

**GEER 2019**

**Restoring beauty  
requires a **beast or two****

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# Florida 12,000 years ago



# Global loss of vertebrate **biomass**

Source: Bar-On et al. 2018

~0.04 GT Carbon

~0.007 GT Carbon



**83% decline**

10,000 years B.P.

Today



Mac Stone



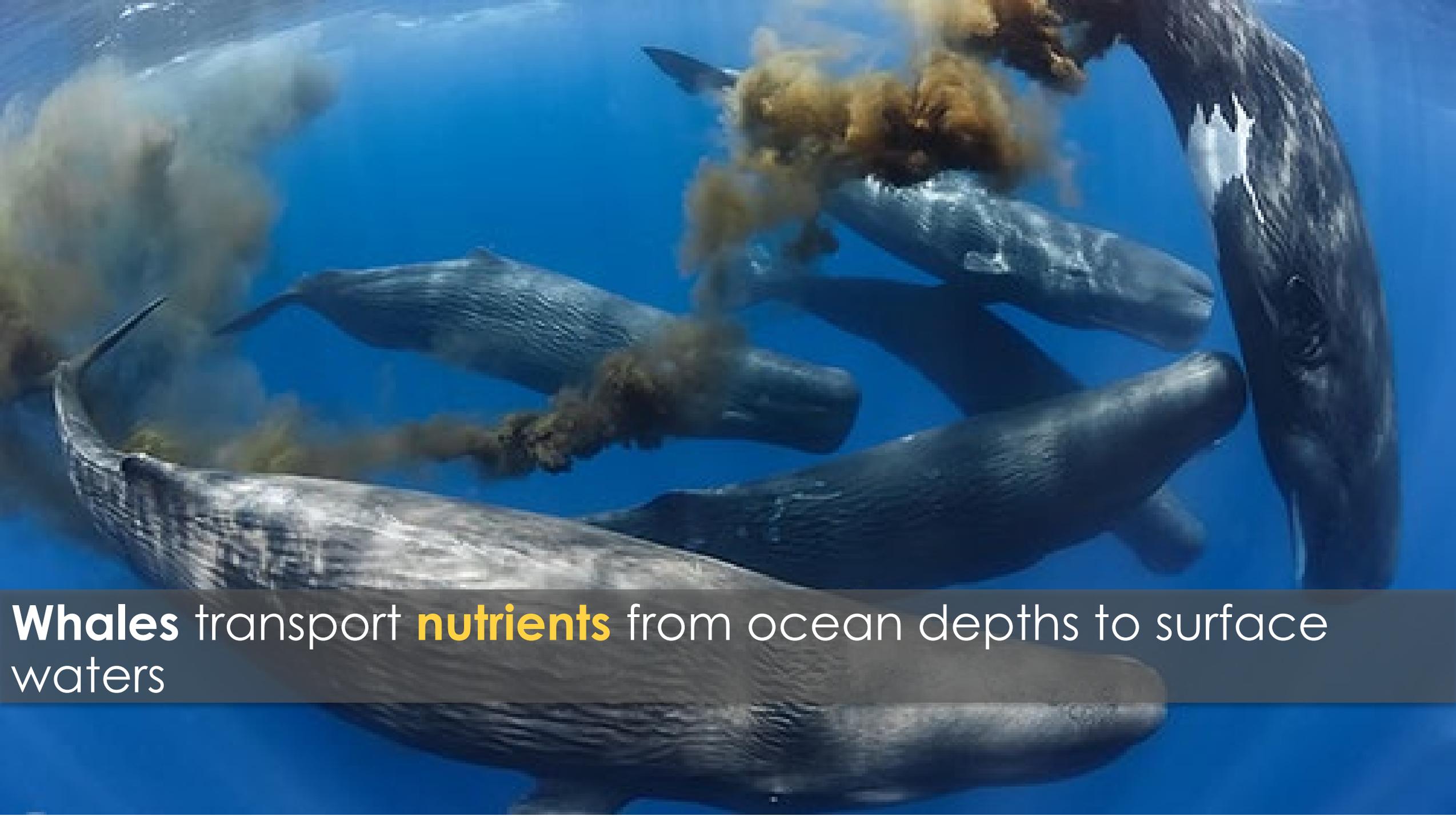
Mark Cook



Mark Cook

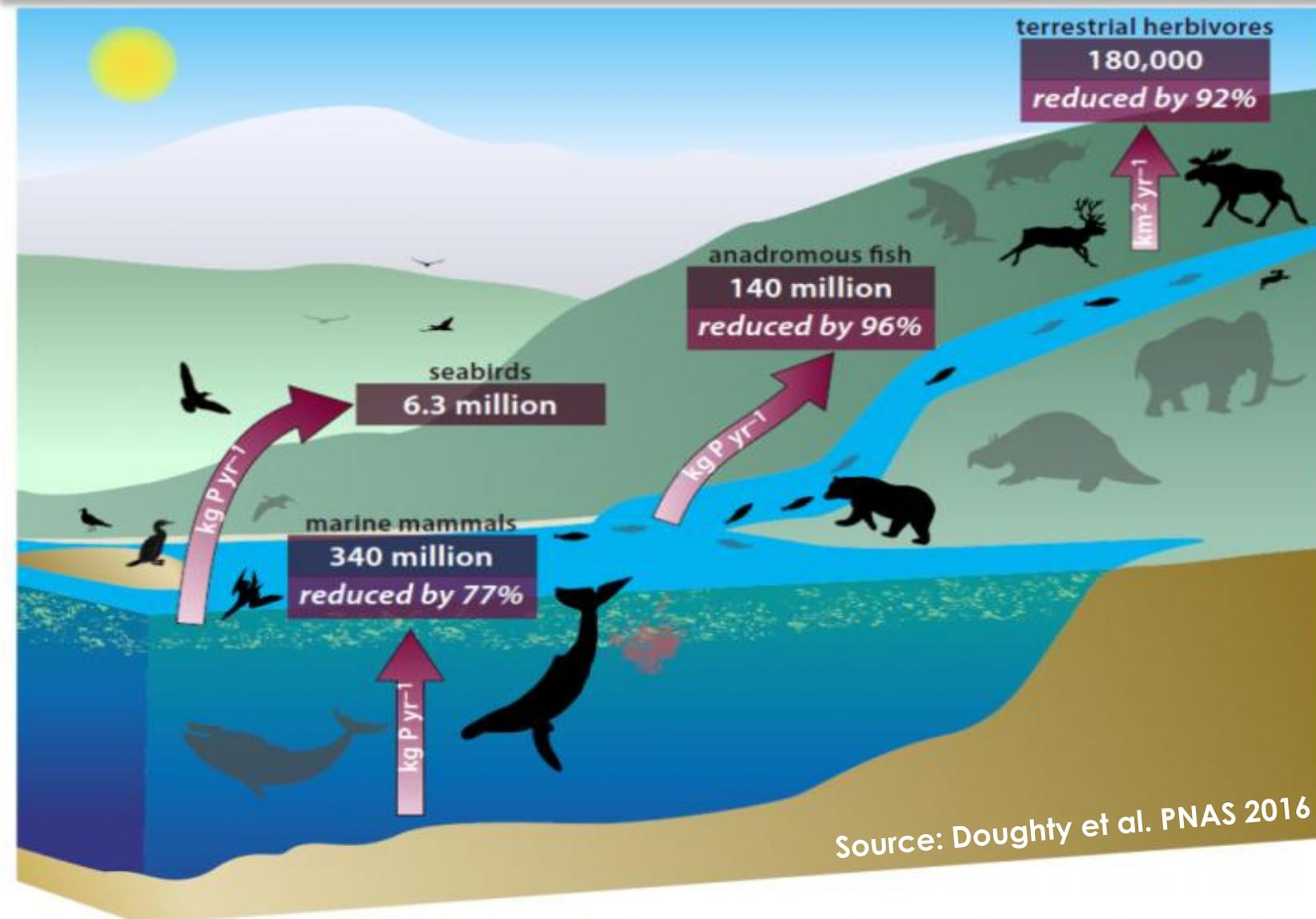


We can't restore the Everglades unless we recover its **wildlife**

A group of whales is shown breaching the ocean surface. The whales are dark grey or black, and their bodies are partially visible above the water. Large, white splashes of water are being thrown into the air as the whales break through the surface. The background is a clear, deep blue sky.

**Whales** transport **nutrients** from ocean depths to surface waters

# A global **wildlife** nutrient-pump from ocean depths to deep inland



In the past, this network of animals transported far greater amounts of nutrients than they do today.



Wildlife populations are much reduced in the freshwater **Everglades**



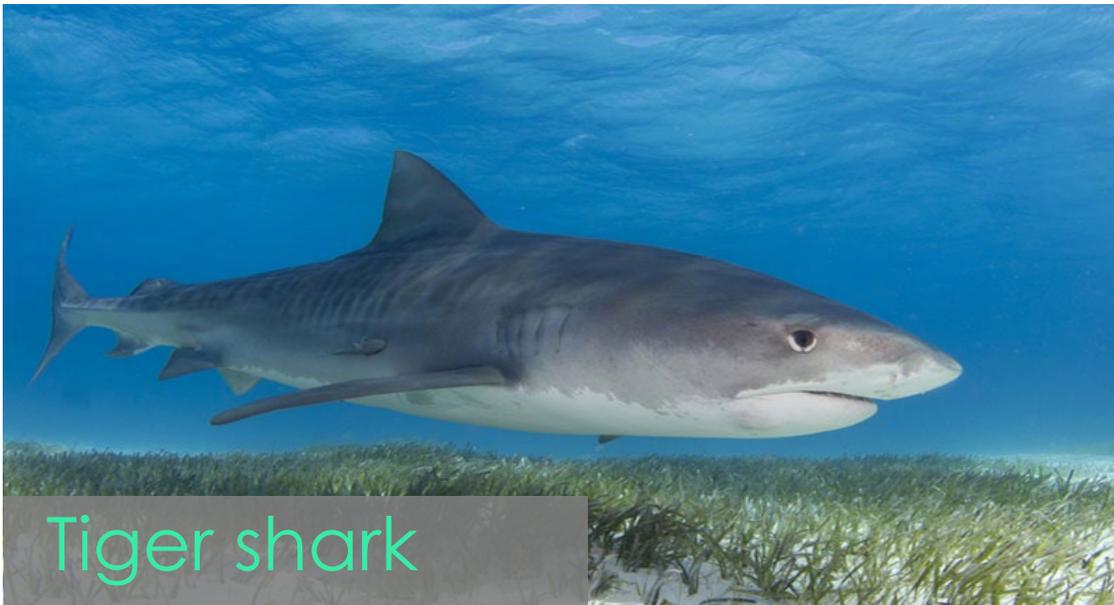
Caribbean monk seal (extinct)



Bottlenose dolphin



....And are also reduced in **Florida Bay**



Tiger shark



West Indian manatee

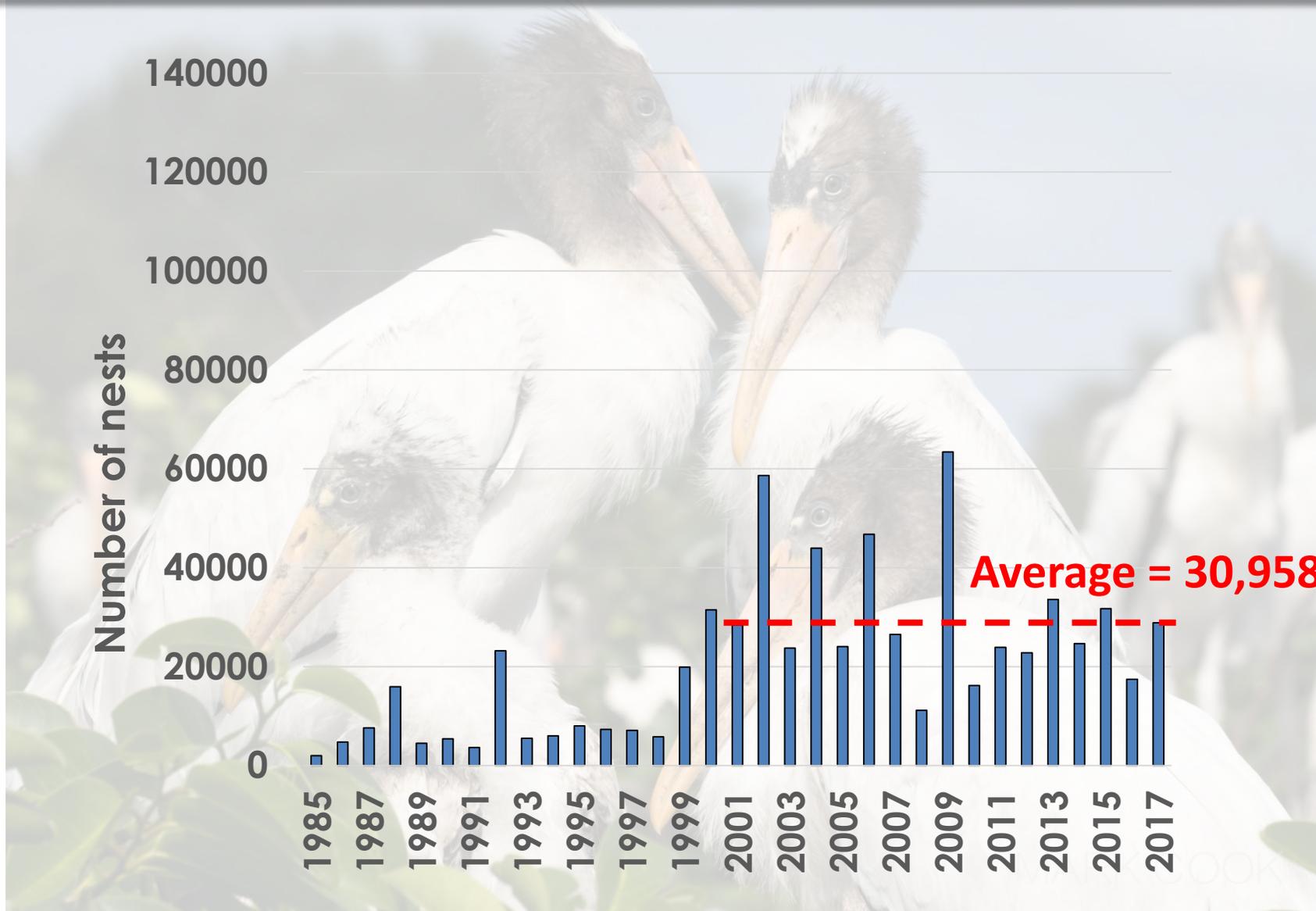
# Green turtle: **seagrass grazer & nutrient recycler**



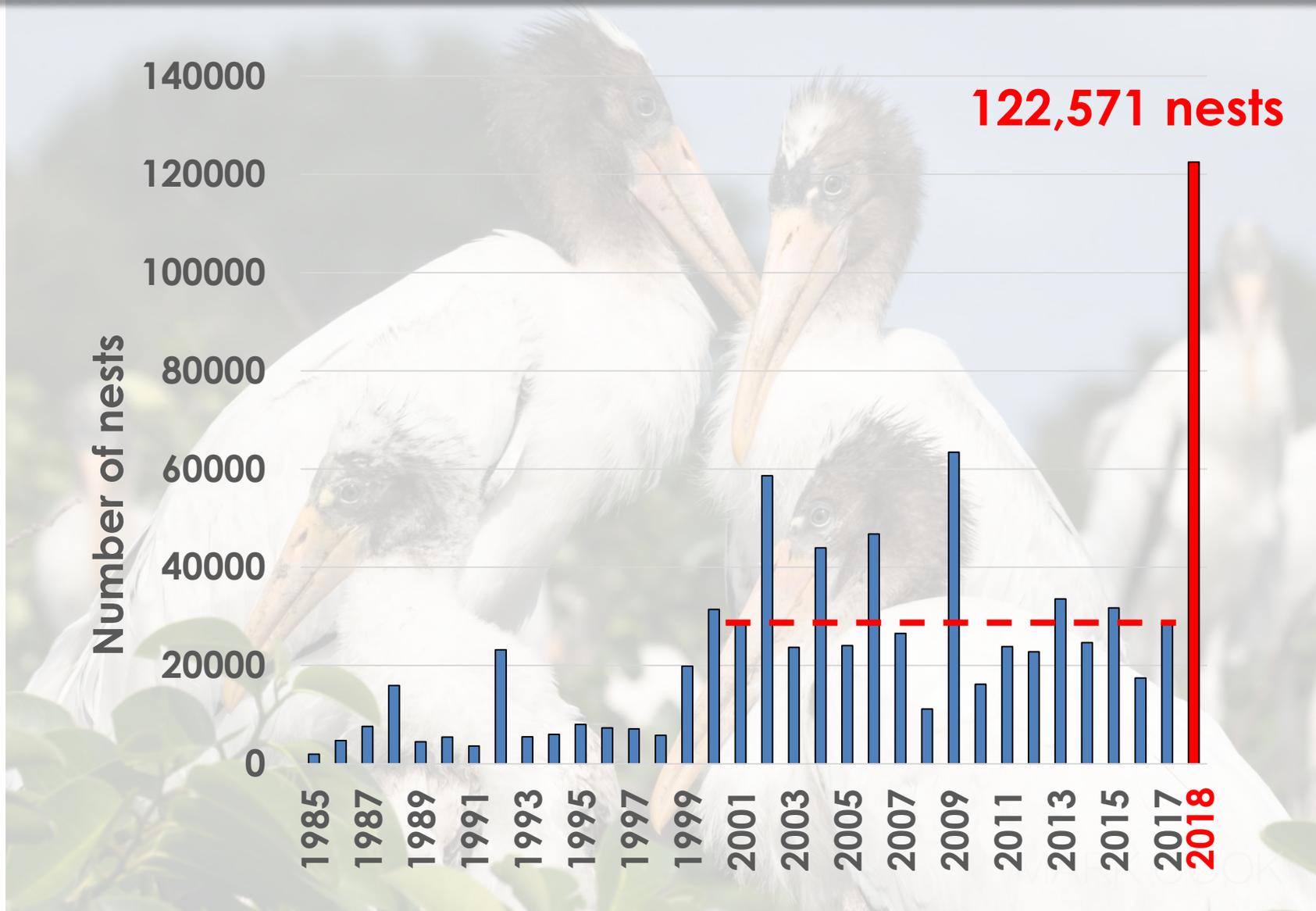
15 - 30 fold **decline** in Caribbean

Source: Jackson 1997, 2001

# Recent **wading bird** nesting effort in the Everglades (all species)



Nesting in **2018** was comparable to that of the **1930's!**





# Increased nesting will reinforce the keystone functions of alligators

## **Burrowing & nesting activities**

- habitat for multiple species
- aquatic refugia
- prey availability for birds

## **Potential trophic effects**

- prey switching
- competitive exclusion
- predator release

**Nestlings** provide a substantial source of energy to **alligators**

Wading bird super-colonies  
concentrate large quantities of  
**nutrients** in the marsh-mangrove  
ecotone



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Experimental phosphorus  
additions can **increase**  
**ground surface elevations**  
in mangrove habitats

Source: McKee et al. 2007



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# What is the **true ecosystem value** of our **missing beasts**?

