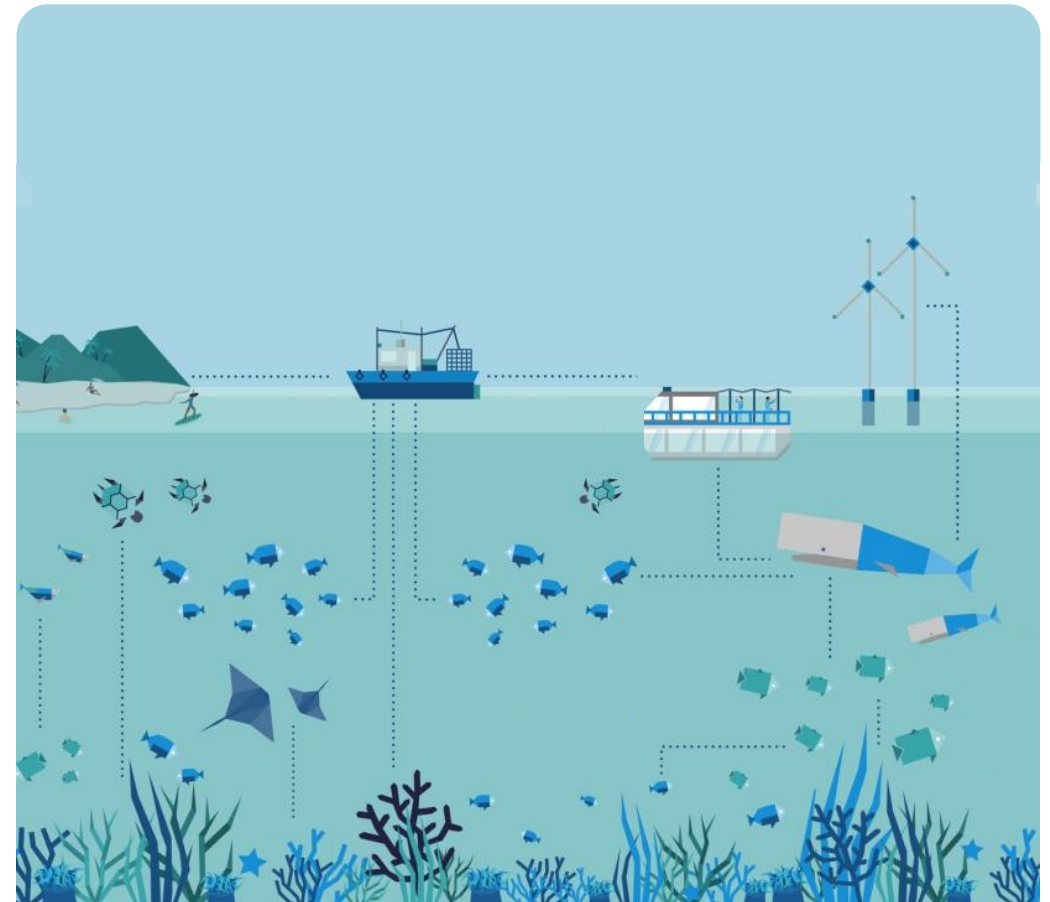


Unravelling Marine Food Webs: From Trophic Ecology to Ecosystem-Based Management

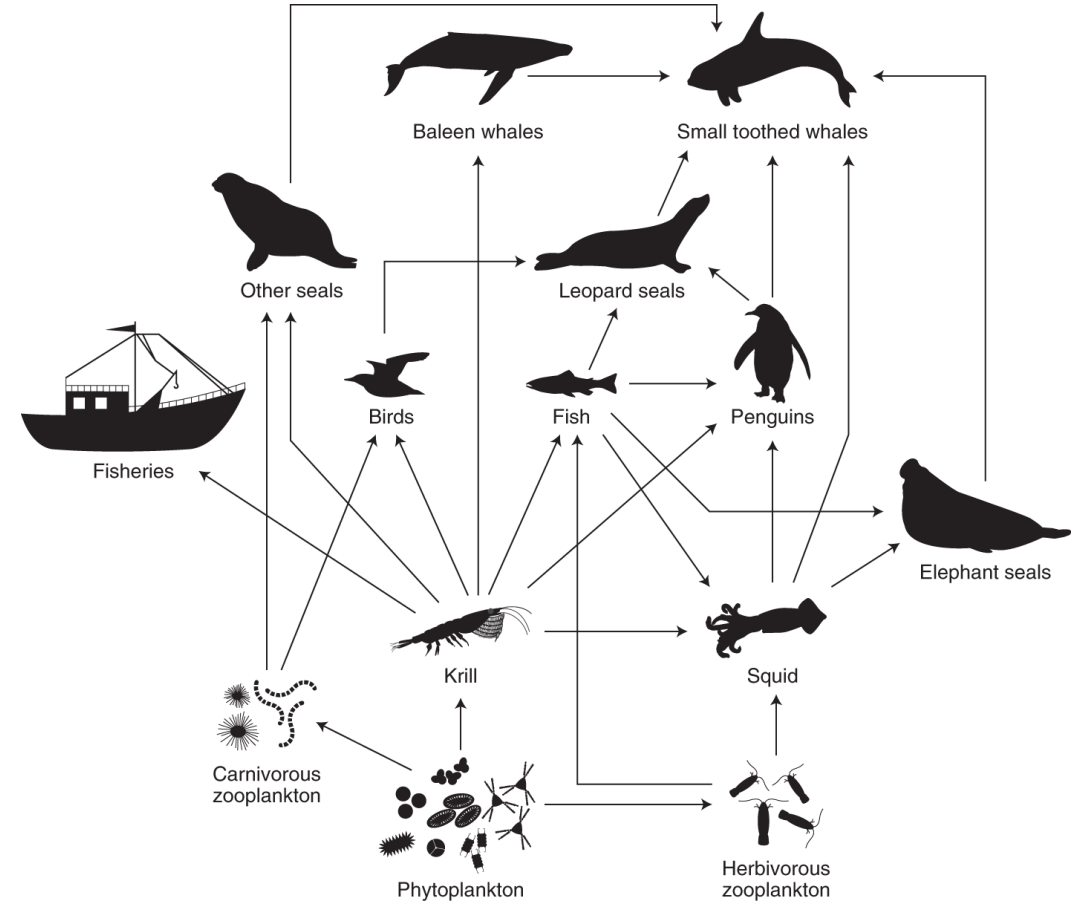


Ges4seas.eu/resources

What are marine food webs and why do they matter?

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Marine food webs are ecological networks of trophic interactions that determine how energy and matter flow through ecosystems.

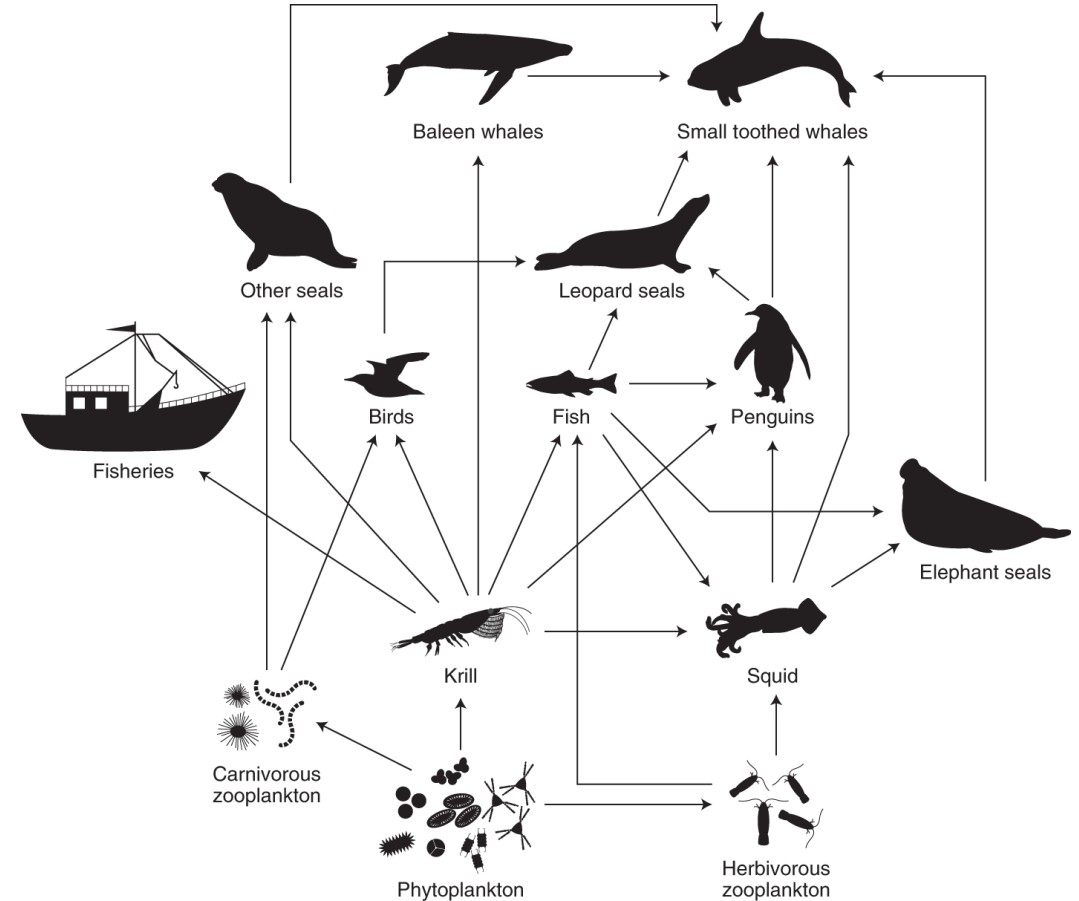


McBride, M.M. Moving to the South Pole. *Nature Clim Change* 9, 90–91 (2019)

What are marine food webs and why do they matter?

Marine food webs are ecological networks of trophic interactions that determine how energy and matter flow through ecosystems.

- Species are connected through feeding interactions
- Energy and matter flow across the ecosystem
- Interactions shape **ecosystem functioning and resilience**
- **These networks are dynamic and increasingly altered by human pressures**



McBride, M.M. Moving to the South Pole. *Nature Clim Change* 9, 90–91 (2019)

How do we study a marine food web?

How do we study a marine food web?

MARINE STRATEGY FRAMEWORK DIRECTIVE: DESCRIPTOR 4 WOOD FEBS



INSTITUTO
ESPAÑOL DE
OCEANOGRAFÍA



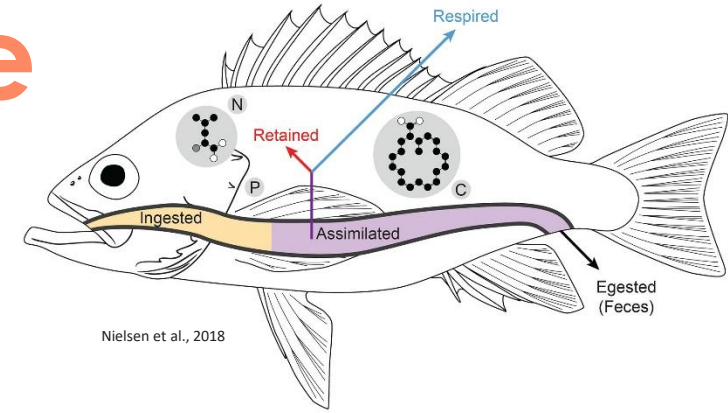
“**Good Environmental Status** implies human activities are not harmful to the marine environment, so ecosystems are kept functional and resilient for future generations”

How do we study a marine food web?

Defining nodes and links

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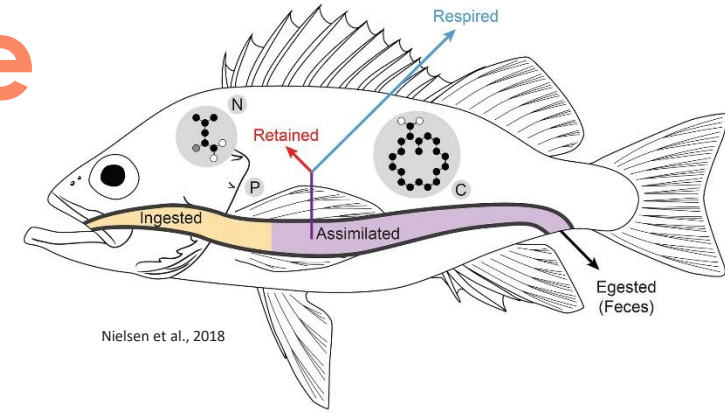
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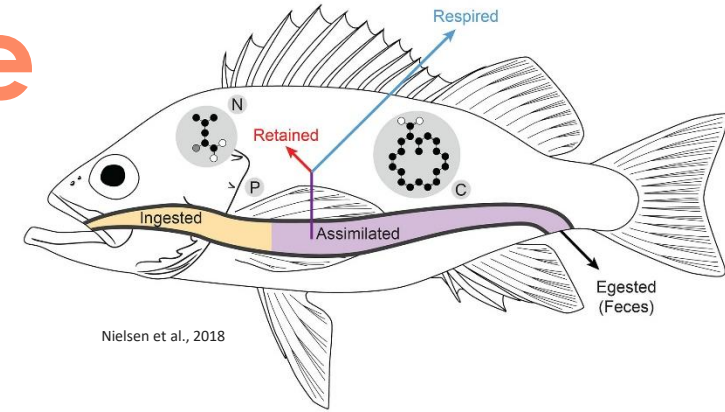
Defining nodes and links

Stomach content analysis (SCA)



How do we study a marine food web?

Defining nodes and links



Stomach content analysis (SCA)

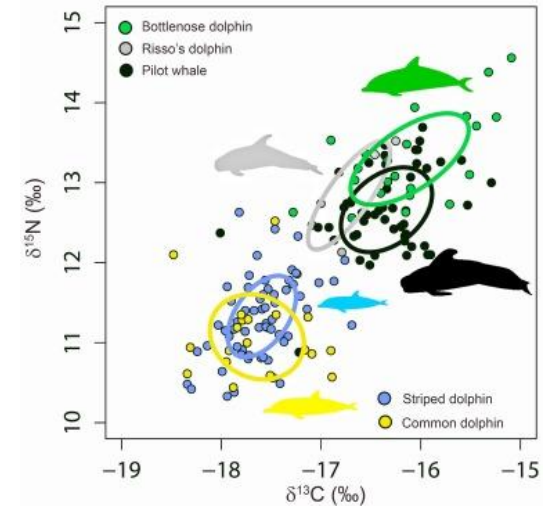
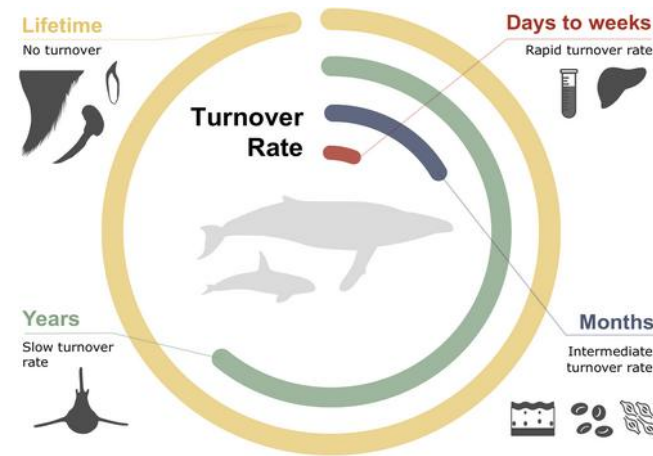
Identification of **ingested diet** items in stomach.

Stable isotopes analysis (SIA)

Analysis of the ratio of heavy to light isotopes of common elements in a biological tissue.

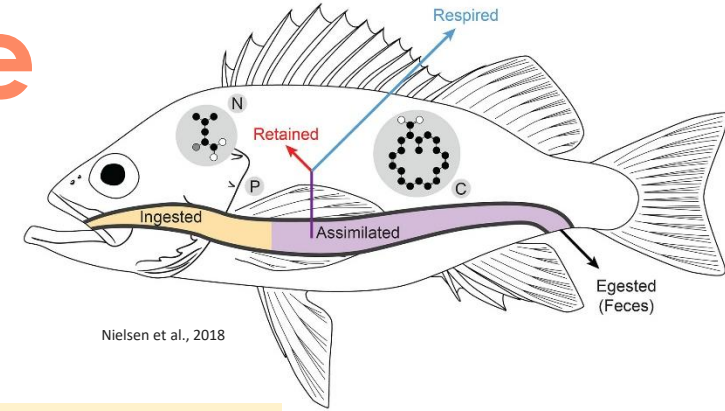
Method measuring **assimilated components**.

$\delta^{13}\text{C}$ and $\delta^{15}\text{N}$ most used.



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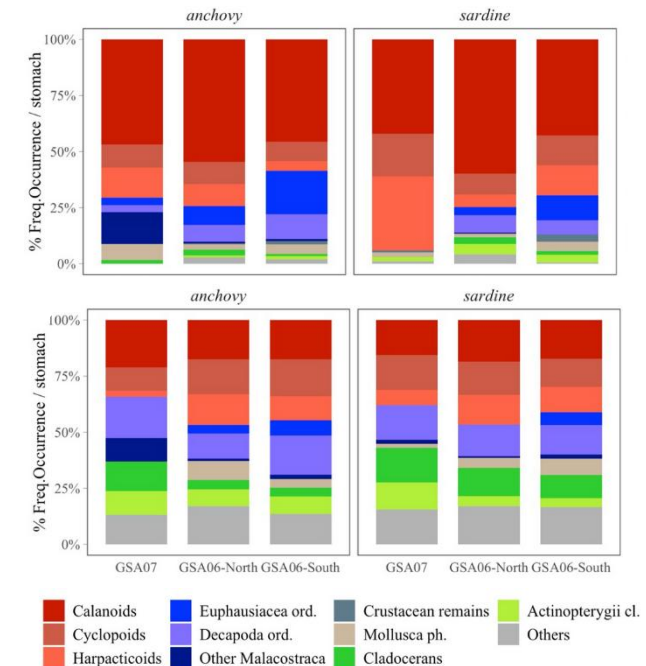
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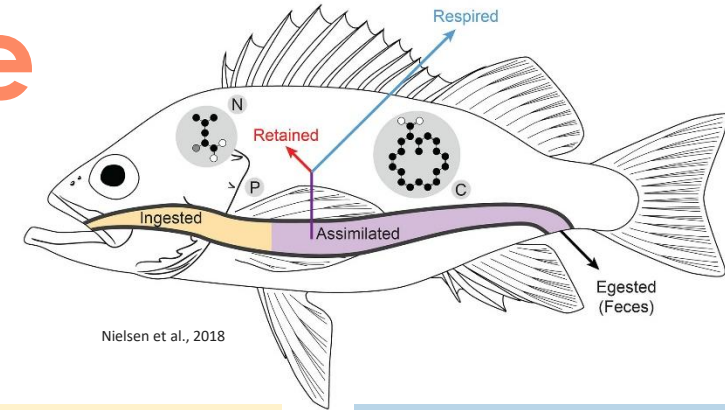
Identification of genetic sequences of diet items in stomach, gut or faeces.

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Ecosystem models

Ecopath with Ecosim (EwE) models.

- Ecopath: A snapshot of ecosystem state, interactions and exploitation
- Ecosim: Time dynamic. Future simulations
- Ecospace: time-space dynamic.

From Science to Management Decisions

Ecosystem Based Management (EBM)

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“An integrated approach to manage human activities that consider **all ecosystem components and their interactions**”

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Single species



From Science to Management Decisions

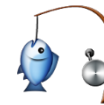
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Ecosystem Approach to Fisheries Management



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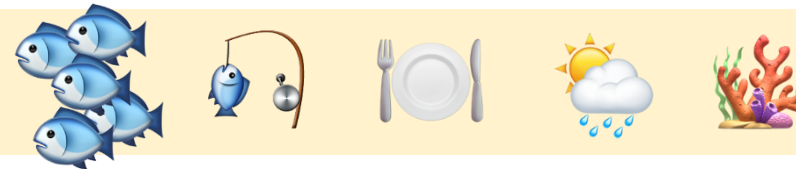
Single species



Ecosystem Approach to Fisheries Management



Ecosystem Based Management



Take Home Message

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Trophic ecology

- Identify key interactions
- Detect important species
- Reveal potential trophic cascades
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EBM

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Understanding food webs means understanding the consequences of our decisions.

The challenge is to integrate this knowledge into real world decision making.



sara.mohamed@ieo.csic.es

Thank you

