

Valuing Aquatic Ecosystem Services: Applications to Recreational Fisheries in Oklahoma



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Fishing in Oklahoma

- Any given year, about 20% of Oklahomans will go fishing
- Oklahoma is great for fishing; its reputation for bass fishing is growing
- The value of these fisheries is threatened by water quality problems, loss of public access



Learning about Angler Preferences

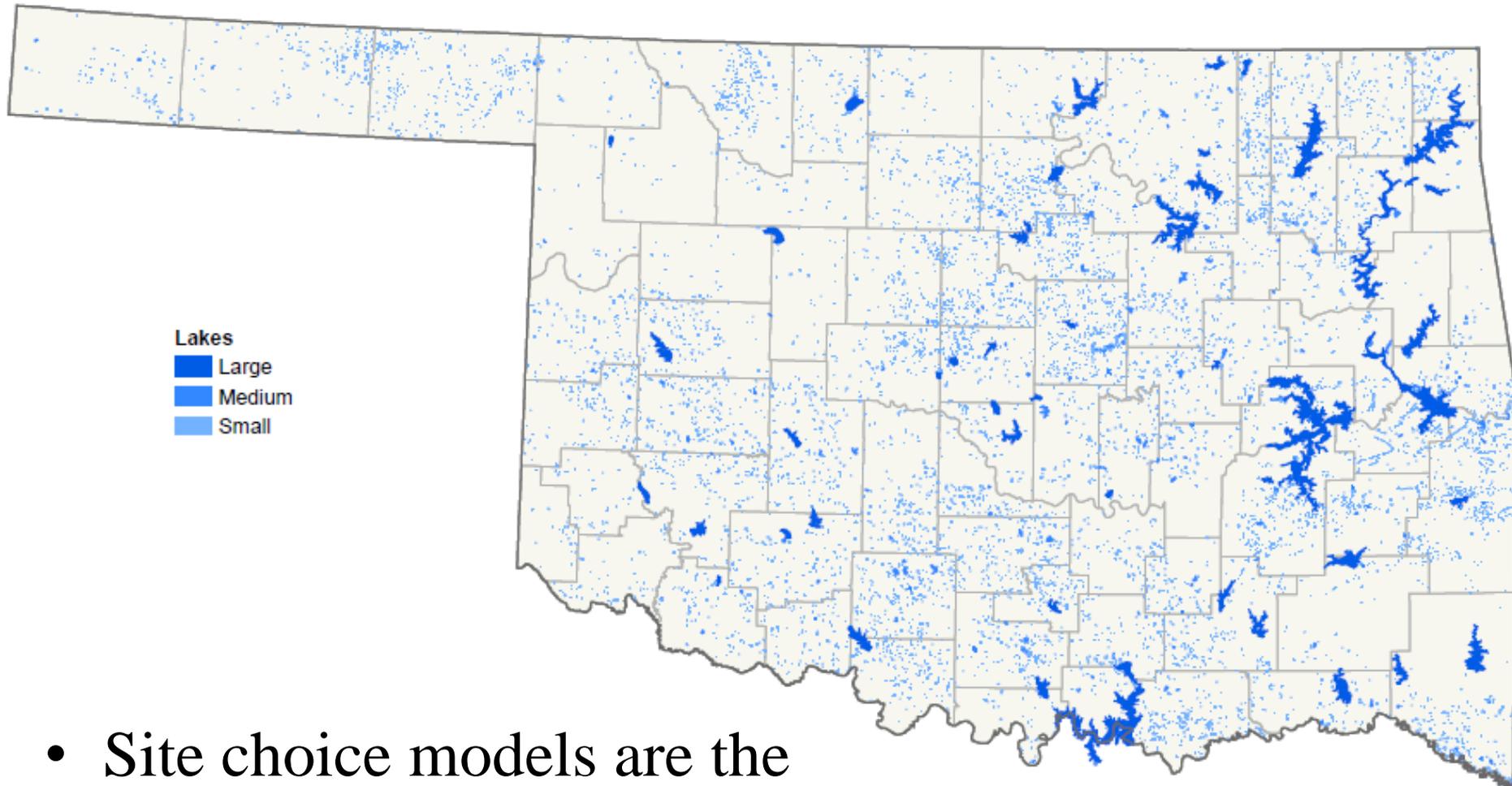
- We need a better understanding of angler preferences and values
- Need information about the cultural ecosystem service value of fisheries
 - Cultural value \neq spending



Research Objectives

- Measure the tradeoffs anglers make when they choose where to fish
 - Use information about tradeoffs to estimate the cultural ecosystem service value of Oklahoma lakes
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- Learn about attitudes toward changing “harvest fisheries” to “catch and release fisheries” for vulnerable species

Model 1: Statewide Fishing



- Site choice models are the work-horse model economists use to value recreation

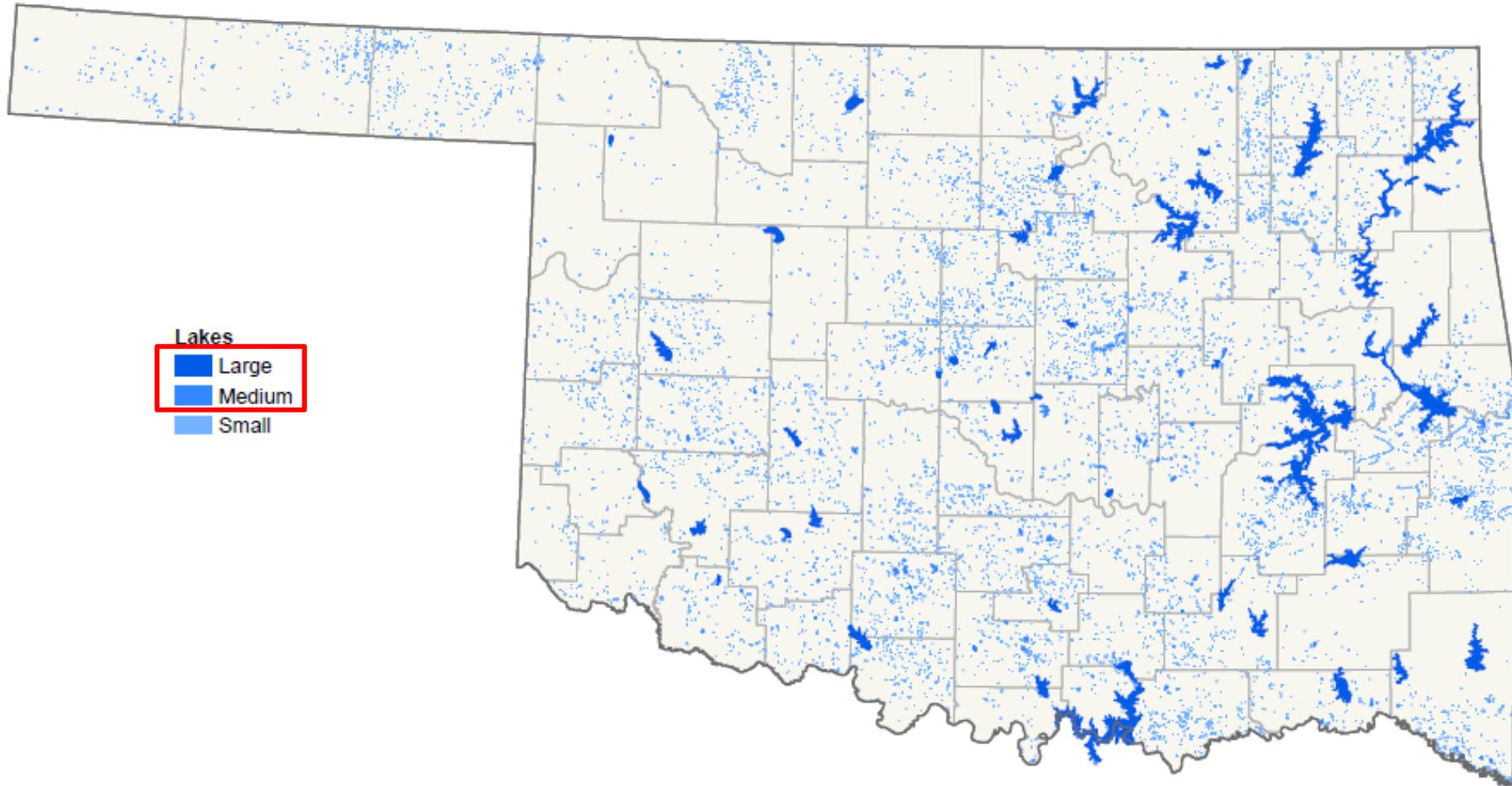
Model 1: Statewide Fishing Data

- Environmental variables that we hypothesize anglers' care about
 - Fish abundance and catch rates
 - Amount of shoreline
 - Driving costs
 - Number of boat ramps
 - Water clarity, e.g. Secchi depth
 - State programs like Close to Home fishing program

Model 1: Statewide Fishing Data

- We received data on approximately ~650 fishing trips from a 2014 fall survey of anglers
- Came up with a list about ~150 public lakes (reservoirs) in Oklahoma

Model 1: Statewide Fishing



Model 1: Results

Lake characteristic	Impact on trips to lake
Black bass abundance	+
Walleye abundance	+
Catfish abundance	NS
Crappie abundance	NS
Shoreline	+
Travel cost	-
Number of boat ramps	+
Secchi depth	+
Close to Home program	+

“-” indicates increases in this variable is associated with fewer trips

“+” indicates increases in this variable is associated with more trips

“NS” indicates the variable was not significantly associated with trip patterns

Model 1: Results

Scenarios (examples)	Value per Trip
50% increase in black bass at all lakes	\$4.65
50% increase in walleye at Canton Lake	\$6.97
50% increase in Secchi depth at all lakes	\$3.56
Eliminate Close to Home program	\$-0.29

- Average value of a fishing trip to a lake: \$60
- Annual value of lake for fishing: $\$60 \times \text{annual trips}$

Model 1: Results

- The model can be used to estimate the number of trips to each site. Examples:

Lake	Annual trips	Lake	Annual trips
Altus City	1,253	John Wells	2,018
American Horse	Closed	Kaw	90,838
Arbuckle	44,267	Kerr	156,250
Arcadia	69,218	Keystone	260,279
Ardmore City	3,616	Kitchen	14,469
Canton	23,150	Markham Ferry	141,433
Carl Albert	1,335	McAlester	7,823
Carl Blackwell	59,612	McGee Creek	38,469
Carter	1,546	Mountain	1,916

Model 1: Results

- We also find that site choice is seemingly more random for some anglers than others
- This may be because some anglers prefer variety

Model 2: Fishing for Paddlefish



- **Paddlefish are considered a vulnerable species and require careful management**

Model 2: Fishing for Paddlefish

- The paddlefish is increasingly popular with resident and non resident anglers
- So managers no longer allow unrestrictive harvesting
- But the paddlefish population in Oklahoma remains at risk

Model 2: Fishing for Paddlefish

- Question: How would anglers react if “catch and release” was applied to certain sites?
- To answer this question, a “choice experiment” was developed

Model 2: Data

- The choice experiment was done in a 2015 survey:

5. Suppose you are trying to decide whether to fish for paddlefish and there are two sites from which to choose. The sites have different characteristics as shown in the table, but otherwise they are the same (they have the same scenery and the same number of anglers). Please compare the sites and check one box to indicate if you prefer Site A, Site B or to stay home.

Three alternatives {

Key site characteristics {

	Site A	Site B	Stay Home
Typical daily paddlefish catch	10	20	I would prefer to stay home if these were my only choices.
Paddlefish daily keep limit	0	1	
Water body type	lake	river	
Miles from your home	5	125	
Which would you choose?	<input type="checkbox"/>	<input type="checkbox"/>	

Angler chooses one

Model 2: Results

Fishing Site Characteristic	Impact on number of trips
Paddlefish abundance/catch	+
Catch and release rule	-
River	NS
Travel cost	-

- Anglers indicated that they prefer sites without the catch and release regulation

Model 2: Results

- But anglers do prefer the sites with catch and release regulations if, relative to other sites,
 - The driving distance is short
 - The catch rate is large
- Value of increase catch by 1 fish/day: \$8
- Value of switching a site to catch and release: -\$72

Conclusions

- In general, anglers value:
 - Higher fish abundance
 - Shorter driving distances
 - Clearer water
 - Sites without catch and release restriction
- But
 - Some anglers do not care about site quality (or at least they behave as if they do not)
 - Anglers are okay with catch and release if they are fairly “compensated” in terms of ecosystem services

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