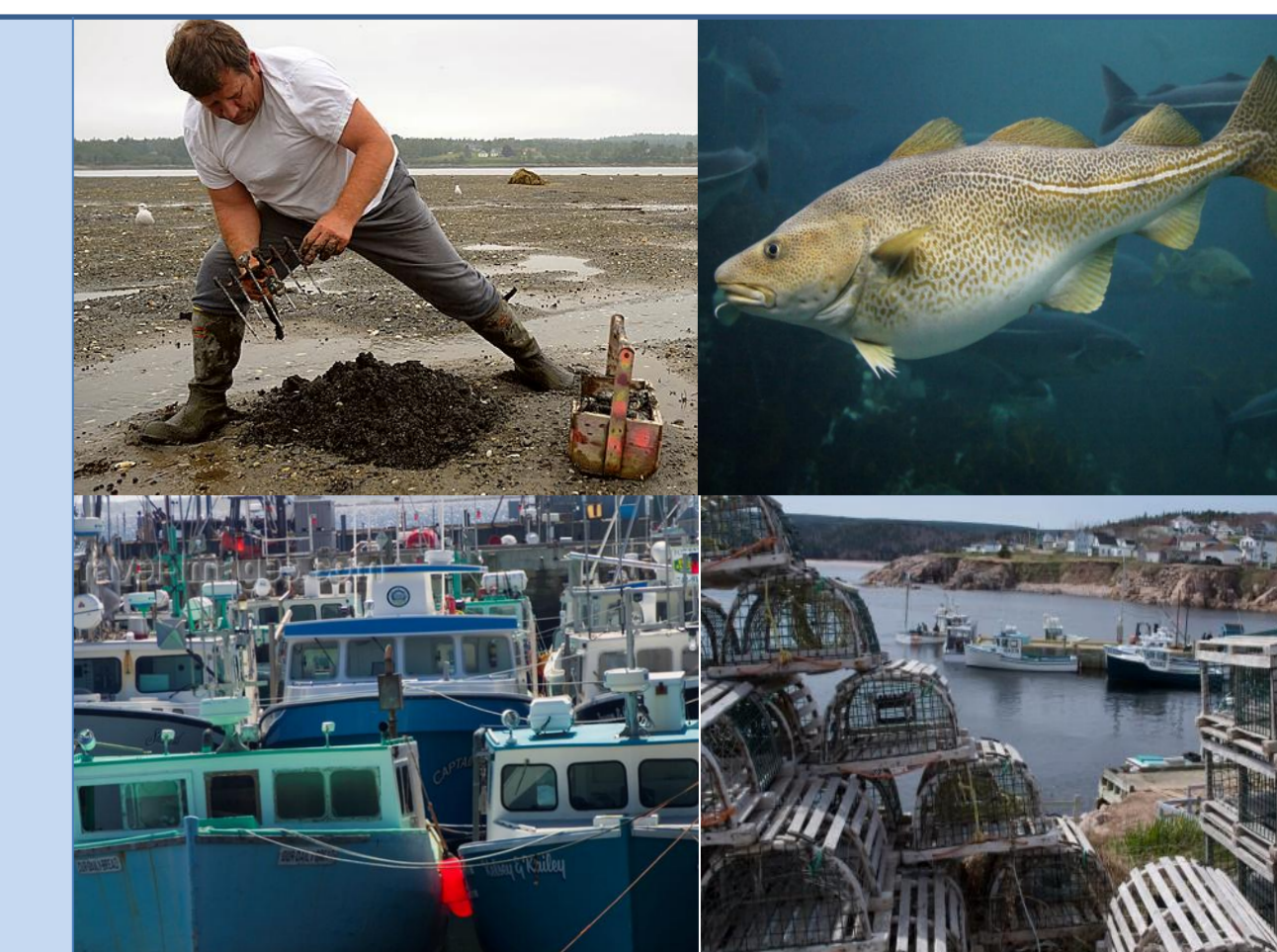


The Key Elements of Ecosystem-Based Management: Theory vs. Industry Priorities in 3 Fisheries in the Bay of Fundy, Canada

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Introduction

Ecosystem-based management (EBM) is a holistic approach to management. It "is an integrated approach to management that considers the entire ecosystem, *including humans*. The goal of EBM is to maintain an ecosystem in a healthy, productive and resilient condition so that it can provide the services humans want and need."¹

EBM has many definitions and synonymous terms, and there is no universal framework to implement EBM.

As a result this creates confusion - a gap between theory and practice.

Objectives

1. To formulate a list of the theoretical key elements of EBM.
2. To determine fishermen's perspectives and priorities of the key elements of EBM.
3. To compare and contrast the theoretical key elements of EBM with industry priorities.

Methods

1. Theoretical Key elements of EBM:

A frequency analysis of the key elements of EBM was conducted from prominent publications to determine the fundamental components for successful EBM application.

2. Industry Priorities of EBM:

Fishermen from the soft shell clam, lobster and groundfish fisheries in Southwest New Brunswick and Nova Scotia in the Bay of Fundy rated the importance of each key element of EBM during a face to face survey.

3. EBM Theory vs. Industry Priorities

The relative importance of the key elements of EBM according to theoretical publications and industry were compared.

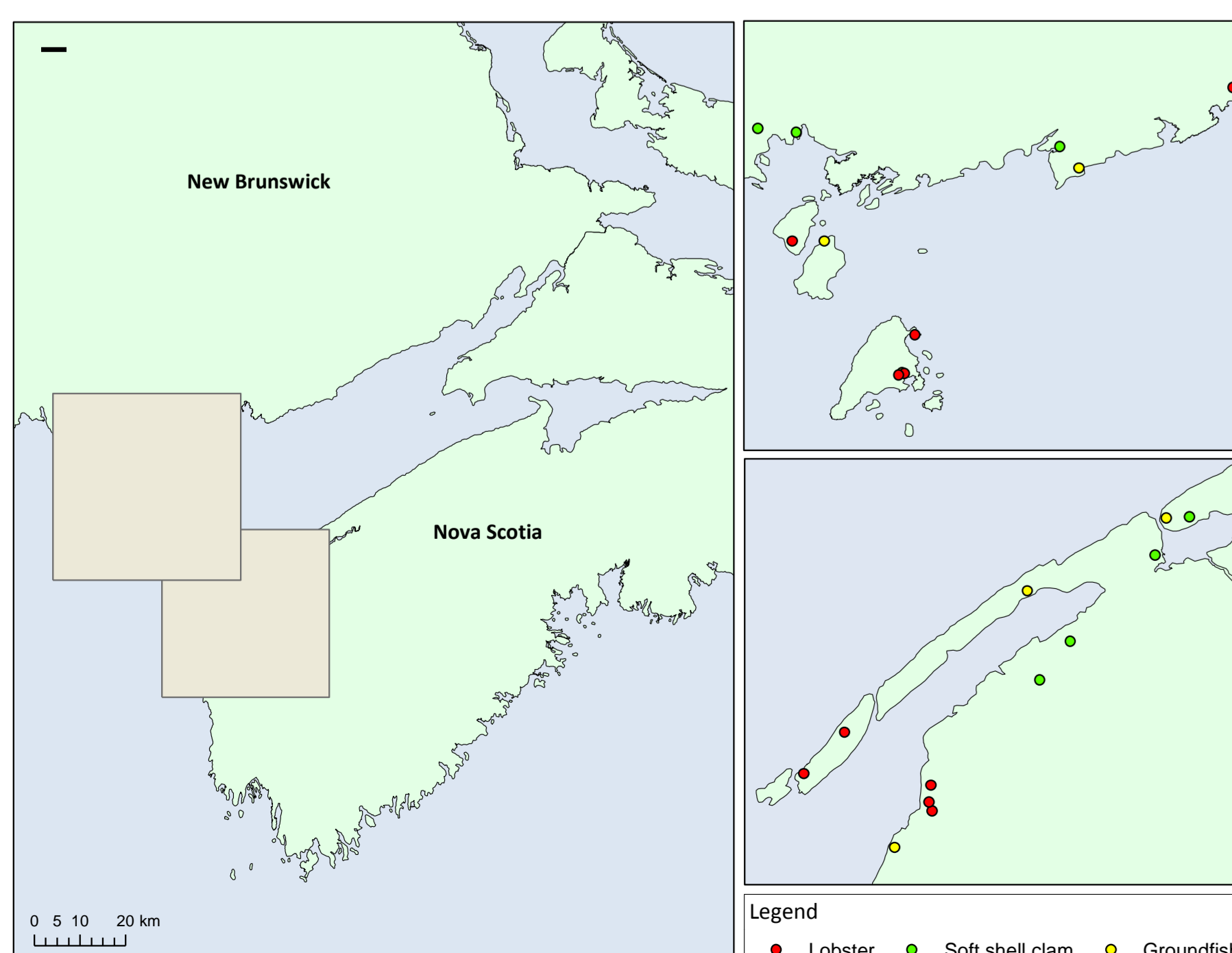


Figure 1. The Soft shell clam, lobster and groundfish fisheries are traditional fisheries in the Bay of Fundy, with varying ecological characteristics, harvesting techniques and management practices, allowing for a diverse range of perspectives to be surveyed. Twenty-three fishermen across southwest New Brunswick and Nova Scotia participated in a face to face survey, each point on the maps indicating the communities of each fisher. Six local fishing organizations participated in this research by recommending industry representatives who are active and/or knowledgeable of local management practices.

Results

1. A list of 15 theoretical key elements was compiled from selected publications.
2. The fishermen expressed that each individual key element of EBM is of relative importance.
3. *Sustainability*, *Long term objectives*, *Stakeholder involvement* and the *Use of all forms of knowledge* were the key element priorities of EBM most frequently chosen by industry.
4. Many of the top priorities from a theoretical point of view were much lower ranked by the fishing industry, and vice versa. The exceptions were *Stakeholder involvement* which ranked highly in both the theoretical literature and the industry priorities, and *Sustainability* which was top-ranked by industry and also ranked fairly high in the literature.

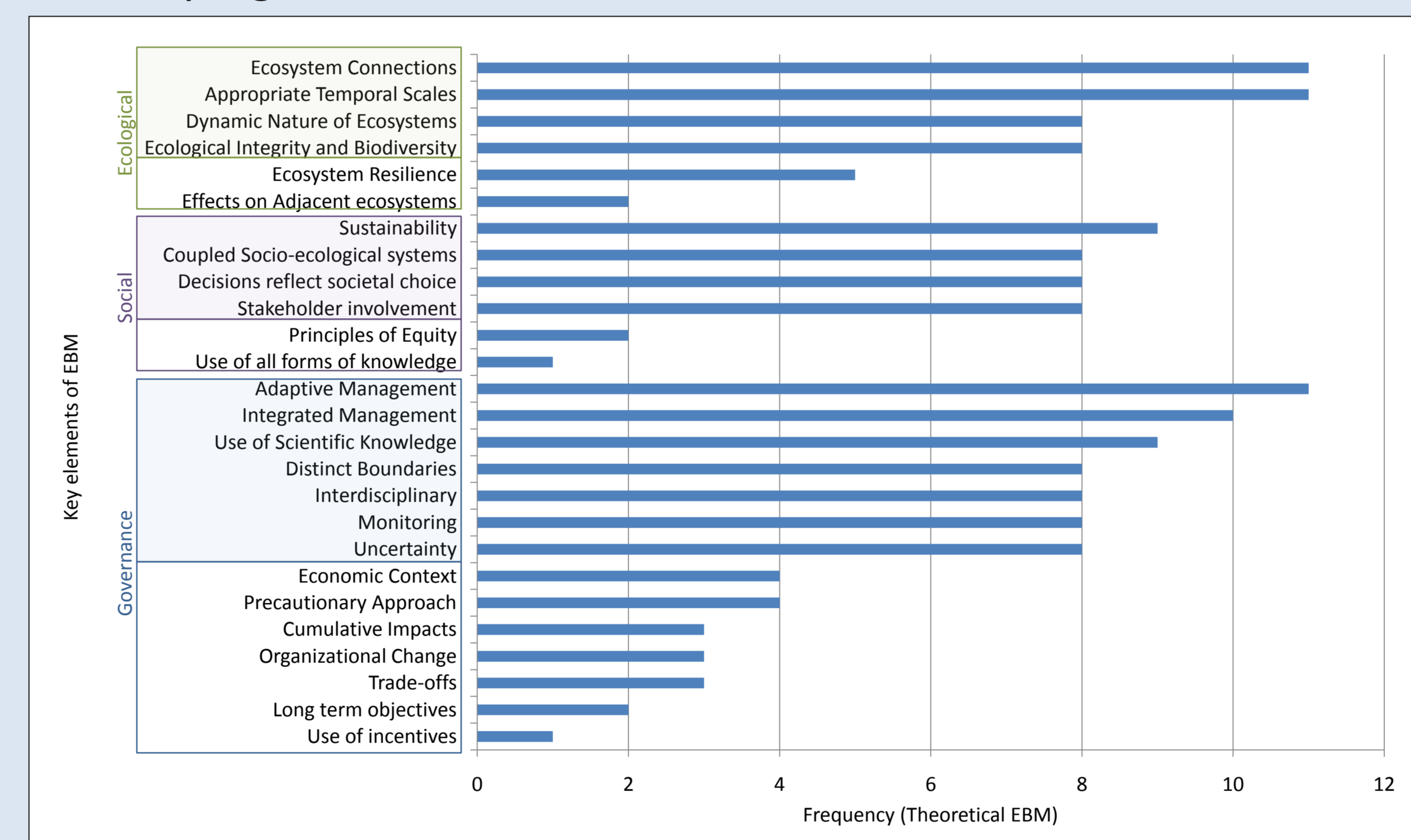


Figure 2. A frequency analysis of the key elements of theoretical EBM from publications for various applications, with shaded elements representing those with the highest frequency and therefore compulsory for the successful application of EBM.

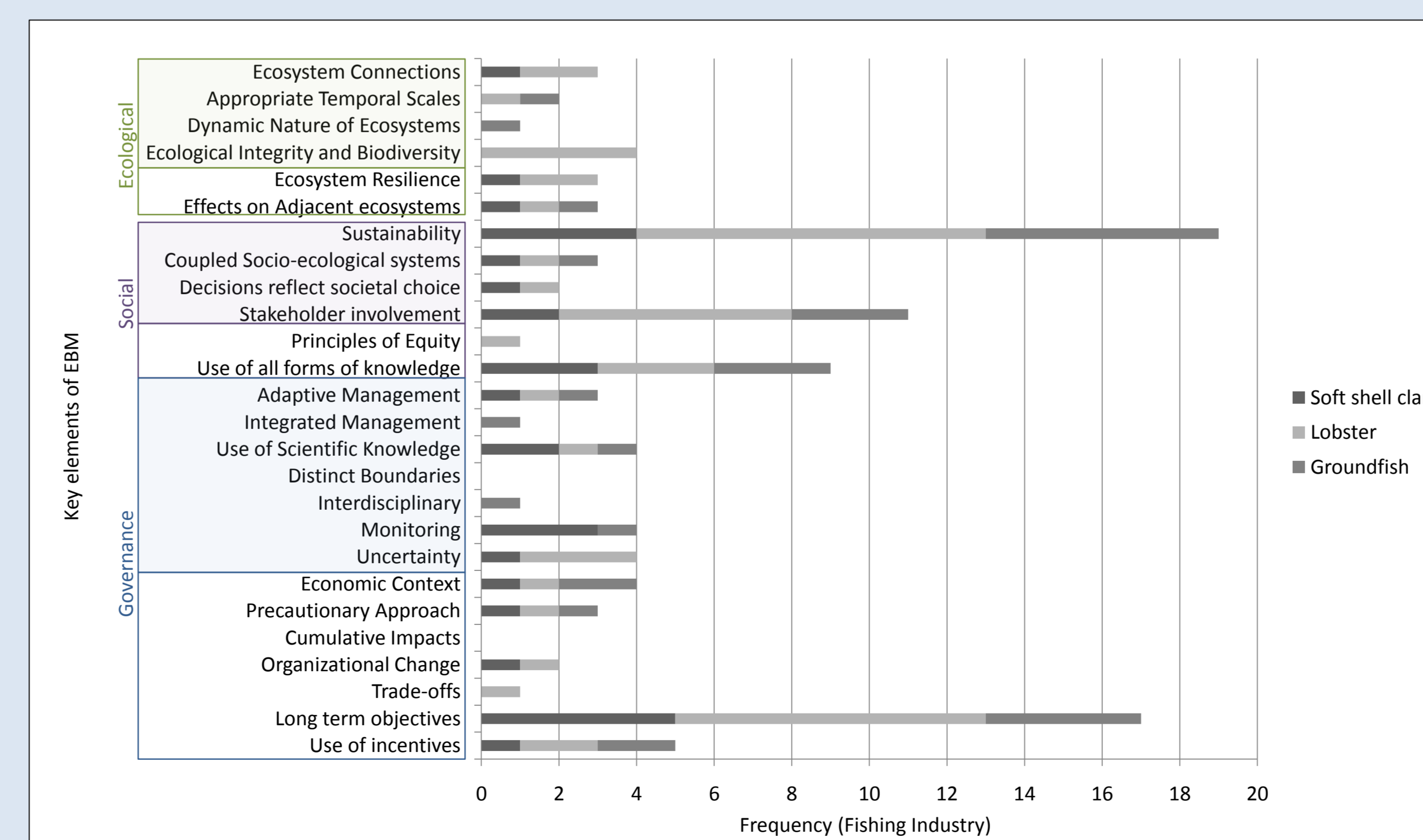


Figure 3. A frequency analysis of the five most important key elements of EBM from face to face surveys with fishermen regarding the management of the soft shell clam, lobster and groundfish fisheries in Southwest Nova Scotia and Southwest New Brunswick in the Bay of Fundy, Canada.

Results Cont'd

Rank	EBM Theory Publications	Frequency	Rank	Industry top 5 EBM Priorities	Frequency
1	Ecosystem Connections	11	1	Sustainability	19
1	Appropriate Temporal Scales	11	2	Long term objectives	17
2	Use of Scientific Knowledge	10	3	Stakeholder involvement	11
3	Stakeholder involvement	9	4	Use of all forms of knowledge	9
3	Dynamic Nature of Ecosystems	8	5	Use of incentives	5
4	Ecological Integrity and Biodiversity	8		Economic Context	4
4	Sustainability	8		Uncertainty	4
4	Coupled Socio-ecological systems	8	6	Monitoring	4
4	Decisions reflect societal choice	8		Use of Scientific Knowledge	4
5	Distinct Boundaries	8		Ecological Integrity and Biodiversity	4
5	Interdisciplinary	8		Precautionary Approach	3
5	Monitoring	8		Adaptive Management	3
5	Uncertainty	8	7	Coupled Socio-ecological systems	3
6	Ecosystem Resilience	5		Effects on Adjacent ecosystems	3
6	Economic context	4		Ecosystem Resilience	3
6	Precautionary Approach	4		Ecosystem Connections	3
7	Cumulative Impacts	3		Organizational Change	2
7	Organizational Change	3		Decisions reflect societal choice	2
7	Trade-offs	3		Appropriate Temporal Scales	2
8	Effects on Adjacent ecosystems	2		Trade-offs	1
8	Principles of Equity	2		Interdisciplinary	1
8	Long term objectives	2		Integrated Management	1
9	Use of all forms of knowledge	1		Principles of Equity	1
				Dynamic Nature of Ecosystems	1
				Cumulative Impacts	0
				Distinct Boundaries	0

Figure 4. A cross comparison of the importance of the key elements of EBM according to their frequency within the selected theoretical EBM publications with those chosen as one of five most important key elements of EBM according to industry representatives in the management of the soft shell clam, lobster and groundfish fisheries in Southwest Nova Scotia and Southwest New Brunswick in the Bay of Fundy, Canada.

Discussion

There are clear differences between EBM priorities within theoretical publications and those of the industry representatives from 3 fisheries in the Bay of Fundy.

Industry priorities are directly linked to major issues raised by the fishermen which impede EBM implementation.

Therefore a consensus among fishermen along with their endorsement and willingness to implement EBM in a meaningful way at the ground level will contribute to the success of EBM.

The support of stakeholders in fisheries management is a vital component for successful management initiatives.²

Greater knowledge of EBM on the ground will help to close the gaps between EBM theory and practice encouraging EBM to be implemented more readily at a local level.

Small scale EBM initiatives can be built upon and 'scaled up' to take on larger issues yet maintain the benefits of localized management.³

Acknowledgements

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Works Cited

1. McLeod, K.L. and Leslie, H.M. 2009. Ecosystem-Based Management for the Oceans. pp. 3-12.
2. Mackinson et al. 2011. Engaging Stakeholders in fisheries and marine research. *Marine Policy*. 35: 18-24.
3. Charles et al. 2010. Integrated Management: A Coastal Community Perspective. *Horizons* 10(4):26-34.