

Pretest Summary



- EPA is conducting a stated preference survey to estimate benefits of improving water quality in the Chesapeake Bay and lakes in the Chesapeake Bay Watershed
- The stated preference survey will be mailed to randomly selected households using a choice experiment approach with the following environmental attributes
 - Water clarity in the Bay
 - Oyster population
 - Striped bass population
 - Lakes with low algae levels
 - Blue crab population
- Our original experimental design included two baseline scenarios in three geographic strata. In response to public comments we added a third baseline and another reference year for attribute improvements to the pretest design

Baseline Conditions	Time Horizon	Geographic Strata
- Improving*	- 2025	- Bay States
- Constant	- 2040*	- Watershed States
- Declining		- Other Eastern States

* Added in response to public comments

Pretest Administration Details



- The sample size for the pretest was based on the following:
 - 6 survey versions and 3 geographic strata result in 18 sampling cells
 - Target of 50 completes per sampling cell
 - Anticipated effective response rate of 28%
 - $(50/.28) \times 18 = 3,214$ households in the sample (rounding resulted in a sample of 3240)
- EPA received approval for the pretest on Sept 17, 2013
- Began printing materials as soon as the government shutdown ended on October 17th
- Pretest mailing schedule
 - Preview letter November 13
 - First survey November 19
 - Reminder postcard November 26
 - Second survey December 9
 - Final reminder December 16
 - Non-response follow up January 16

Response Rate Calculation



- Accounts for: completed surveys, refusals, deceased, physically or mentally incompetent, ineligible addresses, non-respondents
- Am. Assoc. for Public Opinion Research (AAPOR)
 - RR1: only removes ineligible addresses
 - RR3: removes ineligibles PLUS a *portion* of non-respondents based on an estimated eligibility rate (e)

	Bay States	Watershed States	Other Eastern States	Overall
RR1	31.7%	26.4%	22.7%	26.9%
RR3	38.1%	33.3%	29.7%	33.7%

Sample Summary Statistics



Typical of mail surveys, our sample includes smaller proportions of females and minorities and tends to be older than the sample frame.

	Sample	Population ¹	H ₀ : Sample% = Population%
Male	55.2%	47.9%	4.09*
Age 20-29	2.82%	17.45%	-24.07***
Age 30-39	12.2%	16.5%	-3.24*
Age 40-49	16.7%	18.8%	-2.16*
Age 50-59	25.5%	17.9%	4.15*
Age 60-69	24.19%	15.76%	5.37***
Age 70 & over	22.7%	12.6%	6.77*
Black	11.2%	18.2%	-5.70*
Hispanic	4.2%	12.5%	-10.71*
College Degree	49.9%	48.1%	0.43

Average and median respondent's household income falls between \$50,000 to \$74,999. The "median" population income is \$52,627.

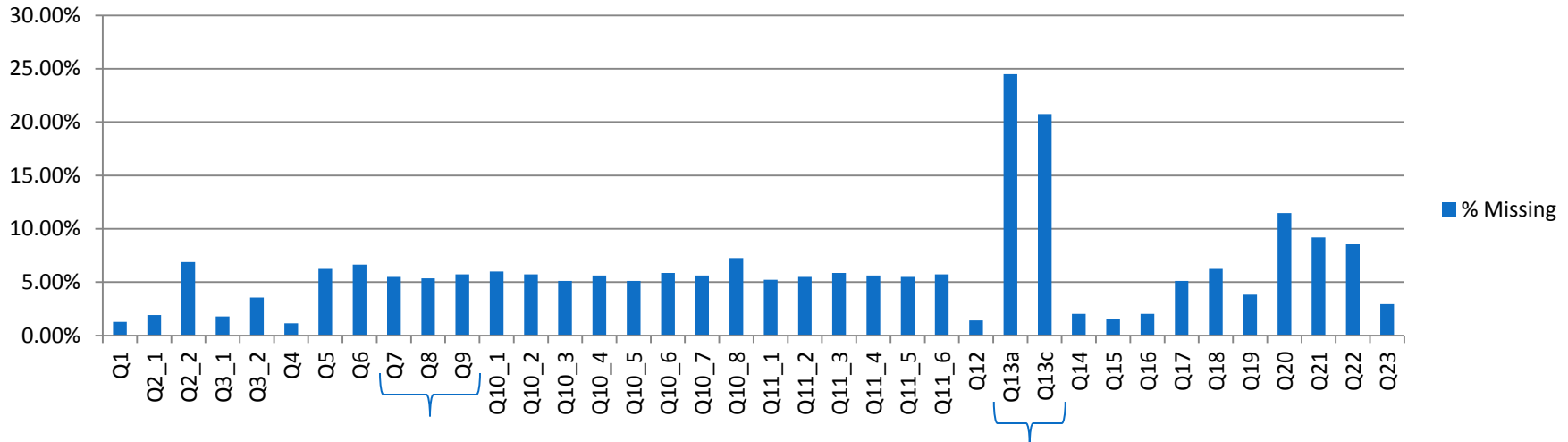
Respondents' familiarity with the Chesapeake Bay and Watershed lakes

	Sample
Heard of the Chesapeake Bay before receiving the survey	90.6%
Has recreated at the Bay in the last 5 years	34.9%
Has recreated at a Watershed lake in the last 5 years	32.4%

Item non-response



% Missing



- Choice question non-response about 5.5%
 - 19 (2%) respondents skipped all three choice questions
 - 716 (91%) respondents answered all three choice questions
- Open ended questions asking where recreation trips to the Chesapeake Bay were taken

Debriefing Questions





- Fourteen Likert scale questions following the choice experiments grouped into Q10 and Q11
 - Evaluate quality of responses to choice questions
 - Probe motivation for WTP
- Respondents still answering questions thoughtfully late in the survey
 - Only 0.003% and 2.3% of participants responded the same for all Likert scale questions in Q10 and Q11, respectively
 - 2.8% and 4.3% said “don’t know”
 - 4.7% and 5.0% skipped all of Q10 and Q11, respectively
- Comparison with Banzhaf et al. (2006) Adirondacks SP study

	Chesapeake Pretest	Adirondacks
Did not vote as if household would face costs	7%	N/A
Did not believe improvements would be achieved	7%	37%
Costs should not be a factor	36%	25%
Against taxes/govt. spending	30%	21%
My household should not have to pay	36%	19%
Considering factors other than attributes in choice questions	32% - 46%	10% - 59%

Probing for Scenario Rejection and Protest Responses



- Respondents generally accepted scenarios and responded to choice questions as if the scenarios posed were real and consequential
- Some indication of protest responses
 - Contradicted by answers to choice questions
 - Could be improved by rewording some prompts

Question Prompt	Strongly Disagree			Strongly Agree			Don't Know	Missing
	1	2	3	4	5			
 I voted as if my household would actually face the costs shown in the questions.	5%	2%	9%	17%	55%	5%	6%	
 I voted as if the programs would actually achieve the results shown by [YEAR]	4%	2%	12%	21%	48%	8%	6%	
I am against any more regulations and government spending. ¹	21%	13%	25%	10%	21%	7%	6%	
My household should not have to pay any amount to improve Bay Waters and Watershed Lakes. ²	17%	17%	21%	9%	25%	5%	6%	
It is important to improve waters in the Chesapeake Bay Watershed, no matter how high the costs. ³	15%	11%	27%	17%	19%	7%	5%	

1. Since our payment vehicle did not include government spending we will change the phrasing for the full survey
2. 114 respondents agreed w/ statement, but voted for policy option at least once
3. 67 of respondents agreed w/ statement but still chose status quo at least once

Motivation for WTP



- How much is WTP motivated by bequest and option value?
- To what extent did factors other than those presented in the choice questions influence respondents' votes?

Question Prompt: Did the following affect your vote?	Strongly Disagree			Strongly Agree			Don't Know	Missing
	1	2	3	4	5			
Changes in the quality and price of seafood	19%	12%	24%	17%	15%	8%	5%	
Impacts on the economy and jobs	10%	9%	22%	24%	22%	7%	6%	
Improving the environment for others	5%	4%	14%	26%	38%	7%	6%	
Water quality improvements to lakes outside the watershed	11%	9%	20%	21%	24%	9%	6%	
Preserving the environment for future generations	5%	3%	11%	22%	48%	5%	6%	
Trips I may take to the Chesapeake Bay or Watershed lakes in the future	19%	11%	19%	15%	18%	12%	6%	

Screening responses for analysis



- Identify protest responses, hypothetical bias, etc. based on both responses to choice scenarios and debriefing questions
- Protest responses
 - Against government regulation and spending
 - Household should not have to pay for improvements
 - Chose status quo in all choice scenarios
- Hypothetical bias
 - Did not vote as if household would actually face costs
 - Chose highest cost option in every choice scenario
- Warm Glow
 - Improvements important no matter how high costs
 - Chose highest cost option in every choice scenario

Full sample	Protest Responses	Hypothetical Responses	Warm Glow Responses	Protest, Warm Glow, or Hypothetical Bias
784	97	4	29	127
100%	12.4%	0.5%	3.7%	16.2%

Comparing Results Across Baseline Versions



	Chi-sq Tests of Differences in Marginal WTP		
	$H_0:(1)=(2)$	$H_0:(3)=(2)$	$H_0:(1)=(3)$
clar	1.19	0.49	3.39*
lake	2.2	0.01	0.26

% respondents exhibiting:	Decreasing (1)	Constant (2)	Increasing (3)	(1)=(2)	(2)=(3)	(1)=(3)
Protest	9.12%	13.18%	15.95%	t=1.51	t=-0.69	t=-2.20**
Hypothetical Bias	0.70%	0.39%	0.41%	t=-0.49	t=-0.05	t=0.43
Warm Glow	5.26%	3.10%	2.49%	t=-1.25	t=0.41	t=1.62

Choice Questions and Econometric Model



Random utility model (RUM)

$$(v(X_i, D, Y-F_i) + \varepsilon_i) \geq (v(X_j, D, Y-F_j) + \varepsilon_j)$$

$v(.)$ =utility

ε_i = stochastic component of utility

Y = income

D = household characteristics

- Estimated several conditional logit regressions using pretest data

7. Please vote for one of the three options below. (Mark one box at the bottom to indicate which option you would prefer.)

Environmental Outcomes	Conditions in 2025 (% change compared to today)		
	Option A	Option B	Option C
Bay Water Clarity Average visibility	4 feet (33% increase)	5 feet (67% increase)	6 feet (100% increase)
Striped Bass Adult Population	26 million fish (8% increase)	30 million fish (25% increase)	30 million fish (25% increase)
Blue Crab Adult Population	260 million crabs (4% increase)	312 million crabs (25% increase)	340 million crabs (36% increase)
Oysters Population	4,300 tons (30% increase)	4,300 tons (30% increase)	6,500 tons (97% increase)
Watershed Lakes Lakes with low algae levels	3,100 lakes (7% increase)	3,350 lakes (16% increase)	3,850 lakes (33% increase)
Your Cost of Living Permanent cost increase for your household starting next year	\$0 every year	\$60 every year or \$5 every month	\$500 every year or \$41.67 every month
Your Vote Please mark <u>one</u> of the boxes to the right	Option A <input type="checkbox"/>	Option B <input type="checkbox"/>	Option C <input type="checkbox"/>

Validity Checks: Scope Tests



Pooled Model: all geographic strata, baselines, and reference years

- ✓ • Scope – signs and statistical significance of coefficient estimates are often as expected
- We are able to improve the precision of our estimates using the screening criteria



External scope

- Estimate each choice question separately
- Estimates based only on cross-sectional variation
- Coefficient signs are often as expected, suggesting that respondents are not just being internally consistent

Validity Checks: Theoretical Validity



- ✓ • Positive coefficient on high income-cost interaction indicates wealthier people are more likely to choose higher cost options
- ✓ • Monotonically decreasing coefficients on cost level dummies reflects decreasing marginal utility of income



- Positive coefficient on user-attribute interactions shows that users of the Bay are generally willing to pay more to improve Bay attributes



- Alternative specific constants

- ✓ – No evidence of status quo bias (i.e., warm glow or cold feet)
- Tendency for respondents to choose Option B and the cheapest alternative
- May be due to the lack of a full orthogonal design in the pretest
- Main survey will have full orthogonal design
- If these confounding influences still exist, they can be controlled for by inclusion of these dummy variables



Annual Household WTP for a 10% improvement in Bay Water Clarity

- Comparison of preliminary WTP estimates across 2025 and 2040 show that respondents are discounting benefits that occur farther in the future
- Estimates from 2040 version of the survey are less precise

Annual Household WTP for a 10% increase in Low Algae Lakes - Watershed States Only

- WTP for Low Algae Lakes is not statistically different from zero for either reference year

Evaluating the 2040 Time Horizon



- Public comment: Some improvements from the TMDL will not be fully realized until after 2025.
- In focus groups and cognitive interviews long time horizons increased the incidence of scenario rejection.
- From our response to public comments: “We will include debriefing questions on all surveys to test for scenario rejection of the type we encountered in focus groups. If the pretest results show that a disproportionate number of respondents reacted negatively to either reference year we will reconsider the split sample design for the full survey.”
- Debriefing Question: “I voted as if the improvements would actually be achieved by 2025/2040”
7.5% of respondents to the 2040 version of the survey disagreed, compared with **4.7%** of respondents to the 2025 version (two-sample t-test p-value = 0.108)

Evaluating the 2040 Time Horizon (2)



- Preliminary WTP estimates for improvements in Bay Water Clarity
 - More precise estimates in the 2025 sample
 - Results indicate people are discounting at reasonable rates; implied discount rate is about 3%
- Standard practice to choose a shorter timeframe and discount benefits accordingly (e.g. Alberini et al. 2004, Banzhaf et al. 2006, Cameron and DeShazo 2013)
- Our preference is to collect data that will provide the “cleanest” estimate of WTP and discount future benefits appropriately.
- Dropping the 2040 time horizon from our experimental design would reduce the cost of conducting the main survey and the burden placed on respondents by half.

Non-response Survey Administration



- Sent to 900 households who did not respond to pre-test
 - Randomly selected by strata
 - Included \$2 incentive payment and “Please Respond Within 2 Weeks” stamp on envelope
 - Brief questionnaire (4 pages total)
- 144 responses (16.2% response rate)
 - 38 received from Bay States
 - 49 received from Watershed States
 - 57 received from Other States

Non-response Survey Results



	Survey	Non-response
Heard of the Chesapeake Bay	91%	85%
Seen the Chesapeake Bay/Lakes	58%/49%	45%/43%
Recreated at the Chesapeake Bay/Lakes	35%/32%	23%/19%
Against more regulations and spending	31%	36%
Should not have to pay to improve Bay or Lakes	34%	43%
Important to improve Bay no matter the cost	36%	39%
Income (“median” based on mid-point of range)	\$62,500	\$62,500
Male	56%	51%
Black	11%	6%
Hispanic	4%	8%
College Degree	49%	45%

Proposed Changes for Full Sample



- Survey Edits
 - Minor changes to phrasing of some debriefing prompts
 - Minor text changes to description of Lakes attribute + changing question 5 to reinforce that information
- Experimental Design
 - Drop the 2040 time horizon
 - Scale back improving baseline version of the survey to Bay States stratum only

Changes to survey text



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“Pollution reduction programs already in place to limit nutrients and sediment flowing into the Chesapeake Bay also help ~~limit algae growth~~ **keep algae levels low** in Watershed Lakes.”

Old Question 5. How do the predicted conditions for the Chesapeake Bay and the Watershed Lakes in [year] compare with what you expected?

- I had expected conditions in [year] to be better than what is predicted
- I had expected conditions in [year] to be worse than what is predicted
- I had expected conditions in [year] to be about the same as what is predicted
- Don't know

New Question 5. If you were taking a recreational trip to a lake, which would you prefer?

- I would prefer a lake with low algae levels and clearer water
- I would prefer a lake with high algae levels and greener water
- I don't have a preference, either type of lake would be fine
- I don't know

Full Survey Schedule



- Goal is to have the survey in the field before summer vacation...

	Dates
Printing and preparation	March/April 2014
Mail Preview Letter	April 28, 2014
Mail Final Reminder	May 26, 2014
Conduct Non-response bias study	June 9, 2014
Begin data analysis	July 2014