Marine ecosystem service values and valuation in the U.S.:
An assessment of the literature through the lens of recent best practice guidelines

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Ecosystem Service Values

- Where do ESVs come from?
  - Measured using market or non-market valuation methods - revealed preference (RP) or stated preference (SP) methods
    - Differing data, resource, and time requirements
  - Existing studies (searchable databases)
    - Envalue: https://www.environment.nsw.gov.au/envalueapp/
    - The Economics of Ecosystems & Biodiversity (TEEB)/Ecosystem Services Partnership: https://www.es-partnership.org/services/data-knowledge-sharing/ecosystem-service-valuation-database/

- Policy uses
  - Ecosystem-based approaches to management
    - EBM, EBFM, IEA, EA, etc.
    - Facilitate trade-off analyses (common metric)
  - Benefit-cost analysis
  - Damage assessments

Benefits Transfer

- Benefits transfer (aka environmental value transfer)
  - Methods for applying existing economic values and value functions to new applications (Johnston and Rosenberger 2010; Navrud and Ready 2007)

Area A – existing value information

Area B – policy application area

- Relies on the existence of valuation studies that yield "high quality" valuation information for the ecosystem services of interest

- How well does the existing **stated preference** ecosystem service valuation literature adhere to "best practices"?

SP Best Practices Guidance

- 1993 NOAA Blue Ribbon Panel recommendations

  - Contingent valuation methods

- 2017 best practices guidelines

  - Contingent valuation and choice experiments

  - 23 guidelines

    - Survey Development and Implementation (6)

    - Value Elicitation (7)

    - Data Analysis (7)

    - Validity Assessment (2)

    - Study Reporting (1)

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Contemporary Guidance for Stated Preference Studies

Robert J. Johnston, Kevin J. Boyle, Wiktor (Vic) Adamowicz, Jeff Bennett, Roy Brouwer, Trudy Ann Cameron, W. Michael Hanemann, Nick Hanley, Mandy Ryan, Riccardo Scarpa, Roger Tourangeau, Christian A. Vossler

Best Practices Guidelines

1	Survey design-related (7)	9	No-answer option (2)	17	Behavioral response anomalies (1)
2	Pretesting activities (4)	10	Decision rule (1)	18	Value estimation (3)
3	Choosing between SP approaches (2)	11	Payment vehicle (4)	19	Using data from auxiliary and supporting questions (2)
4	Experimental design (3)	12	Auxiliary or supporting questions (3)	20	Sample representativeness and value aggregation (6)
5	Ethics in data collection (4)	13	Ex ante procedures to enhance validity (2)	21	Conducting and interpreting validity tests (2)
6	Extent of market, survey mode, sampling, and nonresponse bias (4)	14	Choice of econometric estimator (3)	22	Weight of evidence in validity testing (2)
7	Willingness to pay versus willingness to accept (2)	15	Modeling heterogeneity (2)	23	Study reporting (2)
8	Valuation question response formats (3)	16	Balancing model parsimony and complexity (2)		**Total of 66 evaluation criteria**

Legend

Survey Development and Implementation

Value Elicitation

Data Analysis

Validity Assessment

Study Reporting

U.S. Ecosystem Service Valuation Studies

- Limited to **U.S. stated preference** valuation studies
- **Peer-reviewed** published literature (journal articles)
- Limited to **marine and coastal ecosystem services**
  - Marine recreational fishing
  - Non-fishing recreation (boating, diving, wildlife viewing, etc.)
  - Marine and coastal habitat and habitat services
  - Threatened and endangered marine species
  - Marine protected areas/reserves
  - Marine cultural services
  - Other
- 85 relevant studies identified (so far)
  - 25 evaluated to date

Evaluation Criteria (example)

- 3 value estimation evaluation criteria for recommendation #18:

  - Recommendation 18: "Reported welfare estimates should, at a minimum, include estimates of central tendency and dispersion. Methods used to calculate welfare measures should be transparent and should ensure that estimates are theoretically and statistically well defined. This applies to all reported moments, quantiles, and so forth." (p.365)

| Criterion 18.1	Criterion 18.2	Criterion 18.3
Are the methods used to calculate welfare transparent and are the welfare estimates consistent with theory and statistically well-defined?	Are both measures of central tendency and dispersion of welfare estimates reported?	If multiple models are estimated, is the preferred model for computing welfare estimates identified and reasons for its selection documented?

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Scoring/Rating System

- Two dimensions

  - **Acknowledge.** To what extent does the study mention or acknowledge the elements in the evaluation criterion?

    - 5-pt scale: No element acknowledged (1) to All elements acknowledged (5)

  - **Address.** For elements mentioned/acknowledged, to what extent does the study address them?

    - 5-pt scale: Not at all addressed (1) to Fully addressed (5)

- Efforts to avoid subjectivity and maintain consistency
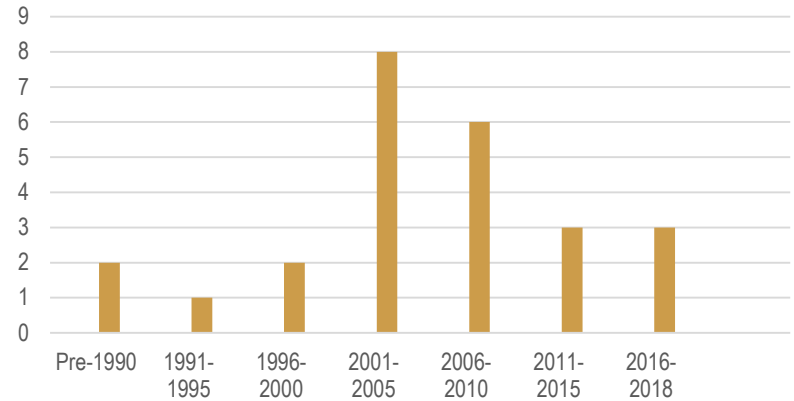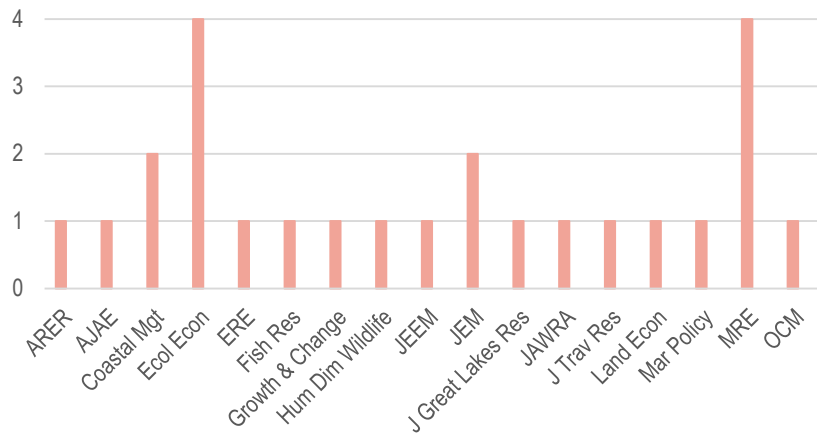
Summary Statistics of Studies (n=25)
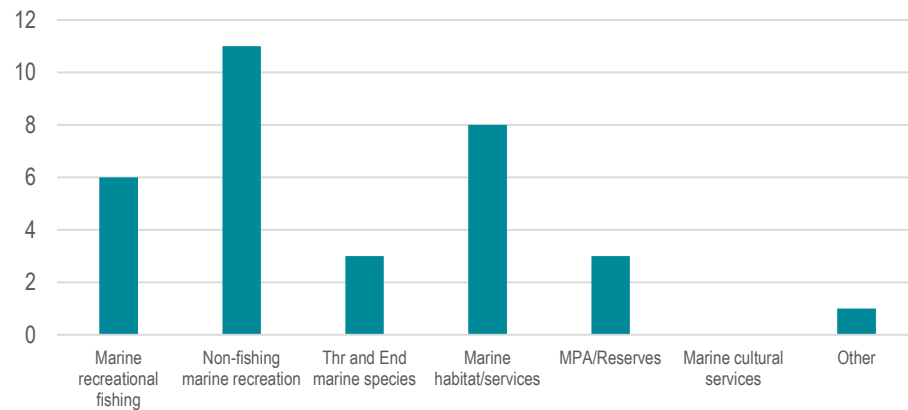

Types of Studies
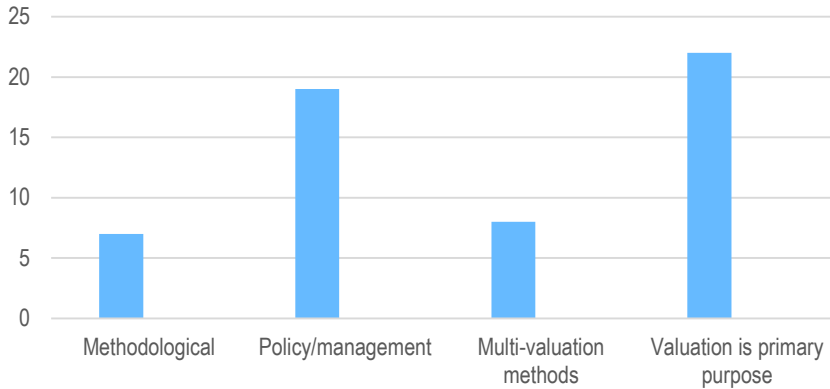
Year of Study

Number of Studies by Journal

Ecosystem Services

What are Studies Not Doing at All?

- Reporting on ethics in data collection (Recommendation #5)
  - 5.2: Was **informed consent** obtained from subjects (or provided in a cover letter or on the survey itself regarding the voluntary nature of the study, for example)?

  - 5.4: Were steps taken to **protect confidentiality and sensitive data**, including use of standard practices for data storage and study reporting?

What are Studies Not Acknowledging Much?

- Mean scores ≤ 1.20 (between 'very few' and 'no' elements acknowledged)

Eval criteria	Description	Mean Score	N
5.1	Evaluation/approval by a university or review board	1.08	25
1.7	Communicating scenario risk or uncertainty in terms easily understood by respondents	1.16	25
5.3	Avoiding deception and negative consequences on respondents	1.20	25
23.2	Full archival reporting and documentation	1.20	25

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What are Studies Acknowledging?

- Mean scores >3.3 (between 'some' and 'most' acknowledged)

Eval criteria	Description	Mean Score	N
1.1	Explaining baseline or status quo conditions	3.32	25
18.2	Reporting central tendency and dispersion of welfare estimates	3.33	24
14.1	Selection of econometric estimator reflecting unique aspects of data, hypotheses to investigate, and how results will be used	3.42	24
15.2	Justification and documentation of model selection and estimation	3.43	23
18.3	Identification and justification of preferred model	3.71	14
18.1	Transparency of welfare estimation and consistency with theory	3.83	24

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What are Studies Not Addressing?

- Mean scores < 2.5 (between 'only a little' and 'somewhat' addressed)

Eval criteria	Description	Mean Score	N
6.1	Rationale for mode of data collection	2.00	5
9.1	Inclusion of no-answer option	2.00	2
8.3	Discussion of trade-offs when using more than one choice question and steps taken to mitigate and evaluate complexity and presence of choice heuristics	2.22	9
2.4	Detailed documentation of pretesting activities	2.44	9

What are Studies Addressing?

- Mean scores > 4.0 (between 'mostly' and 'fully' addressed)

Eval criteria	Description	Mean Score	N
14.3	Justification for econometric models used and trade-offs involved	4.06	18
22.1	Inclusion of multiple validity tests to address specific issues/concerns	4.25	4
18.2	Reporting central tendency and dispersion of welfare estimates	4.29	17
18.3	Identification and justification of preferred model	4.36	11

Next Steps

- Finish compiling and reviewing U.S. marine ecosystem service valuation studies

- Breakdown results by ecosystem service and other characteristics and analyze trends

- Evaluation of RP valuation literature of ecosystem service values?

- Potential for evaluating literature in other countries/regions?

Source: http://www.middlewisconsin.org/a-laundry-list-of-bad-ideas/

Questions?