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Addressing Data Deficient Fisheries
Wednesday 3 February
09.00 – 10.15

Wignacourt

Seafood Summit, Malta

Options and challenges for assessment and management of data-deficient fisheries

Simon Jennings
Centre for Environment, Fisheries and Aquaculture Science
United Kingdom

SeaWeb Seafood Summit “Addressing Data-Deficient Fisheries” 3 Feb 2016

Questions for managers, industry and society

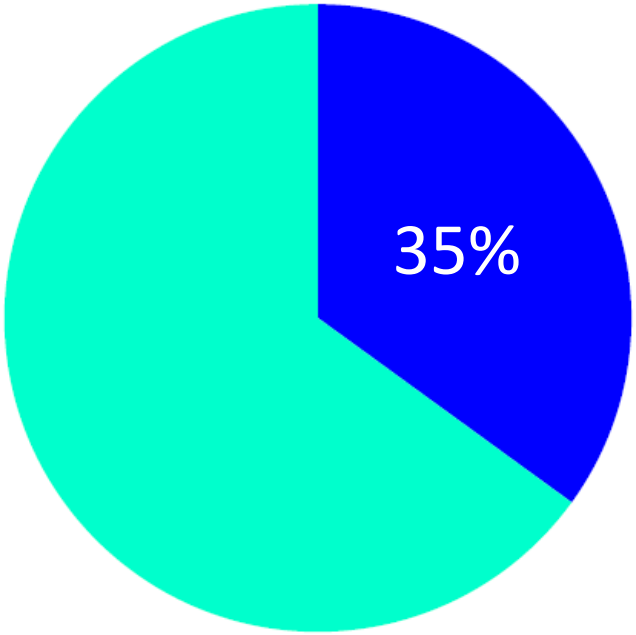
- What is the current state of the stock?
- How does this relate to where we want to be?
- How do we get there and what can be caught?

Risks when data-deficient

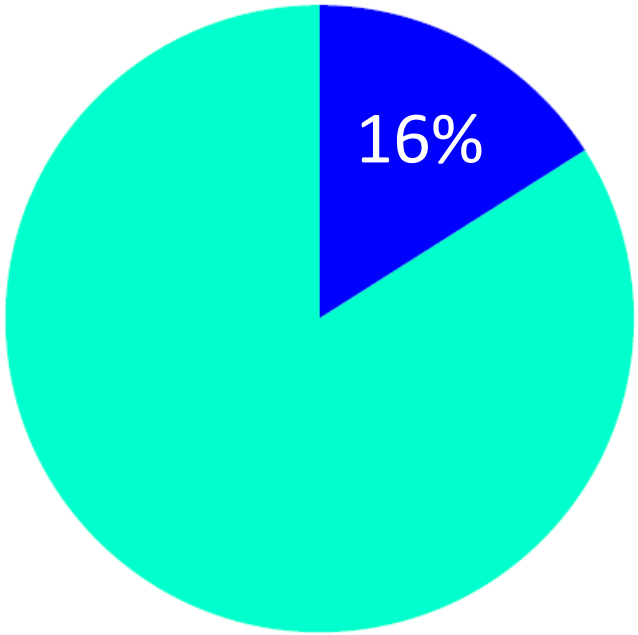
- Overfishing
- Underfishing (excessive precaution)
- No access to certification
- No evidence base for society

Knowledge of status of global stocks

Landings of assessed species as a proportion of total landings



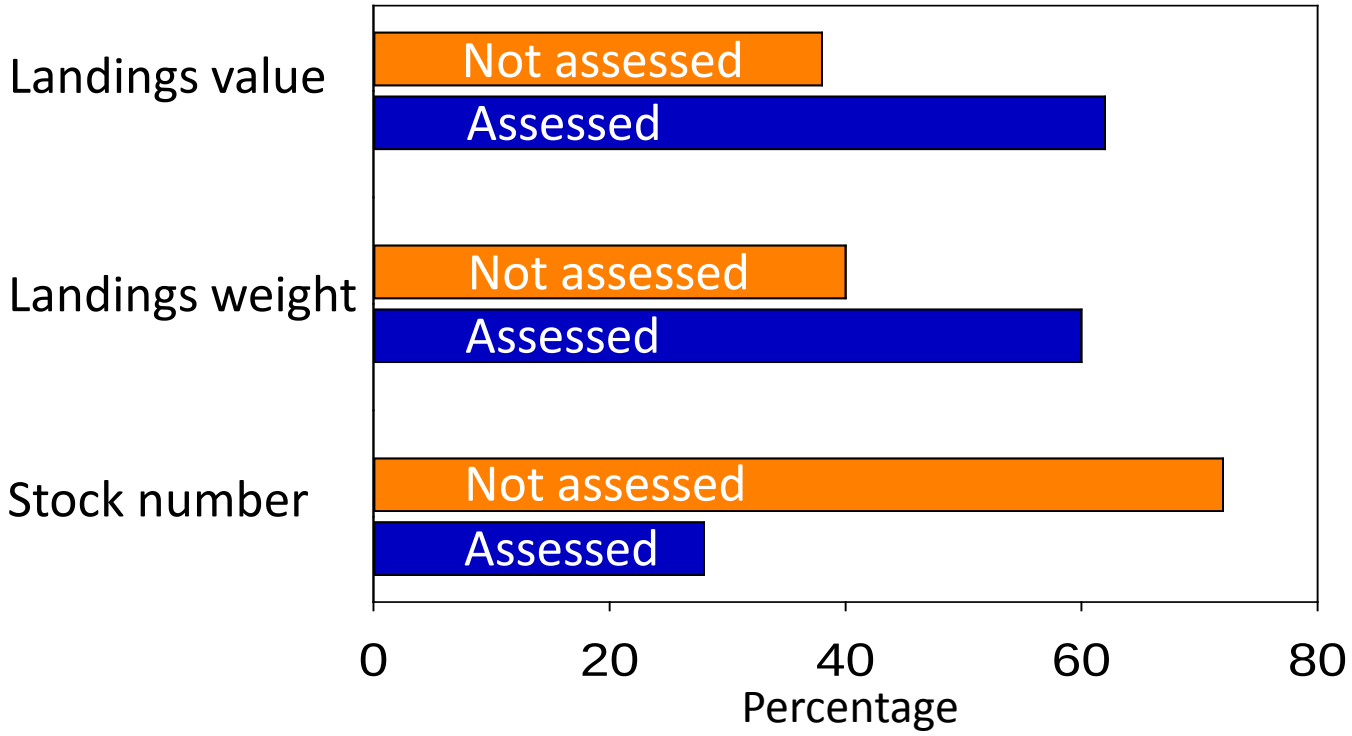
Numbers of assessed species as proportion of species recorded in catches

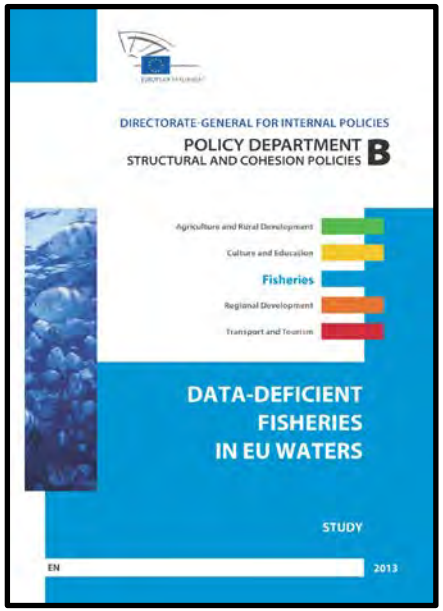


Sources: Hilborn & Ovando (2014) .... and Ricard et al (2012)

Knowledge of status of European stocks

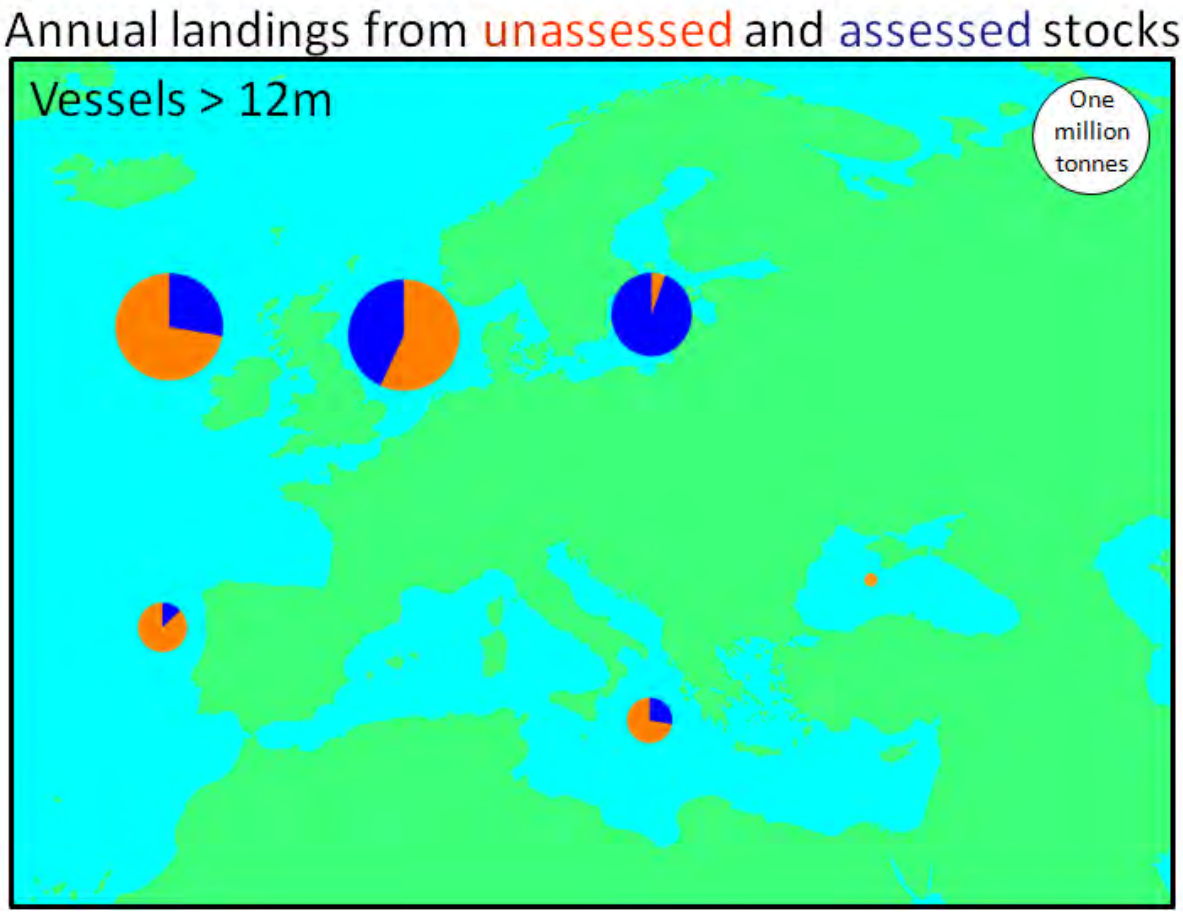
(For which Total Allowable Catches are set)





Source: Le Quesne et al (2013)

Knowledge of status of European stocks



Source: estimates from analysis of Le Quesne et al (2013)

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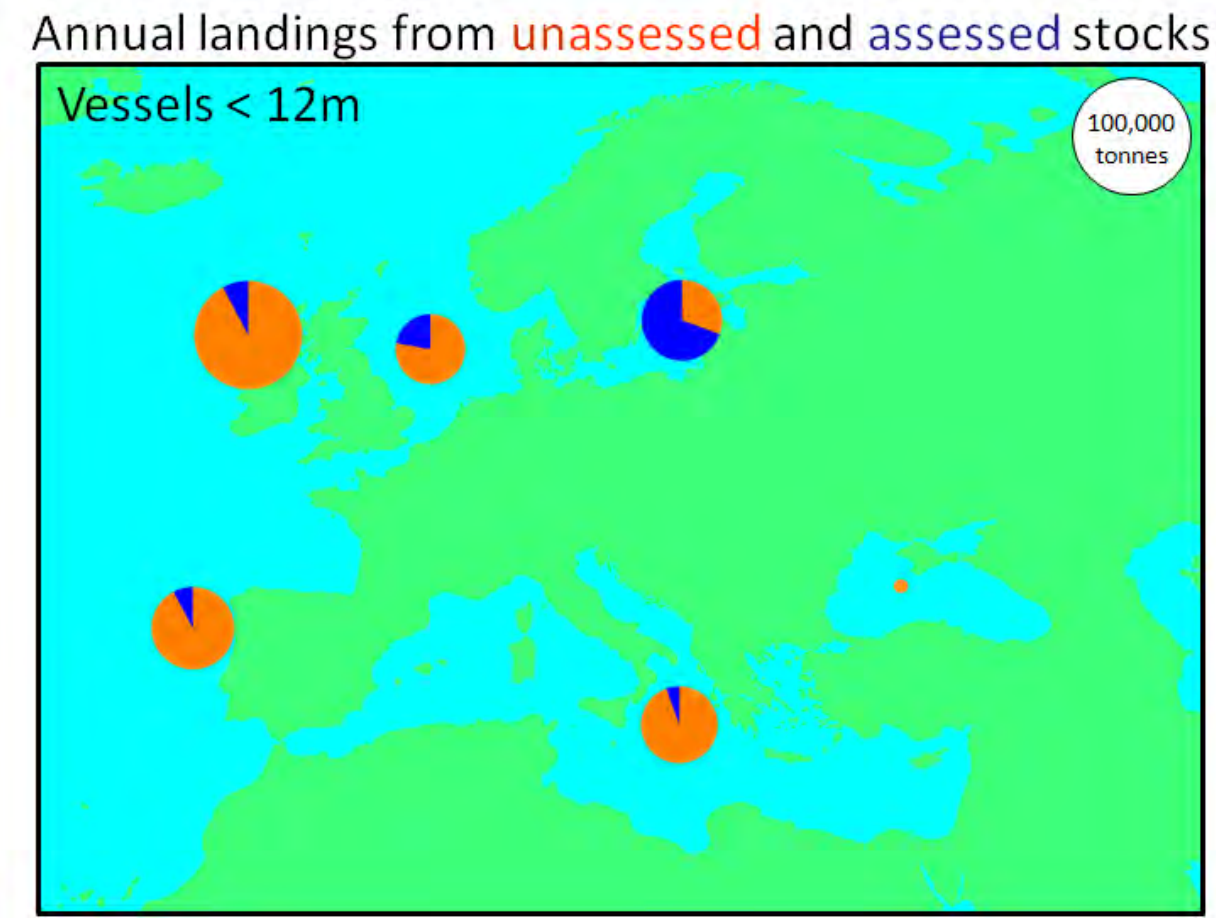

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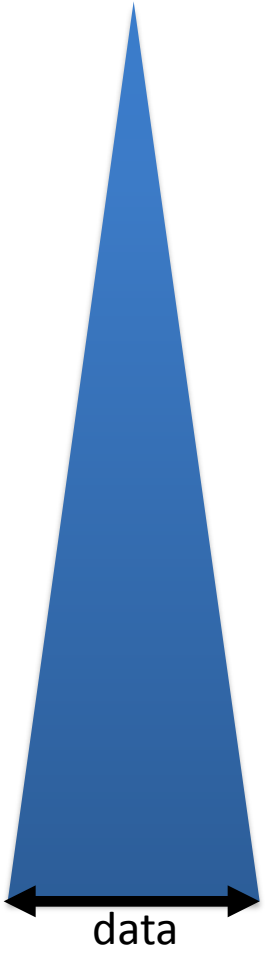
ICES approach to fisheries advice



Category 6: Stocks with negligible landings data and taken in minor amounts as bycatch

Category 5: Stocks with landings data only

Category 4: Stocks with reliable catch data allowing MSY to be approximated

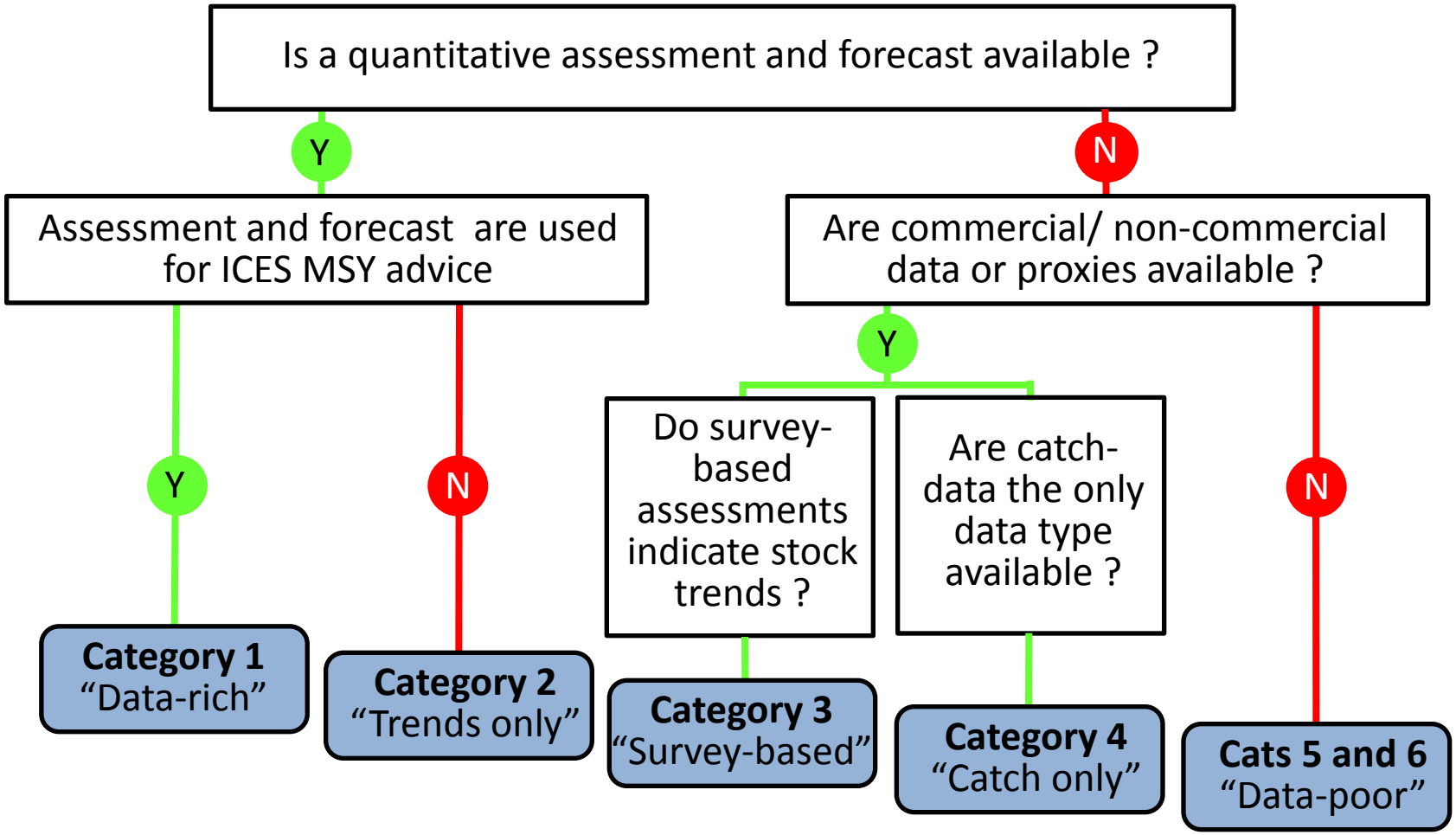
Category 3: Status from fishery-dependent and fishery-independent indices which reliably show stock properties

Category 2: Analytical assessment and forecast available but to be treated qualitatively

Category 1: Quantitative assessments with stock status and forecasts of status

Source: Based on ICES (2012)

ICES approach to advice on data-limited stocks



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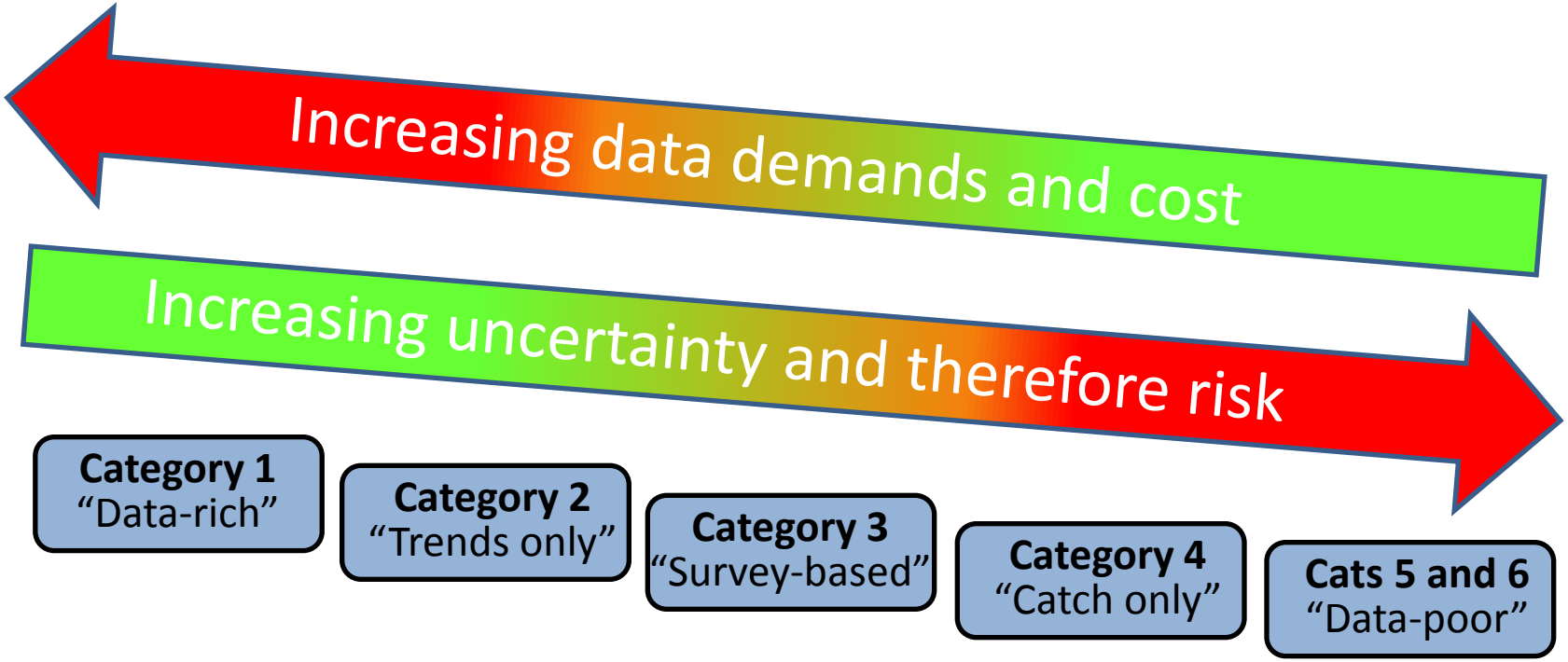
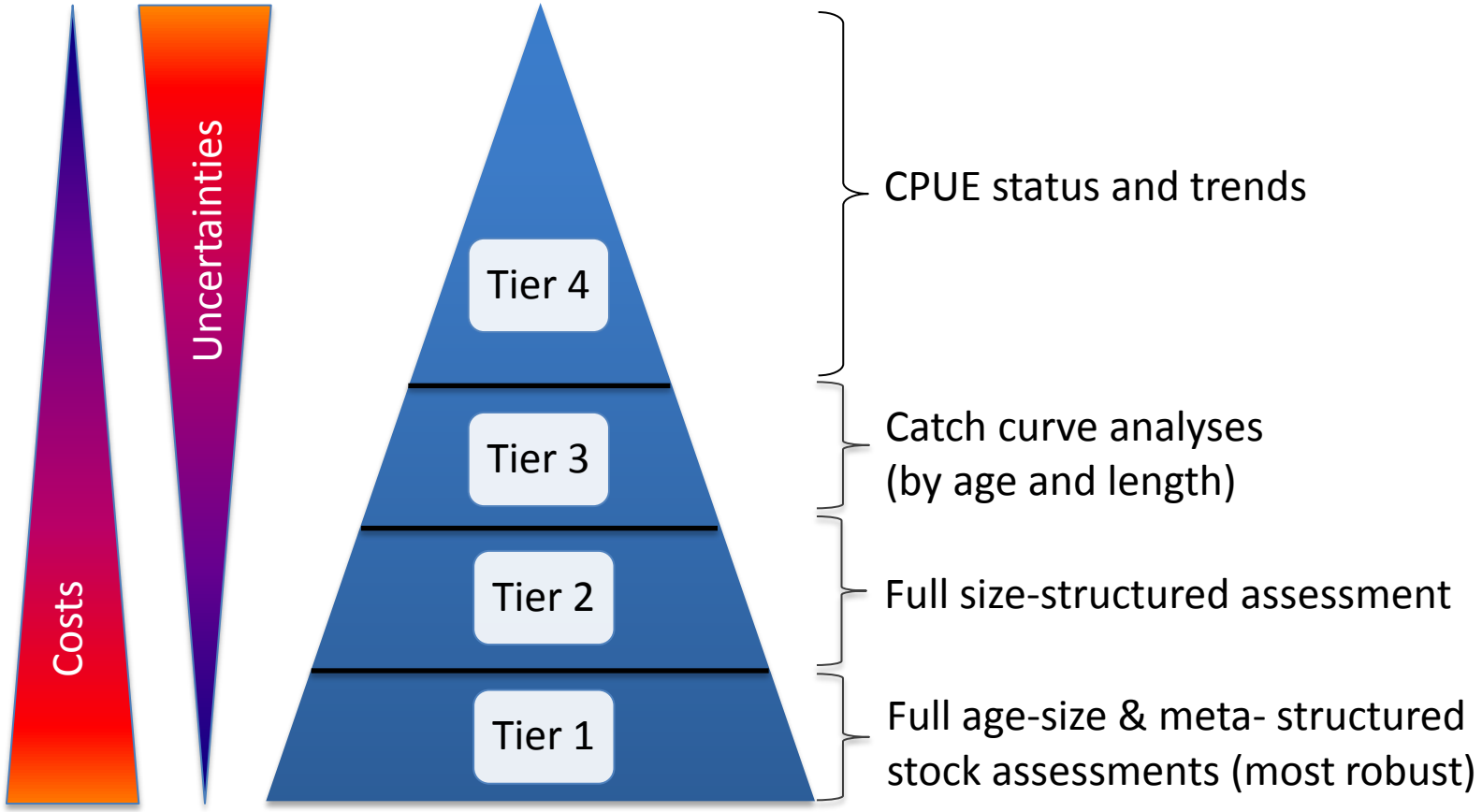


Source: Based on ICES (2012)

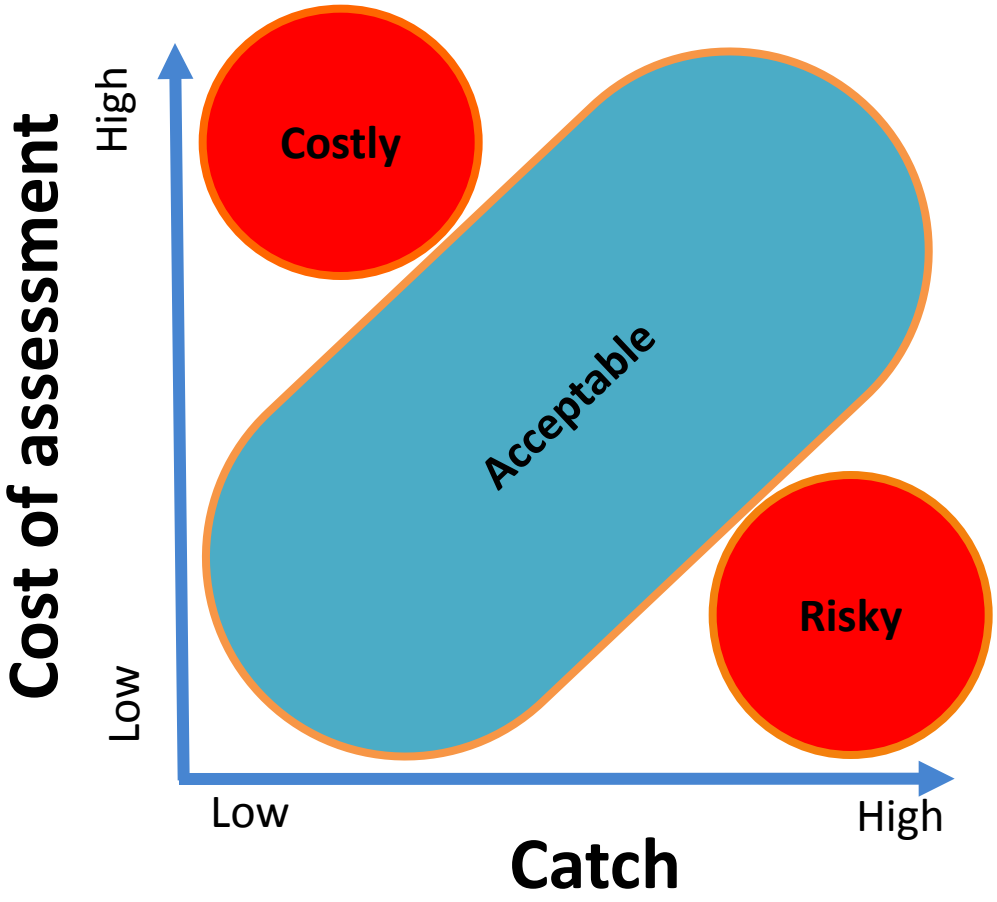
Other tiered approaches e.g. Australia



- Explicit reduction in TAC as Tier level increases (more precautionary)
- Stocks can move between Tiers

Source: David Smith, Dichmont et al 2015

Tradeoffs between costs and catch



Source: After Sainsbury (2005)

Initiatives to develop and test methods

- Workshops on the development of quantitative assessment methods based on life-history traits, exploitation characteristics and other key parameters for data-limited stocks (ICES, WKLIFE)

- Assessment for All (a4a) projects: Joint Research Centre, EC

- Many other projects nationally and internationally

See examples in: ICES WKLIFE & related reports, Jardim et al 2014 and recent special issues of Fisheries Research and ICES Journal of Marine Science

Remaining challenges

- To increase focus on testing the performance of methods proposed for the assessment of data deficient fisheries (not a shortage of methods so much as a shortage of rigorous tests)
- To improve knowledge of the precautionary buffers needed to provide risk equivalence: to allow cost-benefit analysis before deciding on the need for more or less data (e.g. Dichmont et al.)
- To further assess when harvest control rules can replace annual assessment and help spread resources (Geromont & Butterworth)
- To increase emphasis on methods relevant to management systems based on effort control and technical measures (e.g. inshore and for shellfish)
- To understand and take account of effects of average assumptions on the performance of data-poor assessment methods

Much more in: ICES WKLIFE reports, Dichmont et al 2015, Fish. Res. spec issue

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Project Inshore

Dr Tom Pickerell, Technical Director
@drpickerell

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- The UK Seafood Industry Authority
- A Non-Departmental Public Body
- Funded by a levy on first sale of Seafood (domestic & imports; not diadromous)
- Report to all 4 UK Fisheries Ministers

"There's a way to do it better - find it."

THOMAS EDISON

The Issue


UK/EU fishery surveys focuses on quota species
Many quota fisheries >6nm
Limited strategic stock assessments within <6nm
Most vessels <6nm are <10m
<10m vessels make up 75% of fleet but receive 4% quota
Many <10m vessels fish for unassessed stocks
Supply chain pressured to source from responsible stocks

The Challenge

- Determine a effective & efficient ($$) method of assessing data-poor stocks
- Provide a means for these fisheries to demonstrate ‘responsibility’:
- Promote to supply chain

Project Inshore

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MSC
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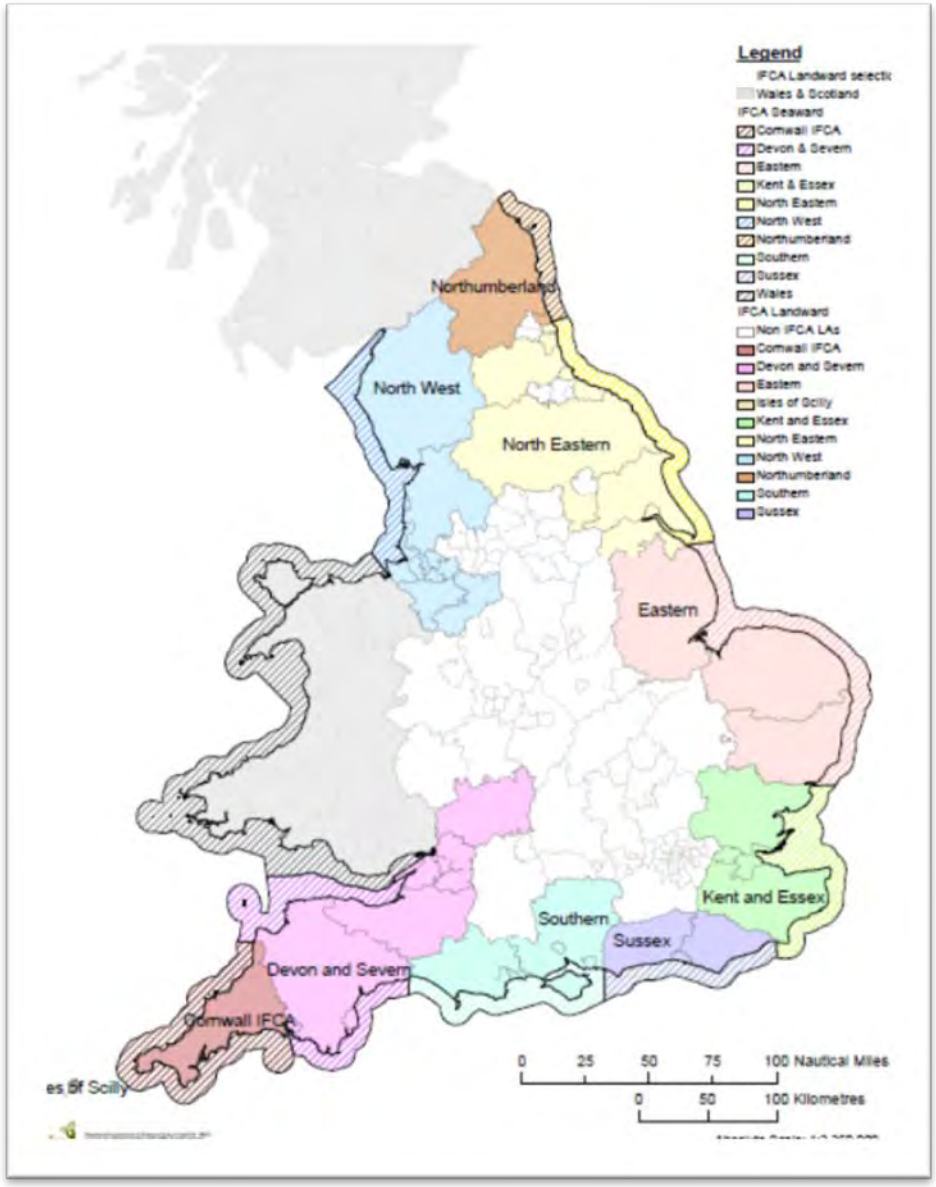
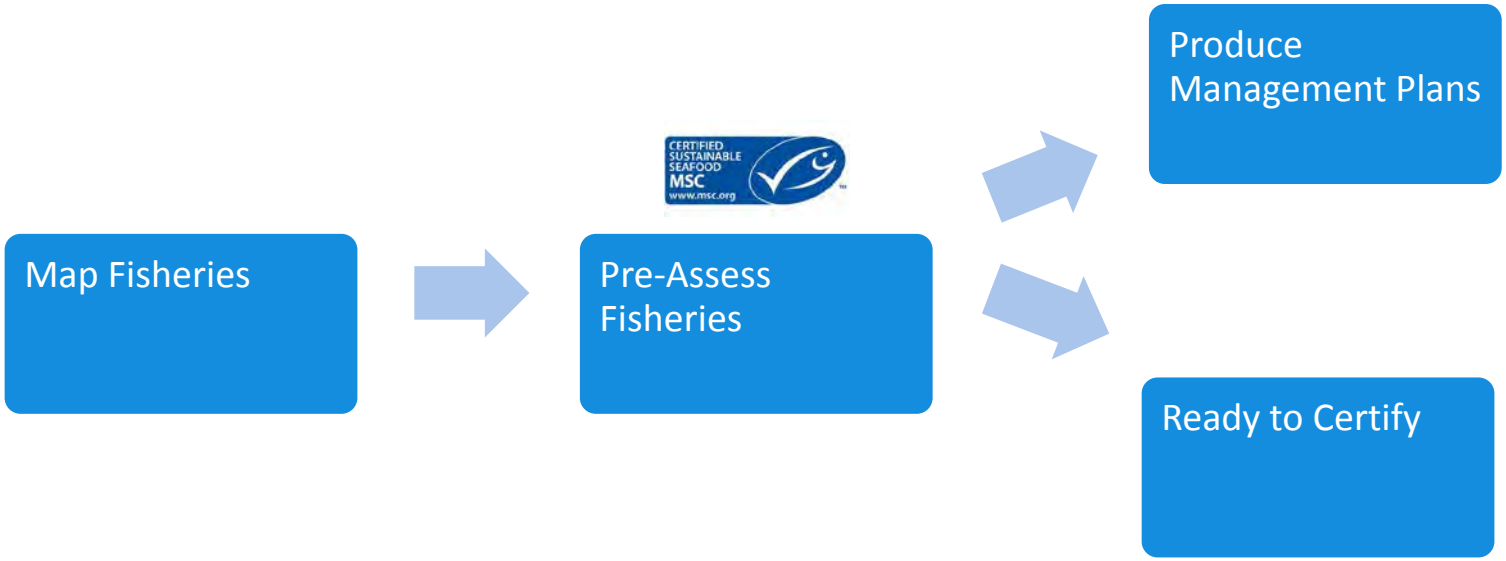
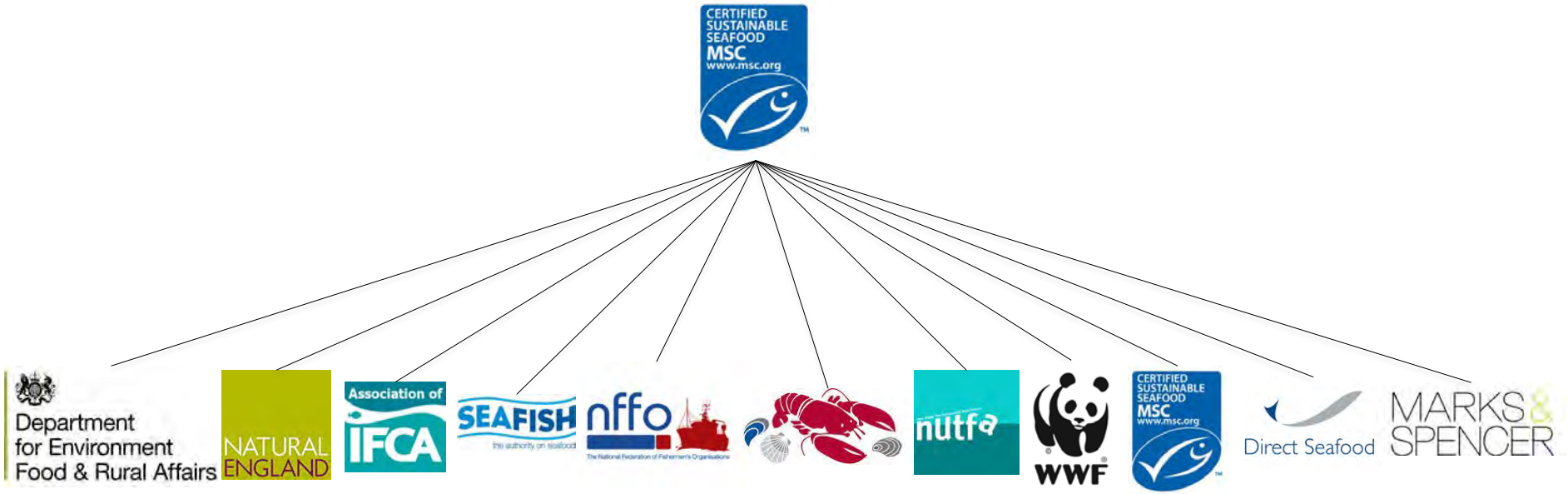
Shellfish Association of Great Britain



The Plan


Map Fisheries
Pre-Assess Fisheries
Produce Management Plans
Ready to Certify

Project Governance



Regulator Advisor Manager NDPD Industry NGO Supply Chain

Project Partners

Direct Seafoods

M&S
EST. 1884

seafood choices ALLIANCE produits de la mer

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Sainsbury's

Shellfish Association of Great Britain

EUROPEAN FISHERIES FUND
INVESTMENT IN
SUSTAINABLE FISHERIES

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MSC
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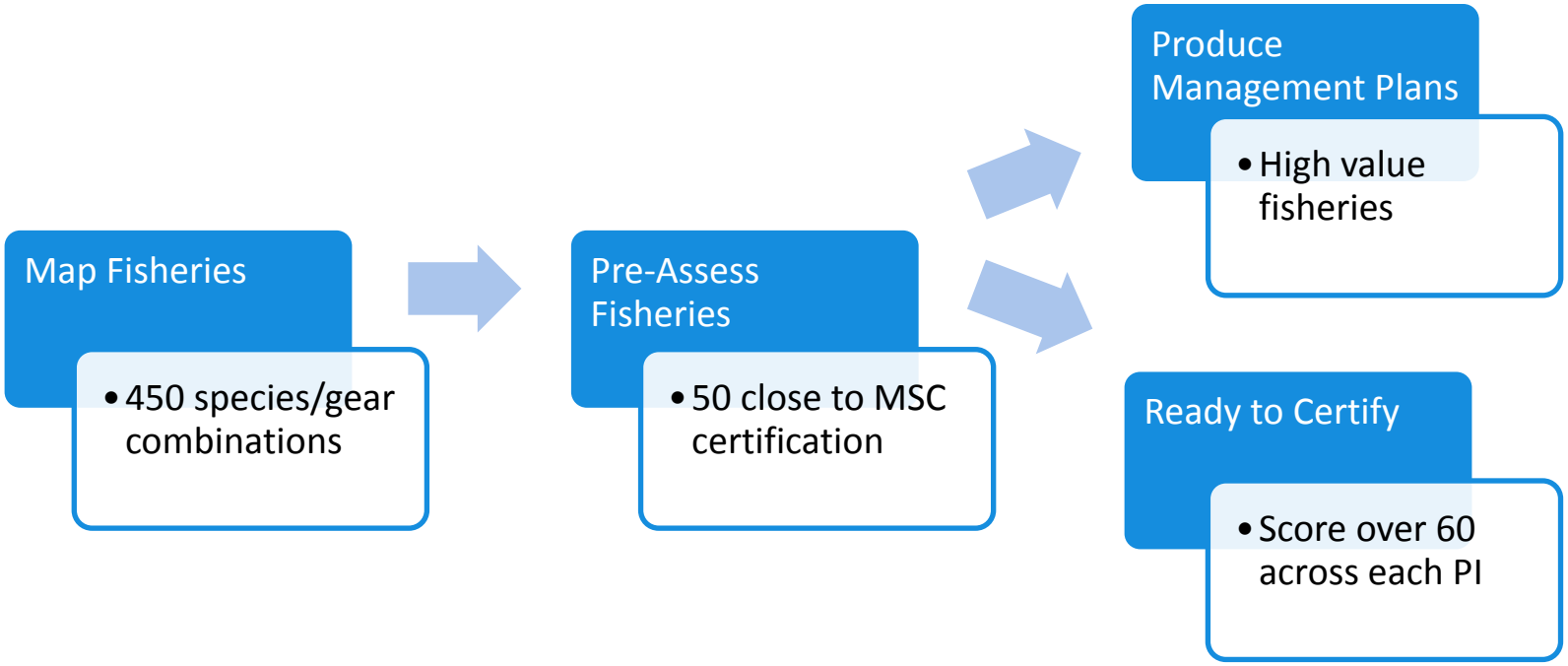
FISH MERCHANTS & INTERNATIONAL TRANSPORTERS
Port to plate in 24 hours

Results


Map Fisheries
• 450 species/gear combinations
Pre-Assess Fisheries
• 50 close to MSC certification
Produce Management Plans
• High value fisheries
Ready to Certify
• Score over 60 across each PI

Project Inshore MSC Pre-Assessment Database

For more information about MSC' Certification Requirements please refer to the MSC website - http://www.msc.org/about-us/standards/methodologies/fam

SG 60: The sustainable level and minimum criterion-level benchmark score for a fishery achieving certification MSC criteria for sustainable fisheries. Note, the aggregate scores for a Principle must be over 80 for a fishery to be certified. Conditions of certification would be applied to improve scores.

SG 80: The benchmark score above which a fishery would expect no conditions upon certification. Equivalent to industry best practice.

SG 100: A fishery that is theoretically perfect.

The full Project Inshore reports are available from the Seafish website - http://www.seafish.org/fishermen/fishing/project-inshore/project-reports

IFCA Management Authorities

Anchovy
Bass
Black Seabream
Blonde ray
Brill
Brown crab
Brown shrimp
Carpet shell clam
Cockle
☑ Cod
Crawfish
Cuckoo ray

Stock

☐ Celtic Sea (VII e-k)
☐ Irish Sea (VIIa)
☑ North Sea and Eastern Channel (IV IIIa VIId)

Gear Types

☑ Beam trawl
☐ Demersal trawl (TR1: >100mm)
☐ Demersal trawl (TR2: 80-100mm)
☐ Drift net
☐ Gill net
☐ Long line
☐ Trammel net

List Selected Inshore Results

Reset Search | Cod [x] | North Sea and Eastern Channel (IV IIIa VIId) [x] | Beam trawl [x]

Species	Stock	Gear Type	Result	
Cod	North Sea and Eastern Channel (IV IIIa VIId)	Beam trawl	Challenges	Details ››

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FCI

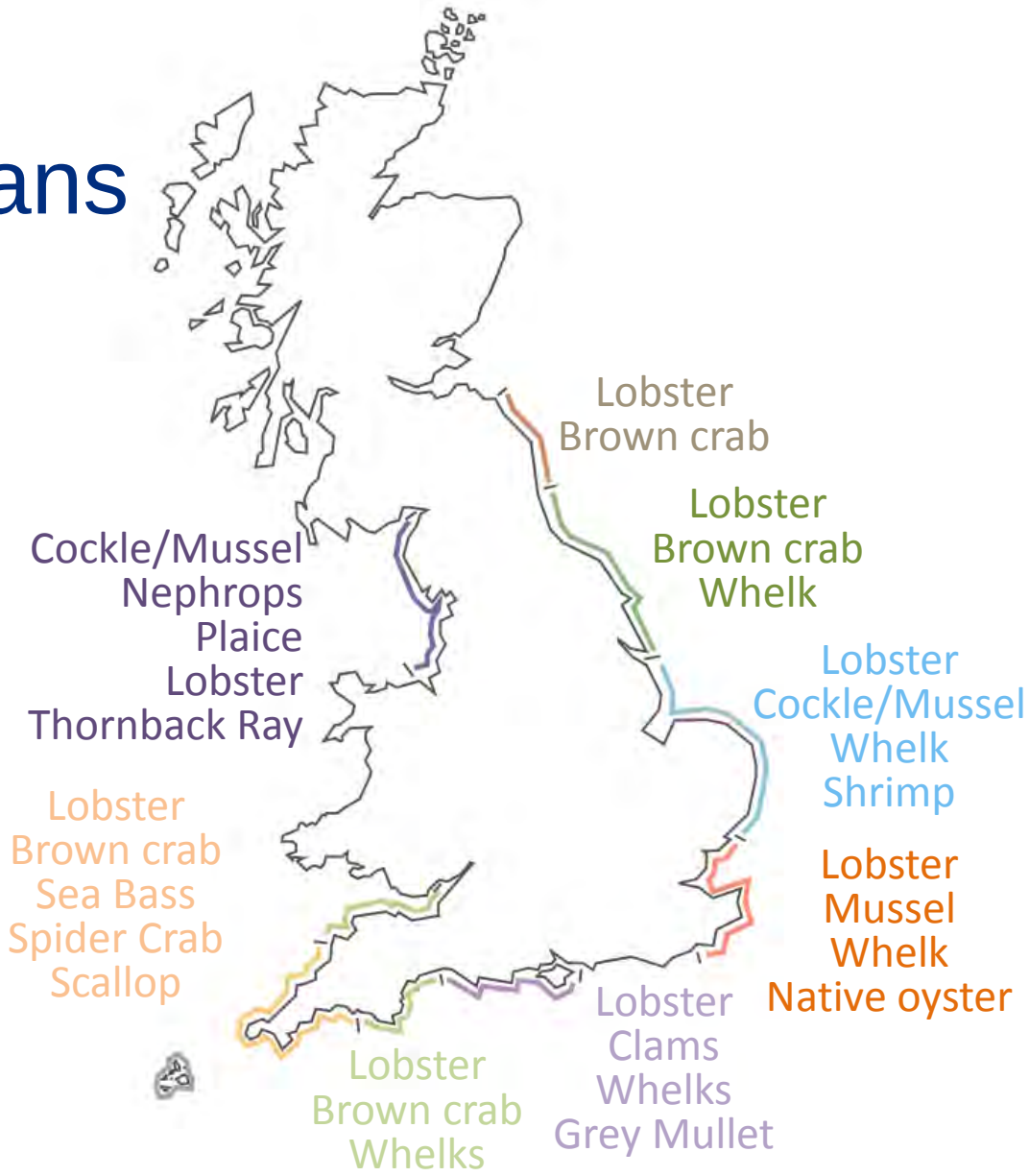
©FCI 2013 - Project Inshore results database designed and developed FCI, a specialist division of Acoura (www.acoura.com)

http://msc.solidproject.co.uk/msc-project-inshore.aspx

Conditions Likely	**2.3.2 ETP Management**
	A small number of measures are in place to manage impacts on ETP in some IFCA's and at a higher national / EU level. However, no ETP management strategies (using the MSC definition) are in place for any fisheries. Management strategies should be designed to manage the impact of the fishery on the ETP component specifically (GCB3.3).
Recommended	**2.3.3 ETP Information**
	The issue concerning lack of qualitative and quantitative data that influenced scoring for 2.3.1 is not being reconsidered here. Beam trawling is more targeted than demersal trawls and there is good information in relation to the spatial and temporal use of the gear primarily for brown shrimp, but also for some flatfish)
Challenges	**2.4.1 Habitat Status**
	Bottom fishing activities are capable significant habitat impacts such as the removal of major physical features, reduction of structural biota, reduction in habitat complexity, changes in sea floor structure and changes to benthic communities. Benthic macrofauna are most affected by trawling activity; whereas burrowing and other smaller seabed infauna are less vulnerable. Negative impacts of trawling are greatest in those areas where seabed habitats are not subject to high levels of natural disturbance. The rates of recovery for benthic communities following intensive trawling disturbance may range from weeks to years, with rates of recovery depending on rates of immigration, recruitment and growth. Without a robust management plan including a network of closed areas and routine habitat monitoring, together with measures to restrict effort and accurately record spatial interaction, it is unlikely that beam trawling would reach the minimum pass requirements.

http://msc.solidproject.co.uk/msc-project-inshore.aspx

Management Plans



Ready to Certify

	Species	Stock / Area	Gear
Demersal	Cod	Celtic Sea (VII e-k)	Drift net
			Trammel net
			Long line
	Plaice	Irish Sea (VIIa)	Trammel net
		North Sea (IV)	Trammel net
	Saithe	North Sea and West of Scotland (IV IIIa VI)	Handline and pole-line
	Sole	Celtic Sea (VII f/g)	Drift net
			Trammel net
		Western Channel (VIIe)	Drift net
			Trammel net
		North Sea (IV)	Trammel net
			Drift net
Pelagic	Herring	Irish Sea (VIIaN)	Drift net
			Pelagic trawl
			Encircling net
		North Sea Autumn Spawners	Pelagic trawl
			Encircling net
			Drift net
Shellfish	Cockle	Wash	Hand raking

UoCs estimated to meet SG80 across all MSC principles

Ready to Certify

	Species	Stock / Area	Gear
Demersal	Cod	Celtic Sea (VII e-k)	Gill net
	Haddock	North Sea (IV IIIa)	Gill net
		Western and Channel (VII b-k)	Gill net
	Hake	Northern Stock (IIIa IV VI VII VIII a/b/d)	Gill net
	Plaice	Irish Sea (VIIa)	Gill net
		North Sea (IV)	Gill net
	Saithe	North Sea and West of Scotland (IV IIIa VI)	Gill net
	Sole	Celtic Sea (VII f/g)	Gill net
		North Sea (IV)	Gill net
		Western Channel (VIIe)	Gill net
	Whiting	Western (VIIe–k)	Gill net
Pelagics	Herring	Irish Sea (VIIaN)	Gill net
		North Sea Autumn Spawners	Gill net

UoCs estimated to meet SG80 for MSC Principle 1 & 3, but between SG60-80 for Principle 2

	Species	Stock / Area	Gear	<80 Principles
Demersal	Ling	Southern (IIIa IVa VI VII VIII IX XII XIV)	Gill net	P1 & P2
	Megrim	Celtic Sea & West of Scotland (VIIb–k & VIIIa,b,d)	Gill net	P1 & P2
	Monkfish / Angler	Western and Channel (VII b-k, VIII a/b/d)	Gill net	P1 & P2
	Plaice	Eastern Channel (VIId)	Trammel net	P1
		Eastern Channel (VIId)	Gill net	P1 & P2
	Red mullet	North Sea and Eastern Channel (IV IIIa VIId)	Gill net	P1, P2, P3
	Sole	Eastern Channel (VIId)	Drift net	P1
		Eastern Channel (VIId)	Trammel net	P1
		Eastern Channel (VIId)	Gill net	P1 & P2
	Whiting	North Sea and Eastern Channel (IV VIId)	Gill net	P1 & P2
Pelagics	Horse mackerel	Western Stock	Handline / pole-line	P1
		Western Stock	Pelagic trawl	P1
		Western Stock	Gill net	P1 & P2
	Pilchard	Bay of Biscay	Drift net	P1
		Bay of Biscay	Handline / pole-line	P1
		Bay of Biscay	Encircling net	P1
		Bay of Biscay	Gill net	P1 & P2
	Sprat	Channel (VIId,e)	Pelagic trawl	P1
		North Sea (IV)	Pelagic trawl	P1
Shellfish	Brown crab	Western Channel	Gill net	P1, P2, P3
	Cockle	Cumbria	Hand raking	P1 & P3
		Morecombe Bay (7)	Hand raking	P1
		Ribble	Hand raking	P1 & P3
		Wirral	Hand raking	P1 & P3

UoCs estimated to score between SG60-80 for MSC Principle 1 (and in some cases P2 & P3)

North Sea Cod

Table 2.3.5. The stocks which have sufficient data and information to support a harvest strategy, and have a well-defined harvest control rule. SS= Stock Status; RP= Reference Points; SR= Stock Rebuilding; HS= Harvest Strategy; HCR= Harvest Control Rule; INF= Information/Monitoring; ASS= Assessment of Stock Status.

Species	Stock Area	SS	RP	SR	HS	HCR	INF	ASS	Main Gaps
Cod	North Sea and Eastern Channel (IV IIIa VIId)	<60	80-100	80-100	80-100	80-100	80-100	80-100	The fishery meets all requirements, except the stock status is below the limit reference point making it ineligible. North Sea cod could pass MSC certification once the stock is above the limit reference point and rebuilding is shown to be fast enough.

North Sea Cod

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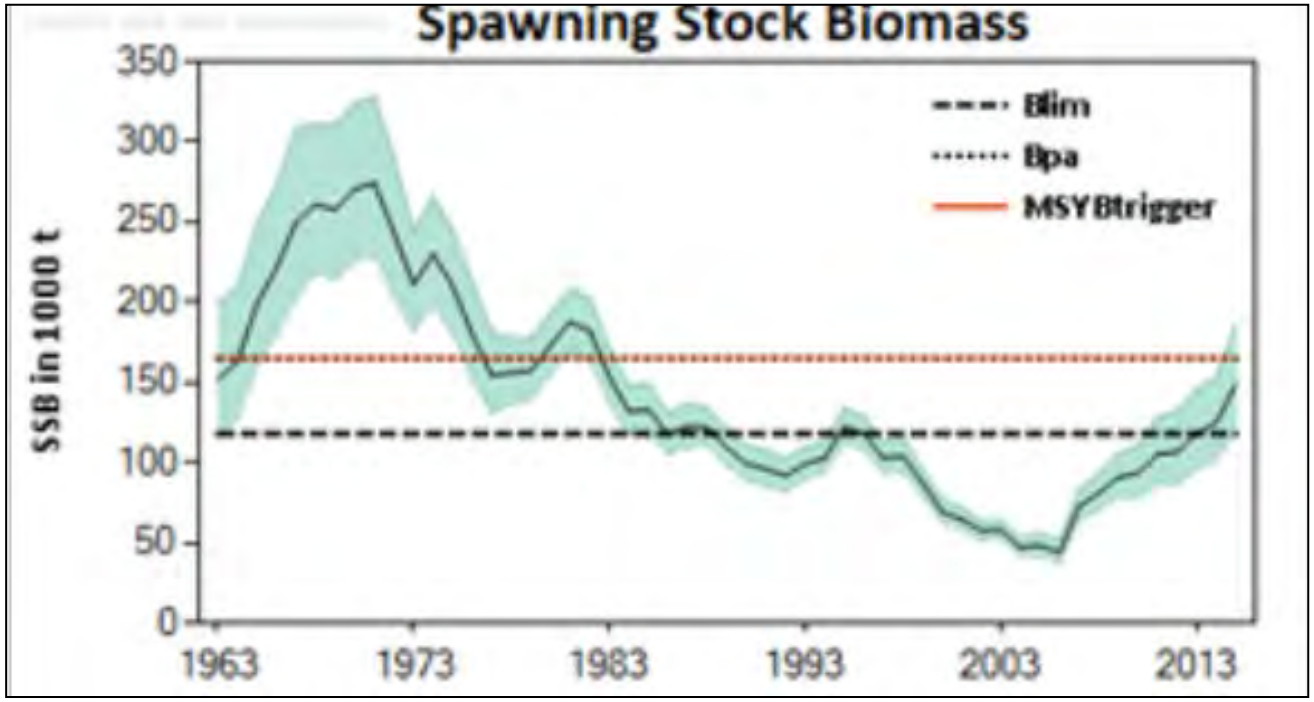
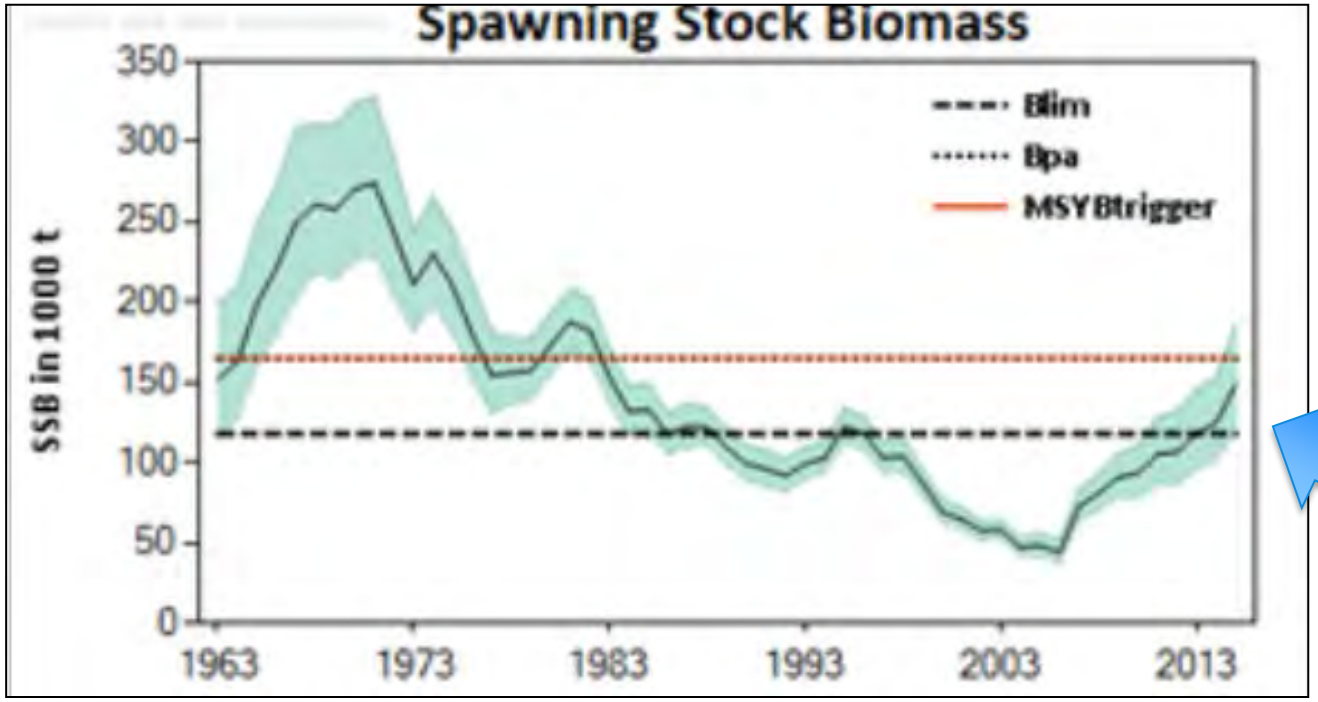
"North Sea cod could pass MSC certification once the stock is above the limit reference point and rebuilding is shown to be fast enough"

North Sea Cod

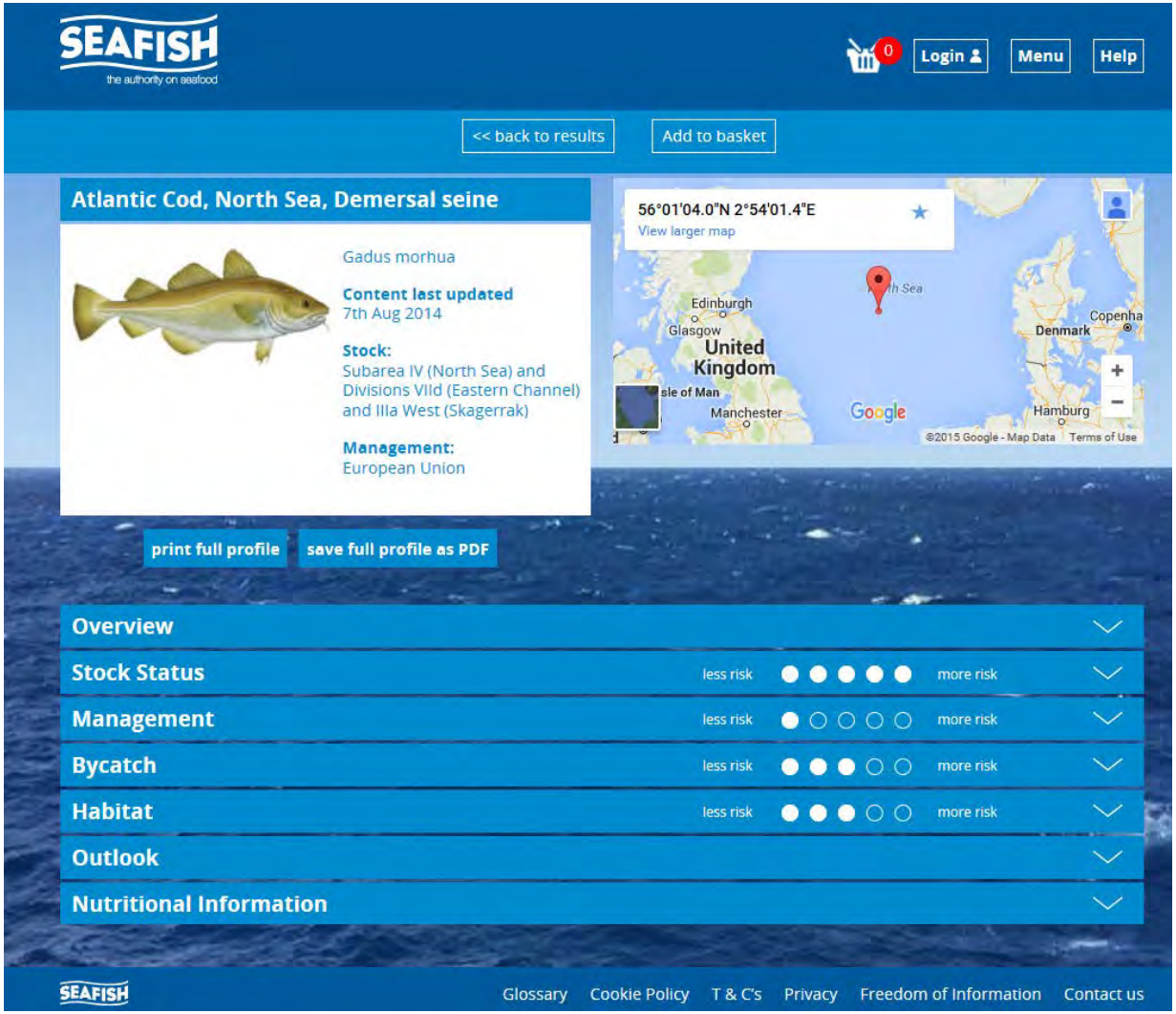


North Sea Cod



The Challenge

- Determine a effective & efficient ($$) method of assessing data-poor stocks
- Provide a means for these fisheries to demonstrate ‘responsibility’:
- Promote to supply chain



www.seafish.org/rass

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Project UK

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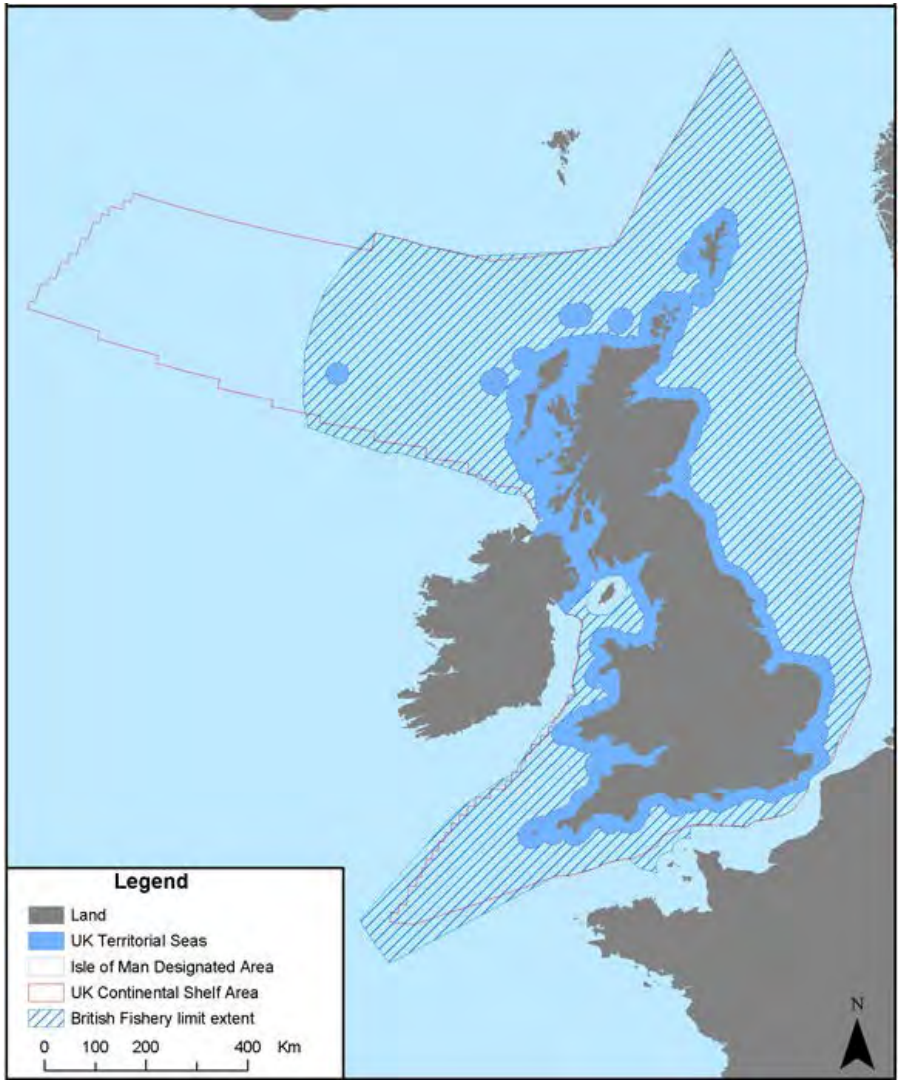
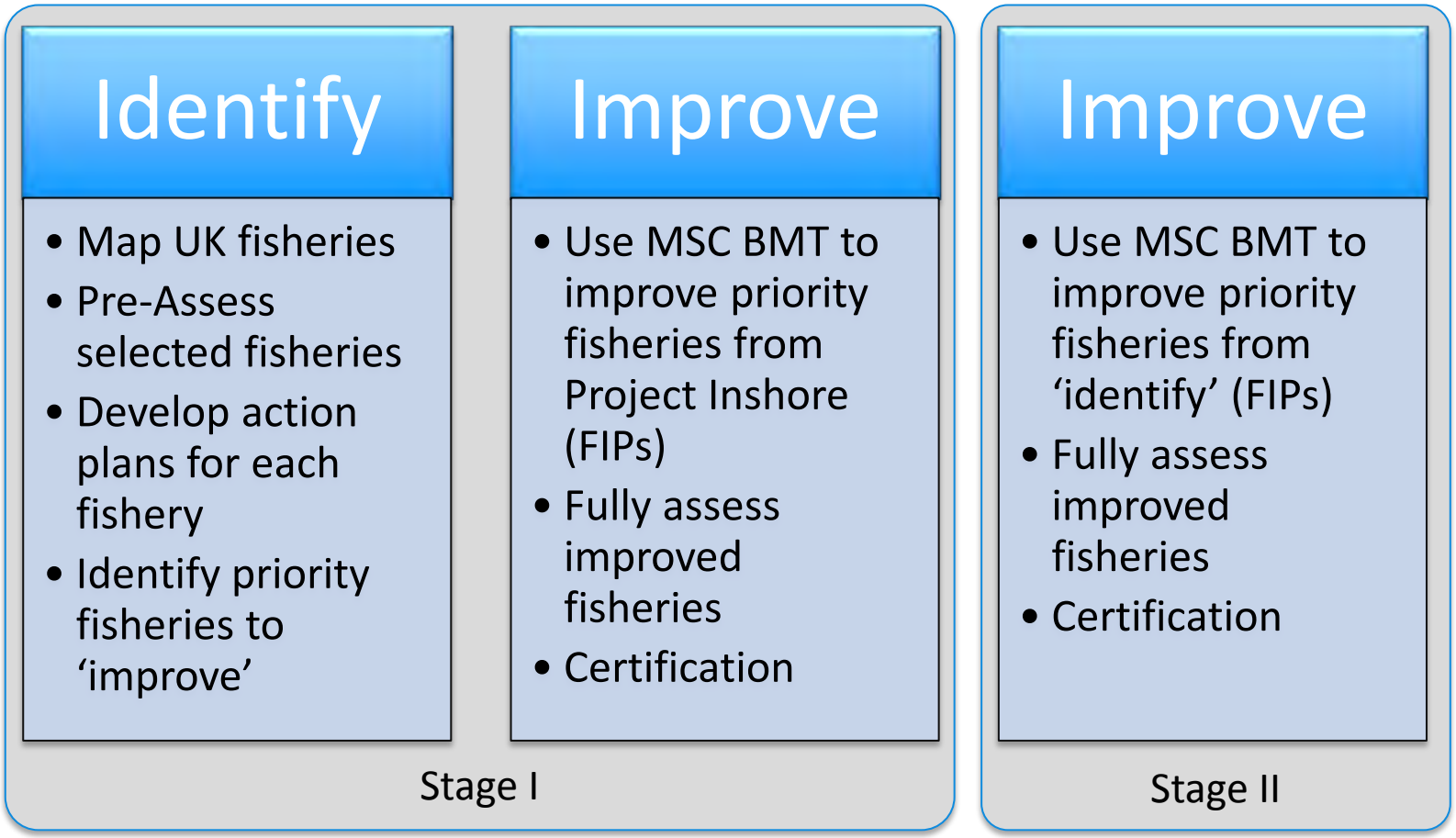
FISHING INTO THE FUTURE
CHARTING A COURSE TO SUSTAINABLE UK FISHERIES



Project UK – partners to date

Project UK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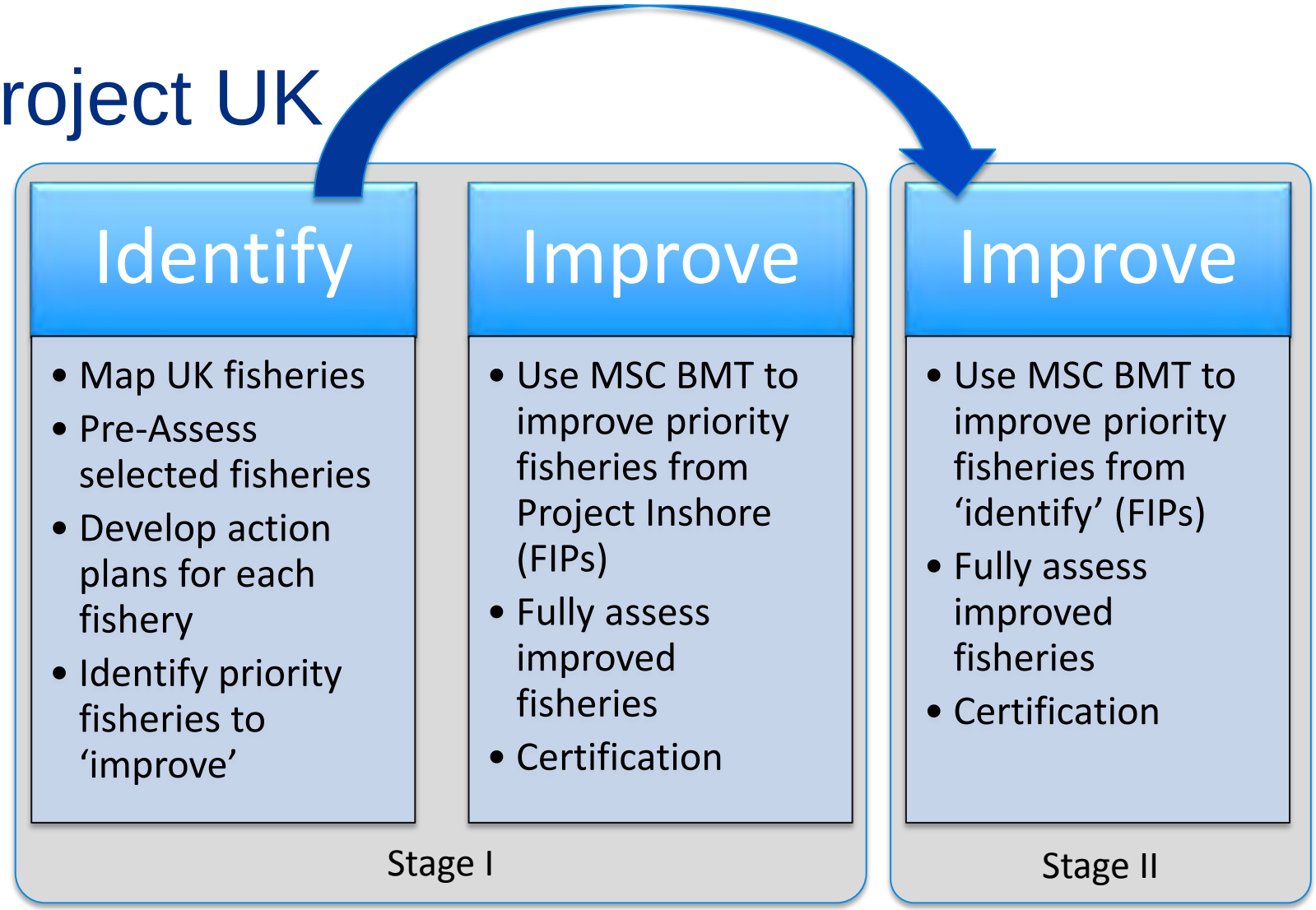
• Pre-Assess selected fisheries
• Develop action plans for each fishery
• Identify priority fisheries to 'improve'
Improve
• Use MSC BMT to improve priority fisheries from Project Inshore (FIPs)
• Fully assess improved fisheries
• Certification
Stage I
Improve
• Use MSC BMT to improve priority fisheries from 'identify' (FIPs)
• Fully assess improved fisheries
• Certification
Stage II

Project UK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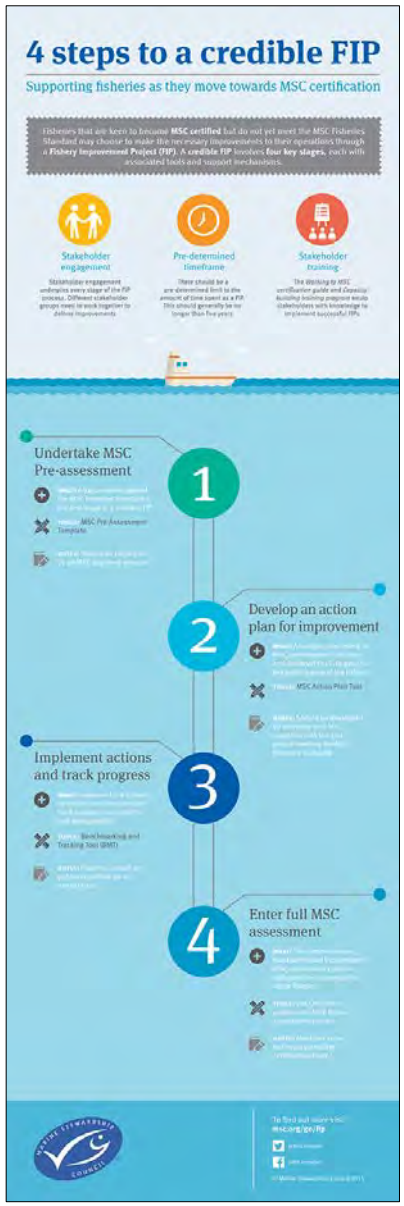
Project UK – Candidate FIPs

- South West brown crab
- South West lobster
- Scallops
- Monkfish
- North Sea lemon sole
- North Sea plaice



Take Home Messages

- The Project Inshore model works
- Transferable
- Scaleable and cost-effective
- Complementary to traditional FIP approach

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Thank you

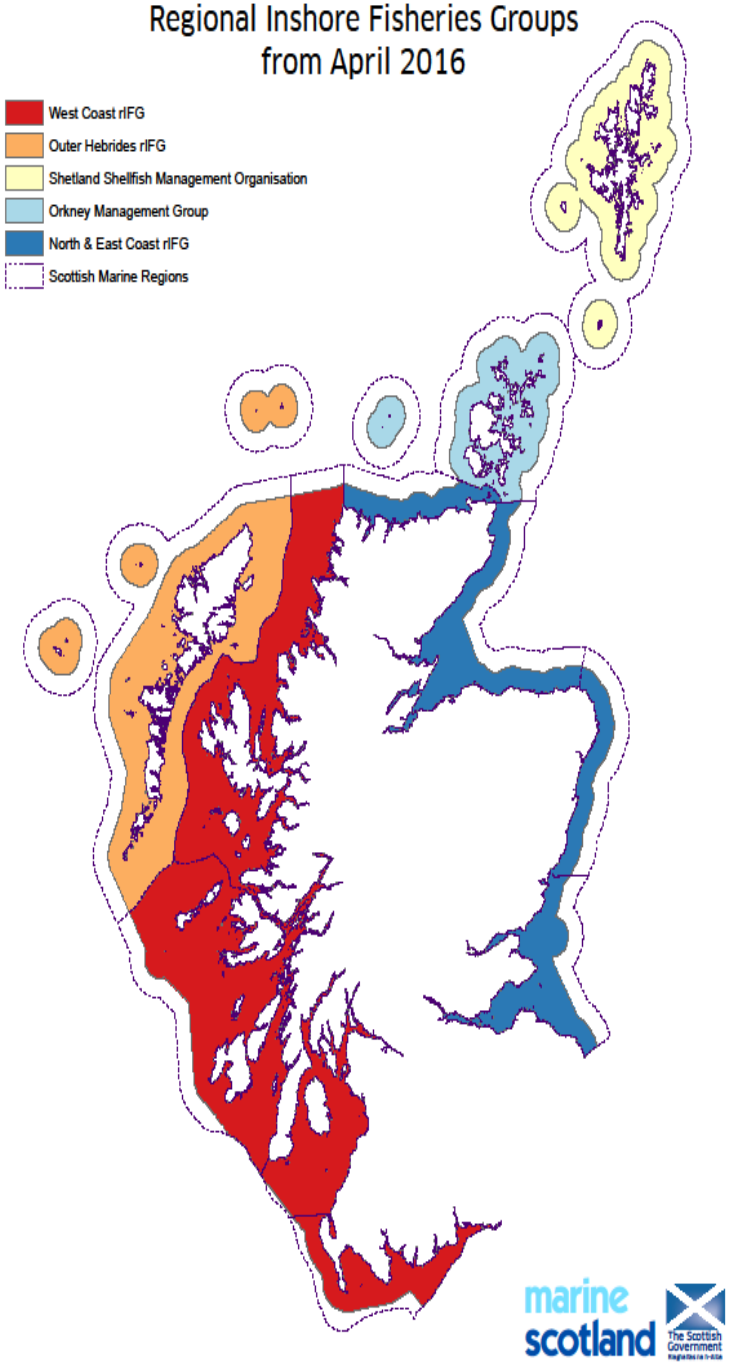
@drpickerell

tom.pickerell@seafish.co.uk

Data deficient fisheries.

The Orkney experience

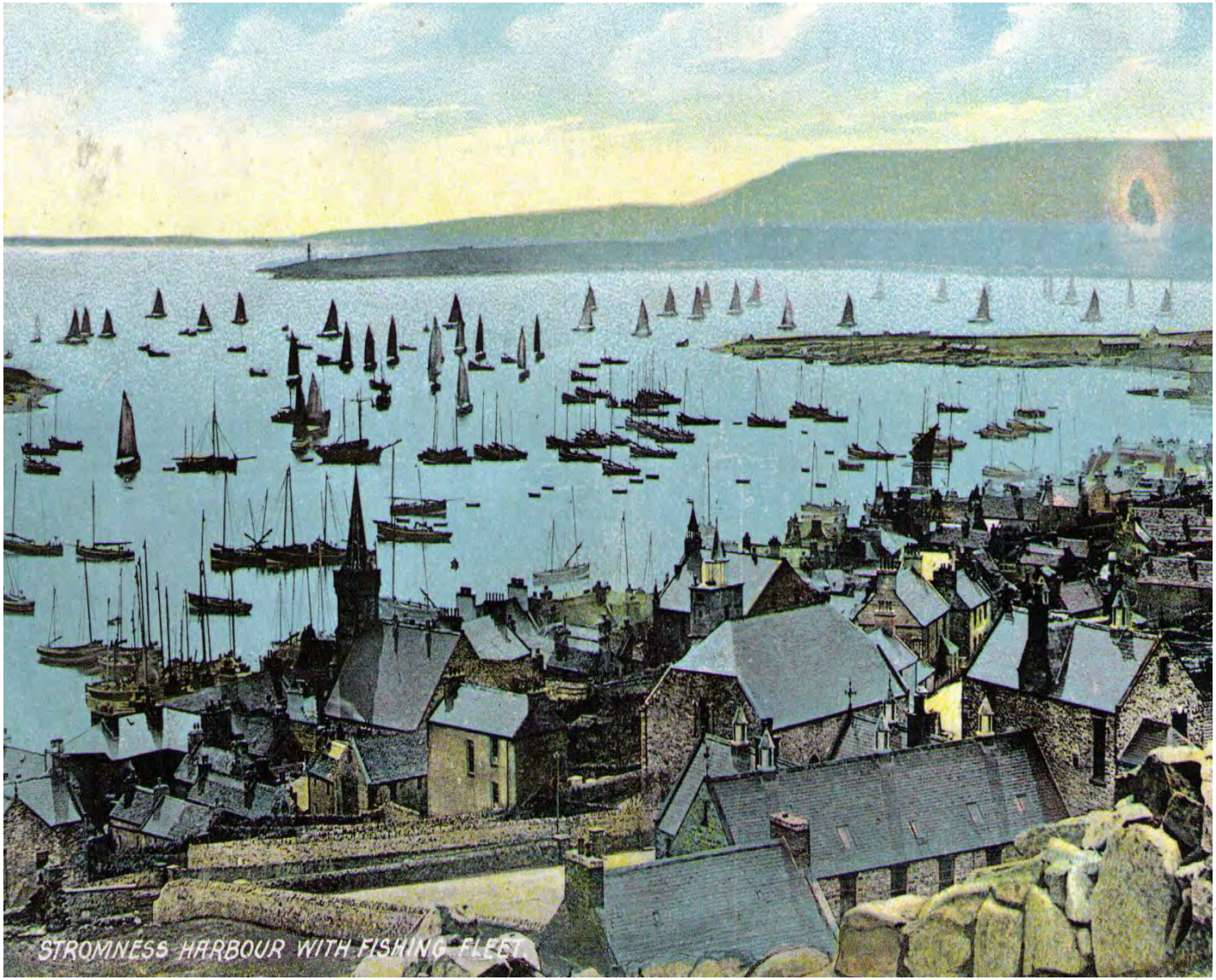
Regional Inshore Fisheries Groups from April 2016



marine scotland

The Scottish Government


Pierowall
Tingwall
Orkney
Mainland
Kirkwall
Stromness
Orkney
Mainland Scotland


STROMNESS HARBOUR WITH FISHING FLEET

Engagement with local


FURUNO
TOYOTA
THE REAL MCKAY
124
MCKAY

Recruitment of committed and enthusiastic scientists

Overarching plan to bring research work together.

The Orkney Fishery Improvement Project

Orkney Fishery Improvement Project

Funded by:

Marks & Spencer
Orkney Islands Council
Local fishing and processing sector

The aim is for the fishery to meet MSC standard by end 2016

Overall summary of Brown Crab FIP

- Pre-assessment identified three critical issues:
  - lack of biological reference points
  - lack of pre-agreed harvest control rule to reduce exploitation rate in response to stock decline
  - lack of effort data
- The FIP is addressing these short-comings by:
  - collecting VMS and logbook data on fishing effort and catch rates
  - developing a sound basis for stock assessment, generating candidate biological reference points
  - providing data and fishery metrics on which any harvest control rules can be based

Extensive market sampling


sylvac
O.F.S Ltd
SANDAY

Observer trips

Orkney Brown crab stock assessment

The bottom line…

- No obvious causes for concern about sustainability of present brown crab fishery
- Careful consideration of potential controls is needed if management is to be brought in line with MSY approach
- Technical measures likely to be at least as important as effort controls
- Target reference points based on spawning potential are likely to be more meaningful than those based on yield
- Analysis of time-series data will be needed for better perspective and for definition of limit reference point

Additional research projects

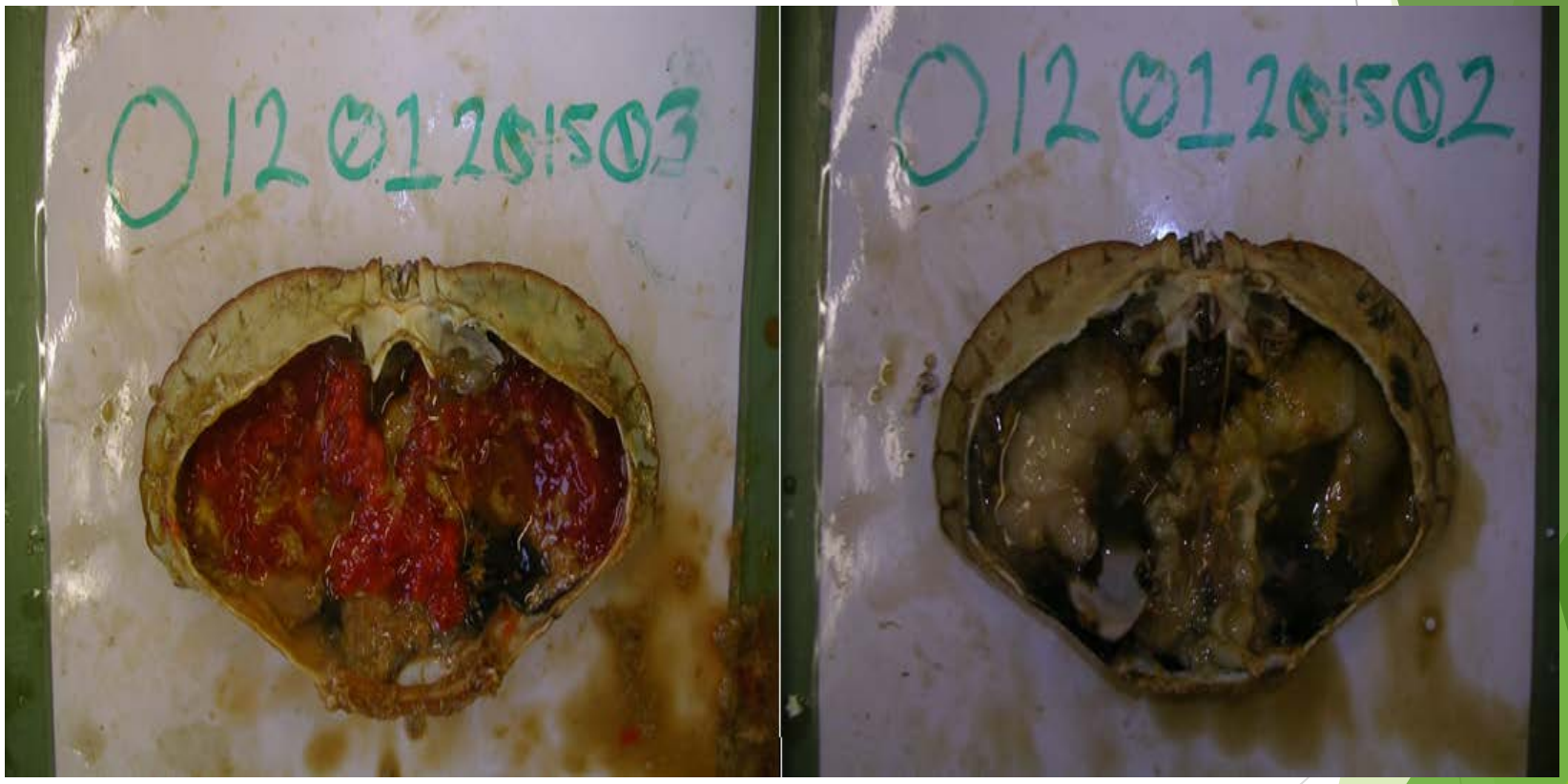
Raising juvenile lobsters

Juvenile lobster habitat trials

Lobster tagging and movement studies

Crab tagging and movement studies

Brown crab sexual maturity studies



Benefits to fishing community?

* Fishermen have ownership of research

* Fishermen feel empowered to take locally informed management decisions

* Greater customer assurance gives greater access to markets


M&S
EST. 1884
ORKNEY
CRAB
BISQUE
a rich creamy blend of Orkney crab finished with Kentish cider, brandy and thyme
Scottish crab
gluten free
suitable for freezing
Serves 2 - half pot provides
Energy
615kJ
147kcal
Fat
6.3g
Saturates
3.0g
Sugars
6.9g
Salt
1.80g
7%
9%
15%
8%
30%
of your Reference intake
per 100g Energy 205kJ/49kcal

FishPath

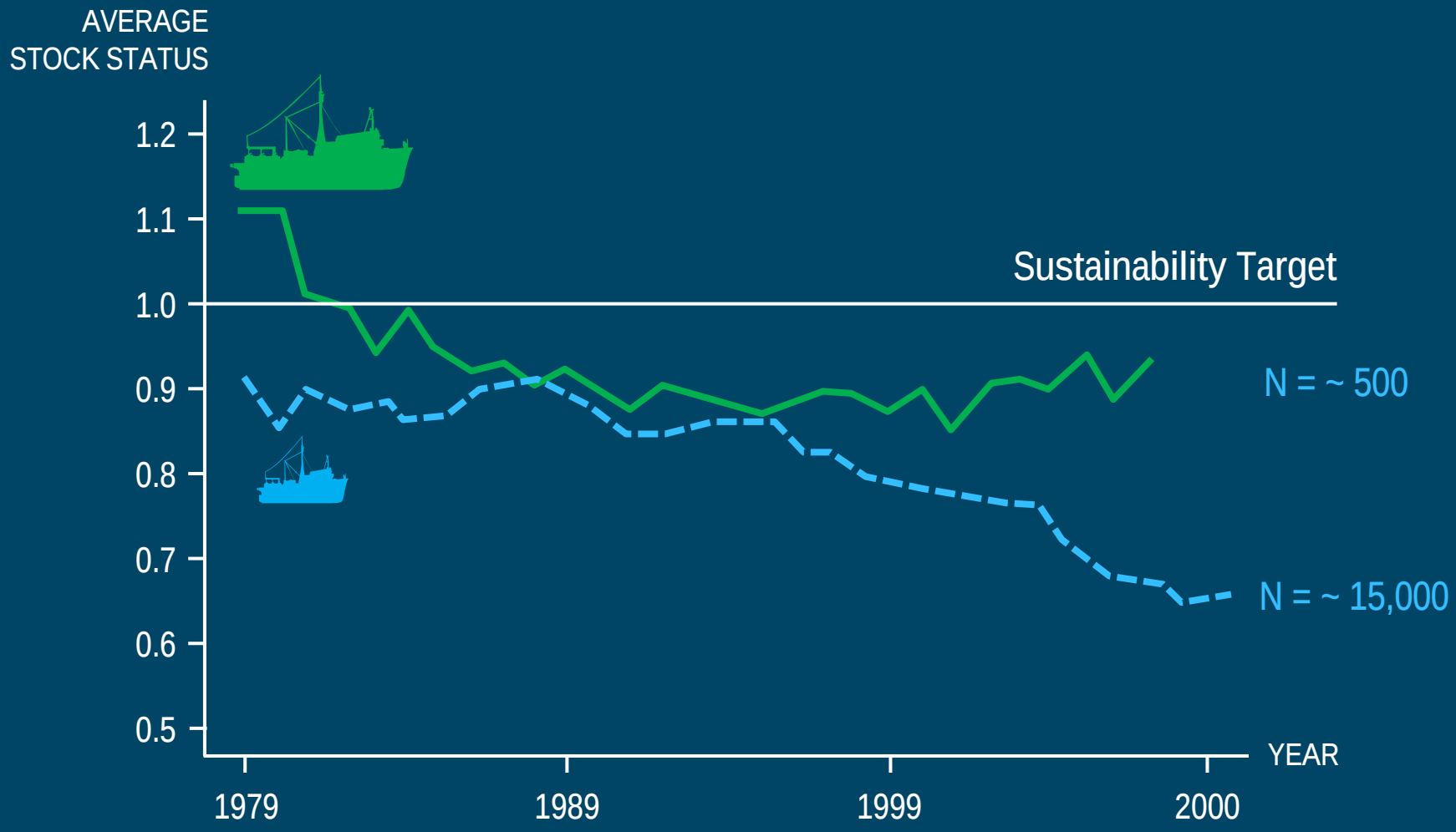
The path to sustainable fisheries

Dawn Dougherty
The Nature Conservancy
3 February 2016

The Nature Conservancy
Protecting nature. Preserving life.

SNAP
Science for Nature and People

Unassessed Fisheries



Costello et al., 2012, Science

Demand Rising

147%

increase in MSC ecolabelled products between 2010 and 2014.

41%

of seafood buyers actively look for fish from a sustainable source.

CERTIFIED SUSTAINABLE SEAFOOD
MSC
www.msc.org

Supply < Demand

IMPROVING FISHERIES

Many methods available for managing and assessing data- and/or capacity-limited fisheries

Challenge: Navigating the methods

- Not easily accessible
- Different requirements and outputs
- Costs and advantages differ
- Social, economic, governance context
- Practitioner bias

disconnect between the development of assessment approaches and decision rule options, and their on-the-ground implementation

FISH PATH

Decision-Making Framework

1 FISHERY DIAGNOSIS & COST DATABASE

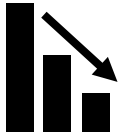
FLEET

BIOLOGY

SOCIO-ECONOMICS

GOVERNANCE

COSTS OF MANAGEMENT

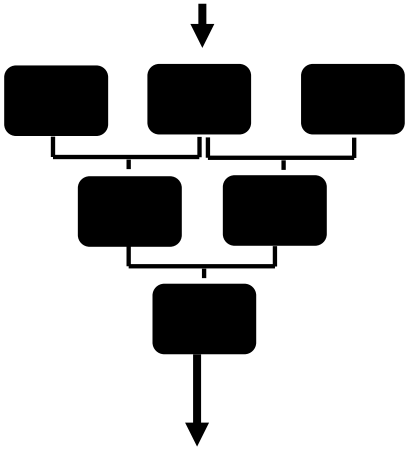


DATA

2 MANAGEMENT STRATEGY SELECTION PROCESS

MONITORING ASSESSMENT DECISION RULES

FISHERY CHARACTERISTICS

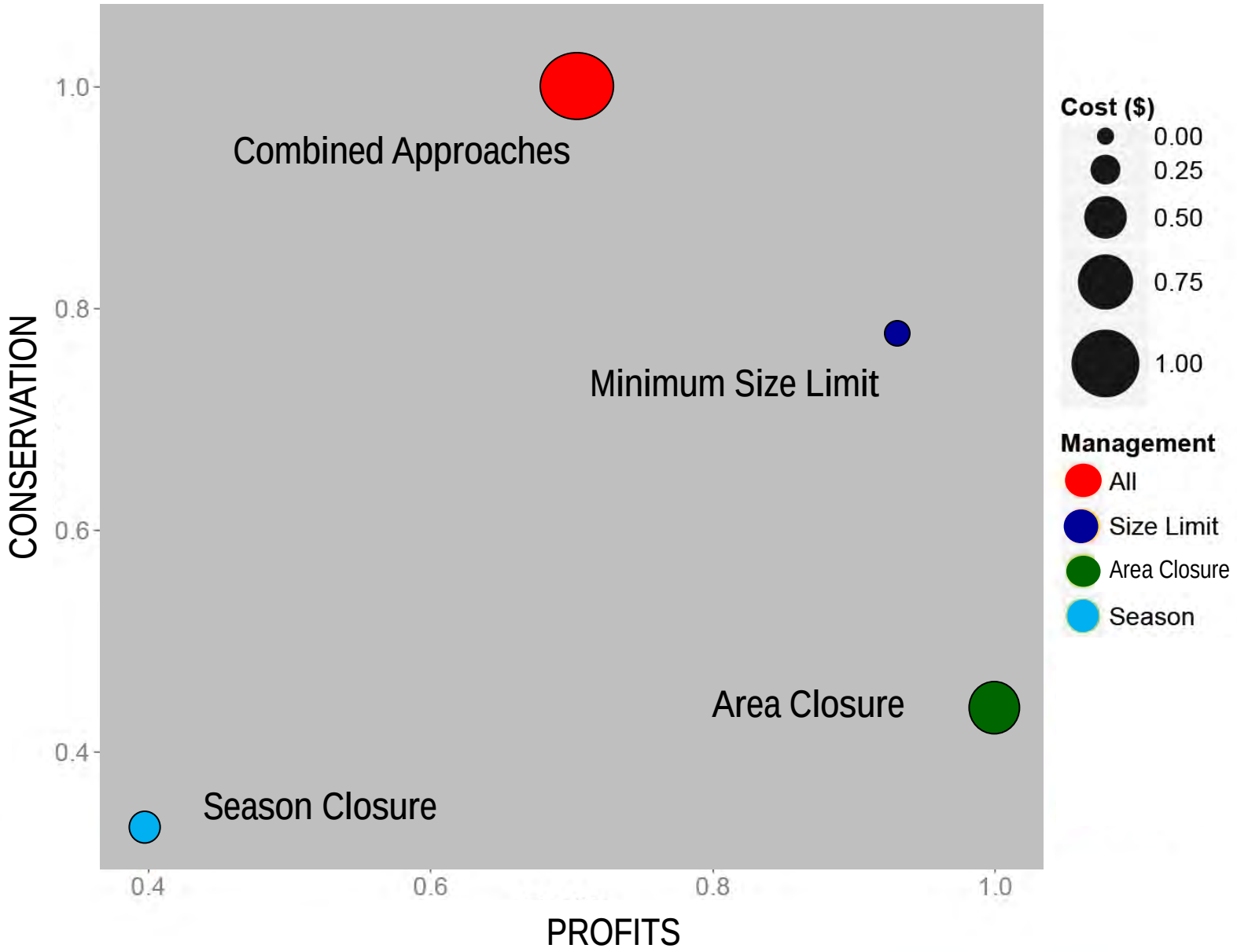


MANAGEMENT STRATEGY

3 TRADEOFF ANALYSES

Simulation Modeling: Management Strategy Evaluation (MSE)

Fishery sandbox | About | Spatial extent | Life History | Management | Simulation | Comparison



Peru Case Study

Lorna Drum (*Sciaena deliciosa*)

Project

- Site visits
- Test and refine
- Identify strategies
- Compare strategies

DEMONSTRATE & REFINE