

GEMS Social and Economic Metrics for Restoration in the Gulf of Mexico

Metrics for: Wastewater Management Sewage System Improvements

[Wastewater Management !\[\]\(919a2cb85b99741a73c0c31a427236a8_img.jpg\) Sewage System Improvements project type details](#)

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Core Metrics Key

Key	Habitat Restoration (HR)	Oyster Restoration (OR)	Recreation Enhancement (RE)	Water Quality Improvement (WQ)
Core Metric				
Not Core				
N/A				

Knowledge: Number of people with additional knowledge of habitat effects and other project outcomes based on project site

Outcome: Cultural Values - Knowledge (R)

Scale: Project

Tier: 2

The number of people with additional awareness of habitat effects and other project outcomes due to proximity to the project, assessed using project-scale methodologies such as surveys, interviews or focus groups.

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

Outcome: Cultural Values - Knowledge (R)

Scale: Project

Tier: 2

The number of people with additional knowledge of habitat effects and other project outcomes due to project-associated educational outreach, assessed using project-scale methodologies such as surveys, interviews or focus groups.

Awareness: Number of people with additional knowledge of habitat effects and other project outcomes on broader scale

Outcome: Cultural Values - Knowledge (R)

Scale: Program

Tier: 2

The number of people with additional awareness of habitat effects and other project outcomes due to living or working in proximity to the project, assessed using program-scale methodologies such as surveys, interviews or focus groups.

Change in program identified cultural value

Outcome: Cultural Values - Other (R)

Scale: Program

Tier: 2

Identification and evaluation of cultural ecosystem services (CES), which vary by community, for monitoring which vary by community, for monitoring (e.g., [Pascua et al. 2017](#)). Where possible, program team can develop framework for pre-and post- restoration monitoring of CES.

Change in project identified cultural value

Outcome: Cultural Values - Other (R)

Scale: Project

Tier: 2

Identification and evaluation of cultural ecosystem services (CES), which vary by community, for monitoring (e.g., [Pascua et al. 2017](#)). Where possible, project team can develop framework for pre-and post- restoration monitoring of CES.

Change in economic activity from project associated commercial fish harvest

Outcome: Economic Activity - Finfish/Shellfish Harvest (R)

Scale: Program

Tier: 2

Jobs, labor income, gross state product, and total industry output modeled annually based on [NOAA commercial harvest data](#) and state data (e.g. [Florida commercial fisheries](#)) for relevant species. Change in economic activity from commercial

fish harvest could be due to changes in target populations or areas closed to harvest due to water quality issues. Reporting harvest and revenue (intermediate outputs for calculating this metric) may also be useful to give a full picture on how commercial harvest patterns have changed in response to the project.

Change in economic activity from project associated commercial aquaculture harvest

Outcome: Economic Activity - Finfish/Shellfish Harvest (R)

Scale: Program

Tier: 2

Jobs, labor income, gross state product, and total industry output modeled annually based commercial harvest data and state data (e.g. USDA Census of Aquaculture) for relevant species.

Change in local business revenue from project disruption

Outcome: Economic Activity - Local Business (R)

Scale: Project

Tier: 2

The change in reported revenue from local businesses whose normal operations are temporarily or permanently impacted by disruption from project construction. Reported pre and post project construction.

Change in economic activity from recreational fishing

Outcome: Economic Activity - Recreation and Tourism (R)

Scale: Program

Tier: 2

Jobs, labor income, gross state product, and total industry output modeled annually at a county to regional level. Angler surveys will account for the difference in activity associated with a restoration project, which would then be used as input into the economic impact analysis (see [Texas Half Moon Reef example \[PDF\]](#)).

Change in recreation and tourism associated economic activity associated with a closure period

Outcome: Economic Activity - Recreation and Tourism (R)

Scale: Program

Tier: R & D

Change in economic activity from recreation and tourism in area with repeated or long-term closures. This can be measured with a location-specific scenario analysis or survey instrument.

Number of jobs supported through recreational fishing at project site

Outcome: Economic Activity - Recreation and Tourism (R)

Scale: Project

Tier: 2

The number of direct, indirect, and induced jobs associated with recreational fishers visiting the restored reef, based on fishing expenditures determined through a survey of recreational fishing anglers conducted by the restoration project.

Change in recreational fishing expenditures associated with project site visitation

Outcome: Economic Activity - Recreation and Tourism (R)

Scale: Project

Tier: 2

Estimate of total recreational fishing expenditures due to the project compared to baseline of recreational fishing expenditures in surrounding area, calculated as the number of recreational fishing trips to the project site (estimated from random sampling counts as part of structured monitoring) multiplied by the average trip expenditure (from [NOAA FEUS 2018 Report](#)).

Change in recreational activity expenditures associated with project site visitation

Outcome: Economic Activity - Recreation and Tourism (R)

Scale: Project

Tier: 2

Estimate of total recreational activity expenditures due to the project compared to baseline of recreational activity expenditures in surrounding area, calculated as the number of recreational trips to the project site (estimated from random sampling counts as part of structured monitoring).

Change in economic activity from restoration spending

Outcome: Economic Activity - Restoration/Intervention (R)

Scale: Program

Tier: 2

Jobs, labor income, gross state product, and total industry output would be modeled based on project expenditures.

Number of restoration jobs supported by project

Outcome: Economic Activity - Restoration/Intervention (R)

Scale: Project

Tier: 1

The number of jobs directly supported by the restoration project, including but not limited to project design, construction, project site maintenance, education, and monitoring, reported every year.

Total restoration expenditures by project

Outcome: Economic Activity - Restoration/Intervention (R)

Scale: Project

Tier: 1

The total amount of money spent on the restoration project as reported in the project budget every year.

Proportion of surveyed harvesters who say that food caught/harvested at the site is important for feeding their household

Outcome: Human Health - Food Security for Communities (R)

Scale: Project

Tier: 2

Estimate of proportion of surveyed harvesters who say that food harvested at project site is important for feeding their household and if that has changed since the installation of the project at site

Proportion of protein or nutrition from food harvested at restoration site

Outcome: Human Health - Food Security for Communities (R)

Scale: Program

Tier: R & D

Relative measure of contribution of subsistence harvest from areas with restoration projects (e.g. seafood, birds, mushrooms) to household nutrition, measured by adding questions to existing national nutrition surveys.

Change in cognitive function

Outcome: Human Health - Mental Health & Psychological Well-Being (R)

Scale: Project

Tier: 2

Change in performance on simple recall or other cognitive function tests pre- and post- recreation activity or time at project site.

Change in subjective well-being

Outcome: Human Health - Mental Health & Psychological Well-Being (R)

Scale: Project

Tier: 2

Change in self-reported state of well being. Survey of visitors pre- and post- time at project site.

Change in number of reported cases of seafood associated disease in counties near the project site

Outcome: Human Health - Seafood Associated Disease (R)

Scale: Project

Tier: R & D

Change in number of reported cases of seafood associated disease in counties near the project site, measured through available CDC, hospital, and clinic data and groundtruthed with survey instruments. Such measurements have not yet taken place and are in the R&D Phase.

Change in number of reported cases of skin and respiratory affects in counties near the project site

Outcome: Human Health - Skin and Respiratory Effects of Toxin Exposure (R)

Scale: Project

Tier: R & D

Change in number of reported cases of toxin-exposure related skin and respiratory effects in counties near the project site, measured through available CDC, hospital, and clinic data and groundtruthed with survey instruments. Such measurements have not yet taken place and are in the R&D Phase.

Change in number of reported cases of waterborne diseases in counties near the project site

Outcome: Human Health - Waterborne Disease (R)

Scale: Project

Tier: R & D

Change in number of reported cases of waterborne disease in counties near the project site, measured through available CDC, hospital, and clinic data and groundtruthed with survey instruments. Such measurements have not yet taken place and are in the R&D Phase.

Change in property value across affected properties

Outcome: Property Protection & Value - Property Value (R)

Scale: Project

Tier: 2

Changes to property values based on proximity to project site, using a hedonic pricing method.

Number of days of disrupted services due to project

Outcome: Social Disruption - Due to Project or Flooding (R)

Scale: Project

Tier: 1

Total number of days of disruption, annually, due to project construction or maintenance, as reported by project.

Total sewer conversion costs for homeowners

Outcome: Water System Costs - Cost to Property Owner

Scale: Project

Tier: 1

Costs to homeowners of the septic to sewer conversion, measured in average cost per homeowner and total cost for all homeowners associated with the project (from project documentation)

New sewer conversion costs for homeowners

Outcome: Water System Costs - Cost to Property Owner

Scale: Project

Tier: 2

Net costs to homeowners for the septic to sewer conversion, incorporating average upfront cost per homeowner, average annual savings on septic maintenance, and annual water bill cost. (need to use survey).

Change in drinking water treatment cost (at facility)

Outcome: Water System Costs - Drinking Water Treatment Costs

Scale: Project

Tier: 2

Change of water treatment costs since project implementation, shared by utility, and change of measured water quality near project site.

Episodic storm related costs

Outcome: Water System Costs - Wastewater Treatment Costs

Scale: Project

Tier: R & D

(Change in incidence of--or total fines paid by treatment plants for--wastewater discharge violations reported annually.)
Change in incidence of and total fines paid by wastewater utilities due to wastewater discharge violations, from utility data, based on utility's willingness to share data.

Change in wastewater treatment cost (at facility)

Outcome: Water System Costs - Wastewater Treatment Costs

Scale: Project

Tier: R & D

Change in wastewater treatment cost, from utility data, based on utility's willingness to share data.