Recreation, Raw Bars, and Risk: How experience and proximity impact water quality choices

George Voigt[*1] , Caroline Noblet[1], Mario Teisl[1]*

1 University of Maine, School of Economics, Orono ME, USA

** presenting author*

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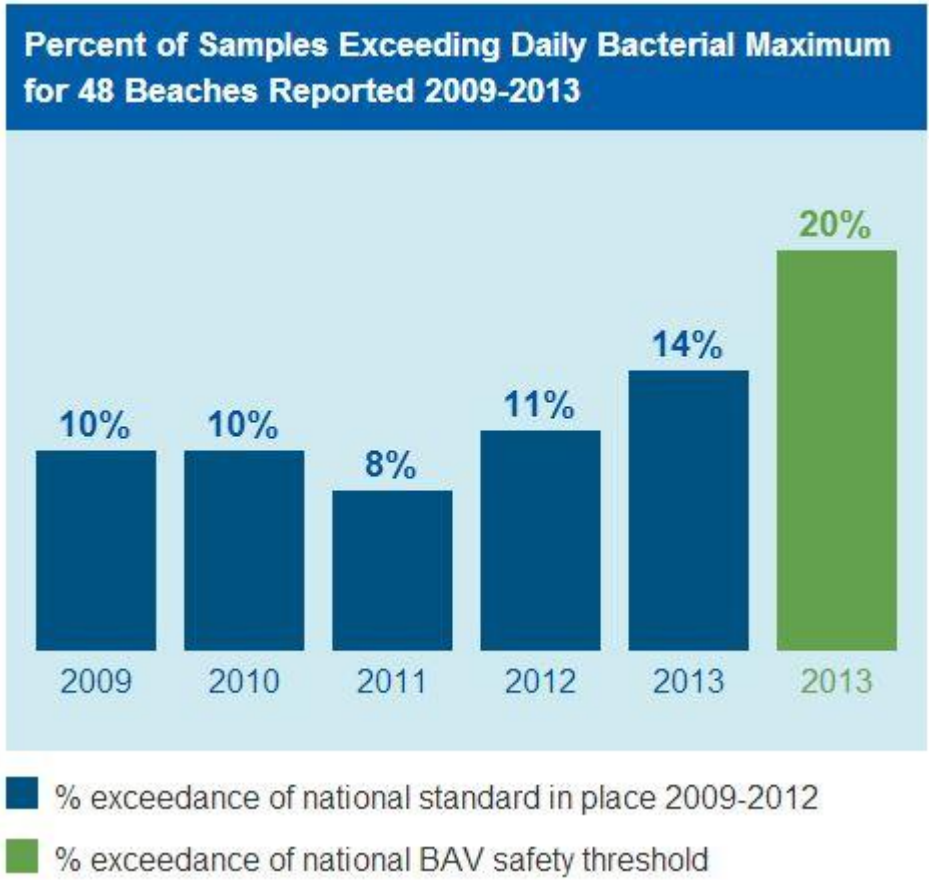
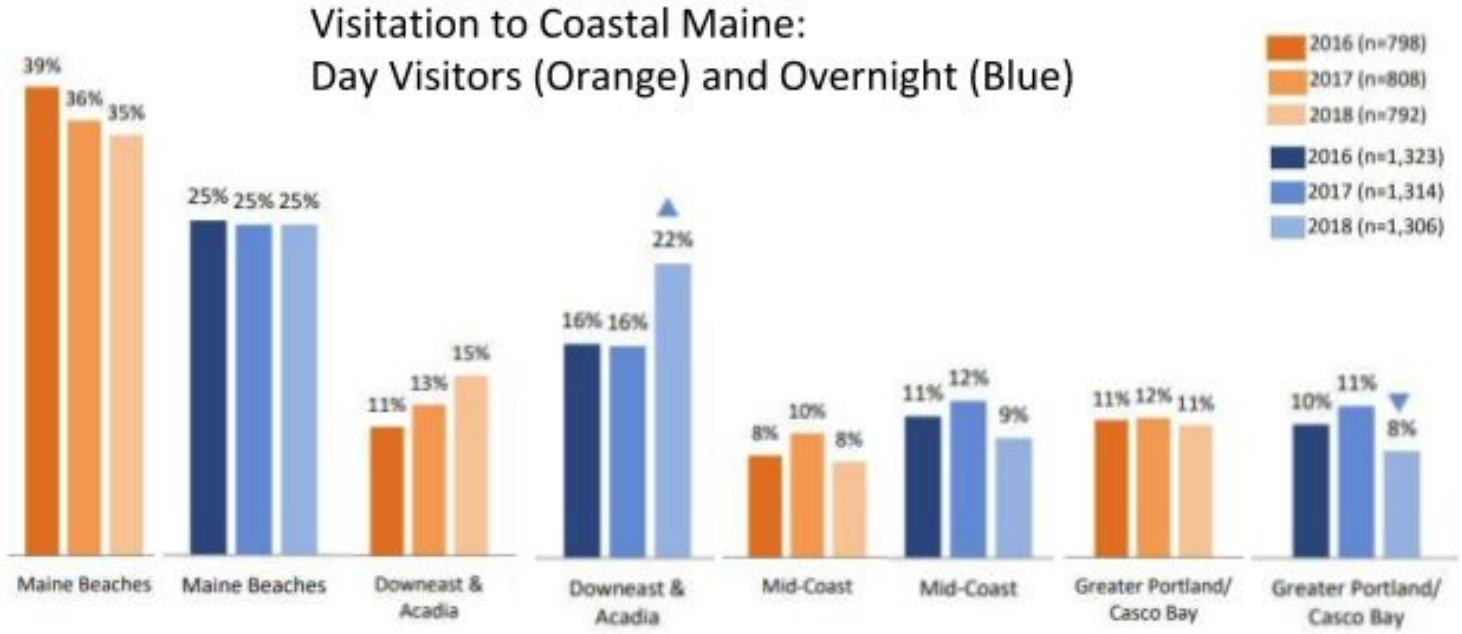
New England Coastal Water Quality is Worsening

- Due to runoff from storm-surge or sewage plants, water quality in Maine's coastal waters is deteriorating
- Runoff from coastal homes can bring nutrients that feed algal blooms harmful to human health
- According to the natural resource defense council's report in 2014[1], Maine's water quality ranked 27th out of the 30 coastal states



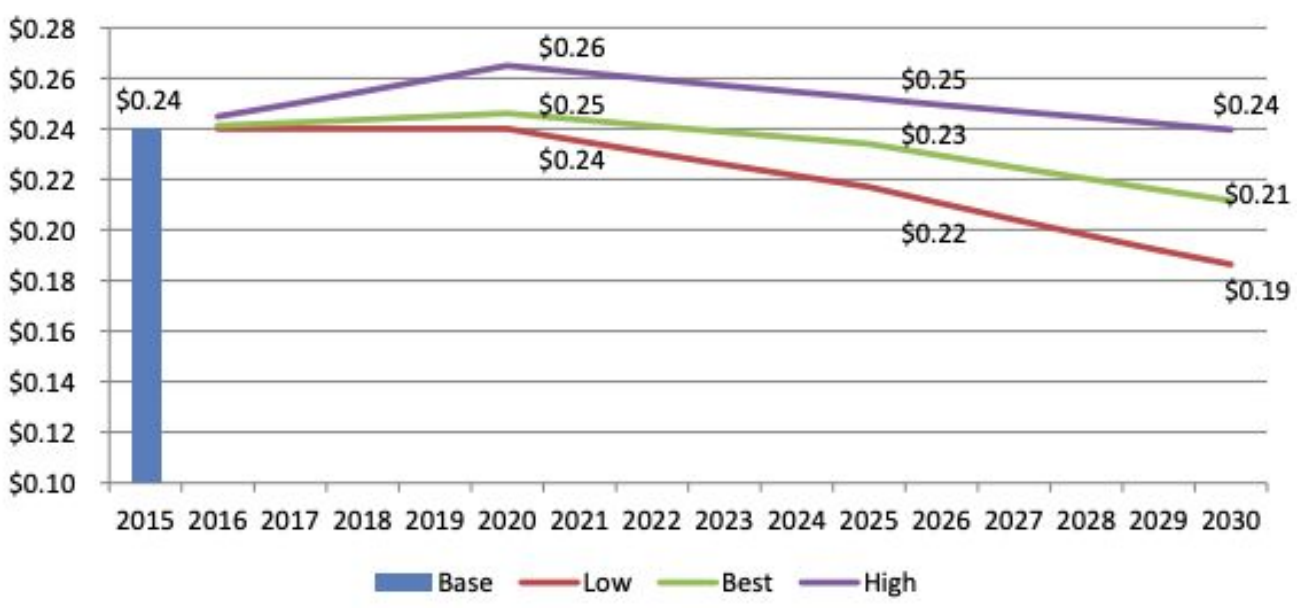
Visitation to Maine is Increasing

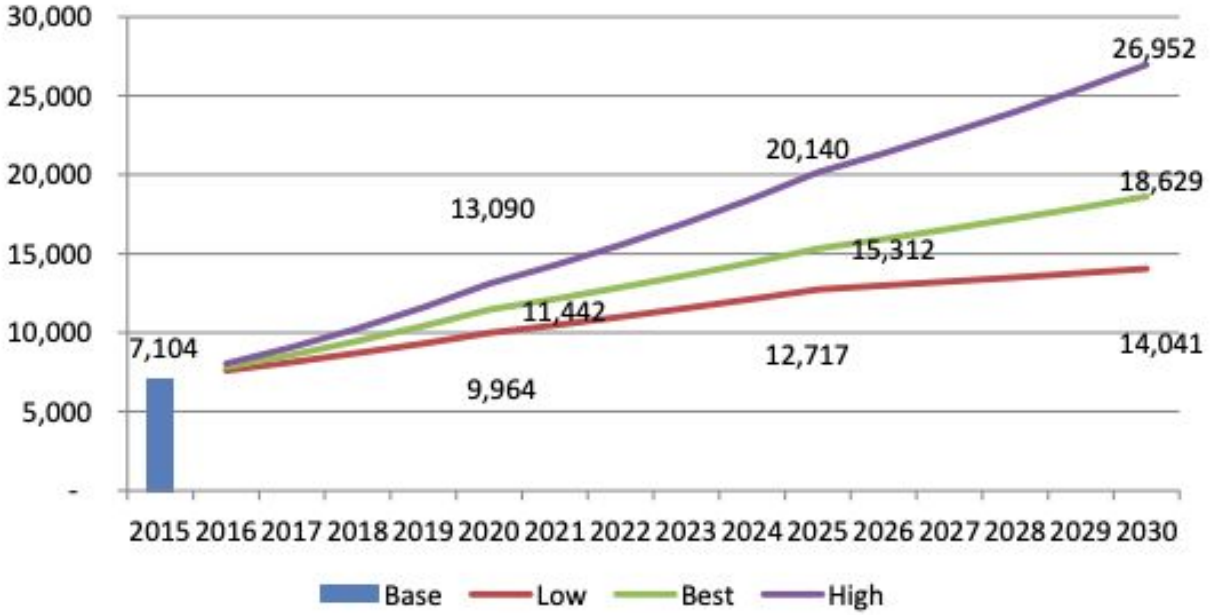
- Based on 2018 Maine Office of Tourism, visitation, both day and overnight, has increased to the coastal regions (Maine Beaches, Downeast & Acadia, Mid Coast, and Greater Portland/ Casco Bay)[2]
- These regions represent over 60% of total tourist visitation from the last 3 years.



Consumption of Shellfish is Increasing

- Based on the 2016 Gulf of Maine Research Institute Report[3], oysters (shown), scallops and mussels were each projected to increase in landings over the next 15 years.





Our Research Contribution

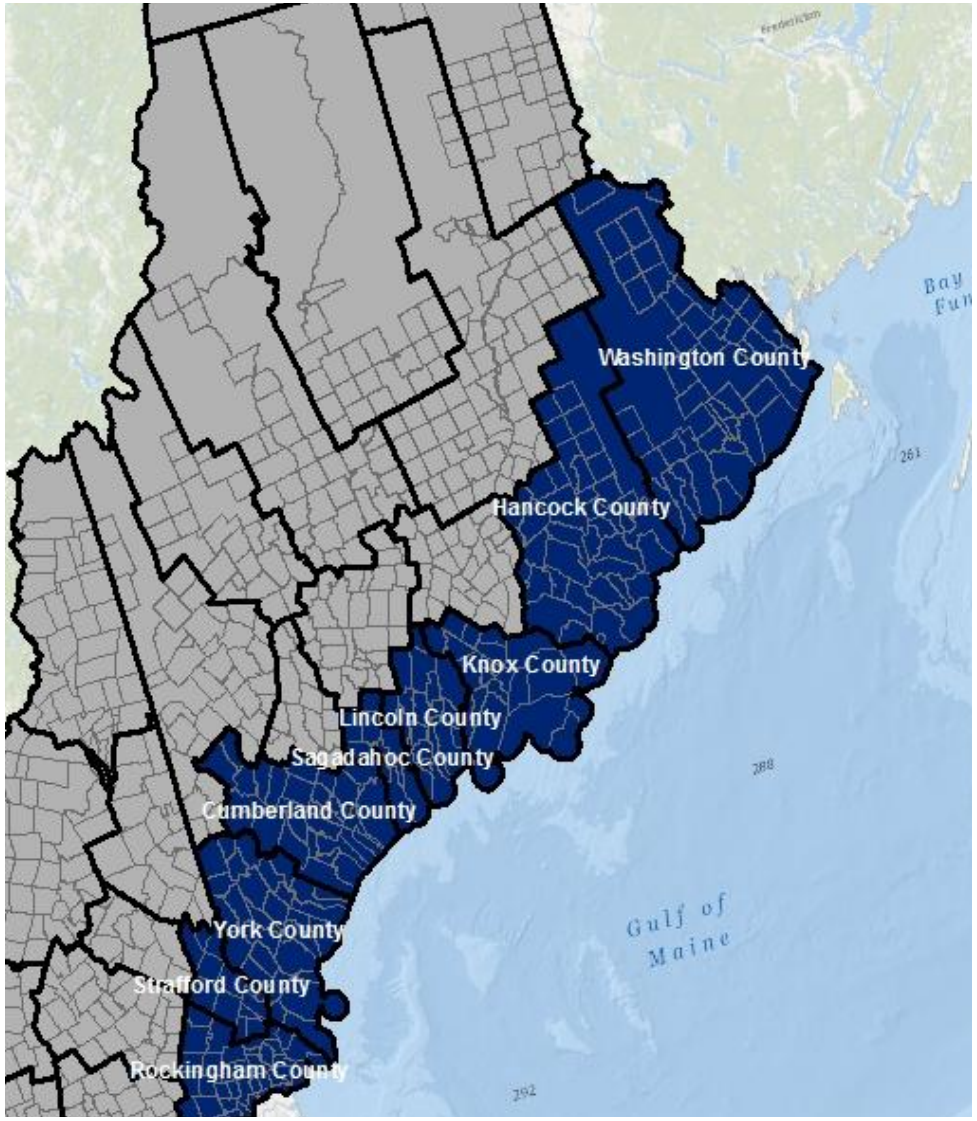
Research Question: What are the factors that are influencing how individuals view coastal water quality, and ultimately impact whether they are willing to do anything about it?

Solution:

1. Examine the extent to which the way questions are posed impacts individual choices regarding water quality
2. Look at how opinions on broader issues like the climate and responsibility impact responses
3. Explain how risk perception is impacting people's decisions
4. Incorporate the theory of psychological distance into our model through a variety of channels

Data Setup

- Mail survey sent to 4000 individuals along coastal Maine and New Hampshire (n=1,176, response rate of 33%)
- Water quality data and beach locations were provided by The Maine Office of GIS and The New Hampshire Department of Environmental Services



Framing questions to look at word sensitivity

- **Assess sensitivity of decisions to choice architecture**
  - Context Dependency [4] (Shellfish or Beach Recreation)
  - Public health or marine environment [5,6]

Please read this information:

A new program has been proposed to address coastal water quality. Please think about coastal water quality in terms of the marine environment, including the health of plants and animals

The proposed Coastal Water Quality Program would be funded by all Maine households, who would be required to pay a fee through higher water/sewer/septic fees. The program would be created by majority vote.

17. What is your level of agreement with the following statement? (CIRCLE **ONE** NUMBER.)

I would be willing to pay higher water/sewer/septic fees to protect coastal water quality.

STRONGLY DISAGREE	DISAGREE	UNSURE	AGREE	STRONGLY AGREE
1	2	3	4	5

18. If the Coastal Water Quality Program would cost your household an additional **$7 per month**, would you be willing to pay that amount and support the program? (CHECK **ONE**.)

- ❑ **Yes**, I would be willing to pay the increase in fees to support the Coastal Water Quality Program.
- ❑ **No**, I would not be willing to pay the increase in fees to support the Coastal Water Quality Program.

Perceptions about broader issues

- **Examine sensitivity of decisions to behavioral metrics**
  - Policy consequentiality [7]
  - Ascription of responsibility [8,9]
  - Beliefs regarding climate change [10]

23. To what extent do you agree or disagree with the following statements? (CIRCLE **ONE** NUMBER FOR **EACH** ITEM.)

	STRONGLY DISAGREE			UNSURE			STRONGLY AGREE
Global climate change is caused mostly by human activities.....	1	2	3	4	5	6	7
Changes in *my* everyday behavior could *worsen* the quality of Maine's coastal water...	1	2	3	4	5	6	7
I think scientists are doing important work....	1	2	3	4	5	6	7
Global climate change is happening.....	1	2	3	4	5	6	7
Scientists provide unbiased information.....	1	2	3	4	5	6	7
State government is responsible for protecting coastal water quality.....	1	2	3	4	5	6	7
Government uses the best available science in making coastal marine environment decisions.....	1	2	3	4	5	6	7

What do individuals perceive as risky?

- **Risk aversion** [11, 12]
  - The type of activity influences the degree to which the respondent could get sick from impaired water quality
  - For the shellfish version of the survey this would be types of shellfish consumed as well as frequency

16. If a beach has an advisory recommending that people not to enter the water, and a person **like yourself** enters the water, **in your opinion** how likely is it that this person gets sick?

➢ Enter a number between 0 (definitely will not get sick) and 100 (definitely will get sick).

_____ **%**

6. In a typical summer, how often do you visit ocean beaches? (CHECK **ONE**.)

- ❑ More than once a week
- ❑ About once a week
- ❑ Two to three times a month
- ❑ A few times a month
- ❑ Not at all → *SKIP TO QUESTION 12*

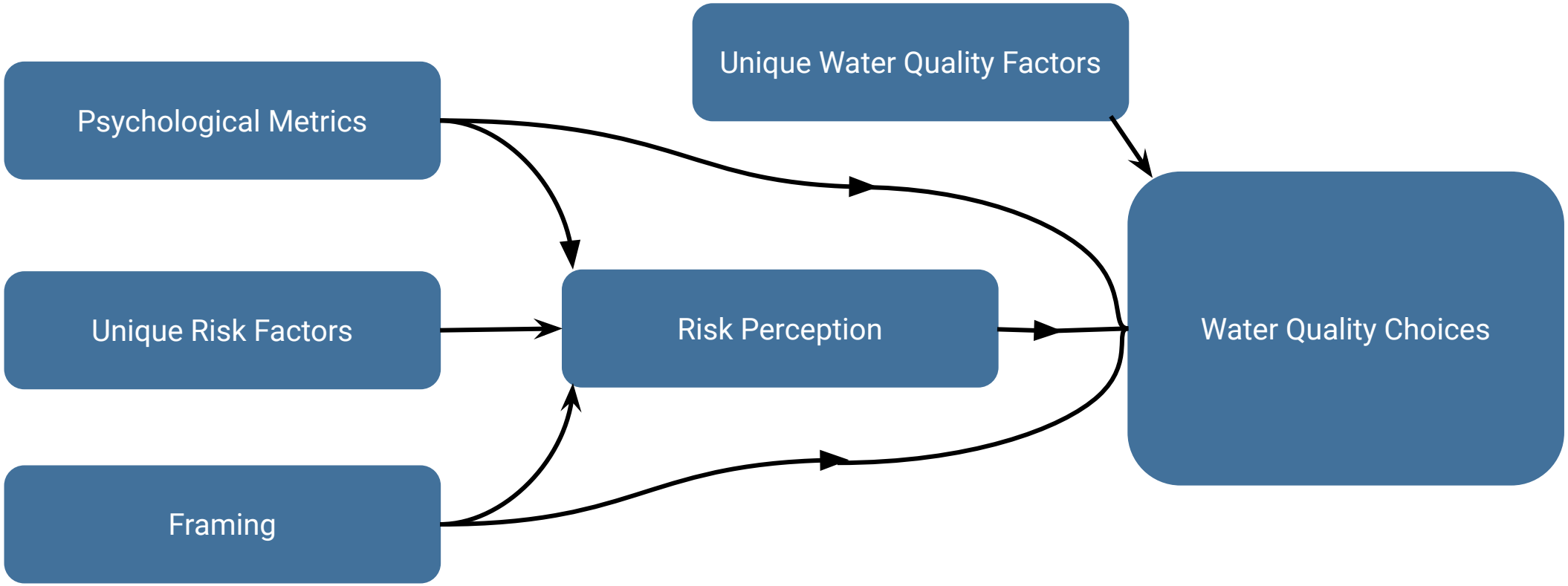
7. What activities do you typically do at the beach? (CHECK **ALL** THAT APPLY.)

- ❑ Sunbathing
- ❑ Swimming
- ❑ Beach games and sports
- ❑ Photography
- ❑ Sight-seeing
- ❑ Boating
- ❑ Shopping
- ❑ Surfing
- ❑ Glass and shell collecting
- ❑ Reading/relaxing
- ❑ Walking
- ❑ Eating at local restaurants
- ❑ Sea-kayaking
- ❑ Other: _____

Psychological Distance

Low Psychological Distance		High Psychological Distance
	Geographic / Spatial Dimension	
Lives far from beach visited	Lives moderately far from beach visited	Lives far from the beach visited
	Temporal Dimension	
Have lived in same state for most of life	Have lived in this state for a while	Have lived in this state for a few years
Visits the beach frequently	Visits the beach often	Visits the beach infrequently
	Social Dimension	
Has several at risk members in the household	Has an at risk individual in the household	Has no at risk individual in the household
Had a family member get sick		Has not had a family member get sick
	Hypothetical/Uncertainty Dimension	
Believes they will likely get sick	Believes there is a chance they will get sick	Believes there is a low chance they get sick
Believes own behavior can significantly impact water quality	Believes own behavior can have some impact on water quality	Believes own behavior can't impact water quality

Conceptual Framework



Preliminary Results

Framing:

- Framing of the issues does appear to matter. Individuals presented with the Shellfish survey were on average willing to support a program that cost $6 more per month than individuals who were given the coastal recreation survey

Broader Issues:

- There was no difference between the states we examined, or the survey respondents perception of water quality
- Sense of place does impact Maine respondents, but not NH respondents.
- For Beach and Shellfish surveys, perceived impact from climate change increased their support for programs by around $1 per month

Preliminary Willingness to Support Results

Risk Perception:

- We find that our spatial distance measurement did impact risk perception, however that did not carry through to the support of water quality improvement programs
- For Shellfish surveys, perceiving a higher home state water quality decreased their support for programs by almost $5 per month
- Maine residents in the shellfish survey were less willing to support the program at a rate of $8 per month

Psychological Distance:

- When incorporating distance into the full specification, and the beach version we see that perceptions of the impact of climate change increase the respondents support by around $2 per month.

Summary of Key Findings

- Distance does play a role in how individuals perceive risk
  - Decreasing risk perception as distance increases to a point, then increasing the risk perception
- Our framing of issues (marine environment v. public health) does not appear to have an effect on overall valuation, while the type (shellfish v. coastal recreation) does.
  - The impact to oneself when considering shellfish is more immediate than coastal recreation
- Believing that climate change is occurring increases the likelihood of supporting the program

Policy Implications

- Resource managers should examine where their visitor base is traveling from to get a sense of the how committed they are to the beach, and how those visitors care about the water quality
- The context that people are seeing information in impacts their decisions, and being aware of how the setting might influence individuals should be considered
- Especially for shellfish consumers, the consumer's perception of water quality is impacting their decision, suggesting that additional informational campaigns could help address misinformation

Next Steps

- Expand our model to incorporate the full effects of psychological distance on individuals preferences
- Examine whether the impact of various explanatory variables are consistent across our frames
- Derive complete WTP estimates for each frame and issue
- Examine contextual evidence for the results we are seeing, such as municipality choices regarding closures

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Questions or Comments?

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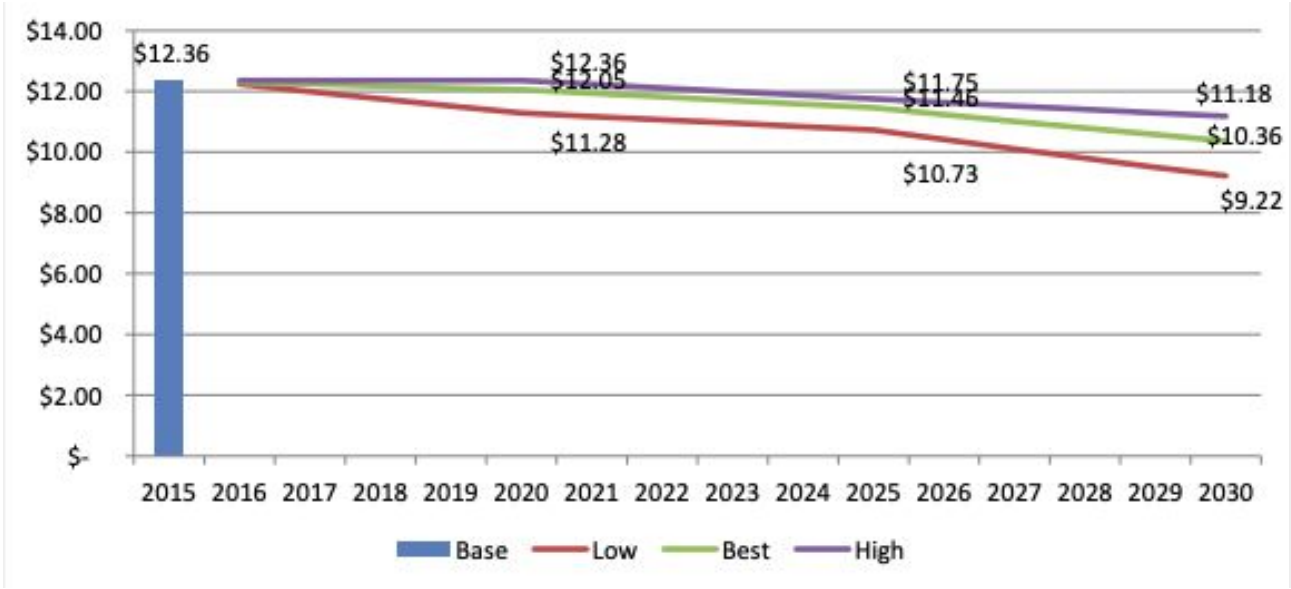
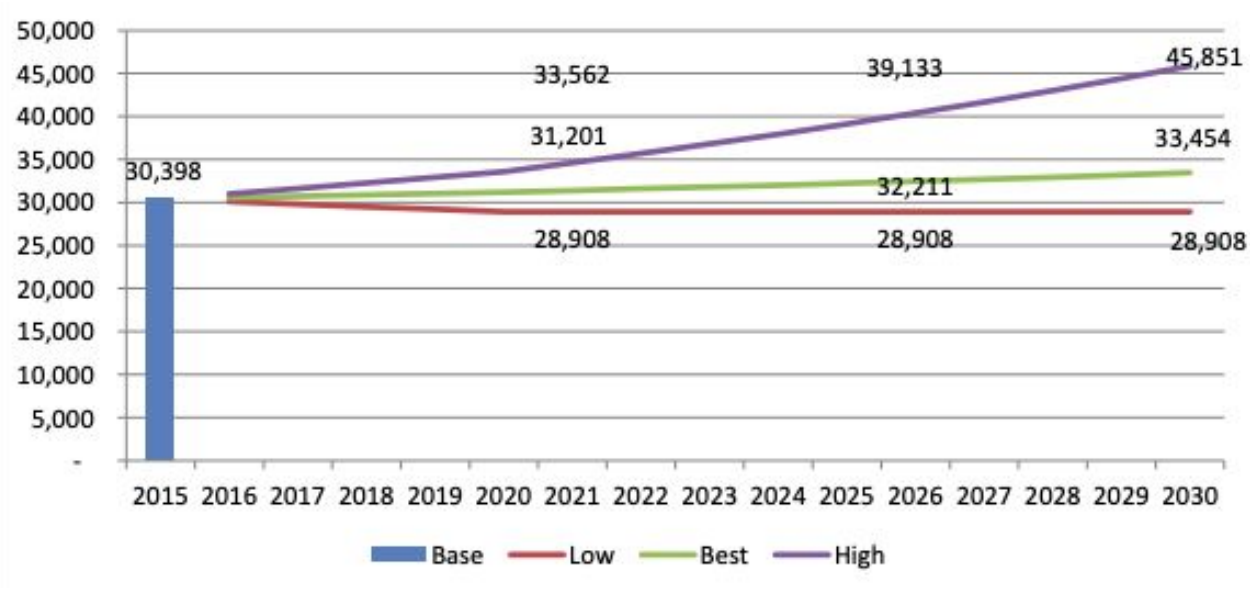
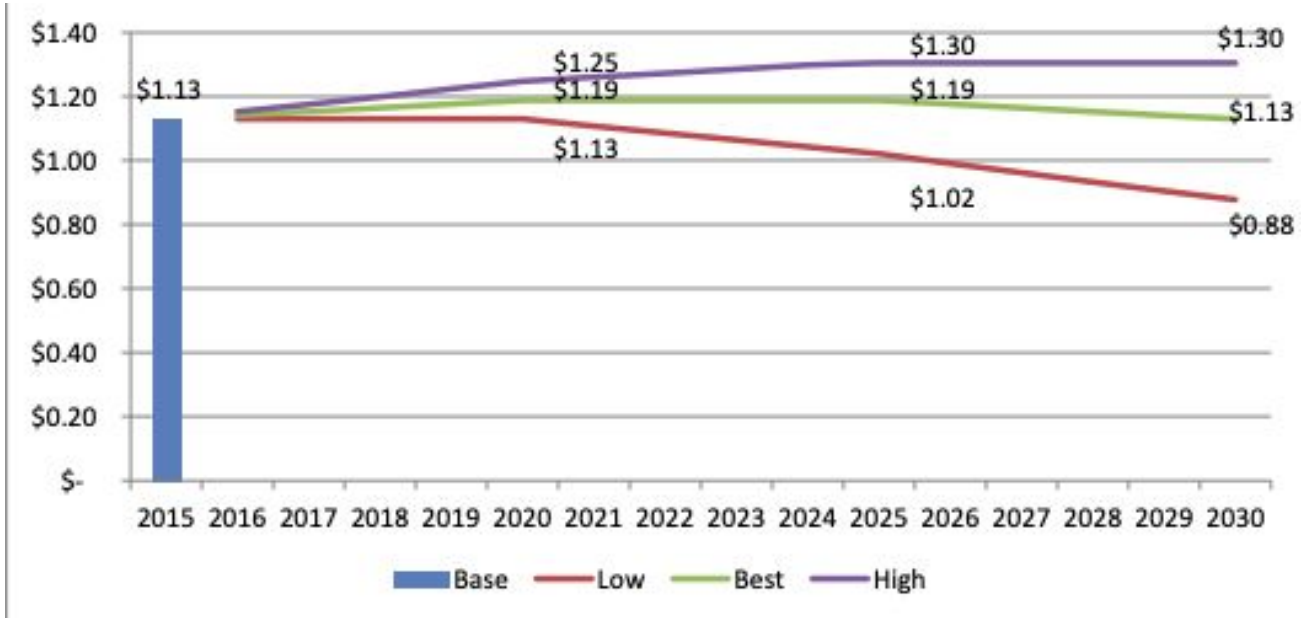
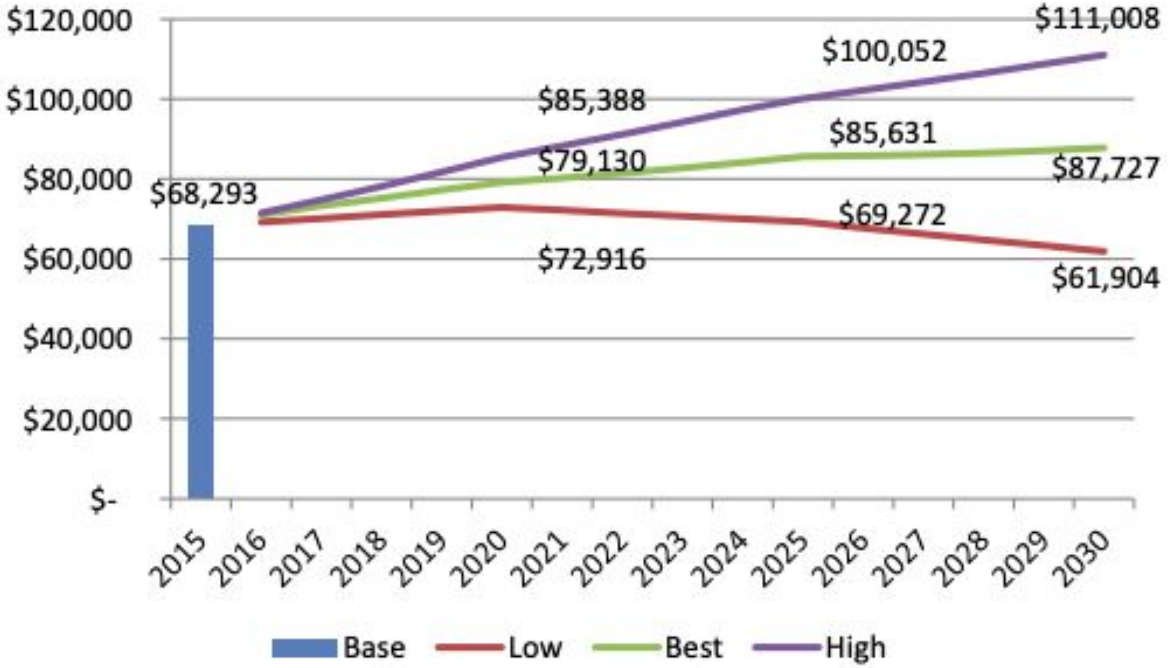
Scallop Trends





Mussel Trends





Select Model Results

- Shellfish are more risk perceptive and willing to support wq programs at all parts of our model
- Age appears to only impact risk perception
- Women are more willing to support the program and are more risk perceptive
- Factors impacting WQ only affect risk perception, not support for the program
- Responsibility and State are not significant contributors to the model

Table 1: Mixed Process Marginal Effects

	WTP Margins	Risk Margins	Full Margins
Frame (Public Health v. Marine Environment)	0.00206 (0.113)	0 (.)	0.00206 (0.113)
Context (Shellfish v. Coastal Recreation)	0.560*** (0.213)	17.53*** (2.367)	0.560*** (0.213)
Education	0.0176 (0.0622)	0.614 (1.007)	0.0176 (0.0622)
Home State WQ (0-5, with 5 being excellent)	-0.0859 (0.0839)	-0.850 (1.319)	-0.0859 (0.0839)
Age	-0.00267 (0.00494)	-0.308*** (0.0806)	-0.00267 (0.00494)
Gender (1 being Male)	-0.283** (0.143)	-5.675*** (2.012)	-0.283** (0.143)
Sense of Place (Proportion of Life In Current Residence)	-0.0513 (0.127)	2.327 (1.942)	-0.0513 (0.127)
Negative WQ Factors (0-7, with 7 having very negative impacts)	0.0910 (0.122)	7.190*** (1.257)	0.0910 (0.122)
Responsibility (0-7, with 7 being responsible for own actions)	0.0134 (0.0472)	0.214 (0.705)	0.0134 (0.0472)
State (1 being ME)	-0.200 (0.129)	-3.290 (2.014)	-0.200 (0.129)
Do You Engage in Activites in the Water?	0.352 (0.388)	-6.174 (5.784)	0.352 (0.388)
Do You Avoid Risk? (0-7, with 7 being strongly agree)	0 (.)	2.104*** (0.613)	0 (.)
Have You Been Sick From Poor WQ Before?	0 (.)	7.845** (3.579)	0 (.)
N	683	683	683

Standard errors in parentheses

* $p < .1$, ** $p < .05$, *** $p < .01$

Select Distance Model Results

- Risk perception decreases with age
- Women are more risk perceptive and more willing to pay for better WQ
- How people interact with coastal water doesn't impact their decisions
- Generally avoiding risks does increase the perception of risk
- Having gotten sick from poor WQ in the past does increase the perception of risk

Table 2: Distance Model Marginal Effects

	WTP	Risk
Home State WQ (0-5, with 5 being Excellent)	-0.0859 (0.0839)	-0.850 (1.319)
Age	-0.00267 (0.00494)	-0.308*** (0.0806)
Gender (0 = Female, 1 = Male)	-0.283** (0.143)	-5.675*** (2.012)
WQ Factors (0-7, with 7 being lots of things impact WQ negatively)	0.0910 (0.122)	7.190*** (1.257)
Responsibility (0-7, with 7 being responsible for own actions)	0.0134 (0.0472)	0.214 (0.705)
State (0 = NH, 1 = ME)	-0.200 (0.129)	-3.290 (2.014)
Do You Engage in Activities in the Water? (0-1)	0.352 (0.388)	-6.174 (5.784)
Do You Avoid Risk? (0 No, 1 = Yes)	0 (.)	2.104*** (0.613)
How Often Do You Visit The Beach? (0-4)	0 (.)	0.830 (0.749)
Have You Ever Gotten Sick From Poor WQ? (0-1)	0 (.)	7.845** (3.579)
Distance	-0.007 (0.011)	-0.176* (0.102)
N	683	683

Standard errors in parentheses

* $p < .1$, ** $p < .05$, *** $p < .01$