



Local knowledge provides the foundation for social-ecological community science



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Local knowledge catalyzes collaborative, community research

Since 2019 our research team has conducted collaborative research together with community members in the State of Maine, Northeastern United States.

Research that emerges from local knowledge:

1. Provides the foundation for knowledge co-production and feedback among scientists and collaborators;
2. Uplifts diverse forms of knowledge and local voices;¹
3. Provides fine-scale information to represent the social-ecological dimensions of the system;²
4. Can tackle transdisciplinary questions that have both local and broader significance.

Illuminates hypotheses & observations of change

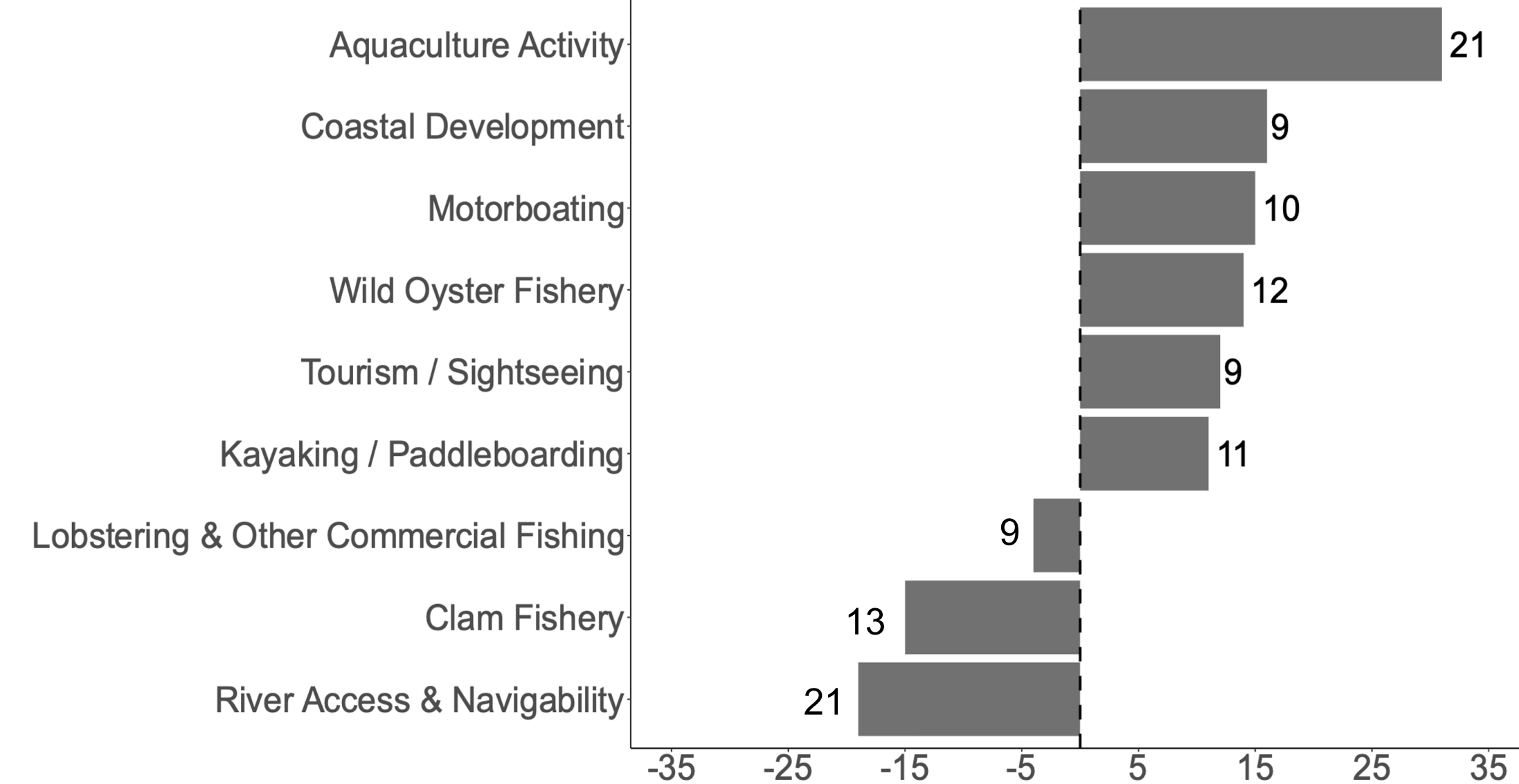


Figure 1: Changes observed by local knowledge mapping study participants (n = 44). Bars show the observed magnitude of the change and whether the perceived change was an increase or a decrease. Numbers by bars refer to replicates.^{3,4}



Figure 2: Participants observed changes like increased aquaculture activity (right) and shifts in wild shellfish populations (left).^{3,4}

Supports collaborative research in coastal SESs

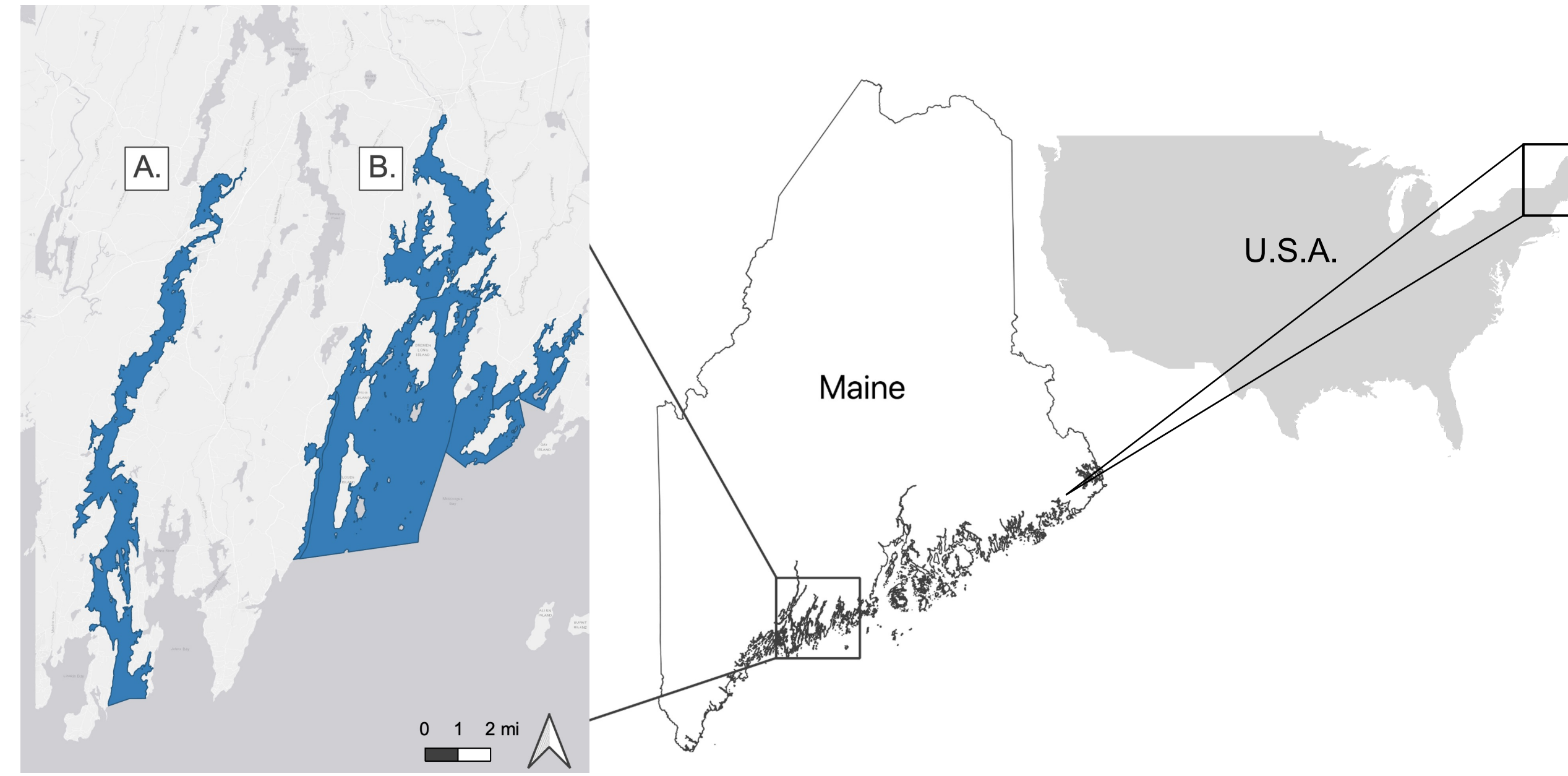


Figure 3: (A) Damariscotta River Estuary and (B) Medomak River Estuary social-ecological systems (SESs), located in Maine, USA. *States Shapefile*, 2015.

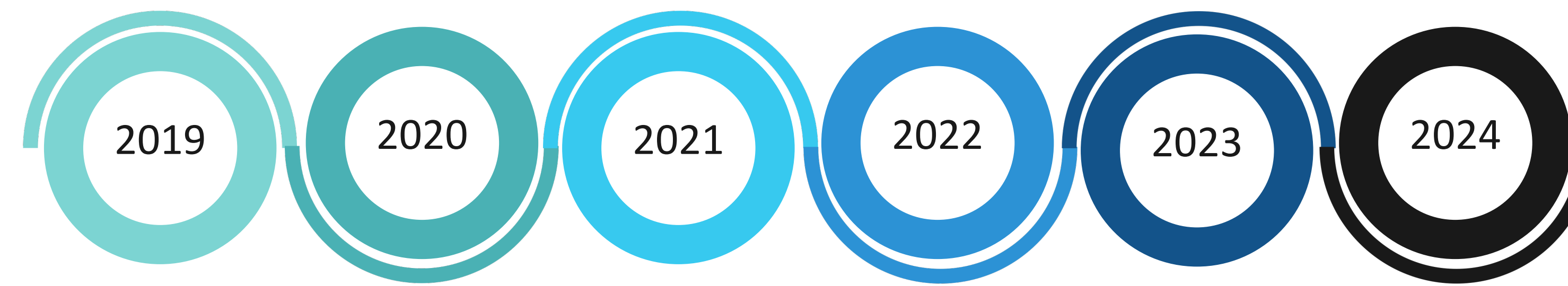
An ongoing process of co-production & collaboration

Local knowledge mapping study

To understand shellfish populations and document shellfish harvester observations.³

Wild oyster studies begin

To examine current wild oyster populations and spat recruiting to the intertidal zone.



Collaboration begins

Between the Joint Shellfish Committee and the UMaine Darling Marine Center. Intertidal mudflat surveys and harvester interviews.

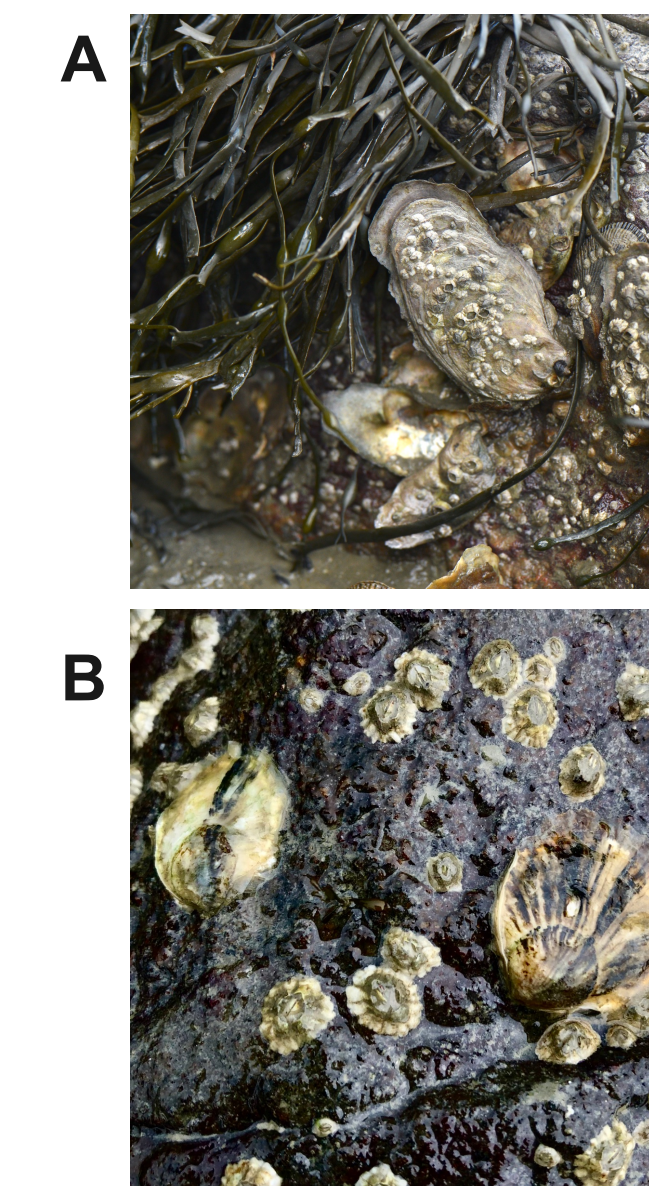
Community science project

Local high school students study shellfish populations and the local ecosystem.⁴

Focus groups and wild oysters

Documenting values and visions for the future and aquaculture-wild shellfish interactions.

Tackles transdisciplinary questions, locally & beyond



“Well, first of all, I think there's no question but the wild American oysters are the result of the aquaculture.”

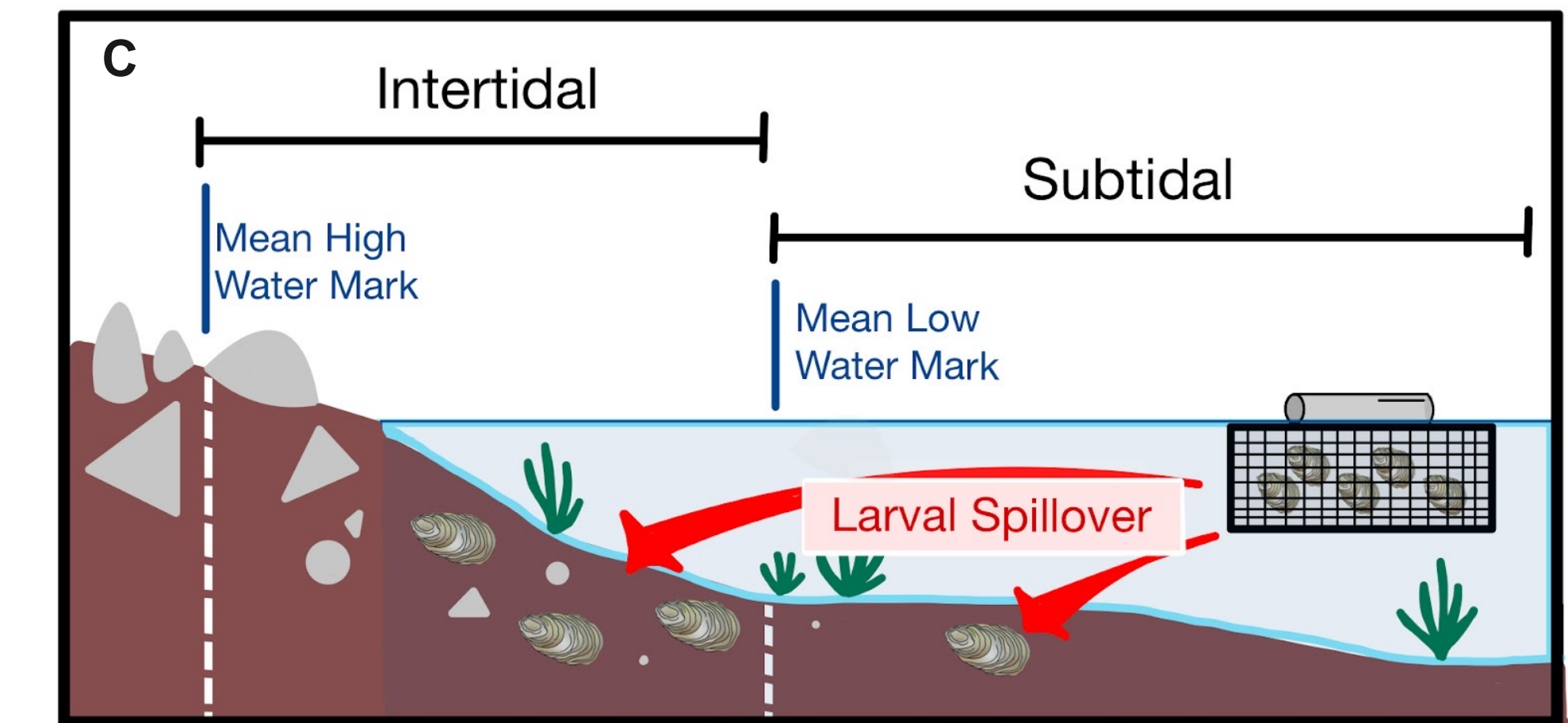


Figure 4: Hypotheses and observations documented through local mapping and focus groups (see quotes) highlight the need to explore links among emerging wild oysters (A. adult oysters, B. settled spat) and larval spillover from oyster aquaculture (C).

Place-based methods for responding to rapid change

Highlighting ecological and social changes as they emerge

“My understanding of the history is that [wild oysters] weren't really here much until oyster aquaculture started to take off. And I'm excited for what that might mean for the estuary, on an ecological fence and on an economical fence. And wild harvesting [of oysters] now is a possibility when I wasn't before, and for and to me that's exciting.”

“...the wild oysters, of course present economic opportunity for clammers and shellfishing people who can't find enough clams as they can move to a lot of oysters.”

Guiding management, planning, and conservation

“And we have a long way to go—there should be tens of millions of these things [oysters] in the estuary. And because of pollution and overfishing they're not here. And I think people don't understand what the coastlines are supposed to look like...there should be acres of reefs in these estuaries that provide habitat for all sorts of organisms. And they just don't exist. We grew up in a world where we're used to clean coasts (clear of oyster reefs), and that's not the way that they're naturally existing or that they should exist.”

References: ¹ Berkes, F. et al. 2000. Rediscovery of Traditional Ecological Knowledge as Adaptive Management. *Ecological Applications*. ² Ban, N. C. et al. 2009. Comparing and Integrating Community-Based and Science-Based Approaches to Prioritizing Marine Areas for Protection. *Conservation Biology*. ³ Risley, S. C. 2022. *Linking Local Knowledge & Community Science in Support of Coastal Marine Stewardship* [MS Thesis, UMaine]. ⁴ Risley, S. C. et al. 2023. Community Science in Support of Ecosystem-Based Management of the Damariscotta River Estuary in Maine. *Maine Policy Review*.

Acknowledgements

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