Introduction

Florida manatee’s (Trichechus manatus latirostris), ranked endangered (IUCN), it’s expected to decline 32% of their populations next 40 years (IUCN). Some threats which are already affecting their population, are closely linked to climate. Therefore, global climate change (GCC) may play a key role on modelling this threats. It’s important to know which correlations and mechanisms exist between these threats and potential climate change scenarios, in order to assess whether they might be become worse in the future and to take preventive measures when it’s necessary and/or possible.

Objectives

Objectives of present study is to find actual threats affecting Florida manatee’s population, check which of them are potentially linked with GCC, find which factors & mechanisms are actually influencing on them, and finally, check how those threats are expected to become in relation with predicted GCC scenarios.

MANATEE’S GENERAL DISTRIBUTION

- Trichechus manatus: West Indian manatee, divided in 2 subspecies (classified as endangered IUCN: T. manatus latirostris (1500 individuals). Vulnerable.
- T. manatus manatus (1500 individuals).

FLORIDA MANATEE

- Populations (200-1015)
- Populations distribution

Thermic stress:

Manatees are exposed to cold stress when temperatures decrease for long periods under 18-20°C for short periods (few days) 10-12°C. Warm water refuges (types & quality): To survive coldest winter periods, most of the manatees from southern two thirds of Florida peninsula, require warm water refuges. There are three different refuges, which differs on their quality/effectively (Lemire et al., 2018):
- Springs: The most effectively, remaining always at the same temperature
- Power plants: loses efficiency when external temperature decrease considerably.
- Passive thermal basins (PTB): Less effectively, reductions in freshwater flow or long period of low temperatures lead to cool water to a lethal levels for manatees.

HAB’s:

Increasing in frequency and range all around the world, being Florida a particular hotspot, most important/harmful species, responsible of red tide episodes, almost exclusively from Florida and Mexico, is Karenia brevis, which produces neurotoxins:
1. Direct ingestion, inhalation
2. Transferred by the food chain

Effects:
- Intoxication: Neurotoxins shuts down the marine mammal’s ability to breathe, so they drown underwater. They’re basically paralyzed, and they’re comatose
- Limiting food: By reducing the amount of light that passes through the water column to the benthos, and leading to death sea grasses.

Discussion

Thermal stress and HAB’s, are actual closely related with GCC threats that affect Florida Manatee populations, they have similar mortality rates and a great variability in its virulence, presenting variations of up to an order of magnitude depending on the year. Factors and mechanisms influencing those mortalities remain still unclear, mainly in the HAB’s case, in which even there are no solutions.

Habitat destruction/degradation

This threat is, this is implied in the previous two threats:
- In thermal stress threat, which includes the loss of hot water refuges
- In HAB’s threat, which includes reduce grating zones.

Influence of climate change on threat:

There is two predicted GCC scenarios, and considering HAB’s and thermal stress trade off:
- Increasing temperature (most expected): It’s expected to favour the HAB’s proliferation
- Cooling temperature: It’s expect an increase of thermal stress threat.

Conclusion:

It’s difficult to predict which conditions would be more devastating to the Florida manatee’s population. But, considering that we have not found significant differences in their mortality values, and taking into account the information obtained, I conclude that:
- Unlike T-stress, factors and mechanisms that lead to HAB’s remain still nowadays unknown, moreover does not have solutions. In an equal values of mortality from those threats, the worst scenario is the one that favours the proliferation of algal blooms, and, by considering information available until today, this scenario is the one exposed in the case 1, which predicts a temperature increase.