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If you are encountering GEMS protocols for the first time, please read:

- The GEMS protocols can help you develop a monitoring plan for a restoration project. They were developed based on existing published monitoring methods, but should not be considered prescriptive or the only appropriate way to monitor.
  - Each protocol is written as if you are monitoring a single outcome, but it is very possible you will be measuring multiple outcomes and may be able to use the same or similar methods to do so. Think about ways to be strategic and efficient when combining methods from different protocols. For example, are there ways to ask questions about multiple outcomes using a single survey instrument? Or is there a way to host a workshop that asks community members about barriers to accessing multiple types of outcomes?
  - Please be aware that the “who” methods—aimed at documenting who will be affected by social and economic changes caused by a restoration project—are quite similar across protocols. Where possible and sensible, you should consolidate community engagement methods that assess stakeholder perceptions of project outcomes to avoid stakeholder fatigue.
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## Background

This document provides an overview of methods available for measuring cognitive function, which can be an indicator for one aspect of mental health. Cognitive function is “the performance of the mental processes of perception, learning, memory, understanding, awareness, reasoning, judgment, intuition, and language” ([American Psychological Association](#)).

The “*how much*” methods allow practitioners to measure changes in cognitive function due to project visitation. The “*who*” methods describe ways for the project to determine who has access to the project site in the project service area<sup>1</sup> which will capture the group of people who are likely to access the cognitive function changes resulting from project site visitation and those that will not

The tables below list when methods would benefit from the expertise of social scientists trained in survey design and implementation, statistics, and economics. These experts should have experience with [human subject research](#), following best practices and, if relevant, conducting research in a way that is accountable to their respective institution’s oversight body, often called an [Institutional Review Board](#). If you do not have such expertise in your project or program, many university programs and consulting firms should be able to assist.

## Relevant Coastal Restoration Approaches

**Habitat Restoration** – Oyster Reef, Salt Marsh, Seagrass, Mangrove, Beach and Dune restoration, Living Shorelines, Restoring Hydrological Connectivity

**Oyster Reef Specific** – Subtidal, 3-Dimensional projects; Protection or Enhancement of Existing Oyster Reef; Oyster Aquaculture

**Recreational Enhancement** – Boat Ramps, Fishing Piers and Fishing Piers installation

**Water Quality Improvement** – Sewage System Improvements, Wastewater Treatment Plant Upgrades, Treatment Wetlands, Gray Infrastructure for Stormwater Management, Green Infrastructure for Stormwater Management, Outflow Treatment (Baffle Boxes), Agriculture BMPs<sup>2</sup>

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<sup>1</sup> The geographic boundary containing those stakeholders for whom a particular project outcome is relevant

<sup>2</sup> Many of the recreation and visitation benefits provided by Water Quality Improvement projects

## “How much” method:

*Overview.* This method helps the project answer: How much has cognitive function of project visitors changed due to their visit to the site?

This method documents the number of surveyed visitors who demonstrated changes in cognitive function as a result of visiting the project and interacting with it in various ways.

### “How much” method:

Method (click on method title to see more detail)	Method Outcomes	Method Description	Human Subject Research Expertise Needed*	Effort Level
<a href="#">Administer pre/post visit cognitive test(s)</a>	Proportion of tested visitors who demonstrate changes in cognitive ability	Perform an attention study prior to and following participation in an activity within or around the restoration project site.	Yes	High

\*Refer to the [NIH Definition of Human Subjects Research](#) for more information

### “How Much” Metric Summary:

Social or economic outcome this metric is linked to:	Mental Health
“How much” metric tier:	<input type="checkbox"/> 1 (easier) or <input checked="" type="checkbox"/> 2 (harder)
“How much” measurement interval:	Annually
Use this protocol if:	Your project provides access to green and blue spaces

## “Who” methods:

Very few (if any) people visit a restoration project site with the intention of improving their cognitive function, but these types of benefits occur incidentally through visitation to the site. Therefore, to consider if cognitive function outcomes are occurring in various groups (as an indicator for equity of mental health benefits), practitioners will need to assess project site access and visitation generally. The methods, [linked here](#), will help identify a) vulnerable groups and historically underrepresented stakeholders in the project service area; b) the accessibility of the project site within the project service area; and c) whether groups who are interested in visiting the site may be disproportionately not accessing or benefitting from outcomes delivered through site visitation.

For more information on the GEMS project metrics and protocols, visit [this page](#).