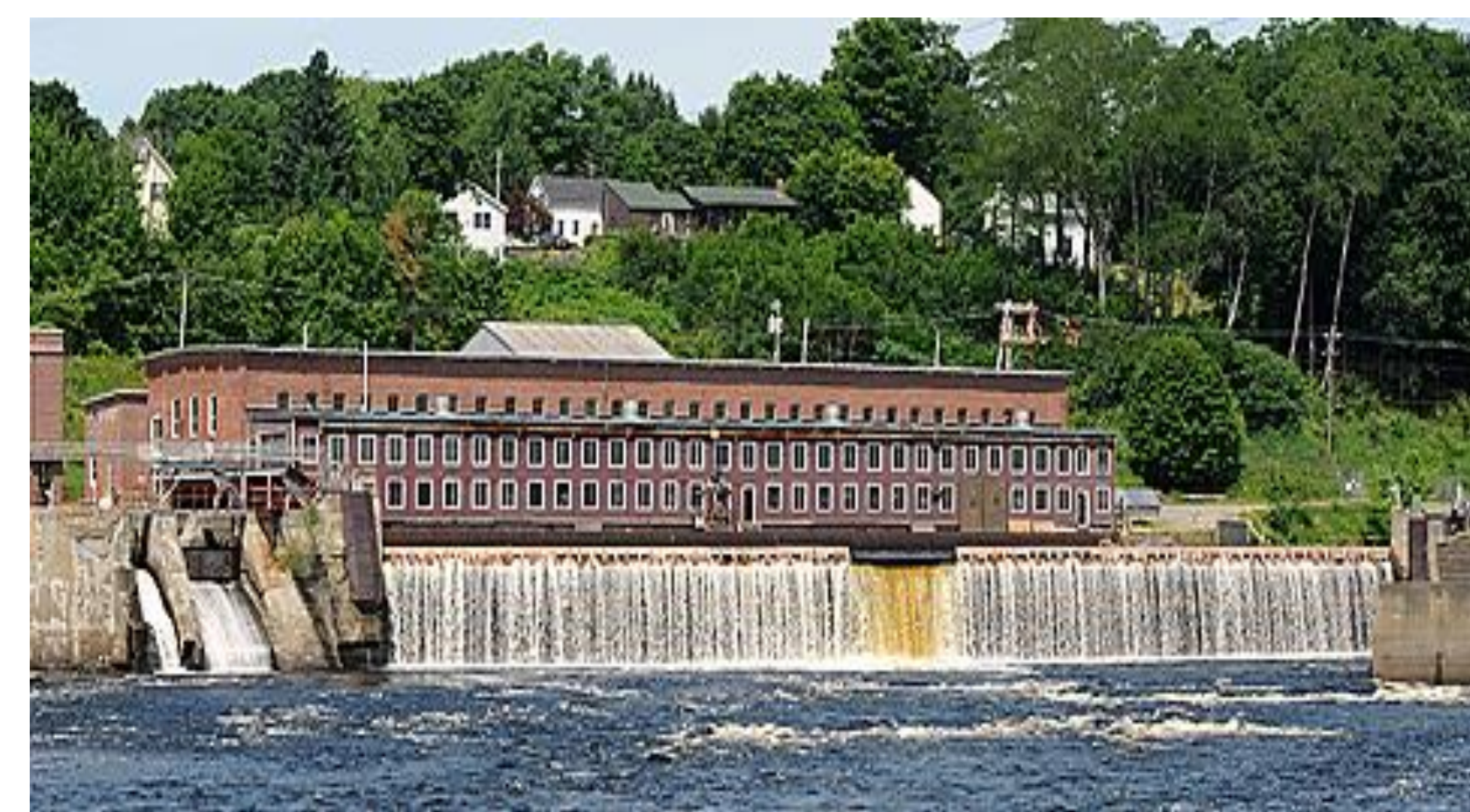


# Public Preferences for Competing Ecosystem Services from Dams and Removals



## INTRODUCTION

Ecosystem services are the benefits people derive from ecosystems. As public goods, they tend to be underprovided unless their value can be incorporated into decision-making processes. Nonmarket valuation facilitates this by assigning monetary values to ecosystem services. Many ecosystem services are subject to supply uncertainty; yet we lack a solid understanding of how people process environmental uncertainty, and how that impacts valuation. This research will improve our knowledge of decision-making in the presence of environmental uncertainty and demonstrate implications for performing benefit transfer.



## RESEARCH QUESTIONS

- What is the public willing to pay for ecosystem services from dam removals?
- What are public preferences for tradeoffs between competing ecosystem services?
- How are willingness to pay and preferences influenced by environmental uncertainty?
- Do people respond to environmental uncertainty in the same way as financial risk?
- Can we improve benefit transfers between scales by incorporating risk preferences?

## METHODOLOGY

- Feasible ranges for key ecosystem services available at two spatial scales derived from PPF analysis
- Two versions of choice experiment survey: one framed at the entire Penobscot Watershed and one framed at Lower Penobscot Watershed scale (Fig. 1)
- Mail survey implemented following Dillman (2009)
- Estimate the marginal utility of each ecosystem service at both scales using two behavioral models: expected utility vs prospect theory
- Strategies to address research questions:
  - Estimate marginal willingness to pay and rates of substitution between services
  - Compare risk aversion parameters to those elicited directly via hypothetical financial lottery
  - Compare results of benefit transfer between scales using both modeling assumptions

	Status Quo No Action	New Plan A	New Plan B
ATLANTIC SALMON maximum possible	1,500 fish	7,000 fish	22,000 fish
LIKELIHOOD of salmon reaching maximum possible	25%	25%	90%
HYDROPOWER thousands of homes powered	155 thousand homes	45 thousand homes	155 thousand homes
RIVER HERRING square miles of habitat	7 mi <sup>2</sup>	7 mi <sup>2</sup>	7 mi <sup>2</sup>
LAKE SHORELINE miles lost	0 mi lost	300 mi lost	500 mi lost
COST TO YOU onetime fee	\$0	\$400	\$50
Which would you choose? check one box ONLY			
	<input type="checkbox"/> No Action	<input type="checkbox"/> Plan A	<input type="checkbox"/> Plan B

Fig. 2. A sample choice set from the survey framed at the Watershed scale. Each respondent faces six choice sets with varying levels.

## APPLICATIONS TO DECISIONMAKING

- Identifying socially optimal points on the PPF (Fig. 3)
- Facilitation of 'trading dams'
- Transferring valuation between scales, reducing the need for costly site-specific studies

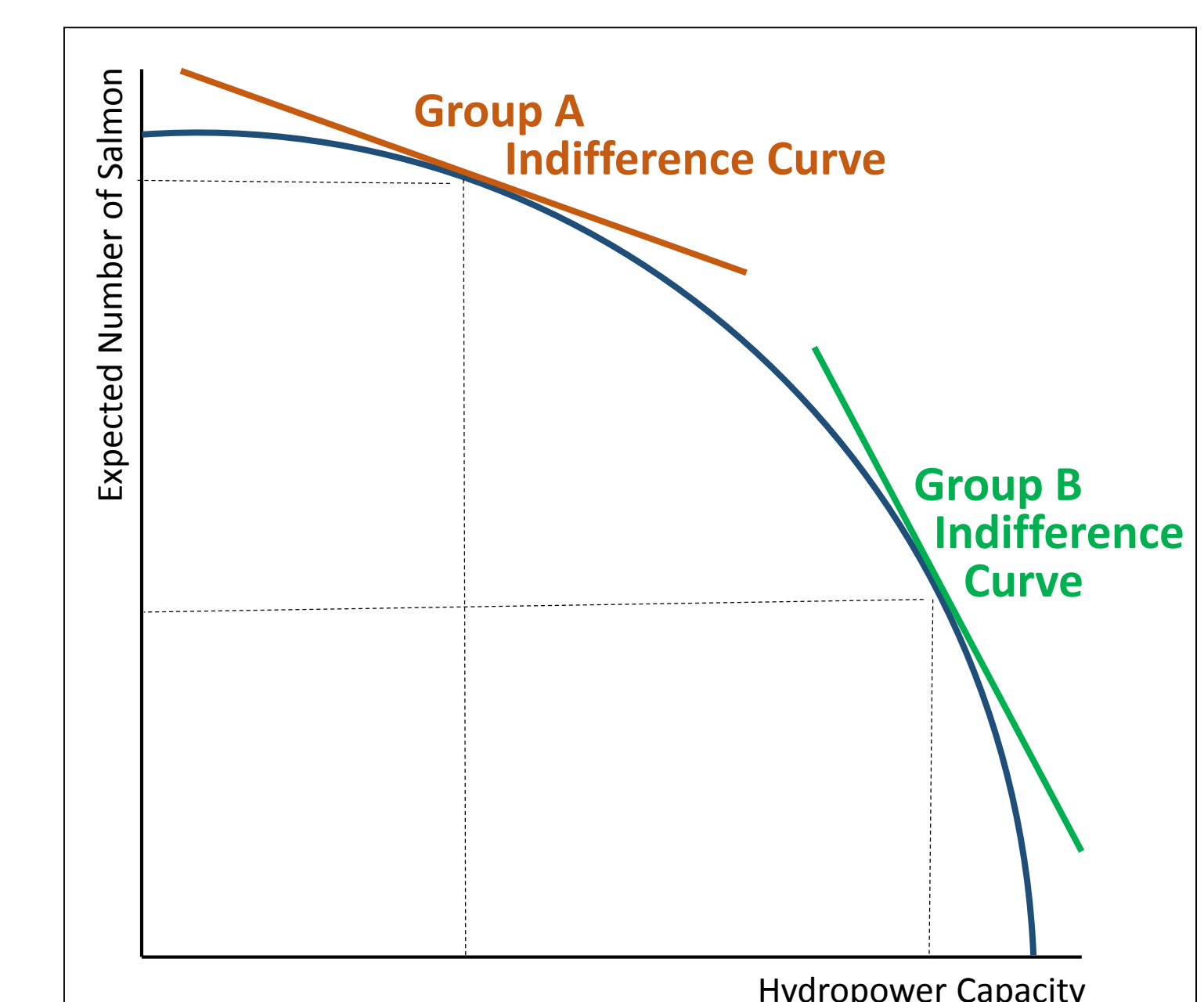


Fig. 3. Simplified example showing how estimated utility functions can be combined with the PPF to identify optimal outcomes for groups with differing preferences.

## STUDY AREA

The study is being conducted in the Penobscot Watershed, Maine. The setting is ideal because:

- Interesting main tradeoff - hydroelectricity vs. fish
- Recent well-publicized removals → enhanced scenario realism
- Substantial uncertainty surrounding Atlantic salmon recovery
- Large enough to support tradeoff analysis at two scales (Fig. 1)

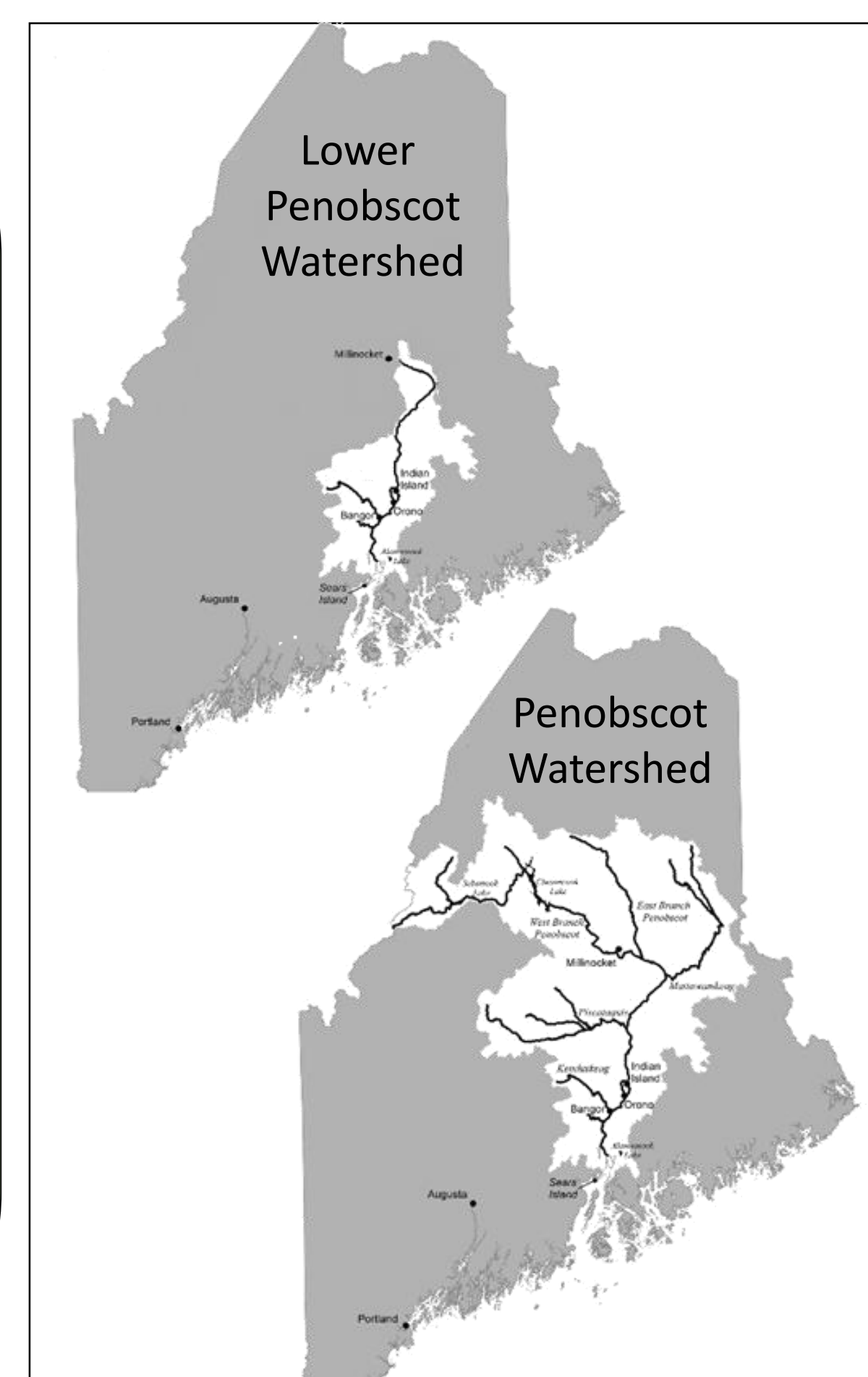


Fig. 1. Valuations are conducted at two spatial scales.

## SURVEY DEVELOPMENT

Draft survey  
Focus groups and peer feedback

## PRETEST (current phase)

May/June 2018  
120 subjects

## DATA COLLECTION

June/July 2018  
1,500 subjects

## ANALYSIS

Fall 2018 - analyze data  
Spring 2019 - manuscript