Socio-economic monitoring recommendations for the Calcasieu Lake oyster reef restoration project

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Introduction

In the Gulf of Mexico, natural and anthropogenic disasters, both acute and chronic as well as small and large-scale, compounded over time, have impacted Gulf environments and economies. Oil spills, hurricanes, chronic flooding, freshwater inflows, coastal erosion, subsidence, and factors related to climate change continue to drive habitat and biodiversity loss, affecting environmental and human well-being. Natural resource programs and policies have identified ecological restoration as a means to achieve environmental and socio-economic goals. Socio-economic goals can include supporting community resilience, economic prosperity, social and community values, public health, risk reduction and hazard mitigation, and other aspects of human well-being.

The Nature Conservancy employs oyster reef restoration as a direct approach toward slowing and reversing coastal erosion and sustaining healthy coastal habitats. Their long-term objective is to manage the Gulf's oyster resources collaboratively using a coordinated approach that delivers the ecosystem functions and services needed to sustain healthy reef habitats and economically sustainable oyster fisheries. In collaboration with local, state, and regional partners, The Nature Conservancy has set oyster restoration goals for specific bays and estuaries throughout the Gulf of Mexico based on the desired levels of oyster production and ecosystem services for those locations. These services increase the resilience of coastal communities, including protecting adjacent shorelines; providing forage and refuge habitat for commercially, recreationally, and ecologically important species of fish, shrimp, crabs, and other reef-associated estuarine species; improving/maintaining water quality via the filtration that takes place when oysters feed; acting to slow currents between reefs and shorelines to allow sediment to drop out of suspension and diminish; limiting or minimizing erosion; and providing larval oysters to adjacent commercial and public harvest areas to stock these areas (Bendick et al., 2018).

The long-term success of these oyster reef restoration projects depends on whether reefs are built in environments that can continue to support the natural growth and reproduction of oysters, on the engineering design of the reefs, and the management of oyster harvest and other surrounding environmental and human impacts. Long-term and holistic monitoring of restored reefs is essential to evaluate the successes and failures of restoration efforts and identify opportunities for improvement. Holistic monitoring should include the measurement of ecological changes attributed to the restoration project, as well as the ecosystem service and social and economic impacts. While biological and ecological monitoring (e.g., number of oysters, the physical growth of the reef, fish and wildlife populations, water quality, etc.) is the standard for most oyster reef restoration projects, socio-economic monitoring of restoration is not consistently implemented in the Gulf of Mexico. This makes the evaluation of restoration success difficult. A few examples exist, such as the collaborative study by The Nature Conservancy and the Texas Sea Grant College Program. In 2014, The Nature Conservancy managed the restoration of Half Moon Reef in Matagorda Bay, Texas. In the two years post-construction, the reef exhibited extraordinary productivity and growth of live oysters, which led to a substantial increase in marine biodiversity and productivity. The restoration was an ecological success, but its impact on human well-being was not evaluated. A series of surveys and economic analyses found a positive economic impact on recreational fishing communities due to the successful restoration effort (Carlton et al., 2016). Studies like these provide a baseline for developing critically important socio-economic monitoring plans associated with habitat restoration investments taking place across the Gulf of Mexico and beyond.

Overall purpose & approach

The following describes the framework the contracted project team (the Community Resilience Group at Harte Research Institute for Gulf of Mexico Studies) used to develop a socio-economic monitoring plan for the Calcasieu Lake oyster reef restoration site, as well as a human dimensions analysis. The objective of this work is to provide The Nature Conservancy and partners a pilot socio-economic monitoring plan that has the potential to be implemented for monitoring the Calcasieu Lake oyster reef restoration site and adjacent human communities. This pilot plan is envisioned to serve as recommendations for holistic monitoring of oyster reef restoration projects and as a model for other practitioners, funders, and planners interested in evaluating the multiple benefits of restoration activities.

The socio-economic outcomes, metrics, and measurement protocols proposed in this pilot socio-economic monitoring plan are grounded in the foundational work of the Gulf of Mexico Ecosystem Service Logic Models and Socio-economic Indicators (GEMS) project (Olander et al., 2020). The GEMS project emerged after the National Academy of Sciences called for measurement of the social and economic impacts of the large-scale investments in restoring the Gulf of Mexico following the Deepwater Horizon Oil Spill. While billions of dollars continue to be spent on restoring the Gulf's environment and economy, there has been little to no monitoring or reporting on how restoration is or is not contributing to economic and social recovery in the Gulf. Funded by the Gulf Research Program of the National Academies, the GEMS project was a collaboration of the Nicholas Institute at Duke University, the Harte Research Institute at Texas A&M - Corpus Christi, The Nature Conservancy, and The Bridge Collaborative. The GEMS project enabled practitioners, funders, researchers, and stakeholders across the Gulf to co-create science-based ecosystem service logic models that illustrate pathways linking different coastal restoration project types to human well-being. These models capture the impacts of restoration as they cascade through the biophysical system to result in social and economic outcomes (Figure 1). The model components include the intervention (e.g., restoration project), biophysical changes, human activity changes, socio-economic outcomes, and potential metrics for monitoring. Metrics for monitoring each of these outcomes were identified by experts, as were measurement protocols to determine how much social and economic outcomes change over time and who is likely to be affected by those changes. The GEMS products and resources are housed on a web-based tool that can help inform holistic planning and monitoring of restoration projects (https://nicholasinstitute.duke.edu/project/gems). Managers, practitioners, funders, and researchers can use GEMS resources to plan for social and economic impacts from the beginning of new restoration programs and projects, to add social and economic outcomes to existing programs, to choose relevant and practical metrics, and to monitor chosen metrics.

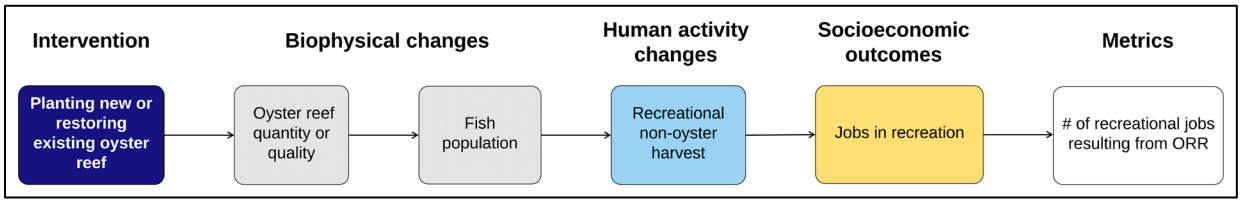

Figure 1. The base components for a GEMS ecosystem service logic model. Using this model as a starting framework, experts from across the Gulf of Mexico created more complex models demonstrating the multiple pathways between restoration activities and socio-economic outcomes, and metrics for monitoring those outcomes. (Olander et al., 2020)

Site description: Calcasieu Lake, LA

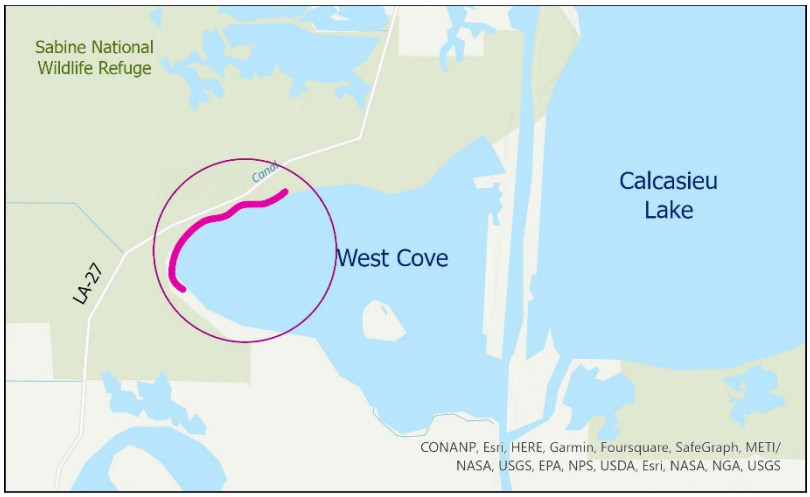

Figure 2. The Nature Conservancy's oyster reef restoration project site in West Cove, Calcasieu Lake, Louisiana.

The state of Louisiana is losing 16 square miles of coastal wetlands annually (Bendick et al., 2018). Thus, the primary objectives of the Nature Conservancy's oyster reef restoration project in Calcasieu Lake, Louisiana are to protect adjacent shoreline from wind and storm energy and to slow down and reverse land loss. The project also aims to create the conditions in which self-maintaining oyster reefs can provide additional ecosystem services produced by oyster reefs as a habitat, such as improve water quality (oysters filter water), create complex habitat for reef-dependent organisms and ecosystem processes, bolster local economic growth, and improve overall resilience.

The majority of Calcasieu Lake is in Calcasieu Parrish, Southwest Louisiana. The restoration site is in West Cove, an area of Calcasieu Lake, and adjacent to the Sabine National Wildlife Refuge within a protected public harvest area (Figure 2). Calcasieu Lake is connected to the Gulf of Mexico by a dredged ship channel. Project engineers designed and implemented a nearshore intertidal oyster reef using gabions, which are baskets filled with limestone rock and shells that create structure for oysters to grow (Figure 3). These six feet by six feet by one-foot gabions were placed for a total of two and a half miles parallel to shore to mimic natural oyster reefs, where the oysters are exposed during low tide and submerged during high tide. The newly constructed reefs, completed in 2022, are not open to harvest so that they can continue to grow and begin to provide oyster seed throughout the area.

Figure 3. As part of oyster reef restoration efforts in Calcasieu Lake, Louisiana, a construction and engineering crew placed gabions – wire cages filled with rocks – in the intertidal zone to construct substrate for growth of larval oysters. Photo courtesy of The Nature Conservancy.

Monitoring activities at Calcasieu Lake involve collaboration with various entities, with experts repeatedly highlighting the crucial role of the LSU AgCenter. The Louisiana Department of Wildlife and Fisheries is actively engaged in stock assessment work, contributing valuable insights into the ecological dynamics of the lake. Engineers overseeing construction projects conduct pre- and post-construction surveys to assess the construction and potential shoreline conditions.

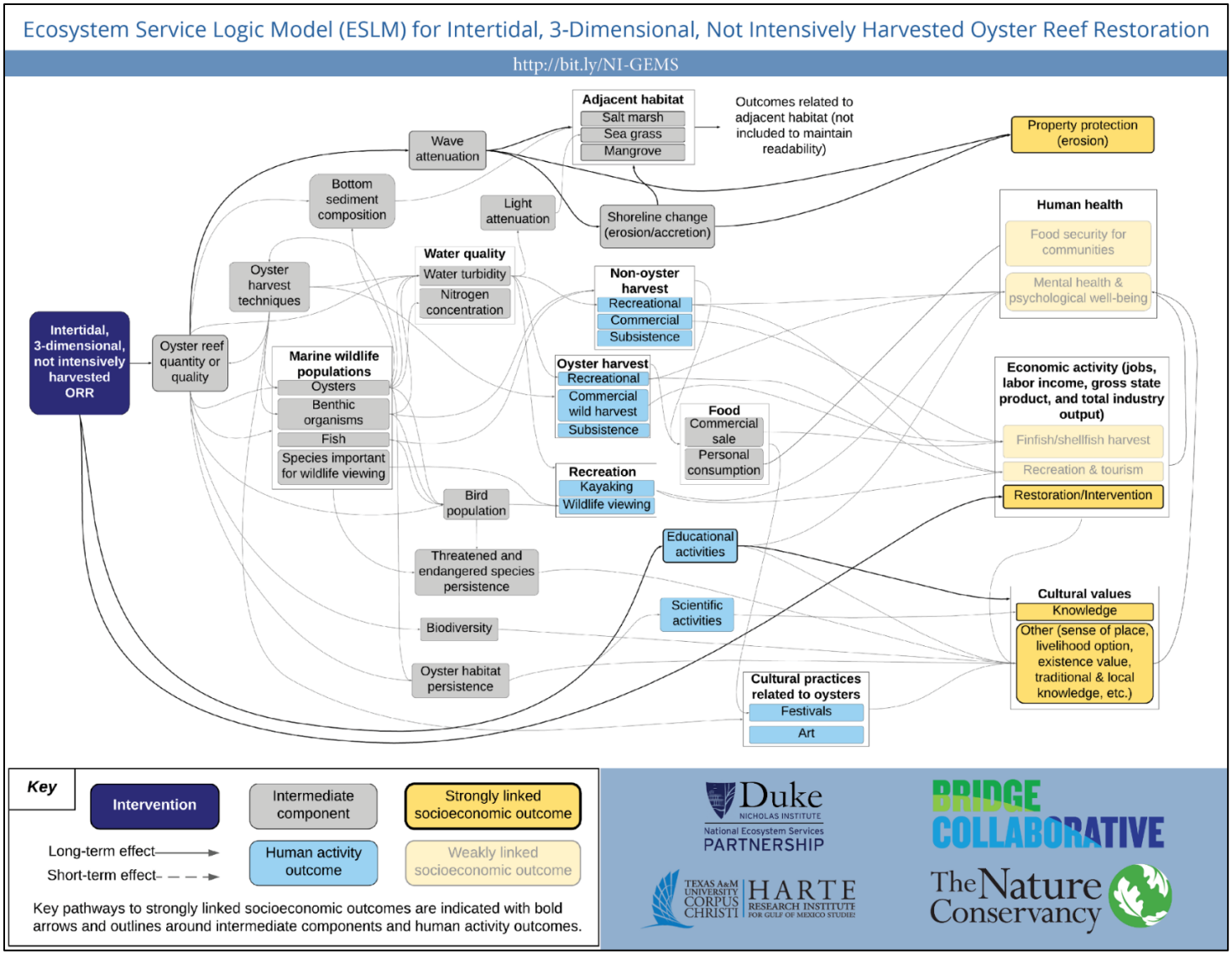

Figure 4. This ecosystem service logic model, entitled, "Intertidal 3-D non-intensively harvested reef restoration," was used as a reference for creating and validating socio-economic monitoring plan recommendations for The Nature Conservancy's oyster reef restoration site in Calcasieu Lake, Louisiana. (Olander et al., 2020; https://nicholasinstitute.duke.edu/project/gems)

Monitoring plan development methods

Based on GEMS models, socio-economic outcomes likely to result from this restoration could include diverse and interrelated social, cultural, physical health, mental health, and economic outcomes. For this socio-economic monitoring plan, the GEMS "Intertidal 3-D non-intensively harvested reef restoration" logic model was selected as a framework (Figure 4) because it was explicitly developed for intertidal oyster reef restoration projects that are not intended for oyster harvest, as was the Calcasieu Lake restoration site. In this model, socio-economic outcomes most likely to result ("strongly linked") include Property Protection from erosion; Economic activity (jobs, labor income, gross state product, and total industry output) from the restoration/intervention activity itself; Cultural values including Knowledge, and Other (sense of place, livelihood option, existence value, traditional & local knowledge, etc.). Additional possible outcomes that are "weakly linked" in this model include Human Health related to human food security, mental health, and psychological well-being and Economic Activity related to finfish/shellfish harvest or recreation and tourism.

While this GEMS model and its associated outcomes and metrics were validated by peer review and expert input, it is necessary to evaluate each potential outcome and recommended metric to determine relevance and feasibility at a local level. In doing so, socio-economic monitoring of the Calcasieu Lake restoration site is more likely to be effective and efficient in considering the local capacity to carry out such a plan. To evaluate the GEMS outcomes and metrics for feasibility and relevance to the Calcasieu Lake site, the research team conducted two components of work that informed the socio-economic monitoring recommendations in this plan. These work components include 1) subject matter expert interviews and 2) a human dimensions analysis of adjacent communities. Below is a brief overview of each component; however, a more comprehensive description of those methods and results can be found in the project's technical report (Del Angel, Lozada, and Hale, 2023).

1. Subject Matter Expert Interviews

This phase of work included the preparation and submission of Institutional Review Board (IRB) application materials for conducting ethical human subject research. The purpose of the subject matter expert interviews was to access local and regional knowledge regarding oyster reef restoration goals: to gather site-specific details that could inform the development of this plan, request data and identify data gaps, and discuss the partnerships and data needed to carry out socio-economic monitoring of the Calcasieu Lake site. This required co-developing a list of local or regional experts with The Nature Conservancy partners involved in this project. An initial list of experts was created, and using the snowball sampling method, additional names of experts to request interviews with were added to the list based on the interviewee's recommendation. All expert interviews took place during July and August of 2023.

Experts with local knowledge regarding the Calcasieu restoration project itself or the community in the surrounding geographic area provided verbal input through discussions in meetings with the project team. All input was documented, sorted into "segments" and then organized into themes ("codes") relating to the GEMS socio-economic outcome categories. Analysis was conducted in MAXQDA©, a qualitative and quantitative analysis software. For example, after analyzing the interview transcriptions, subject matter experts discussed socio-economic outcomes, including Cultural Value (n=1), Economic Activities (n=8), and Property Protection (n=9) as relevant to the Calcasieu restoration project. As a cultural value, one respondent suggested that the oyster reef restoration project can improve the quality

of life and increase the resilience of coastal communities. They also mentioned that the restoration of oysters contributes to the aspects of the environment that bring people to the area and are a reason people choose to live there. There is a link between the physical landscape, tourism, and the region's economic development. Other forms of economic activity that may be an outcome of such restoration mentioned by experts were commercial and recreational fishing. Some experts expressed a need for a survey of commercial and recreational charter fishermen who use the area. Feedback like this was used to select and recommend socio-economic metrics that are locally relevant and potentially feasible. The complete list of interview questions, description of methods, and summarized results is available in (Del Angel, Lozada, and Hale, 2023).

2. Human Dimensions Analysis

The human dimensions analysis was designed to characterize the values currently held by people who live nearby or visit the restoration site or nearby area, thus further validating the relevance of the GEMS model for the Calcasieu Lake site. It is important to know what types of human perceptions, values, and activities occur in a restoration area so that socio-economic monitoring plans are relevant, feasible, and effective for the location. This analysis was also conducted to establish a baseline understanding of human values and perceptions so that if monitoring is implemented and continued, changes in human values and perceptions attributed to the restoration project or program can be tracked and compared over time. This phase of work also included the preparation and submission of Institutional Review Board (IRB) application materials for conducting ethical human subject research. We designed a human dimensions survey and distributed it online. Two team members distributed survey flyers in communities adjacent to Calcasieu Lake; survey distribution was selected after consultation with The Nature Conservancy project partners and subject matter experts. The survey identifies how people utilize natural resources and assets in the restoration area, their perceptions of natural assets, and their knowledge and awareness levels regarding the specific restoration site. Survey response analysis was conducted in MAXQDA©, a qualitative and quantitative analysis software.

The human dimensions survey questions and summarized results are available in Del Angel, Lozada, and Hale (2023) report. Survey responses have yielded valuable insights into various socio-economic outcomes associated with oyster reefs in the Calcasieu Lake-West Cove site. Notably, a question probing "job ties to Calcasieu Lake" uncovered a significant percentage of respondents reporting employment linked to the site. Specific roles identified include a wholesale/retail buyer of shrimp, fish, and oysters from Calcasieu Lake, individuals engaged in commercial fishing, and those employed in natural resource management. Further, a question regarding environmental concerns found that a majority of survey respondents have a high concern for shoreline stabilization, an important goal of the TNC Calcasieu Lake Oyster Reef Restoration Project.

To validate the local-level relevance of the GEMS model outcomes and associated metrics for the restoration site, we cross-referenced the results of the subject matter expert and the human dimensions analysis interviews (all of the coded segments) with the socio-economic outcomes indicated in the GEMS model (Figure 4). Suppose the socio-economic outcomes and human activities were mentioned or discussed in either the interviews or surveys. In that case, this provides some "Evidence of Local Relevance" as seen in Table 1. We use this evidence to support our recommendations for metrics in the following section.

Table 1. Evidence of Local Relevance analysis for West Cove, Calcasieu Lake: Intertidal Non-Intensively Harvested Restoration Outcomes and Metrics (adapted from GEMS/ Olander et al., 2020). Socio-economic outcomes from GEMS model were cross-referenced with the results of the Subject Matter Expert Interviews and Human Dimensions Analysis (public survey). If the socio-economic outcomes were mentioned in either the interviews or surveys, it received a Yes in this analysis (n = number of coded segments), which provided some evidence of local relevance; the associated metrics were then included in our recommendations for monitoring.

Socio-economic Outcome from GEMS model	**Was the outcome or metric mentioned by Subject Matter Experts? Yes/No**	**Was the outcome or metric mentioned by Public Survey Respondents? Yes/No**	**Potential Monitoring Metric from GEMS model**
Cultural Values: Knowledge	Yes n=1	Yes n=8	Number of people with additional knowledge of habitat restoration effects and other project outcomes based on project site
Cultural Values: Education-related Knowledge	Yes n=1	Yes n=68	Number of people with additional knowledge of habitat restoration effects and other project outcomes
Cultural Values: Awareness-related Knowledge	No	Yes n=68	Number of people with additional knowledge of habitat restoration effects and other project outcomes on broader scale
Cultural Values: Other	Yes n=1	No	Change in project or program identified cultural value
Economic Activity -Restoration/Intervention	Yes n=3	Yes n=3	Number of restoration jobs supported by project
Economic Activity -Restoration/Intervention	Yes=3	Yes n=3	Total restoration expenditures by project
Economic Activity -Restoration/Intervention	Yes n=3	Yes n=3	Change in economic activity from restoration spending
Property Protection & Value - Property Protection from Erosion	Yes n=2	Yes n=21	Number of properties or length of infrastructure adjacent to shoreline with reduced erosion after project

Socio-economic Monitoring Recommendations for TNC Calcasieu Lake Oyster Reef Restoration Project

1. Monitor Property Protection & Value

a. *Recommended Metric: Number of properties or length of infrastructure adjacent to shoreline with reduced erosion after project installation*

Some subject matter experts and survey respondents mentioned "shoreline stabilization" as a concern in this location. One of the primary goals of the Calcasieu Lake oyster reef restoration project is to protect adjacent shorelines from wind and storm energy and slow down and reverse land loss. Thus, measurement of the property acreage, number of properties, or area of infrastructure adjacent to the restoration area with reduced erosion since the installation of the oyster reefs could be reported annually. Much of the shoreline and inland area in this location is part of the Sabine National Wildlife Refuge property, including some infrastructure such as State Highway 27. Partnering with the Refuge to plan and monitor this particular metric will be important. This could involve digital spatial analysis techniques and on-the-ground assessments using photographic monitoring, drones, and elevation profile monitoring to assess changes in shoreline characteristics. This could also be paired with a stakeholder assessment to understand who is impacted by erosion or interested in protection from erosion in the project service area; see the following Cultural Values sections for more information. Details about this property protection metric and suggestions for methods can be found at https://nicholasinstitute.duke.edu/sites/default/files/gems/protocols/property-protection-erosion-overview.pdf.

2. Monitor Economic Activity

a. *Recommended Metric: Number of restoration jobs supported by restoration project*

In the GEMS model (Figure 4), Economic Activity related to the restoration project itself is indicated as a strongly linked outcome of intertidal, non-harvest oyster reef restoration projects. Restoration jobs include engineers, construction workers, practitioners, education coordinators, and other partially or fully employed staff because of project implementation or funding. For example, as managers of the Calcasieu Lake oyster reef restoration project, the Nature Conservancy can use their project budgets, reports, and contract information to determine the number of full-time or part-time employees hired from project inception and throughout the project's life. Further, demographic information can be collected to understand who had access to employment opportunities so that local vs. non-local employment information related to economic activity attributed to the project site can be tracked over time. For more details on this metric and associated protocols, see https://nicholasinstitute.duke.edu/sites/default/files/gems/protocols/restoration-jobs-overview.pdf.

b. *Recommended metric: Total restoration expenditures by restoration project*

Likewise, the restoration project managers for Calcasieu Lake likely track the total amount of money spent on the restoration project as reported in the project budget, at a given time interval, such as an annual report. Expenditures include equipment, engineering, construction, maintenance, employment, monitoring, and more. Tracked over time, expenditure data can reveal Economic Activity as a direct

outcome of the Calcasieu project.
https://nicholasinstitute.duke.edu/sites/default/files/gems/protocols/restoration-expenditures-overview.pdf

c. Recommended metric: Change in economic activity from restoration spending

This metric requires that jobs, labor income, gross state product, and total industry output be modeled based on project expenditures. It would likely be combined with additional Economic Activity metrics related to the restoration project or program, such as "Number of restoration jobs supported by restoration project" and "Total restoration expenditures by restoration project". This metric would be most appropriate for monitoring broad-scale or program-wide outcomes of one or more oyster reef restoration projects over time. It will likely require a partnership with economic modeling experts. Subject matter experts mentioned that several oyster restoration projects led by different organizations are ongoing in Calcasieu Lake, so partnering with the managers of those projects to monitor this metric may help obtain a broad understanding of restoration spending across multiple projects in the Calcasieu area.

3. Monitor Cultural Values

To determine how the Calcasieu Lake restoration project has or has not affected local cultural values, the awareness, education, and knowledge related to the restoration project can be measured over the short or long term. These three metrics can be measured separately or as part of a combined measurement tool or instrument. It is important to note that whenever humans are involved in research, an expert with experience in human subject research should be consulted, and best practices should be followed. Depending on the types of questions included in the survey (or other measurement instrument), a review from an Institutional Review Board (IRB) may be required to carry out an analysis. An IRB is an administrative group associated with an institute organization charged with reviewing all research involving human participants before the start of the research. The IRB is primarily concerned with protecting the welfare, rights, and privacy of human subjects. In the Calcasieu Parrish area, a local University partner like Louisiana State University or the Louisiana Sea Grant College Program will likely have IRB expertise to consult with.

a. Recommended Metric: Awareness: Number of people with additional knowledge of habitat restoration effects and other project outcomes on a broad scale

Measuring awareness of the Calcasieu oyster reef restoration project and its outcomes enables understanding of how much community members are aware of the restoration project and its effects. Awareness can come from disseminating information about the project through local news stories, information passed on by community members, driving by the restoration site, seeing construction or project signage, and social media platforms. Awareness can be assessed using surveys, interviews, or focus groups. Specifically, this metric determines the number of people with additional awareness of the effects of the Calcasieu oyster reef restoration project due to living or working in proximity to the restoration project site. For more details on this type of measurement, visit https://nicholasinstitute.duke.edu/sites/default/files/gems/protocols/knowledge-awareness-overview.pdf.

b. Recommended Metric: Knowledge: Number of people with additional knowledge of habitat restoration effects and other project outcomes based on project site

This metric is similar to the awareness metric, but it goes beyond awareness to understand the number of people with additional knowledge of oyster reef restoration habitat effects and other restoration outcomes specific to the Calcasieu Lake site. Surveys, interviews, and focus groups can be used to determine how many people have additional knowledge directly attributable to the site, what kind of knowledge they have, and even how they obtained that knowledge. This metric can be measured alone or combined with the Awareness metric above or the Education-related knowledge metric described below.

c. Recommended Metric: Education-related knowledge: number of people with additional knowledge of habitat effects and other project outcomes

According to the results of the subject matter expert interviews, educational activities associated with the Calcasieu Lake oyster reef restoration effort are currently minimal, but many were interested in the potential for developing educational programming in the local communities. If planned, this could include formal educational programs (e.g., classroom lessons, coursework) and informal learning opportunities (e.g., volunteering at the restoration site). Educational activities related to habitat restoration can affect an individual's and a community's awareness, knowledge, attitudes, values, behavior, environmental practices, and participation in additional activities related to the environment. Evaluating the impacts of education related to or in association with the Calcasieu Lake restoration project can help improve the project's outcomes, contribute to local learning, and demonstrate the restoration project's impacts to the broader community and funders. If monitored, this metric would track the number of people with additional knowledge of oyster reef restoration effects and other project outcomes attributed to local educational outreach or programming. This can be assessed using surveys, interviews, or focus groups. As mentioned above, IRB experts should be consulted before beginning educational assessments when humans are involved in research. Subject matter experts we interviewed suggested potential local partners for monitoring education-related knowledge, including Louisiana Sea Grant, Just Imagine Southwest Louisiana Campaign, Sabine National Wildlife Refuge, Louisiana Coastal Master Plan, and Chevron. For example, because the Calcasieu Lake site is nearby the Sabine National Wildlife Refuge, a visitor use survey could be developed and distributed at the Refuge to determine the knowledge levels of visitors that encounter information about the restoration site or to evaluate educational programming delivered by local school groups that visit the Refuge. For more information and examples of how to conduct education-related knowledge assessment, visit https://nicholasinstitute.duke.edu/sites/default/files/gems/protocols/knowledge-education-overview.pdf.

d. Recommended Metric: Change in Cultural Value

Cultural values can include cultural diversity, spiritual and religious values, education value, aesthetic values, sense of place, sense of security, indigenous knowledge, and existence value, among others. An in-depth study may be required to determine Cultural Value outcomes captured in the subcategory of "Other" in the GEMS model. These cultural value outcomes of restoration are often referred to as Cultural Ecosystem Services or CES, and understanding these Cultural Ecosystem Services is important for continued management of the Calcasieu Lake oyster reef restoration project now and into the future. Through subject matter expert interviews and as seen through the results of the human dimensions analysis, communities in this area are intimately connected to Calcasieu Lake. The human dimensions survey and analysis conducted as part of this socio-economic monitoring plan is a good example of how

to capture some aspects of CES for the Calcasieu Lake restoration site (Del Angel, Lozada, and Hale, 2023). A University partner or other expert institution with access to mixed methodologies and social science expertise may be required to conduct a CES evaluation for this site. For more information about measuring cultural value, see https://nicholasinstitute.duke.edu/sites/default/files/gems/protocols/project-identified-cultural-value-overview.pdf.

Conclusion

This study employed an Ecosystem Service Logic Model to identify potential socio-economic metrics for monitoring the outcomes of oyster reef restoration in Calcasieu Lake West Cove. The local relevance of these potential socio-economic outcomes and metrics was rigorously analyzed using data from expert interviews and an online public survey. The resulting plan delineates 8 proposed metrics categorized under cultural values, economic activity, human health, and property protection and value.

It is important to note that all the outcomes and associated metrics in the original GEMS model are worthy of consideration for developing a socio-economic monitoring plan. However, what works for one community may not be effective for another. Thus, there is a need to evaluate local relevance and selecting the metrics that have the most potential for capturing the benefits of oyster reef restoration at this site. Effective monitoring requires local and regional partnerships, open data exchange, and consistent funding and support. The recommendations herein will require testing and, through trial and error, can be adapted to meet the needs of the restoration managers, funders, community members, and anyone interested in understanding the multiple benefits of restoration. This plan is intended to be collaborative, adaptive, and regularly updated as the socio-economic monitoring efforts evolve parallel to the changing environment and community.

Acknowledgments

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