# UMB

#### Introduction

Florida manatee's (*Trichechus manatus lariostris*), ranked endangered (UICN), it's expected to decline 20% their populations next 40 years (UICN). 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 Number 2000. 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 to become worse in the future and to take preventive measures when it's necessary

#### **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 elation with predicted GCC scenarios.

Kigdoom: Animalia Phylum: Chordata Class: Mammalia Order: Sirenia Family: Trichechidae

## MANATEE'S GENERAL DISTRIBUTION



- <u>Trichechus inunquis:</u> Amazonian manatee (10000 individuals), **Vulnerable**. <u>Trichechus senegalensis:</u> African manatee (10000 individuals) **Vulnerable**.

T.manatus manatus: (>2500 ind)

## FLORIDA MANATEEE



Populations distribution

Upper St. Johns river →5% Northwest Florida →12, 8% Atlantic Coast →45, 6% Southwest Florida →36, 6%

Subpopulations established by Florida fish and wildlife research, and based on fidelity of warm water refuges.



## **Threats & mortalities**

- Harmful algal blooms (HAB's)
- · Habitat loss & degradation
- Collisions



winter In Power plants (Line)

HAB's and T.Stress are

related with climate.

• there isn't difference on their mortality values

(sig 0.525) Habitat loss & degradation

- it's implied on those by:
   HAB's→ foraging areas
- T.Stress → shelters loss

## HAB's:

ncreasing in frequency and range all around the world 👊 particular hotspot<sub>score et al., 2019</sub>, most important/harmfully specie, responsible of red tide episodes, almost exclusively from Florida and Mexico, is *Karenia brevis*, whom produces neurotoxins

- 1) Direct ingestion, inhalation
- 2) Transferred by the food chain (ton

9 of 14 sampled manatee's presented HAB's toxins on their tissues

1) Intoxication: neurotoxin shuts down the marine mammal's ability to breathe, so they drown underwater. They're basically paralyzed, and they're comatose

2) Limiting food: By reducing the amount of light that passes through the water column to the benthos, and leading to death sea grasses

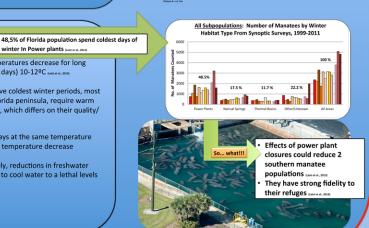


## Thermic stress:

manatees are exposed to cold stress when temperatures decrease for long periods under 18-20°C or for short periods (few days) 10-12°C w

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 (Laist et al., 2013):

- Springs: The most effectively, remaining always at the same temperature
- **Power plants:** Loses efficiency when external temperature decrease
- <u>Passive thermal basins (PTB's):</u> Less effectively, reductions in freshwater flow or long period of low temperatures lead to cool water to a lethal levels



## THERMIC STRESS ♠♠

## HAB's **↓**

- Cooling low quality refuges (1997) 12 (2017)
- Refuge molection (Label et al., 2013)

  Habitat/loss degradation

## PREDICTED GCC SCENARIOS

Winter temperatures are like to become cooler than average

- Increase of temperature
- Dryer conditions

## THERMIC STRESS **◆**

## HAB's 🛧

- Vertical mixing reduction Increasing salinity
- Increasing manatee exposition to HAB's
- Habitat loss/degradation

### Discussion

Thermal stress and HAB's, are actual closely related with GGC 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 grazing zones.

## Influence of climate change on threats

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 is 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.