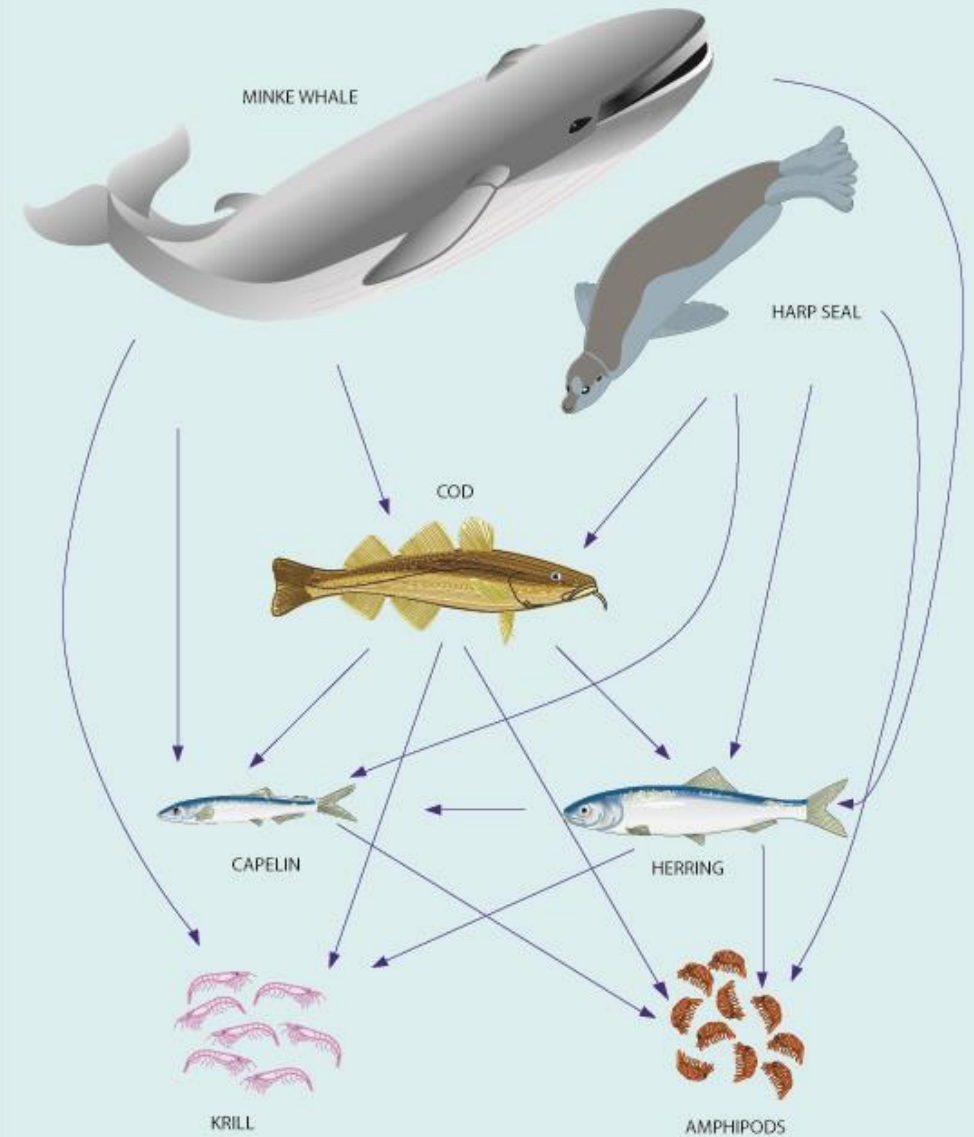


# Eco-system functioning and management of pelagic species

Henrik Sparholt  
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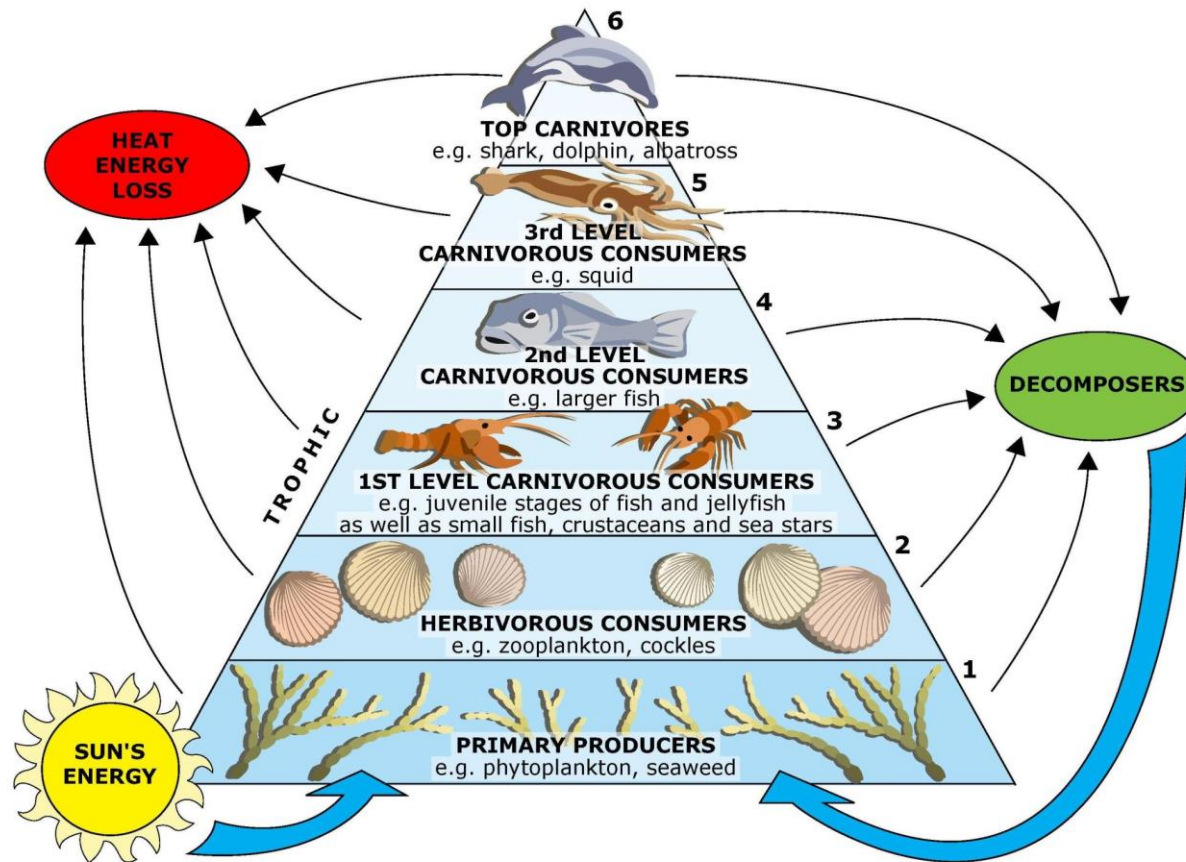
Graham 1947, Beverton&Holt 1957, Ricker 1958, Hilborn&Walters 1992, Longhurst 2010, and many others...

Longhurst, A. 2010. Mismanagement of marine fisheries. Cambridge University Press, Cambridge, UK:

**” For any level of fishery harvest to be sustainable, some or all of the biological processes contributing to production must be compensatory, i.e. increasing as stock biomass decreases...”**

# Ecosystem productivity

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# Basic ecosystem concepts

1. The production in an ecosystem is based on primary production.
2. This production is moving up the food web and at each trophic level losing about 90%.
3. If fishing is too light: the fish stocks will be too large and burn too much production in metabolic maintenance (produce CO<sub>2</sub> and not fish meat) - production which could otherwise have been harvested.
4. If the fishing is too hard: the fish stocks will be too small and not produce enough juveniles.

# Four compensatory mechanisms –

Taken into account in current management?

- Density dependent recruitment
- Density dependent individual fish growth
- Density dependent mortality
- Density dependent maturity

✓

Not yet

Not yet

Not yet

Missing any of these in Fmsy calculations will give a downward bias!

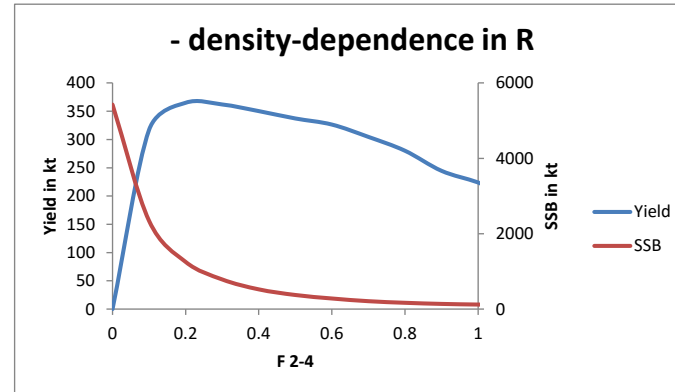
Example:

Yield/SSB  
vs  
Fishing pressure

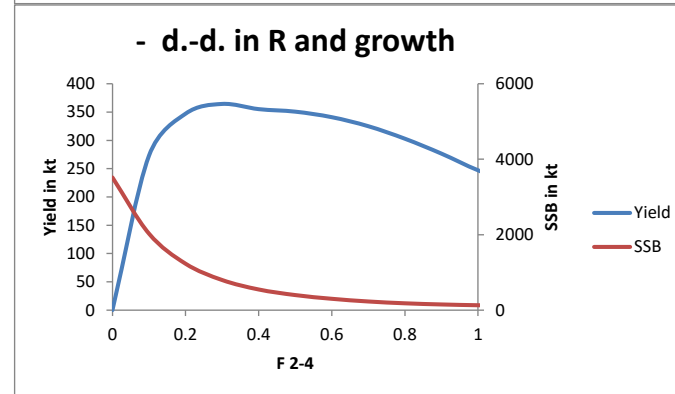
North Sea cod



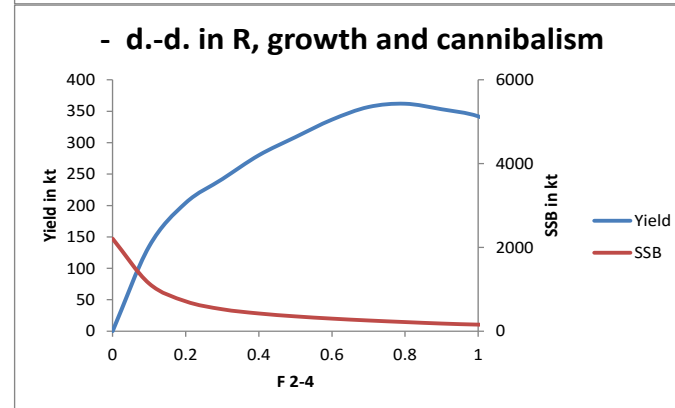
Fmsy



0.20



0.30



0.70

# Conclusion

- Managing predatory fish fisheries based on downward biased Fmsy will give too large predatory stocks eating too many pelagic fish.
- Managing pelagic fish fisheries based on downward biased Fmsy will give too large pelagic stocks eroding their own food basis.





*Thank you!*