

Effects of red king crab on food-web structure and ecosystem properties

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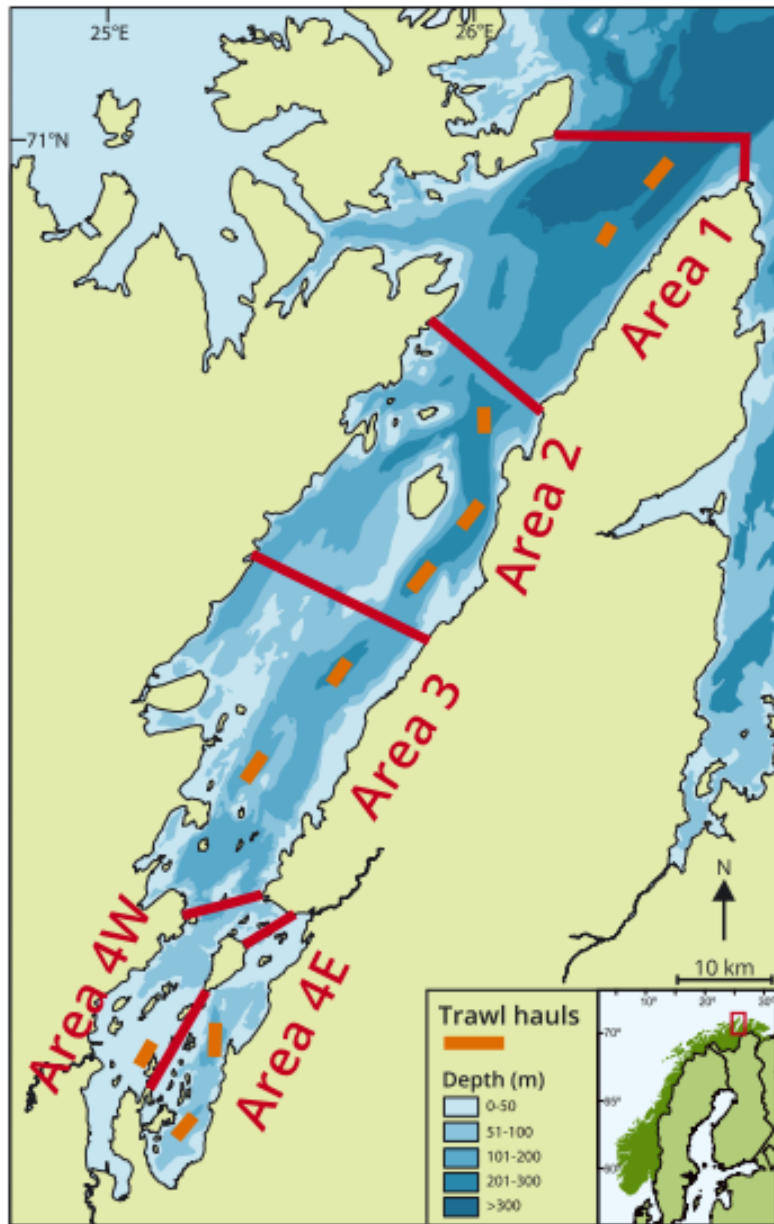


Effects of the invasive red king crab on food web structure and ecosystem properties in an Atlantic fjord

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What are the direct and indirect effects of red king crab?

-part of the EPIGRAPH-program in Porsangerfjorden (2008-2012)



The investigation area in Porsangerfjorden

-invaded during 2004 til 2010

-five sub-areas

-bars show trawl areas

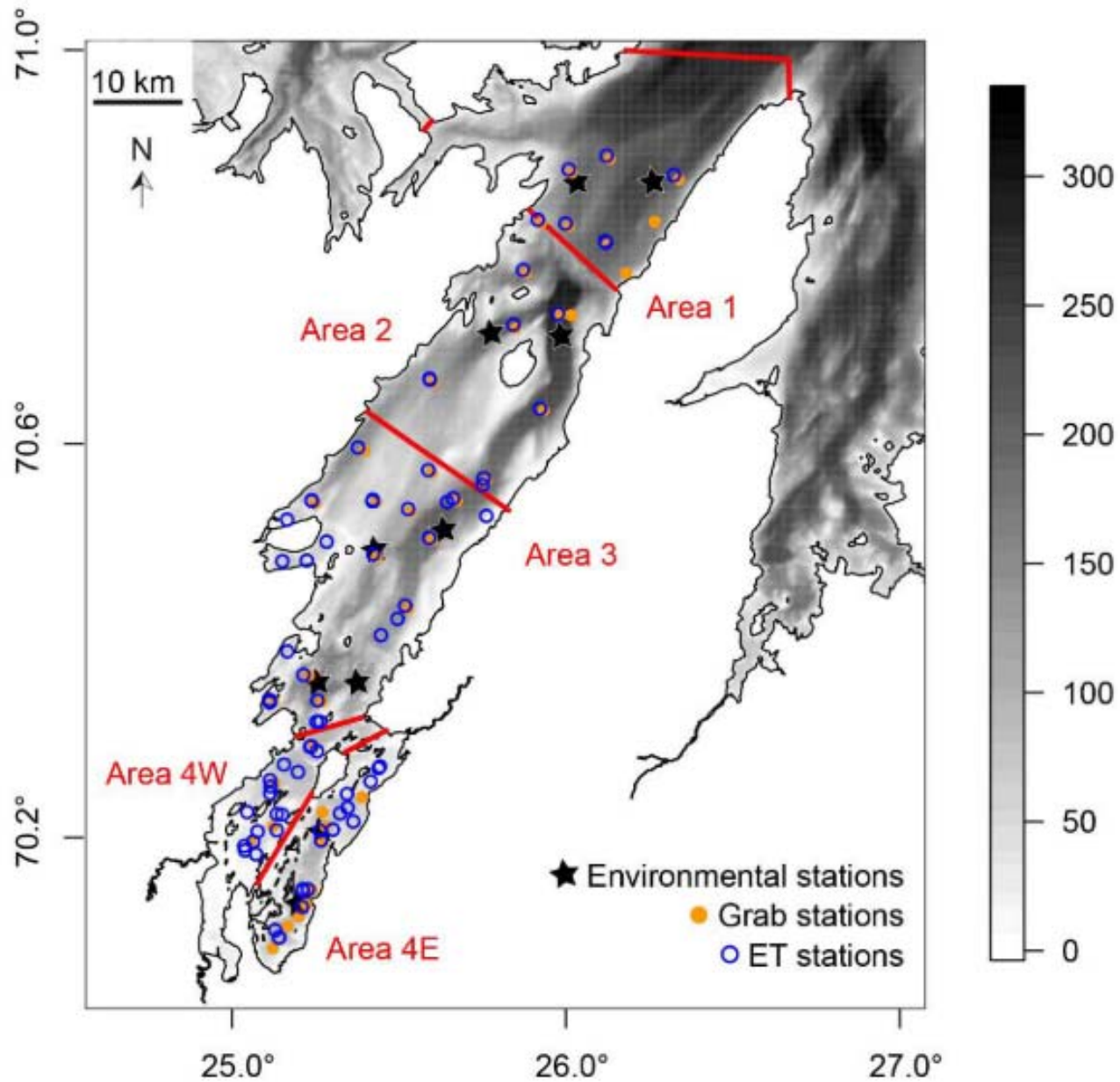
Parametrized five mass-balance food-web models (ECOPATH), one for each sub-area

-needed in-data for the various groups (abundance, weights, diet, mortality rates, catches)

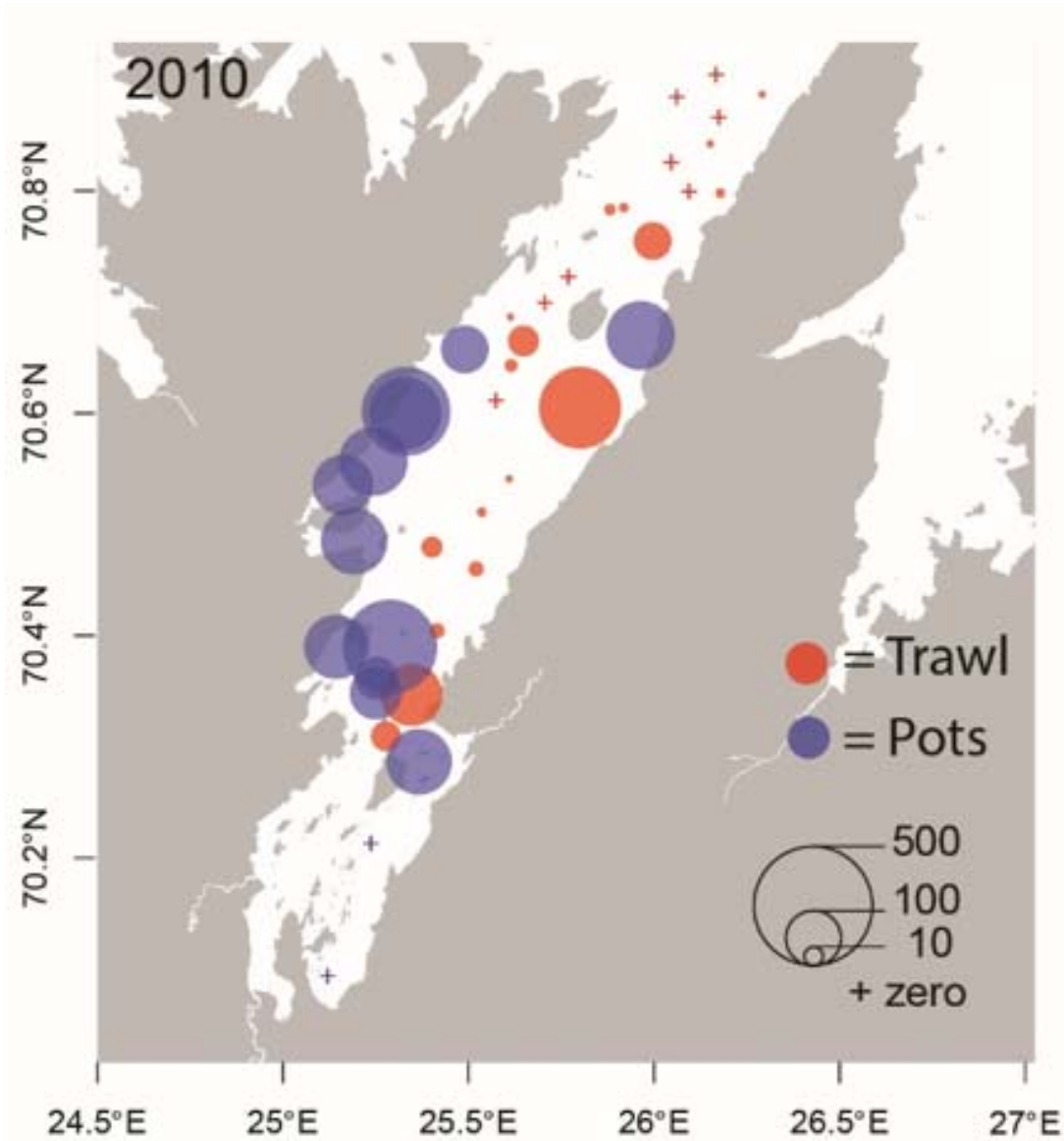
-62 ecological groups

-mass-balance budget, mass-flows in Carbon

Sampling of invertebrate benthos



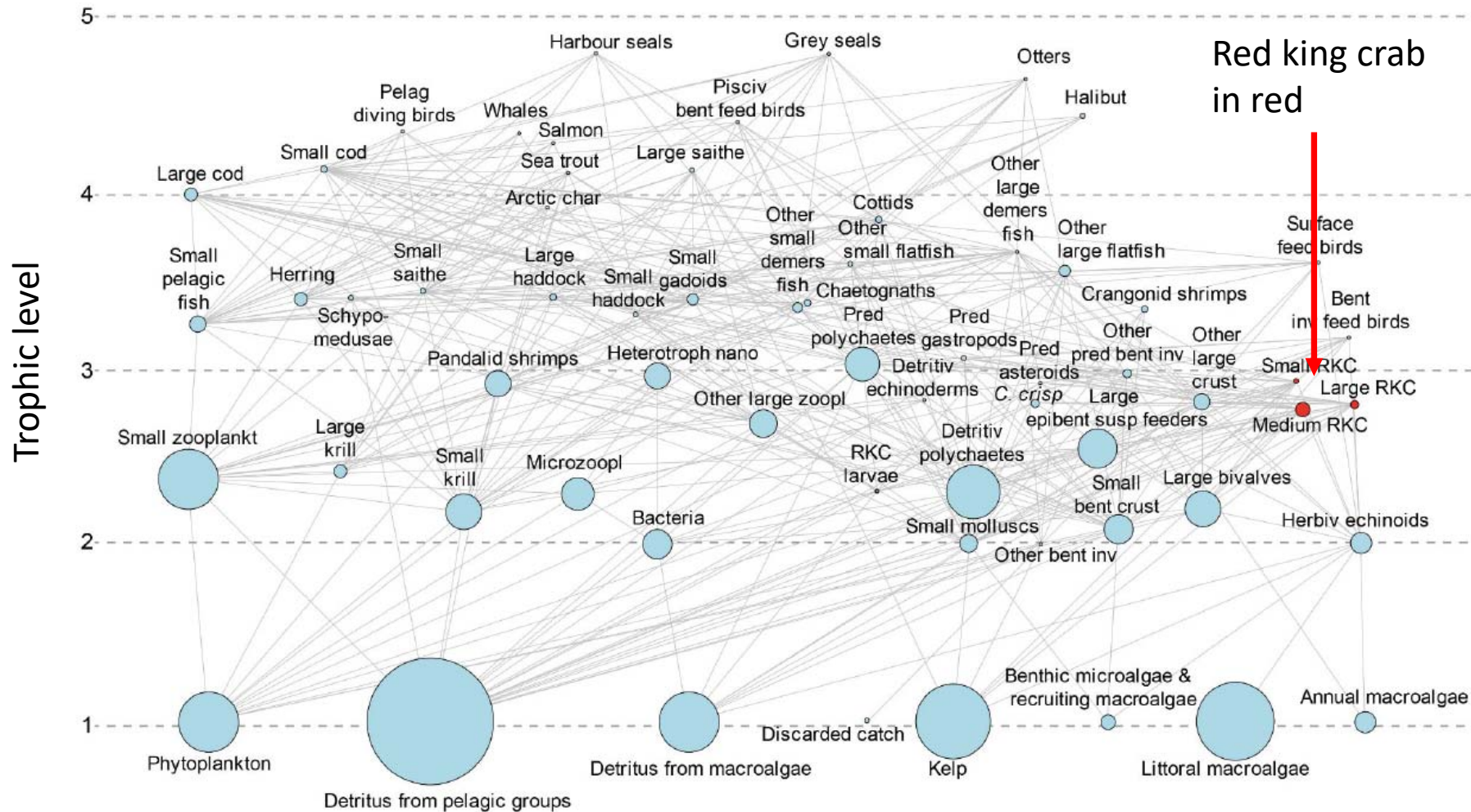
Distribution of red king crab in 2010



From Fuhrmann m. fl. (2015)

Food-web for the mid-part of Porsangerfjorden

Pedersen m. fl. (2018)



Simulated removal of red king crab in ECOSIM

-what happen if the red king crab is removed?

-assume that the changes are opposite of changes during invasion

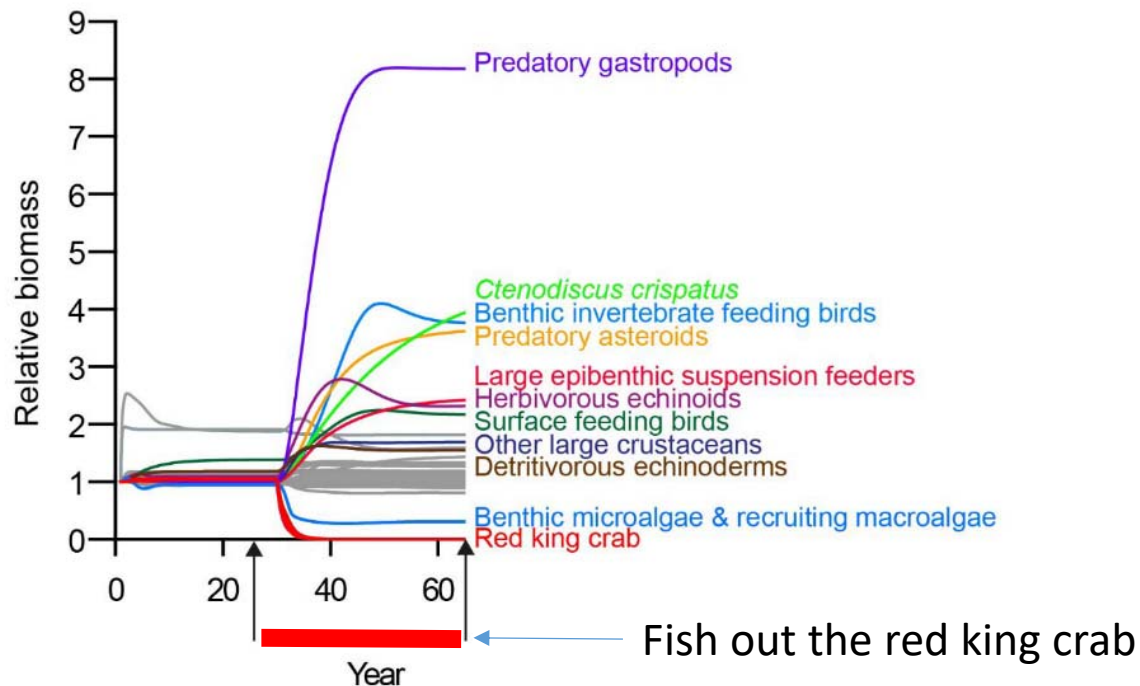
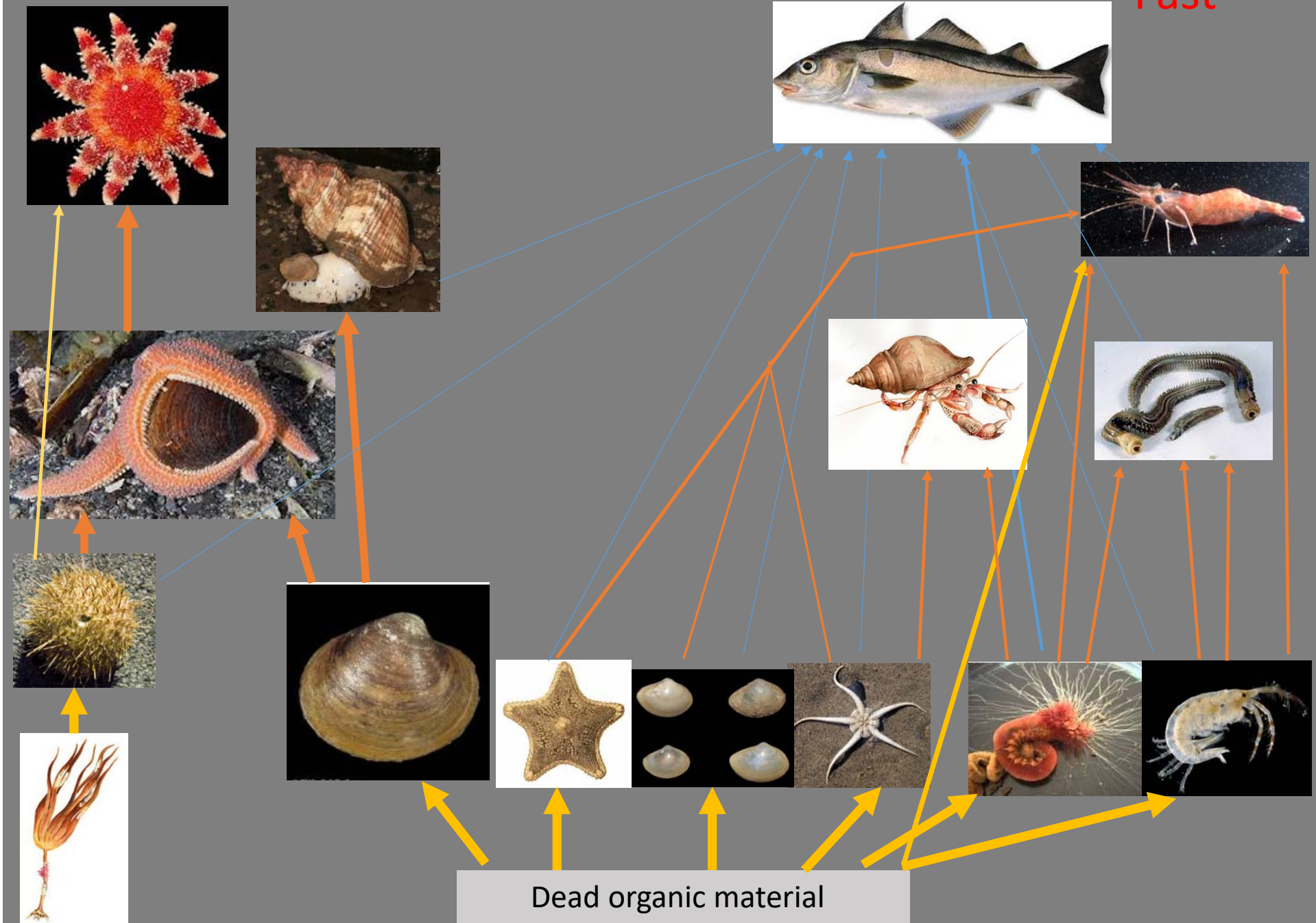


Figure S11. Changes in relative biomass (biomass at time divided by biomass at start, time = 0) of various groups in a crab-removal Ecosim scenario for subarea 3, where red king crab biomass was removed by an intensive fishery during years 30–68. Arrows show when models were “sampled” at years 25 and 65 for comparing Ecopath outputs.

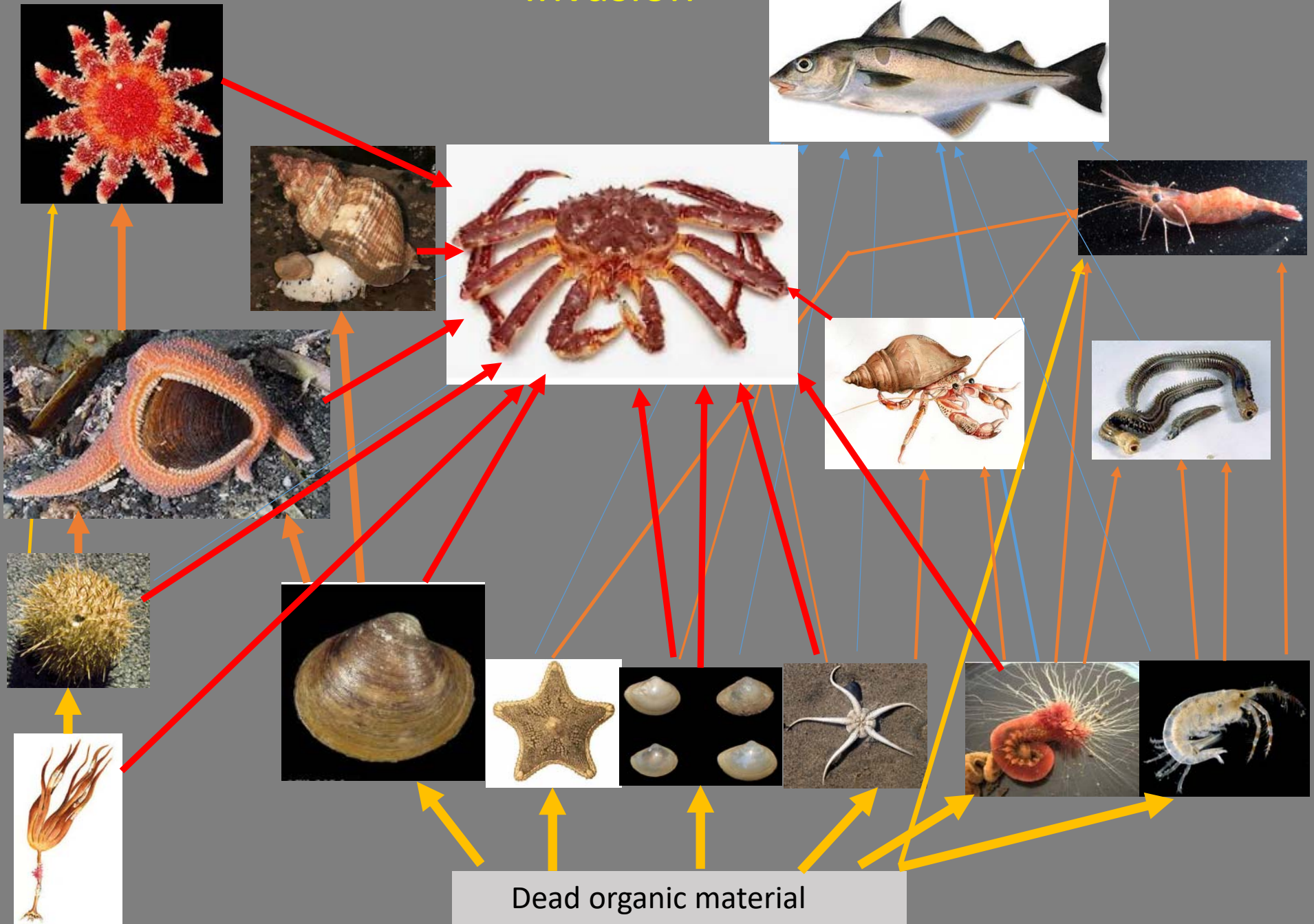
Slow

Before invasion

Fast



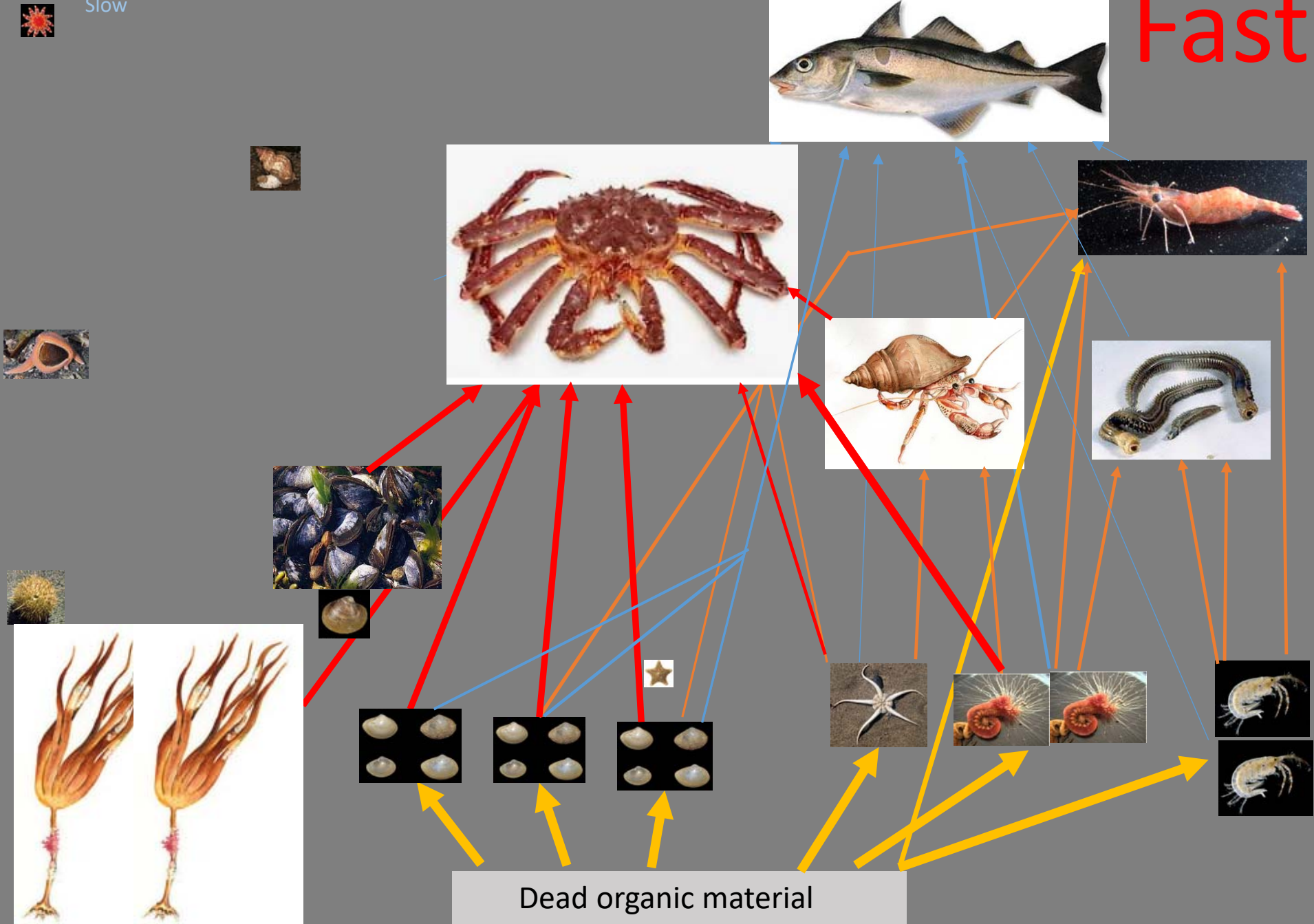
Invasion



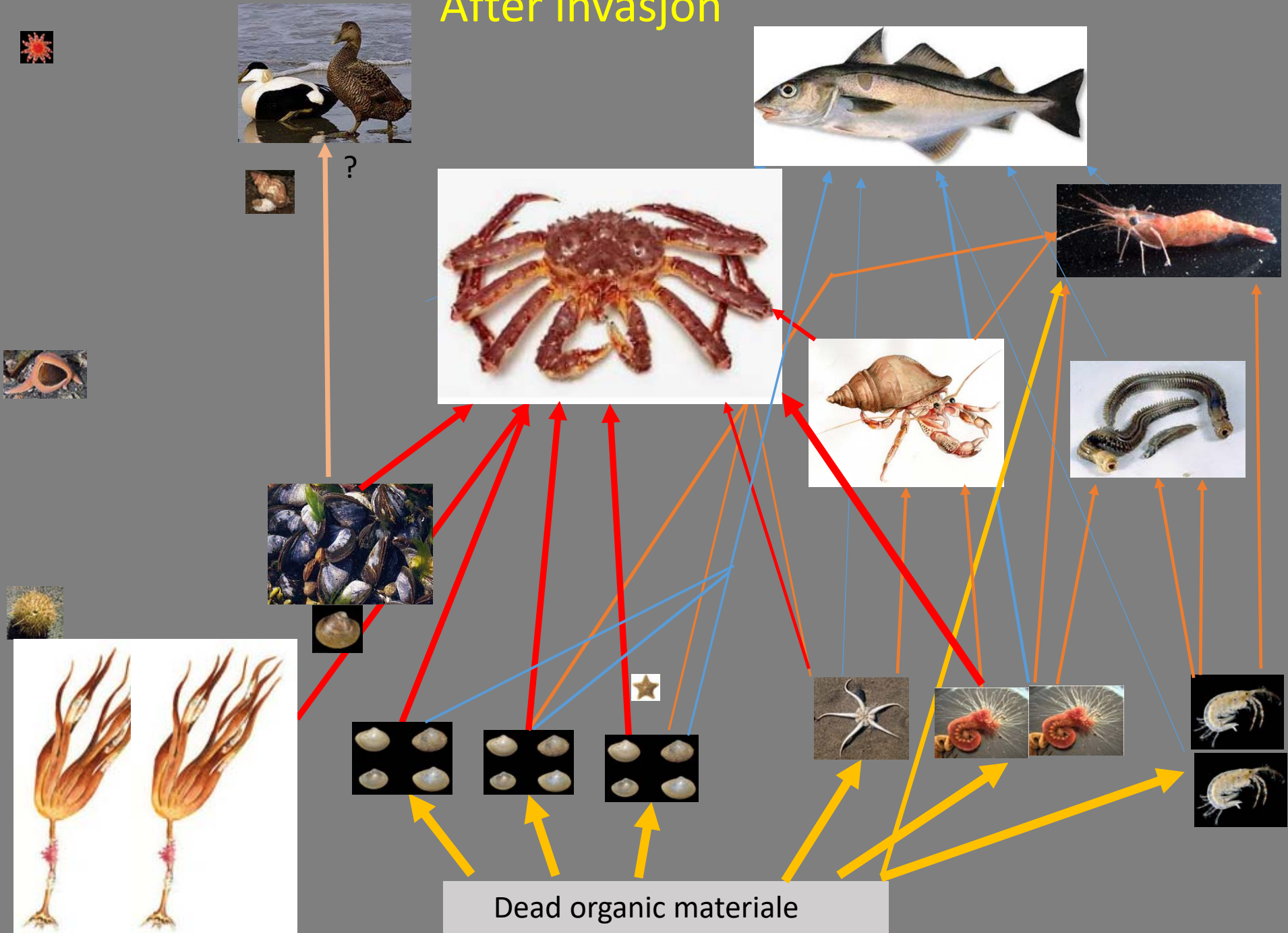
After invasion

Fast

Slow



After invasjon



The red king crab consume and take the place of large long-lived predators (e.g. large asteroids, gastropods) with low mobility

In the mid-fjord with highest abundance of red king crab

Simulated effect of invasion on benthos biomass and production:

Biomass (numbers x individual body mass) decrease by ca. 22%

Production per biomass (P/B) increase by ca. 16%

Production (= biomass x P/B) decrease slightly, ca. 2-11%

Oppsummering

-kan kongekrabbe omdanne og foredle «skitt» som havner på havbunnen til høyverdig godt betalt mat? **Ja**

-vil kongekrabben spise opp bunndyrene og legge bunnen øde? **Nei, men langlevde bunndyr blir sterkt redusert i mengde**

-vil kongekrabbe spise opp fiskeegg og yngel og rasere de andre fiskeriene? **Kongekrabben spiser egg den får lett tak i, men «raserer ikke fiskeriene»**

-hvilke direkte og indirekte effekter har kongekrabben på andre arter i økosystemet? **Den har størst negativ effekt på langlevde byttedyr og de som spiser på dem. Kan ha positiv effekt på gjenvekst av tareskog.**

..., men Atlanterhavet blir aldri som før !

Video stations for macroalgae (H. Steen)

