Estimating the Economic Value of Recreational Fishing and Water Management in Lake Okeechobee, Florida

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GEER Conference
4/24/25

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Lake Okeechobee Management Challenges

Non-Native Species

Source: FWC Flickr

Source: USACE

Nutrient Loading

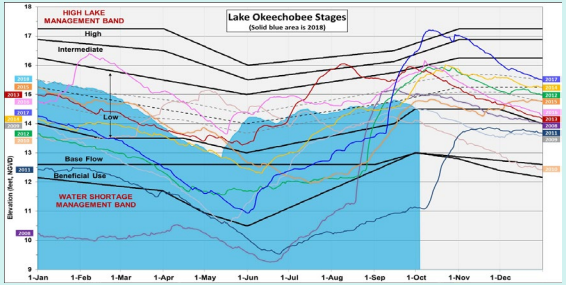
+P **+N**

Algal Blooms in Lake

Source: NOAA Earth Observatory

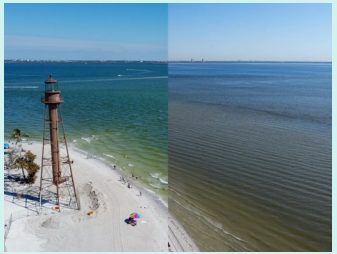
Stakeholders

Lake Level Fluctuation + Control



Source: USACE

Algal Blooms in Estuaries

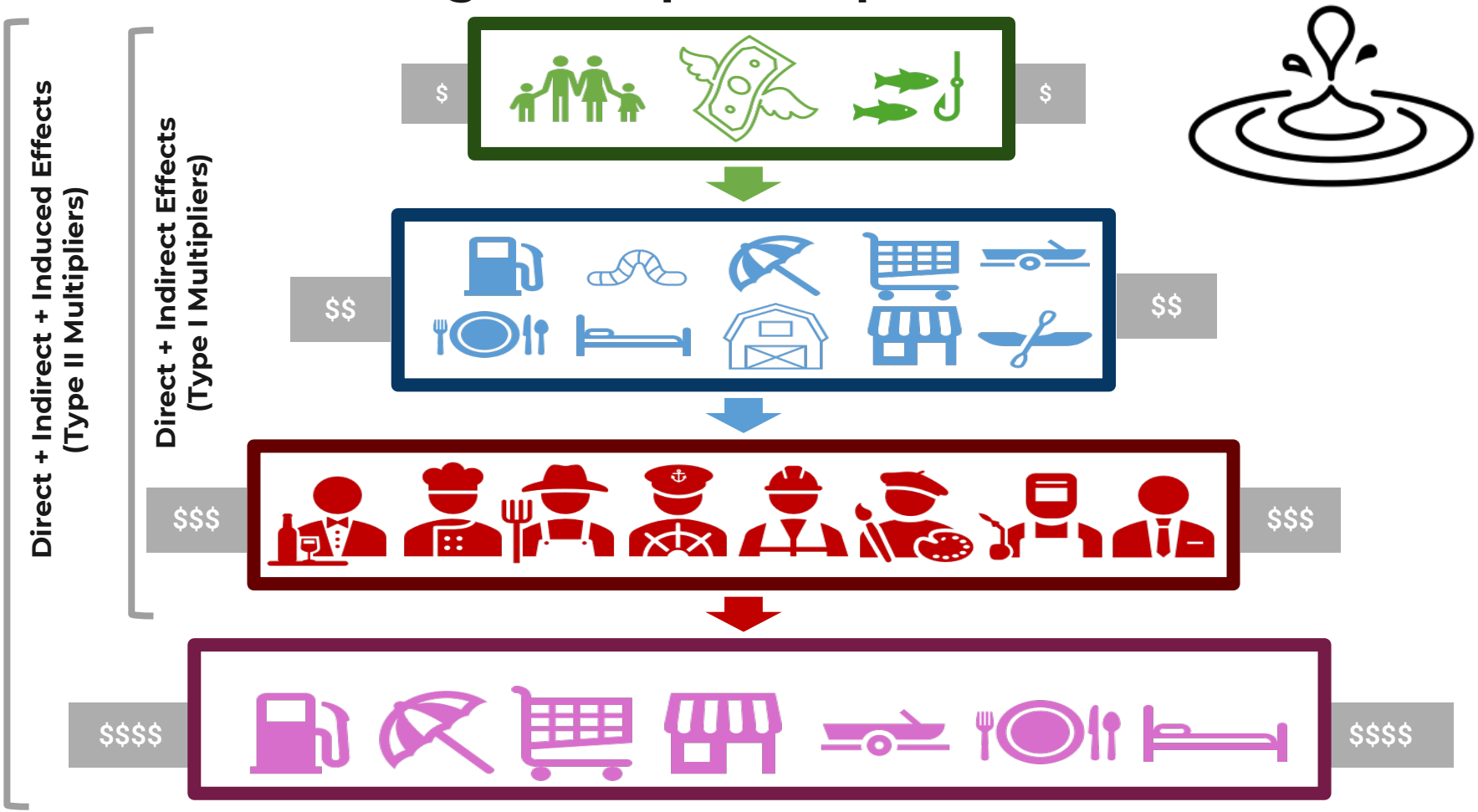


Source: Captains for Clean Water

Research Questions

1. What is the economic impact of recreational fishing in Lake Okeechobee?
2. How do real Lake Okeechobee anglers respond to shifting ecological conditions?
3. What is the economic impact of Lake Okeechobee harmful algal bloom scenarios?

Regional Input-Output Model



Model Framework

Goal	**Economic impacts of fishing and algae in Lake Okeechobee**		
Essential Information	**Perception and Spending Data + Proportion of Spending**	**Industry multipliers + Sensitivity Analysis**	**Harmful Algal Bloom (HAB) Scenarios**
Data Sources	Online angler survey for proportion of spending data (**Qualtrics**)	Regional Input-Output Model (RIMS II) industry multipliers (**BEA**)	Florida seasonal tourism data (**Visit Florida**)
	Florida Statewide Comprehensive Outdoor Recreation Plan (SCORP) spending data (**FDEP**)	Monte Carlo simulations to predict a range of possible outcomes	Literature review of Lake Okeechobee algae dynamics

Florida Outdoor Recreation Data (FDEP)

How much do anglers **spend**?

	Freshwater Boat Fishing		Shoreline Fishing		Non-Boat Fishing	
County	Resident Spending	Visitor Spending	Resident Spending	Visitor Spending	Resident Spending	Visitor Spending
Glades	$3,748	$28,202	$18,062	$27,074	$22	$60,164
Hendry	$34,290	$191,844	$165,261	$184,170	$274,324	$409,266
Martin	$237,043	$15,196,398	$500,361	$4,778,512	$395,329	$5,853,957
Okeechobee	$2,930	$701,567	$88,252	$238,728	$69,727	$940,620
Palm Beach	$74,468,877	$121,748,448	$17,691,566	$48,868,474	$1,160,863	$28,577,066
Total	**$74,746,888**	**$137,866,459**	**$18,463,502**	**$54,096,958**	**$1,900,265**	**$35,841,073**

But **what did they spend money on**?

Online Survey Data Collection

	Spending on Trip ($USD)
Lodging, including campgrounds	
Food, drink, refreshments and ice	
Public transportation by airplane, car rental	
Private vehicle transportation	
Guide or charter fees	
Fishing licenses and tags	
Live and dead bait	
Boat and equipment rental	
Boat moorage, maintenance, storage, insurance, etc.	
Boat fuel	

Online survey gathered **share of expenditures** on goods and services by angler group

+

Share **spent in Florida**

What percentage of your **freshwater** fishing **trip** expenditures were made in the state of **Florida** in **2019**? Expenses should not include items purchased from national online suppliers such as Amazon or eBay.

0 10 20 30 40 50 60 70 80 90 100

% of Expenditures made in Florida

But how does this impact **specific economic industries**?

Methods

Spending Data + Proportion of Spending | **Industry multipliers + Sensitivity Analysis** | Harmful Algae Bloom Scenarios

What are the **impacted economic industries**, and how **connected** are they to the Florida economy?

Expenditure	Output	Earnings	Employment	Value-Added
Lodging, including campgrounds				
Accommodation	1.884	0.549	12.0174	1.1531
Food, drink, refreshments, and ice				
Food and beverage stores	1.966	0.6317	18.4765	1.2367
Full-service restaurants	2.0291	0.6751	17.3403	1.2053
Limited-service dining	2.028	0.542	16.8152	1.0728
All other food and drinking	2.1207	0.7911	21.9763	1.3006

Source: BEA RIMS II Multipliers

What is the **probability** of impact?

Monte Carlo Variable/Parameter	Distribution
Share of regional food and drink purchases, Share of producer regional sale purchases, RIMS II multipliers across multiple industries	Uniform
RIMS II multipliers for expenses related to one industry	Fixed
Share of consumer purchases in Florida by angler group and expenditure type	Normal

Expenditure ÷ Proportion of Expenditures × Industry Multipliers + Monte Carlo = Economic Impact of Lake O fishing

Lake Okeechobee Angler Economic Impacts

	Output ($)		Earnings ($)		Jobs		Value-Added ($)	
Angler Type	Mean	Std. Dev	Mean	Std. Dev	Mean	Std. Dev	Mean	Std. Dev
Boat Angler								
Resident	107,028,646	13,429,303	32,379,141	4,105,557	710	91	63,710,910	8,011,915
Visitor	144,590,008	45,226,848	43,679,432	13,675,384	967	304	87,276,903	27,309,875
Shoreline Angler								
Resident	26,581,684	4,059,032	16,860,045	2,639,425	400	62	31,316,590	4,872,658
Visitor	52,415,467	16,349,237	17,229,453	5,376,993	389	122	33,333,861	10,397,985
Non-Boat Angler								
Resident	2,591,087	407,830	788,692	126,248	21	3	1,529,454	241,637
Visitor	35,502,341	11,131,798	10,847,797	3,402,692	255	80	21,156,107	6,636,054
Grand Total	**$369 million**		**$122 million**		**2,743 jobs**		**$238 million**	

How could **harmful algal blooms** impact the economy?

How do **harmful algal blooms** impact Florida's economy?

Month (2019)	Visitation Rate/ Month (Visit Florida)	Less Severe	Moderately Severe	More Severe	Extreme
March	9.03%	0%	0%	0%	30%
April	8.21%	0%	0%	10%	30%
May	8.21%	10%	10%	15%	40%
June	8.21%	13%	15%	20%	50%
July	8.27%	15%	20%	30%	65%
August (PEAK)	**8.27%**	**20%**	**25%**	**40%**	**75%**
September	8.27%	15%	20%	40%	65%
October	7.83%	13%	20%	30%	50%
November	7.83%	10%	15%	20%	40%
December	7.83%	0%	10%	15%	30%
January	9.03%	0%	0%	10%	30%
February	9.03%	0%	0%	0%	30%

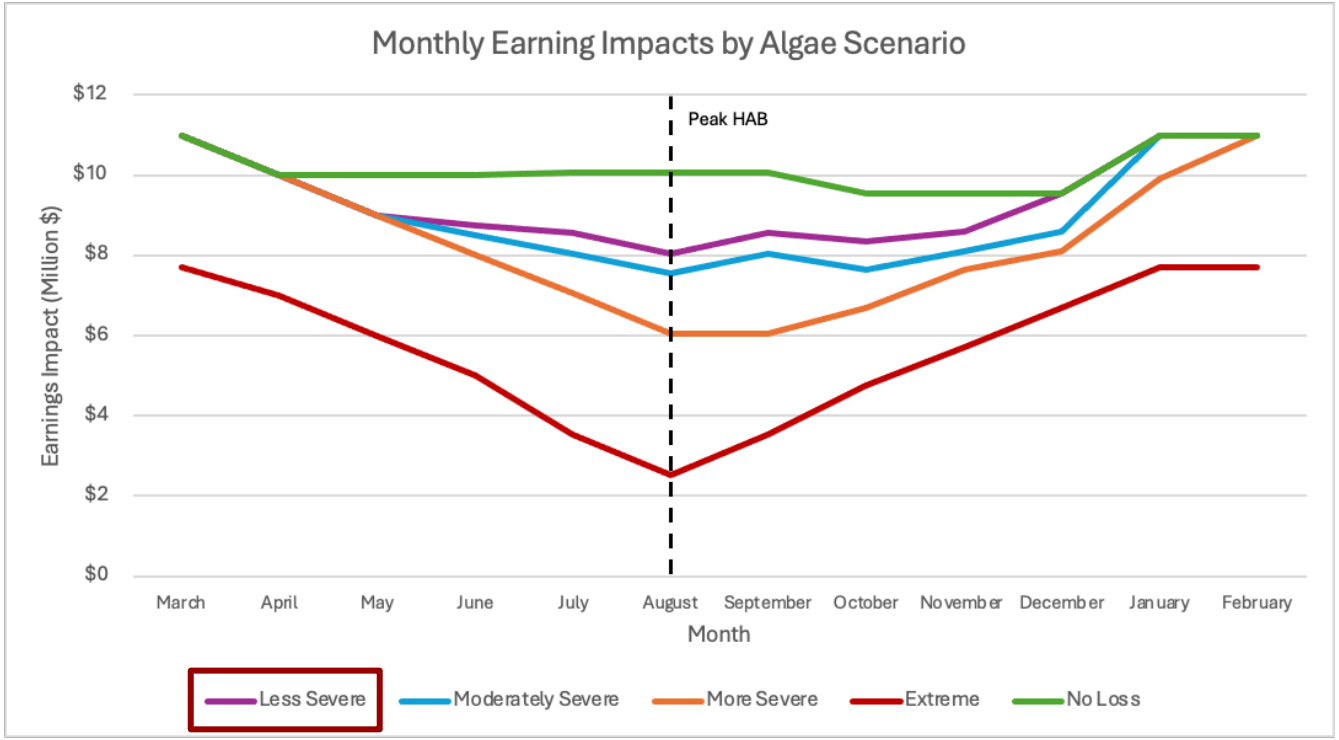
How did real Lake Okeechobee anglers respond?

Visitation	Visitors (%) (n = 205)	Residents (%) (n = 376)
First Time Fishing	19	7
Fish Less	25	39
Fish the Same	41	40
Fish More	12	13

25% of **residents** +
18% of **visitors**
reduced trips because of
degraded water quality OR
less and/or smaller fish

27% fished in a **different lake in Florida** or **not in Florida at all** due to algae

Harmful Algal Bloom Scenarios



Severity

+

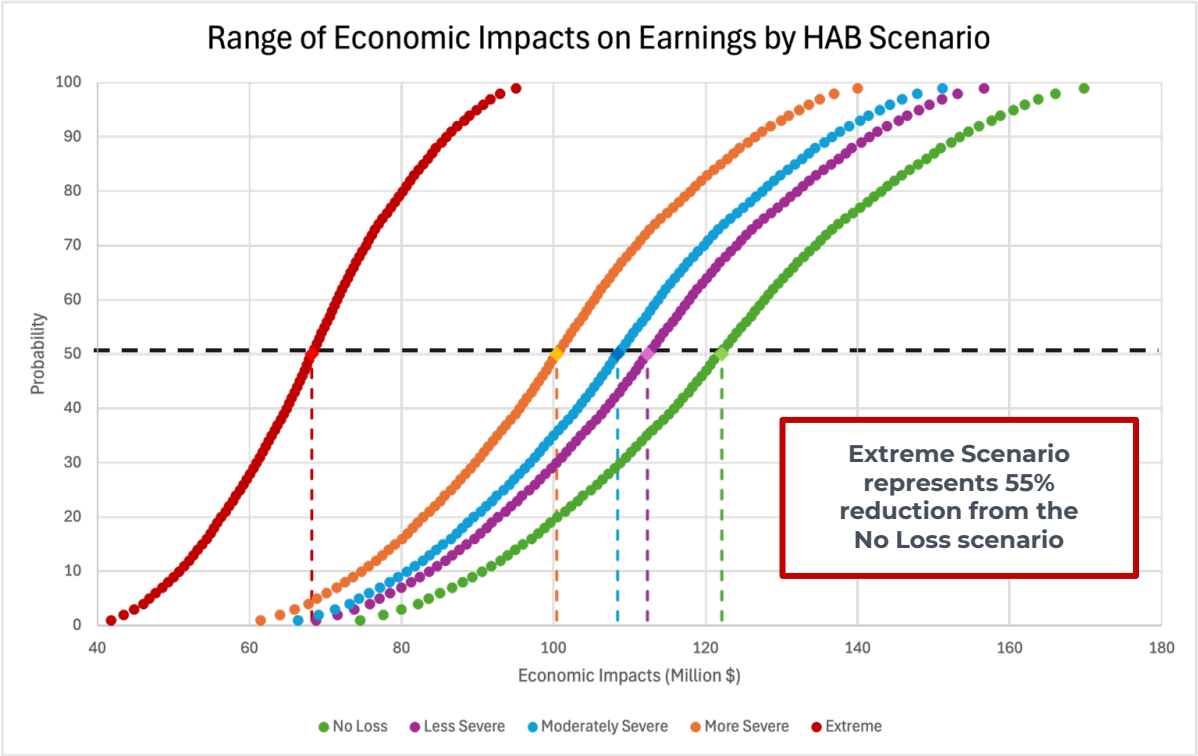
Duration

+

Recovery

Harmful Algal Bloom Scenarios

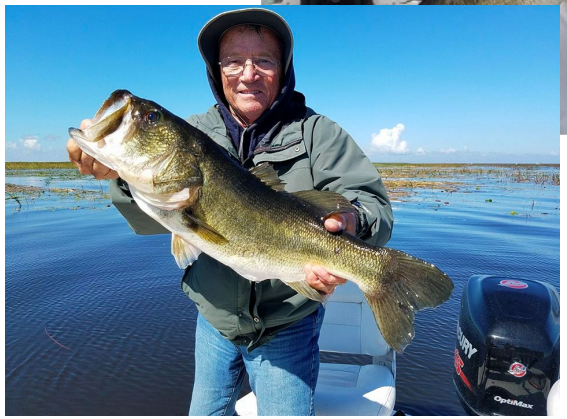
Monte Carlo simulations display the **range** of impacts



Conclusions

- Ecosystem service valuation = **decision-making tool** in next phases of Everglades restoration
- Lake O anglers are **sensitive** to ecological shifts
- Chronic water quality issues result in **unpredictable** economic loss in the estuary counties **AND** in Lake Okeechobee adjacent counties

Source: Coastal Angler Magazine, 2017



Source: lakeokeechobeebassfishing.com