Context Document: Building and Restoring Boat Ramps Ecosystem Service Logic Model

Project: GEMS
http://bit.ly/NI-GEMS

Ecosystem Service Logic Models (ESLMs) are conceptual models that summarize the effects of an intervention, such as a habitat restoration project, on the ecological and social systems. Each model links changes in biophysical systems caused by an intervention to measurable socioeconomic, human well-being, and ecological outcomes. ESLMs assume that the restoration is successful and include all potentially significant outcomes for the intervention; not all outcomes will be relevant to each individual project, depending on location and environmental conditions.

The direction of an outcome (whether the restoration will have a positive or negative influence) often depends on the specific situation or is unclear due to multiple links (arrows) leading into an outcome that may have opposite effects. Thus, language like "increased" or "decreased" is not included in the models. These models are often used to consider management with or without an intervention or to compare different interventions.

This context document includes additional information about the restoration approach and details about some of the relationships in the building and restoring boat ramps ESLM. It also includes a list of the references used to develop the ESLM and names of experts with whom we spoke to refine the model.

Building and Restoring Boat Ramps in the Gulf of Mexico

Typically boat ramp projects entail either repairing existing boat ramps or constructing new boat ramps and is typically meant to increase access to public waterways, in addition to offshore areas and inaccessible campgrounds. Sometimes, the restoration activity also involves adding or repairing parking lots for the boat ramp area, though the effects of this construction are not included in the model.

Ramp construction or repair typically involves removing sediment and water to put in place the underwater part of the ramp and then attaching concrete slabs.

External Factors That Influence Restoration Success

The anticipated outcomes of climate change including sea level rise and recurring flooding and waves threaten the longevity of boat ramps and other coastal infrastructure that may improve access to waterways. Projects that do not follow Best Management Practices (BMPs) may also not be as successful.

Model Notes and Clarifications

Boating Safety: Safety risks are associated with the use of boat ramps. Congestion at boat ramps can put people in harm's way, towing vehicles can be pulled into water when the ramp is too steep or slippery, a method of launching boats known as "power loading" where a boat's motor is used to assist can create erosion and steeper drop-offs at boat ramp sites that can threaten safety as well. Boat ramps can be designed and repaired to address these issues by: providing more

space and access for boats that can decrease congestion, aligning the ramp to match the setting, ensuring the slope is less than a 15% grade, and providing more information to boaters on how to increase boat safety. For this reason, the socioeconomic outcome "Boating Accidents & Cost of Boat Damage" is linked to the restoration project as well as to education. It is also linked to the "Boating" activity outcomes and the "quantity of boats in the water" intermediate outcome because the volume of boats entering the water may increase occurrence of on water boating accidents and damage to boats.

Invasive Species: Boats can introduce invasive species that they pick up from other locations. Invasive species can therefore proliferate in new areas due to these introductions. At the same time, invasive species can have an impact on the populations of other wildlife or vegetation in the area.

Adjacent Habitats: Boat ramp restoration can have effects on other types of habitat close to the project site. Changes to these habitats will have their own suite of ecological and socioeconomic effects. In the ESLM, these are referred to under the heading, "Outcomes related to adjacent habitat." If a project is expected to have substantial effects on other habitat types, we recommend referring to the separate ESLM for that habitat type.

Fishing to Physical Health (excluded): Fishing activity (both on boats and from shore) can require some level of physical exertion or alternatively reduce an individual's opportunities to be physically active or dedicate effort towards physical health. However, there is limited evidence showing a demonstrable relationship between these two outcomes. While it is included in the oyster model and evidence library, it is excluded in the recreational enhancement models as the relationship is very tenuous.

Camping and Pathogens (excluded): New or enhanced boat ramps can have an effect on access to camping grounds and therefore camping activity in the Gulf of Mexico. Waterways close to campgrounds tend to have higher levels of pathogens, particularly coliform bacteria, through higher concentrations of mismanaged human waste being released (Stott 2019). However, there is not sufficient evidence in the region to suggest that this increased concentration would impact other social and economic outcomes in the Gulf of Mexico, especially compared to the effect that stormwater and wastewater have on water quality in the region.

Intervention to Maintenance Costs (excluded): The design of a new or reconstructed boat ramp could affect future maintenance costs (for dredging, pile replacement, etc.). Each project differs in terms of how these maintenance costs are paid for and who pays for them. A project budget could include funds for maintenance, which would fall under the "Economic impact" of restoration node in our models. We chose to exclude this link from the model because while a boat ramp could impact maintenance costs, it is far too variable and unpredictable between projects to confidently posit that this is an outcome across the region.

Intervention to Air Quality (excluded): There are several modes by which air quality can be affected by this kind of restoration project: 1) localized and short-term impact from project construction, 2) diesel exhaust from boat engines, and 3) vehicle exhaust or dust particles from parking lots adjacent to boat ramps. While even a brief exposure to these kinds of conditions

can potentially have an impact on human health, it is likely that construction workers using best management practices would utilize provisions to minimize impacts to them as well as nearby residents. The link between the intervention, air quality, and any sort of socioeconomic impact felt too tenuous to include in the model.

Nutrition for Communities: This as an expected socioeconomic outcome of restoration projects can come from two sources: changes in fish and shellfish harvesting, and changes in land-based hunting on restoration areas. For this model, the source of nutrition is mainly from changes in fish and shellfish harvesting.

Experts Consulted

Cherie Obrien, Texas Parks and Wildlife

Fritz Wettstein, Florida DEP

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