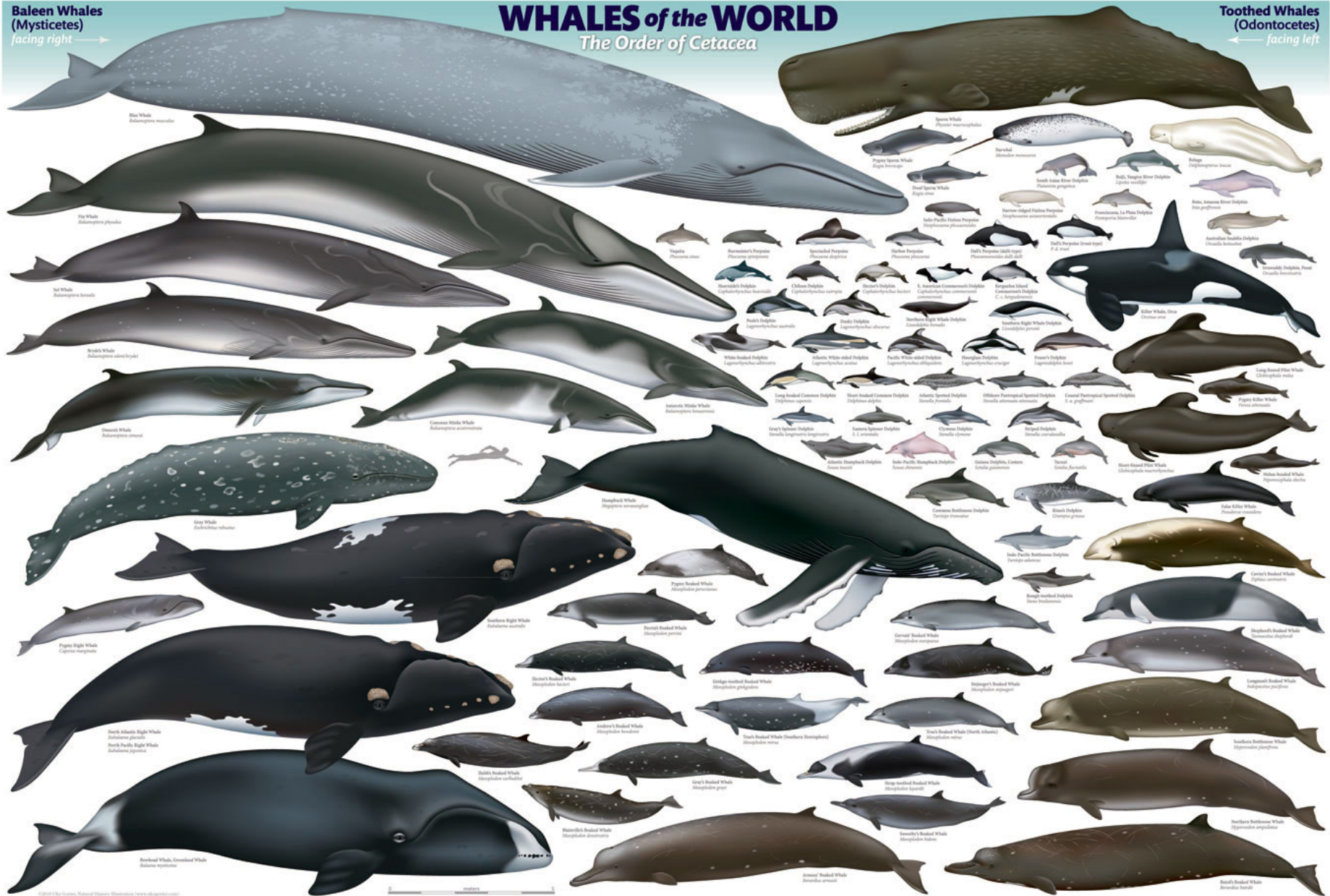


Baleen Whales (Mysticetes)
facing right →

WHALES of the WORLD

The Order of Cetacea

← facing left
Toothed Whales (Odontocetes)



ECONOMIC HISTORY OF WHALES

Whale hunting began since 3000 BC – *subsistence, beached whales.*

Industrial whaling in 17th C – *organized fleets, conflict among whale-hunting countries, factory ships in 20th C.*

Whale products in past

Blubber & bone.

Blubber oil – fuel, lubricant (industrial revolution). Whales referred to as swimming oil wells. ‘Spermaceti’ – waxy oil from sperm whales produced candles that were odorless/smokeless. Countries without access to protein hunted whales for meat.

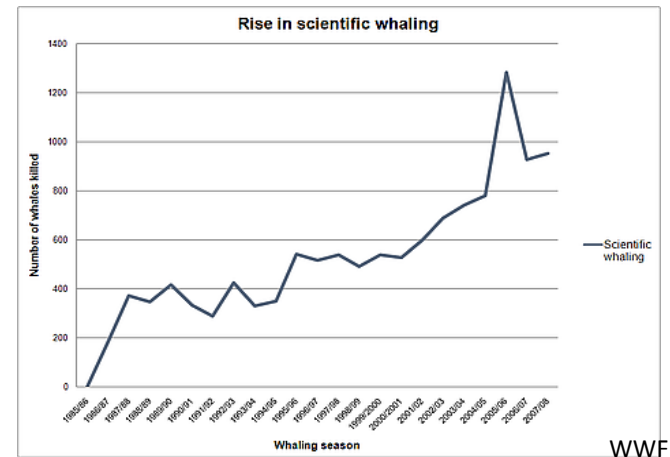
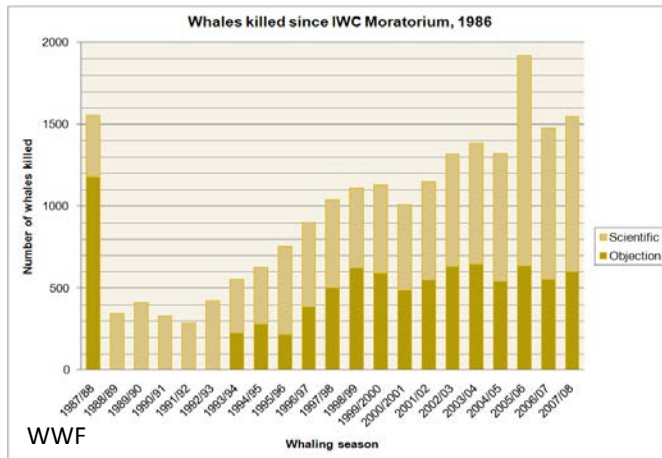
Whale products now

Meat rather than oil

THREATS TO WHALES

Hunting

About 32,000 whales killed by whaling since IWC moratorium in 1986. 1,400 killed every year.



Pollution

Pesticides, heavy metals, oil slicks, noise.

Fish nets

Entanglement.

Ship collision

ECOLOGICAL ROLE OF WHALES

Global influence

Regulate ocean food chain. One blue whale consumes 40 million krill a day.

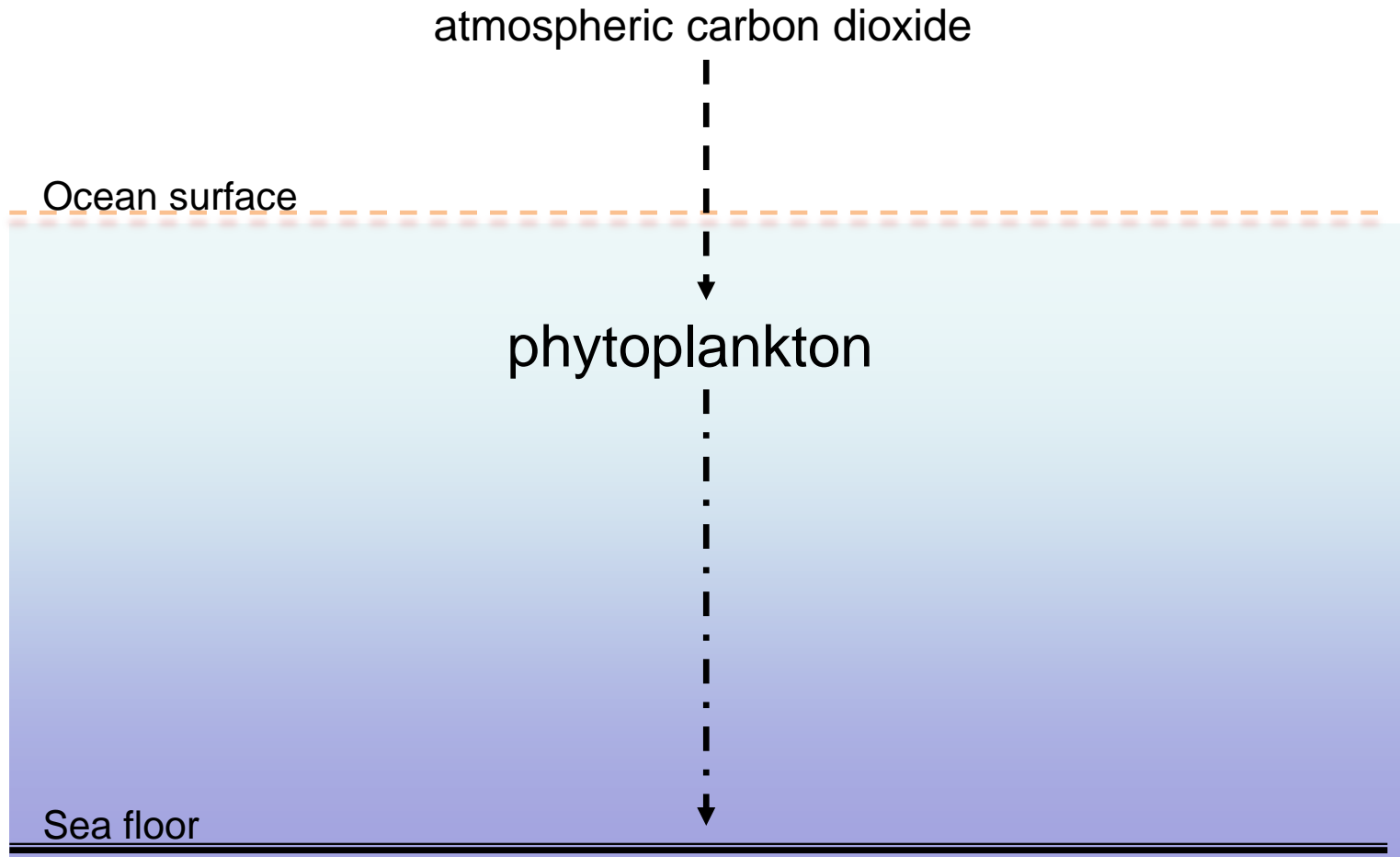
Whale watching becoming lucrative economic business.

Biomimicry - much to learn from whales regarding echolocation.

Whale poop helps to offset carbon in the atmosphere.

Roman J, Estes JA, Morissette L, Smith C, Costa D, McCarthy J, Nation JB, Nicol S, Pershing A, Smetacek V. **Whales as marine ecosystem engineers.** *Frontiers in Ecology and the Environment*, 2014; 140703070154008 DOI: [10.1890/130220](https://doi.org/10.1890/130220)

THE CARBON PUMP



Plankton production depends on availability of nutrients.

Limited amount of nutrients (particularly iron) in the open oceans.

Geoengineering solution: Fertilize parts of open ocean to increase phytoplankton production – ocean fertilization.

Could fix more carbon and transport it to ocean floor.

Whales (e.g. sperm whale) do this most efficiently.

Lavery TJ, Roudnew B, Gill P, Seymour J, Seuront L, Johnson G, Mitchell JG, Smetacek V. 2010. *Iron defecation by sperm whales stimulates carbon export in the Southern Ocean*. Proceedings of the Royal Society B (doi: 10.1098/rspb.2010.0863)

- 12,000 sperm whales in Southern Ocean
- Each defecates 50 tonnes/year.
- Feces rich in iron – stimulates phytoplankton growth, traps carbon, sinks to the deep ocean.
- The whales remove 400,000 tonnes of carbon/year (they contribute 200,000 of carbon dioxide a year through respiration).
- Better than carbon neutral.