

Incorporating the supply and demand of fishery resources into mangrove and seagrass related fishery offsets

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Introduction

Offset rules can be used to govern where gains from offsets should be located relative to the loss they are counterbalancing, and if well-designed, they could improve ecosystem service outcomes from biodiversity offsetting. While, the implications of offset rules on ecosystem service outcomes are still unclear. Particularly, current marine habitat offsets do not account for the interaction of the supply, flow and demand of fishery resources. Given that, we explored implications of different offsetting rules guiding the location of offsets on fishery outcomes provided by mangroves and seagrasses in Queensland, Australia.

Methods

Building a supply-service-shed-based spatial model (Figure 1).

- **Scenario 1:** offsetting to be as close as possible (within ecological constraints) to the impact site.
- **Scenario 2:** offsetting without restrictions on proximity.
- **Mangrove:** offsetting in areas with the highest potential of restoration.
- **Seagrass:** offsetting in areas with the largest number of traditional moorings.

Seagrass offset sites: traditional moorings located in existing seagrasses

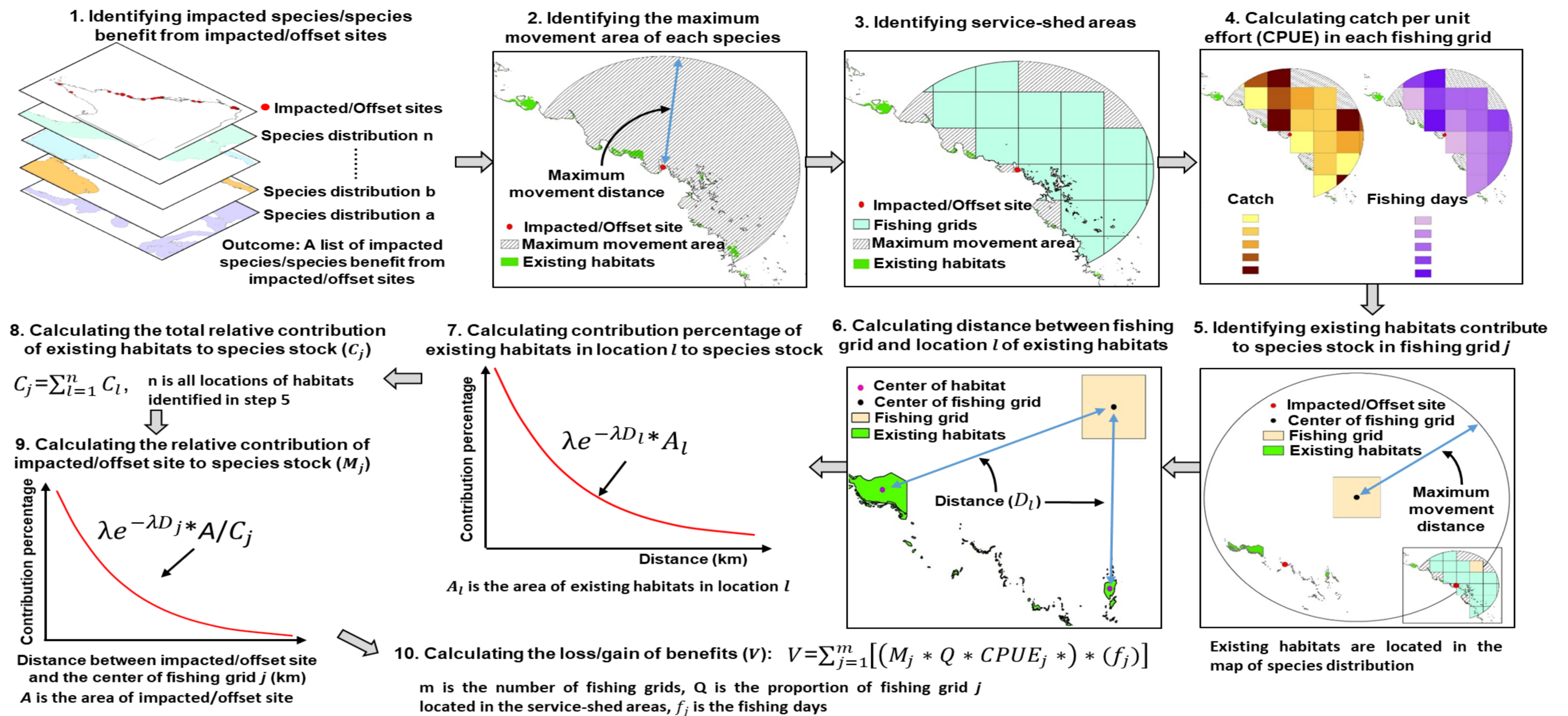


Figure 1 The conceptual model to estimate impacts and benefits of impact and offset sites to commercial fisheries

Results

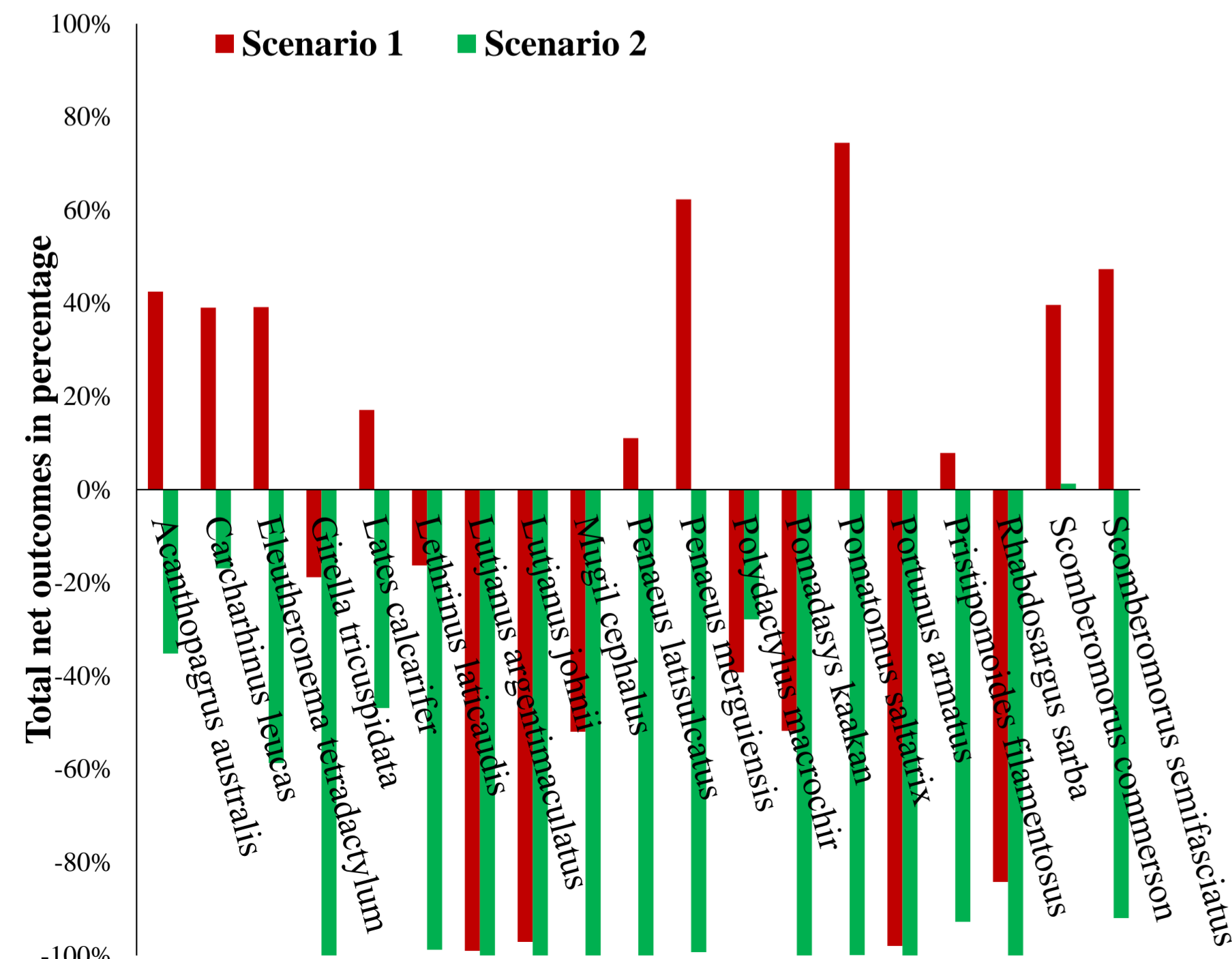


Figure 2 Total net outcomes by species for the whole commercial fishery for mangrove offsets

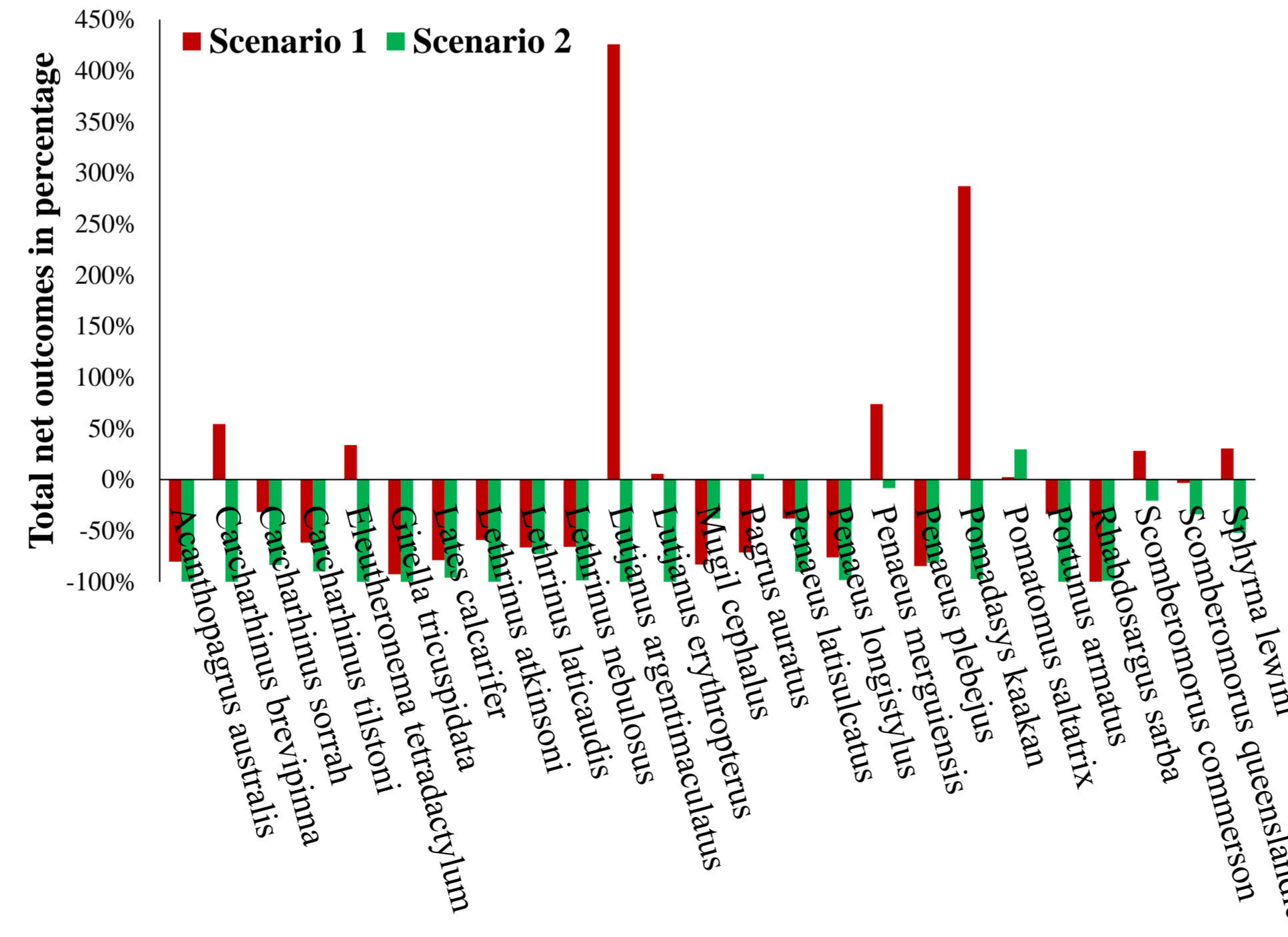


Figure 3 Total net outcomes by species for the whole commercial fishery for seagrass offsets

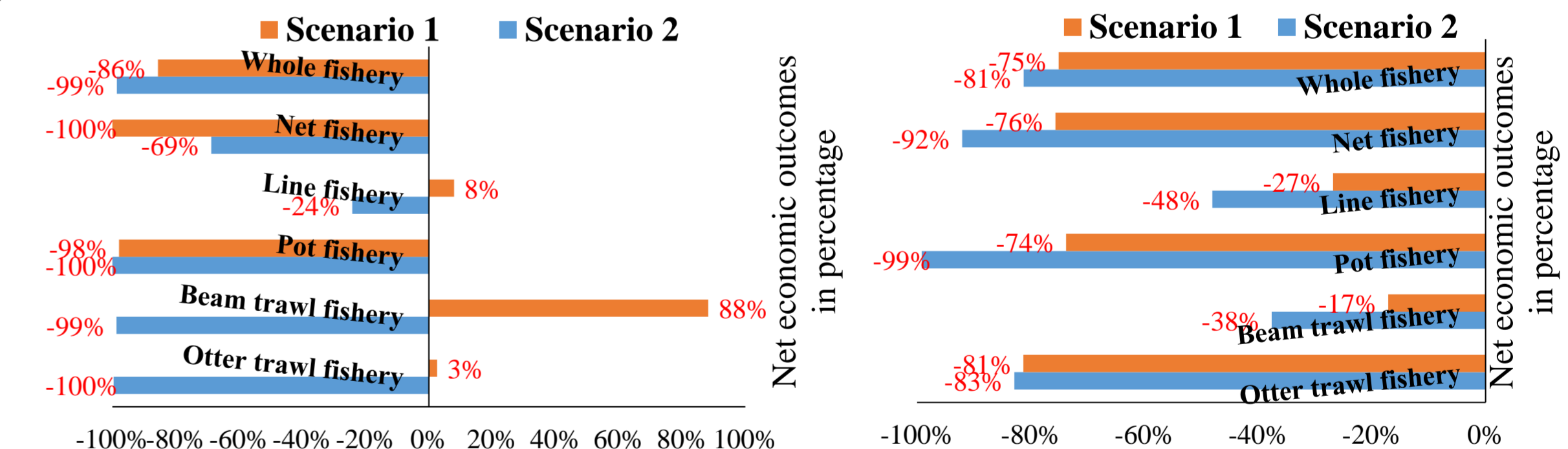


Figure 4 Net outcomes of economic benefits by fisheries for mangrove offsets

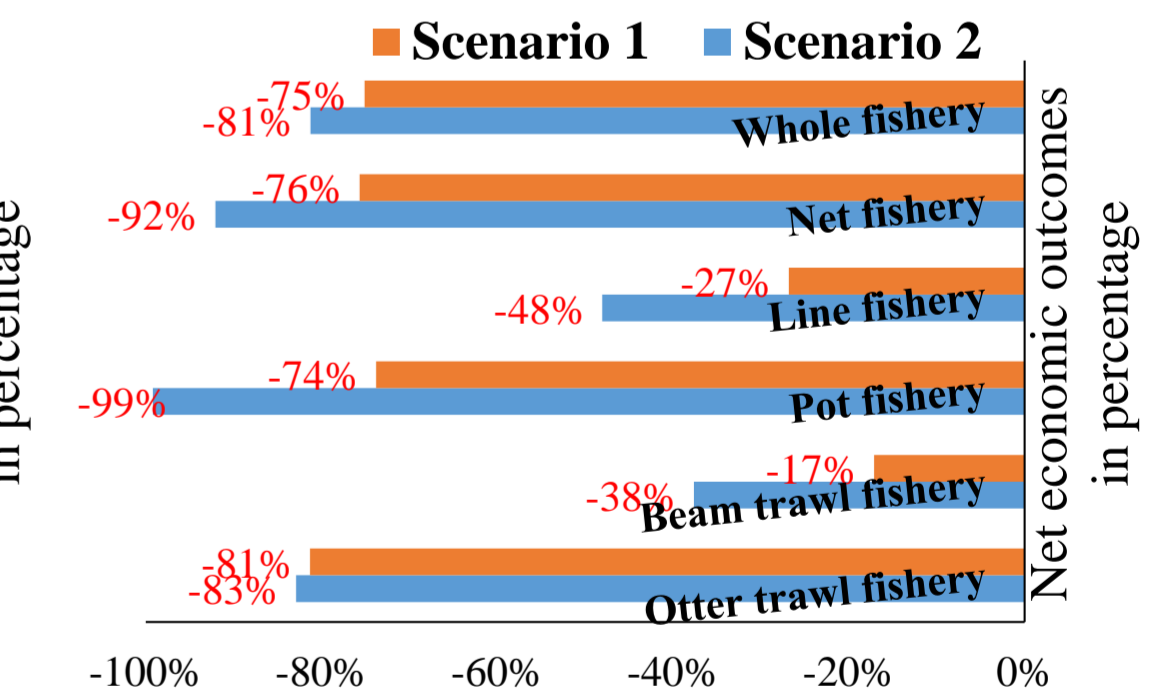


Figure 5 Net outcomes of economic benefits by fisheries for seagrass offsets

- Mangrove offsets: the number of species gained net positive outcomes under scenario 1 and 2 were 10 and 1 respectively. Only line and trawl fisheries gained net economic outcomes under scenario 1.
- Seagrass offsets: 9 species gained net positive outcomes under scenario 1, while only 2 species were fully offset under scenario 1. All fisheries suffered net economic losses.

Conclusions

Different offsetting locations determined by different offsetting rules changed the net outcomes of fishery resources significantly. The spatial scales of the supply and demand of fishery resources determine if losses of fishery resources can be fully compensated by offsetting projects.