CONTEXT

Billions of restoration dollars are flowing into the Gulf of Mexico since the Deepwater Horizon oil spill, but there is currently no standardized way to monitor and track the social and economic outcomes of restoration projects, like community resilience and economic revitalization. Through a project known as Gulf of Mexico Ecosystem Service Logic Models & Socio-Economic Indicators (GEMS), a consortium of researchers from the Nicholas Institute at Duke University, the Harte Research Institute, and the Nature Conservancy is trying to address this issue by using Ecosystem Services Conceptual Models (ESCMs) as a foundation from which to develop metrics in order to facilitate standardized monitoring of socioeconomic outcomes of restoration projects. Both the ECSM design and metrics development were stakeholder driven processes during workshops and informal conversations that attempted to incorporate the perspectives, values, and priorities of everyone engaged in social-ecological systems in the Gulf of Mexico. This process demonstrates that ECSMs can serve as a conceptual framework from which stakeholders interested in monitoring can develop metrics that, if implemented on the ground, would reflect the unique set of socioeconomic outcomes related to habitat management and restoration in a given region. This case describes the workshop process used to generate metrics related to oyster reef restoration projects, but subsequent years of the project focused on additional restoration approaches.

PROCESS

Five workshops—one in each Gulf state (Florida, Alabama, Mississippi, Louisiana, Texas)—were held over the course of three months to generate ideas for metrics that could be used to monitor the socioeconomic outcomes of oyster reef restoration in the Gulf. In addition, a literature review was conducted to find potential metrics. Afterwards, a two-day regional workshop with approximately 30 Gulf-wide participants representing different stakeholder groups was held to refine and prioritize the metrics list drafted at each of the state workshops.

State Workshops—Determine most important outcomes and generate metric ideas

At each state workshop, participants were asked to select which socioeconomic outcomes of restoration they determined to be most important. This was defined by outcomes that were a) likely to be significantly impacted by oyster restoration projects and b) important to the community in the representative state. Participants then were asked to brainstorm a list of possible metrics that could be used to monitor those dominant outcomes.

Regional Workshop Part 1—Introduce and Finalize the ECSM

The workshop participants, including resource managers, on the ground practitioners, researchers, and NGO representatives reviewed a general oyster ESCM and provided feedback on how to modify it to better represent the outcomes of oyster reef restoration in the Gulf of Mexico. The model was modified when there was consensus amongst diverse stakeholders regarding

proposed changes (Figure 2). The socioeconomic outcomes from the final modified ECSM served as the basis for developing linked metrics for those outcomes.

Regional Workshop Part 2—Comprehensive Metrics Discussion

For each socioeconomic outcome, metrics were assessed using SMART criteria. Those metrics that passed the most criteria were identified by the project team before the workshop and then refined by stakeholders during the workshop and afterwards in one-on-one conversations. These metrics were iteratively revised based on desktop research and stakeholder input to see whether data or existing measurement protocols were available and whether they were being implemented elsewhere. The metrics were characterized based on geographic scale and ease of implementation by practitioners (Figure 1, below).

Figure 1. Metrics Matrix.

Project scale metrics could feasibly be measured and reported by individual projects; program scale metrics would likely need to be modeled for a suite of projects at a county, state, or regional scale by a third party. Tier refers to the ease of data collection; Tier 1 metrics are relatively low-effort and easy to measure, while Tier 2 metrics would require additional effort and expertise for data collection.

RESOURCES USED

Workshop Guide. Workshops were designed using multiple session types described in the *Workshop Guide: Using Facilitation Techniques to Integrate Ecosystem Services into Coastal Management Decisions.* See Sections 2 and 3 of the linked workshop guide.

Oyster ESCMs. A draft oyster reef restoration ECSM was introduced to the workshop participants who then suggested modifications based on their knowledge.

Figure 2. Modified Oyster ESCM Following Workshop Designed to Get Stakeholder Input
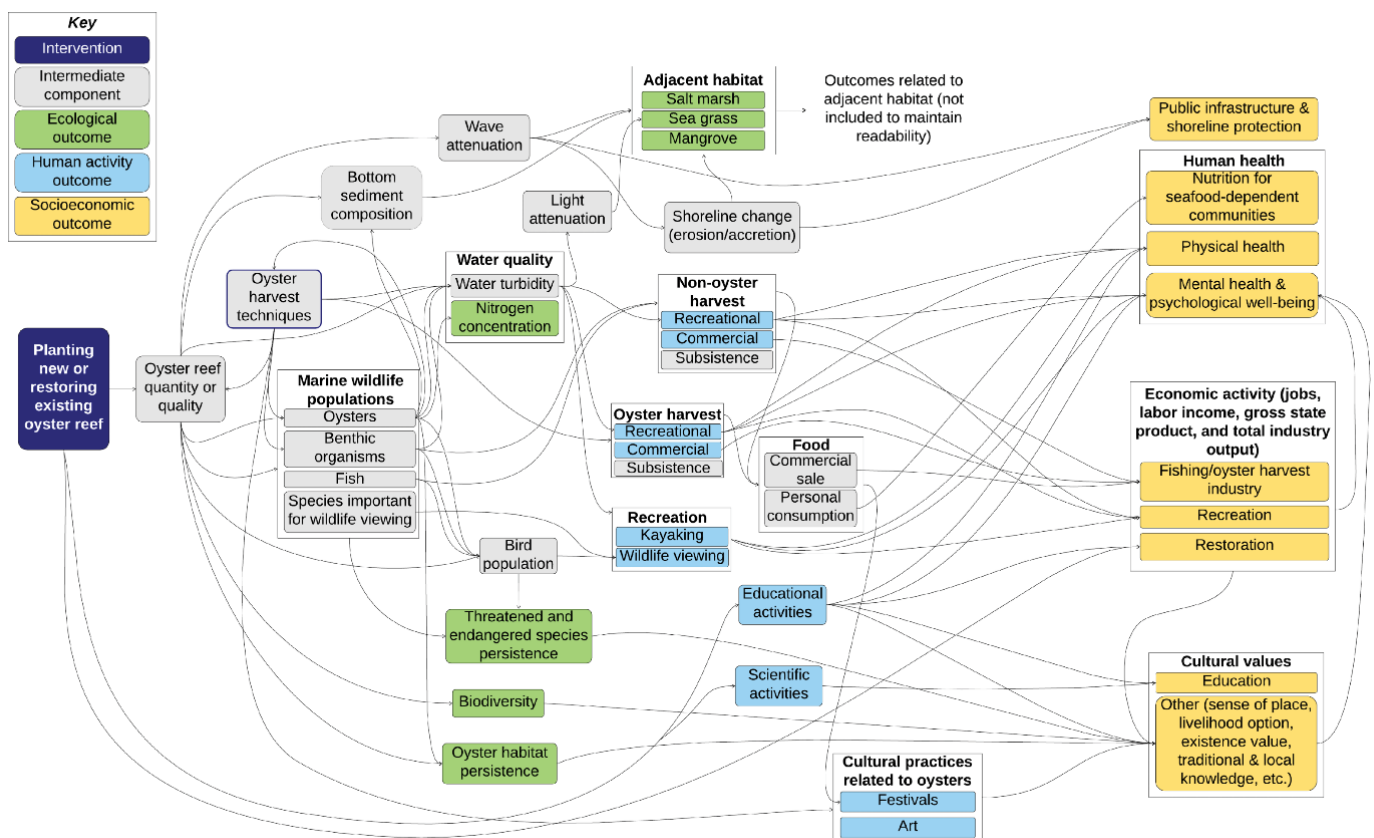
SMARTs Criteria. The initial list of metrics was evaluated against the SMARTs criteria to allow the project team to identify which metrics would be most appropriate to include in the final list of metrics linked to socioeconomic outcomes.

APPLICATIONS

Getting everyone on the same page. The Gulf of Mexico is a large region and relies on functioning ecosystems for a number of services, from food provision, to recreation, to property value. No one individual or stakeholder group is an expert in all of these. The ESCM provides a framework for engaging people who have deep knowledge of particular outcomes and how to measure them in a transparent and systematic way. This enabled a unified and comprehensive understanding across all participants of the suite of ecosystem services associated with a given habitat or site.

Standardized metrics. ECSMs can be designed to present social and economic outcomes of oyster restoration (or any habitat management action) across a region, such as the Gulf of Mexico. An ESCM therefore serves as a strong foundation from which to develop and design linked metrics and protocols that can be standardized across a region. When restoration projects monitor and report on the same metrics, they can be rolled up and aggregated across an entire region to more effectively demonstrate how restoration projects are collectively affecting social and economic components of the Gulf of Mexico socioecological system (SES). This can lead toward status' and trends assessments of socioeconomic changes due to restoration within a region.

ADDITIONAL RESOURCES

Olander, L., D. Yoskowitz, H. Tallis, C. Shepard, K. Warnell, S. Mason, et al. 2020. GEMS Phase I Report: Oyster Reef Restoration. NI R 20-01. Durham, NC: Duke University. https://nicholasinstitute.duke.edu/sites/default/files/publications/GEMS-Phase-I-Report-Oyster-Reef-Restoration.pdf.

GEMS project website: https://nicholasinstitute.duke.edu/project/gems.