Preliminary Results of Fish Community Structure Post 2011 Drought at Great Salt Plains Lake

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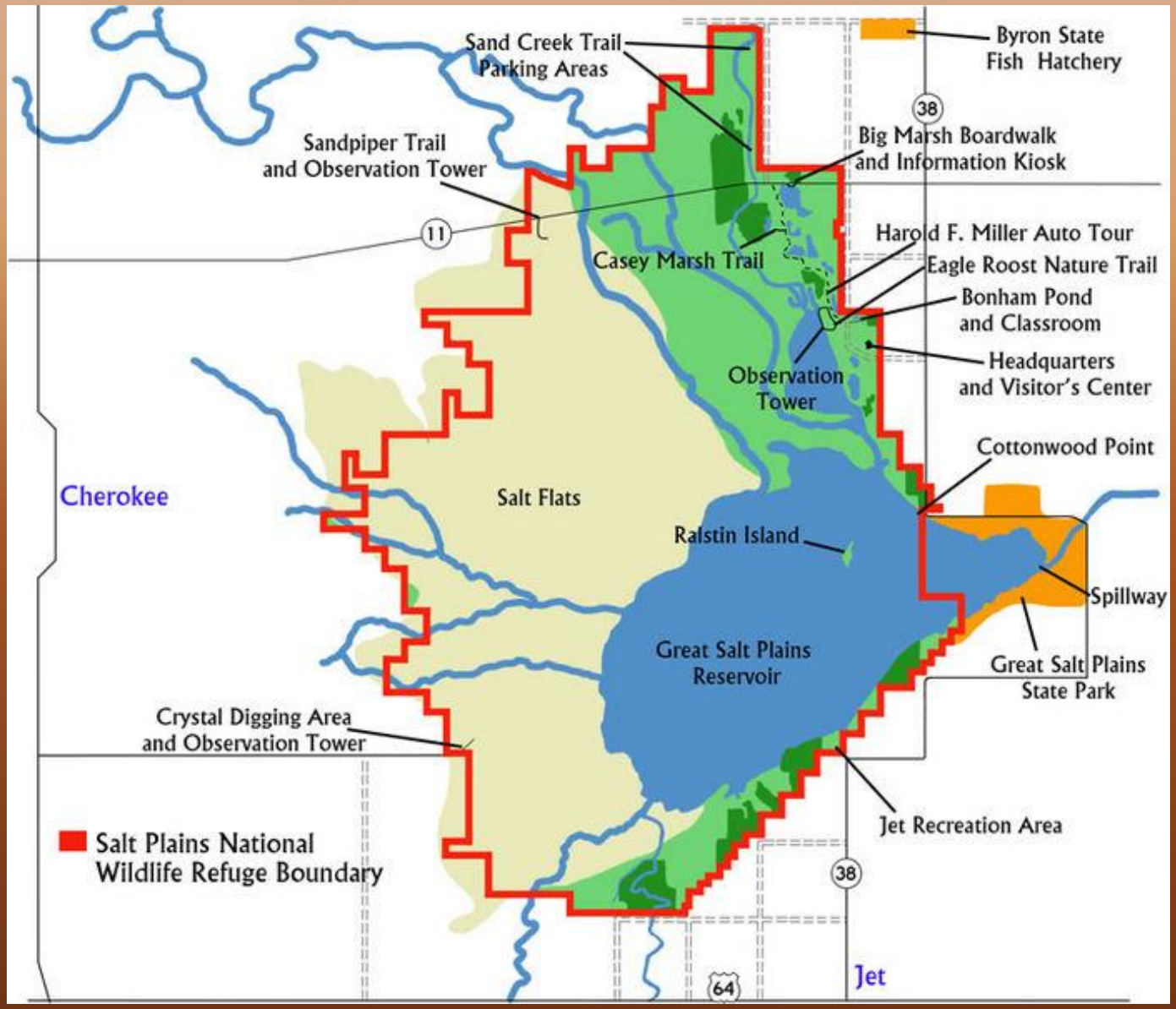
Great Salt Plains Lake (GSPL)

- **Created in 1941 by the U.S. Army Corps of Engineers on the Salt Fork of the Arkansas River in Alfalfa County**
- **The lake covers approximately 3700 hectares**
- **Mean depth < 0.5 meters**
- **Turbidity is very high**
- **Great Salt Plains Lake has under gone substantial siltation and is hypereutrophic**
- **Great Salt Plains Lake is saline**

Great Salt Plains Lake



Great Salt Plains Lake

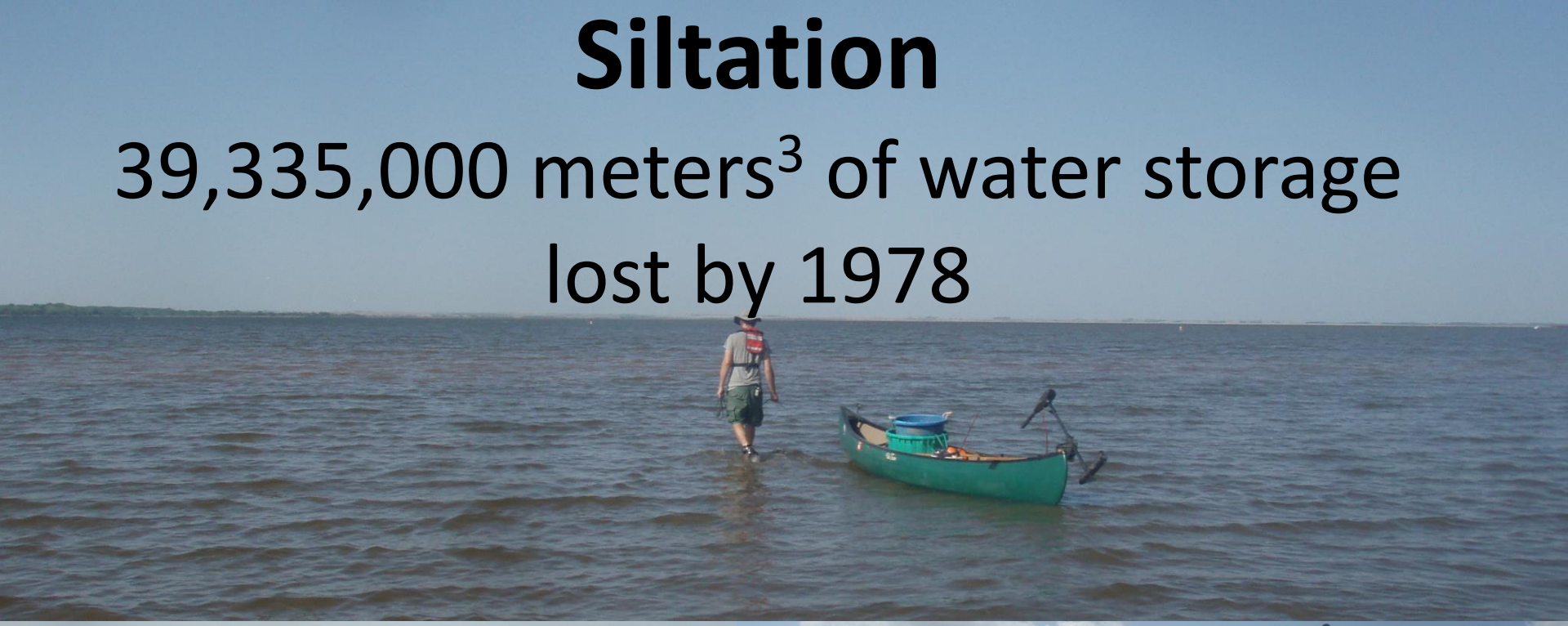
Very little information is available on fishes in GSPL, with only 3 published surveys: one in the lake and its tributaries (Jenkins 1949), one in selected tributaries (Ashbaugh et al. 1996), and one that covered shoreline and tributaries on the north side of the lake only (Schweitzer and Leslie 1996).

Great Salt Plains Lake

Jenkins (1949) comprehensively sampled the ichthyofauna of GSPL with seines, gillnets, and angling at 14 sites when the lake was only 8 years old from June to December, 1948. Jenkins (1949) found 23 species of fish including several sensitive to turbidity (e.g. the Carmine shiner (*Notropis percobromus*), Arkansas River shiner (*Notropis girardi*), and Speckled dace (*Macrhybopsis aestivalis*)) suggesting high quality fish habitat existed immediately after impoundment.

Siltation

39,335,000 meters^3 of water storage lost by 1978



Turbidity

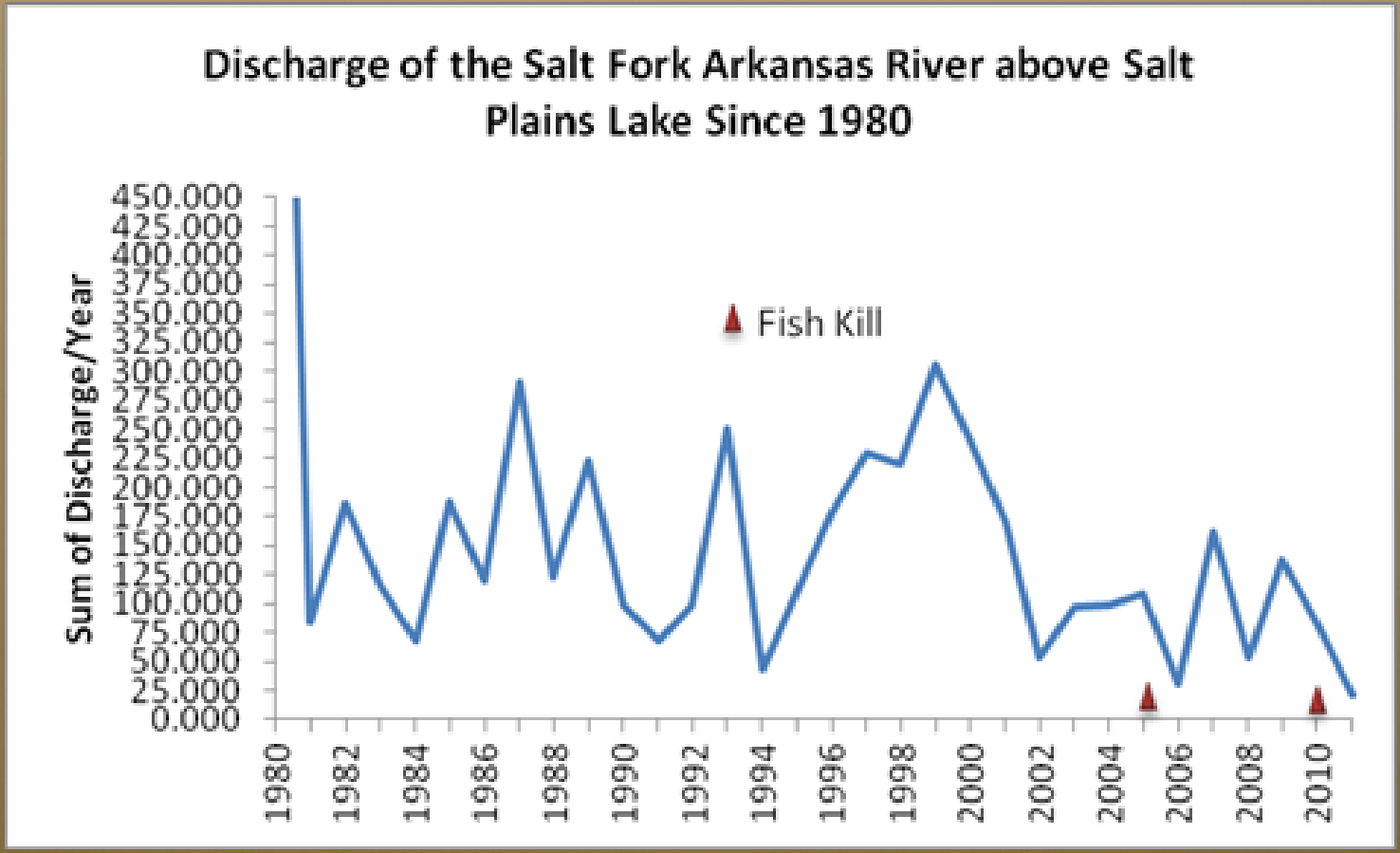
"Not Supporting" of fish and wildlife propagation (Oklahoma Water Resource Board 2006)

Drought

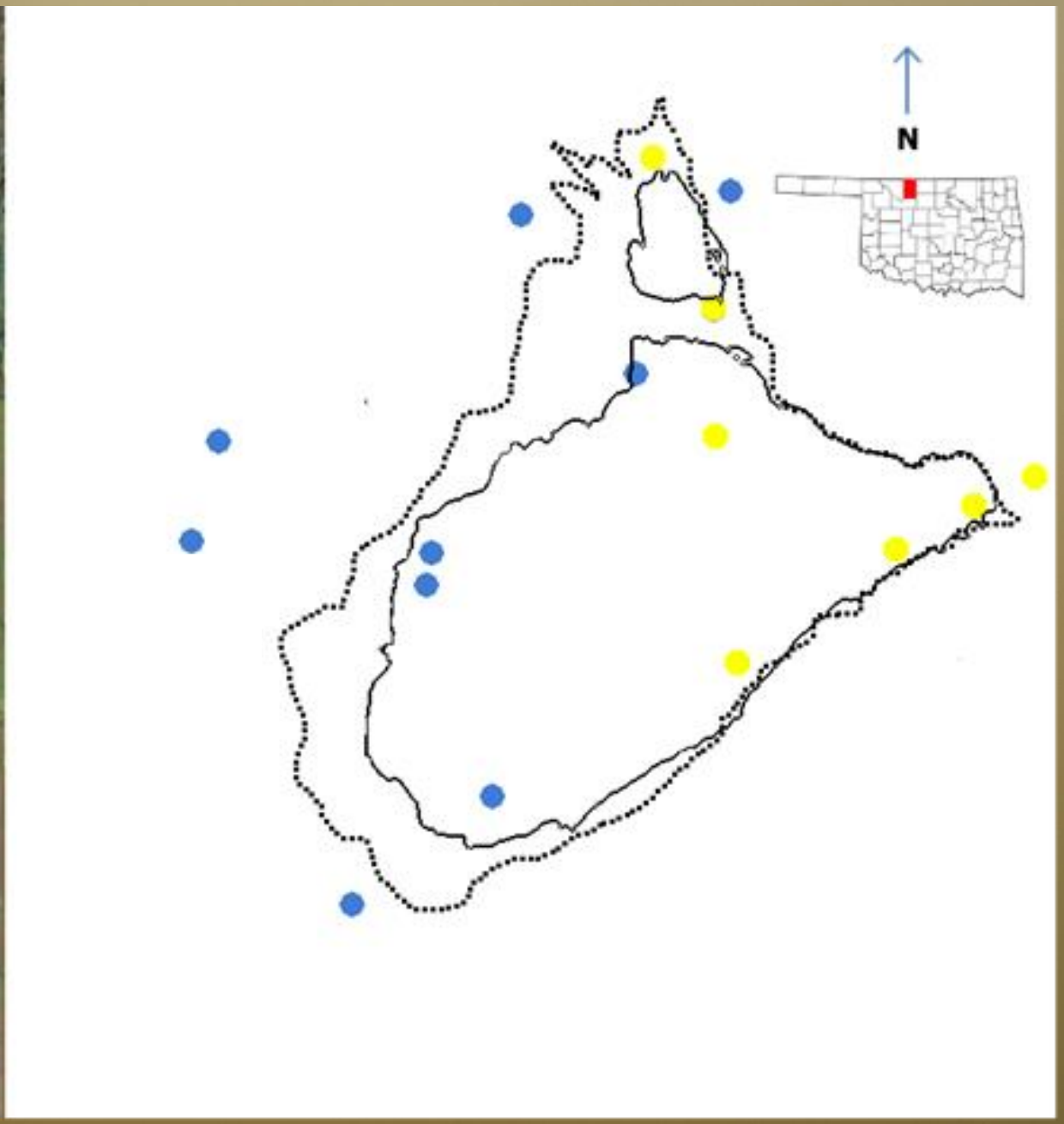
The sever droughts in 2011 and 2012 resulted in fish kills. Some species may have been extirpated from the lake during these events.

Drought

Two recent fish kills




Dam
Back Bay
Salt flats
Dam
Reservoir
Back Bay
Salt flats
Dam
Reservoir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Great Salt Plains Lake (full pool)

Great Salt Plains Lake (drought, 2012)

Drought

Even the turtles have been impacted

Found in 1948 and not since

Carmine shiner (Notropis percobromus)

Arkansas River shiner (Notropis girardi)

Speckled dace (Macrhybopsis aestivalis

<u>Found in 1948 and not since</u>

Species absence most likely due to increased turbidity?

Picture: Secchi depth ≈ 2cm with wind at 5.44 knots from the West

(Carp in gillnet >8cm ahead)

Important sanctuary for many species of birds

Purpose: Recreation

The importance of GSPL as a recreational destination has been declining for some time. At its height in 1966, over 800,000 people visited the lake for mostly boating related activities. By 2007, visitation had been reduced to 129,338 (U.S. Army Corps of Engineers Tulsa District 2010). Siltation and high turbidity were believed to be the reason for this decrease in visitation, which has had a negative impact to the local economy (U.S. Army Corps of Engineers Tulsa District 2010). However, an increase in wildlife and bird watching and selenite crystal digging may explain an increase in visitation between 2008 and 2009, though still well below the height observed ~ 50 years ago (U.S. Army Corps of Engineers Tulsa District 2010).

Purpose: Flood Control

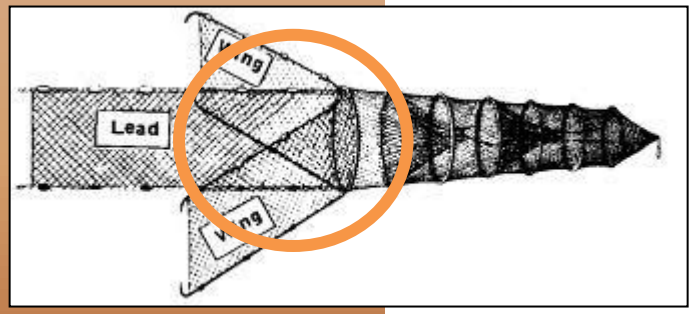
- **Over $239 million in flood damages have been prevented since its impoundment.**
- **Still functioning as flood control to some degree.**

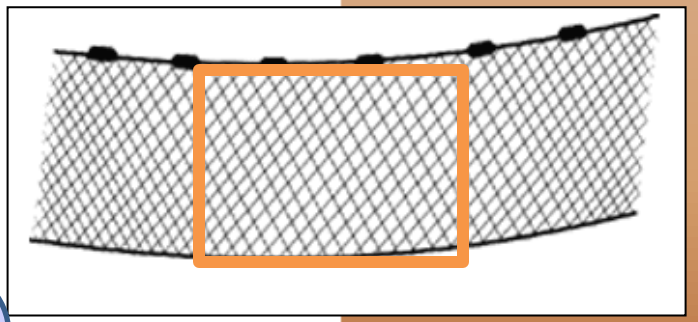
The future of GSPL

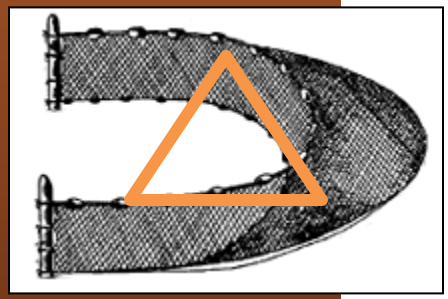
Currently, there is a debate as to how to proceed with the management of GSPL because of its reduced water storage capacity and altered recreational purpose.

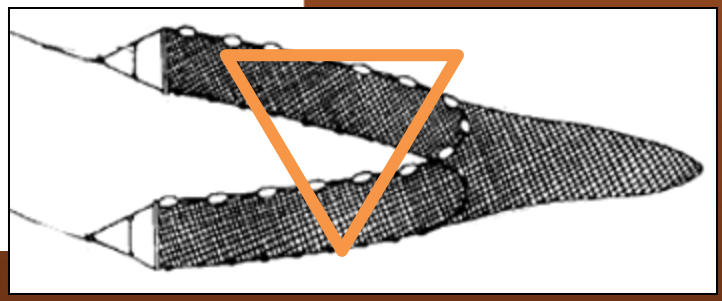
Comprehensive survey of the Ichthyofauna in GSPL

Sampling So Far









Findings

The bulk of the biomass in the lake:
common carp and inland silversides

Findings

Species Composition of GSPL (all sites) 2012
Species
Gizzard shad (*Dorosoma cepedianum*)
River carpsucker (*Carpoides carpio*)
Common carp (*Cyprinus carpio*)
Red shiner (*Cyprinella lutrensis*)
Sand shiner (*Notropis stramineus*)
Fathead minnow (*Pimephales promelas*)
Channel catfish (*Ictalurus punctatus*)
Plains killifish (*Fundulus zebrinus*)
Mosquitofish (*Gambusia affinis*)
Green sunfish (*Lepomis cyanellus*)
Bluegill (*Lepomis macrochirus*)
Largemouth bass (*Micropterus salmoides*)
Black crappie (*Pomoxis nigromaculatus*)
Plains Minnow (*Hybognathus placitus*)
Number of species: 14

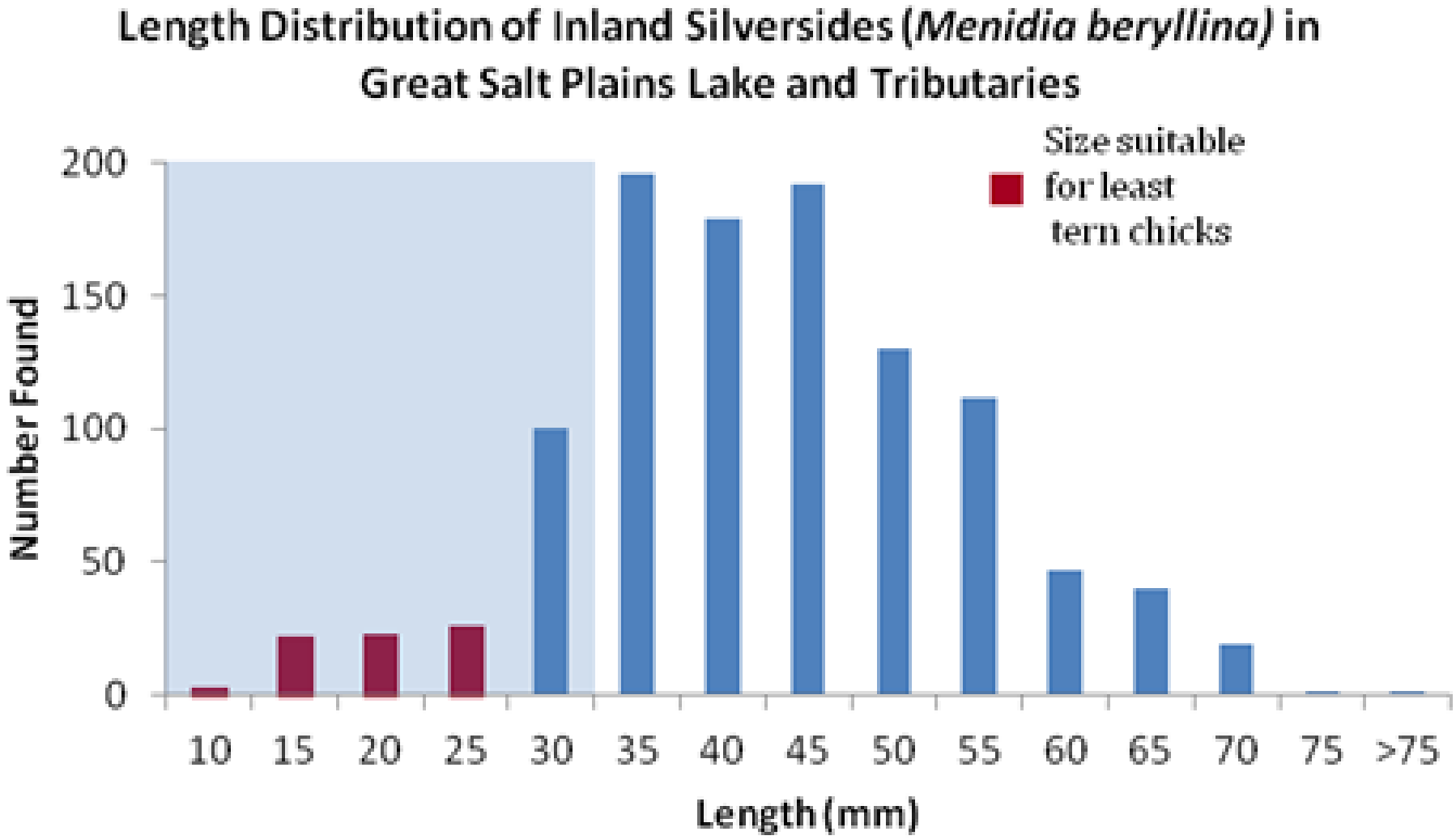
Findings

Species Composition of GSPL and the adjacent system in 1949			
Species	Tributaries	Lake	Below spillway
Gizzard shad (*Dorosoma cepedianum*)		X	X
River carpsucker (*Carpoides carpio*)	X	X	X
Common carp (*Cyprinus carpio*)	X	X	X
Carmine shiner (Plains shiner) (*Notropis percobromus*)	X	X	X
Red shiner (*Cyprinella lutrensis*)	X	X	X
Arkansas River shiner (*Notropis girardi*)		X	X
Sand shiner (*Notropis stramineus*)	X	X	
Fathead minnow (*Pimephales promelas*)	X	X	X
Channel catfish (*Ictalurus punctatus*)	X	X	X
Black bullhead (*Ameiurus melas*)	X	X	X
Plains killifish (*Fundulus zebrinus*)	X	X	X
Mosquitofish (*Gambusia affinis*)	X	X	
Green sunfish (*Lepomis cyanellus*)	X	X	X
Orangespotted sunfish (*Lepomis humilis*)	X	X	X
Bluegill (*Lepomis macrochirus*)		X	
Longear sunfish (*Lepomis megalotis*)	X		
Largemouth bass (*Micropterus salmoides*)	X	X	X
Black crappie (*Pomoxis nigromaculatus*)	X		X
Suckermouth minnow (*Phenacobius mirabilis*)	X		X
Speckled dace (*Macrhybopsis aestivalis*)			X
Silver chub (*Macrhybopsis storeriana*)			X
River shiner (*Notropis blennius*)			X
Plains Minnow (*Hybognathus placitus*)	X	X	X
Total species per site:	17	17	19

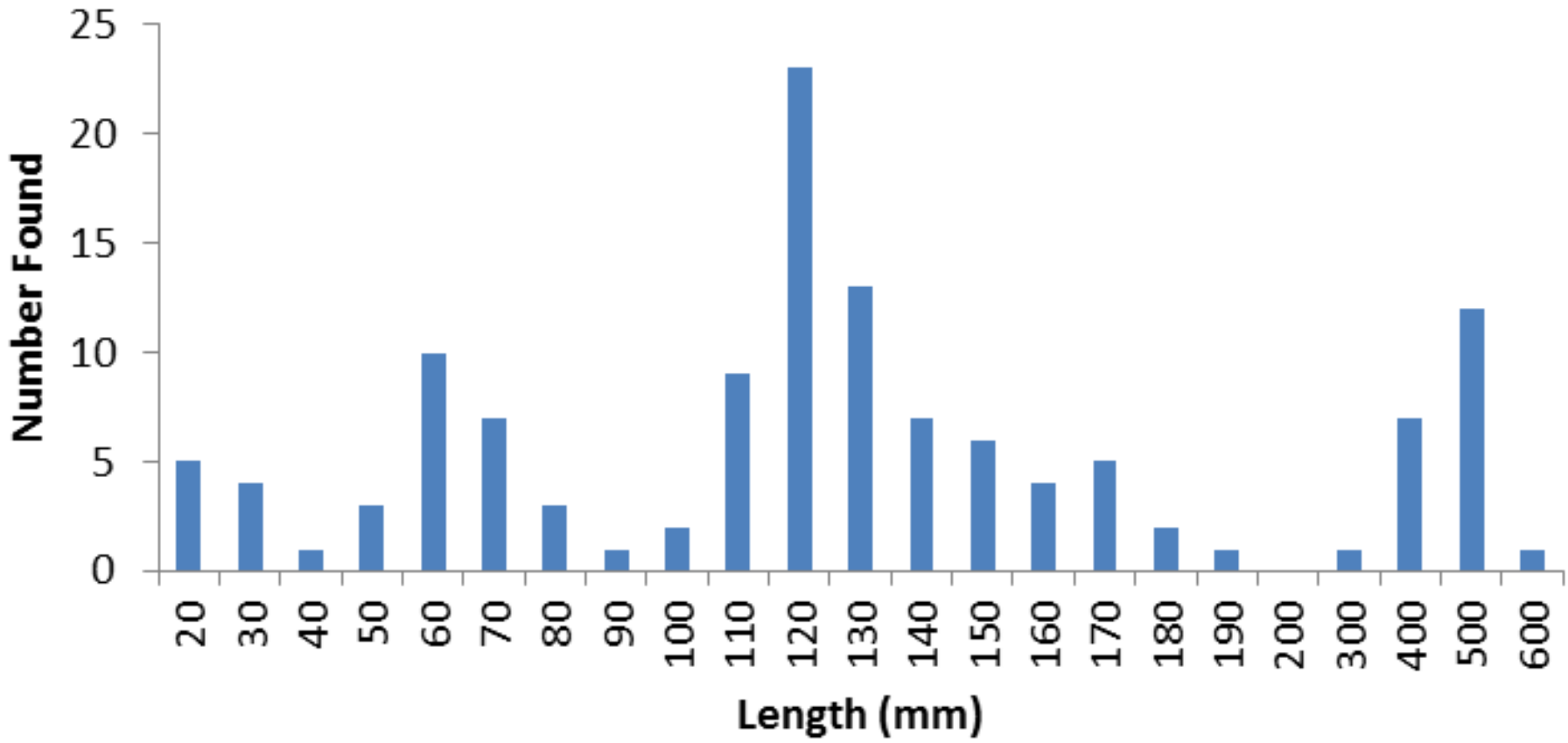
Findings

Species Composition of GSPL and tributaries in 1996	Ashbaugh et al.	Schweitzer and Leslie
Gizzard shad (*Dorosoma cepedianum*)	X	X
Common carp (*Cyprinus carpio*)	X	X
Emerald shiner (*Notropis atherinoides*)	X	X
Red shiner (*Cyprinella lutrensis*)	X	X
Hybrid striped bass (*Morone hybrid*)	X	
Sand shiner (*Notropis stramineus*)	X	X
Fathead minnow (*Pimephales promelas*)	X	X
Bullhead minnow (*Pimephales vigilax*)	X	
Channel catfish (*Ictalurus punctatus*)	X	X
Inland silverside (*Menidia beryllina*)	X	X
Plains killifish (*Fundulus zebrinus*)	X	X
Mosquitofish (*Gambusia affinis*)	X	X
Green sunfish (*Lepomis cyanellus*)	X	
Orangespotted sunfish (*Lepomis humilis*)	X	X
Bluegill (*Lepomis macrochirus*)	X	
Plains Minnow (*Hybognathus placitus*)	X	X

Findings


Length Distribution of Inland Silversides (*Menidia beryllina*) in Great Salt Plains Lake and Tributaries
Size suitable for least tern chicks
Number Found
200
150
100
50
0
10
15
20
25
30
35
40
45
50
55
60
65
70
75
>75
Length (mm)

Findings


Length Distribution of Cyprinus carpio in Great Salt Plains Reservoir and Tributaries
Number Found
0
5
10
15
20
25
20
30
40
50
60
70
80
90
100
110
120
130
140
150
160
170
180
190
200
300
400
500
600
Length (mm)

Preliminary conclusions and observations

- The effects of drought and siltation has negatively affected the ichthyofauna species richness in GSPL, and has resulted in a shift of the dominate fish species
- Bird watching has become more popular in recent years at GSPL and may be a good alternative to fishing and boating

Literature Cited

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Questions?