Fisheries Innovation Scotland: contract FIS013

Scoping the background information for an ecosystem approach to fisheries in Scottish waters: Review of predator-prey interactions with fisheries, and balanced harvesting

Project leader: Michael Heath (University of Strathclyde)

Workshop leaders: Richard Law (University of York), Kate Searle (Centre for Ecology and Hydrology)

University of Strathclyde	Robin Cook, Michael Heath, Douglas Speirs
Centre for Ecology and Hydrology, Edinburgh	Francis Daunt, Kate Searle, Sarah Wanless
Centre for Environment Fisheries and Aquaculture Science, Lowestoft	Kieran Hyder, John Pinnegar, Robert Thorpe
Edinburgh Napier University	Karen Diele
Marine Scotland Science	Neil Campbell, Peter Wright, James Thorburn
MRAG Ltd, London	Robert Arthur
North Atlantic Fisheries College	Paul Macdonald, Beth Mouat
Scottish Association for Marine Science	Clive Fox, Sheila Heymans
Scottish Fishermen's Federation	Ken Coull
Seawatch Foundation, Anglesey	Peter Evans
University of Aberdeen	Paul Fernandes
University of St Andrews	Phil Hammond, Sophie Smout
University of York	Richard Law

University of Bergen	Jeppe Kolding
Institute of Marine Research, Galway	David Reid

Supporting projects

The project was conceived though discussions in the **Marine Science and Technology Scotland (MASTS) Fisheries Forum**.

Input was also provided from the **NERC Marine Ecosystems Research Programme (MERP)**

Marine Alliance for
Science and Technology for Scotland

Objectives of the project

To provide FIS with background information relevant to implementation of an ecosystem approach to fisheries by:

a) Producing an inventory of information on marine predators and prey that are affected by Scottish fisheries and,

b) Reviewing the practicalities of implementing a “balanced harvesting“ scheme in Scottish fisheries as a more eco-friendly alternative to current harvesting patterns.

White Paper on Post-Brexit Fisheries

Department
for Environment
Food & Rural Affairs

Sustainable fisheries
for future generations

Presented to Parliament
by the Secretary of State for Environment, Food and Rural Affairs
by Command of Her Majesty

July 2018

"As set out in the 25 Year Environment Plan, we will pursue an ecosystem approach to fisheries management that aims for more sustainable management and accounts for, and seeks to minimise, impacts on non-commercial species and the marine environment generally"

What is the motivation for an ‘ecosystem approach to fisheries’?

- Marine ecosystems are inevitably affected by fishing because this involves the removal of a portion of the natural production to meet the human need for food.

- Up to now, fisheries management has focussed on regulating harvesting to secure the long-term sustainability of targeted fish stocks, but has largely closed its eyes to the interactions with the rest of the ecosystem.

- In many cases these interactions have undermined the productivity of targeted fish stocks and compromised other qualities and services provided by the ecosystem that human societies also value.

- Recognition of these impacts has led to calls for urgent corrective action.

What is the motivation for an 'ecosystem approach to fisheries'?

- An ecosystem approach is not "anti-fishing"
- It's about securing the life-support system which maintains productive and economically viable fisheries – and a range of other services from the ecosystem

Characteristics of the ecosystem approach (defined by the Convention on Biological Diversity, Malawi Principles, 1998)

1	**Management objectives are a matter of societal choice.**
2	Management should be decentralized to the lowest appropriate level.
3	Ecosystem managers should consider the effects of their activities on adjacent and other ecosystems.
4	Recognizing potential gains from management there is a need to understand the ecosystem in an economic context.
5	**A key feature of the ecosystem approach includes conservation of ecosystem structure and functioning.**
6	Ecosystems must be managed within the limits to their functioning.
7	The ecosystem approach should be undertaken at the appropriate scale.
8	Recognizing the varying temporal scales and lag effects which characterize ecosystem processes, objectives for ecosystem management should be set for the long term.
9	Management must recognize that change is inevitable.
10	**The ecosystem approach should seek the appropriate balance between conservation and use of biodiversity.**
11	The ecosystem approach should consider all forms of relevant information, including scientific and indigenous and local knowledge, innovations and practices.
12	**The ecosystem approach should involve all relevant sectors of society and scientific disciplines.**

Progress on implementing an ecosystem approach

- Implementation of a marine ecosystem approach in Scotland, and in the UK in general, has become entwined with conservation legislation and marine spatial planning.

- The principal mechanism for regulating fisheries so as to ostensibly meet ecosystem objectives has been the establishment of Marine Protected Areas (MPAs).

- However, this falls well short of the wider goals of an ecosystem approach as defined by FAO and international agreements.

- It is not axiomatically the case that by protecting a proportion of representative seabed habitats and sensitive species from the physical impacts of certain fishing gears, that the ecosystem will be harvested in a more balanced way and that the underlying productivity and functions will be protected.

Report findings: Predator-prey interactions

The report identifies:

a) the main predators and prey for each of the key fish stocks for Scotland,
b) how they are directly and indirectly affected by fisheries in Scotland, and,
c) the priority research areas to improve the evidence base on these interactions.

- At current population levels, top-predators are generally unlikely to be capable of depleting fishery resources – with a few clear exceptions – e.g. **grey seals on the west coast of Scotland, which are having a significant impact on cod stocks**.

- There are uncertainties regarding the impact of fisheries on predators, but **black-legged kittiwake are judged to be particularly vulnerable to depletion of their food sources by fisheries**.

Report findings: Balanced Harvesting

The report:

- Explains and reviews what ‘balanced harvesting’ means

  The intention of Balanced Harvesting (BH) is to bring fishing mortality on different components of the food web in line with their productivity.

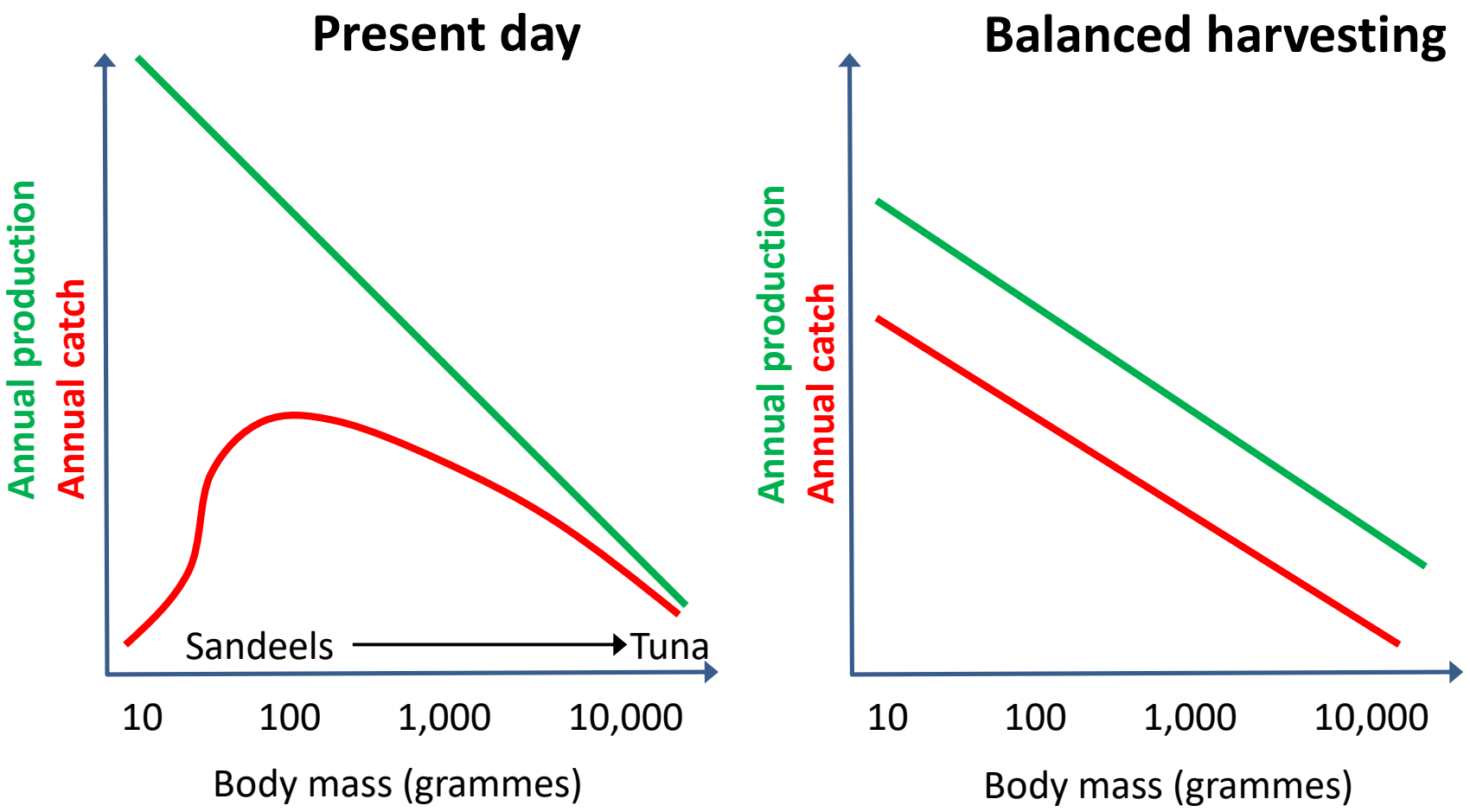
  Setting fishing mortality in proportion to the production rates protects food web components that are rare, and allows more exploitation of those that are abundant.

- Examines the extent to which harvesting of the West of Scotland ecosystem is balanced (*it’s not*)

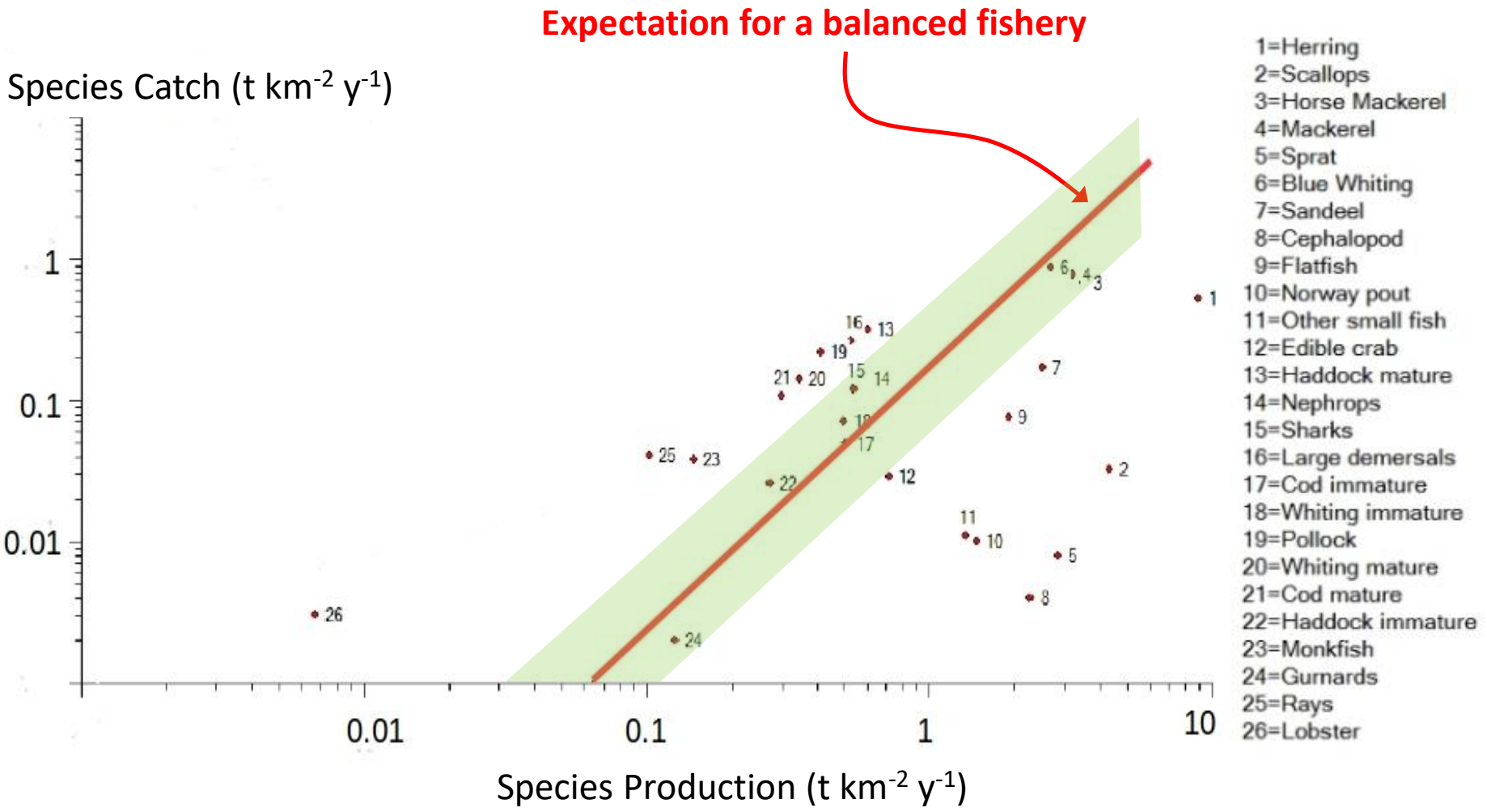
- Reviews the practicalities of moving towards more balanced harvesting

- Identifiers data and research that would be needed to support implementation of balanced harvesting

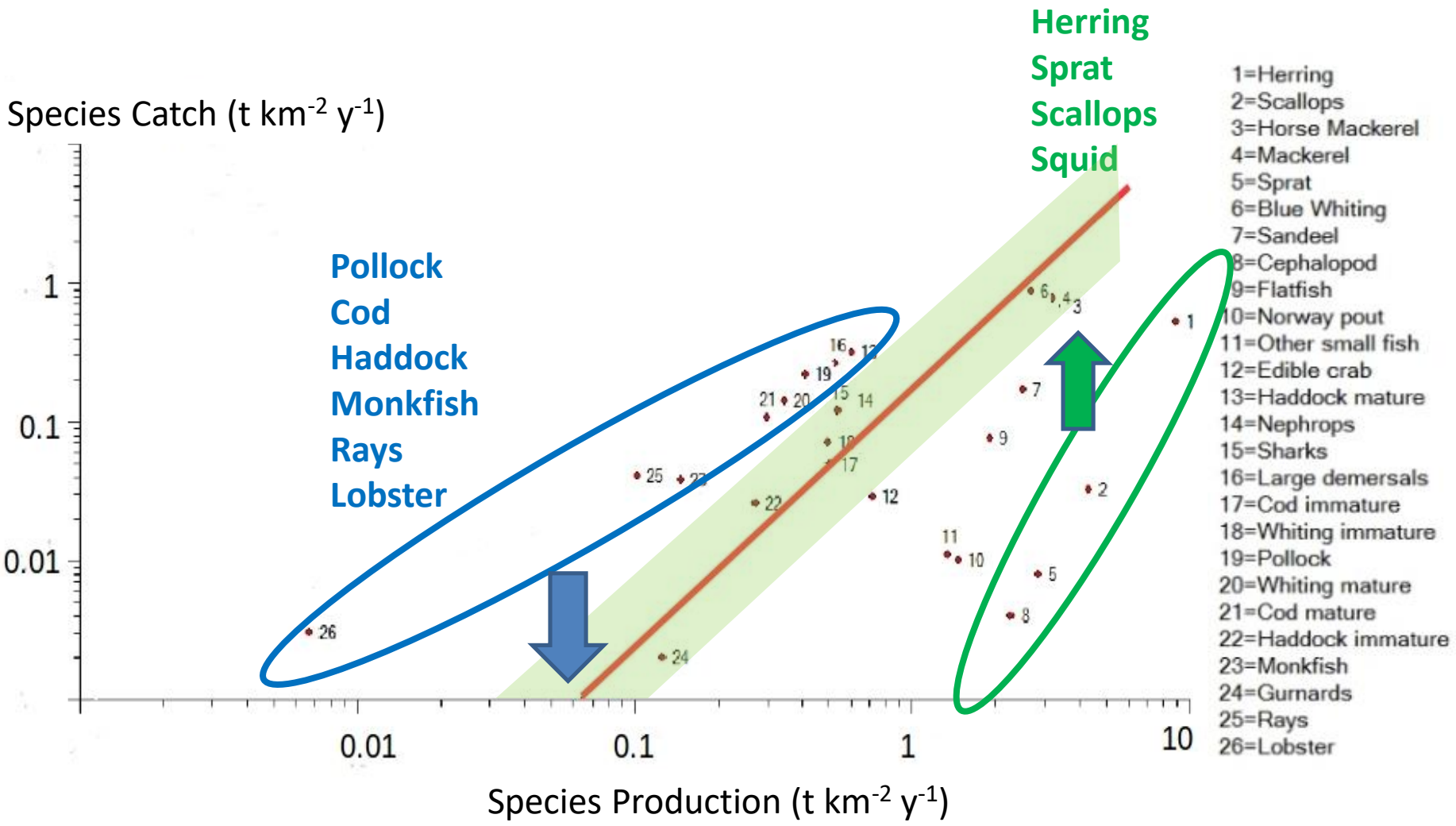
Schematic of what we mean by balanced harvesting



How balanced is the West of Scotland fishery?



What would have to change to achieve balance?



Implementation of Balanced Harvesting

- Moving towards BH would require a reduction in fishing on large, low productivity species that are currently heavily exploited.
- On the other hand, there could be increased fishing on small species with high production rates. This could include species further down the food chain that are exploited little, if at all, at the present time.
- Many societal challenges would need to be addressed regarding the consequences for the fishing sector, the supply chain, markets, prices, processing and consumer preferences, the ecosystem, local economies, and national economies.
- BH would need to be reconciled with current regulations and management objectives, e.g. in the context of landing obligation, landing fish that would previously have been discarded is not necessarily detrimental from the perspective of BH: the aim would be to land, and sell, all fish that are caught.

Implementation of Balanced Harvesting

- Management target would be to move fishing mortalities gradually in directions that would improve the balance in the ecosystem.

- This would require new management methods. Métier-based management is suggested as a possible approach, with a strong industry responsibility, much greater flexibility from managers and fishers, and a results-based, multi-year approach to targets and objectives.

A métier is defined as a combination of the vessel/gear configuration and the species mixture captured.

To conclude…

- Our report explains what is meant by an ecosystem approach to fisheries management.
- We have compiled an inventory of what is known about the predators and prey of species targeted by Scottish fisheries.
- We have explained the principles behind Balanced Harvesting, assessed the extent to which the West of Scotland fishery is balanced, and reviewed the issues around implementation.
- The report is timely because both the UK and Scottish Governments have stated that they wish to explore new approaches to managing fisheries as the UK leaves the CFP, including an ecosystem approach.
- Establishment of Marine Protected Areas does not in itself constitute an ecosystem approach