Gulf of Mexico Ecosystem Service Logic Models & Socio-Economic Indicators (GEMS)

With support from the National Academies' Gulf Research Program, Duke University's Nicholas Institute for Environmental Policy Solutions, The Harte Research Institute, and The Nature Conservancy are leading a project to advance standardized metrics of restoration success across the Gulf of Mexico. To do this, we are using ecosystem service logic models (see other side) to identify outcomes of restoration actions that are important to people. Then, we develop metrics for each of these outcomes in collaboration with stakeholders and experts from across the Gulf.

The matrix below shows the metrics identified to capture the social and economic effects of oyster reef restoration in the Gulf of Mexico. Metrics are flagged by outcome category (yellow boxes) corresponding with the ecosystem service logic model on the reverse side. Metrics are organized by scale (project or county) and by tier (1 or 2). Scale reflects whether the metric could feasibly be measured by individual projects or would need to be compiled by a third party at the county level. Tier refers to the ease of data collection; tier 1 metrics are relatively low-effort and feasible to measure, while tier 2 metrics would require additional work for data collection.

This metrics list is not yet finalized. We considered several health-related metrics, but concluded that there is currently no way to attribute health metrics to oyster reef restoration. We did not include resilience as a separate outcome category, but flagged metrics related to resilience with an asterisk (*). Several other metrics related to resilience are under consideration.

	Tier 1	Tier 2
Project scale	**Economic Activity** Aquaculture **jobs** (FTE, reported every 2 yr) Restoration **jobs** (FTE, reported every 2 yr) Restoration **expenditures** (reported every 2 yr) **Public Infrastructure Protection** *Miles of **public infrastructure with reduced erosion** from oyster restoration (identified by the project or based on change in erosion rate relative to pre-project rate as assessed by the project) *Metric is related to resilience	**Economic Activity** Recreational fishing **jobs** supported (# of guides visiting restored reefs, reported annually) Additional recreational fishing **expenditures** due to oyster reef project (# recreation trips * average expenditure, reported annually) **Cultural Values** Number of people with **additional knowledge of oyster reefs** (surveyed by project) **Cultural value** to be selected through project team engagement with community and monitored via appropriate pre- and post-restoration data collection.
County scale	**Economic Activity** Economic activity from commercial harvest of oyster reef-associated species: **jobs, labor income, gross state product, and total industry output** (modeled, reported annually) Economic activity from commercial oyster harvest: **jobs, labor income, gross state product, and total industry output** (modeled, reported annually) Economic activity from recreational fishing: **jobs, labor income, gross state product, and total industry output** (modeled, reported annually) Economic activity from restoration spending: **jobs, labor income, gross state product, and total industry output** (modeled, reported annually)	**Cultural Values** Number of people with **additional knowledge of oyster reefs** (broader-scale survey)

Ecosystem Service Logic Model (ESLM) for Oyster Reef Restoration
General model
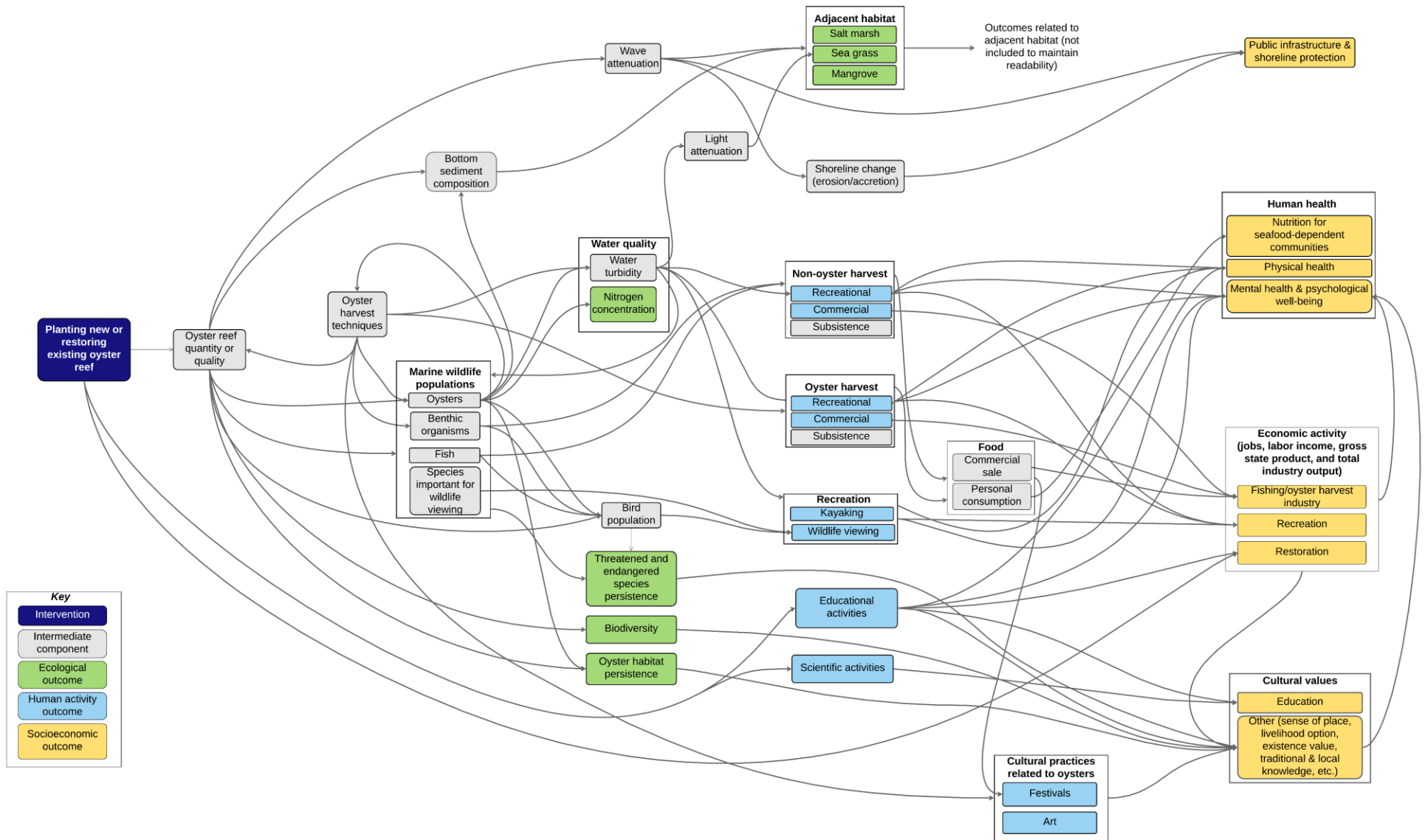
A digital version of this figure and more information on the GEMS process are available on the GEMS website: nicholasinstitute.duke.edu/focal-areas/gems.