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FISHERIES**

# The Value of Saltwater Recreational Fishing in Massachusetts: Separating Truth from Fiction

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In cooperation with the Massachusetts Division of Marine Fisheries and QuanTech, Inc.

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# Marine Recreational Fishing in Massachusetts

- Conducted a stated preference nonmarket valuation study in 2012 to compare angler values estimated from responses to hypothetical questions with values based on actual cash transactions
- Estimate the annual value of access through eliciting the economic value of marine recreational fishing permits in MA

# Objectives

- Build upon literature that compares hypothetical and real nonmarket valuation survey responses
  - Construct models to compare hypothetical and real valuation estimates
- Provide MA DMF best estimate of the economic value of saltwater recreational fishing in MA
  - How changes in the price of a MA saltwater recreational fishing license would affect the demand for permits and the total revenue obtained from permit sales.

# Study Motivated By....

Bishop, Richard C. and Thomas A. Heberlein. 1979. Measuring values of extramarket goods; are indirect measures biased? *American Journal of Agricultural Economics* 61, 926-930.

- Discovered a disparity between hypothetical and real nonmarket valuation estimates (hypothetical bias)
- Introduced the discrete choice questioning strategy

# An Assessment of Marine Recreational Fishing Values in Massachusetts

- Requirement for a MA saltwater recreational fishing permit in 2011
- Chance to apply Bishop and Herbelein approach to recreational fishing
- Buy-in from MA DMF and NOAA Fisheries was challenging
- Ultimately received approval from both and \$145K for study

# MA Recreational Fishing Permits

- \$10 annual fee for both residents and nonresidents over 16 yrs of age
- Obtained names and addresses of anglers that purchased an early season 2012 MA fishing permit
- Permits selected using stratified random sampling
- Notification letters sent to notify potential participants they would be receiving a survey in the mail and to mitigate skepticism about the study

# MA Recreational Fishing Permits

## 1<sup>st</sup> Mail Sample (HWTa)

- 700 anglers that purchased an early season 2012 MA fishing permit received hypothetical offers for their 2012 fishing permit (\$15 - \$500)
  - Offers ranged in log-linear amounts

## 2<sup>nd</sup> Mail Sample (HWTP)

- 700 anglers received surveys that offered matched but hypothetical willingness to pay values (i.e., buy)
- Short cheap-talk script and certainty question added after valuation question for both samples
- Discrete choice format – individual simply had to answer “yes” or “no” without any need to specify the exact amount

# MA Recreational Fishing Permits

## 3rd Mail Sample (AWTA)

- 500 received actual cash offers for their 2012 permits
- Checks were mailed along with instructions that each angler should return either the check or their fishing permit
- Anglers in all samples were asked to complete a short survey



# Response Rates

Sample Type	Completed Survey (%)
Sample 1 (HWTa)	69
Sample 2 (HWTP)	68
Sample 3 (AWTA)	61
All	66

# Weighted Acceptance Rates (Samples 1 & 3 - WTA)

Amount of Offer (\$'s)	Hypothetical Offers Acceptance Rate (%)	Cash Offers Acceptance Rate (%)
15	1	8
25	10	0
40	10	8
55	26	13
75	10	32
100	16	30
125	25	41
160	18	41
200	31	55
250	21	34
300	24 <sup>**</sup>	63 <sup>**</sup>
350	21 <sup>***</sup>	83 <sup>***</sup>
400	39	52
450	38 <sup>*</sup>	67 <sup>*</sup>
500	62	67

\* Significance at 10% Level  
\*\* Significance at 5% Level  
\*\*\* Significance at 1% Level

# Weighted Acceptance Rates (Sample 2 - HWTP)

Hypothetical Price (\$'s)	Acceptance Rate (%)
15	71
25	55
40	33
55	15
75	14
100	15
125	13
160	5
200	6
250	5
300	0
350	15
400	9
450	19
500	16



# Sample 3 – Checks Cashed

- \$73,690 in checks mailed to anglers
  - \$26,290 cashed (36%)
  - \$47,400 returned (64%)
- 91 anglers cashed checks and returned their permit
- 4 anglers cashed check, kept permit, and did not complete survey
- 12 anglers cashed check, kept permit, and completed survey  
(3% of the total sample frame)



# Logit Model

$$P(\textit{AcceptOffer}) = 1 - \left\{ \begin{array}{l} 1 + \exp[\beta_0 + \beta_1(\$offer) \\ - \beta_2(boatown) \\ - \beta_3(dayswillfish2012)] \end{array} \right\}^{-1}$$



# Actual WTA Logit Model

	Coefficient	Standard Error	z
Constant	-1.01343***	0.28595	-3.54
Offer Amount	0.00782***	0.00117	6.66
Boat Ownership (1=owns, 0=does not)	-2.57596***	0.45603	-5.65
Days Will Fish 2012	-0.01861***	0.00692	-2.69

Note: \*\*\* = Significance at 1% level

McFadden Pseudo R-squared = 0.3180521

In Sample Predictions: Correctly predicted 94% of the anglers that accepted offers and 83% of anglers that rejected offers

# Economic Value of a MA Fishing Permit

- The value that an angler places on possessing a MA fishing license
  - The value of access to fishing in MA waters

$$WTA\_Value = 1 / \beta_1 * (\ln(1 + \exp(-1 * (\alpha + \beta_2 * boat + \beta_3 * days))))$$

# Value Comparisons

	Mean Value per Angler (\$'s)	95% Confidence Interval (\$'s)	Total Value (\$'s)
HWTA - sample 1	593	423 - 762	91.4 million (65.2 - 117.5 million)
HWTP - sample 2	80	53 - 106	12.3 million (8.2 - 16.3 million)
AWTA – sample 3	317	262 - 372	48.9 million (40.4 - 57.4 million)

Confidence Intervals: Krinsky-Robb method using 50,000 draws

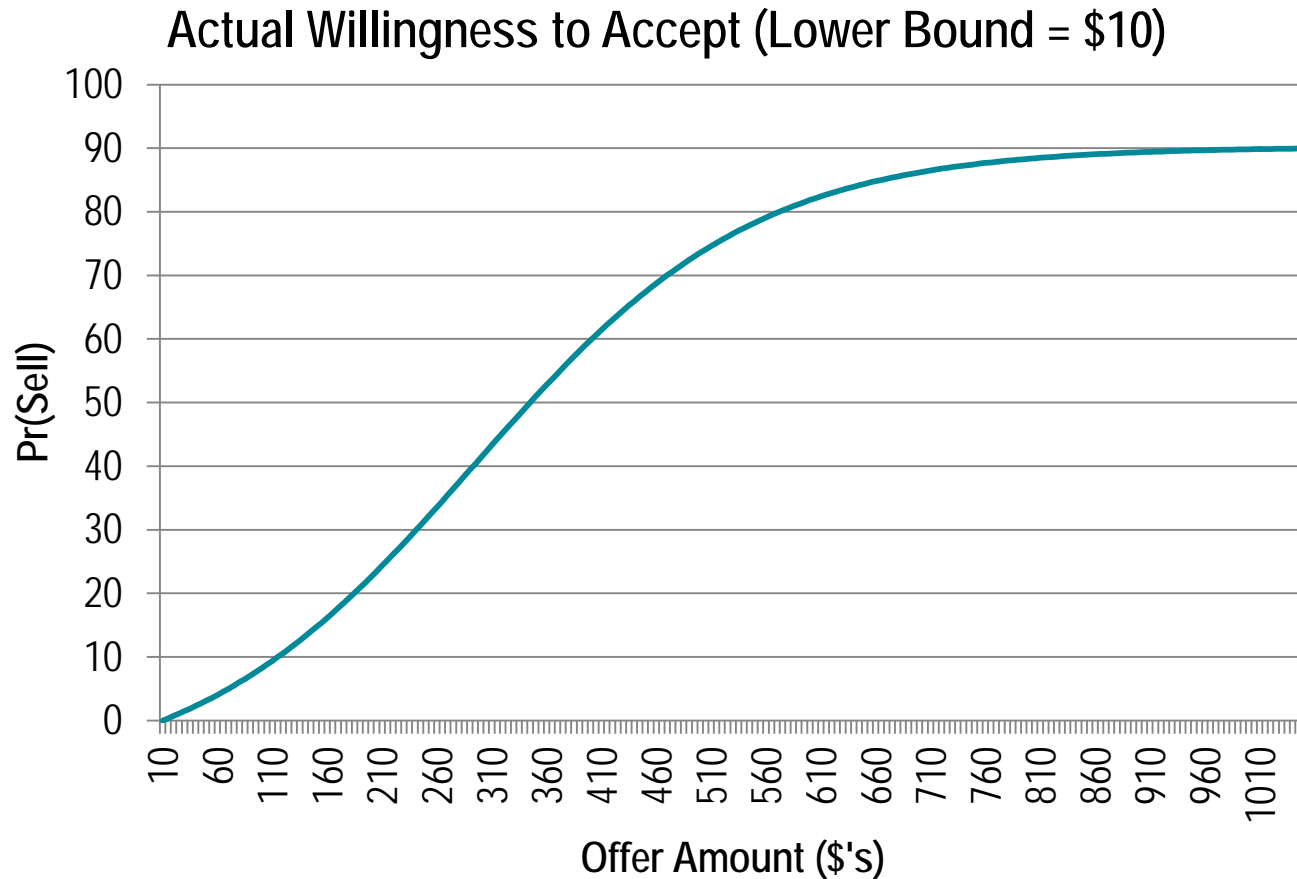
154,167 angler permits issued in 2012



# Model Predictions

- How price changes affect the demand for permits
- How price changes affect total permit revenue
- The price that maximizes total permit revenue

# Model Predictions

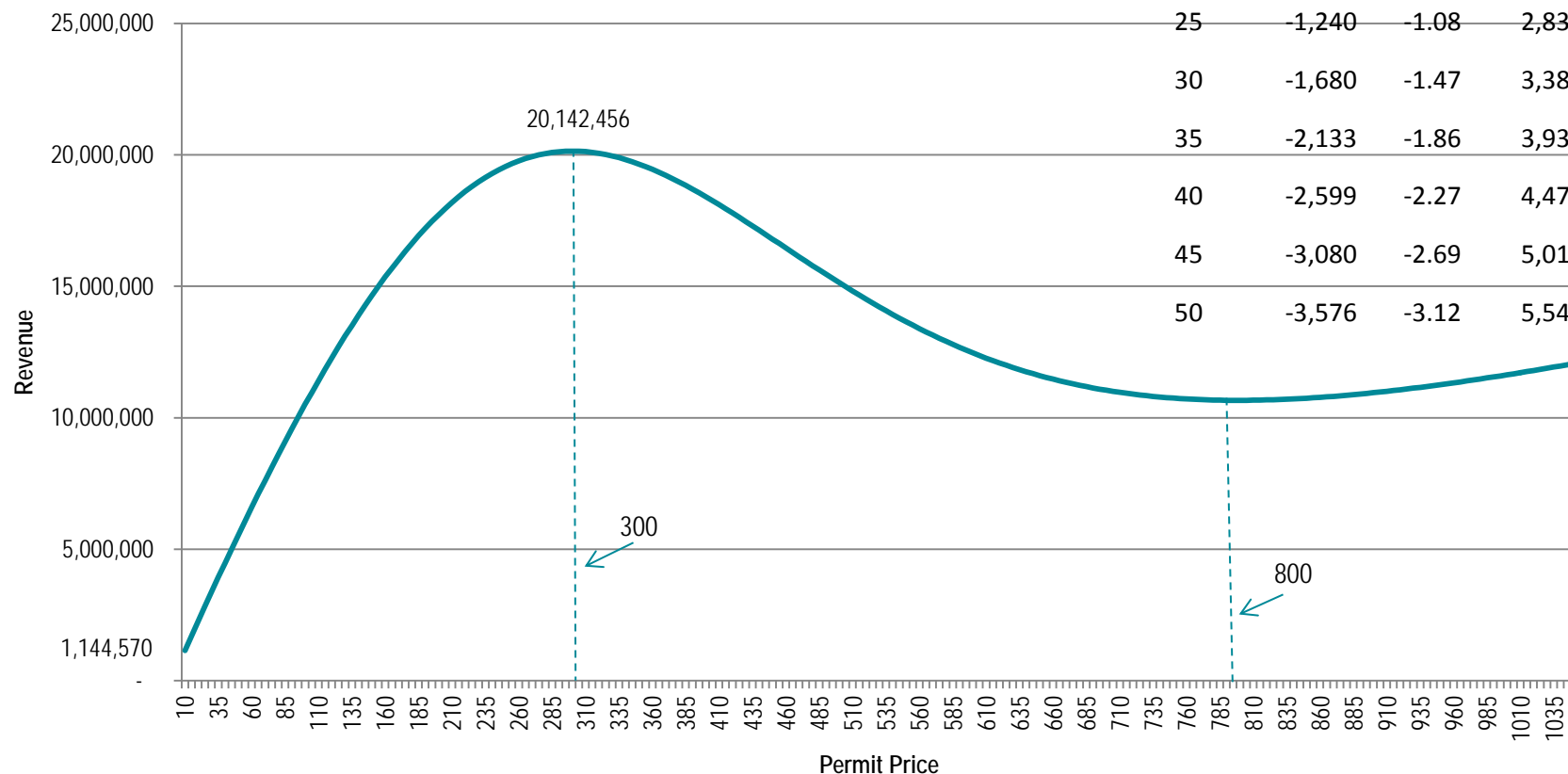


Offer	Pr (Sell)
10	0
15	0.35
20	0.71
25	1.08
30	1.47
35	1.86
40	2.27
45	2.69
50	3.12
55	3.57
60	4.03
65	4.50
70	4.98
75	5.48

# Model Predictions

Price	Permits	% Change	Revenue
10	0	0	1,144,570
15	-401	-0.35	1,710,846
20	-814	-0.71	2,272,863
25	-1,240	-1.08	2,830,423
30	-1,680	-1.47	3,383,323
35	-2,133	-1.86	3,931,354
40	-2,599	-2.27	4,474,303
45	-3,080	-2.69	5,011,951
50	-3,576	-3.12	5,544,074

Actual and Potential Permit Revenue 2012



# Future Work

- Explore reasons for disparities between estimates
  - Strategic behavior
  - Decision uncertainty
    - ✓ Cheap talk
    - ✓ Certainty Question

# Publicity

- Boston Globe article
  - “In experiment, US offers up to \$500 for fishermen not to fish”
- Six other newspapers covered the study
- Letter to NOAA from U.S. Senator Scott Brown
- Study mentioned by a Congressman on the floor of the House Chamber during NOAA budget discussions
- Science Magazine printed a story about the study
- NOAA & MA DMR released press releases and had informational meetings with recreational fishing constituents
- Primary concerns
  - Results will be used to raise permit fee
  - NMFS buyback under the guise of research
  - Results will be biased because of publicity (12 obs deleted)



# Questions?

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