Overfishing and the replacement of demersal finfish by shellfish: an example from the English Channel

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In 2003-2008 I used a Royal Society Research Fellowship to work with ICES, NEAFC, NWWRAC and the SFF to design protected areas that minimized fisheries displacement.
The demersal gear closures maximize habitat protection and minimize fisheries displacement.
Good progress

• Industry input helped make sensible use of available data in designing seabed recovery zones

• Industry benefits by avoiding being seen to be wilfully damaging the environment at the same time as being engaged with the design of measures to secure long-term profitability
The current study

• 90-year English Channel landings dataset

• Have there been major changes in species landed?
Setting the scene…..

- Pauly et al. (1998): Fishing Down Marine Food Webs
  - mean Trophic Level (mTL) of global fisheries landings declining
  - NW Atlantic  →  cod → shrimps, crabs, lobsters
  - Firth of Clyde  →  finfish → *Nephrops* and scallops
The English Channel
Landings and mTL

A

Total landings (t)

1920 1940 1960 1980 2000

B

mTL

1920 1940 1960 1980 2000

Time (yr)
Catch composition

- miscellaneous demersal fishes
- squids, cuttlefish, octopuses
- miscellaneous aquatic invertebrates
- sharks, rays, chimeras
- flounders, halibuts, soles
- cod, hakes, haddocks

Percentage of landings (%)

Time (yr)

- 1920
- 1930
- 1940
- 1950
- 1960
- 1970
- 1980
- 1990
- 2000
- 2010
**Extirpation** refers to local losses of stocks or subpopulations, it reduces genetic diversity.


Now common skate (plus long-nose skate and white skate) have also be extirpated from the Channel and most of their NE Atlantic range.

These fish are large, grow slowly, mature late, have low fecundity which all increase their vulnerability. They get caught/killed by accident due to their body shape.

Laying eggs on the seabed may contribute to their vulnerability if benthic habitats are damaged.
Elasmobranchs

Small-spotted catshark (*Scyliorhinus canicula*)

Spurdog (*Squalus acanthias*)

Tope (*Galeorhinus galeus*)
Gadoids

Landings now low - Its not that there is decreasing demand for gadoids (the UK imports them to meet demand)

Quotas are set based on landings, and reflect what has been caught
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Percentage of landings (%) vs. Time (yr) from 1920 to 2010.
Invertebrates

A. Edible crab

B. Lobster

C. Scallop

D. Common cuttlefish

Landings (t) vs. Time (yr)
Invertebrates now more prevalent in Channel landings.
VMS shows where heavy gear types are used

West Channel footprint of a) UK scallop dredgers and b) UK beam trawlers >15 m length (Campbell et al. Marine Policy 2014)
Dredges and trawls alter the seabed; scallops are resilient but many long-lived organisms (e.g. maerl) are not
Dredges and trawls alter the seabed; scallops are resilient but many long-lived organisms (e.g. maerl) are not
Conclusions

• mTL decline, one of the fastest observed worldwide

• Invertebrates now more prevalent in landings, scallops are tough animals that survive dredging well. Fish spawning areas can be damaged though.

• Seabed recovery zones may benefit marine life and the fisheries that depend on it.
Evidence base


Many other papers, email jhall-spencer@plymouth.ac.uk for pdfs.
There used to be more big, high trophic level fish