

# Context Document: Mangrove Restoration Ecosystem Service Conceptual Model for Fruit Farm Creek Restoration Site

<http://bit.ly/NI-ESCM>

Ecosystem Service Conceptual Models (ESCMs) are conceptual models that summarize the effects of an intervention, such as a habitat restoration project, on ecological and social systems. Each model links changes in biophysical systems caused by an intervention to measurable socioeconomic, human well-being, and ecological outcomes. ESCMs 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 remains unclear due to multiple links (arrows) that may have opposite effects leading into the same outcome. 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 mangrove restoration ESCM created for Southwest Florida. The model was built at a workshop held at the Rookery Bay National Estuarine Research Reserve in January of 2019. The model was adapted from a general mangrove model developed at the same time. You can see that parts of the general mangrove model have been “turned off” (shown in gray) to illustrate those elements of the general model that are not relevant at the Fruit Farm Creek site.

## Mangrove Restoration Description at the Fruit Farm Creek Site

Fruit Farm Creek is a 225-acre site of dead and dying mangroves situated between Marco Island and Goodland, Florida. A road that bisects Fruit Farm Creek prevents tidal flows from sufficiently reaching the southern part of this site and inhibits drainage when heavy rains occur. The restoration project is focused on restoring historic tidal flows. Activities include: excavating sediments, creating a tidal swale, replacing old and adding additional culverts, and clearing debris from tidal creeks and channels. The restoration depends on natural regeneration and colonization by propagules from surrounding mangrove areas.

One portion of the restoration (54 acres) was completed in 2012, and funding was recently obtained to expand restoration activities to the rest of the site.

## External Factors That Influence Restoration Success

A number of factors, including environmental factors (salinity, sedimentation) and social factors (institutional constraints), can affect the success of a mangrove restoration project but are outside of the project’s control. During a workshop held to improve and expand this mangrove restoration ESCM the following external factors affecting project success were identified by participants: storms and hurricane damage to mangroves, human development direct and

indirect effects, water pollution (e.g., agricultural runoff, stormwater being directed into mangrove areas), sea level rise, invasive species, and ocean acidification.

## Model Notes and Clarifications

This model was adapted from the general [Florida mangrove ESCM](#); see the [context document](#) for that model to see the notes and clarifications applicable for that general model. Here we include notes on how that general model was specified to the Fruit Farm Creek site.

**Nearby habitats:** The only relevant nearby habitats that could be affected by this site are areas of seagrass. Therefore, the other adjacent habitat types have been removed.

**Wildlife species:** Only the relevant aquatic and terrestrial wildlife species have been included in this model.

**Mental health:** This should be maintained, but in this case, it is most relevant for its connection to property value. People living nearby with a view (or a smell) of the dead and dying mangroves will likely have stress and other associated mental health outcomes affected by restoration and the associated changes in their property values.

**Fish and shellfish harvest:** Only species that are harvested in the Fruit Farm Creek area have been included in this model.

**Recreation:** Only recreational activities relevant to the Fruit Farm Creek site have been included in this model.

**Wave and storm surge attenuation:** Because of the location of this mangrove site and the type of mangroves present, wave attenuation services are likely irrelevant (as these are not fringe mangroves), but storm surge protection is likely relevant for the residential properties adjacent to the site.

## Experts Consulted

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## References

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