



# Economic Analysis of the Recreational Fisheries in Sardis & Grenada Lakes

Clifford Hutt, Kevin Hunt,  
& Steve Grado

Human Dimensions & Conservation  
Law Enforcement Laboratory at MSU

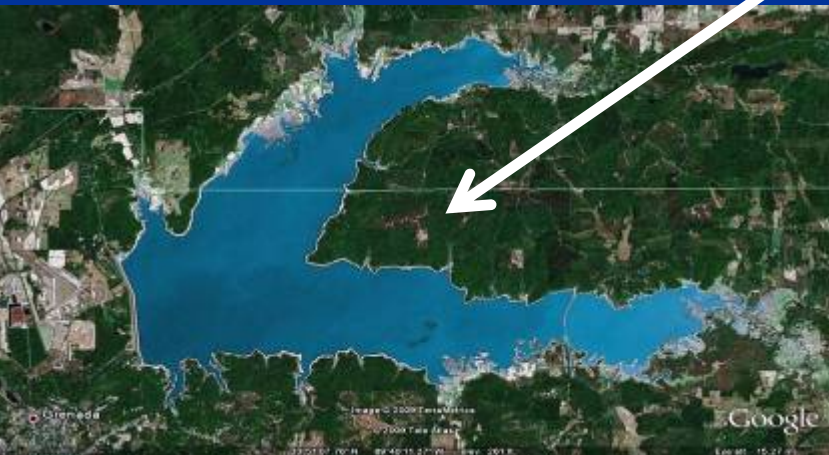
Steve Miranda

MS Coop Fisheries Research Unit

# Sardis Lake



# Grenada Lake



# Management Issues

- Increased use by non-residents and tournaments
- Perceived decline in crappie abundance; resident anglers blaming non-residents
- Drought and low water levels



# Study Objectives

- Socio-economic assessment of the fisheries at Sardis and Grenada Lake
- Estimate economic impact of fishery
  - Angler daily expenditures and activity days
- Estimate net economic value
  - Angler consumer surplus (WTP)
- On-site creel survey and follow-up mail survey

# Onsite Creel & Mail Surveys

- Sardis: Mar 2006 – Feb 2007 (120 d)
- Grenada: Mar 2007 – Feb 2008 (129 d)
- Estimate total angler activity days
- Collect addresses for quarterly mail survey
  - June, Sept, January, & March

# Mail Survey Data

- Trip characteristics
  - State of origin, distance traveled, trip length, group size, first or repeat trip, trip satisfaction
- Trip specific expenditures
  - Transportation, food, lodging, bait, fees, etc.
- Long-term equipment expenditures
  - Boat, motor, rods & reels, electronic, etc.
  - Only those made in MS in the past 12 months
- Demographics

# Contingent Valuation

- Dichotomous choice WTP question
- *If the price of goods a services were to increase so this trip cost \$XX more, would you pay the higher price rather than have not gone fishing on this trip?*
- Bid amounts ranged from \$3 to \$1,200

# Economic Impact

- Input-output analysis
  - Impacts of fishing to MS economy
    - Sales, salaries, wages, and jobs
    - Inter-industry trade and commerce
    - Household consumption from employment
- Method of modeling
  - Impact Analysis for Planning (IMPLAN)
    - Developed by USFS
    - Activity days and average daily expenditures





# Economic Impact

- Debate on including resident impacts
- Resident expenditures are endogenous to regional economy, do NOT count (Crompton et al. 2001; Chen et al. 2003)
- Others argue resident may spend their money elsewhere if the resource did not exist (Steinback 1999; Loomis 2006)

# Economic Impact Adjustment

- Asked resident anglers what % of their expenditures would be spent out-of-state if they could go longer fish Sardis/Grenada
- Average response used to estimate potential leakage and adjust resident impacts

# Consumer Surplus (WTP)

- Probit model estimation in SAS
  - BID – randomly assigned bid amount
  - RESIDENCE – MS resident (0) or non-resident (1)
  - CLUB – member of a fishing club (1)
  - WORTH – agreed trip was worth what they paid (1)
  - TROPHY – did they catch a trophy fish (1)
  - IMPFISH – how important they ranked fishing as an outdoor activity
- Recalculated model with significant variables to estimate marginal effects and mean WTP

# Angler Contacts & Response Rate

Lake	Survey Participants		Total	Response Rate
	Resident	Non-Res		
Sardis	260 (60%)	176 (40%)	436	78%
Grenada	395 (82%)	86 (18%)	481	74%

# Respondent Demographics

---

	Mean			Median	Median
	Age	%Male	%White	Income	Educ.
<hr/>					
Sardis					
Res	53	97	94	\$50-59K	H.S.
N-R	54	95	92	\$70-79K	College
Grenada					
Res	52	99	97	\$50-59K	H.S.
N-R	54	98	100	\$70-79K	College

---

# Trip Characteristics

---

	Distance Travel (mi)	First Trip to Lake (%)	% Crappie Fishing
Sardis			
Res	37	0.6	75
N-R	111	6.0	85
Grenada			
Res	33	2.0	86
N-R	332	34.0	95

---

# Activity Days

---

	Mean Trip Length	No. of Trips	No. Days Fishing
<b>Sardis</b>			
Res	1.2 d	45,140	54,168
N-R	3.7 d	10,174	37,643
<b>Grenada</b>			
Res	1.2 d	31,074	37,289
N-R	4.1 d	2,133	8,747

---

# Average Daily Expenditures

	Expenditures (\$)		Est. Resident Leakage (SE)
	Trip	Long-term	
Sardis			
Res	49.44	112.00	47.5 (3.8)
N-R	45.79	111.35	--
Grenada			
Res	60.25	121.69	26.5 (2.8)
N-R	57.59	61.12	--



# Total Economic Impact (In thousands, 2009 Dollars)

	Impacts			Multiplier	Jobs
	Direct	Indirect	Total		
<b>Sardis</b>					
Res	9,205	7,976	17,181	1.87	155
N-R	4,618	4,158	8,776	1.90	80
<b>Grenada</b>					
Res	7,130	6,481	13,611	1.91	132
N-R	1,071	970	2,041	1.91	19

# Adjusted Total Economic Impact (In thousands, 2009 Dollars)

	Impacts			Multiplier	Jobs
	Direct	Indirect	Total		
<b>Sardis</b>					
Res	4,372	3,789	8,161	1.87	74
N-R	4,618	4,158	8,776	1.90	80
<b>Grenada</b>					
Res	1,890	1,717	3,607	1.91	35
N-R	1,071	970	2,041	1.91	19

# Sardis Probit Model

Variable	Model 1		
	Mean	$\beta$	$p$ -value
CONSTANT		0.292	0.173
BID	86.424	-0.004	< 0.001
RESIDENCE	0.442	0.257	0.135
CLUB	0.163	0.173	0.468
WORTH	0.660	0.681	< 0.001
TROPHY	0.046	0.583	0.208
IMPFISH	0.675	0.007	0.971

# Sardis Probit Model

---

Variable	Model 2			
	Mean	$\beta$	$\beta(x)$	WTP
CONSTANT	1.000	0.411	0.411	104.80
BID	86.424	-0.004	-0.339	
WORTH	0.660	0.654	0.432	110.10

---

Mean WTP per trip = \$214.90

---

# Grenada Probit Model

Variable	Model 1		
	Mean	$\beta$	<i>p</i> -value
CONSTANT		0.480	0.005
BID	124.301	-0.007	< 0.001
RESIDENCE	0.183	0.496	0.034
CLUB	0.132	0.684	0.016
WORTH	0.562	0.415	0.015
TROPHY	0.120	-0.097	0.715
IMPFISH	0.633	0.061	0.724

# Grenada Probit Model

---

Variable	Model 2			
	Mean	$\beta$	$\beta(x)$	WTP
CONSTANT	1.000	0.509	0.509	82.30
BID	124.301	-0.006	-0.768	
RESIDENCE	0.183	0.468	0.086	13.88
CLUB	0.132	0.661	0.087	14.11
WORTH	0.562	0.410	0.230	37.28

Mean WTP per trip = \$147.57

---

# Consumer Surplus

---

	No. of Trips	Mean WTP	Consumer Surplus
<b>Sardis</b>			
Res	45,140	214.90	9,700,586
N-R	10,174	214.90	2,186,392
<b>Grenada</b>			
Res	31,074	147.57	4,585,590
N-R	2,133	147.57	314,766

---

# Total Economic Value (In thousands, 2009 Dollars)

---

	Economic Impact	Consumer Surplus	Combined
<hr/>			
Sardis			
Res	8,161	9,701	17,862
N-R	8,776	2,186	10,962
Grenada			
Res	3,607	4,586	8,193
N-R	2,041	315	2,356

---



# Factors Reducing Economic Value

- Low water suppressed angler use in 2006-08
- Non-residents spending \$ outside MS
- Local economies under-developed (1.9)
  - Multipliers for recreation \$ usually 1.5 to 2.7



# Conclusions

- Fishing on Sardis & Grenada is still a valuable contribution to local economy
- Provide substantial benefit to anglers
- Potential for greater economic impact & net value in the future



