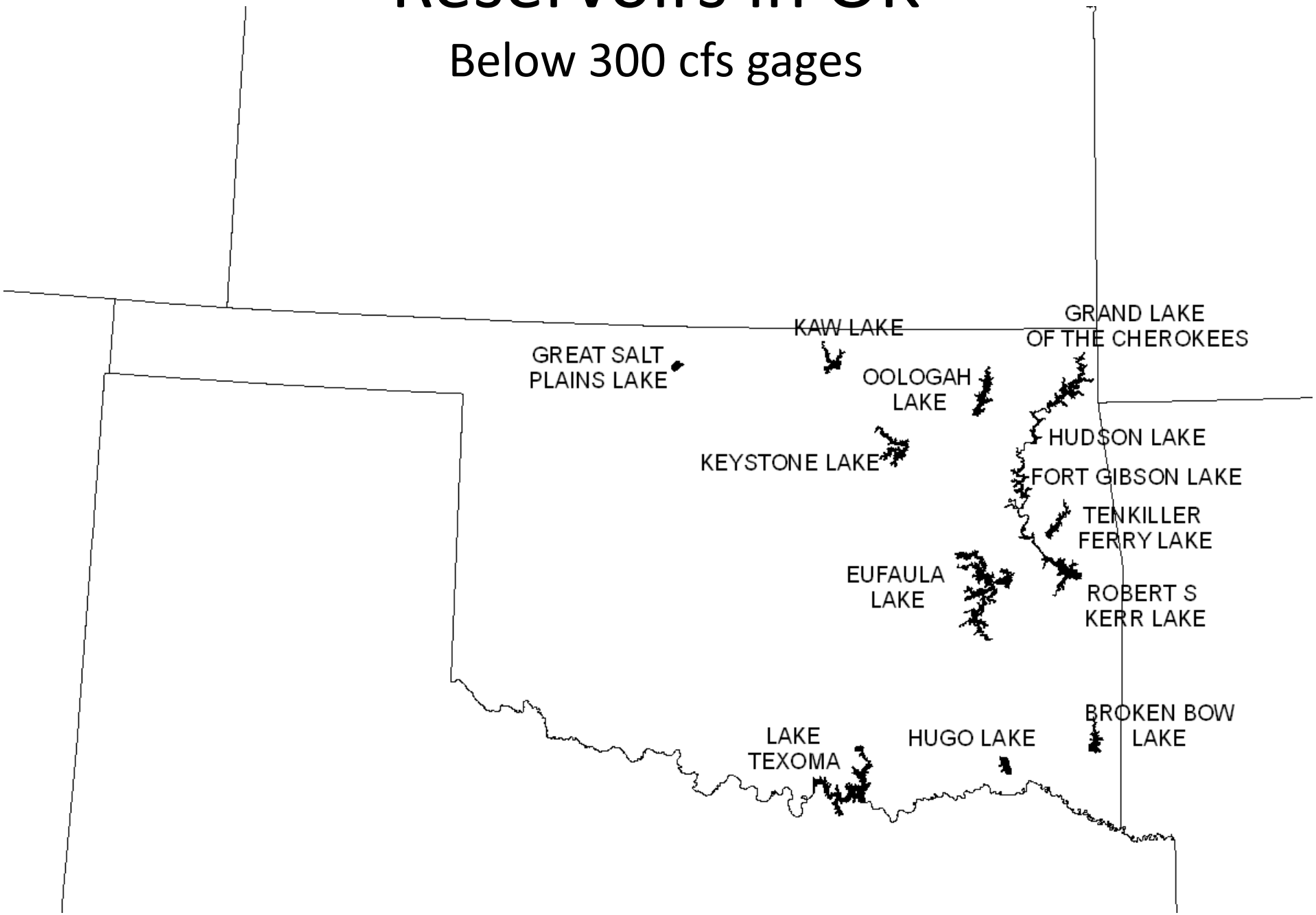
# Reservoirs in OK

## Below 300 cfs gages



# Reservoirs in OK

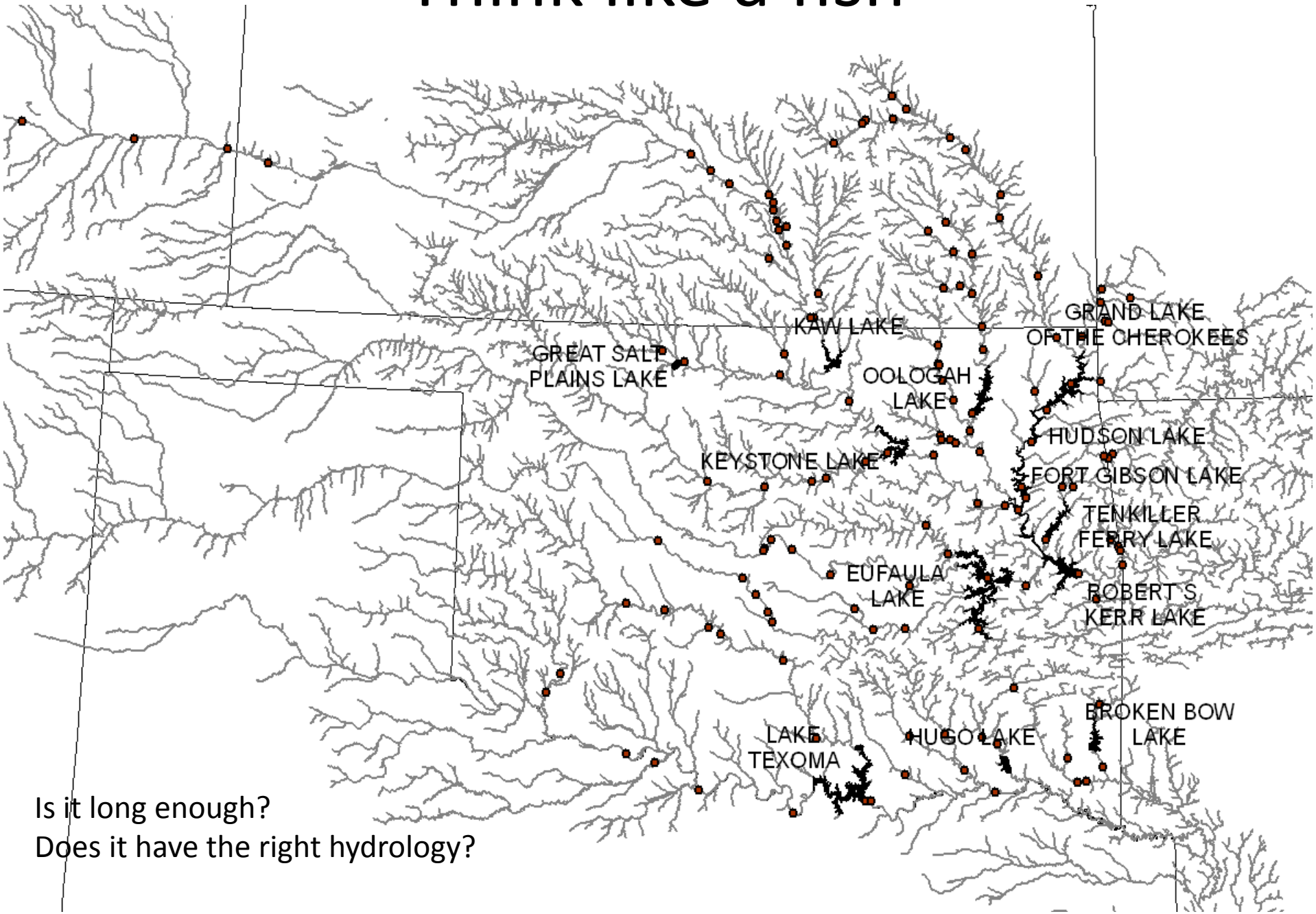
## Below 300 cfs gages



# Bighead Carp Reproduction

- Large river
  - >300 mean annual cfs
- 100 km free-flowing

# Think like a fish




Is it long enough?
Does it have the right hydrology?

# Dams and hydrology


Distance from reservoir to first upstream dam at least 100 km

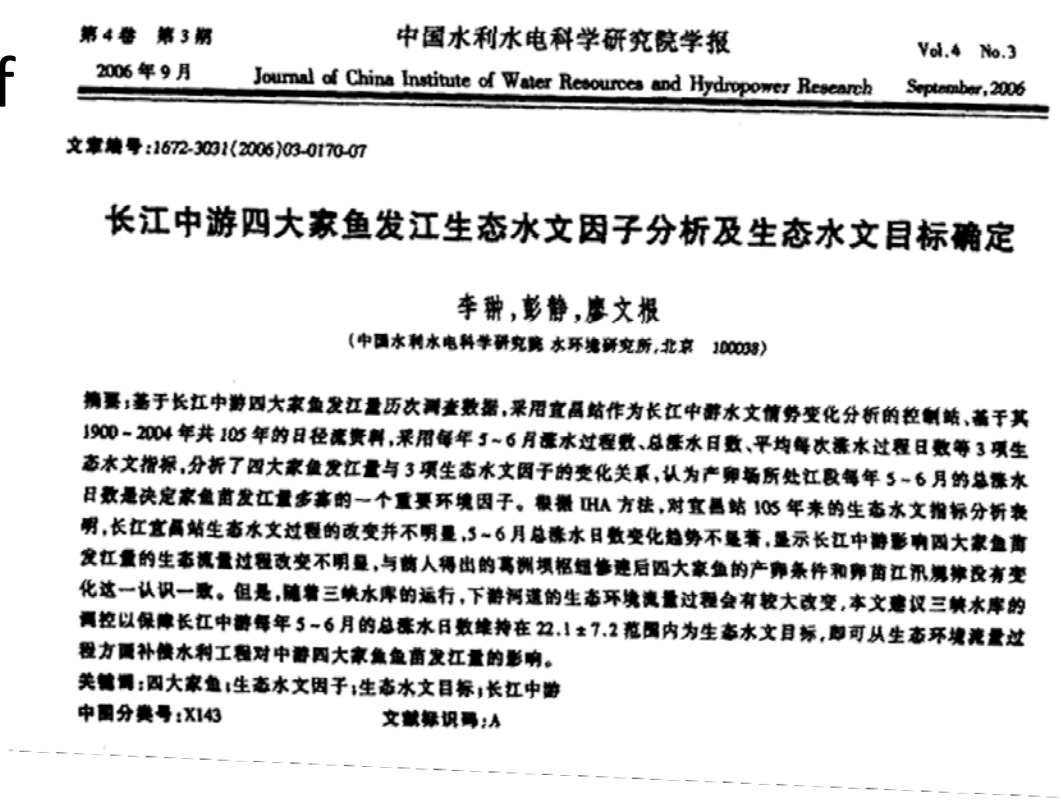
# Bighead Carp Reproduction

- Large river
  - >300 mean annual cfs
- 100 km free-flowing
- Hydrology
  - Sufficient flow to maintain egg suspension during development

# Days of Discharge Rise (DDS)

## May-June

- Mean number of days of discharge rise calculated over the period of record
- Most upstream USGS gage that has mean annual cfs ≥300 and is at least 100 km from reservoir.



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长江中游四大家鱼发江生态水文因子分析及生态水文目标确定

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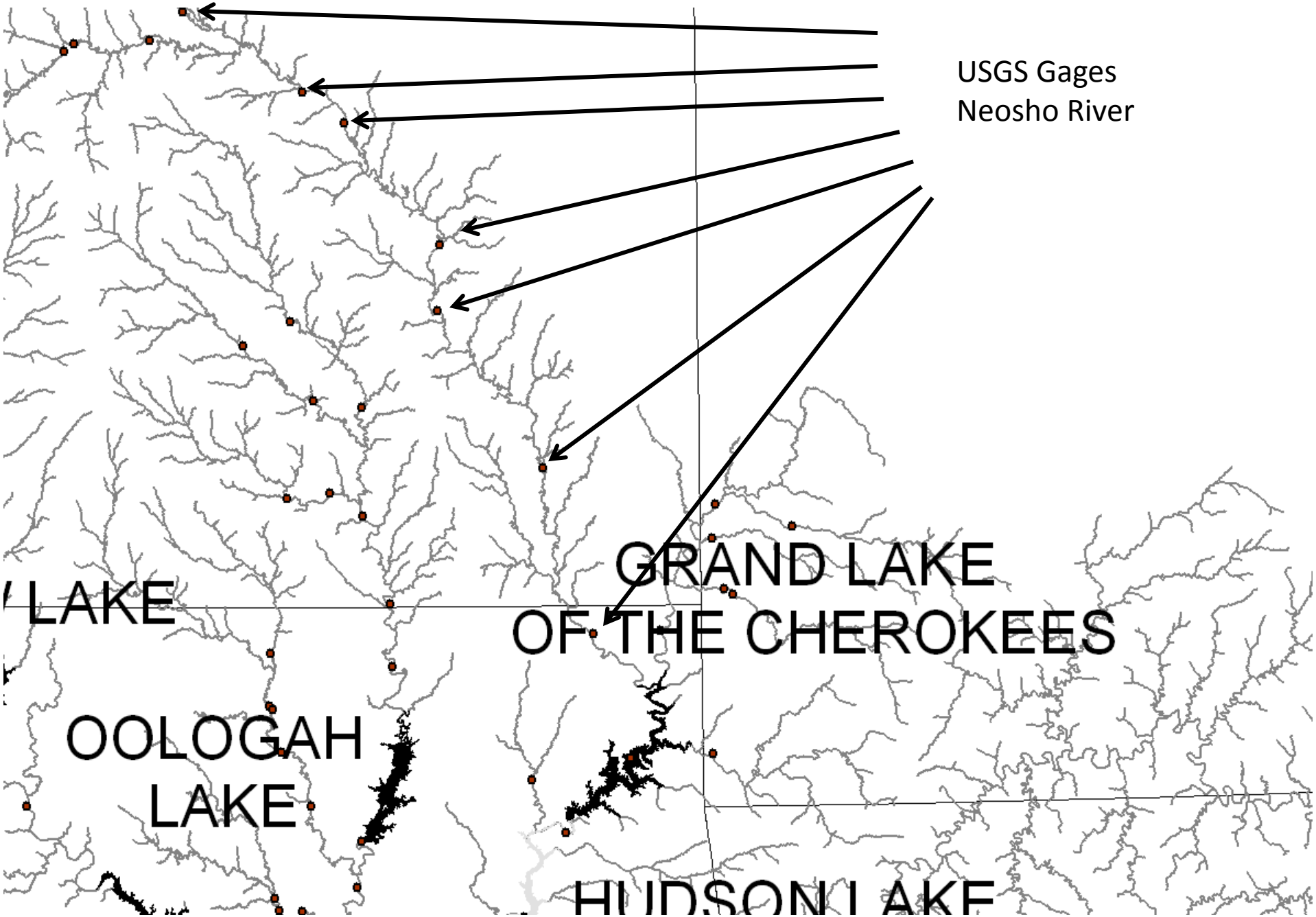
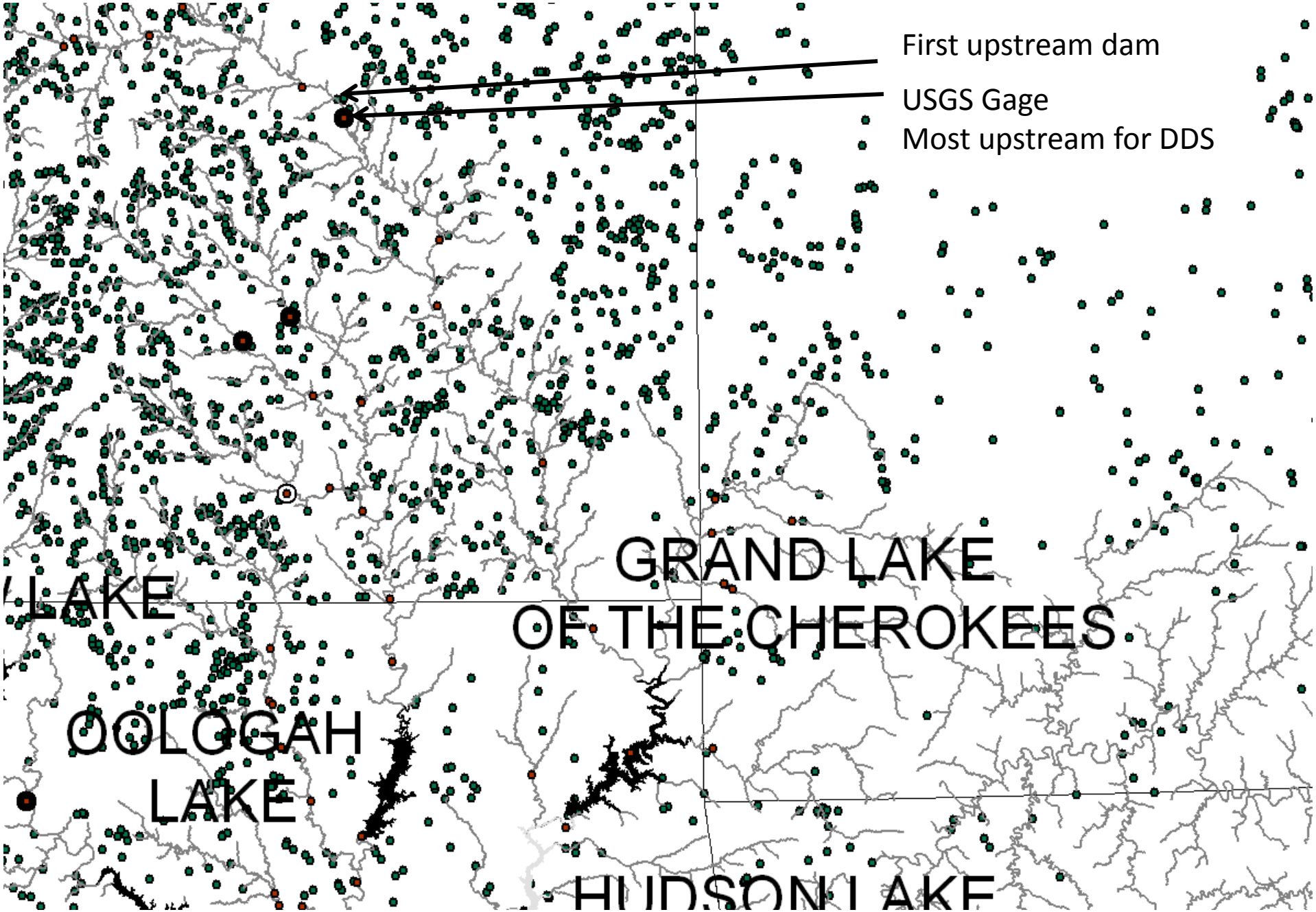
摘要:基于长江中游四大家鱼发江量历次调查数据,采用宜昌站作为长江中游水文情势变化分析的控制站,基于其1900~2004年共105年的日径流资料,采用每年5~6月涨水过程数、总涨水日数、平均每次涨水过程日数等3项生态水文指标,分析了四大家鱼发江量与3项生态水文因子的变化关系,认为产卵场所处江段每年5~6月的总涨水日数是决定家鱼苗发江量多寡的一个重要环境因子。根据IHA方法,对宜昌站105年来的生态水文指标分析表明,长江宜昌站生态水文过程的改变并不明显,5~6月总涨水日数变化趋势不显著,显示长江中游影响四大家鱼苗发江量的生态流量过程改变不明显,与前人得出的葛洲坝枢纽修建后四大家鱼的产卵条件和卵苗江孔规律没有变化这一认识一致。但是,随着三峡水库的运行,下游河道的生态环境流量过程会有较大改变,本文建议三峡水库的调控以保障长江中游每年5~6月的总涨水日数维持在22.1±7.2范围内为生态水文目标,即可从生态环境流量过程方面补偿水利工程对中游四大家鱼鱼苗发江量的影响。

关键词:四大家鱼;生态水文因子;生态水文目标;长江中游
中图分类号:X143 文献标识码:A

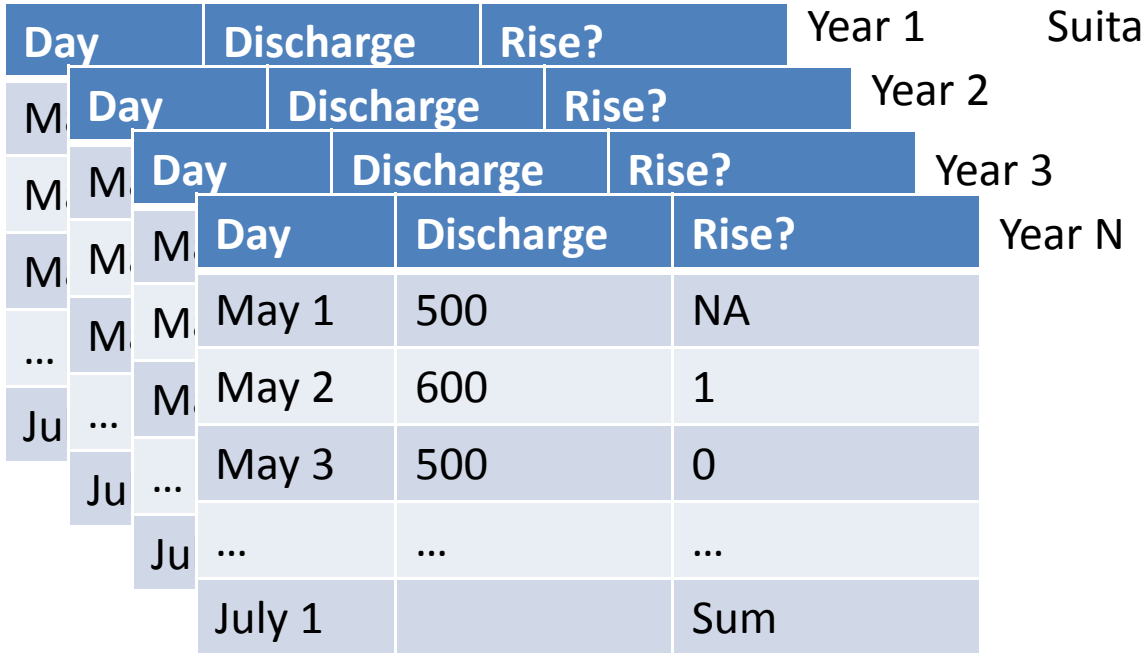

USGS Gages
Neosho River
LAKE
GRAND LAKE
OF THE CHEROKEES
OOLOGAH
LAKE
HUDSON LAKE


First upstream dam
USGS Gage
Most upstream for DDS
GRAND LAKE
OF THE CHEROKEES
OOLOGAH
LAKE

# Days of Discharge Rise (DDS)

May-June

Mean number of days of discharge rise calculated over the period of record for the most upstream USGS gage that has mean annual cfs ≥300 and is at least 100 km from reservoir.



# Bighead Carp Establishment Potential

Free-flowing (100 km above reservoir) river at least 300 cfs mean annual discharge with suitable hydrology (i.e., mean DDS >15 & <27)

Reservoir is suitable if at least 1 tributary meets this criteria

# Bighead Carp Establishment Potential

KAW LAKE

GREAT SALT PLAINS LAKE

OOLOGAH LAKE

GRAND LAKE OF THE CHEROKEES

HUDSON LAKE

FORT GIBSON LAKE

KEYSTONE LAKE

TENKILLER FERRY LAKE

EUFAULA LAKE

ROBERT S KERR LAKE

LAKE TEXOMA

HUGO LAKE

BROKEN BOW LAKE

**Reservoirs**

**BHC_Est**

suitable

unsuitable

**Big Rivers >300 cfs mean**

DDS Suitable

DDS Unsuitable

too short

**USGS Gauging Station**

DDS Suitable

DDS Unsuitable