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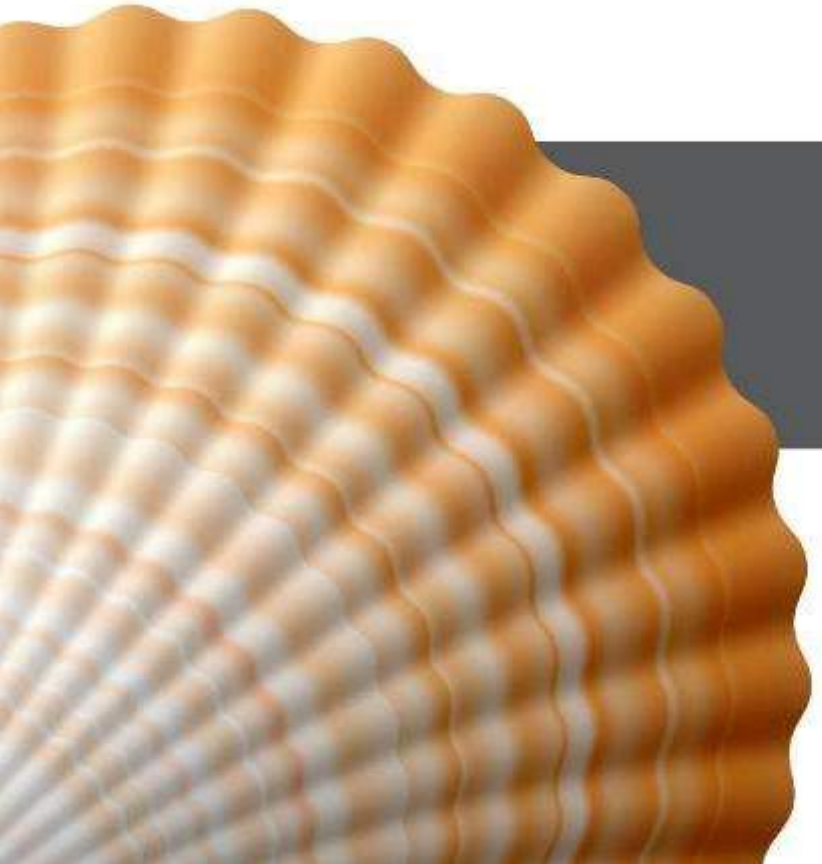

UK SCALLOP MANAGEMENT CONFERENCE 2019

INFORMING THE FUTURE OF SUSTAINABLE FISHERIES MANAGEMENT

Monday, 4 February | Fishmongers' Hall, London

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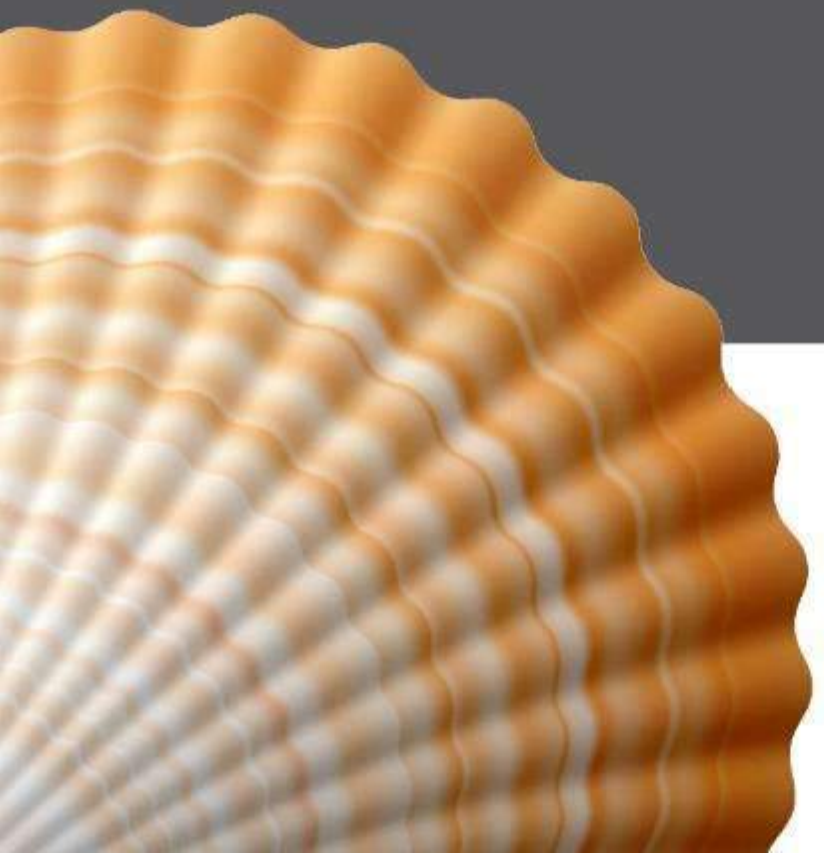

Andrew Wallace

Fisheries Director
The Fishmongers' Company

Introduction

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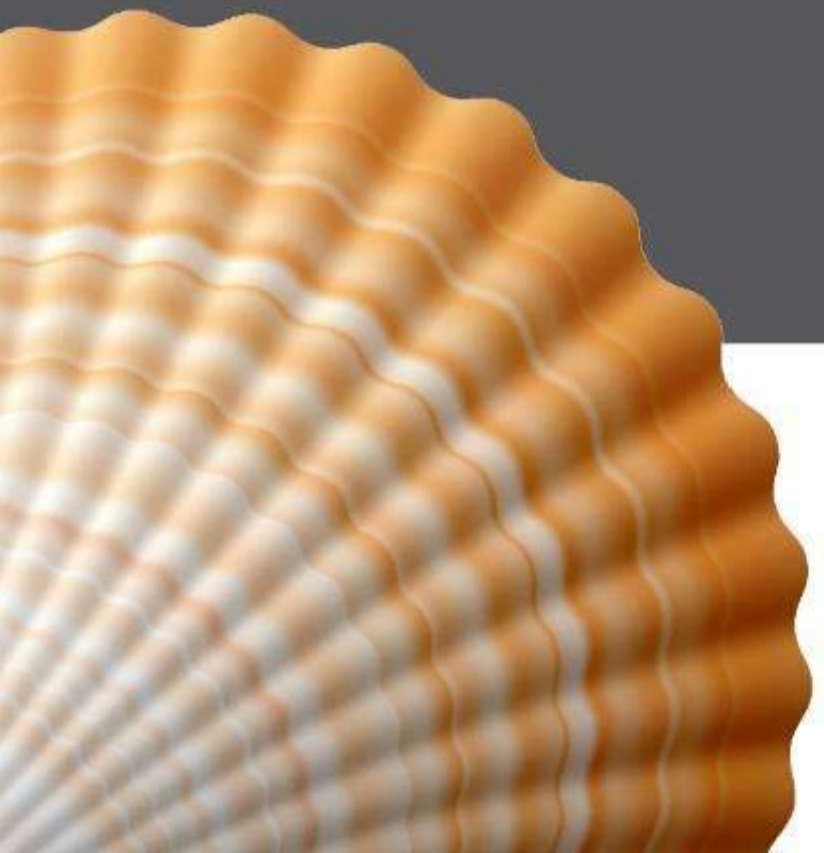

Introduction to Live Polling

Ice breakers

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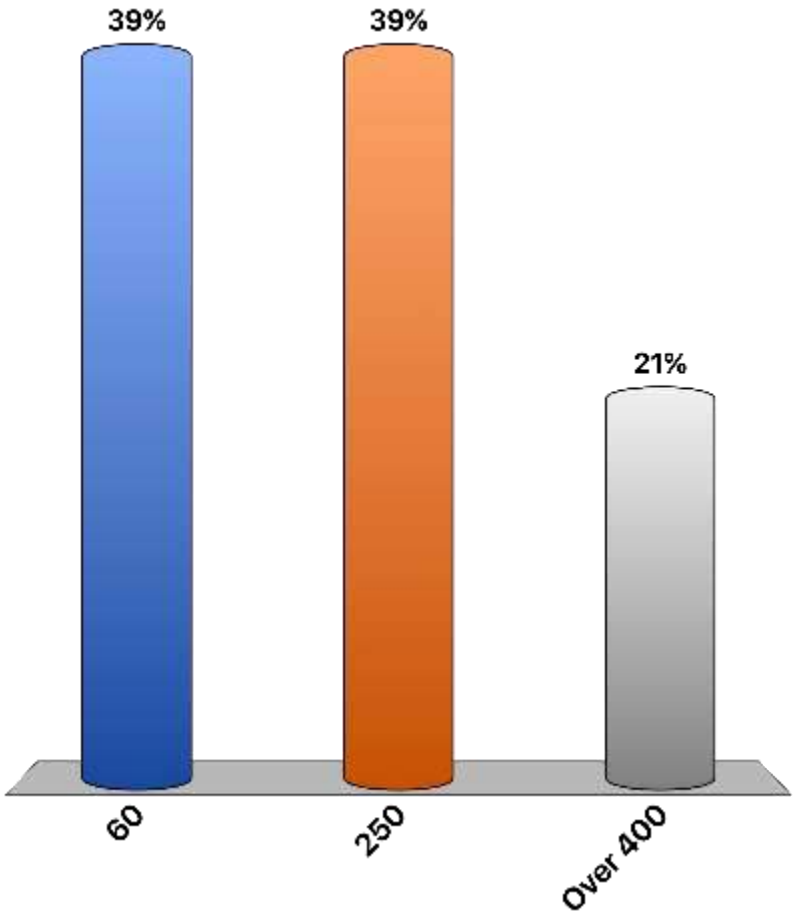
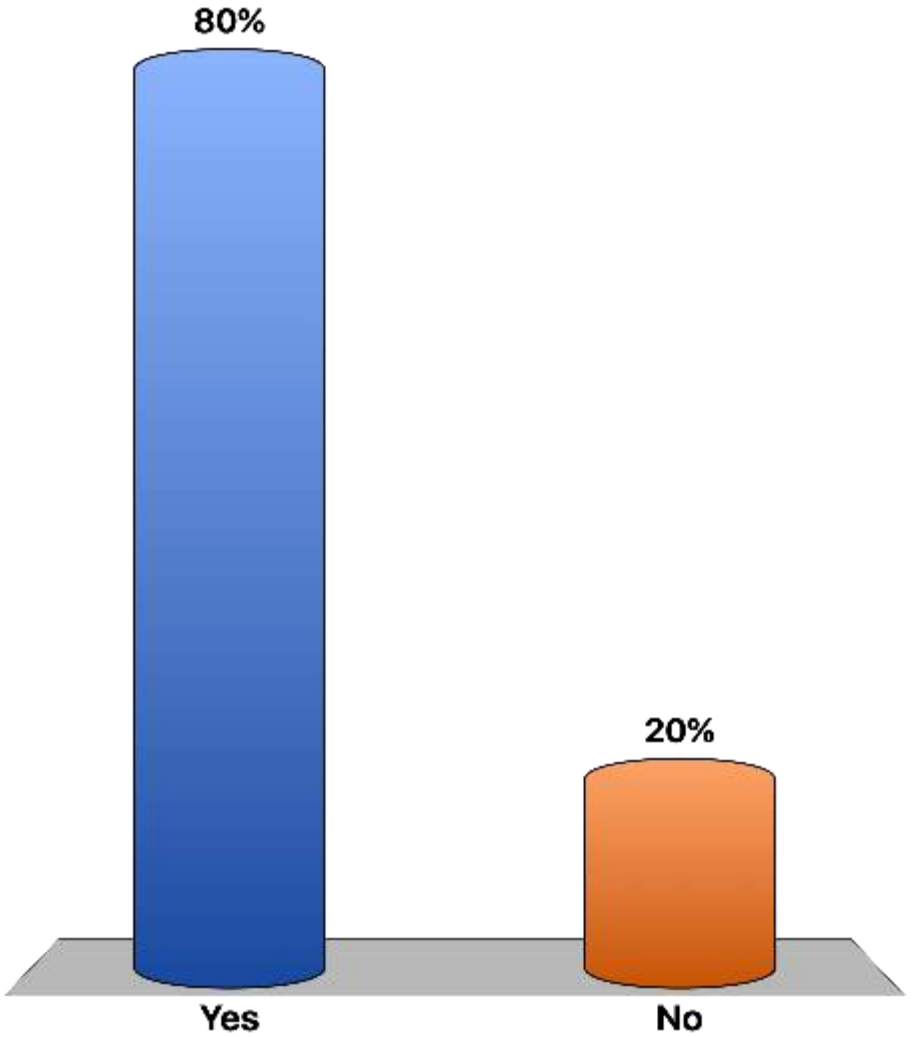
How many species of scallop are there, world-wide?

A. 60
B. 250
C. Over 400



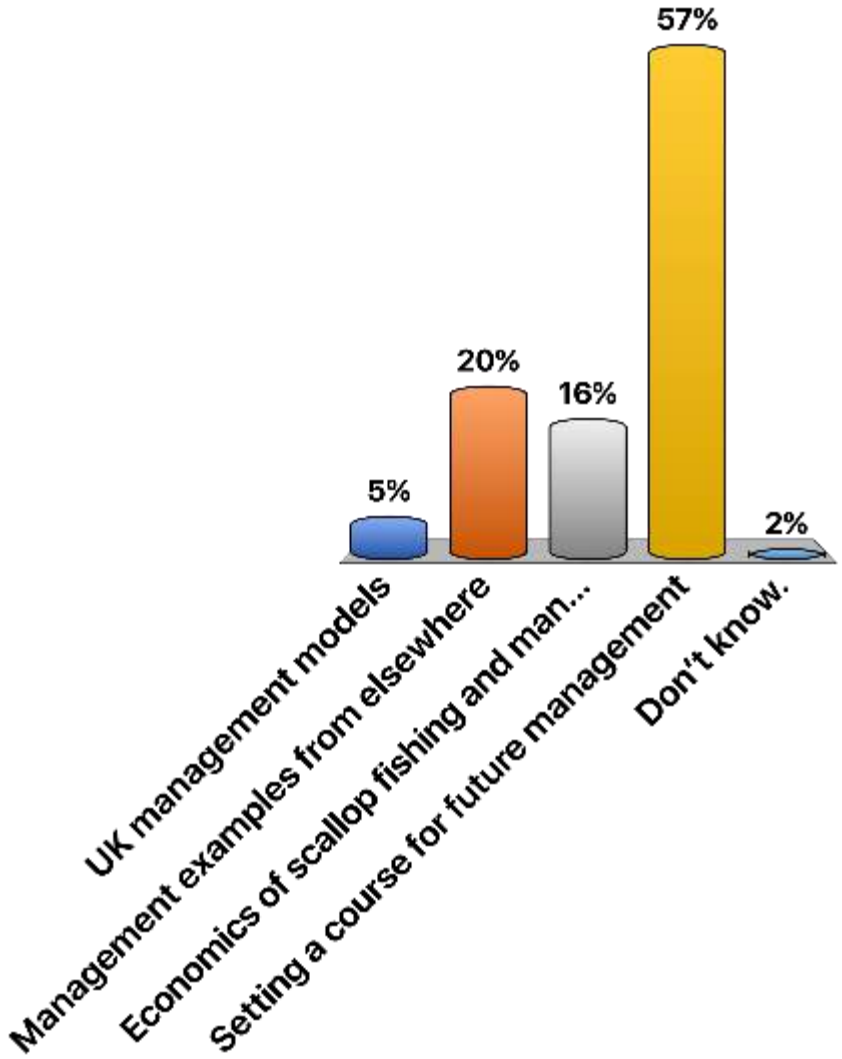
How many of you will be joining us for a drink at this evening's reception?

A. Yes
B. No



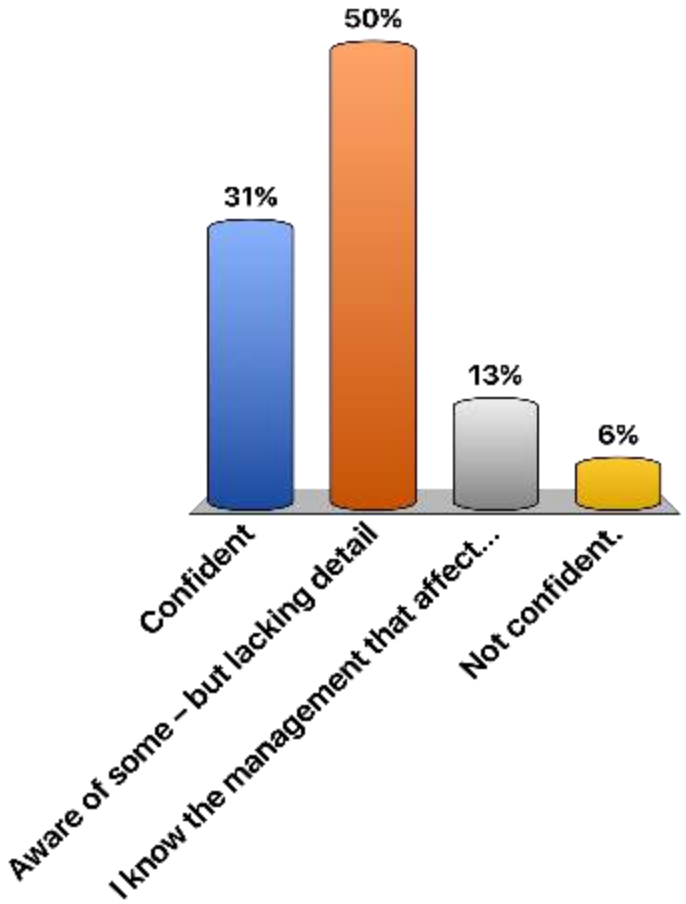
What are you most interested to learn about during the course of the conference? Pick one.

A. UK management models
B. Management examples from elsewhere
C. Economics of scallop fishing and management
D. Setting a course for future management
E. Don’t know.



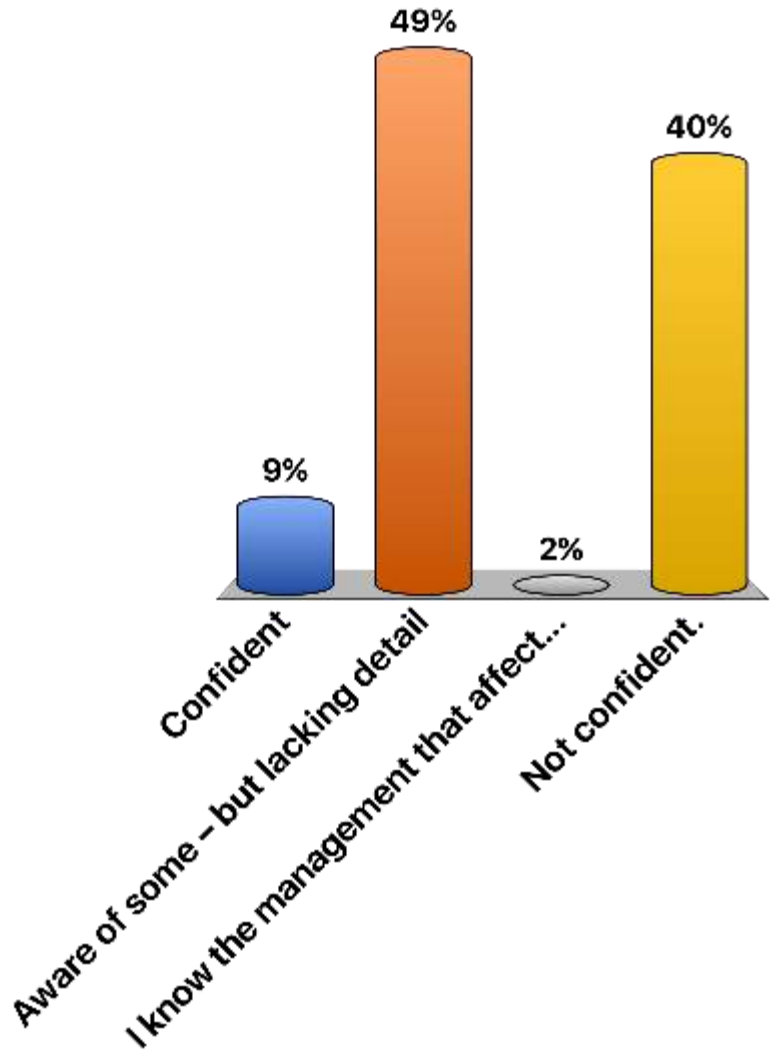
How familiar are you with the different scallop management regimes in the UK? Pick one.

A. Confident
B. Aware of some – but lacking detail
C. I know the management that affects me
D. Not confident.



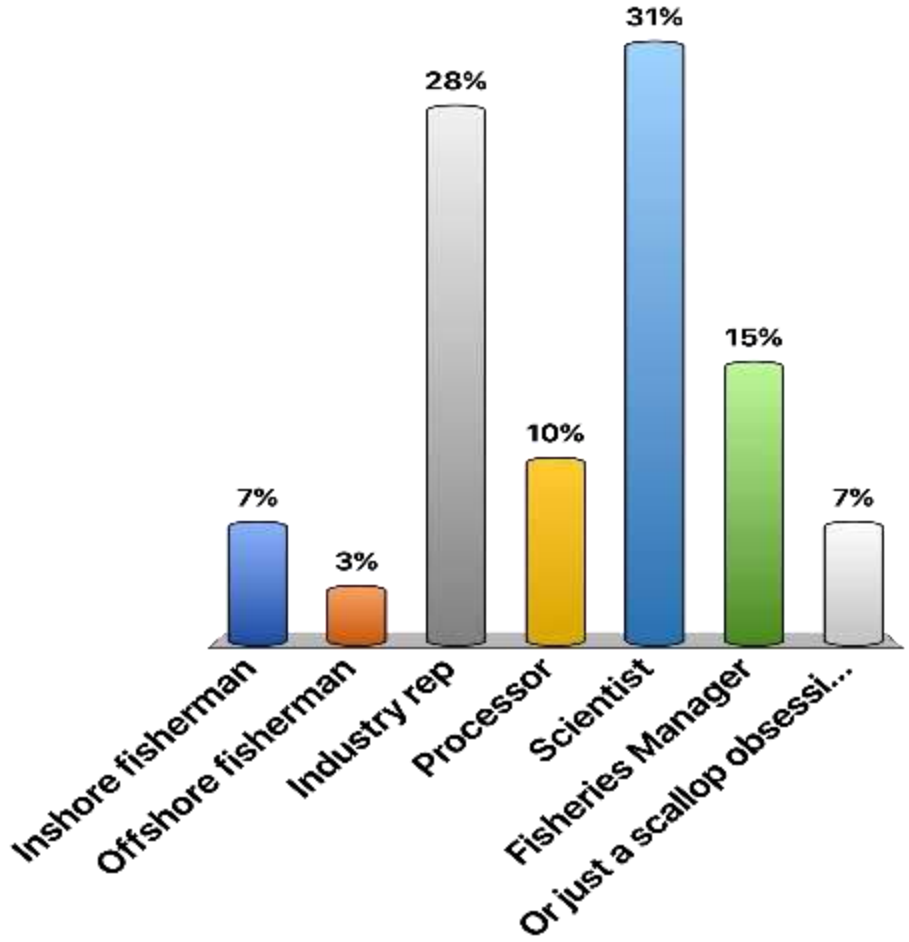
How familiar are you with the different scallop management regimes elsewhere in the world? Pick one.

A. Confident
B. Aware of some – but lacking detail
C. I know the management that affects me
D. Not confident.



How would you classify yourself as an attendee at this event? Pick one.

A. Inshore fisherman
B. Offshore fisherman
C. Industry rep
D. Processor
E. Scientist
F. Fisheries Manager
G. Or just a scallop obsessive..



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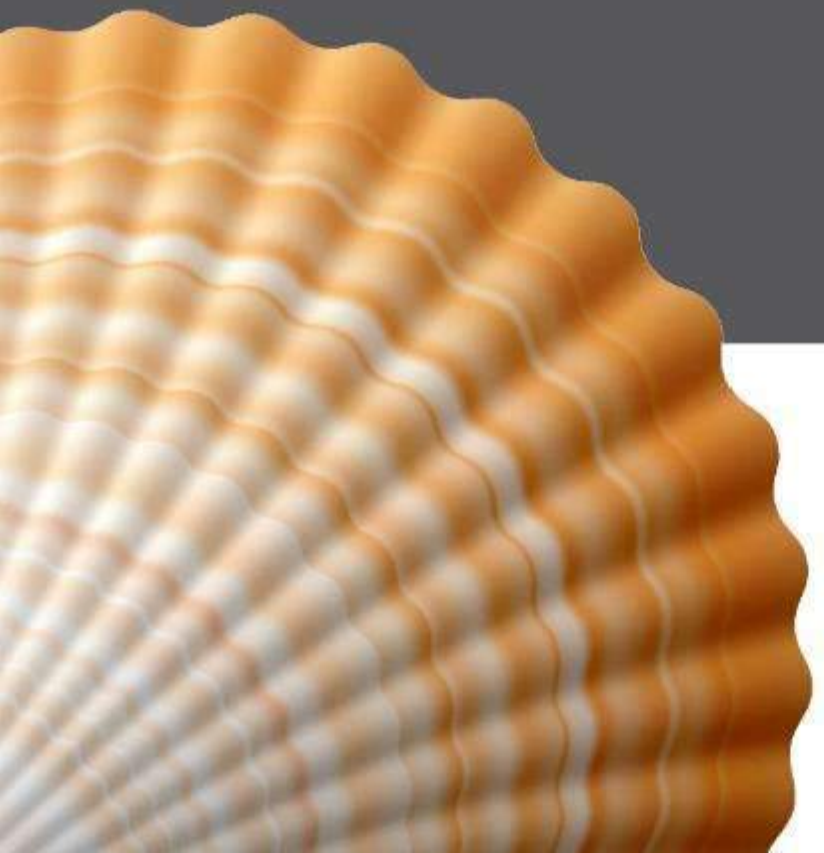

Session 1
Chair: Rod Cappell
Director, Poseidon

Current state of play

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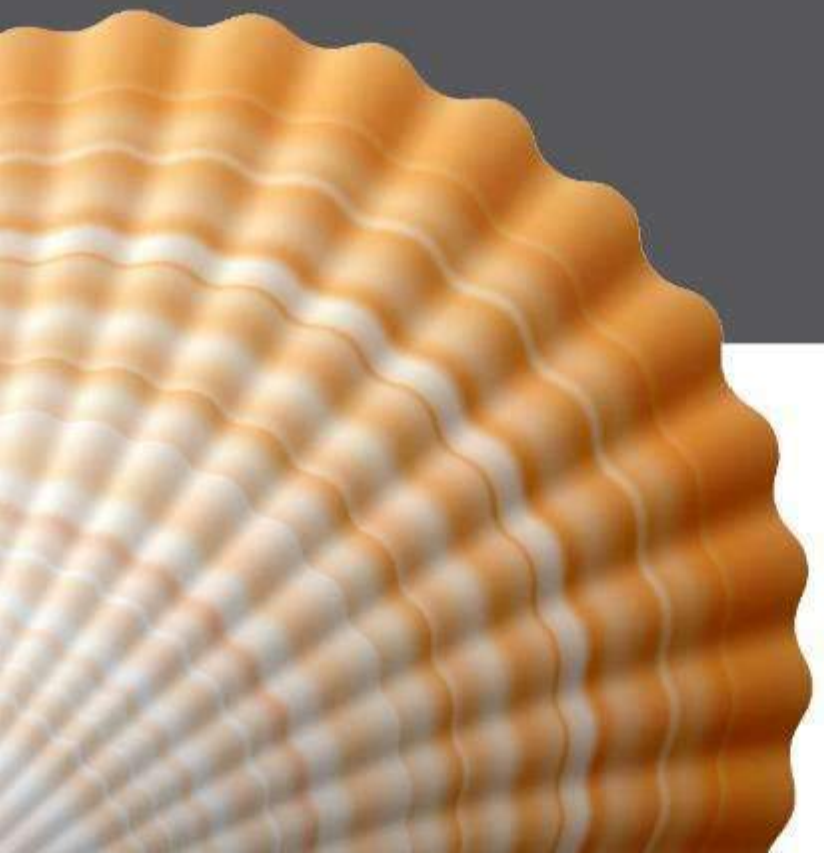

Hazel Curtis

Interim Director of Corporate Relations
Seafish

Why isn't the current model working?

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UK Scallop Management Conference 2019

Current state of play:

Why isn't the current model working?

Hazel Curtis
Interim Director of Corporate Relations
(former Chief Economist)

4 FEBRUARY 2019

Why isn't the current model working?

What is the current model?

What does it actually look like?

What would "working" look like?

What's missing from the model?

What is the current model?

- No management plan
- Series of regulations
- Varies around UK
- Input limits – boats, days, dredges
- No landing limits
- Minimum landing size

What would "working" look like?

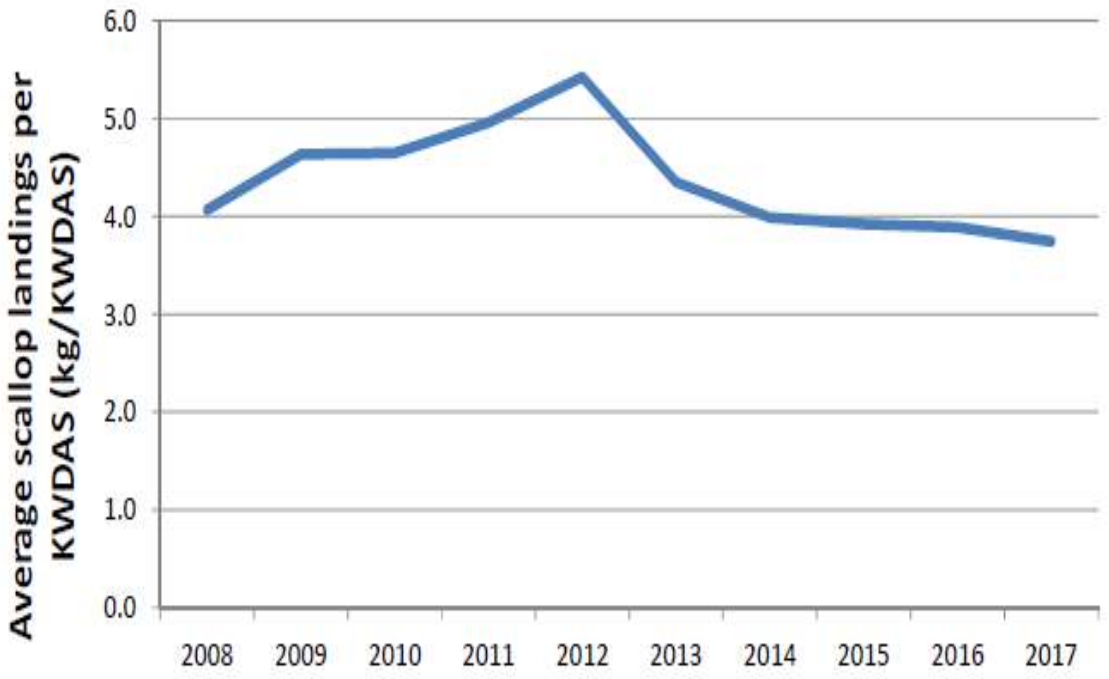
- Healthy stocks, stable or cyclical
- Viable catch rates per hour / day
- Safety and wellbeing for crews
- Good access to markets, good prices
- Certainty about future opportunities
- Stable number of profitable vessels

What does it actually look like?

Healthy stocks, stable or cyclical

What does it actually look like?

Viable catch rates per hour / day



What does it actually look like?

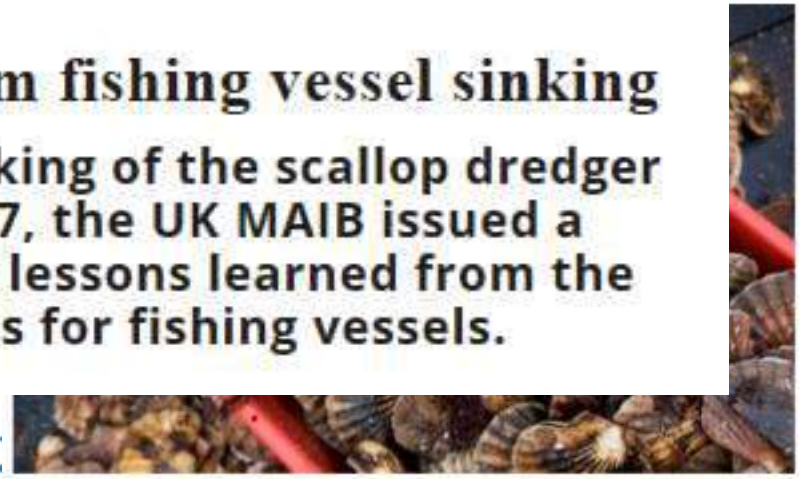
Safety and wellbeing for crews

UK police rescue nine suspected victims of slavery from British trawlers

Two Britons were arrested after the men, from Africa and Asia, were taken to safety after allegedly working unlimited hours at sea with little rest and low pay

UK MAIB: Safety lessons learned from fishing vessel sinking

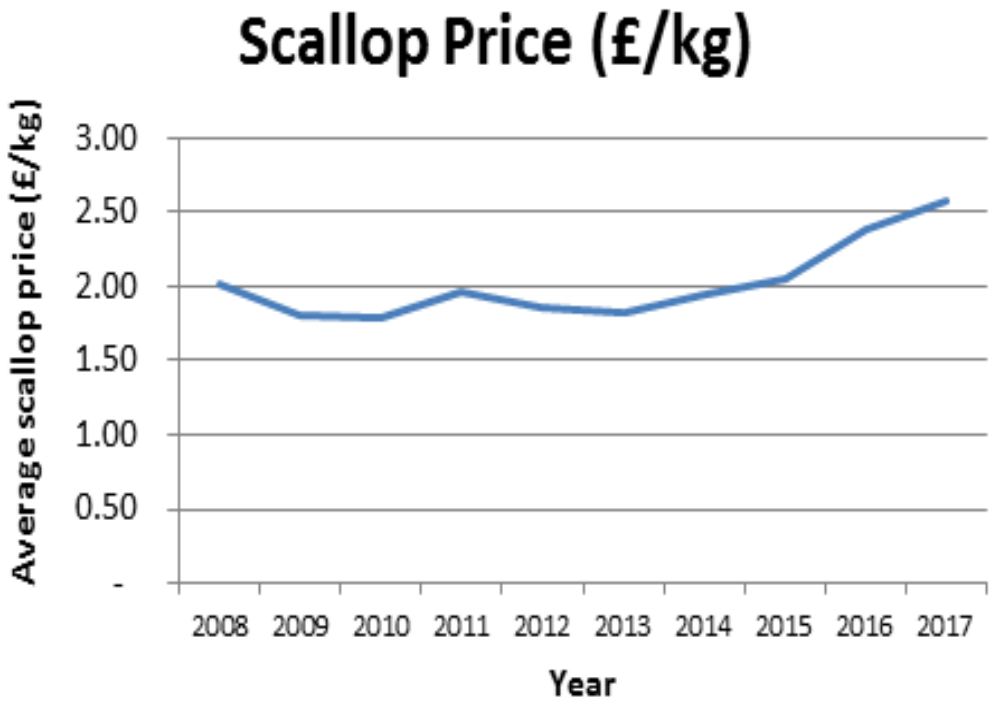
As part of its safety investigation on the sinking of the scallop dredger 'Solstice' with one fatality in September 2017, the UK MAIB issued a safety flyer for the fishing industry to share lessons learned from the casualty which raised poor stability concerns for fishing vessels.



▲ The nine rescued crew members were working on a pair of British scallop trawlers. Photograph: Murdo MacLeod for the Guardian

What does it actually look like?

Good access to markets, good prices

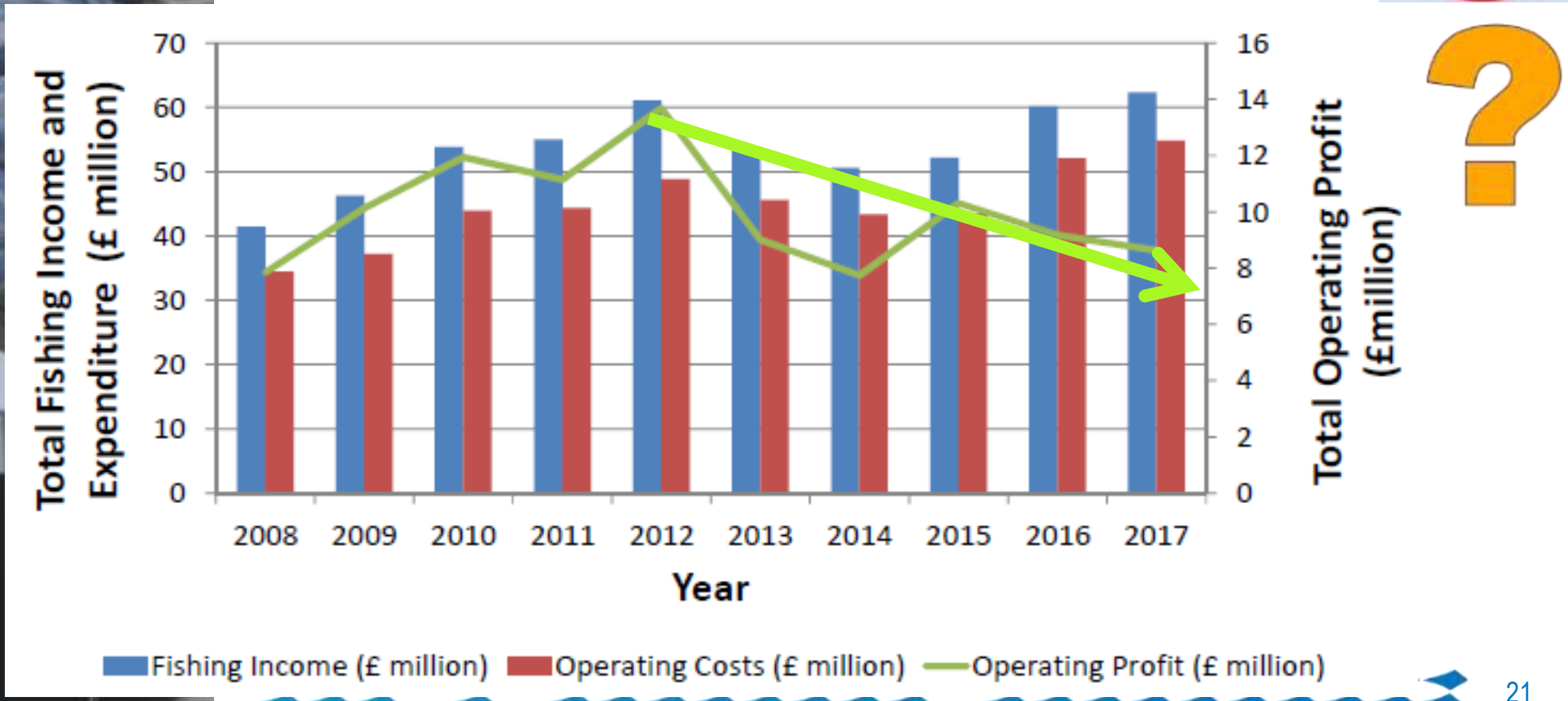


What does it actually look like?

Certainty about future opportunities

What does it actually look like?

Stable number of profitable vessels



What's wrong with the current model?

Missing elements or scope for improvement

- **Stock assessment** – agree sustainable harvest levels
- **Output limits** – protect stocks by directly restricting harvest levels
- **Tradable fishing rights*** – investment in appropriate number of vessels
- **Monitoring & enforcement** – ensure harvest levels & rights
- **Certification?** – crew welfare; vessel standards; sustainable stocks
- **Co-management** – get the best plan, most likely to be observed

Thank you

Hazel.Curtis@seafish.co.uk

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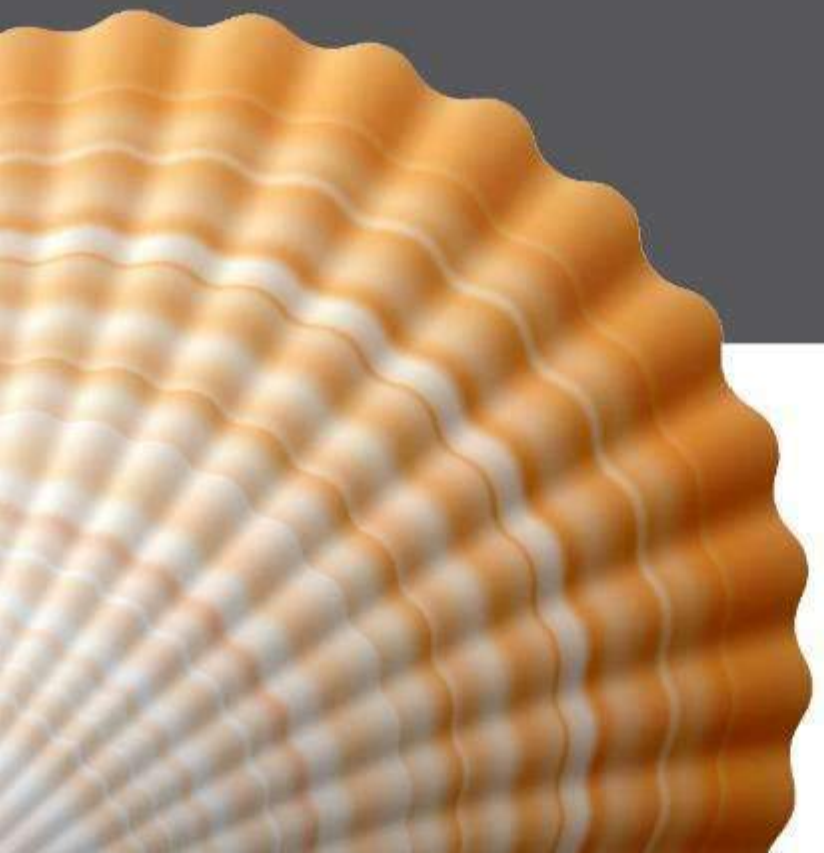

Jim Portus

Chair, Scallop Industry Consultation Group

What are the risks of the status quo and to the marketplace; why is management needed?

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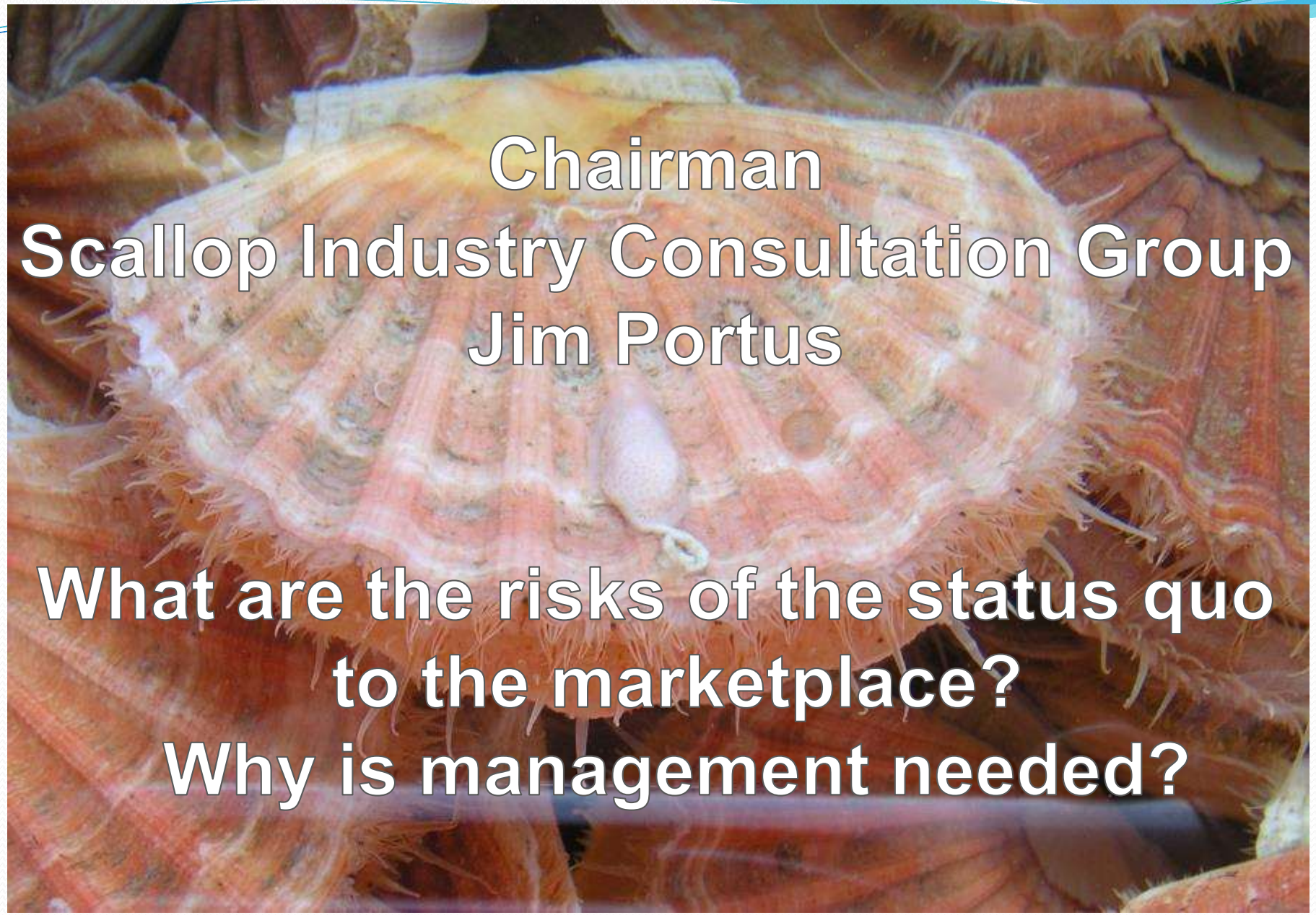
Chairman
Scallop Industry Consultation Group
Jim Portus
What are the risks of the status quo to the marketplace?
Why is management needed?

Pecten Maximus at Home

This presentation:

- 1. A very brief history of King Scallop production in UK waters.
- 2. The political stuff from 1972.
- 3. The technical and structural stuff.
- 4. The environmental stuff.
- 5. The economic stuff.
- 6. Risks of status quo distilled from 1 to 5.
- 7. Requirement for new, sustainable management to provide: industry buy-in, data sufficiency, adequate protection of stock, habitats & ecosystem, plus conflict resolution while also providing economic wellbeing.

The history stuff:

1. Dredging for King Scallops in UK waters has a relatively short history. Post-war and until the mid-70s, the fishery was undeveloped.
2. Significant growth of the scallop sector started around 1975.
3. Improvements in scallop processing helped maintain product quality from catcher to consumer.
4. The market burgeoned. Investment was not impeded.
5. In the early days, vessels dredged only seasonally, exploiting inshore scallop beds and not migrating.
6. Pressure on diminishing quotas and inadequate decommissioning led to increased investment.

The political stuff:

1. The Common Structural Policy (2141/70) was the first component of what would become the Common Fisheries Policy. The Common Market Organisation (CMO) (2142/70) was the second.

For scallops and certain other stocks, there is no TAC & Quota under the CFP of 1983, but there is Effort Limitation under the CFP of 1993, (as amended in December 1995.)

4. The CMO objectives have been to:
   - : Correct the most negative effects of the imbalance between supply and demand;
   - : Stabilise prices in order to guarantee a minimum level of income for fishermen;
   - : Promote the general competitiveness of the Union fishing fleet on world markets.

5. The first UK “recognised” POs were started in 1974.

More of the political stuff:

- The setting of quotas, from 1983 on, is influenced by political pressure so that the end result has been to allow too much fishing.
- From inception of the CFP Agreement of 1983, Quotas have been considered an insufficient method of control of fish stocks and have been supplemented by "effort control“.
- Effort control measures were agreed in 1995. They are based on kilowatt days.

The environmental stuff:

1. The rapid growth rate of the Scallop fleet and associated harvest tonnages over the decade to 2014 and its high value to the UK would not, of themselves be causes for concern.
2. It is Scallop harvesting BY DREDGE that has brought the fishery into general concern.
3. Fish buyers are acutely aware that their customers, the consumers, are watching the likes of “Hugh’s Fish Fight”, Blue Planet etc.

The economic stuff:

- Total annual effort by scallop revenue-dependent vessels increased by 53%, from around 18,500 dredging days at sea in 2008, to over 28,000 dredging days at sea in 2016.
- Landings of king scallops by revenue-dependent vessels increased from around 19,000 tonnes in 2008 up to nearly 30,000 tonnes in 2012.
- Landings per dredge per day at sea all increased from 2008 to 2012.
- King scallop prices increased from £2.01 in 2008 to £2.34 in 2016.
- The average UK fuel price to the fleet fell from £0.55 per litre in 2013 to £0.34 per litre in 2016.

The “New management” stuff: Neither fish nor fuel!

- Newhaven dredges are very inefficient at catching small scallops.
- Dredges can modify the seabed habitats that encourage spat settling. Spatial controls are needed (MCZs).
- Management plans that separate static and mobile fisheries should be developed.
- Scallop fishing is not “unregulated”. There are existing gear restrictions, fish MLS, vessel size limits, seasonal closures, curfews, “Golden-miles”, MPAs, iVMS controls, AIS controls, license capping, permit schemes, potting agreements etc. These should be registered and their benefits quantified.
- Sustainability must be deliberate and profitability should not depend on the price of fish or of fuel!
- We must ensure that good new management measures provide protection for nurseries, healthier ecosystems, conflict resolution and long-term economic benefits to support investment decisions.

Let success be our legacy!

- Not only will the market not forgive us if we fail to act responsibly now for the sake of the marine environment and its ecosystems, but
- The risks are real that the trends of productivity exposed by Seafish will continue downwards.
- We will have failed in the key duties of responsible fisheries managers.
- We must deliver adequate protection of breeding stock, habitats & ecosystem, plus conflict resolution while also providing economic wellbeing sustainably.
- Success must be our legacy, not failure!
- Thank you.

References used in this PPT.

- https://www.cefas.co.uk/publications/lableaflets/lableaflet51.pdf
- https://oceana.org/blog/how-science-and-bit-luck-brought-atlantic-sea-scallops-back-brink
- http://www.sift-uk.org/media/file/Howarth%20and%20Stewart%20(2014)%20Ecosystem%20effects%20of%20UK%20scallop%20fisheries.pdf
- http://eprints.whiterose.ac.uk/105473/1/Beukers_Stewart_Beukers_Stewart_2009_Scallop_Fisheries_Management.pdf
- https://www.seafish.org/media/Publications/2nd_Edition_Scallop_report_FINAL_Dec2017.pdf

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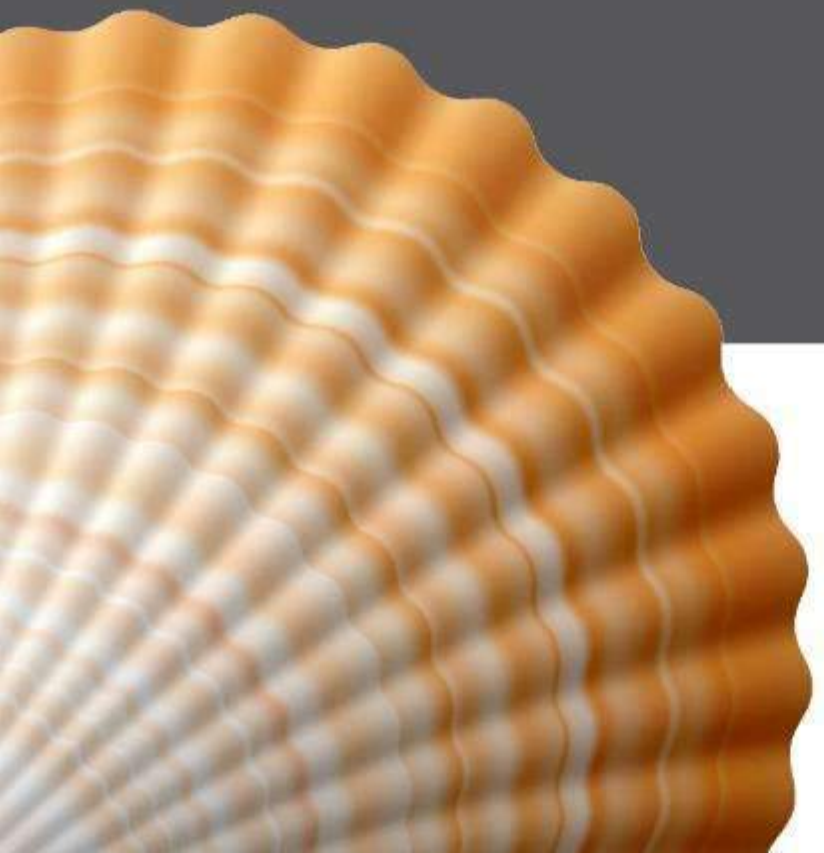

Lynda Blackadder

Chair, ICES Scallop Working Group

What do we know about the stocks and what are the evidence needs to inform future management decisions?

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Scallop Stock Science

Lynda Blackadder
Chair ICES Scallop WG

Scottish Government
Riaghaltas na h-Alba
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SCIENCE
STOCK ASSESSMENT
WGSCALLOP

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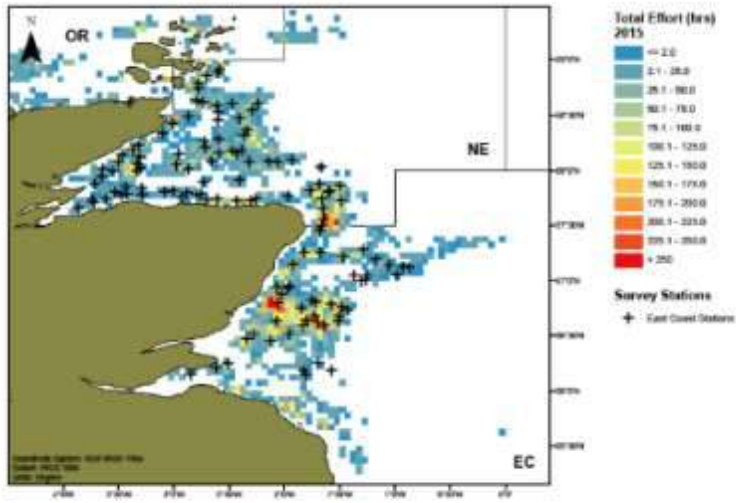
Science



Stock assessment

The **state of the stock**

- how has the stock performed up to the present
- makes use of historical data

How we respond to that state

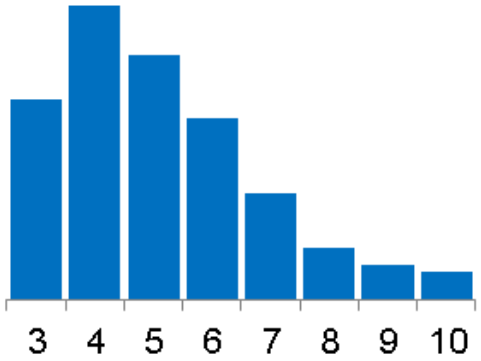
- a forward look (a **forecast** or prediction) of what will happen if we take certain action

Recent approaches to scallop stock assessments

- **MSS 2016** (King scallop, dredge survey and commercial sampling, stock status based on model outputs)
- **NAFC 2016** (King scallop, VPA)
- **IoM 2018** (King and queen scallop, dredge survey , CSA, catch advice based on precautionary approach)
- **CEFAS 2018** (King scallop, dredge survey and UWTV, harvestable biomass)
- **IFREMER 2018** (King scallop, dredge survey, exploitable biomass)
- **Bangor University/AFBI** – in progress

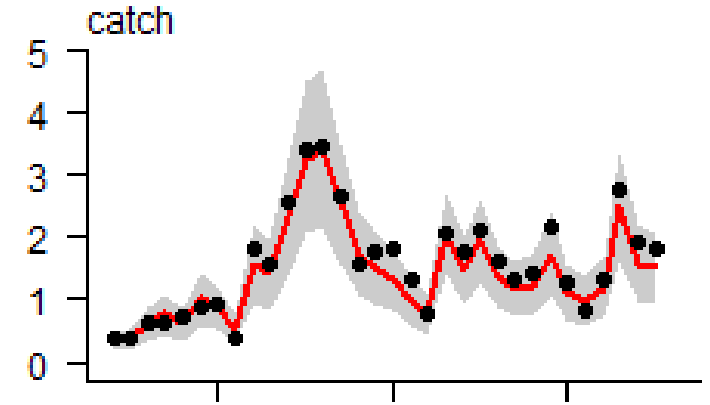
Output from model

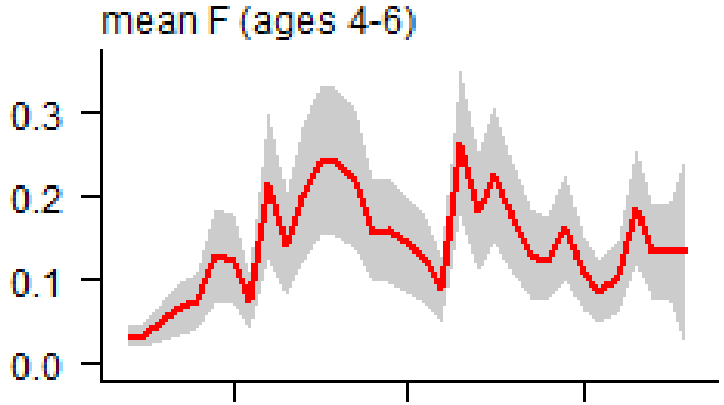
Landings data (logbooks)

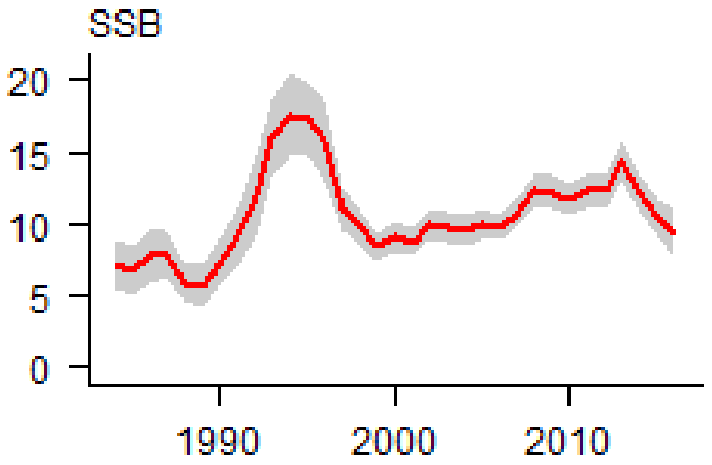


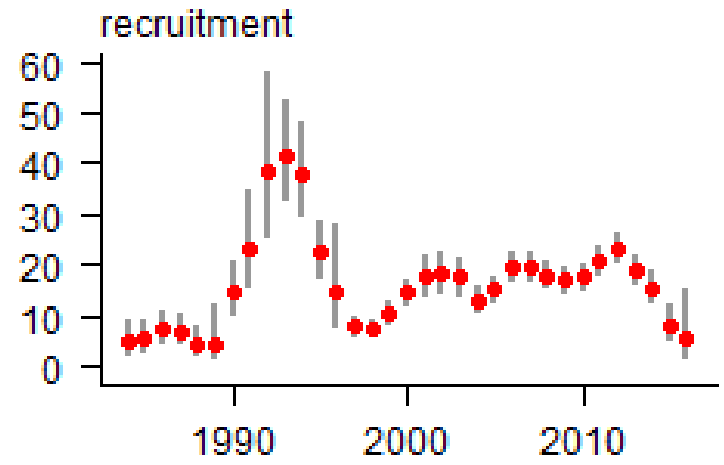
Population model

Survey data and sampling (catch at age)



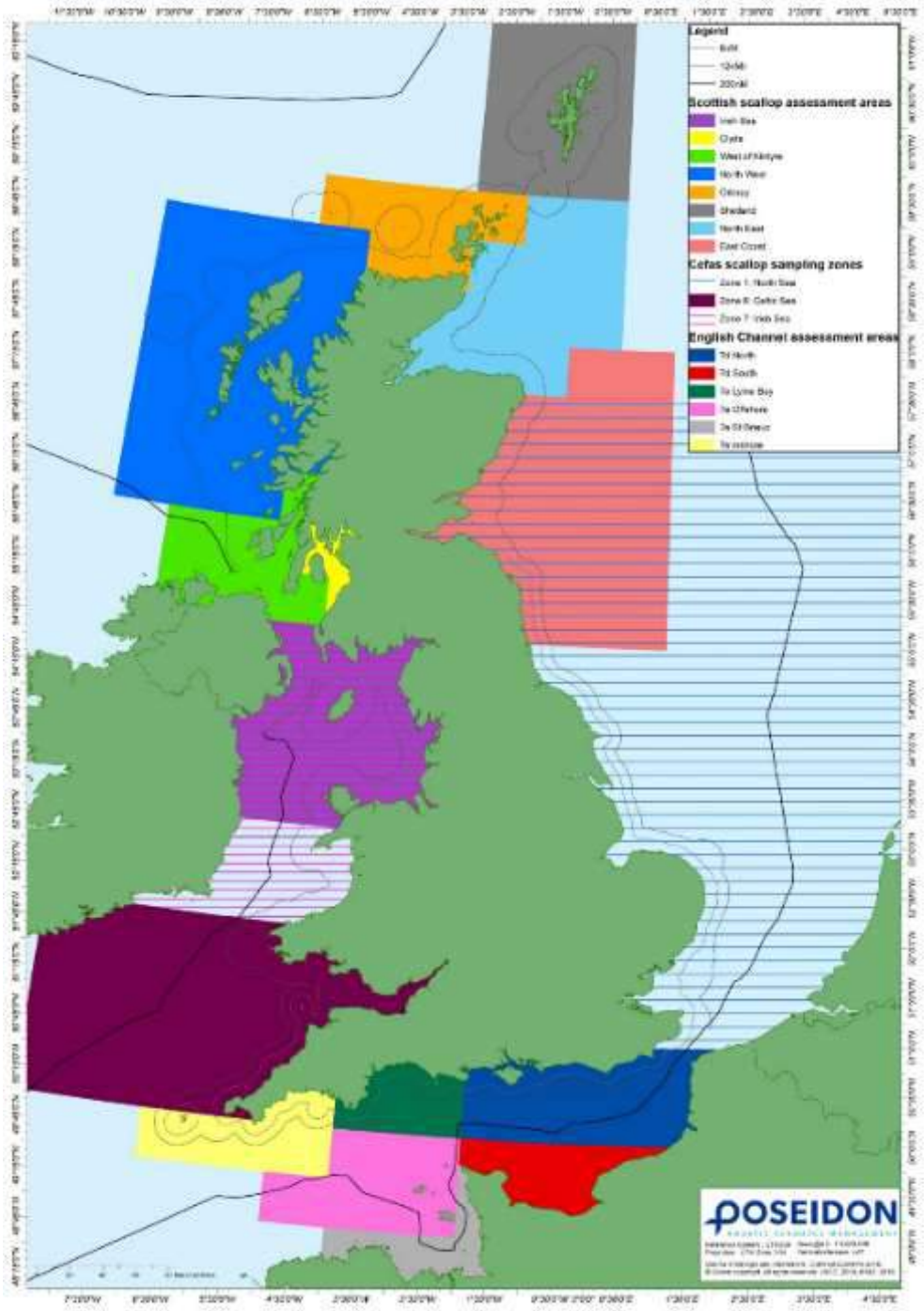






marinescotland science

			ToR 1, 2, and 5	
ICES	**Stocks**	**Species**	**Data support**	**Assesments**
IVa	Shetland	King	Landings (sq), VIMS, 2 surveys, C at Age,	C at Age TSA, VPA, LPUE
	Moray Firth	King	Landings (sq), VIMS, 1 surveys, C at Age,	C at Age
IVb	East coast Scotland/England	King	Landings (sq), VIMS, 1 surveys, C at Age (limited)	Survey based
VIId	Bay of Seine	King	Survey; logbooks; effort; landings; VMS	TAC
	Greenwich Buoy	King	logbooks;effort; landings;VMS	Effort
	Sussex	King	logbooks;effort; landings;VMS	None
	Bassurelles	King	logbooks;effort; landings;VMS	Effort
VIIe/h	Cornwall	King	VMS, historical survey	None
	Greater Baie de St Brieuc	King	Survey;logbooks; effort; landings	TAC
	West Brittany	King	Survey; logbooks; effort; landings	Effort
	Lyme Bay	King	logbooks; effort; landings	Effort
	Baie de Brest	King	logbooks; effort; landings	Effort
	Casquets	Queen	logbooks; landings	None
VIII	Glenan	King	logbooks; effort; landings	Effort
	Pertuis/Charentais	King	logbooks;effort; landings; historical surveys	Effort
	Belle ile en Mer	King	logbooks; effort; landings	Effort
VIIg	Celtic Sea	King	logbooks, VMS; historic survey, size data	Trend
VIIa	Tuskar	King	logbooks, VMS; historic survey, size data	Trend
VIIa	Cardigan Bay/Liverpool Bay	King	landings; logbooks; VMS; 2 years survey	landing size, engine power, # of dredges, gear specs, closed areas
(Isle of Man)	Liverpool Bay/Isle of Man/Scot coast inshore	Queen	21 yrs surveys(I of M); logbooks; VMS; landings	landing size, # of dredges, gear specs, closed areas
	Liverpool Bay/Isle of		21 yrs surveys(I of M);	landing size, # of dredges


Legend
Scottish scallop assessment areas
Cefas scallop sampling zones
English Channel assessment areas
POSEIDON

International Council for the Exploration of the Seas

“Provide the best available science for decision-makers to make informed choices on the sustainable use of the marine environment and ecosystems.”

WGSCALLOP

2012

Initial scallop study group

2013

- “Progress towards provision of scientific advice on scallops will be greater where a common approach to assessment of stocks can be developed.”

- Data

- Knowledge gaps

So many questions…

Connectivity?

Genetics?

Biology?

Growth?

Mapping?

VMS?

Habitat?

Ageing?

Cameras?

Fishery?

Management?

MPAs?

Gear?

Ecosystem?

Surveys?

WGScallop

- Data on scallop fisheries - most notably north east Irish Sea.
- Stock assessment methods - evaluate other methodologies.
- Attempt stock assessment for the north east Irish Sea.
- Share expertise, knowledge and technical advances.
- Stock structure - improve current mapping of scallop stocks.
- Report on field and laboratory studies.
- Age reading.

Evidence needs will depend on the management system

Lynda.Blackadder@gov.scot

http://www.ices.dk/community/groups/Pages/WGScallop.aspx

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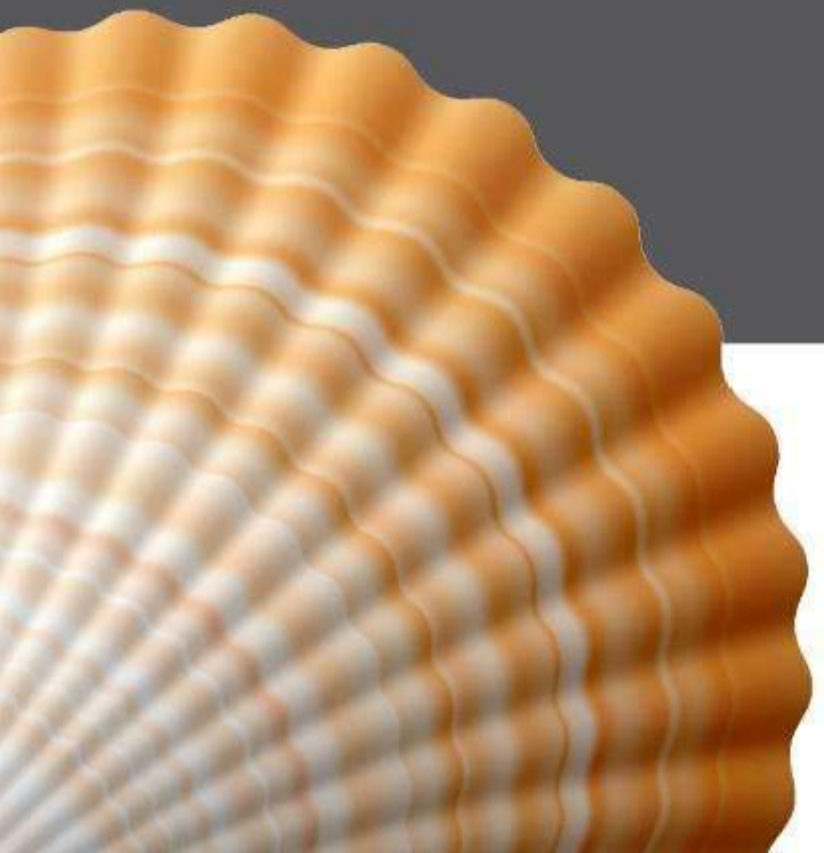

Session 1 – Panel Q & A and Live Polling

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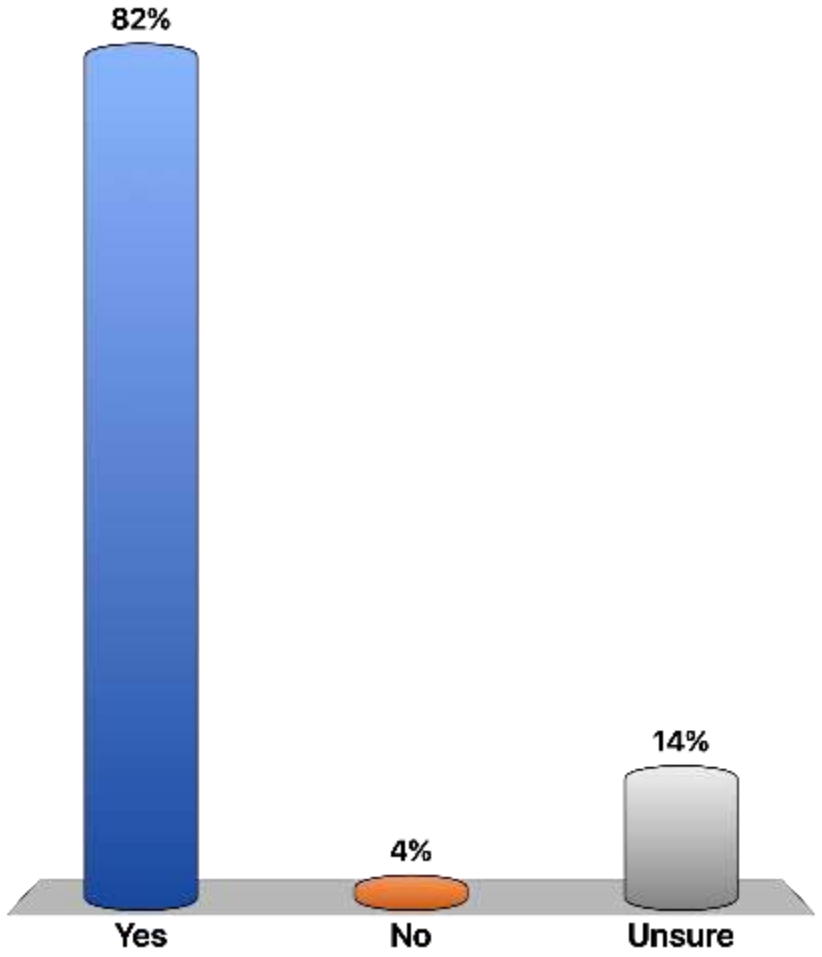
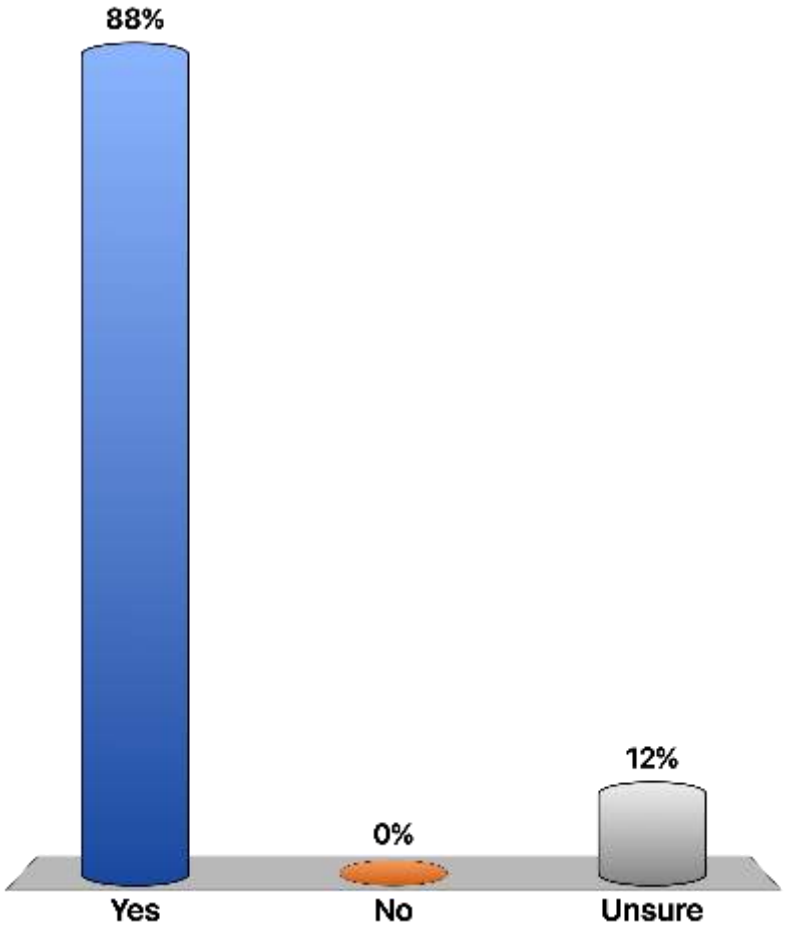
Do you see an urgent need to reform management of scallop fishing in the UK – for the inshore?

A. Yes
B. No
C. Unsure



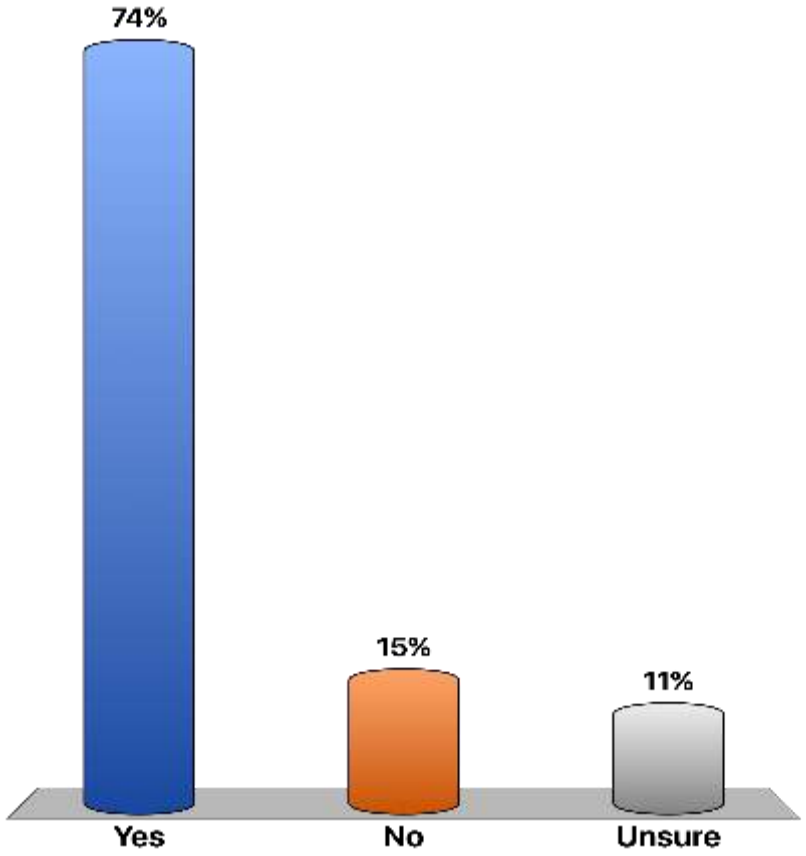
Do you see an urgent need to reform management of scallop fishing in the UK – for offshore fishing?

A. Yes
B. No
C. Unsure



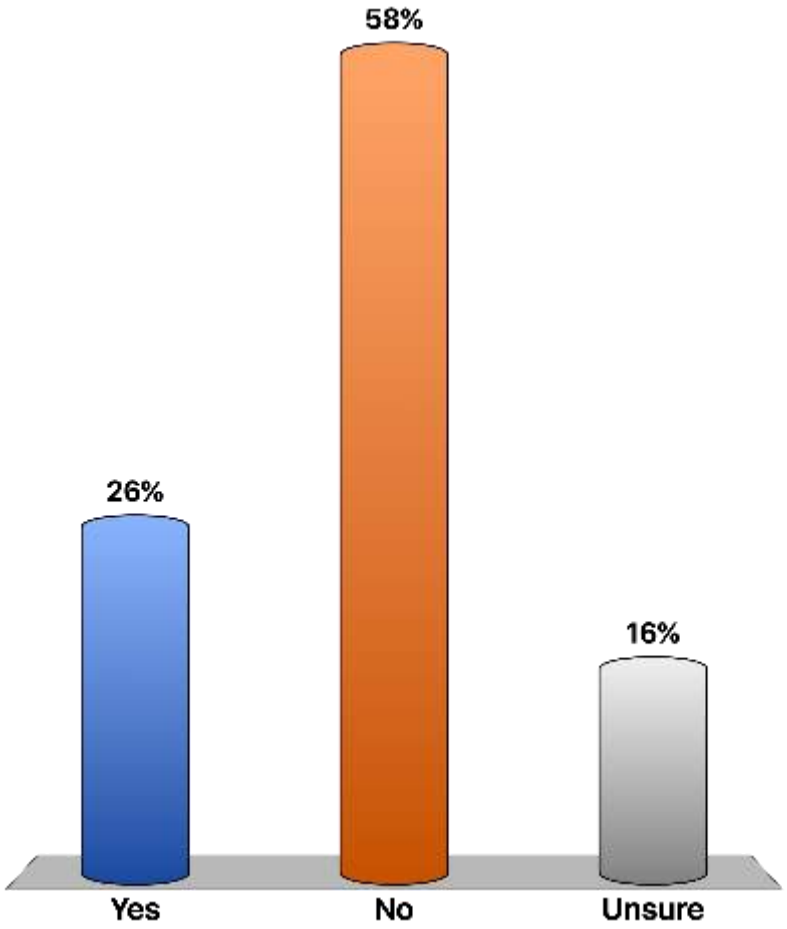
Do you see a need for spatially differentiated management in UK scallop fishing – ie. dividing management measures by ‘inshore’ and ‘offshore’?

A. Yes
B. No
C. Unsure



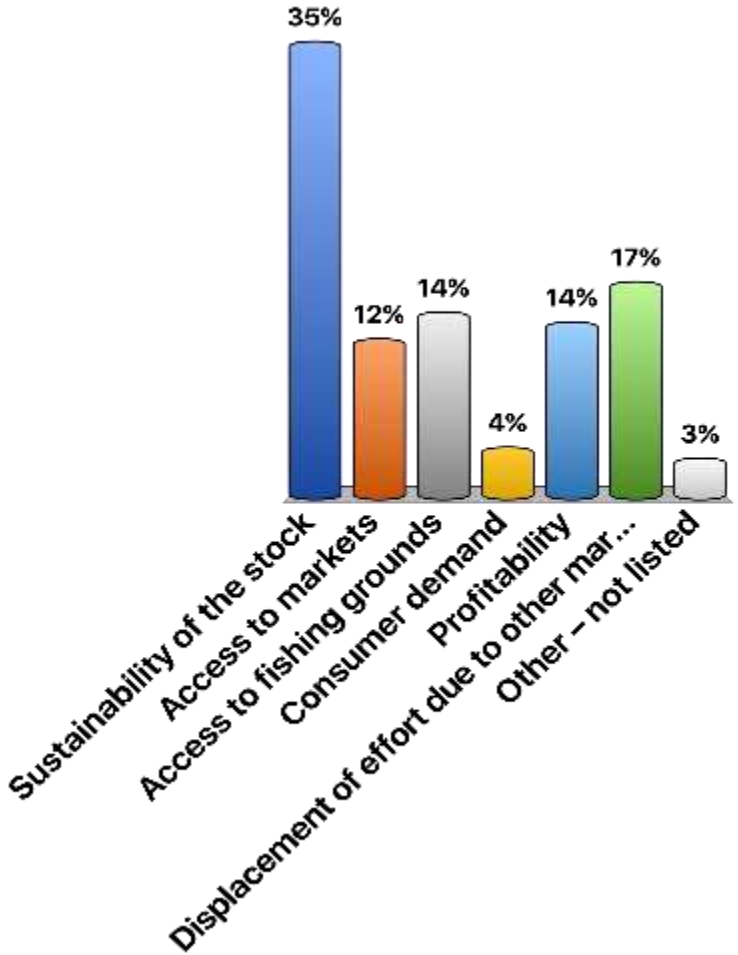
Do you feel well-equipped enough with information about management options to make decisions about the future of your fishery?

A. Yes
B. No
C. Unsure



What are your key concerns for the future? Please rank your top three.

A. Sustainability of the stock
B. Access to markets
C. Access to fishing grounds
D. Consumer demand
E. Profitability
F. Displacement of effort due to other marine users, including static gear fisheries
G. Other – not listed



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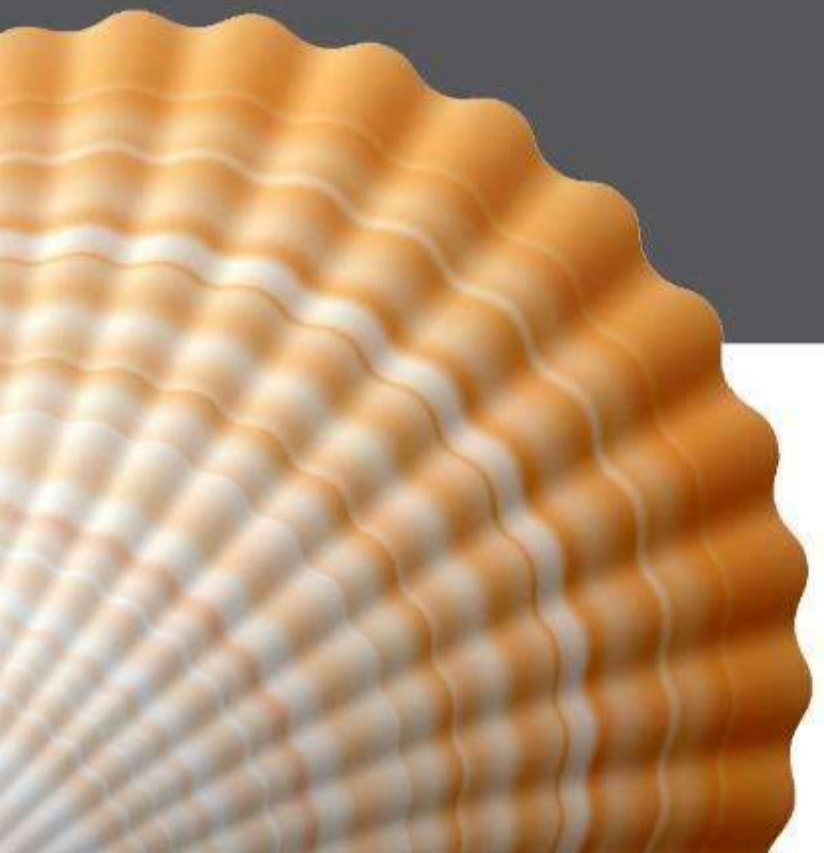

Session 2

Chair: Claire Pescod

Marine Stewardship Council

Inshore fisheries management models

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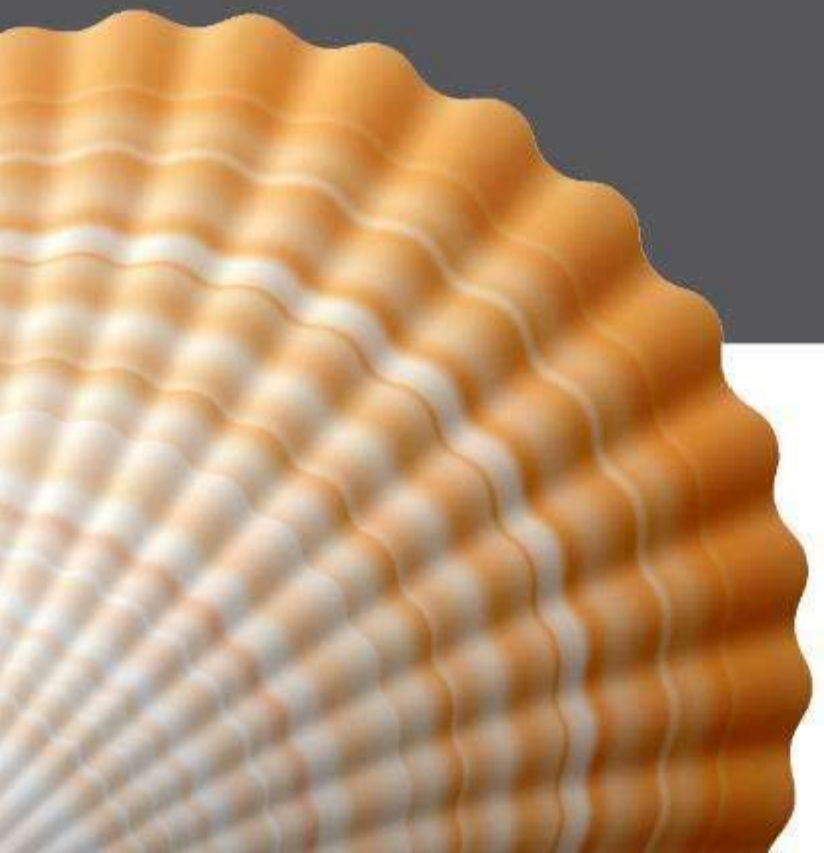

Dr Beth Mouat

Chair | Shetland Shellfish Management Organisation Advisory Committee

Shetland Case Study

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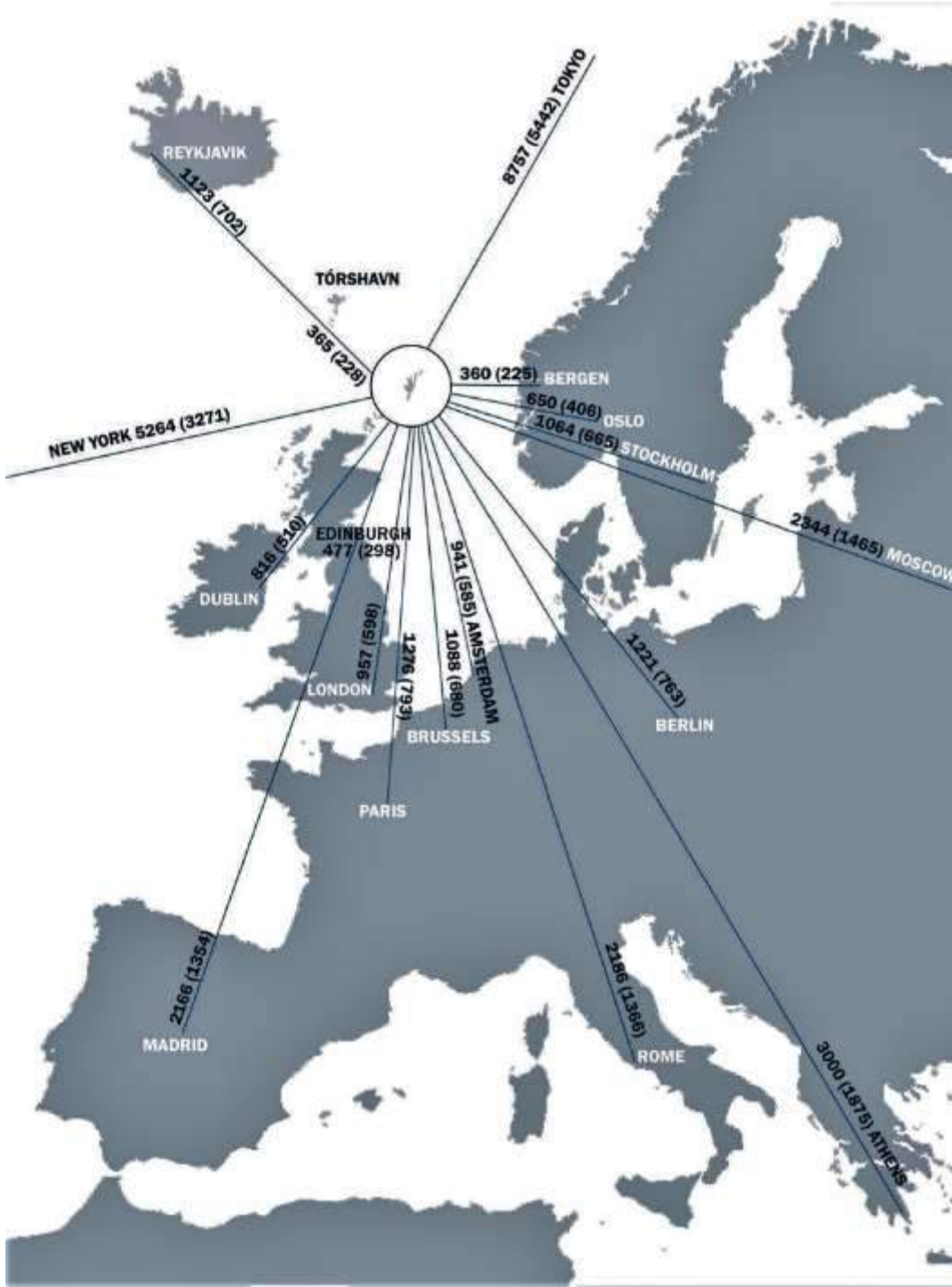
Shetland

- 1697 miles of coast
- Seafood worth £300 million annually
- 104 Shellfish Vessels
- 22 Scallop Vessels



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Shetland Shellfish Management Organisation

- SSMO is a company limited by guarantee
  - Set up in the late 1990s to apply for and implement a Regulating Order
- Desire for local management to deliver long term sustainability

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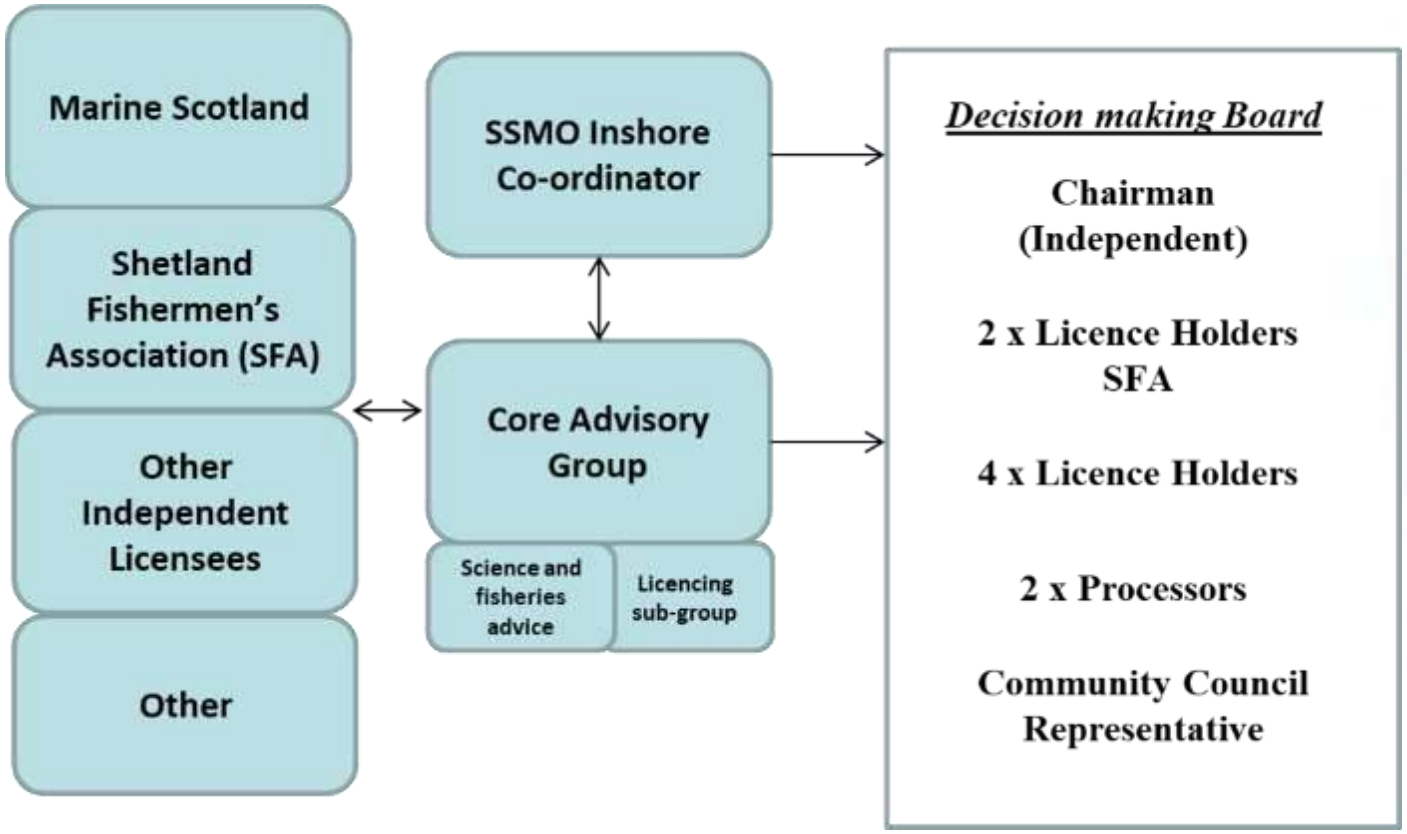
SSMO Management Structure



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Shetland Shellfish Management Organisation

Management Mechanisms

- Regulating order
  - Shetland Shellfish Licence required to fish within the 6 mile limit
  - Mandatory submission of SSMO logsheets
  - Abide by Regulations
  - Management measures approved by Marine Scotland

				King Scallop			Queen Scallop		
Fishing Area	Hours Towed	No. Dredges		Target? ■			Target? ☐		
L11	6	10	Catch	No.	Unit	Weight	No.	Unit	Weight
				1000	IN	kg ☐ st ☐	100	IN	kg ☐ st ☐
			Returns	No.	Unit	Reason	No.	Unit	Reason
				200	IN	U	25	IN	U

				King Scallop			Queen Scallop		
Fishing Area	Hours Towed	No. Dredges		Target? ■			Target? ☐		
L12	5	10	Catch	No.	Unit	Weight	No.	Unit	Weight
				850	IN	kg ☐ st ☐			kg ☐ st ☐
			Returns	No.	Unit	Reason	No.	Unit	Reason
				160	IN	U			

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Shetland Shellfish Management Organisation

SSMO Management Plan

- An active plan supported by policy documents

  - **Vision** - A buoyant shellfish sector based on a sound management system, resulting in fisheries that are managed to ensure long term biological, environmental, and economic sustainability.

  - **Aim** - To continue to maintain sustainable and well managed shellfish fisheries operating within a healthy marine environment.

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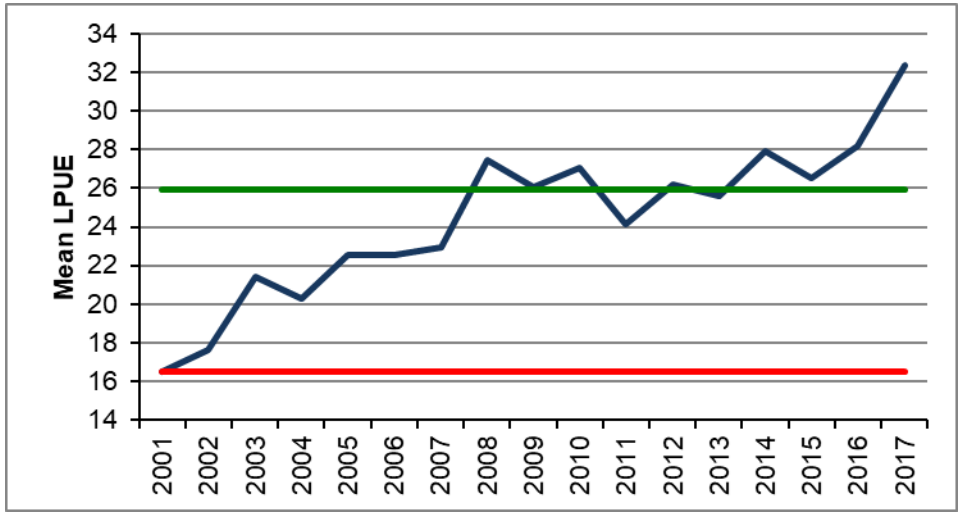
SSMO Management Plan

- Overarching Management and Implementation Plan
- Underpinning policy documents including:
  - Code of Conduct
  - Spatial Management Plan
  - Licencing Policy
  - Harvest Control Rules – linked to fishery reference points



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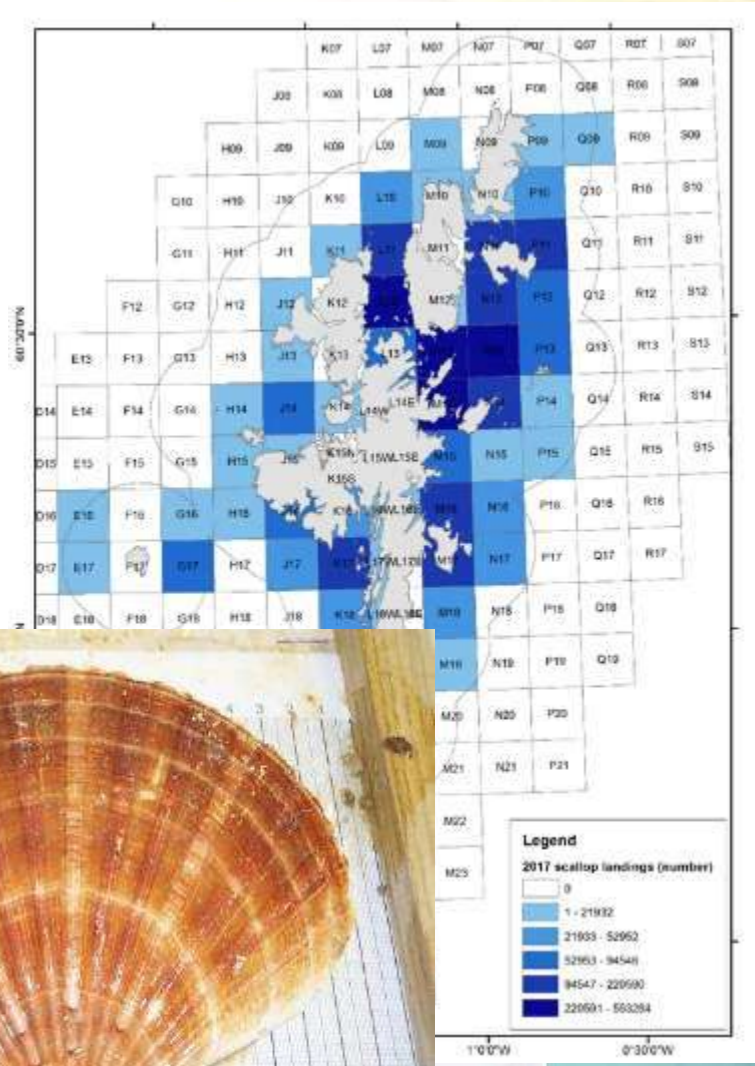
Shetland Shellfish Management Organisation

Scientific Support - NAFC

- Data collection
  - Observers
  - Market sampling
  - Logsheets
- Stock assessment
- Applied research projects



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www.nafc.ac.uk

Shetland Scallop Fleet

- 22 active scallop vessels
- Majority under 10m
- Landings of over 1000 tonnes
- >50% of the value of shellfish landings

Photo: Ryan Nesbit

CERTIFIED SUSTAINABLE SEAFOOD MSC www.msc.org ™

Scallop Management Measures

- Gear Limitations
  - Limited to 5 dredges per side
  - Maximum bar length of 8.80m
- Curfew
  - Fishing only permitted between 6am – 9pm
- Spatial Management
  - Protection of vulnerable seabed habitats

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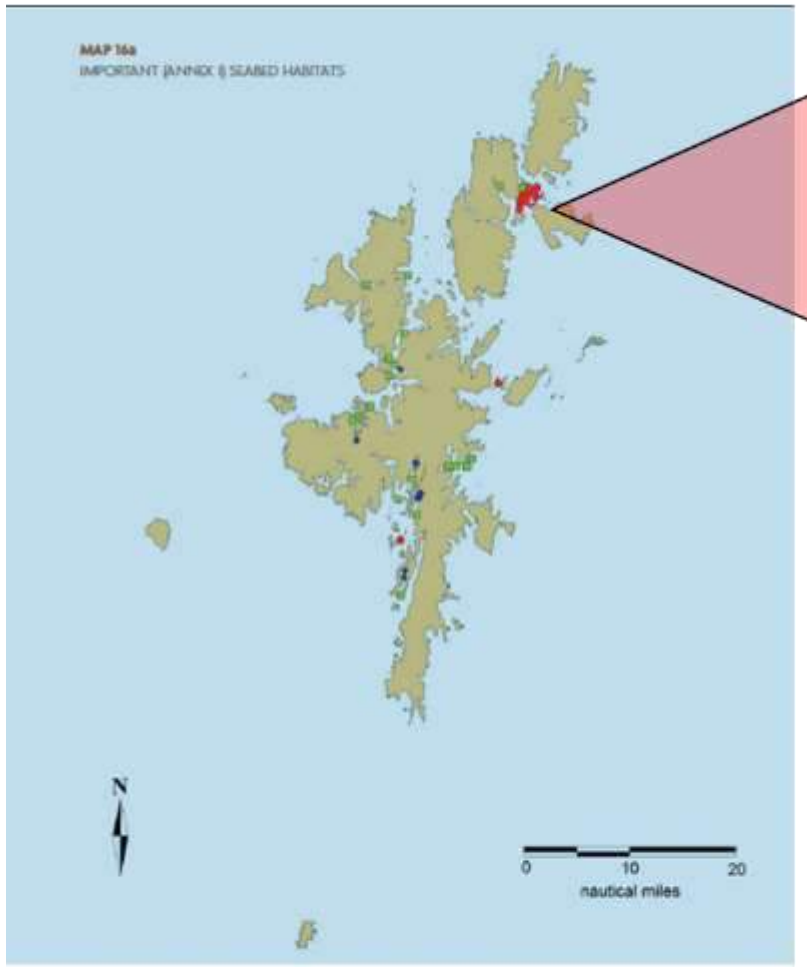

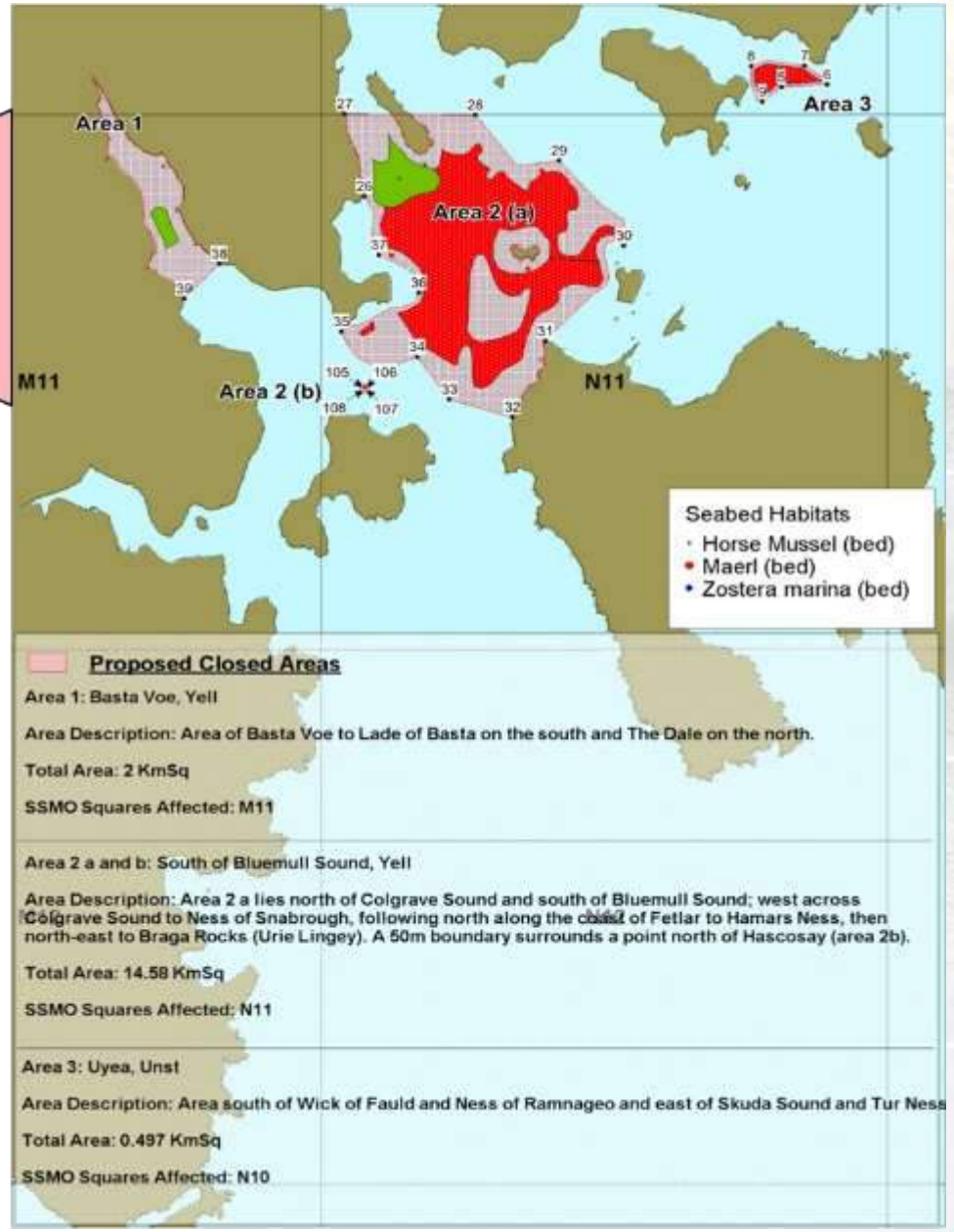

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Shetland Shellfish Management Organisation

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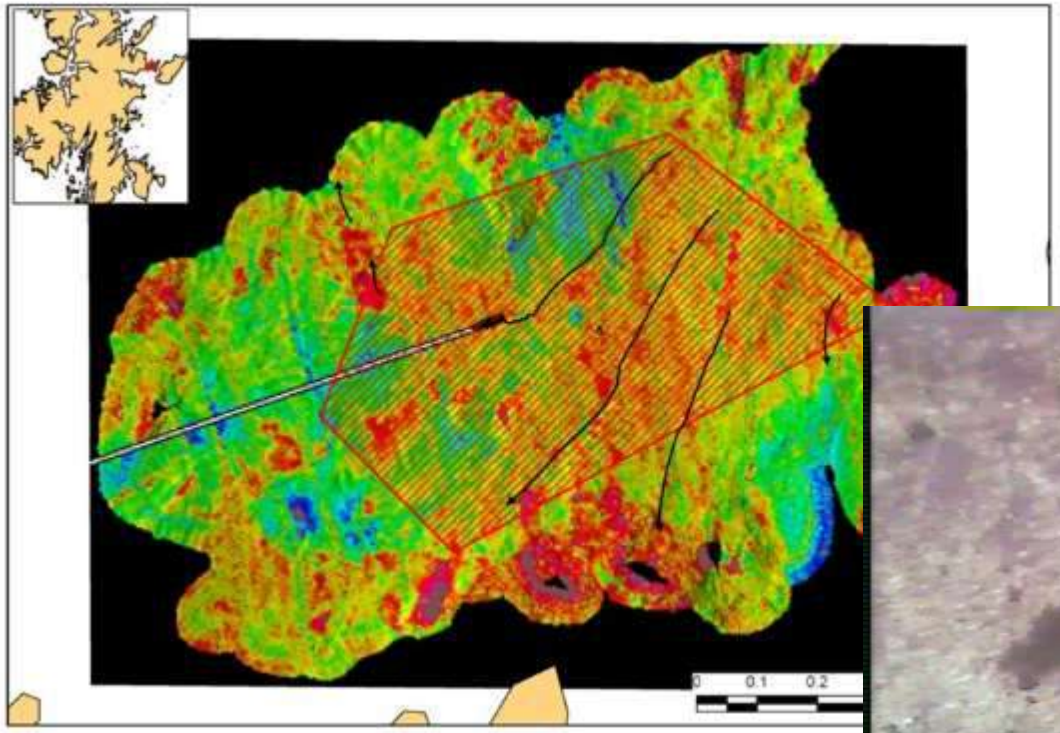
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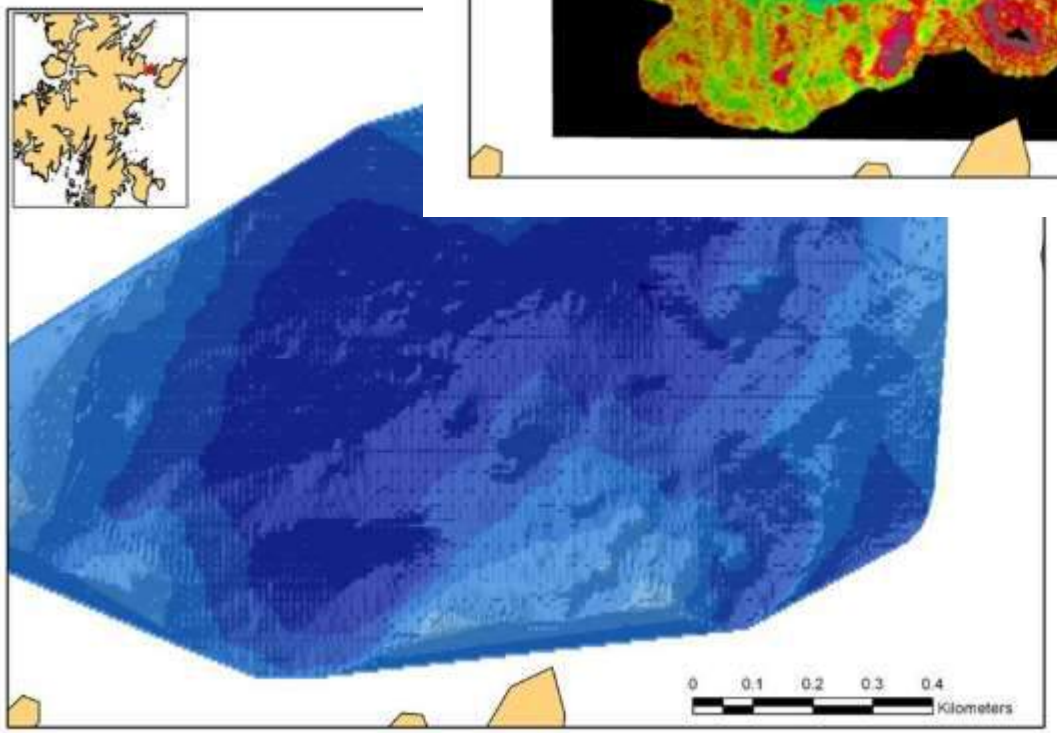
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Kilometers

Vessel Monitoring Systems

- VMS Pilot Study Started in 2013
- Most active vessels selected
  - Covering around 75% of landings
- Data Sharing agreements used to ensure confidentiality

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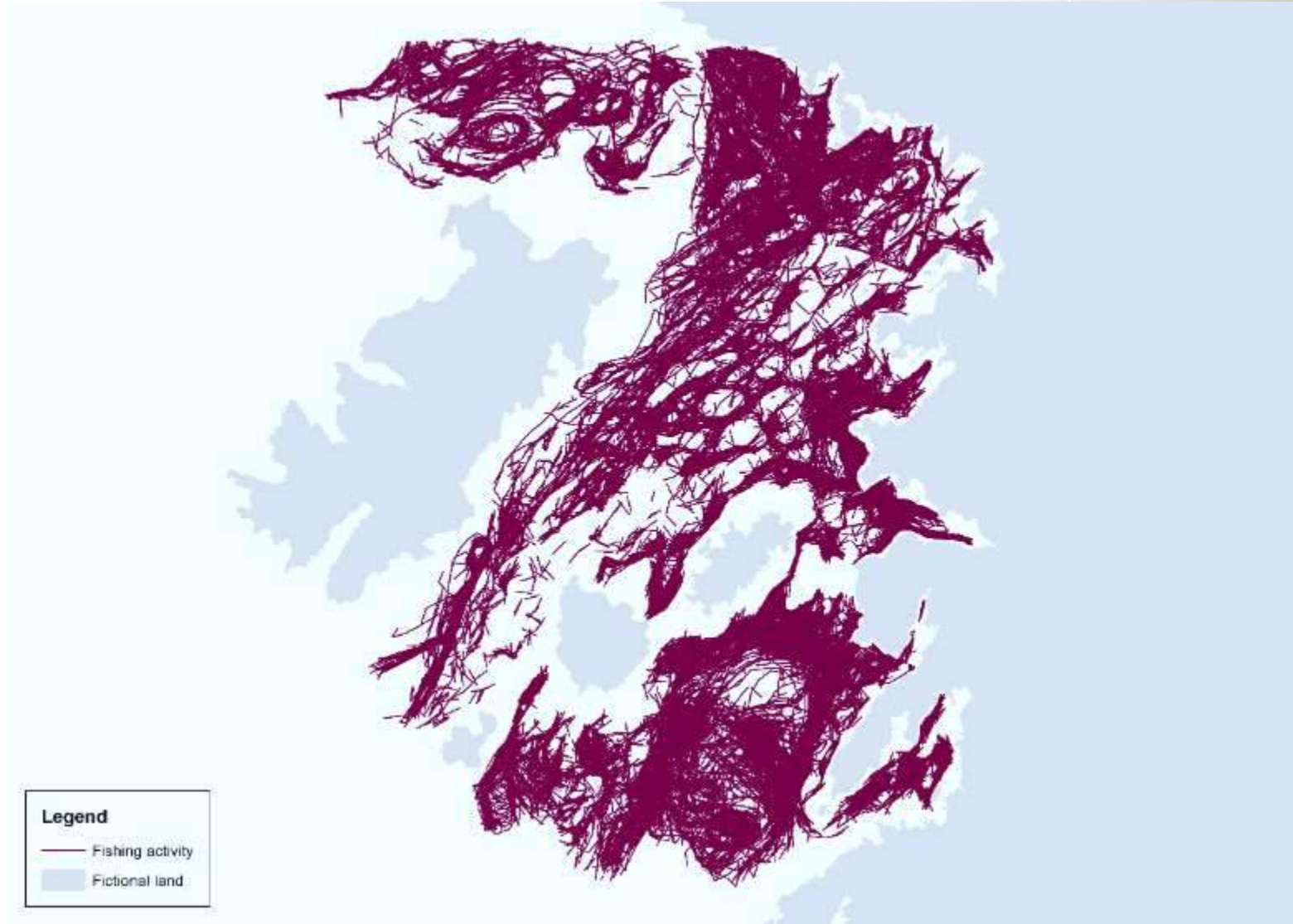
University of the Highlands and Islands

Shetland Shellfish Management Organisation

Vessel Monitoring Systems

- 10 second reporting interval
- High resolution data
- Less than 5% of the seabed is fished



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VMS Data Uses

- Marine Planning
- Stock Assessment
- Detecting breaches of regulations
- Informing discussions on MPA Management
- Informing MSC re-certification and objection process

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Shetland Shellfish Management Organisation

Vessel Monitoring Systems

- Value of data recognised by fishers and managers
- Compulsory VMS for scallop vessels has been approved by the Board
- Working with Marine Scotland to implement within the National System

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University of the Highlands and Islands

Shetland Shellfish Management Organisation

Summary

- Coastal Scallop fishery carried out by small inshore vessels
- Limited access fishery with technical, temporal and spatial management measures
- Local management is facilitating long term biological, environmental, and economic sustainability

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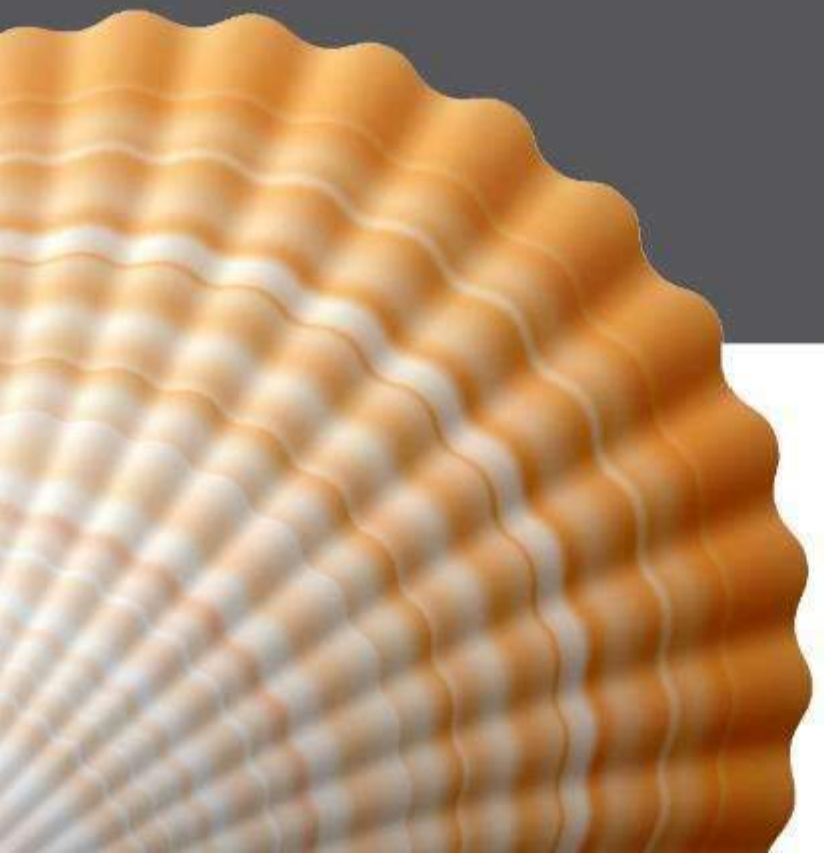


Dr David Beard

Chief Executive
IoM Producer Organisation

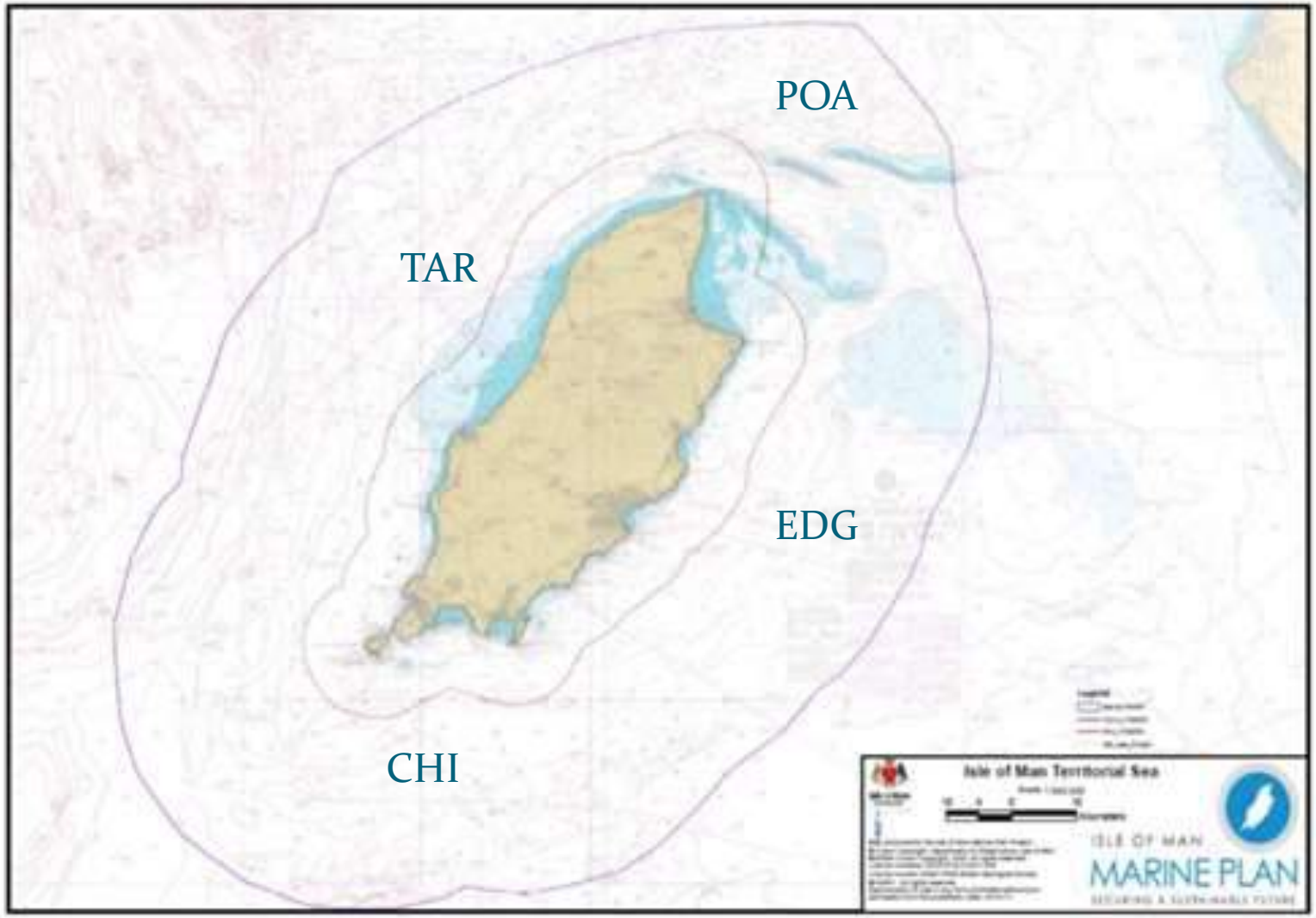
Isle of Man Case Study

Supported by seafish

Management of Inshore King Scallop Fisheries in waters around the Isle of Man

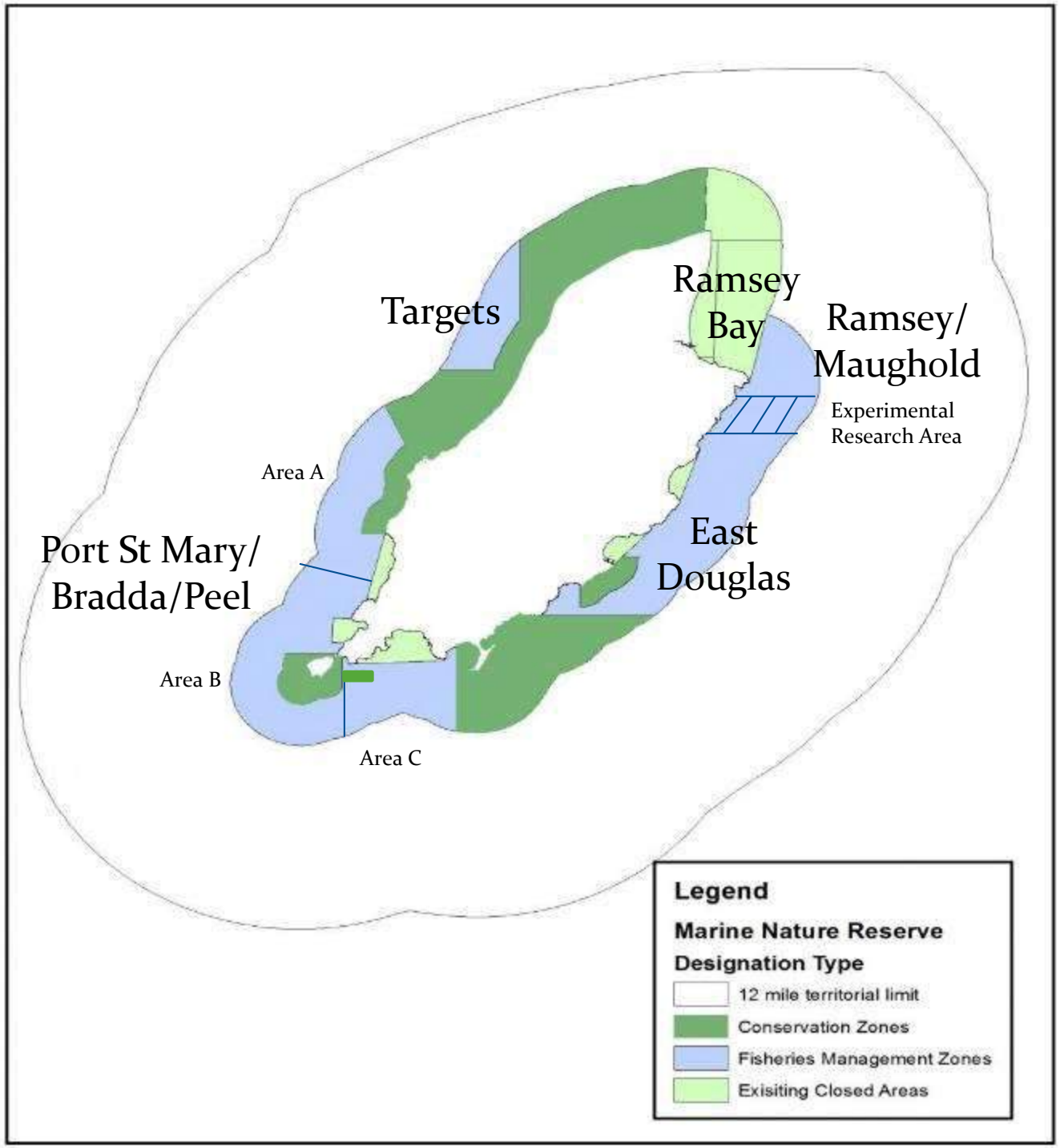
with reference to Ramsey Bay MNR and the 0-3 mile zone

Map of Isle of Man Territorial Sea with 3 mile and 12 mile (or median line) boundaries and main King Scallop fishing grounds



Designations within 0-3 mile area

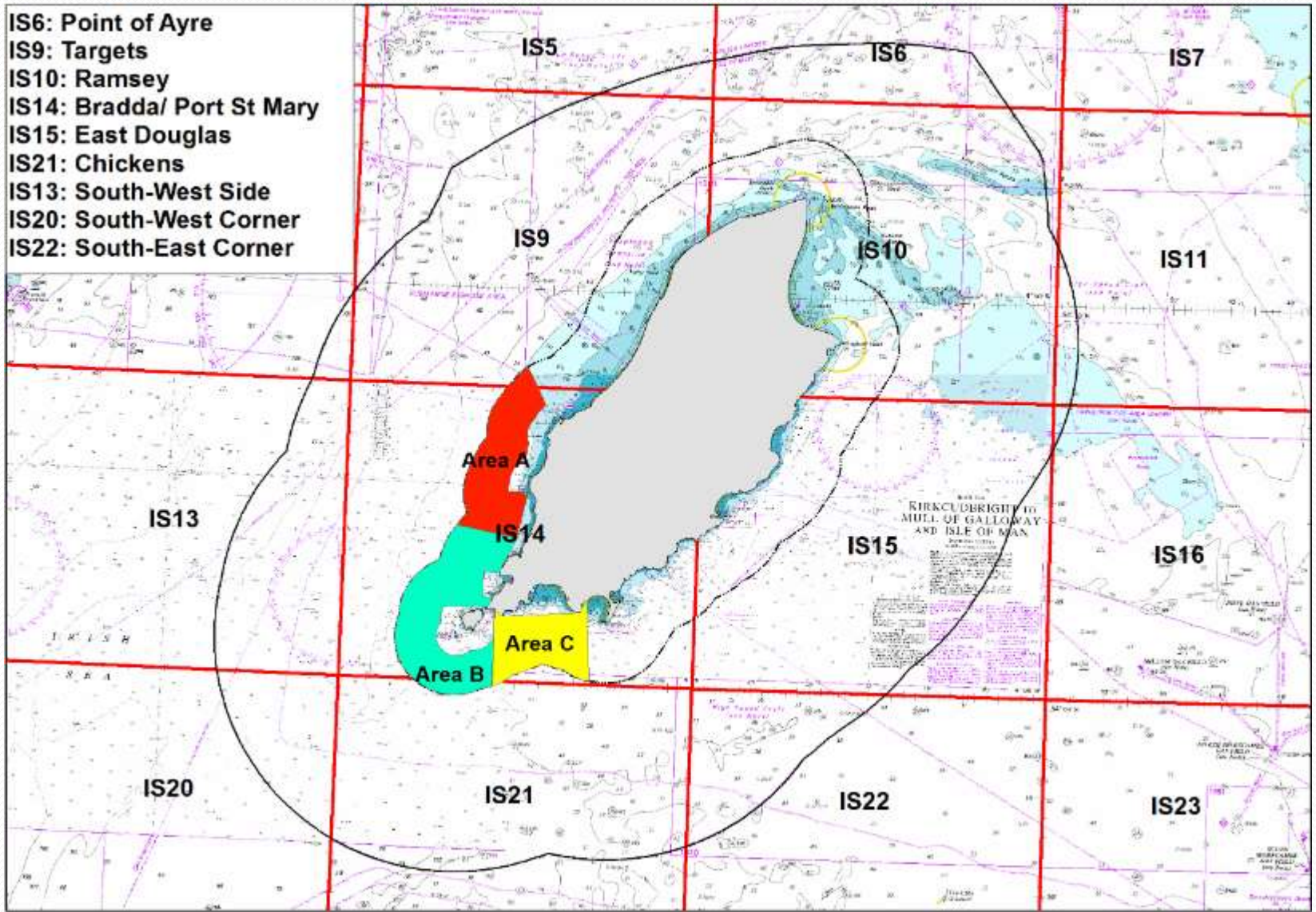
- System of ten Marine Nature Reserves in 0-3 mile.
- Occupy more than 50% of inshore area.
- Designated to protect key environmental areas such as horse mussel reefs, sand banks, eel grass, beds of scallop brood-stock.
- Ramsey MNR is zoned for multiple use. It is possible that certain other MNR's will follow a similar pattern.
- Outside the MNR's, but within the 0-3 mile, there are fisheries management zones.



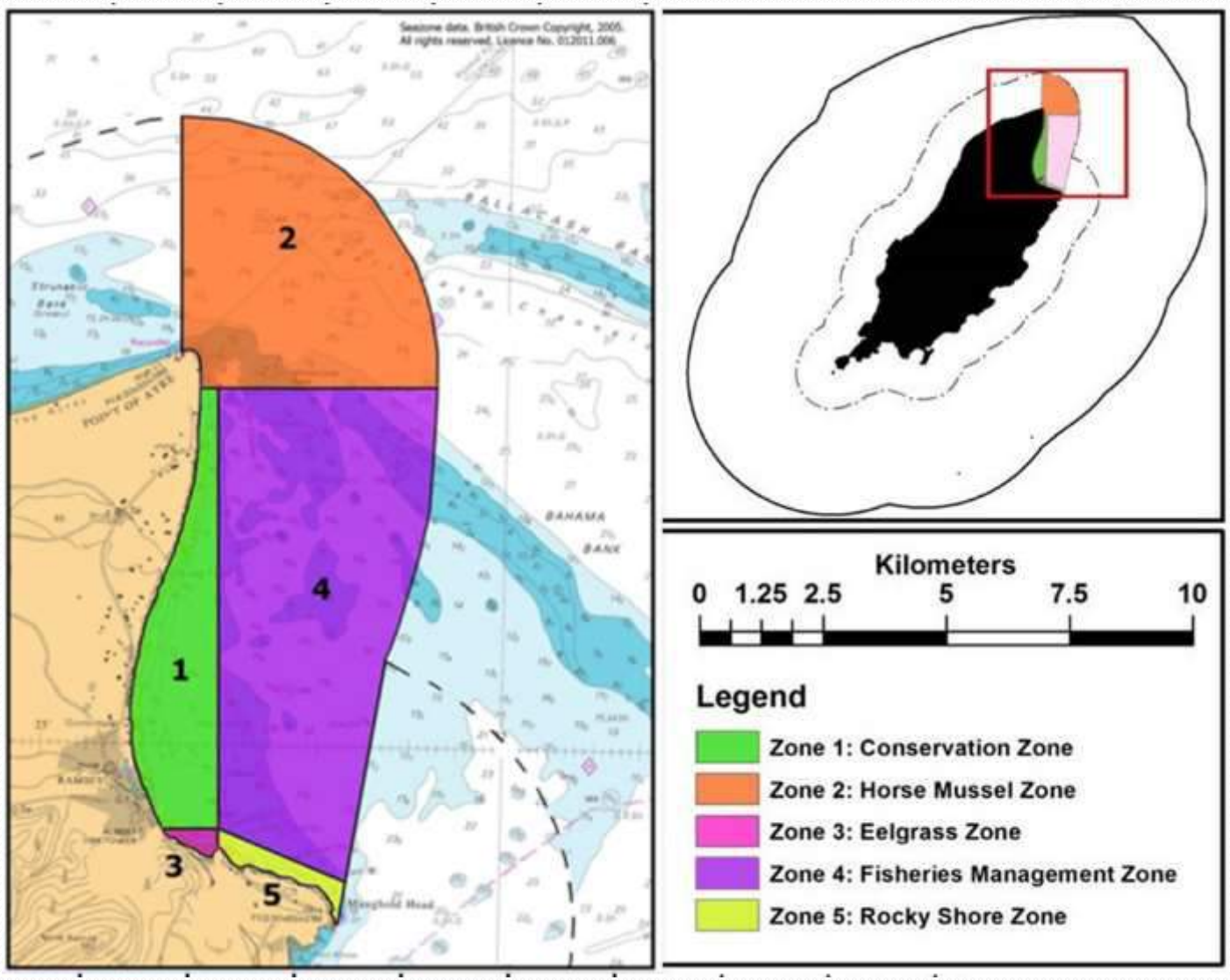
Four main Fishery Management Zones in 0-3 mile:

- Port St Mary / Bradda
- Targets
- Ramsey/Maughold
- East Douglas
- One MNR with restricted fishing (Ramsey Bay)
- One Experimental Research Area

Port St Mary/Bradda/Peel FMZ defined by typical tow data

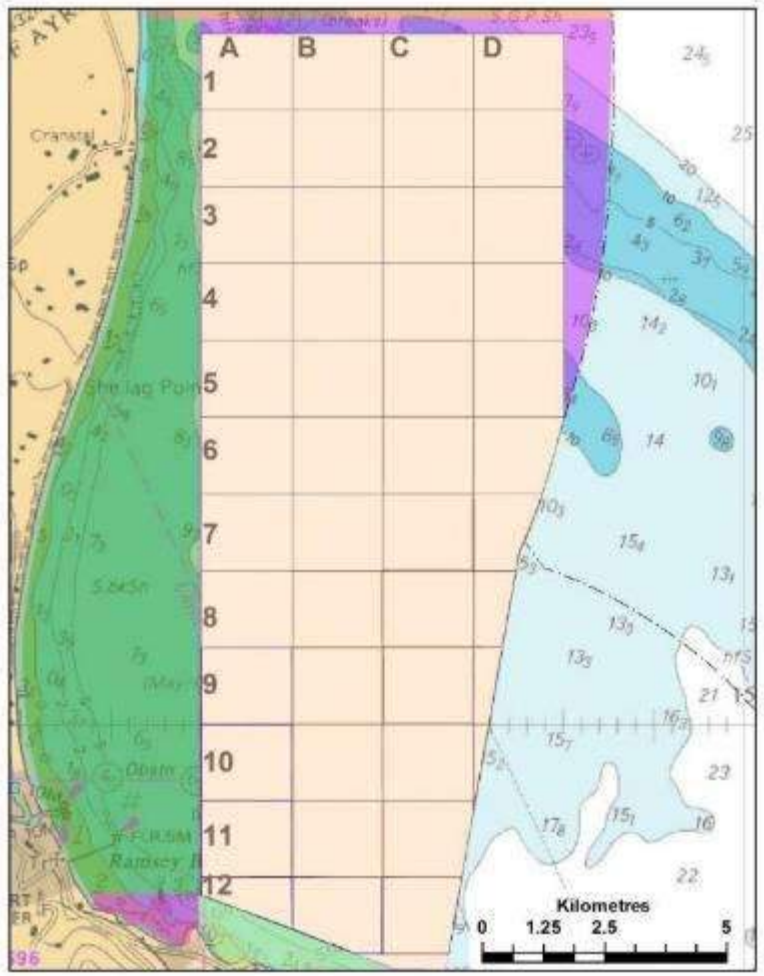


Ramsey Marine Nature Reserve



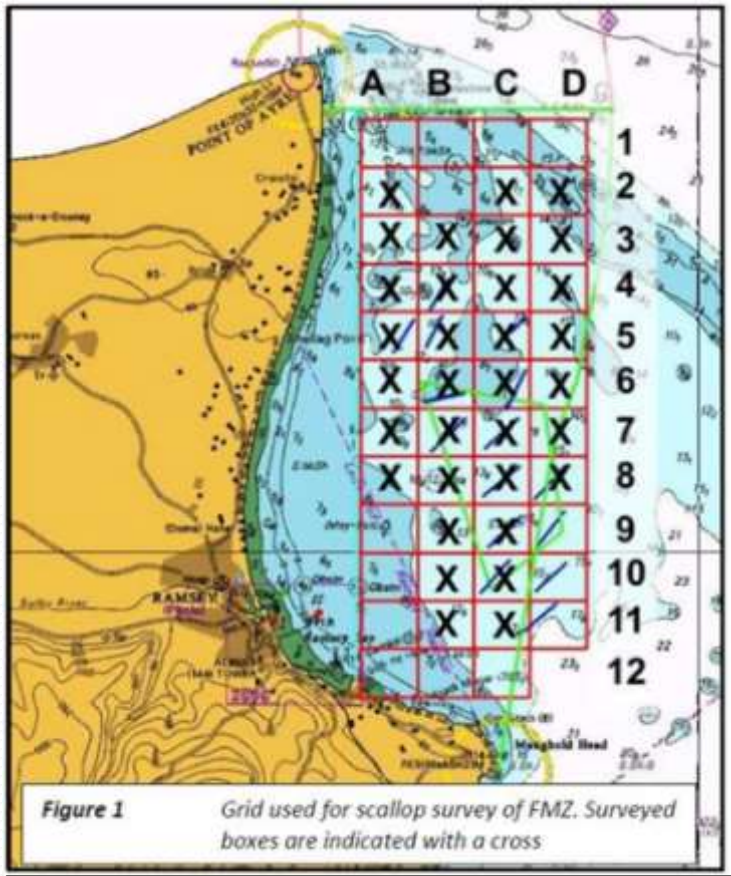
- Ramsey Bay closed to mobile fishing in 2009 at request of the fishing industry as stocks had been fished down to very low levels
- Designated a MNR in 2011 and area sub-divided into zones
- Sea-bed survey carried out
- Scallop stock survey carried out in Zone 4 from 2102 on annual basis

Fisheries Management Zone within Ramsey Bay MNR



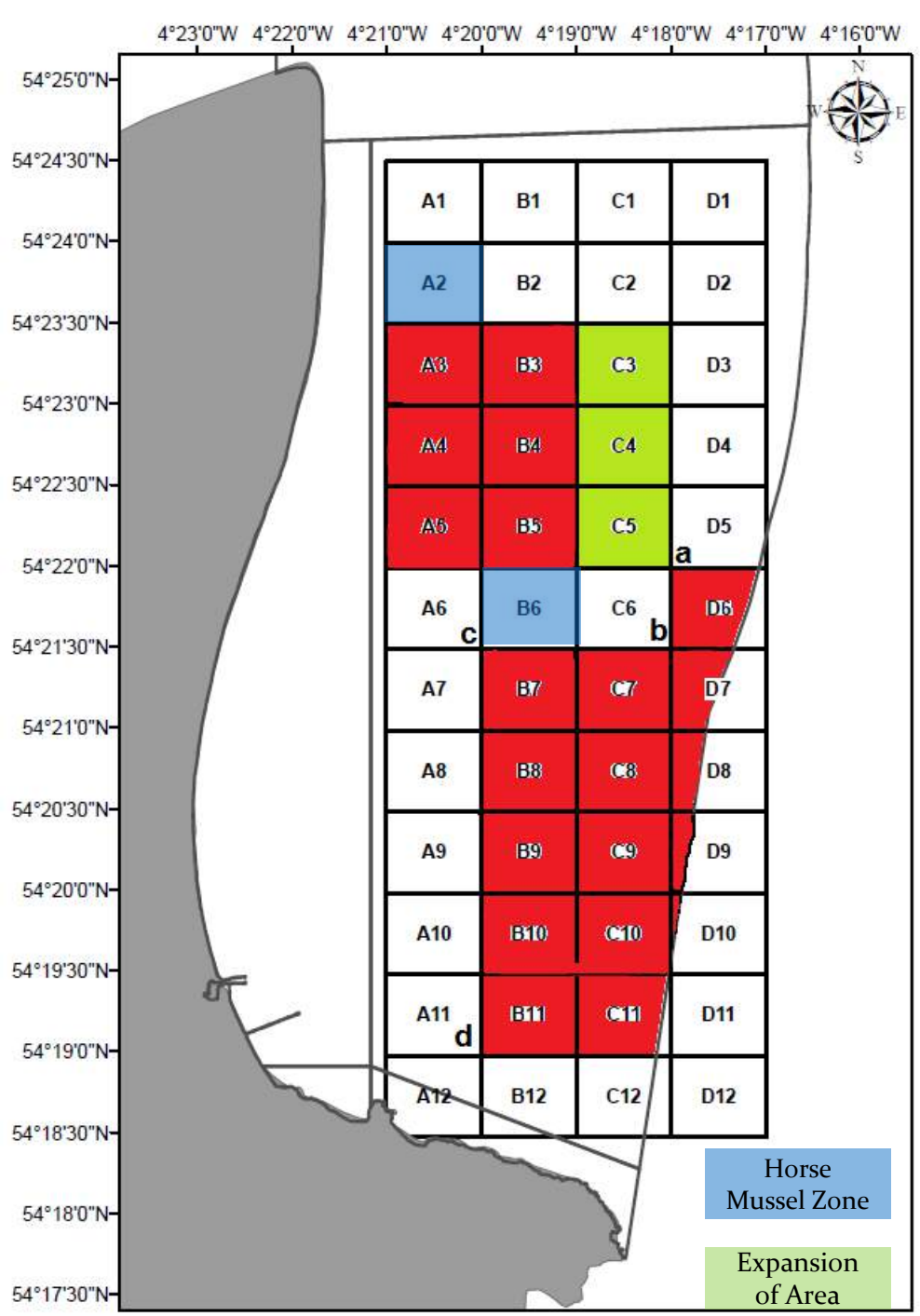
- Fisheries Management Zone divided into grid boxes
- Regular sampling within these grid boxes records year to year changes in scallop biomass, size and age distribution within the FMZ
- Initial years all grid boxes sampled by DEFA (IOM Fisheries Department) and Bangor University
- Subsequent years sampling carried out by industry (MFPO) with sampling limited to high density areas but with multiple tows to compensate for variations in the tow data
- Grid boxes within the FMZ where key environmental features were found were not included in fishing areas

Sampling in Ramsey Bay FMZ



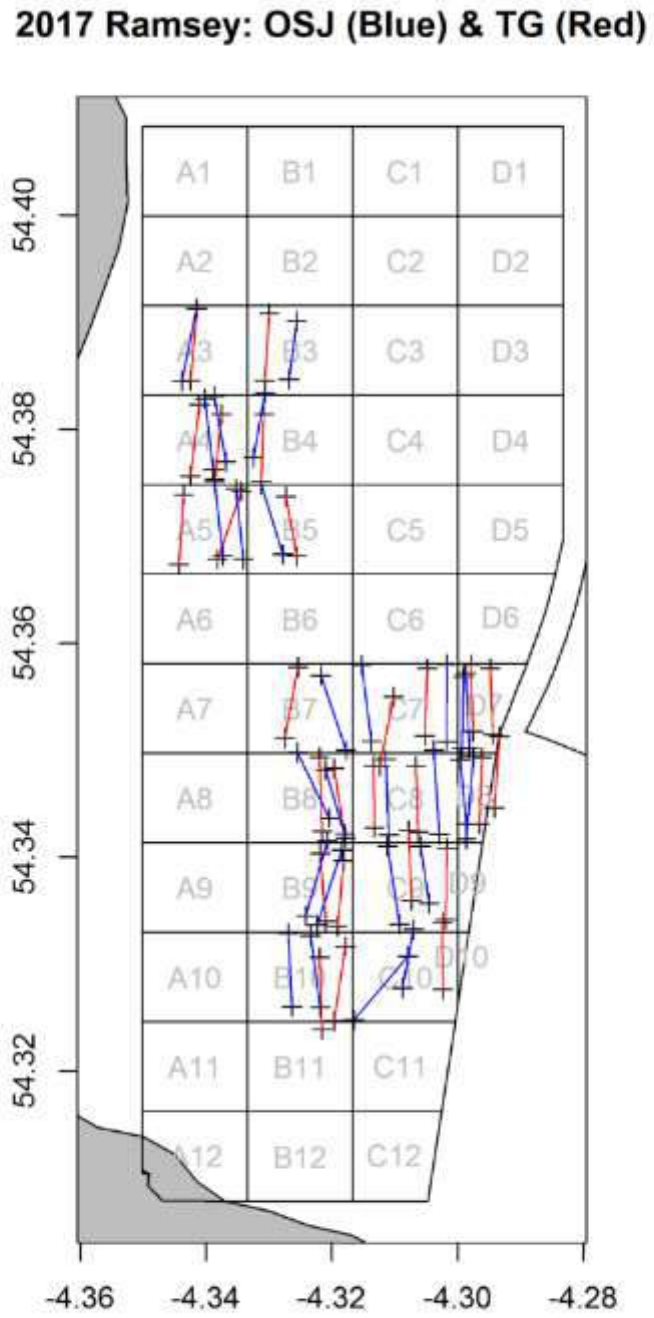
Annual Spring survey – industry led, industry financed, 2 vessels, 2 x 10 min tows per vessel per grid box, standard sampling gear - provides an estimate of the biomass which helps to define TAC

ZEBRA-TECH LTD



Key aspects of Ramsey Bay FMZ

- Two fishing areas within the FMZ – North Box and South Box
- Area expanded as stock increases which then allows for rotation of fishing activity within each fishing area
- Key environmental features found during initial sea-bed surveys protected and excluded from fishing areas



Sampling and calculation of biomass

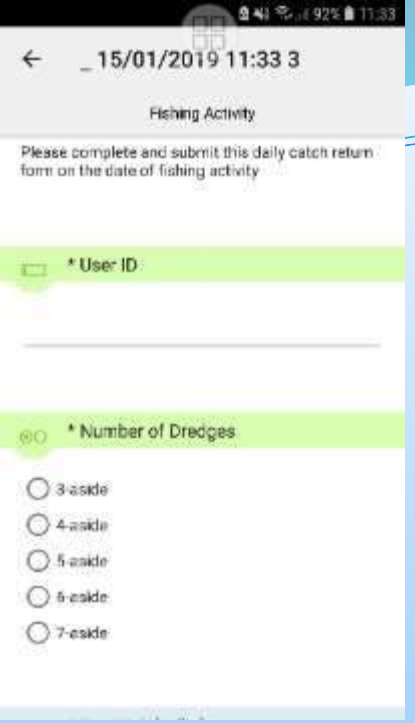
- Biomass for each grid box calculated using tow distance, tow time, width of dredges, estimated dredge efficiency, area of box.
- Overall biomass calculated for each fishing area and harvest strategy decided on by examining differences in densities from year to year.
- Typical Harvest Rate of 8-12% of overall biomass.
- High density areas are identified which ensures fishing is targeted, efficient and the impact on the sea-bed is limited.

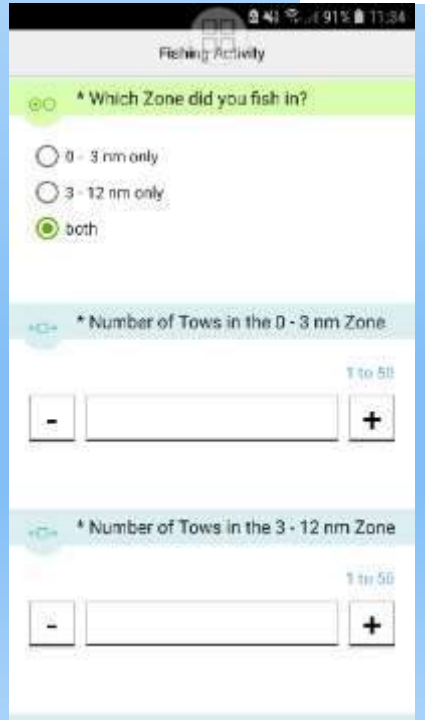
Harvesting strategy – main considerations

- Industry analyses survey data noting year to year changes in density and distribution and agrees harvesting strategy, where fishing should be concentrated and the overall TAC with DEFA
- Typically just a 2 week fishery at optimum time of year to maximise profit
- Monitor fishery in real time examining catch rate per area
- Minimise sea bed contact time
- Brief, targeted and sustainable fishery
- Maximise profit, minimise impact

Ramsey Bay Fishery

- Initially the fishery was a profit-share system and a small number of boats were contracted to fish the TAC on behalf of the stakeholders resulting a very low carbon footprint for the fishery.
- As stock biomass and annual TAC has increased more boats have fished, under licence, but it is still limited in number with boats fishing for other boats share.
- Advantage of increasing the number of vessels has been that there is more involvement for all stakeholders and a greater level of buy-in to the overall process as they observe the results first-hand.
- This then creates momentum for change in other areas.

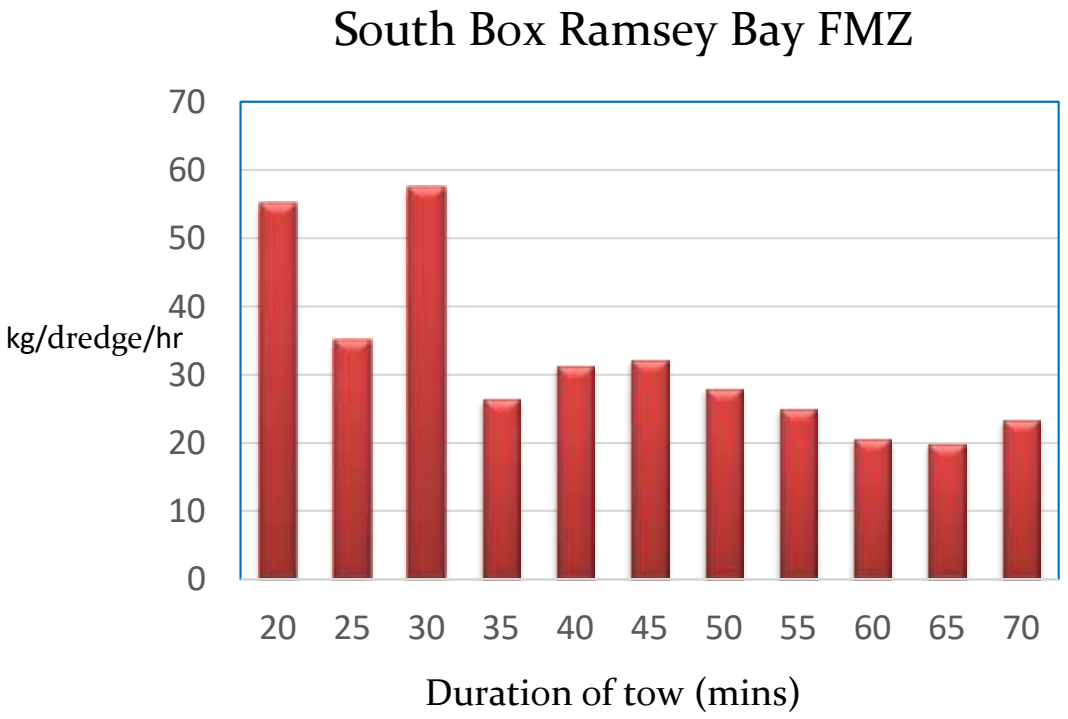


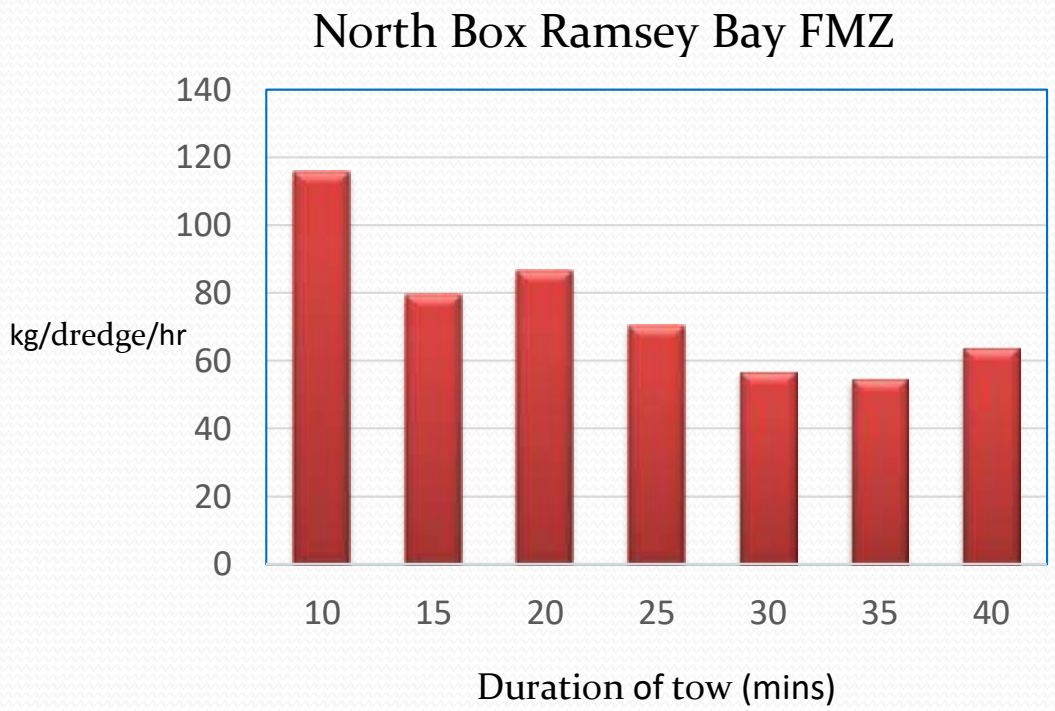


Monitoring of the fishery

- Reporting procedure from fishermen
- Nestforms Smartphone App
- Simple to use
- Real-time data allows real-time management

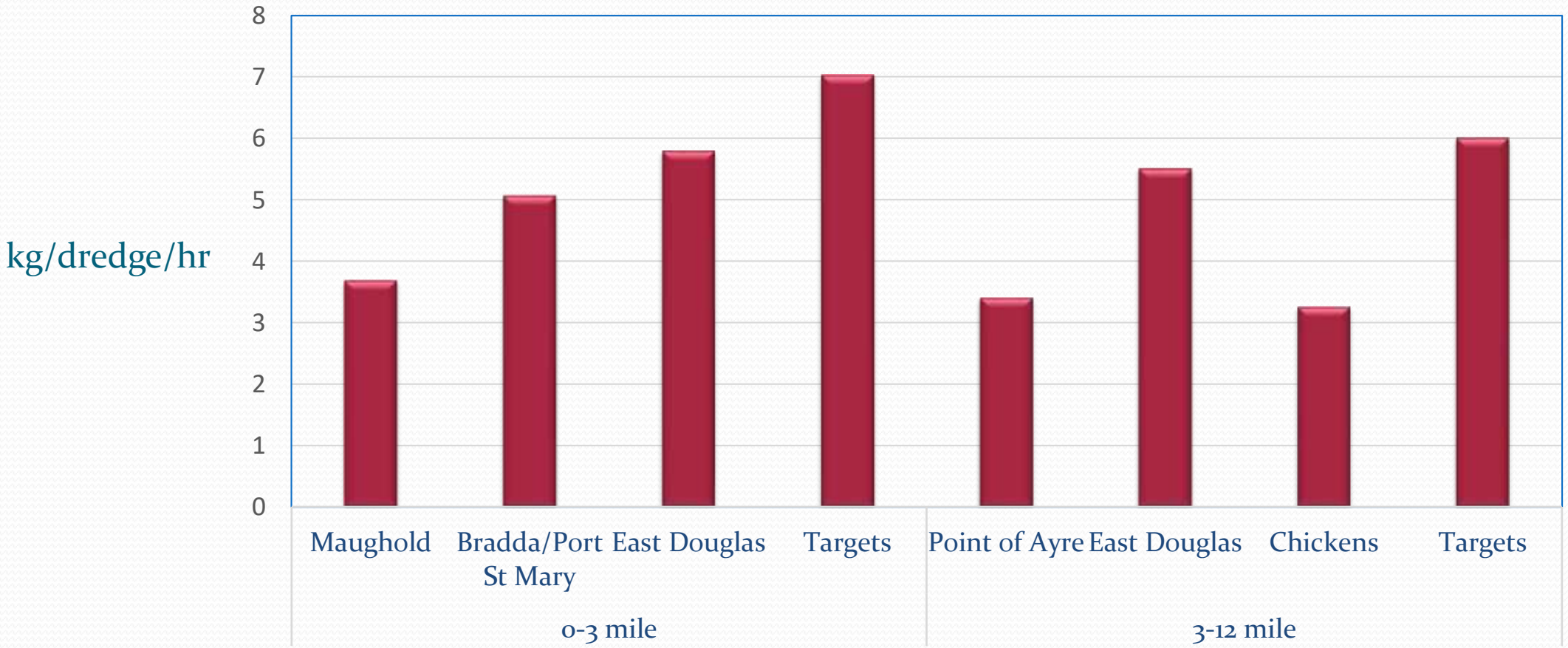
Use of Nest-forms in real time: Graph to show relation between catch rate and duration of tow in Ramsey Bay



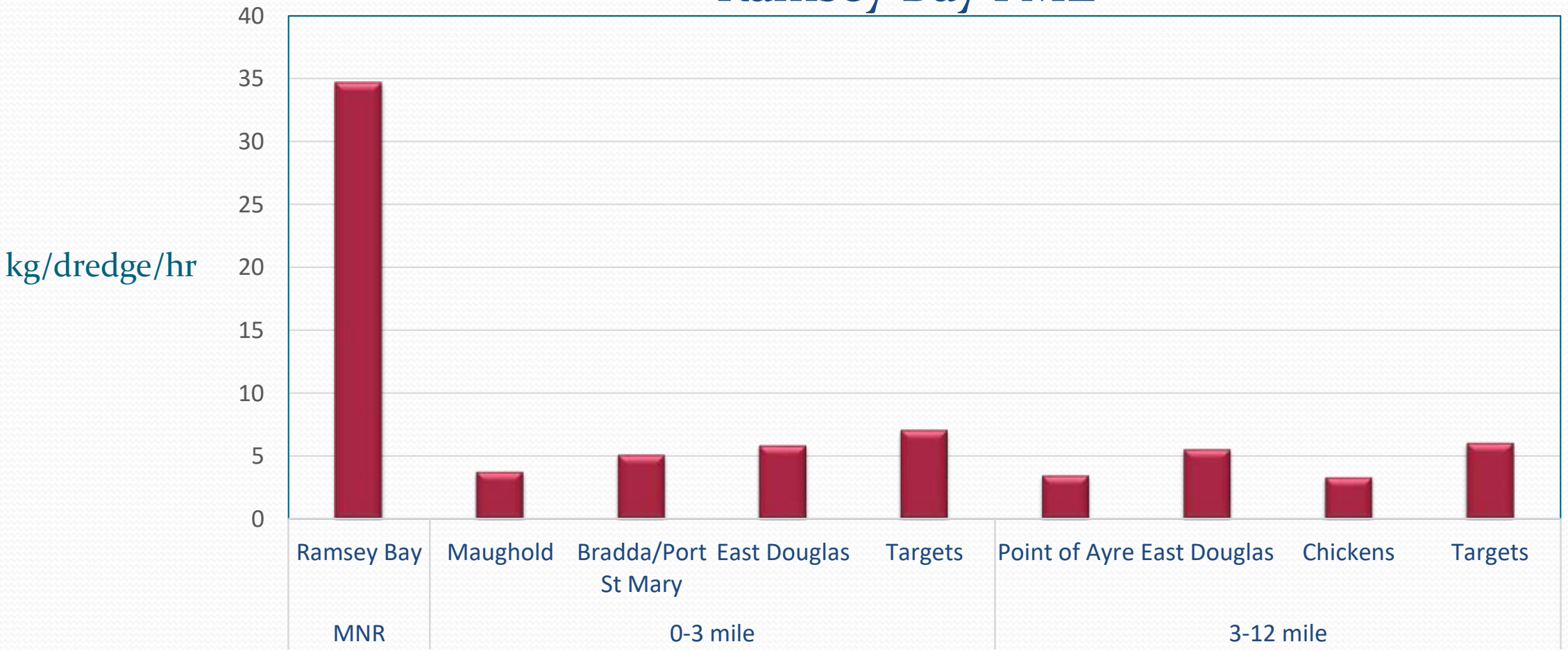


- Recommended maximum tow time of 20-30 mins in South and 10-20 mins in North
- Average tow time in 0-3 mile is 71 minutes
- Average tow time in 3-12 mile is 85 minutes
- Can we learn from Ramsey Bay and calculate optimum tow time to reduce seabed contact time in other areas?

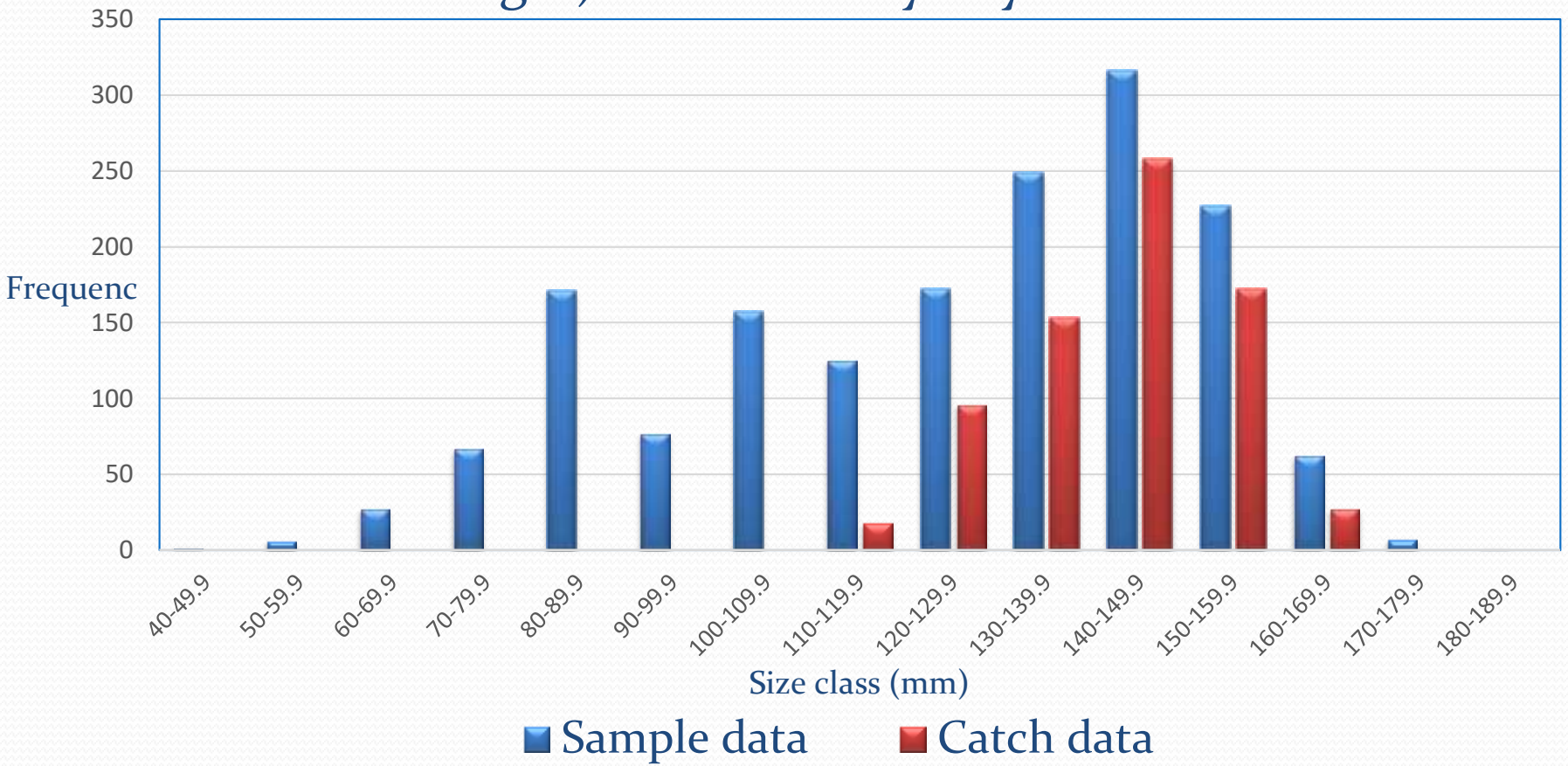
Catch rates (kg/dredge/hr) for key areas in Territorial Sea Dec 2018



Catch rates (kg/dredge/hr) for key areas in Territorial Sea Dec 2018 – comparison to Ramsey Bay FMZ



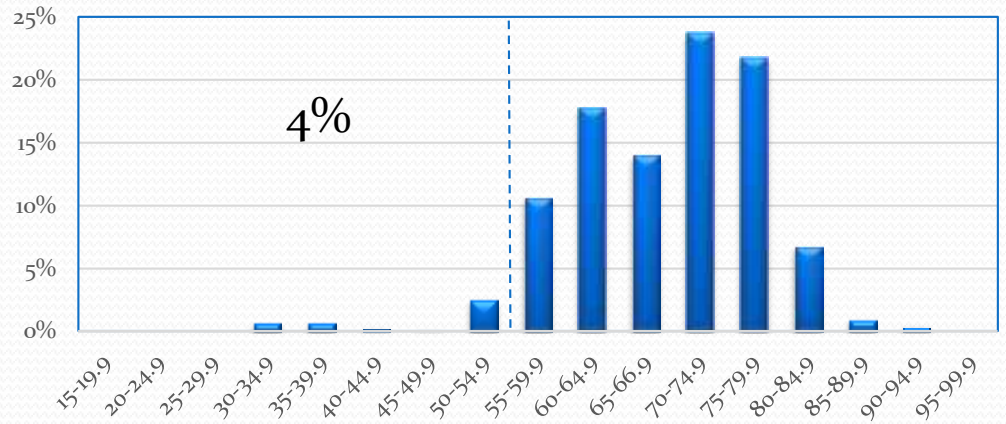
Size distribution of King Scallops from survey data (queen scallop dredges) and catch data (king scallop dredges) from Ramsey Bay Dec 2018



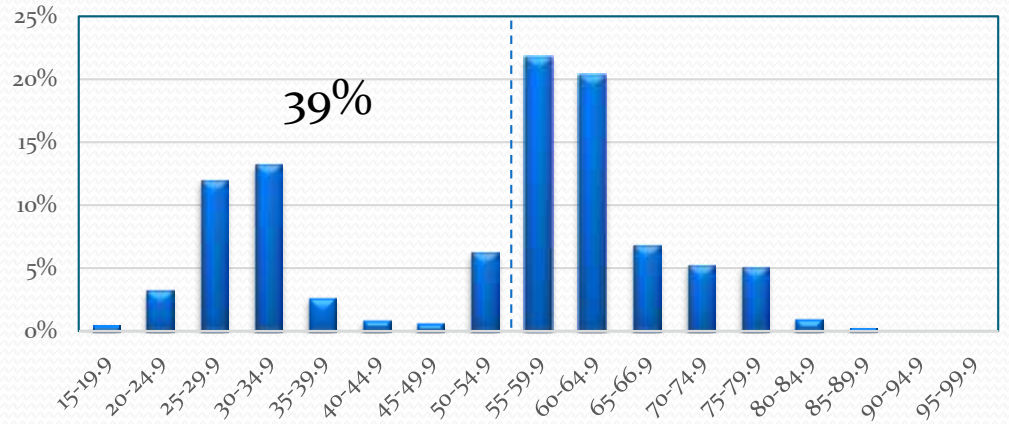
- Use a combination of survey data and catch data to decide appropriate fishing strategy
- Base management decisions on level of recruits and post-recruits

Use of appropriate sampling gear: size distribution of queen scallops using four sampling methods

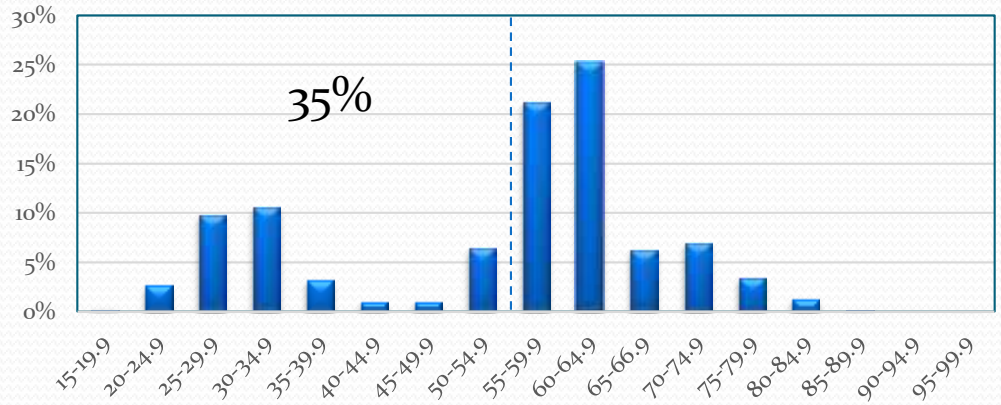
Standard sampling gear 10 teeth



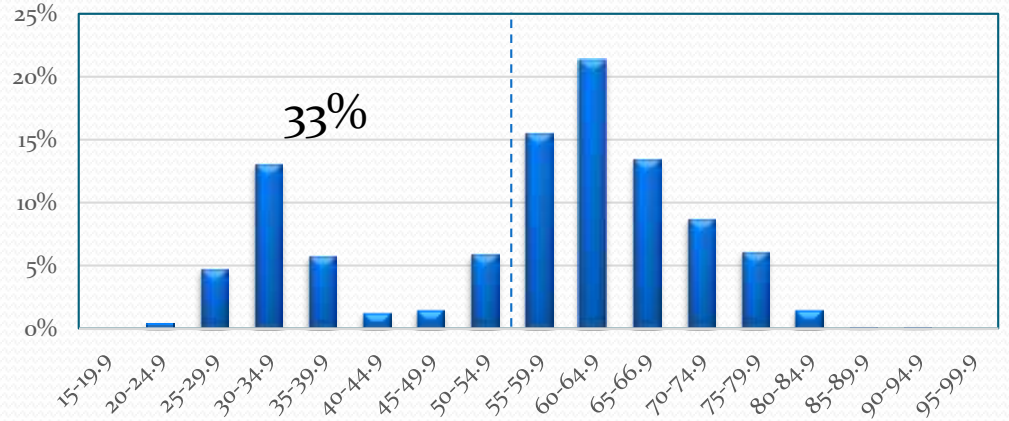
Rubber Mats with 35mm mesh



Standard sampling gear 17 teeth



Beam trawl with 5mm mesh



Can we learn lessons from Ramsey Bay fishery?

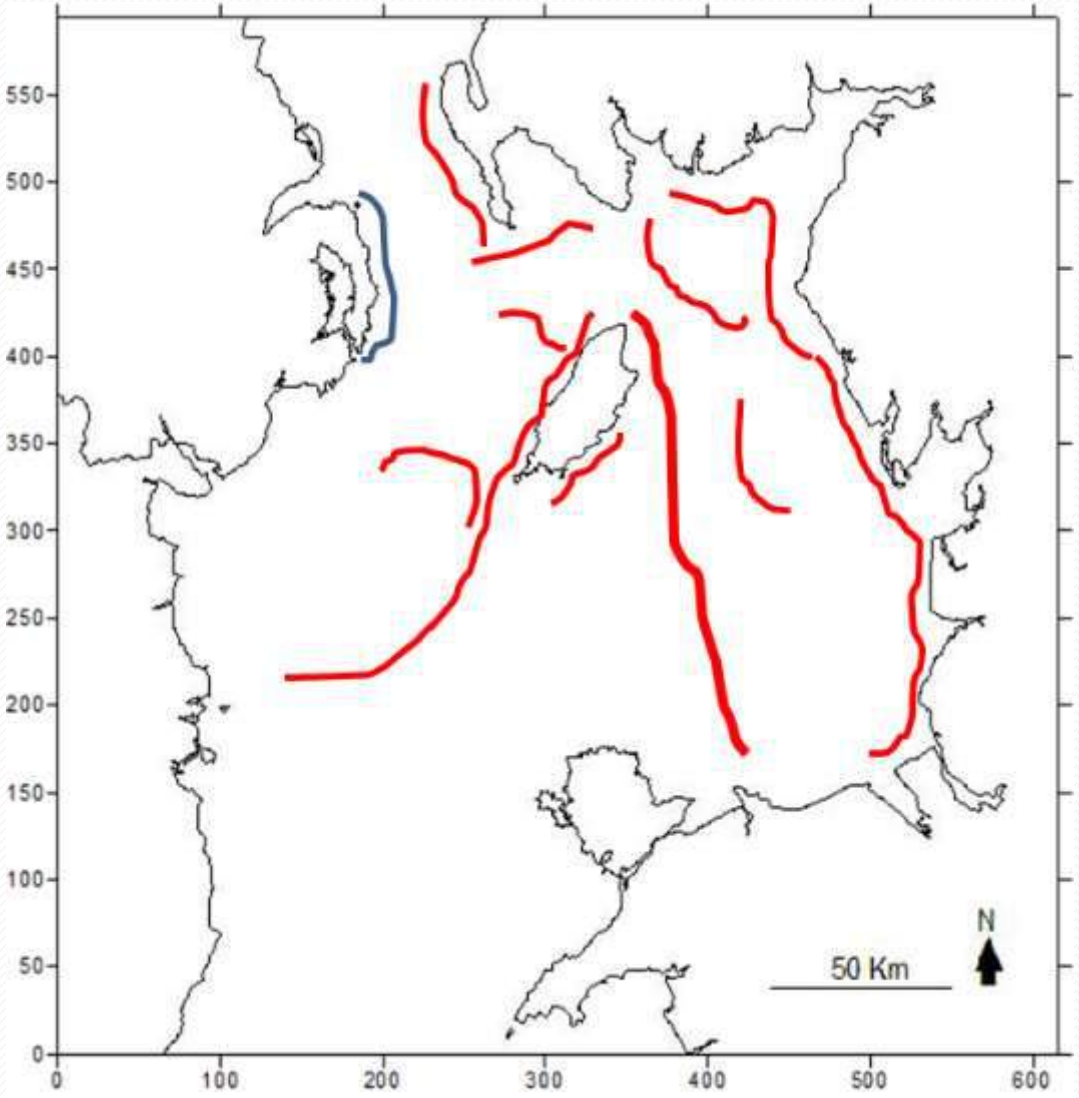
- A well managed inshore area with limited stakeholders has many benefits
  - a small profitable low impact fishery
  - maintaining a high brood-stock biomass
  - overspill of stock to surrounding areas
  - spat-fall to a wider area

- Can we transfer knowledge gained from Ramsey Bay into appropriate future management of the 0-3 mile and perhaps even 3-12 mile?

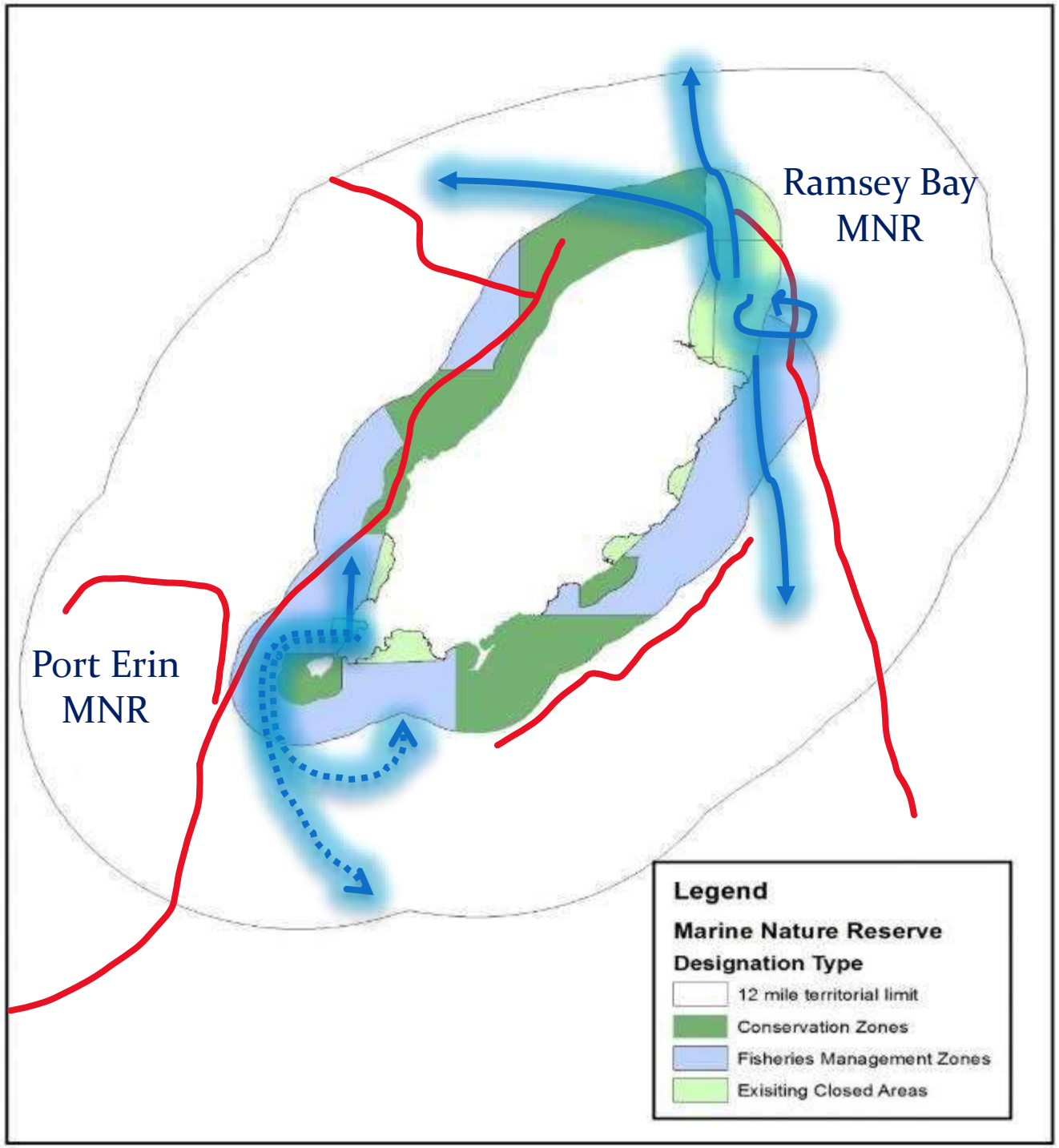
- Leads to a system of management with high level of restrictions in key inshore (even some offshore) areas, medium level restrictions in surrounding areas and a looser method of management offshore.

- Must have an overriding strategy of effort limitation, stock-based management and sustainable low-impact fishing. Essential to match effort to the available resource.

Spat-fall to a wider area: effect of persistent hydrological fronts around the Isle of Man

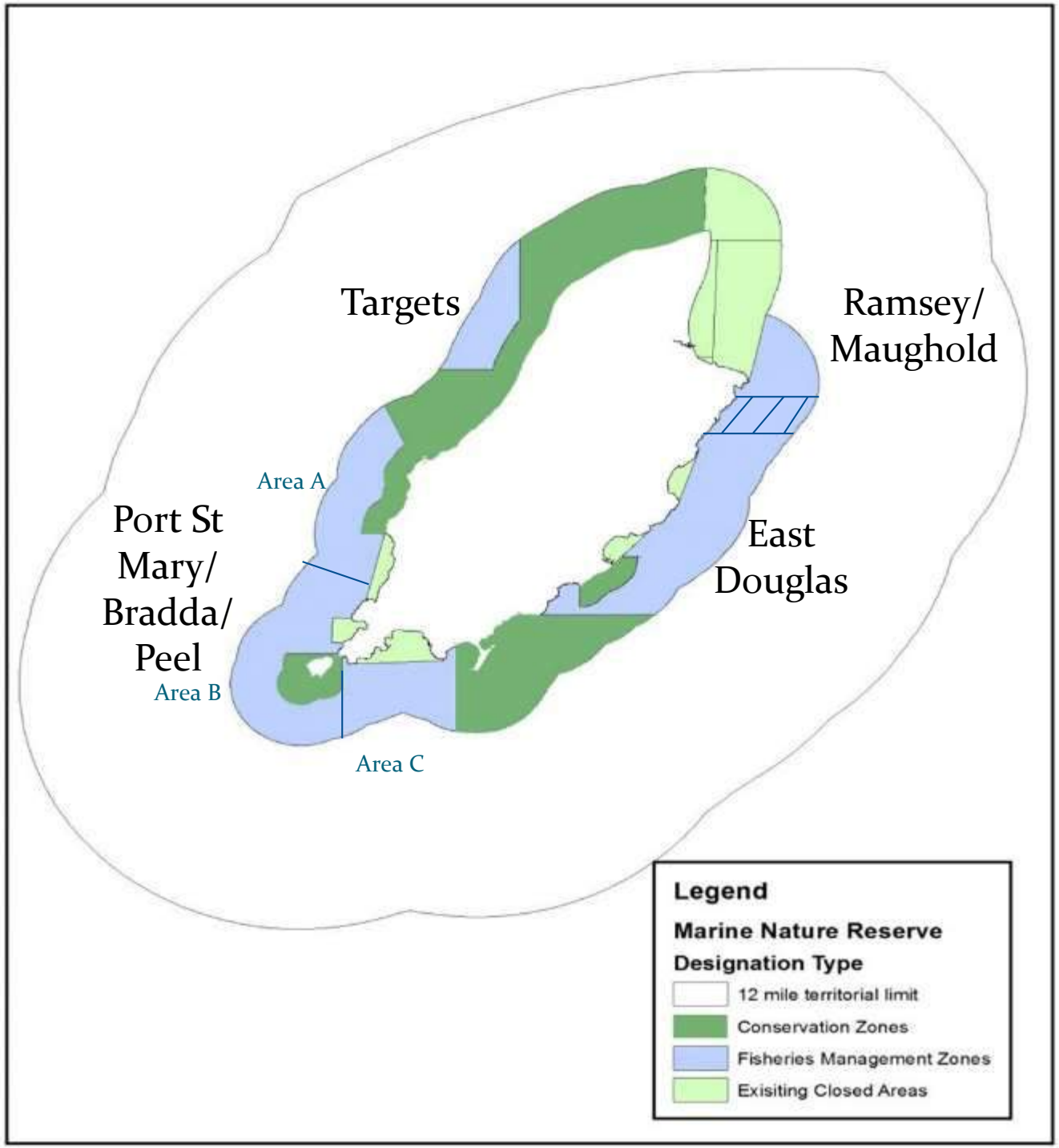


- Protected or carefully managed areas of Scallop stocks should lead to increase in stock levels within that area.
- Broadcast spawner's: larger and more numerous scallops lead to an increase in spat production which benefits surrounding areas
- Spat-fall can be affected by presence of hydrological fronts – differences in salinity, temperature, concentrations of nutrients, phytoplankton, larvae, etc.
- It is key that areas that could benefit from the spat-fall have a sea bed conducive to successful settlement



Possible benefits of closed or controlled fishing areas

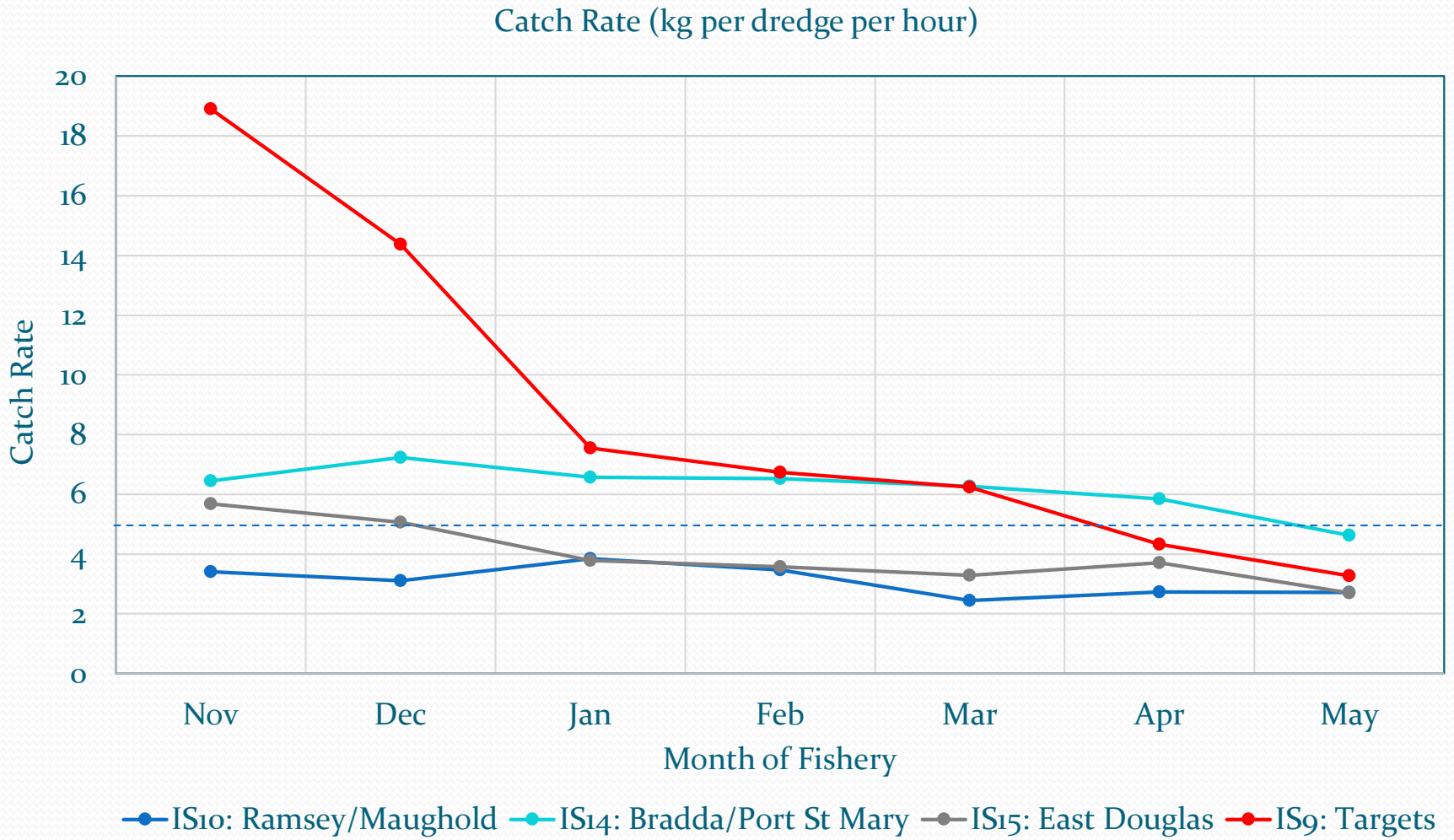
- Overflow of stock to surrounding areas
- Persistent fronts and effect on settlement of spat
- Fronts move with tide, time of year, etc
- Spat can settle a long way from the source



Transfer of knowledge gained from Ramsey Bay FMZ: developing Fisheries Management Plans for the Inshore Areas

- Use Nest-forms data to calculate overall catch, rate of catch, average tow times, tow efficiency
- Combine with appropriate survey data
- Examine patterns over the season and from year to year
- Have catch rate thresholds which trigger a decision process?

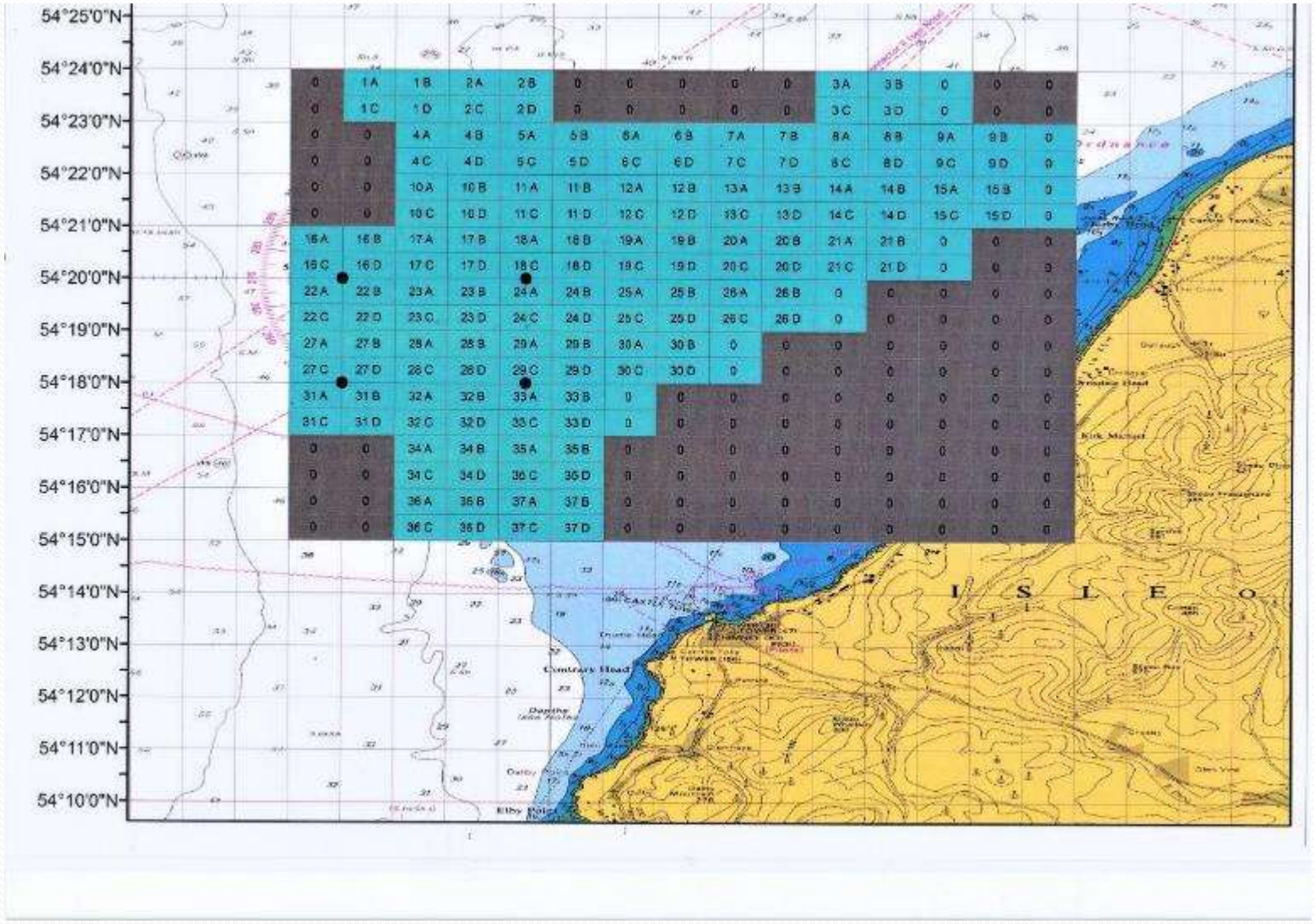
Seasonal patterns and catch thresholds: importance of monitoring of the fishery - changes in catch rate over time for four inshore areas



- Always be aware of the effect of management decisions on other areas when opening or closing an area or reducing/increasing fishing effort

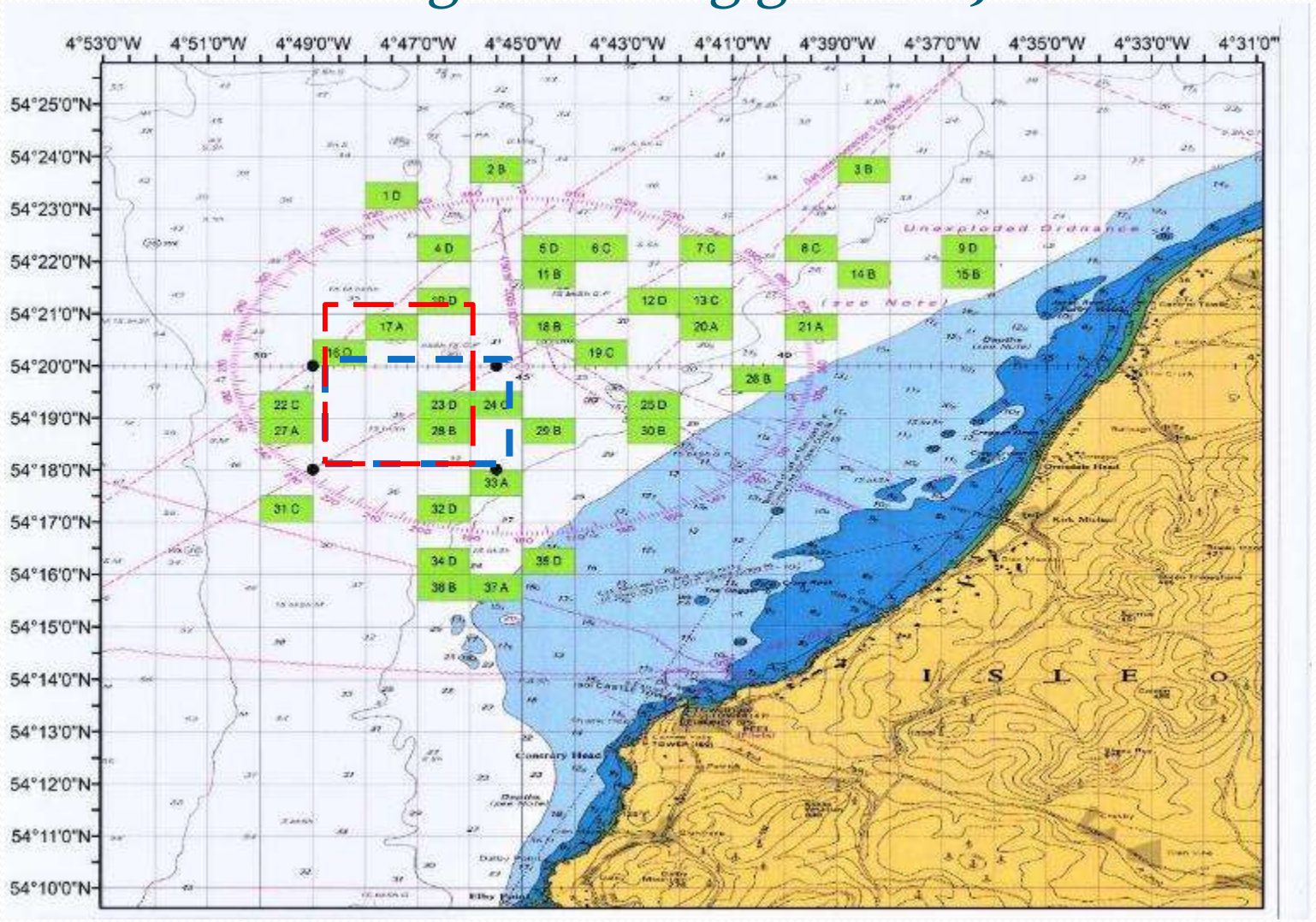
Possible trigger point

Can the detailed Grid survey system and method of biomass calculations be used in a larger area?



- TAR fishing area divided into a grid system
- Sampling limited to area with known concentration of sample species
- Random sampling of grid

Randomised grid boxes sampled in survey trial at Targets fishing ground June 2018



- Survey each grid box recording tow distance, towing speed, area swept and quantity and size distribution of target species
- Calculate biomass for this sub-area
- Data also used to firstly identify and then re-define a temporary closed area to protect high densities of juvenile scallops

Policing and Enforcement

- The benefits of maintaining a high biomass in an area such as Ramsey Bay or Port Erin MNR could be lost without effective policing and enforcement
- Use of VMS plus, acceleration of polling in the area, Geo-fencing, real time text alerts to enforcement team, monitoring speed of vessels
- Inshore areas easier to protect as they are typically bordered on one of more sides by a coastline
- Protection of offshore areas more difficult but they may be as important as inshore areas
- Key factor: involve the stakeholders from the start and obtain buy-in from industry

Review of overall management of IOM Territorial Sea

- Overall Territorial Sea – annual stock survey, overall stock based TAC, ICES Category 3 stock with changes in TAC limited to +/- 20% per annum, 12 hour fishing day, daily catch limit, Nest-forms to monitor and manage effort, industry-led Scallop Management Board, whole area within Isle of Man UNESCO Biosphere.

- Highest level of protection: network of inshore MNR's.

- High level of protection: Ramsey Bay - a share fishery with the MFPO also taking shares in the fishery to pay for survey time and survey equipment not just in Ramsey Bay but also in the wider Territorial Sea.

- Medium/high level of protection: 0-3 mile - restricted licences (currently 41), 5 a side and a lower (voluntary) daily catch limit, FMP's being prepared for each fishing zone with an industry/government co-management structure. More detailed industry-led stock surveys in 0-3 mile in near future.

- Medium level of protection: 3-12 mile - restricted licences (currently 88), 7 a side, daily catch limit

- Low level of protection: Irish Sea

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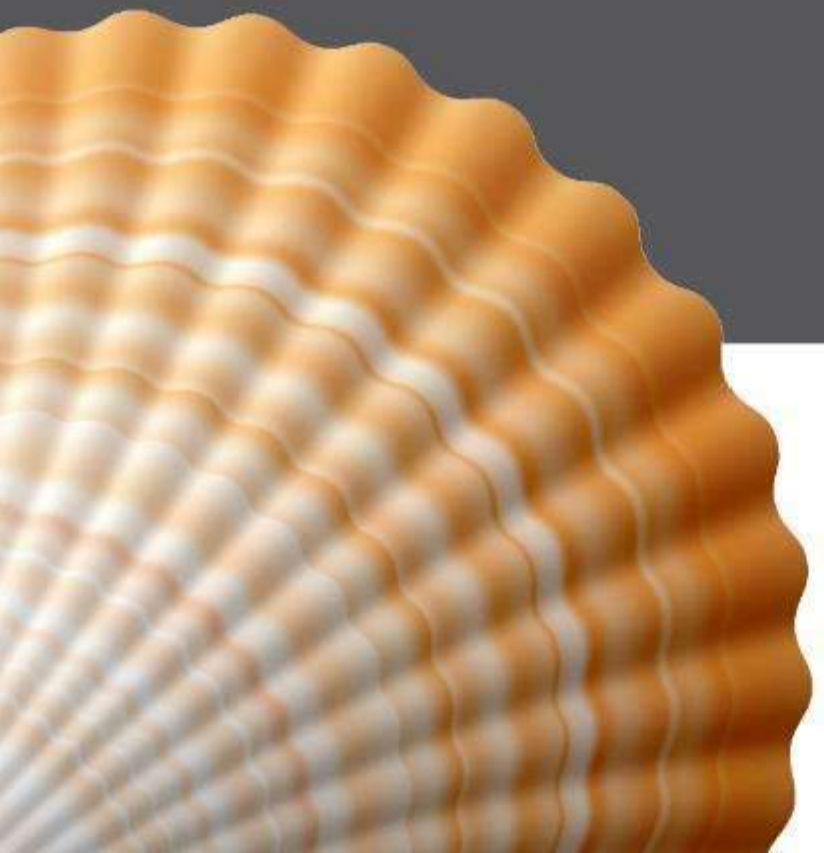


Alain d'Entremont

President

Full Bay Scallop Association

Canadian Case Study

Supported by seafish

Canadian Case Study:
Canadian Full Bay Scallop Fishery

Alain d'Entremont

President – Full Bay Scallop Association

President – Scotia Harvest Inc.

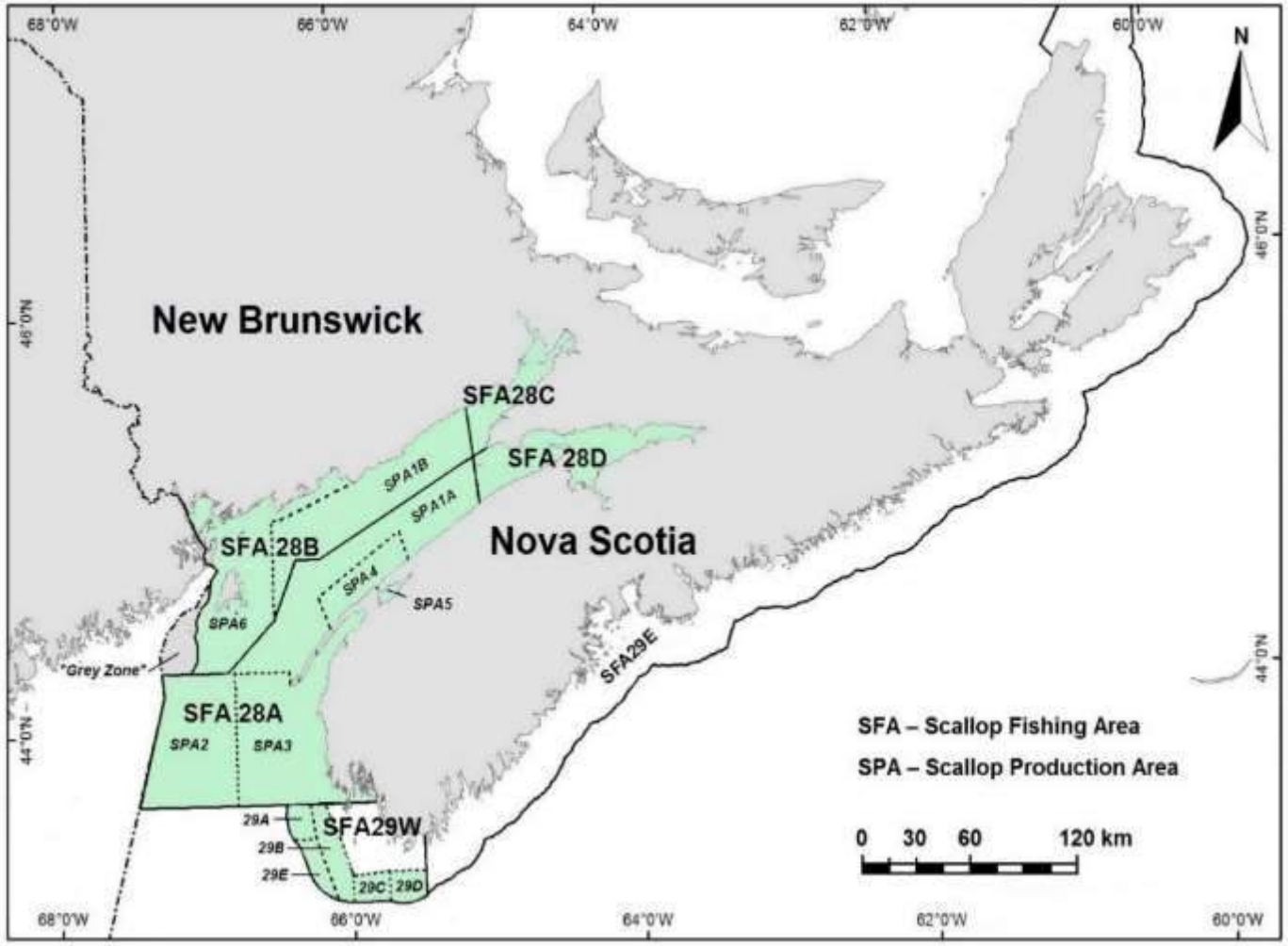
Scotia Harvest Inc.

- **Vertically integrated**
  - Five full-time scallopers
  - Two full-time groundfish trawlers
  - Processing facilities
  - Small ship repair yard
  - Sales and marketing

Full Bay Scallop Association

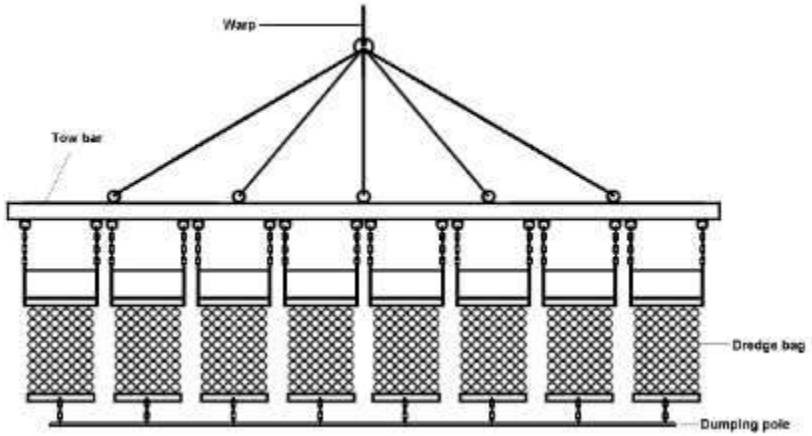
- **Industry association**
  - Representing ~97% of quota held in fleet
    - Independent fishermen, Companies, First Nations
  - Vessels <65’ (<19.8m)
  - One of four inshore fleets operating in area
- **Bay of Fundy and Approaches Area**
  - Federally managed fishery by the Department of Fisheries and Oceans (DFO)
  - Adjacent to both Nova Scotia and New Brunswick
  - Combined TAC has been 1,500 – 1,800 mt of meats in recent years. (12,450 – 14,940 mt whole scallop)
    - Full Bay Fleet represents 65-75% of that total varying annually
  - All scallops must be landed in meat form

Bay of Fundy and Approaches Area



Full Bay Sea Scallop (Placopecten magellanicus) Fishery History

- **Commercially fished since mid 1880s**
- **“Digby Drag” fishery started in 1920s**
- **In 1972, limited entry introduced**
  - Fleet frozen at 60 licenses.
- **Politics/appeals until 1977**
  - Fleet capped at 99 licenses
- **Large recruitment event in early 1980s**
  - Fished aggressively, investments in harvesting capacity, all fleets competing for same limited and declining resource
- **1985 Agreement (Voluntary – but depends on who you ask)**
  - Permanent separation and sharing arrangement between fleets
    - Limiting potential harvesting capacity (movement of boats) and allow for management control and investment by fleets



Full Bay Sea Scallop (Placopecten magellanicus) Fishery History

- **Catches for Full Bay fleet quickly rebound with 1985 Agreement (coincidental large recruitment event)**
  - Leads to record catches in late 1980s
    - Management measures insufficient to protect resource combined with a significant natural mortality event in Fall 1989.
- **Changes in other fisheries in early 1990s leads to increase in effort on scallop**
  - Individual Transferable Quotas (ITQ) in groundfishery creates surplus vessels
  - Scallop fleet capacity increases, resource does not.
- **Existing management measures insufficient, resource and catches continue to decline**
- **In 1996, Bay of Fundy Inshore Fleets put forward recommendations to drastically change the management of the Bay of Fundy Scallop Fishery**
  - Full Bay opts for an Individual Transferable Quota (ITQ) System
    - Not unanimous and remains contentious with some members
  - Other fleets, fishing same areas, chose to go with a competitive quota-based fishery
    - Almost all participants considered multi-species fishers

Full Bay ITQ Program

- **Initial ITQ allocation formula based on a DFO-approved industry proposal using historical catch levels**
- **Starting in 1997**
  - Any permanent quota share transfer had to include all quota on license
    - Changed in 2010, any portion could be transfered to another license permanently
  - Limit of 2.5% of permanent quota share per license
  - No limit on temporary quota transfers
  - When a license has <0.50%, it is ineligible to receive conditions to fish until it acquires at least that much permanent quota
  - All vessels required to participate in a Dockside Monitoring Program to ensure integrity of ITQ system
- **In 2007, DFO announces "Preserving the Independance of the Inshore Fleet in Canada's Atlantic Fishery" (PIIFCAF) policy**
  - The Full Bay fleet was one of six fishing fleets in the Region to be granted exempted status meaning that licenses can be owned by both individuals or companies with the ability to designate an operator for that license
  - Meant that an individual or company can hold more than one Full Bay Scallop license
    - License holders must be a Canadian or for a Company >51% Canadian owned

Full Bay Fishery Management Measures Summary

- **Limited entry and Individual Transferable Quota**
  - License fee calculated on a base fee + $547.50 per tonne of scallop meats or ~$0.25/lb
- **100% Industry-funded Dockside Monitoring**
  - Combined with logbooks
- **100% Vessel Monitoring Systems**
  - Hourly reporting in most areas, 15 minutes in one area
- **Seasonal/Area closures**
  - Too many due to gear conflict concerns
  - Likely not enough specifically focused on resource productivity
- **Minimum shell height size**
  - >75 mm / ~3 inches in most area, >100 mm / ~4 inches in one area

Full Bay Fishery Management Measures Summary

- **Gear restrictions**
  - The use of offshore scallop drags and “green sweep” scallop drags is not permitted in the inshore scallop fishing areas.
  - The maximum width of a scallop drag or combination of scallop drags is limited to 18 feet (5.5 m) in total width and the scallop drag with a bag must consist of rings of at least 82 mm inside diameter
- **Vessel length restrictions**
  - <65’ (19.8 m) length overall
- **Meat Counts**
  - 45/500g in most areas, 33/500g in one area
  - Not really as important with ITQ system and shell height restriction

Current Full Bay fleet

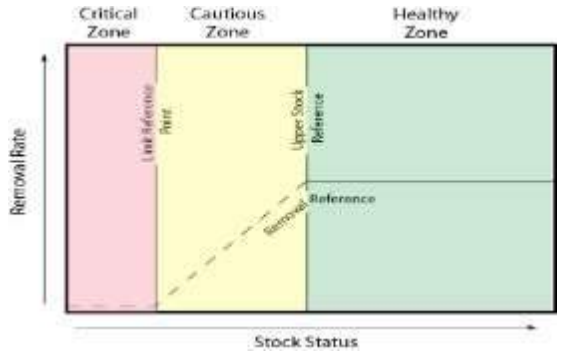
- **Full Bay fleet currently has 100 licenses**
  - Over past 3 years
    - 55-67 licenses have been active in fishery
    - 55-61 unique vessels
    - Licenses can be attached to different eligible vessels through the same fishing year
- **Approximately two thirds of the fleet are full-time scallopers**
  - Deriving all their income from scallop fishery
  - Mostly active year-round, more focus on winter due to market price

Current Full Bay fleet

- **Remaining vessels fish scallop for a portion of their fishing year**
  - Mostly lobster or fixed gear groundfish
- **Vessels carry 3 to 9 fishermen total, most carry 4 to 6 total**
- **Trips range from 1 to 10 days, majority of trips are 3 to 5 days**
- **Fleet remains a mix of corporate and independent owners**
  - Most independents make an arrangement to access quota from buyers or license holders without vessels active in fishery

Industry & DFO & Other Stakeholders Co-management

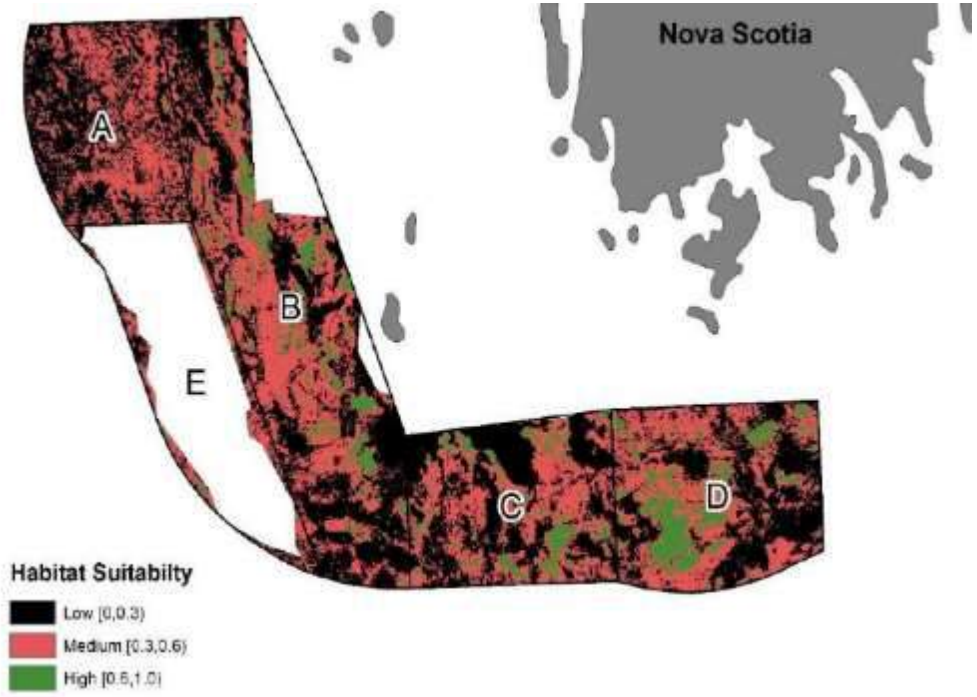
- **A Full Bay vessel is chartered annually to conduct the two scallop surveys**
  - Main area is funded by DFO, one separate area funded by industry
  - After the data is processed by DFO Science an assessment report is generated and provided to industry and stakeholders
    - Quota levels along with other management decisions are made through recommendations at the appropriate Advisory Committees
- **Quotas set by applying the DFO Precautionary Approach, developed by the Advisory Committee**
  - Lower Reference Points
  - Upper Stock Reference Points
  - Removal reference point
  - Doesn't work perfectly for scallop
    - Large recruitment events, density dependence



- **DFO has been strong supporters of the Marine Stewardship Council (MSC) certification**
  - Providing staff time to help achieve and maintain the certification

State-space habitat-based population modeling

- Only in SFA 29 West so far
  - Exciting potential, based on and industry and government funded multi-beam acoustic mapping of the seafloor, camera work and other scientific work
- VMS seems to match up
- Short timeseries
- Still exploring appropriate Harvest Control Rule (HCR)
- Doing data collection to expand to more areas



Pictures!

Pictures!

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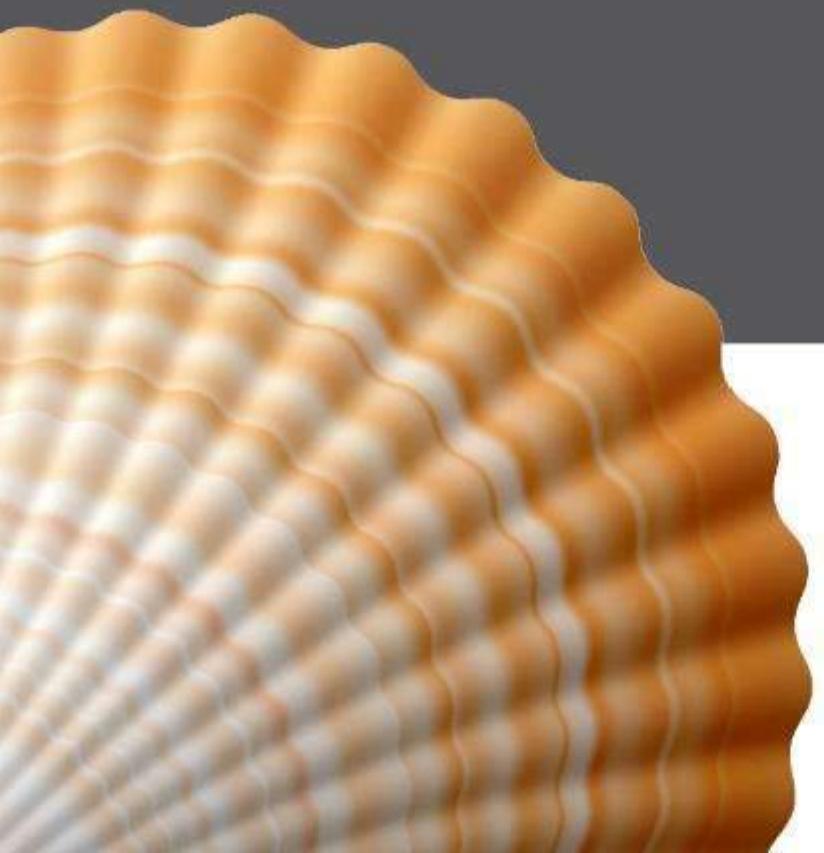

Servane le Calvez

Chargée de Mission Environnement
Côtes d'Armor (District of Saint-Brieuc)

French Case Study

Supported by
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THE GREAT ATLANTIC SCALLOP FISHING IN BAY OF SAINT-BRIEUC

An example of a territorial stock management

SUMMARY

1. Regulatory framework
2. Localisation
3. Background
4. Scientific surveys
5. Appropriate regulation
6. Regular controls
7. Importance of the scallop
8. Trade & economic stability
9. Threats & Challenges

REGULATORY FRAMEWORK

NATIONAL REGULATIONS

- National fishing licence is required
- Quota of fishing vessels in ICES zones
- Set the minimum size of the fishing gear : rings 92mm
- General timetable: To first Monday of October until 14th of May

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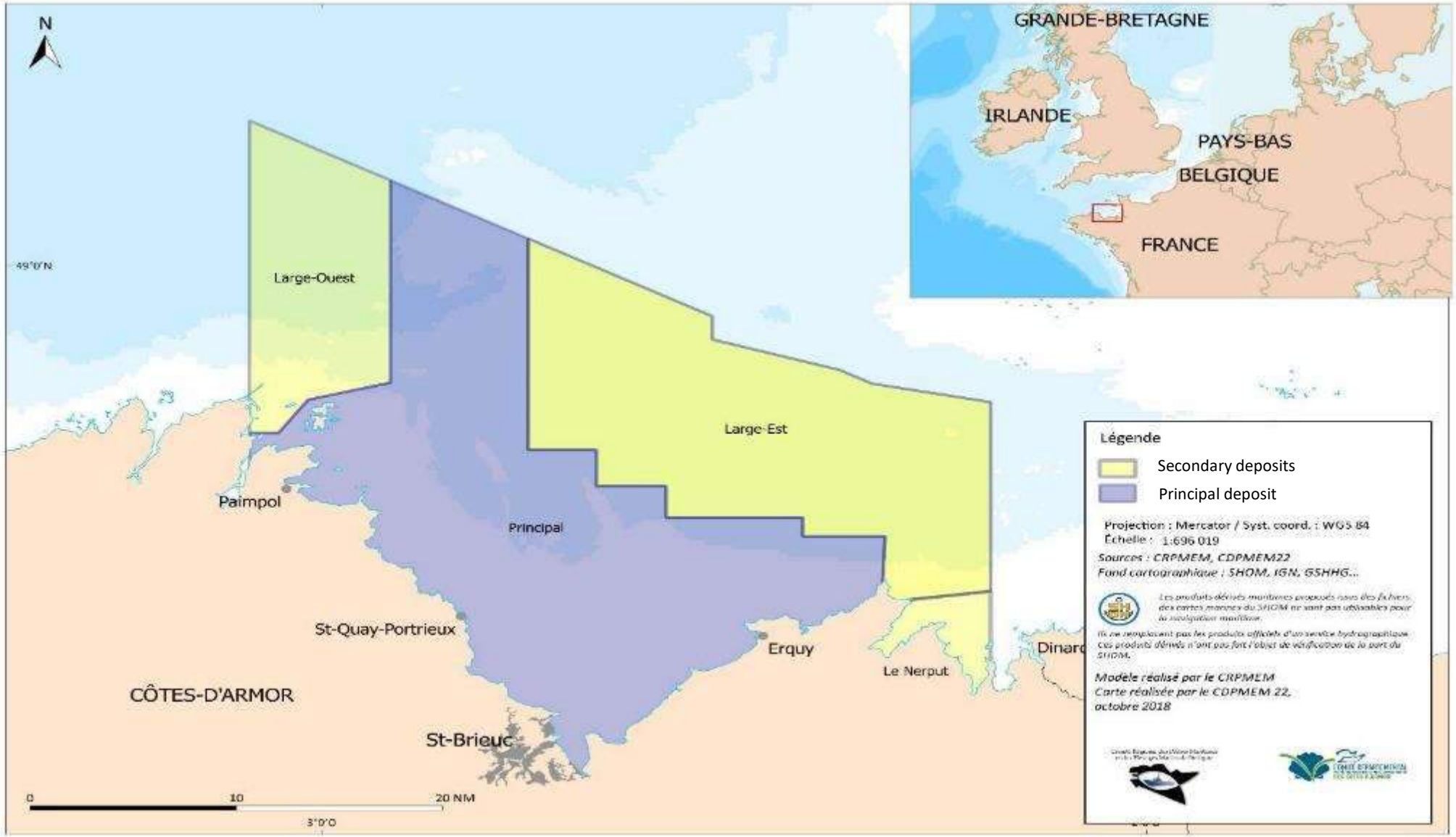
LOCALISATION



BACKGROUND

» **1962 :** Start of the fishing (56 vessels)

» **1975 :** Creation of local fishing licence (469 vessels)

» **70's:** High catch levels: **50%** of national catches

➔ **Very strong fishing pressure on scallop stocks !!**

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SCIENTIFIC SURVEYS

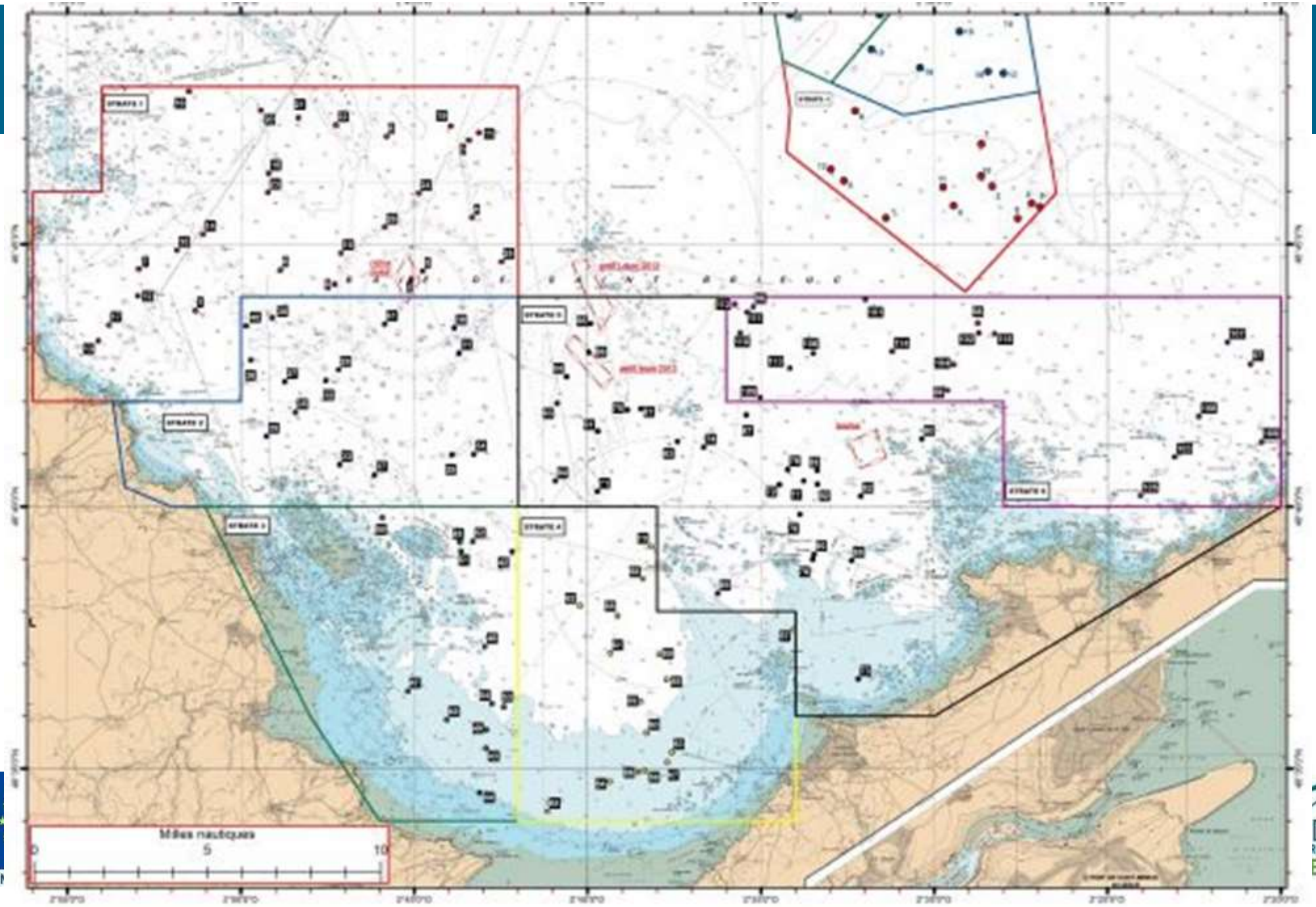
COSB : Survey of scallop stock in bay of Saint-Brieuc

» Annual survey since 1973

» Realized by Ifremer (national institute) before fishing period

» They give the quantities of available resources

➔ **Recommend a global quota of catches**


Milles nautiques
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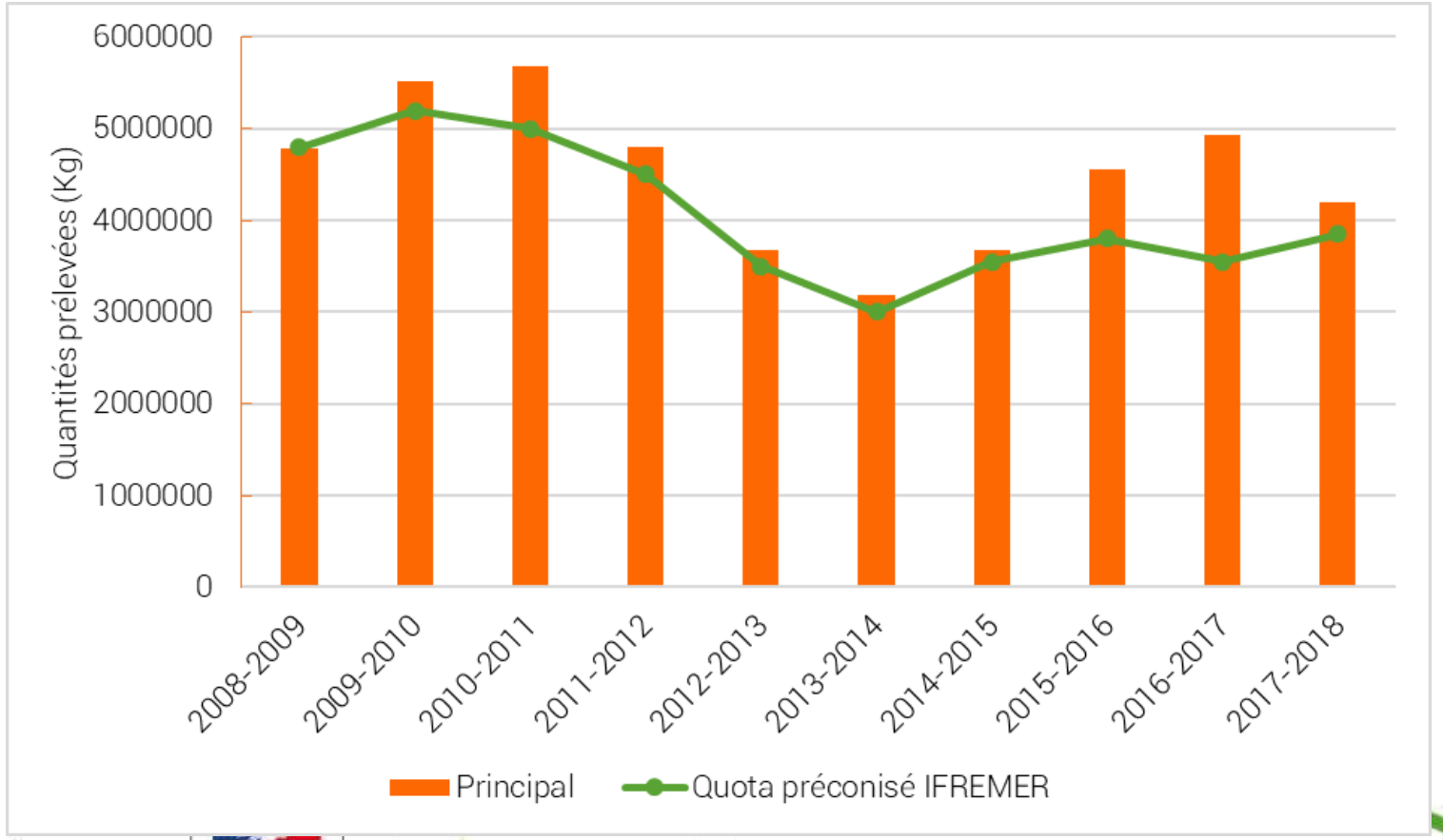
SCIENTIFIC SURVEYS

Trends in total catches volume and recommended quota



UNION EUROPÉENNE

l'Europe s'engage en France avec le FEAMP

FRANCE FILIÈRE PÊCHE

Ifremer

COMITÉ DÉPARTEMENTAL DES PÊCHES MARITIMES ET DES ÉLEVAGES MARINS DES CÔTES D'ARMOR

SCIENTIFIC SURVEYS

Survey of natural reproduction

» Annual survey since 1978

» Realized by CDPMEM 22 (fishermen)

» Spat collection

➔ **Data on the natural reproduction**

APPROPRIATE REGULATION

These studies are the basis of the regulatory framework established in local by the professionals

The local regulations are:

- ➔ **2 days/week**
- ➔ **45 min** of fishing in the principal deposit
- ➔ **Permitted areas :** rotation between deposit

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APPROPRIATE REGULATION

- Catch size: **10.2 cm**
- maximum quantity/vessel/day of fishing : **1.2 tonnes**
- Gear characteristics:

  2 dredges maximum per vessels,

  Rings of **97 mm** (*evolution since 1985*)

Year	Ring's size
70's	72 mm
1985	85 mm
1996	92 mm
2017	97 mm

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APPROPRIATE REGULATION

➔ Compulsory weighing **:**

Real time monitoring of landing quantities *(respect of recommended quota)*

Adjustment of fishing season

A licensing system to control access to the resource

➔ **Vessels quota**

» **238** vessels

➔ **Vessels characteristics**

» Length : less than or equal to **13 m**

» Vessel’s engine power : less than or equal to **184 KW** (250 CV)

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REGULAR CONTROLS

Control operations on land

» Controls in fish auction *(respect of scallop commercial size)*

Control operations at sea

» Control in vessels (*gear characteristics, fishing schedules)*

Control operations in the sky

» The chartering of an airplane in order to carry out aerial surveillance (*respect of areas, fishing time*)

» Cost of the chartering is financed by fishermen *(Increase price of scallop fishing licence)*

➔ **Professional sanctions** (withdrawing licences)

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DES CÔTES D'ARMOR

IMPORTANCE OF THE SCALLOP

» One of the largest scallop deposit in France (size and quantity of scallops)

» **70%** of Côtes d'Armor vessels fish scallops (183 sur 267)

» Major economic activity:

➔ **Turnover of 10.5 million euros**

➔ **1,000 jobs created** *(1 job at sea for 3 jobs on land)*

➔ **Strong cultural attachments** *(many local festivals about the Great Atlantic scallop)*

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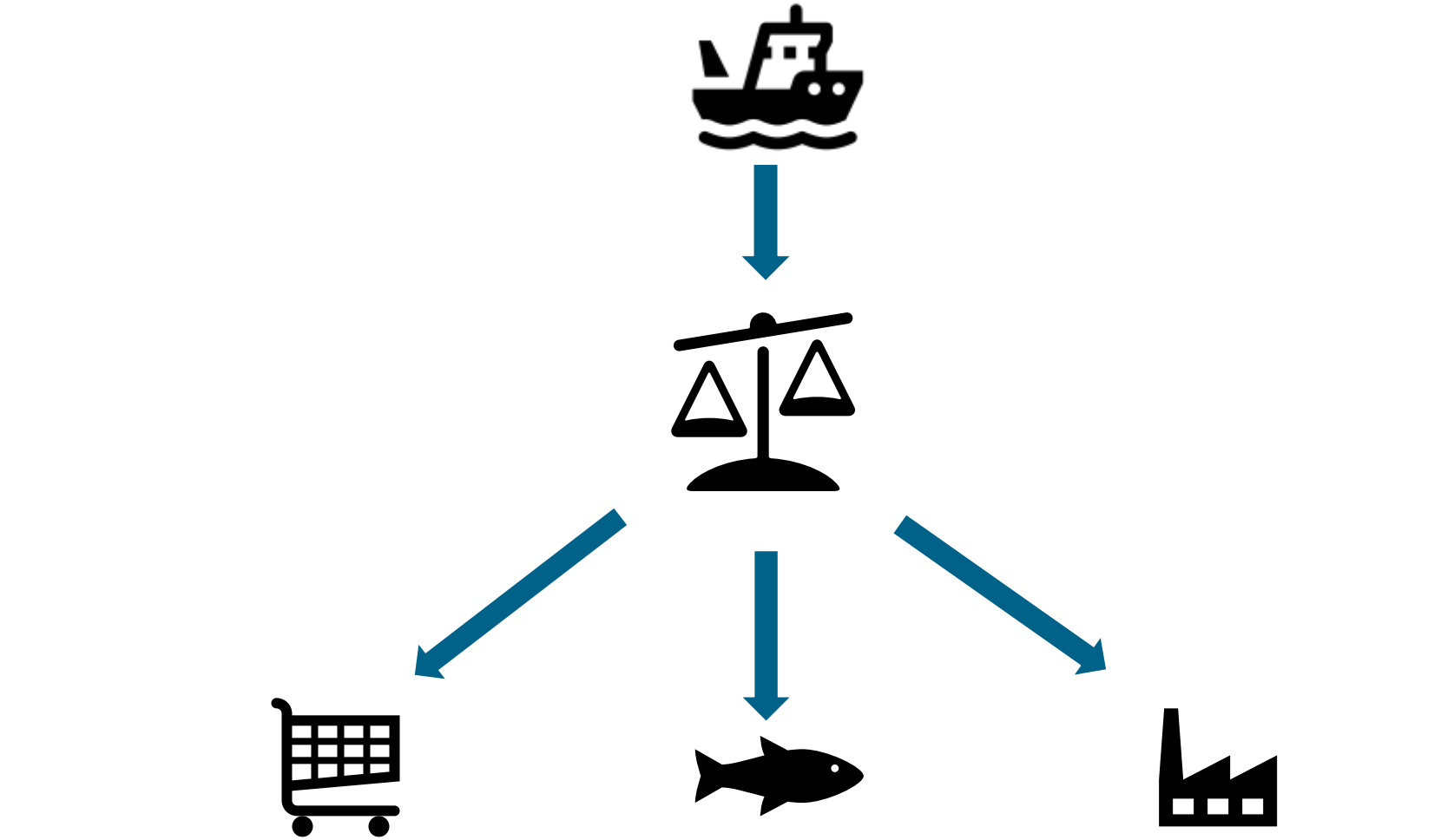
DES CÔTES D'ARMOR

TRADE & ECONOMIC STABILITY



Fisherman buy his fishery

Sale in fish auction

Buy with a shelling factory

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DES CÔTES D'ARMOR

THREATS & CHALLENGES

THREATS :

- Decrease of the resource and environmental quality
- Become a community species
- Globalization of markets (price drop)

CHALLENGES :

- Keep the local management
- Maintain partnership with national scientists
- Promote the Great Atlantic Scallop

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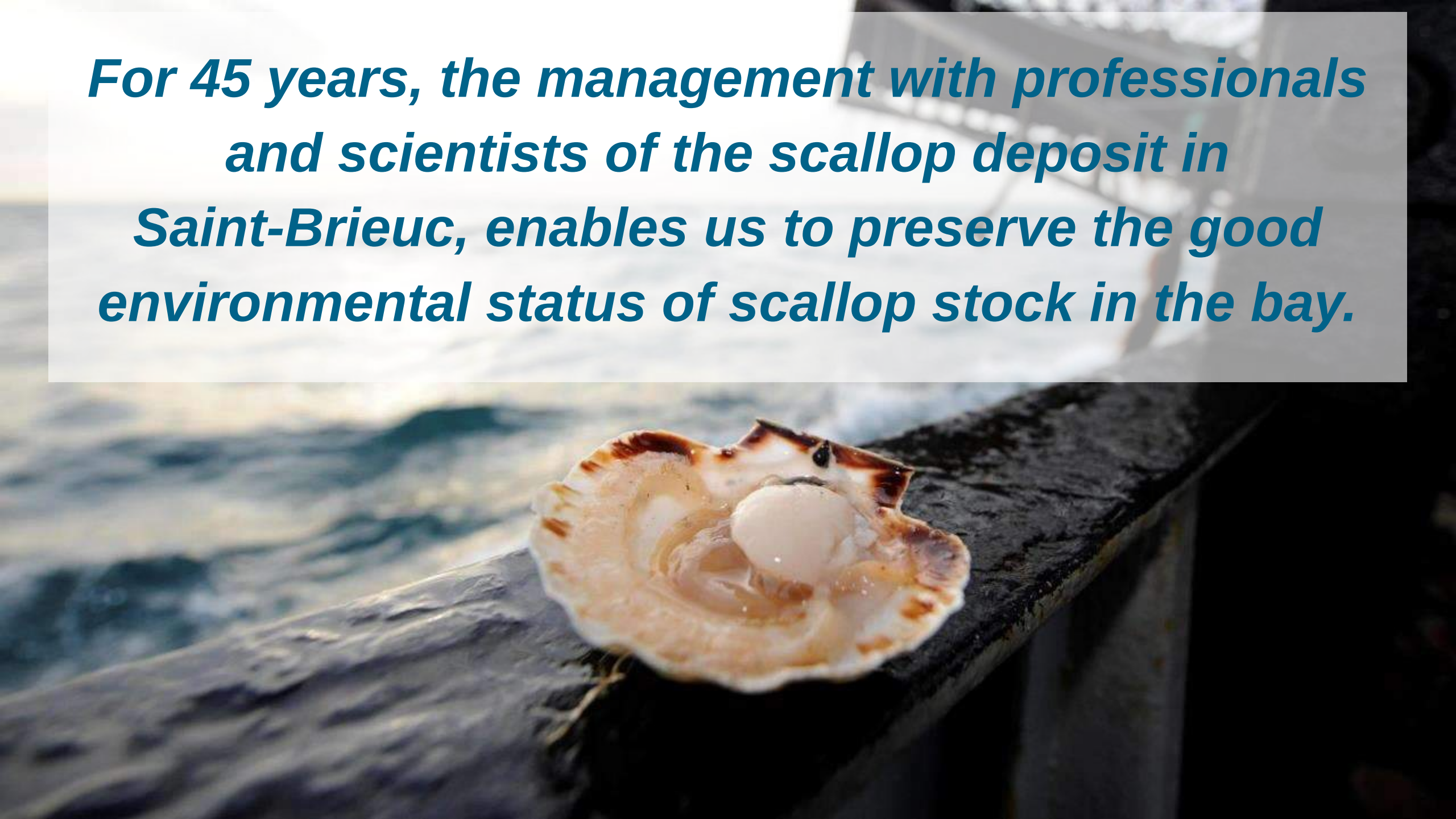
DES CÔTES D'ARMOR



For 45 years, the management with professionals and scientists of the scallop deposit in Saint-Brieuc, enables us to preserve the good environmental status of scallop stock in the bay.

Thank you for your attention

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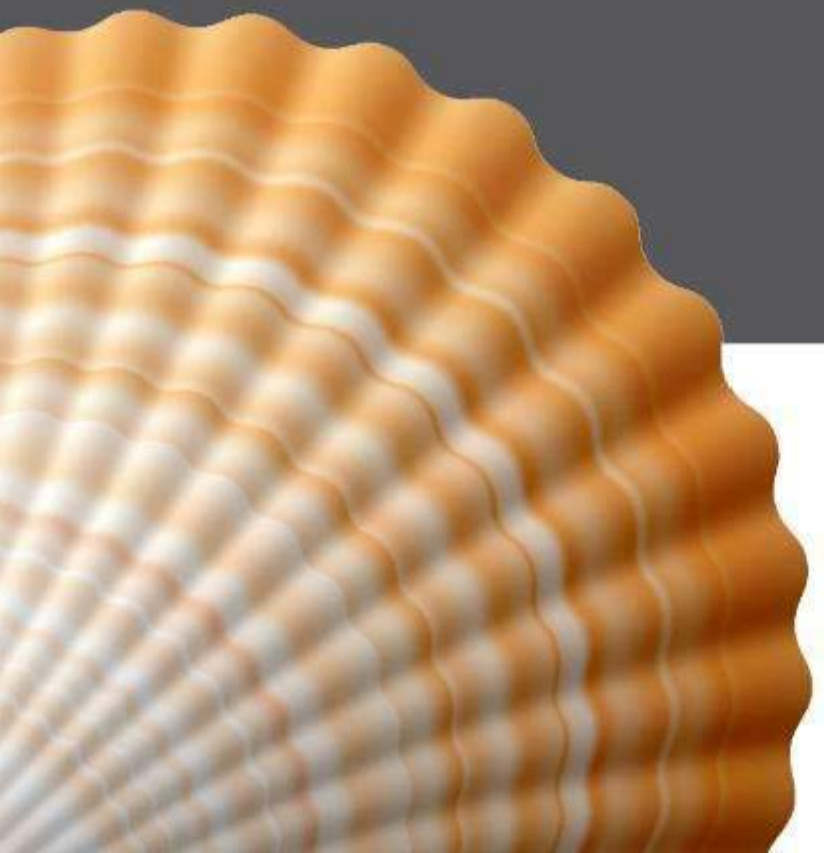

Session 2 –Panel Q & A
and Live Polling

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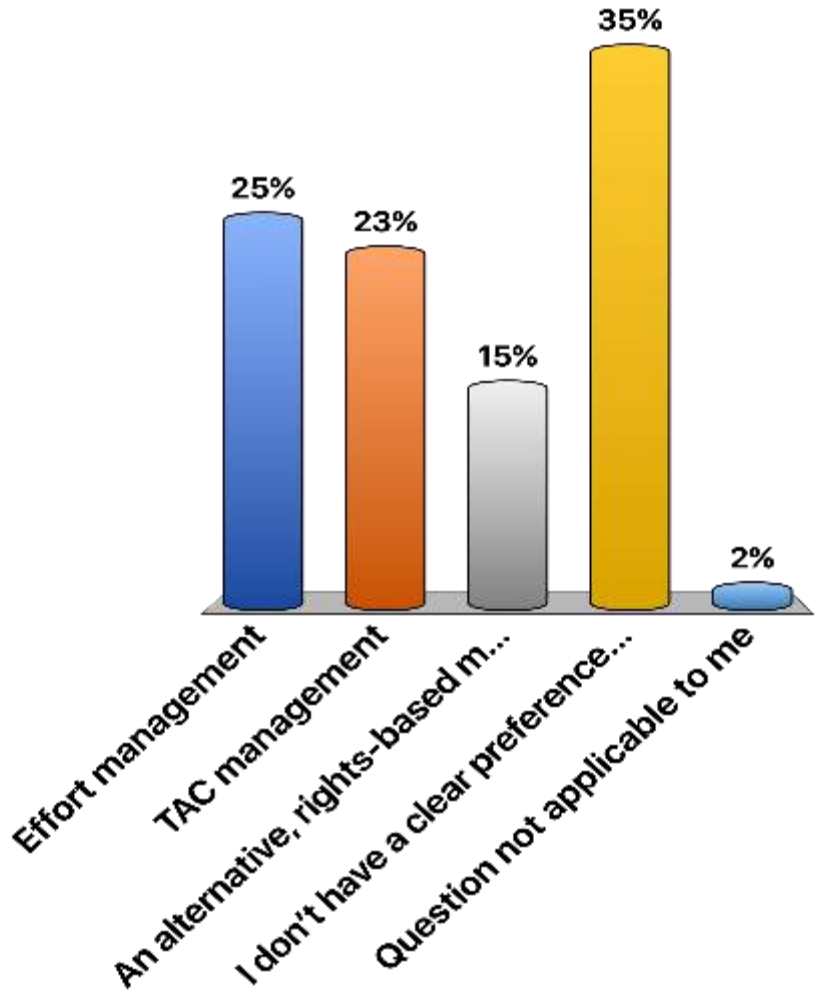
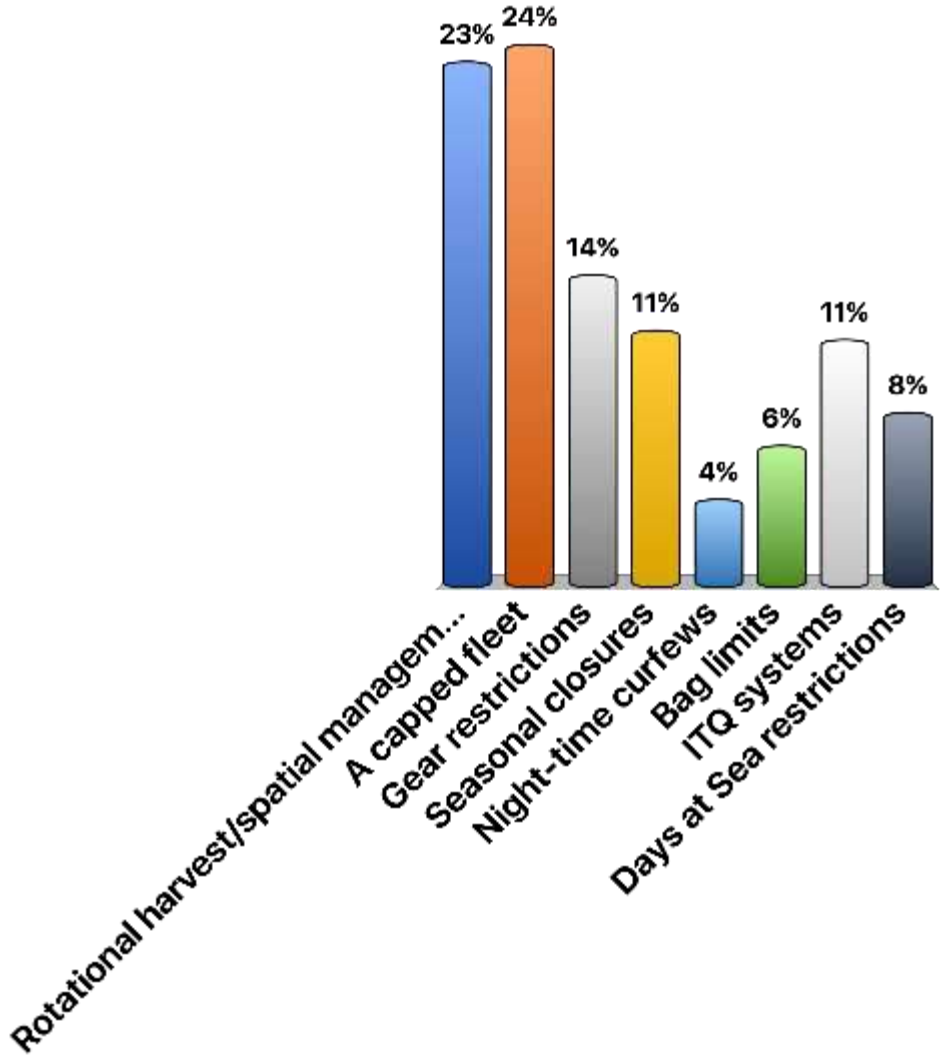
From what you have just heard, which over-arching management model appears the most attractive given your experience of UK inshore scallop fishing? Please select one.

A. Effort management
B. TAC management
C. An alternative, rights-based model
D. I don't have a clear preference yet
E. Question not applicable to me



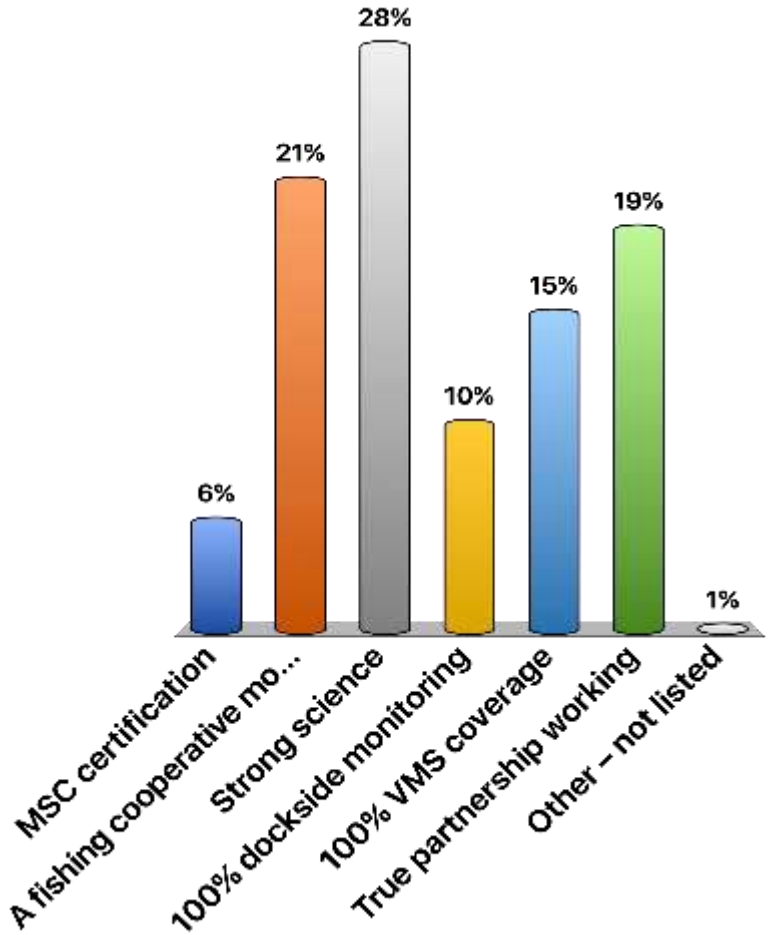
What specific measures work best for inshore scallop fishing, in your view? Please rank your top three.

A. Rotational harvest/spatial management
B. A capped fleet
C. Gear restrictions
D. Seasonal closures
E. Night-time curfews
F. Bag limits
G. ITQ systems
H. Days at Sea restrictions



What were the most appealing aspects of the case studies presented on inshore fishing, in your view? Please rank your top three.

A. MSC certification
B. A fishing cooperative model
C. Strong science
D. 100% dockside monitoring
E. 100% VMS coverage
F. True partnership working
G. Other – not listed



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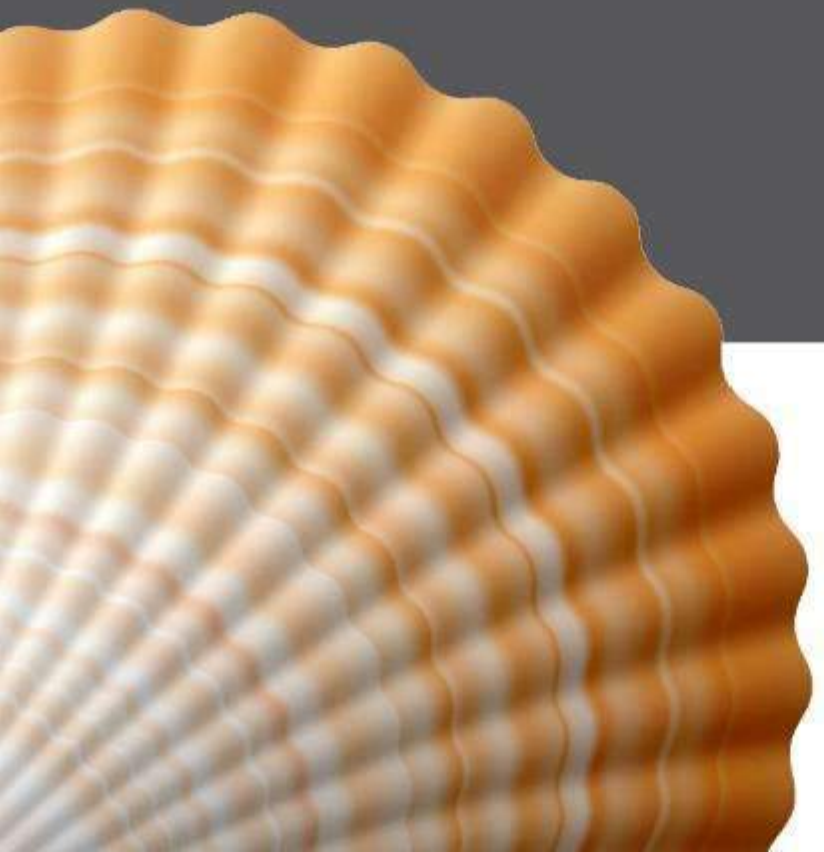

Session 2
Table Discussions & Feedback

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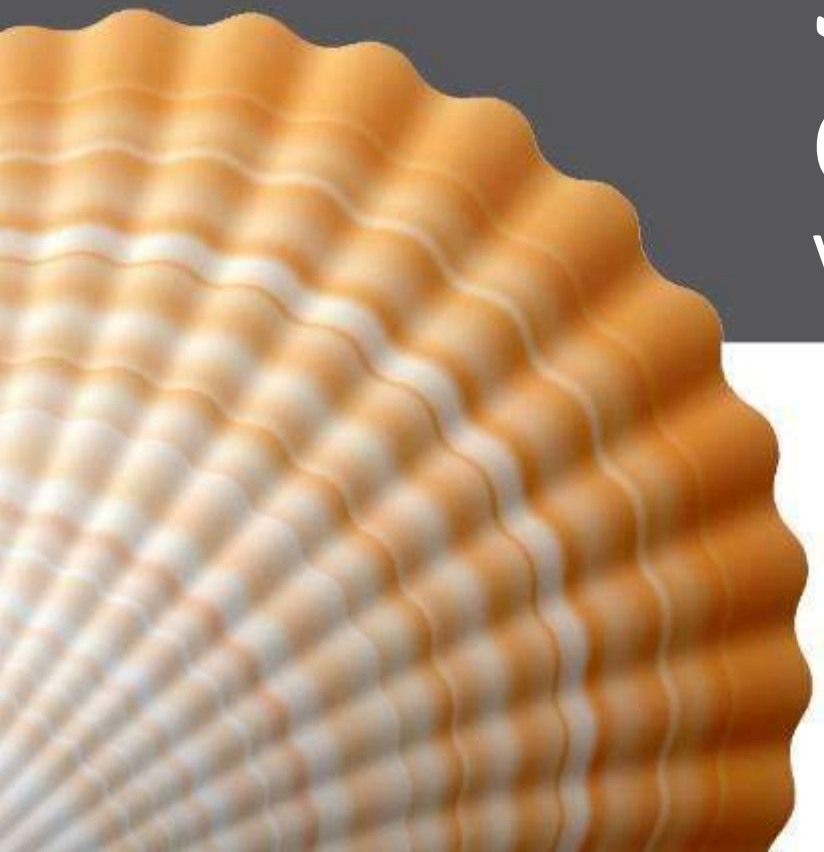
Session 3

Chair: Christine Penney

VP Sustainability & Public Affairs, Clearwater



Offshore fisheries management models

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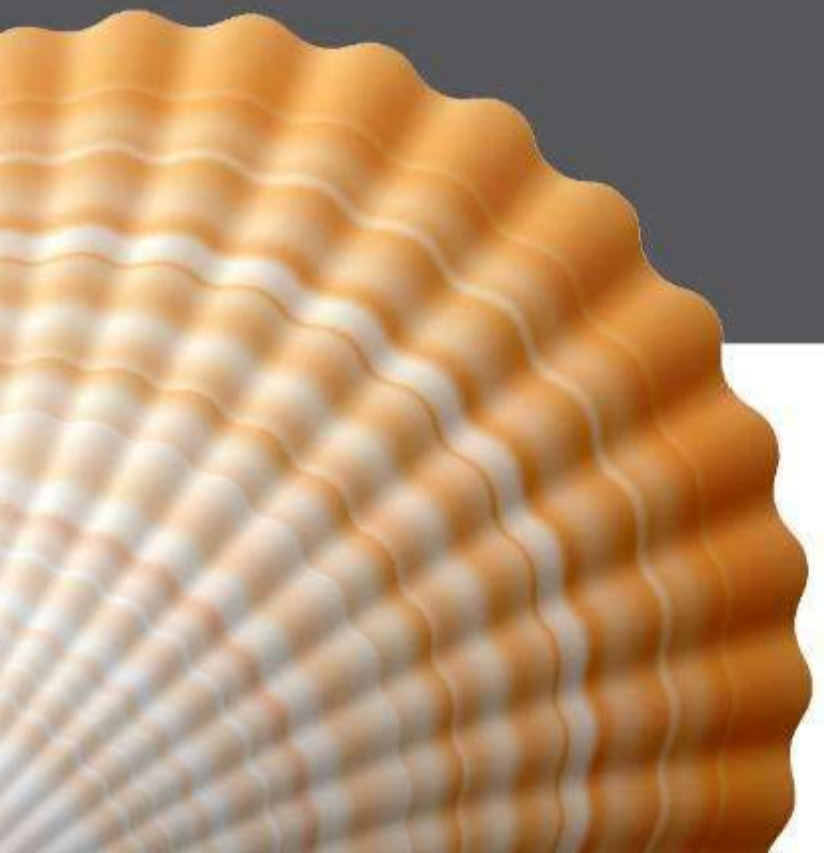


Prof Oscar Iribarne

Senior Scientist
UNMDP-CONICET, Argentina

Patagonian Case Study

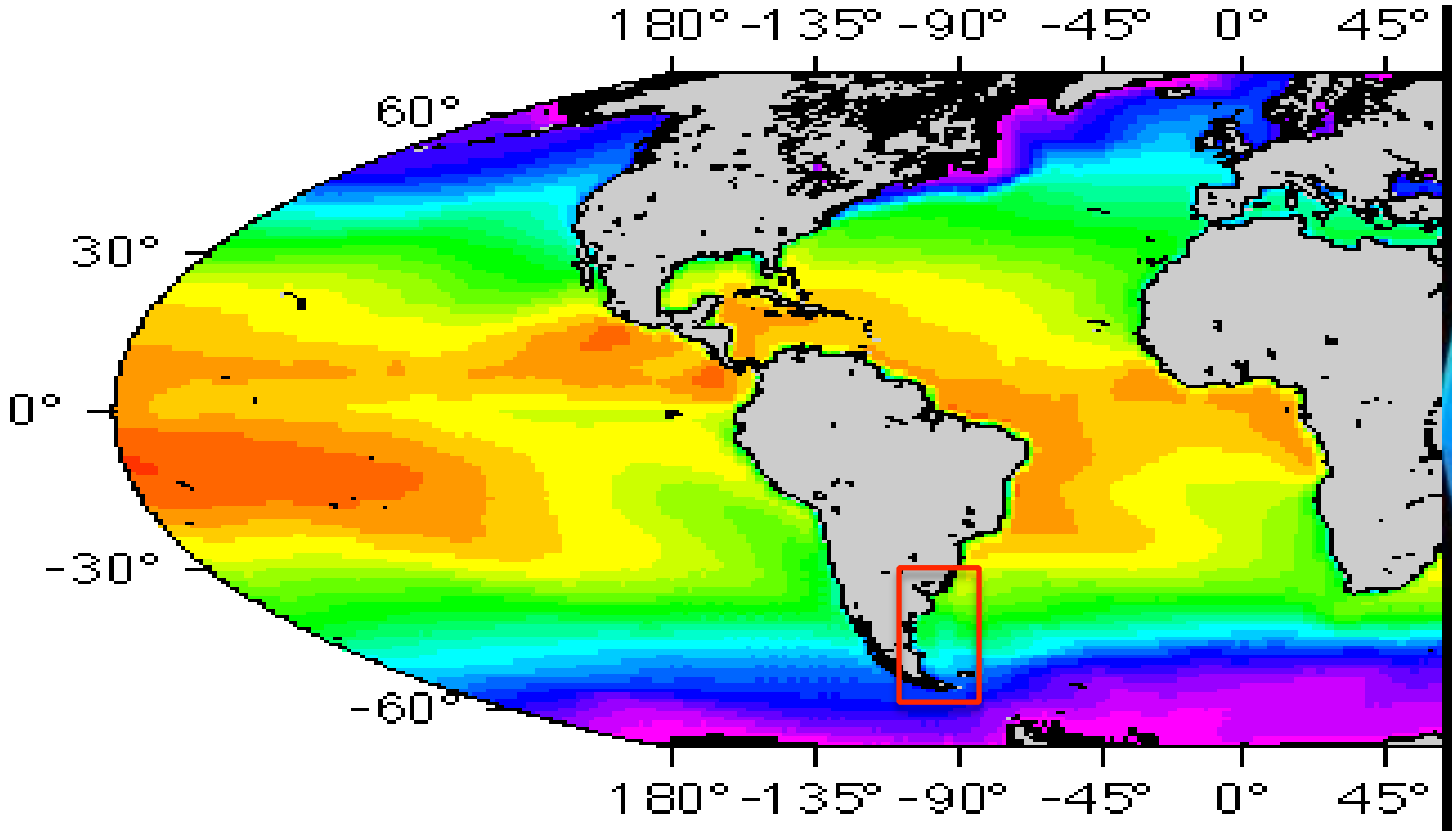
Supported by
seafish

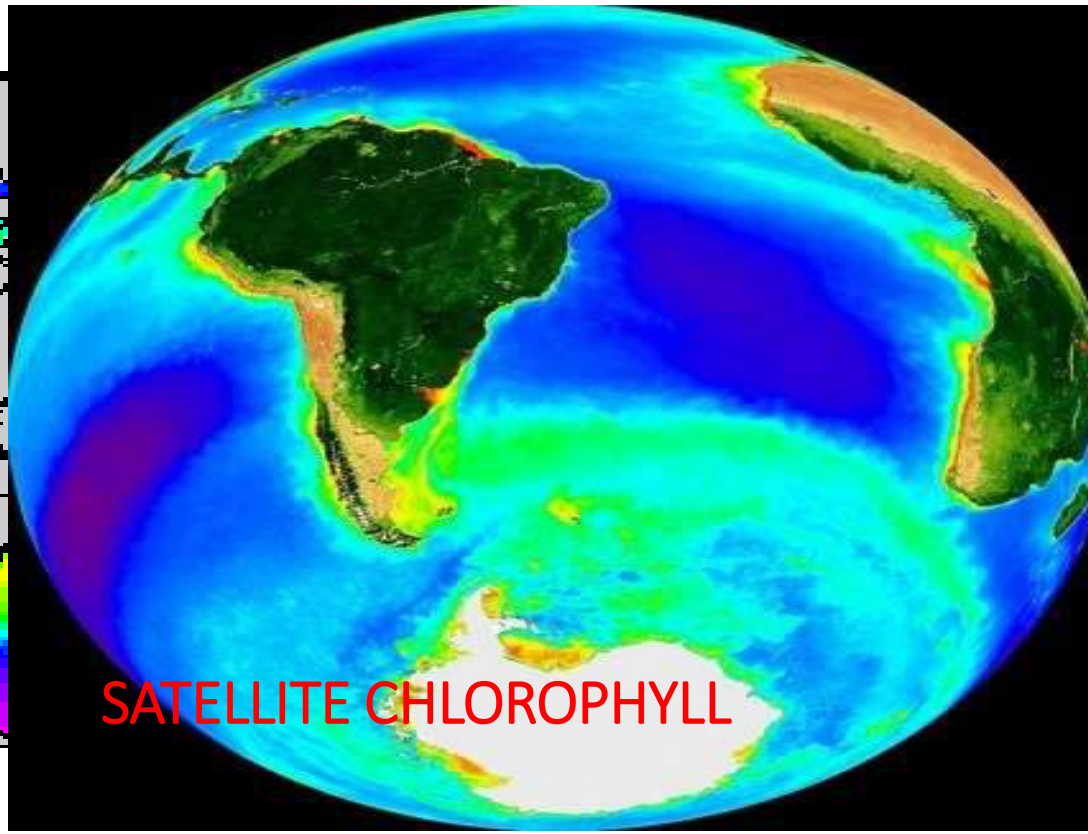
PATAGONIAN CASE STUDY

Zygochlamys patagonica

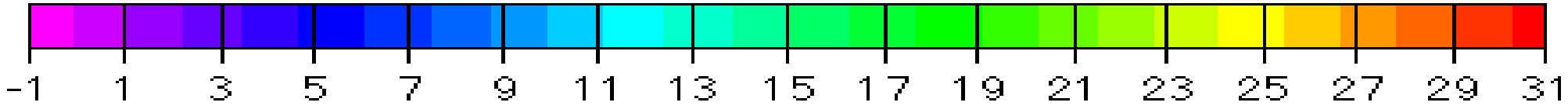
Oscar Iribarne
National University of Mar del Plata (UNMDP)
National Council of Research and Technology (CONICET)
Argentina

January SST





SURFACE WATER TEMPERATURE



NASA

Zygochlamys patagonica
"Patagonian scallop"

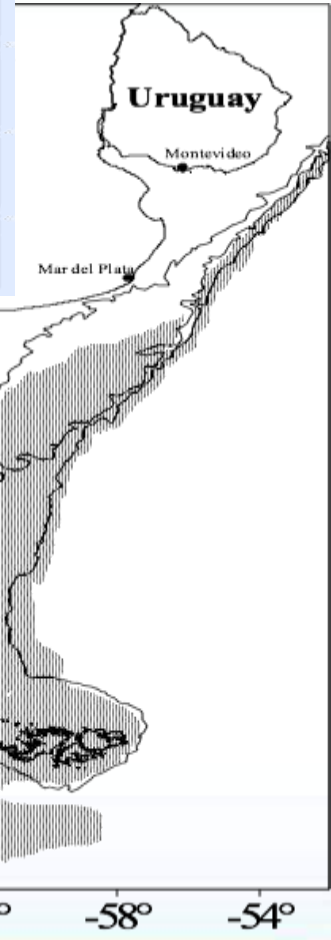
- **COOL TEMPERATE SPECIES**

- **FROM CHILOE (CHILE) TO RIO DE LA PLATA (ARGENTINA-URUGUAY)**

- **40 TO 200 M DEPTH**

- **ASSOCIATED TO INVERTEBRATES SPECIES AND SOME FIN-FISHES**

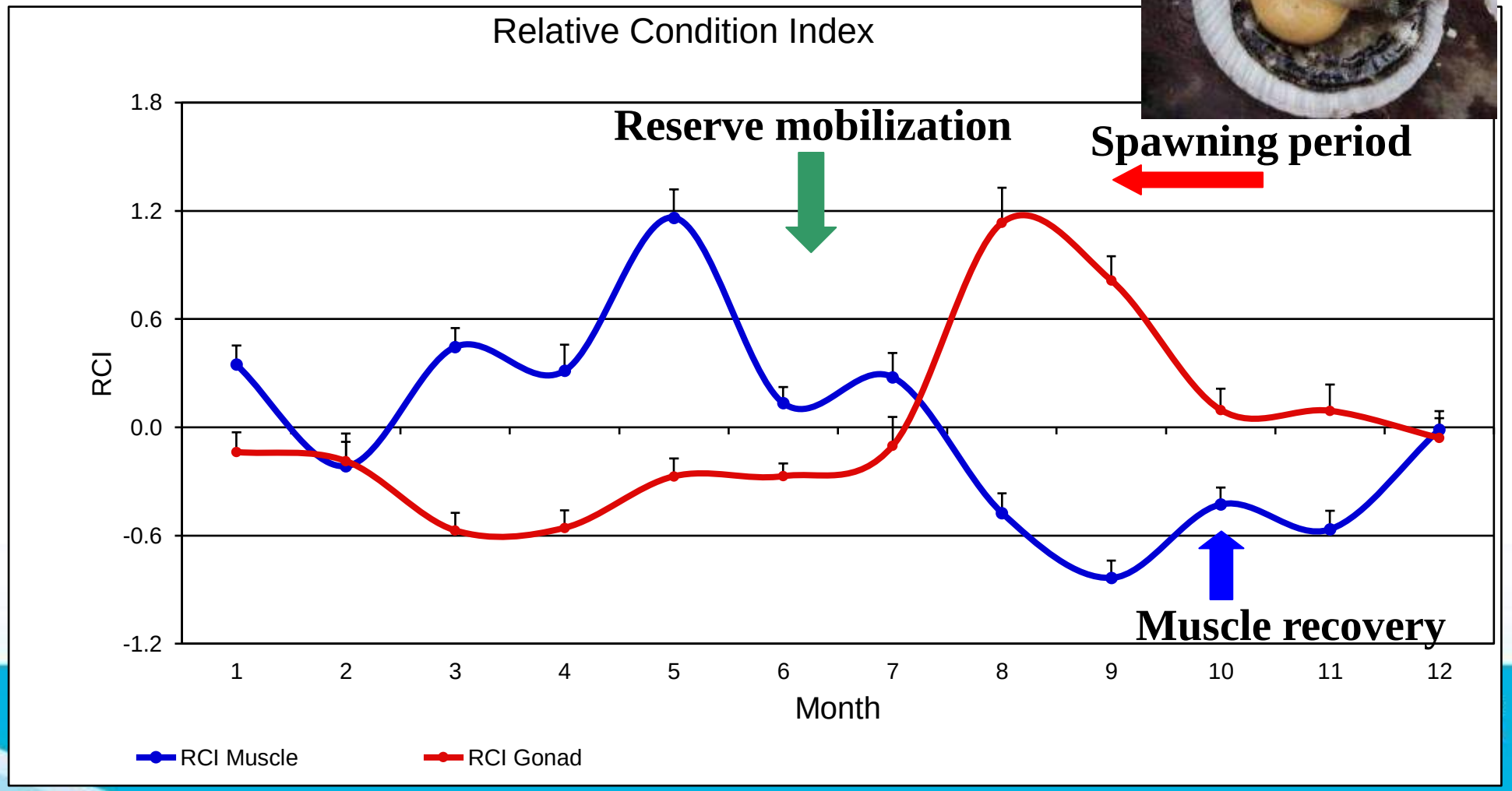
- **DOMINANT IN BIOMASS**




- SMALL SIZE SPECIES
- 160-240 pieces · kg-1
- SEXES ARE SEPARATED (SEX RATIO 1:1).

- **FIRST SPAWNING SIZE *aprox.* 40 mm TH (2+ YO, vary with Lat.).**
- **SPAWNING FROM AUSTRAL SPRING TO AUTUMN.**

MUSCLE AND GONADS SHOWS SEASONAL VARIATION

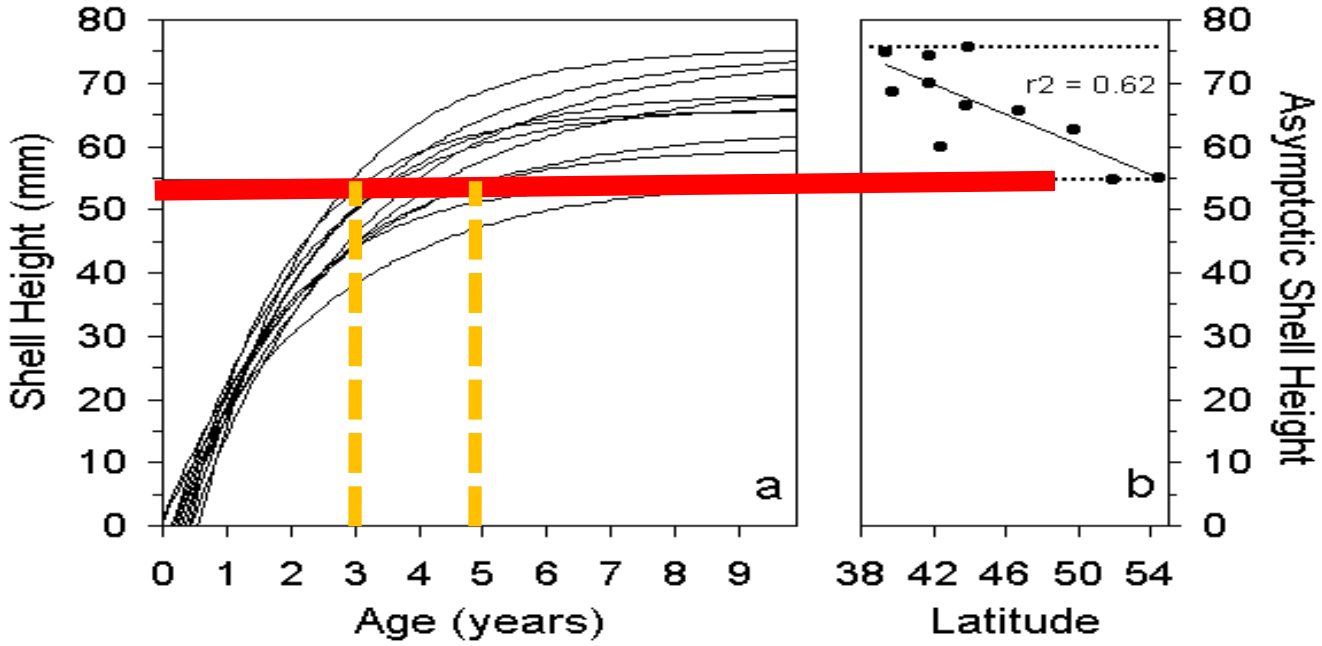


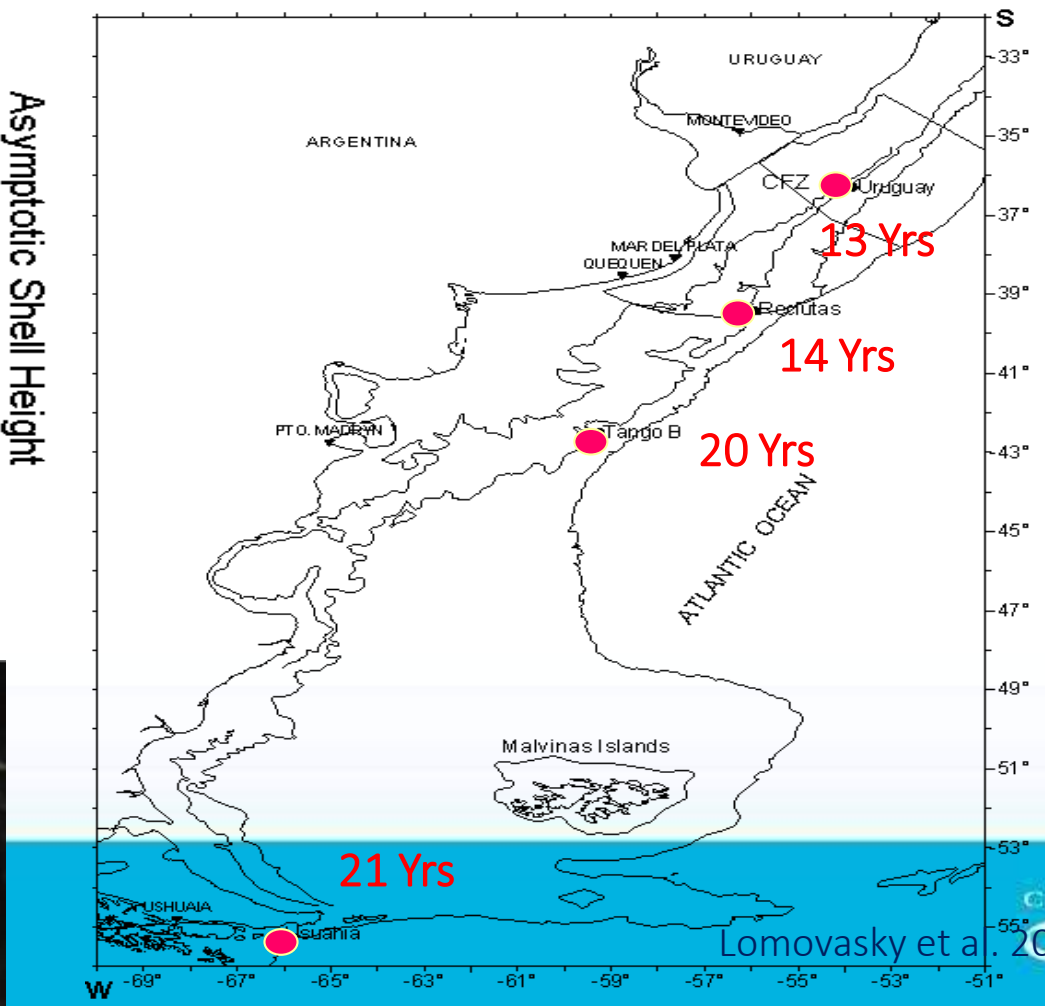
GROWTH VARIES ACROSS LATITUDE

- **INVERSELY RELATED TO LATITUDE.**

- **UP TO 13 - 21 YEARS OLD.**

- **COMMERCIAL SIZE: 55 MM H (3+ TO 5+ YEAR).**

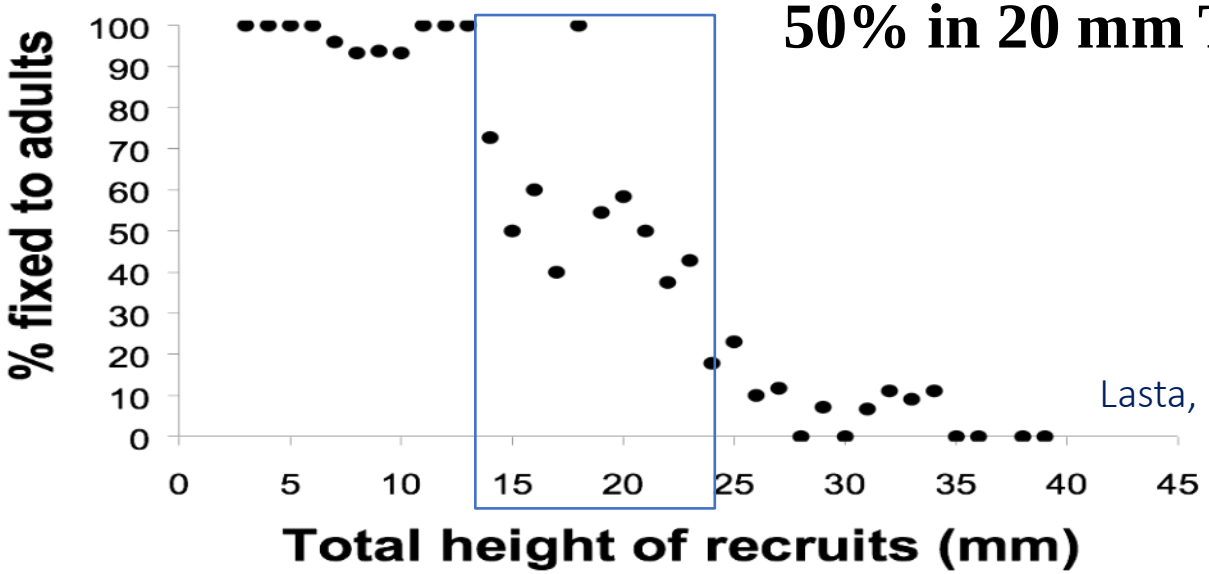




Lomovasky et al. 2008,2009

RECRUITMENT

98 % RECRUIT ON LIVE SCALLOPS



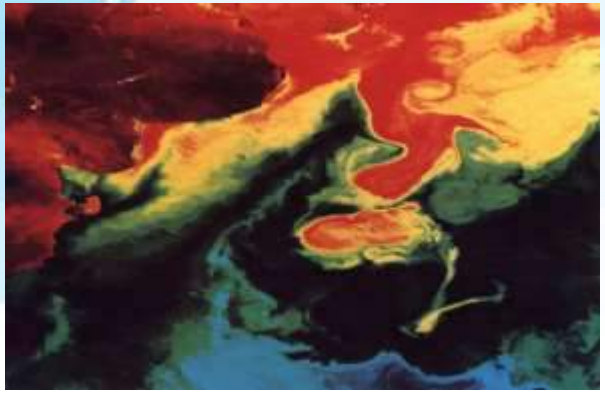
50% in 20 mm TH

Lasta, pers. com.

AND…. ONLY FEW ANNUAL COHORTS SHOWED STRONG RECRUITMENT!!

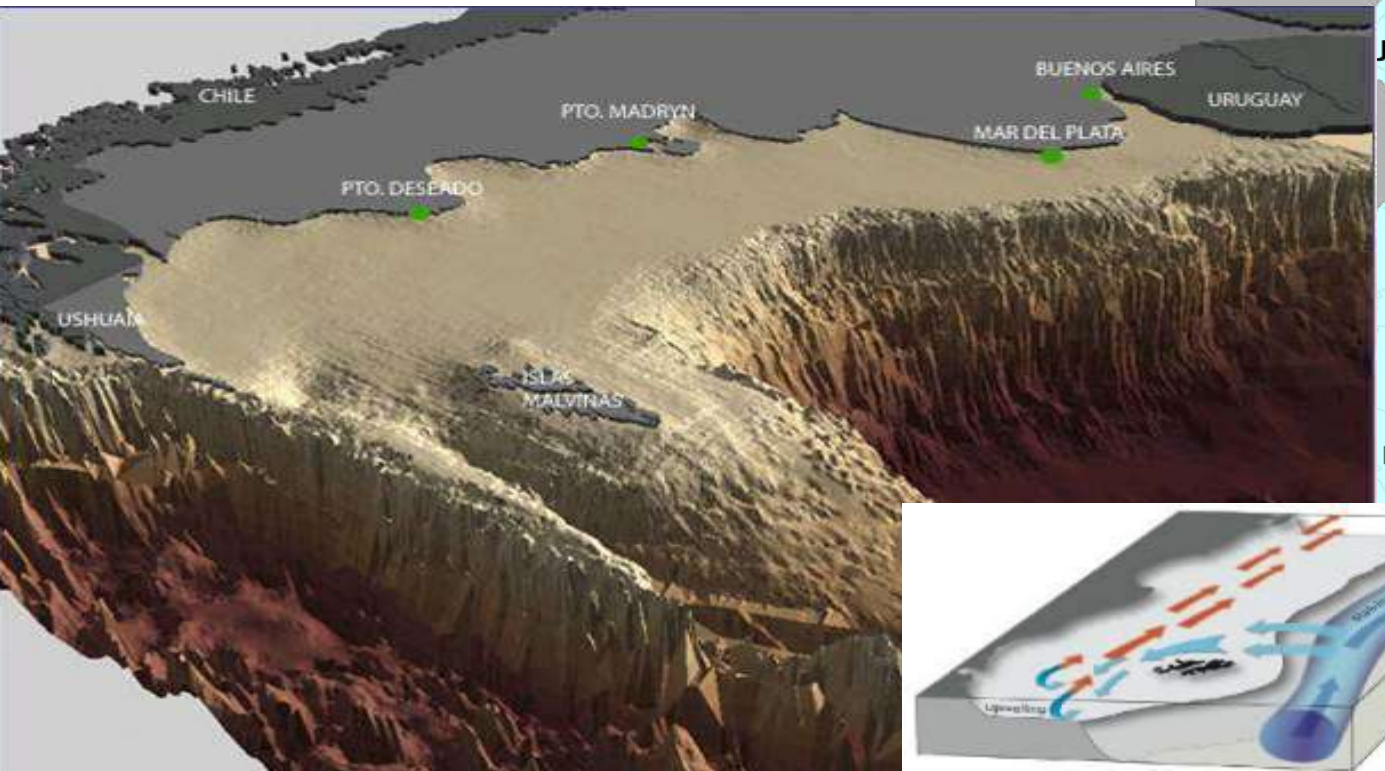
>> STOCK-RECRUITMENT RELATIONSHIP IS ELUSIVE??

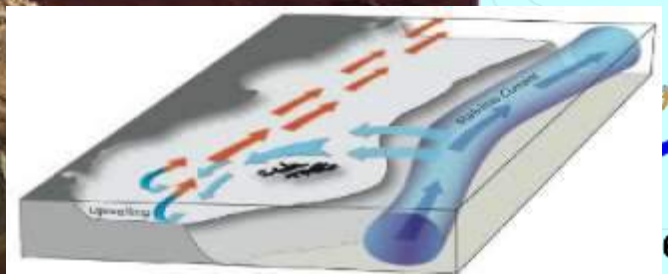
SST

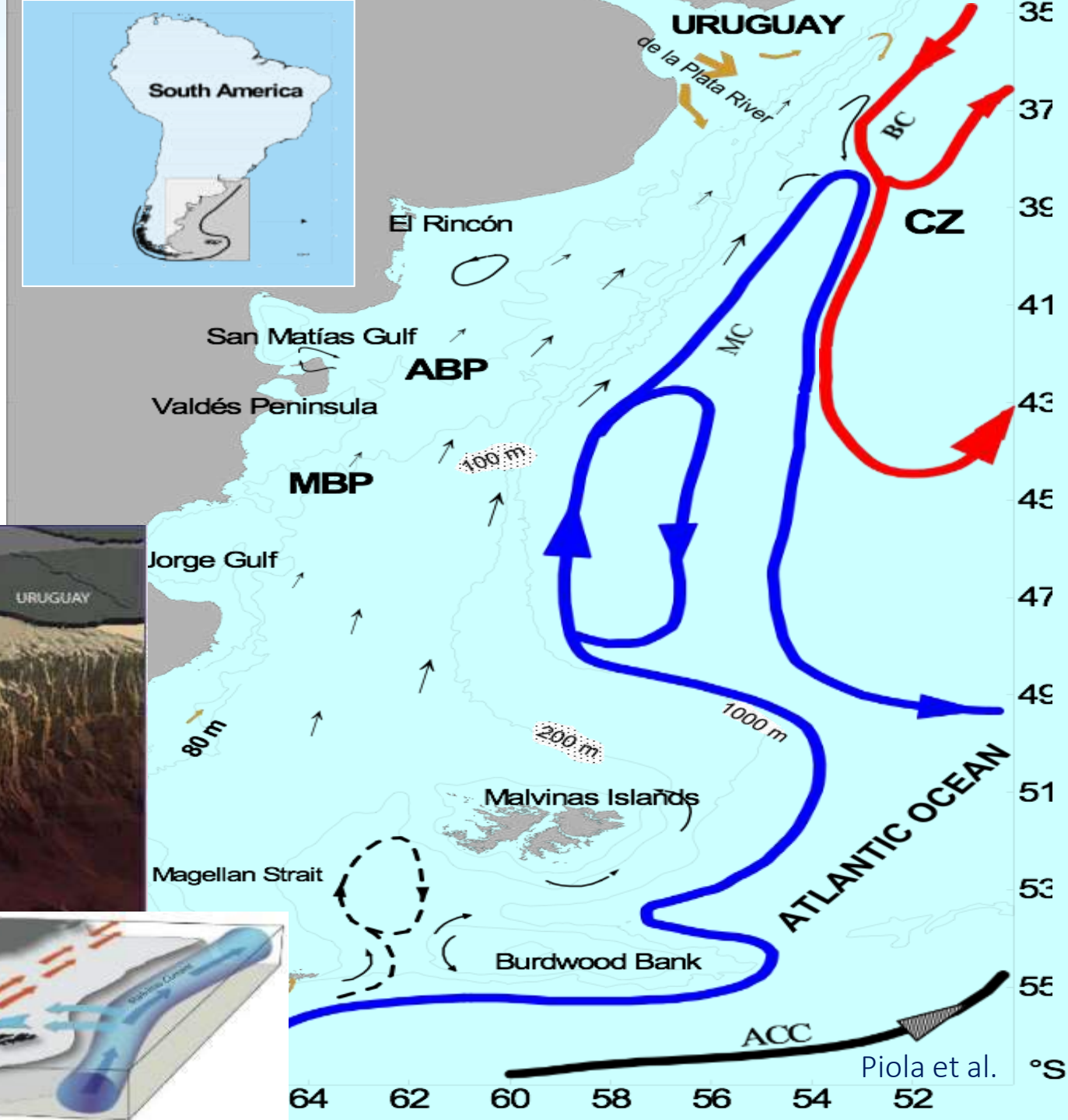


Argentine platform

- Nutrients are strongly fueled by the Malvinas (Falkland) Current.

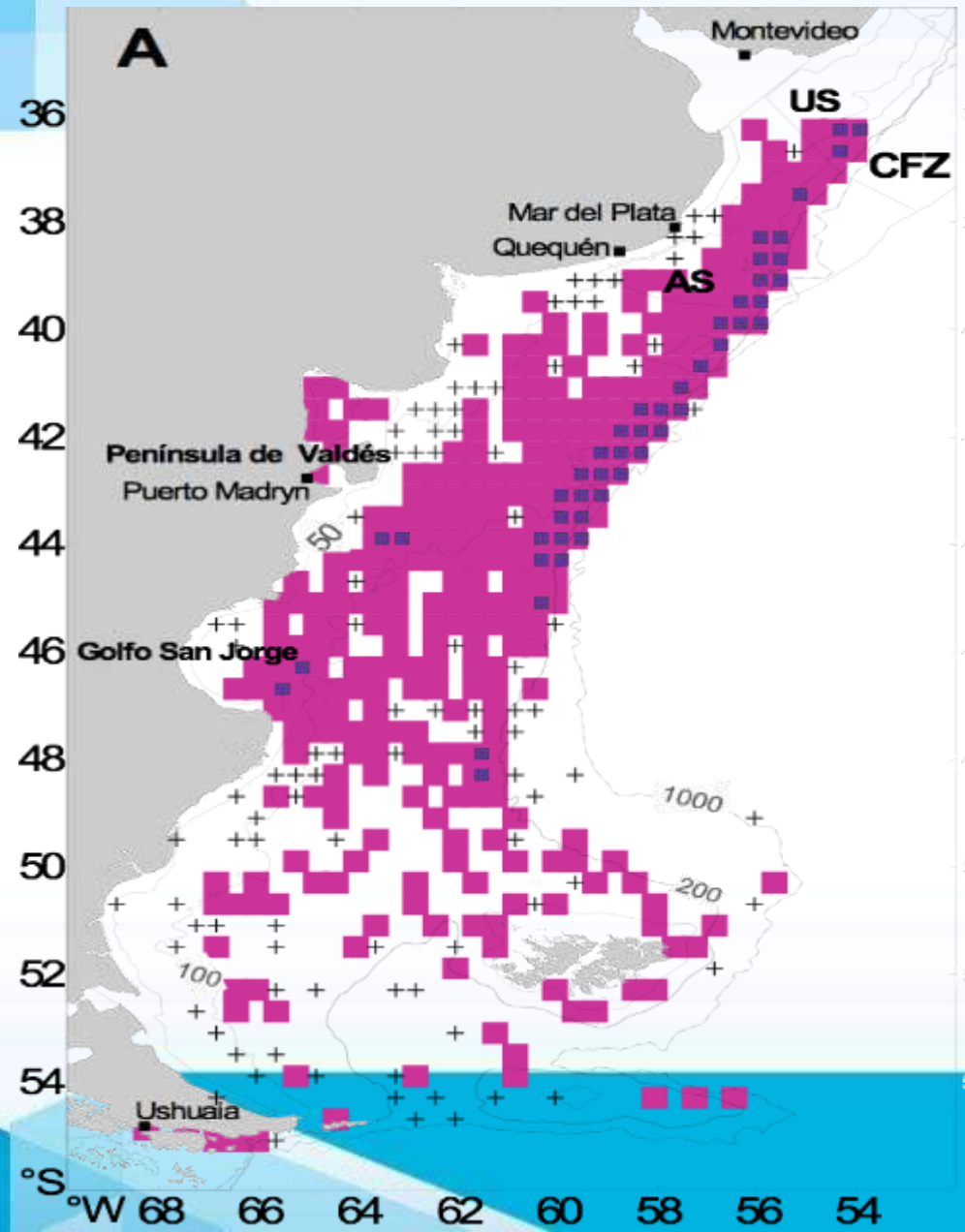


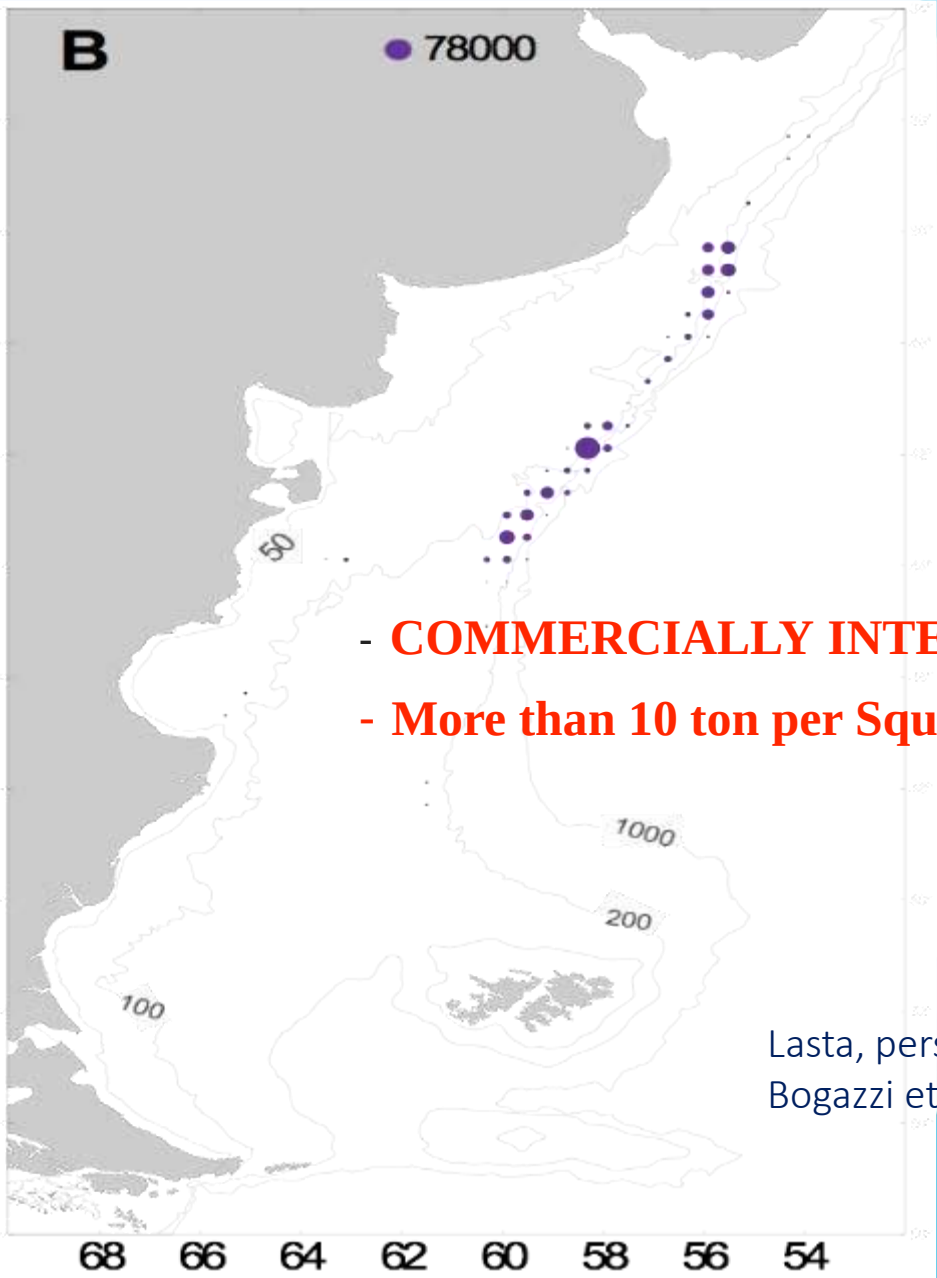




Piola et al.

FROM SPECIES DISTRIBUTION TO “FISHING BEDS”

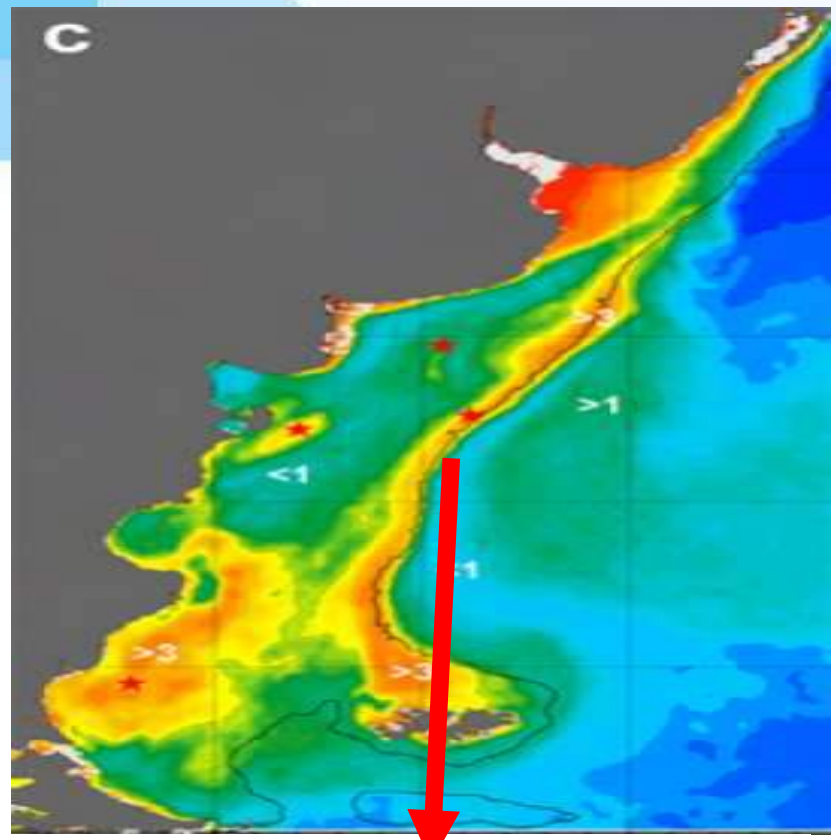


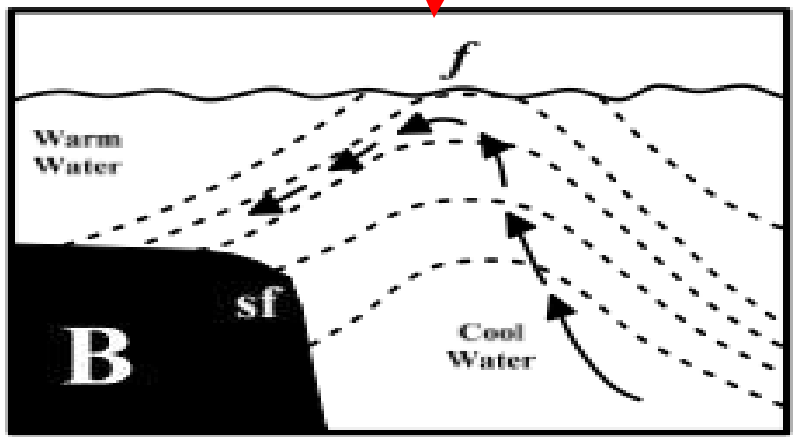


- **COMMERCIALLY INTERESTING?**
- **More than 10 ton per Square Km**

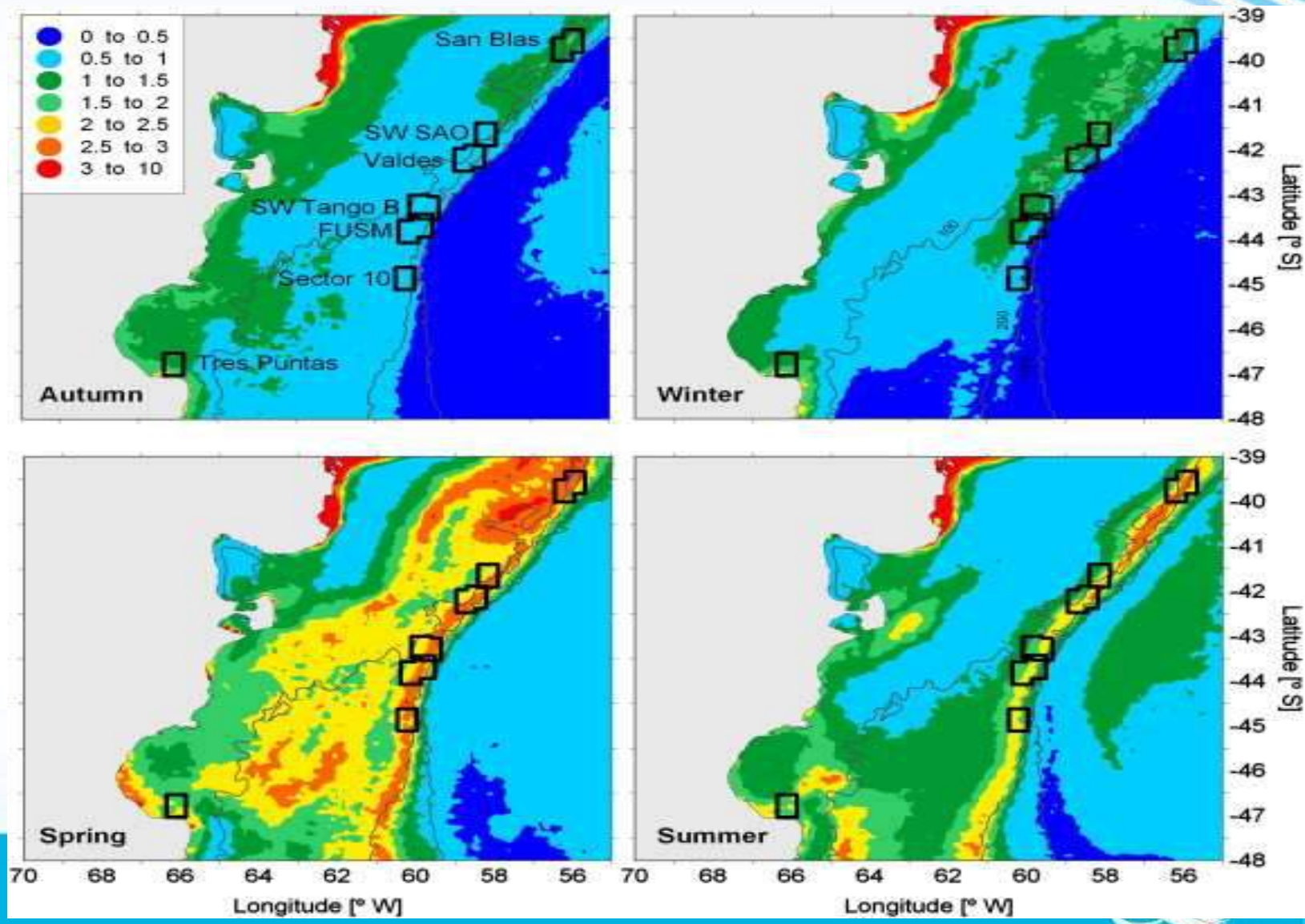
Lasta, pers. com.
Bogazzi et al. 2005

DENSITY IS COUPLED WITH REGIONAL PRIMARY PRODUCTION!!



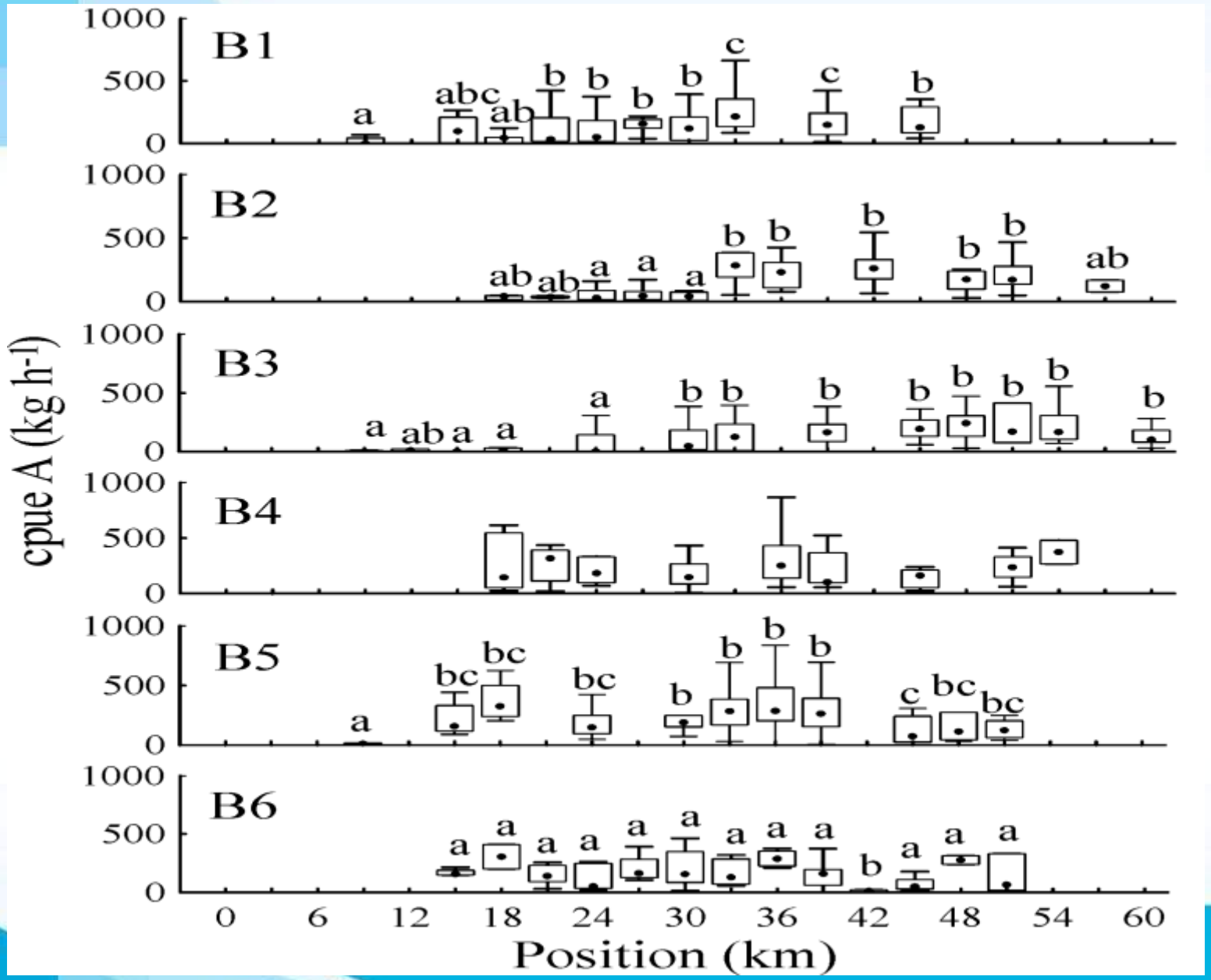


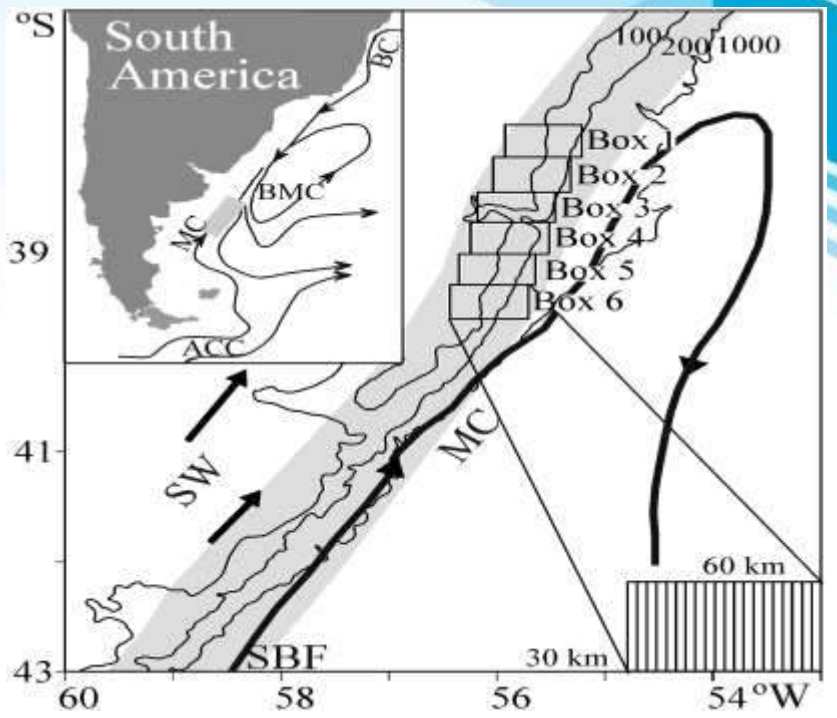
HIGHLY PRODUCTIVE YEAR AROUND!!

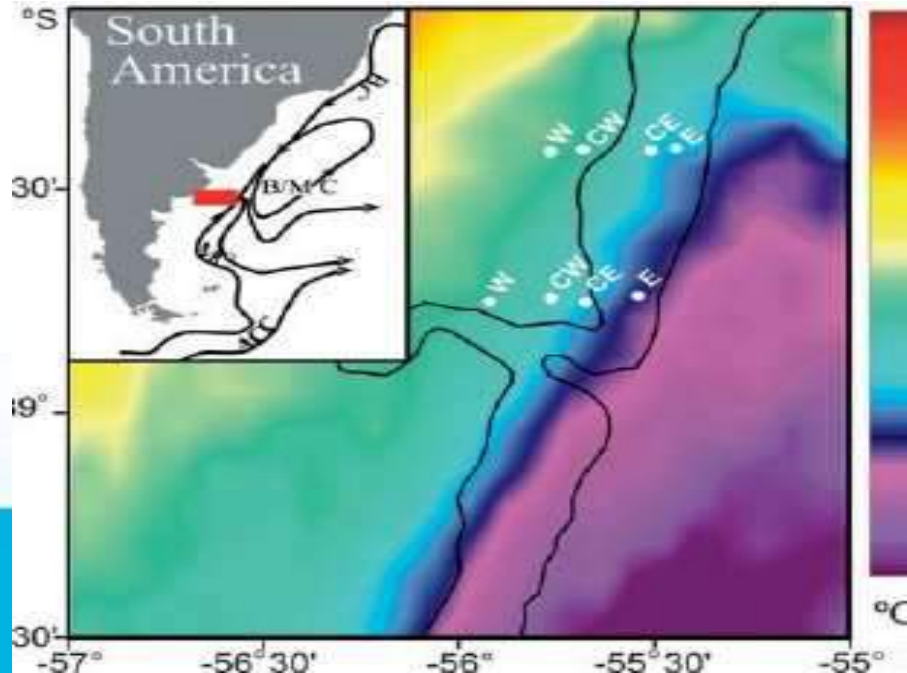


Bogazzi et al. 2005, Rivas 2006, Matano et al. 2010

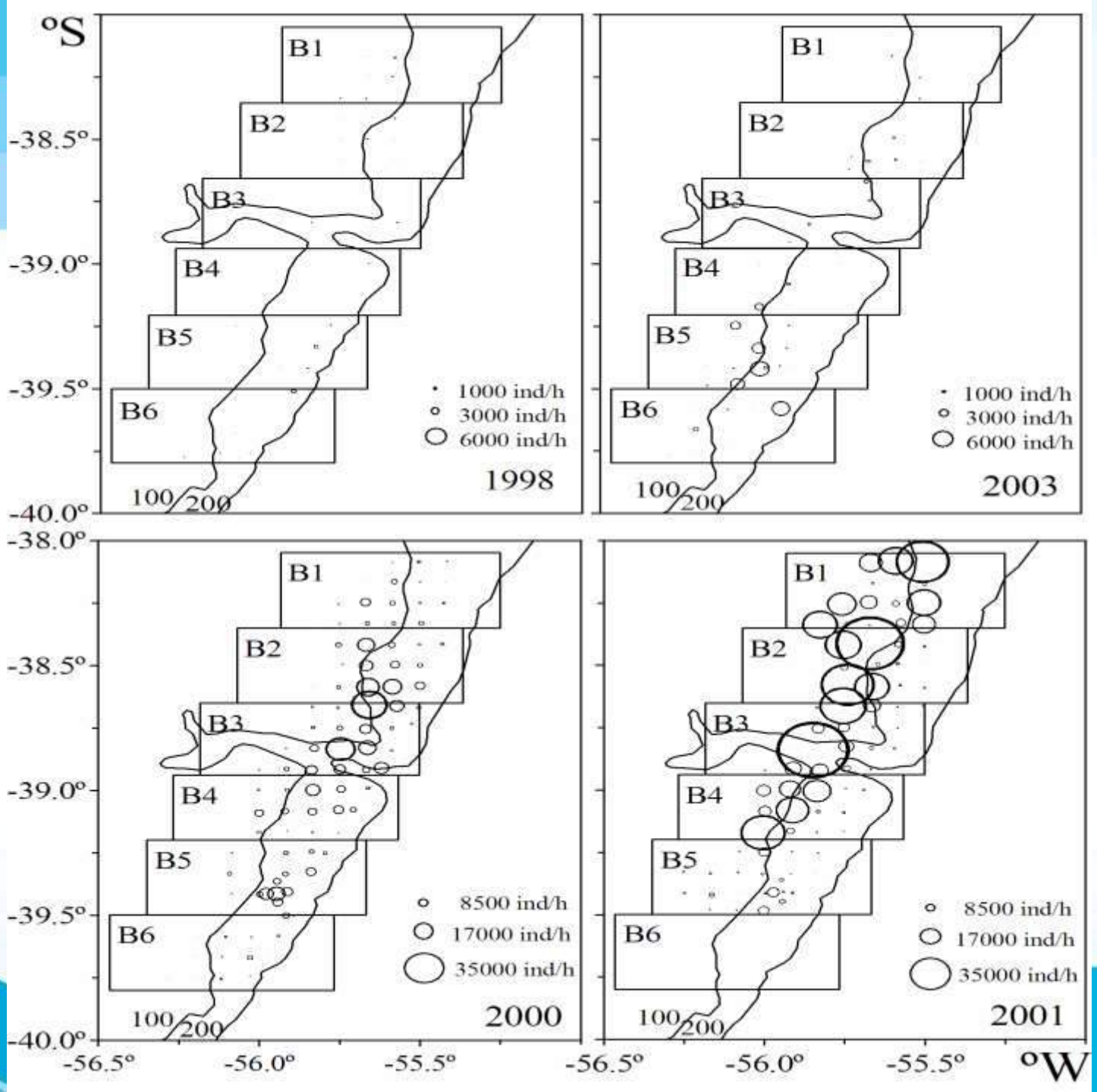
SCALLOP ABUNDANCE VARIES ACROSS FRONT

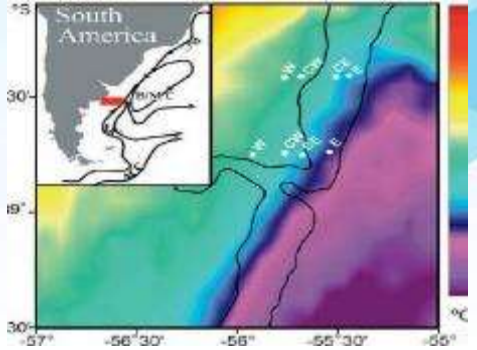






Mauna et al. 2008, 2010





- **RECRUITMENT ALSO VARIES ACROSS THE FRONT.**

- **1998 AND 2003: POOR RECRUITMENT**
- **2000 AND 2001: SUCCESSFUL RECRUITMENT YEARS (SCALE IN THE SYMBOL)**

- **100 AND 200 M ISOBATH**

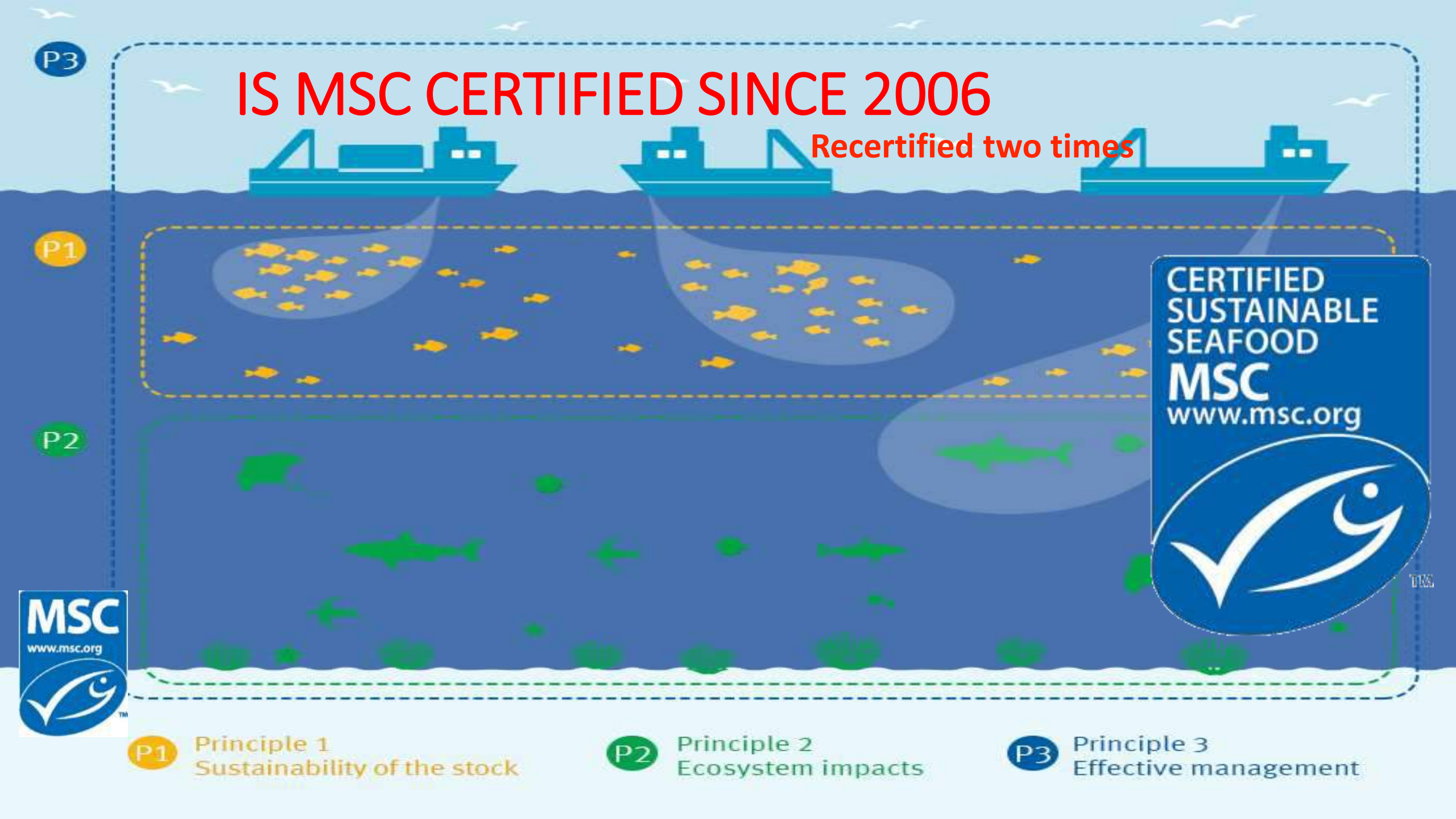
Mauna et al. 2008

THE FISHERY IS SIMPLE!!

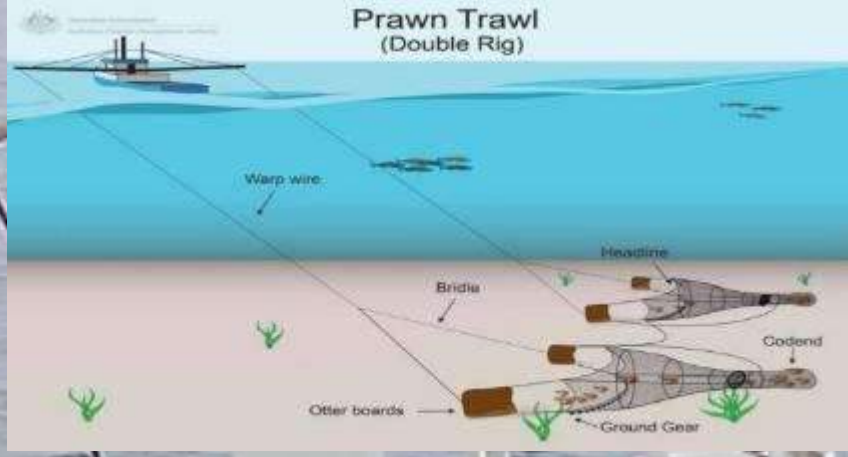
- TWO COMPANIES.
- 50% TAC EACH ONE.
- FOUR FISHING-FACTORY VESSELS.

Clearwater

GLACIAR PESQUERA S.A.


P3
IS MSC CERTIFIED SINCE 2006
Recertified two times
P1
CERTIFIED
SUSTAINABLE
SEAFOOD
MSC
www.msc.org
P2
MSC
www.msc.org
P1 Principle 1
Sustainability of the stock
P2 Principle 2
Ecosystem impacts
P3 Principle 3
Effective management

- CAPTURE : 40-50 thousand ton/year (55 mm AT)
- 5 - 6 THOUSAND TONS MEET YEAR
- ALL EXPORTED



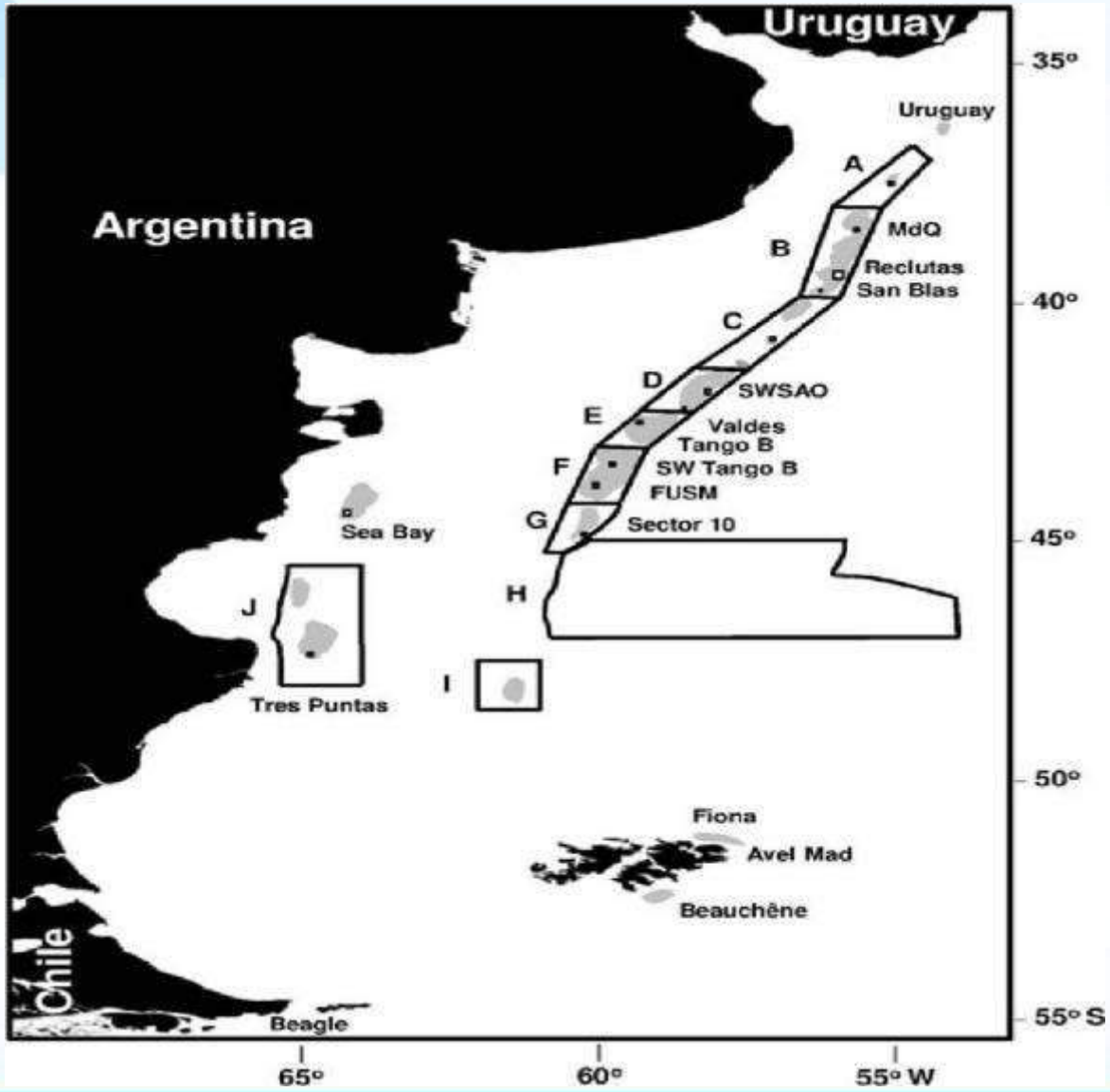
MANAGEMENT RULES

- **Fishing ground divided in discrete Management Units (MU).**
- **A high density Reproductive Reserve of 5-10% of the area in each MU.**
- **Fishing allowed if abundance of commercial size scallops ≥ 10 ton per Square Km.**
- **Percentage of individuals larger than 55 mm (Z) should be > 50%.**

-Total Allowable Catch (TAC)

- **If the biomass is increasing, TAC is 40% of the mean estimated biomass.**
- **If the biomass is decreasing, TAC is 40% of the lower limit in the estimation of the mean biomass.**
- **Devices to minimize damage to oceanic birds are mandatory.**

MSC
www.msc.org
™



- SEVERAL MANAGEMENT UNITS (MU).

- "MU" COVERS ONLY A SMALL FRACTION OF THE SPECIES DISTRIBUTION.

- THE ANNUAL TRAWLED AREA IS LESS THAN 14% OF THE "MU" AREAS (Alemany et al. 2016).

source INIDEP - Industry

HABITAT IS SIMPLE
>>> MAINLY SANDY BOTTOM

Ponce et al. 2011

Lasta, Pers. Com

SIMPLE COMMUNITY STRUCTURE!!

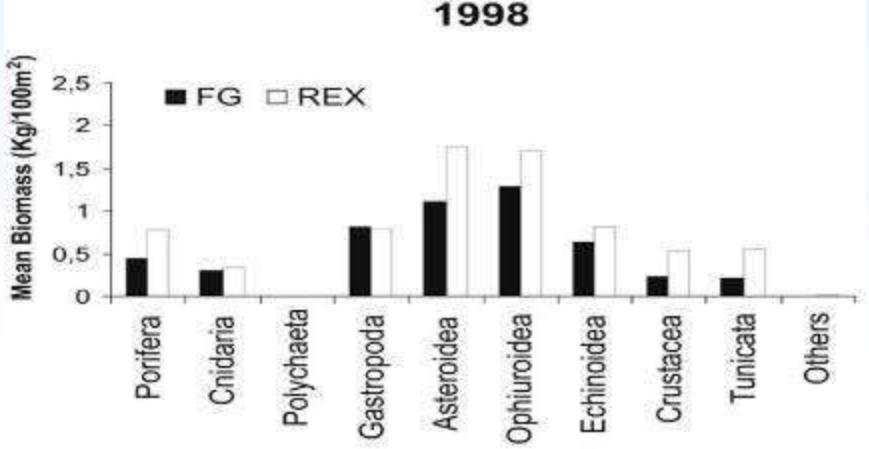
Bethoney et al. 2018

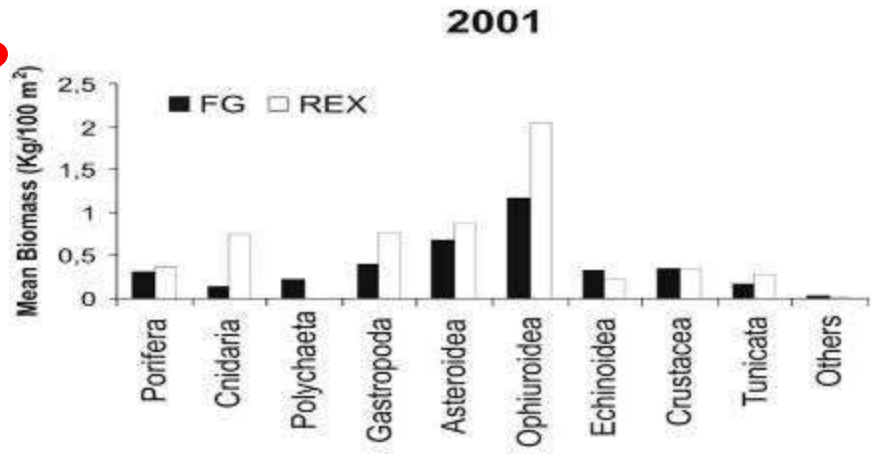
AUTOMATIZED ON BOARD PROCESSING

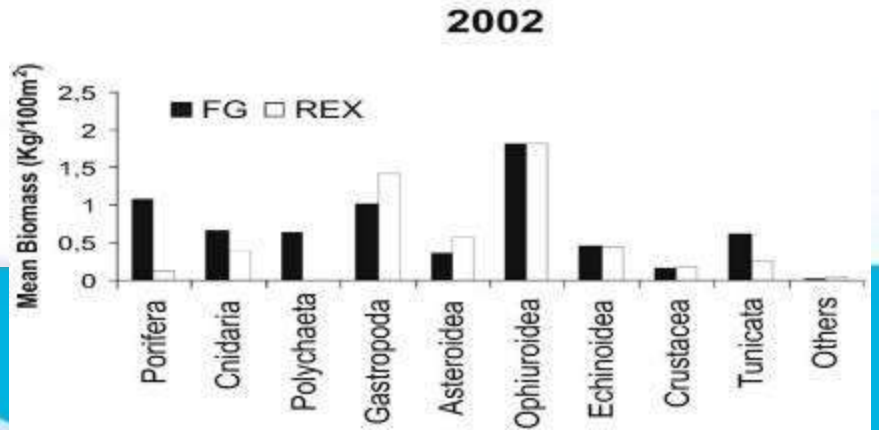
- 94-95 % OF THE SCALLOPS GOING THROUGH SIZE-SELECTION, SURVIVE.

EFFECT ON BOTTOM BIODIVERSITY?

>> FISHED (FG) VS EXCLUSION (REX) AREAS



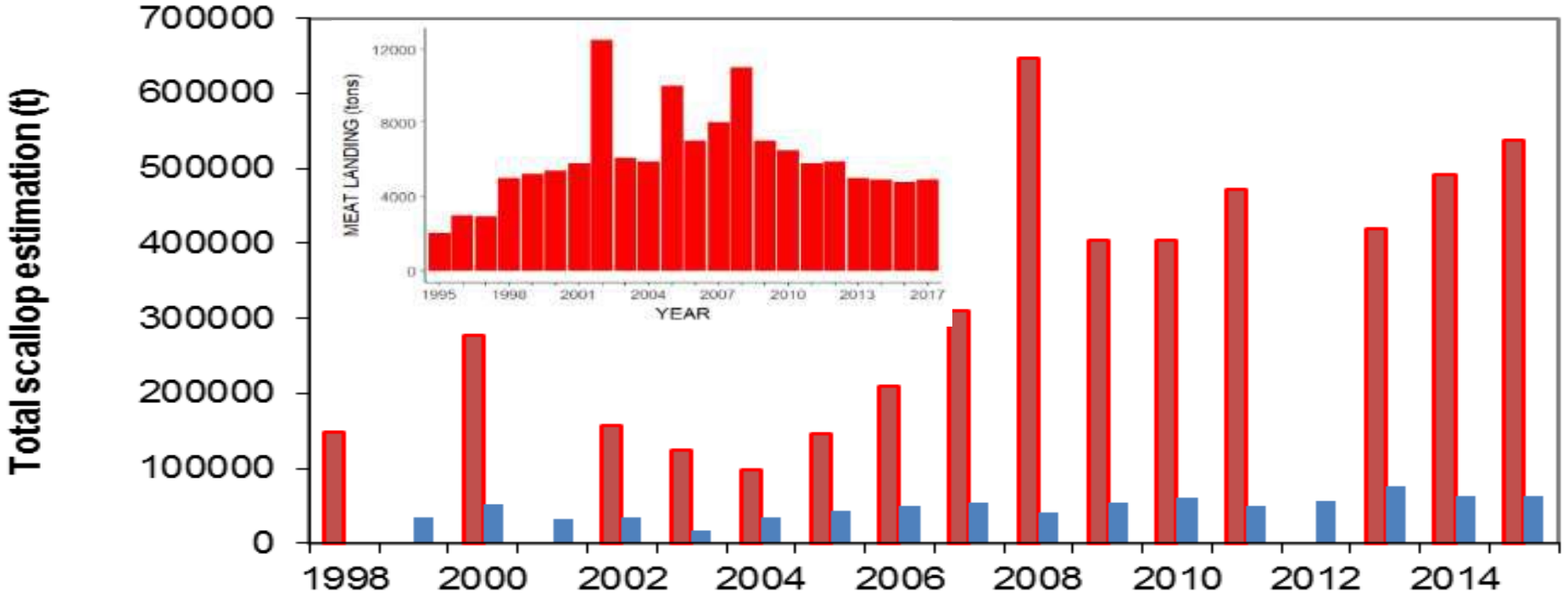




Schejter et al. 2008, 2012
See also Bremec et al. 2015

HISTORY

RELATIONSHIP BETWEEN ESTIMATED SCALLOP BIOMASS (RED) AND TAC (BLUE)



However, what determines recruitment is still unknown

CONICET

UNIVERSIDAD NACIONAL de MAR DEL PLATA

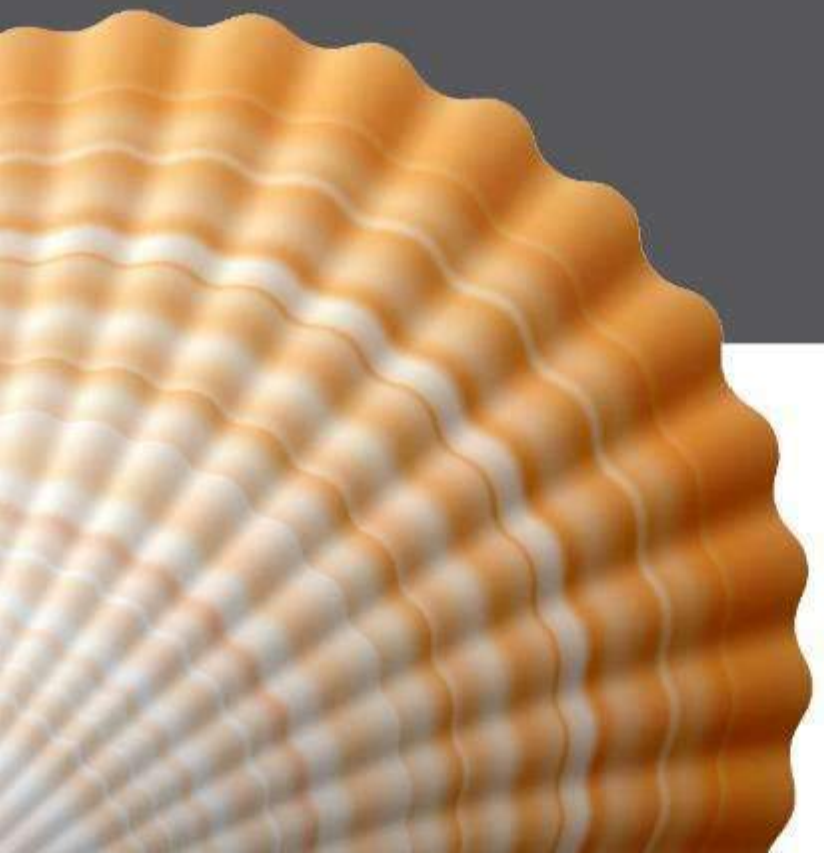
I I M Y C

THANK YOU!

The Fishmongers' Company

MACDUFF
Wild about Shellfish

Scallop science partners
INVESTING IN SUSTAINABILITY



Prof Kevin Stokesbury

US Georges Bank Sea Scallop Fishery
University of Massachusetts

US Case Study

Supported by seafish

The US sea scallop Fishery 1997-2018

Kevin D. E. Stokesbury

Department of Fisheries Oceanography
School for Marine Science and Technology
University of Massachusetts Dartmouth

The **Atlantic sea scallop** supports the highest valued commercial fishery in New England > $550 million /year fishery (Voorhees and Pritchard, 2014).

Record **American lobster** landings in 2014: 123 million pounds, $456 million in value; DMR -February 26, 2015

NEW BEDFORD RANKED TOP FISHING PORT IN THE NATION

New Bedford Standard Times, 2004

The Port of New Bedford generates $9.8 billion in total economic value

- 35,350 jobs supported by the Seafood Industry
-140 million lbs of seafood landed in 2015


STARDUST
STARDUST

What are the key problems in Fisheries Science?

Ricker 1975

1. Abundance of the population
2. Total mortality at successive ages
3. Fraction of total mortality; fishing, predation, disease
4. Rate of growth
5. Rate of reproduction
6. Rate of surplus production

3 Independent Fisheries Surveys used to answer these questions:

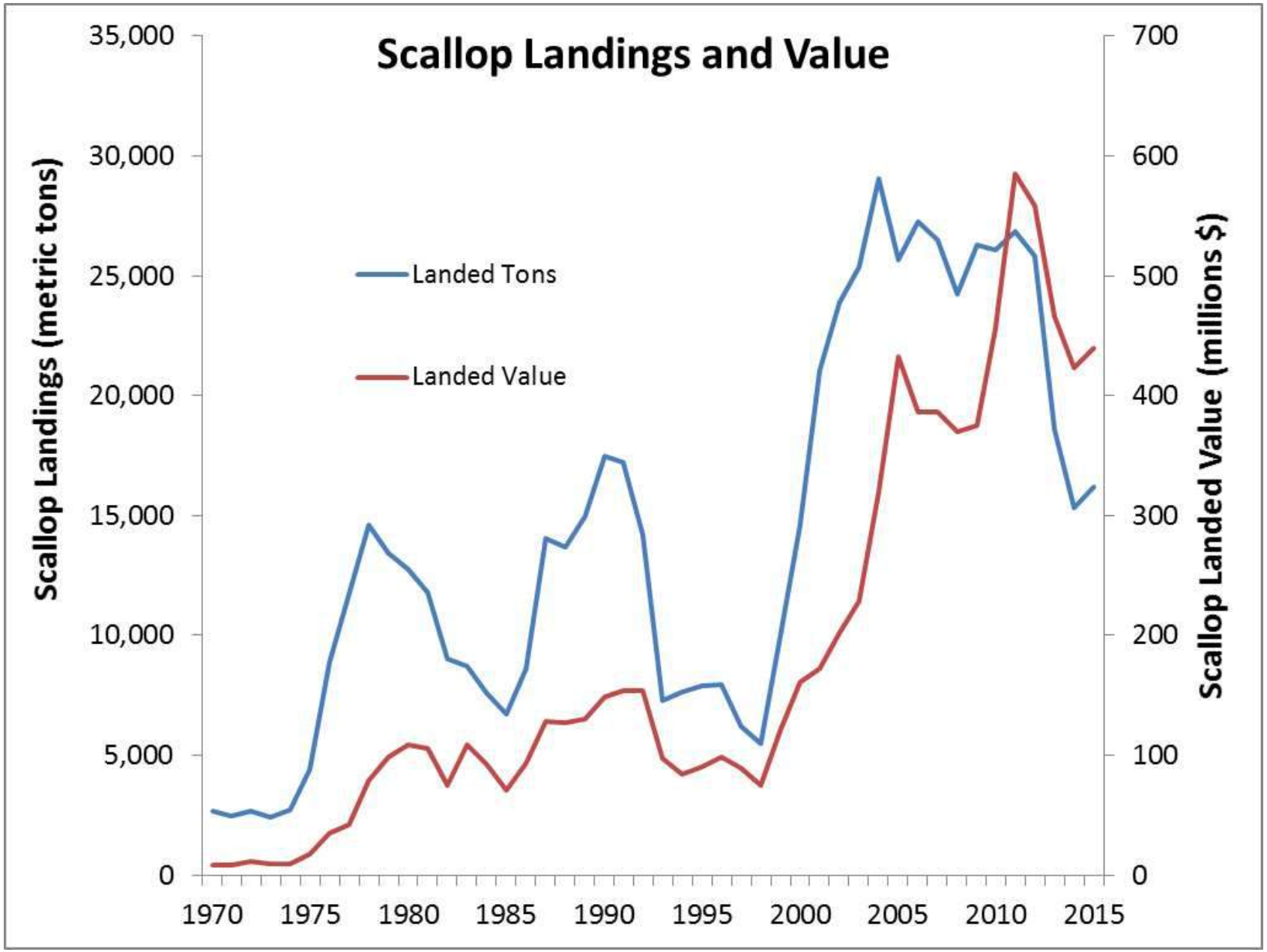
- **Drop camera (SMAST),**
- **Dredge survey (VIMS and NMFS),**
- **Habcam (WHOI, NMFS, CFF)**

Management Probability

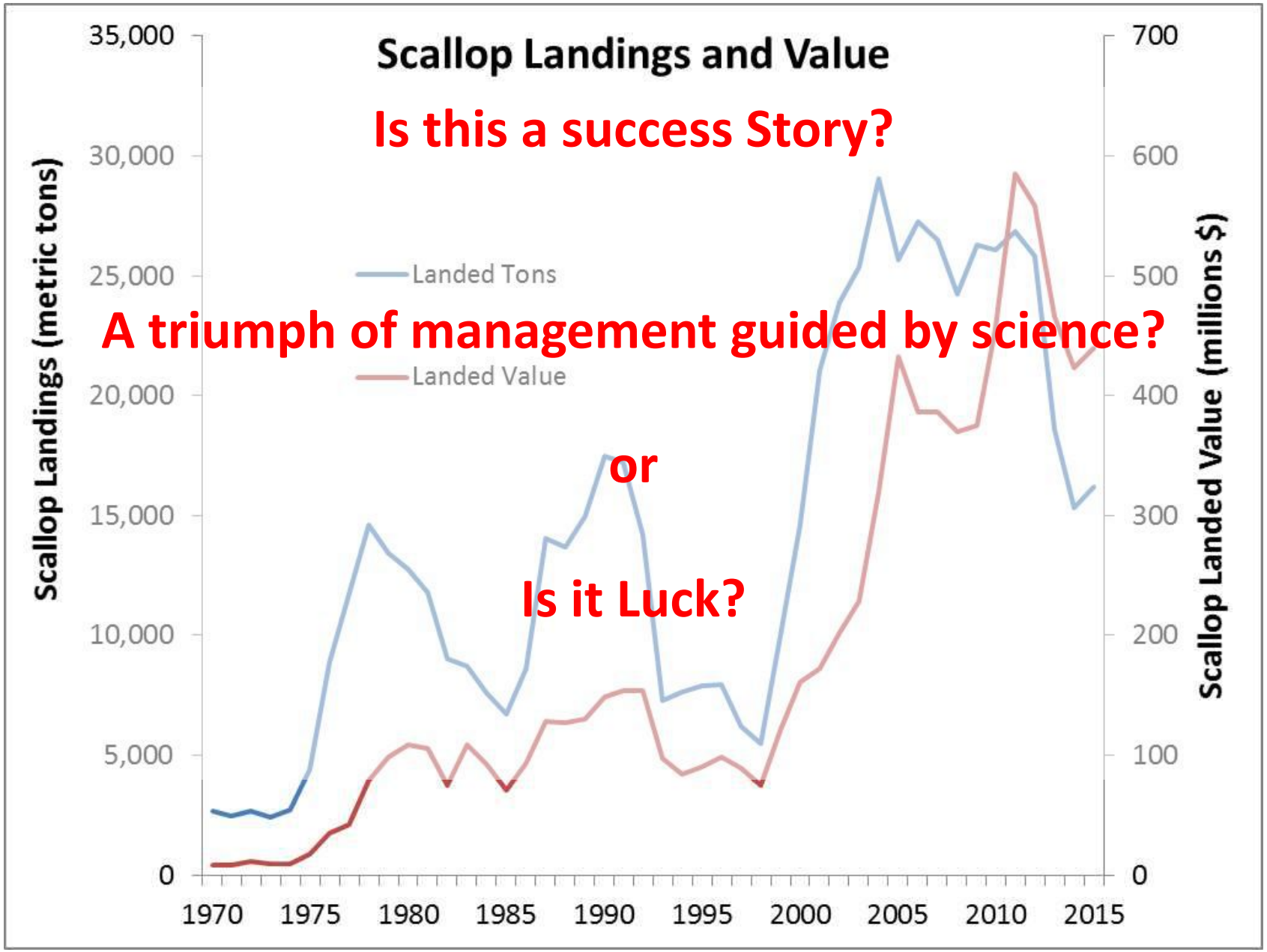
Fishery is being harvested sustainably		
	If H_0 is true	If H_0 is false
If H_0 is rejected	Stop fishing when not necessary	No error
If H_0 is not rejected	No error	overharvest resource

Paul Dayton NSA meeting 2015

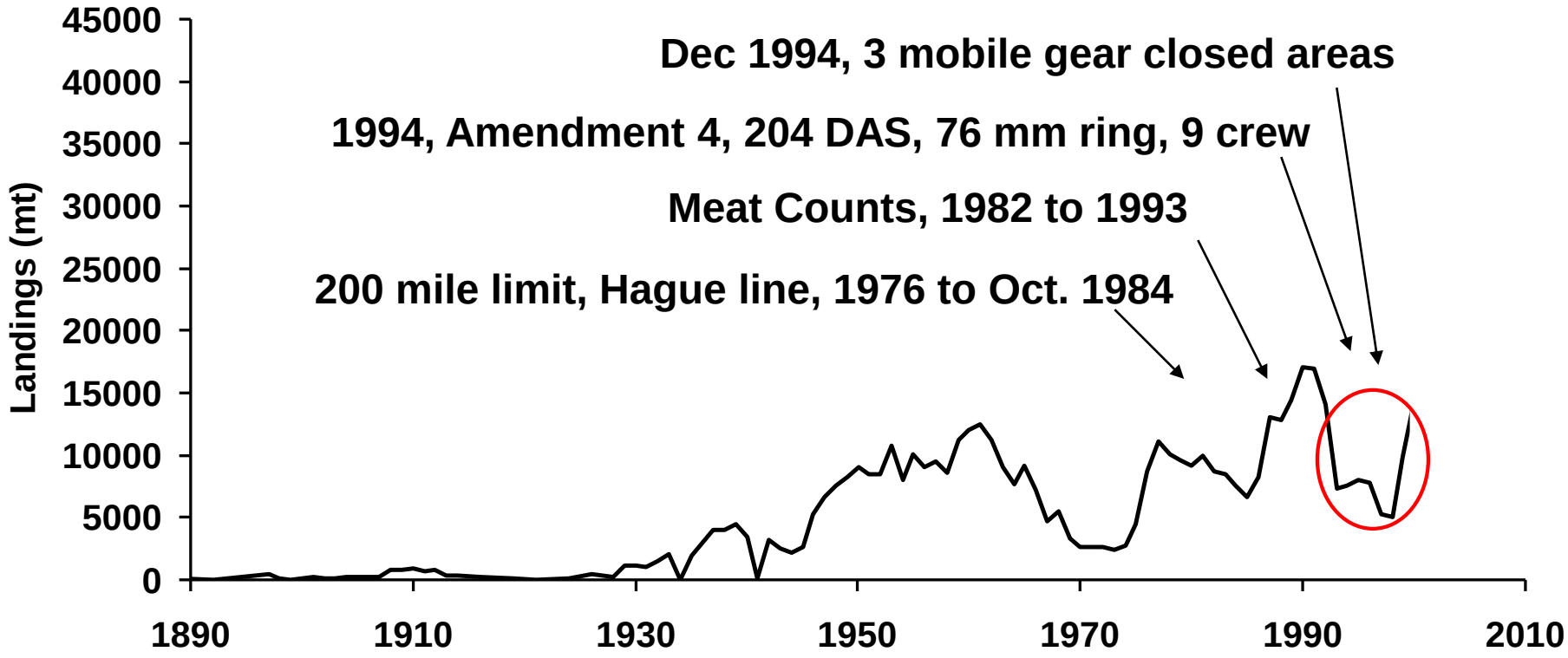
The loss of nature and the nature of the loss



Source: https://www.st.nmfs.noaa.gov/st1/commercial/landings/annual_landings.html


Scallop Landings and Value
Is this a success Story?
A triumph of management guided by science?
or
Is it Luck?
Landed Tons
Landed Value
Scallop Landings (metric tons)
Scallop Landed Value (millions $)
35,000
30,000
25,000
20,000
15,000
10,000
5,000
0
700
600
500
400
300
200
100
0
1970
1975
1980
1985
1990
1995
2000
2005
2010
2015

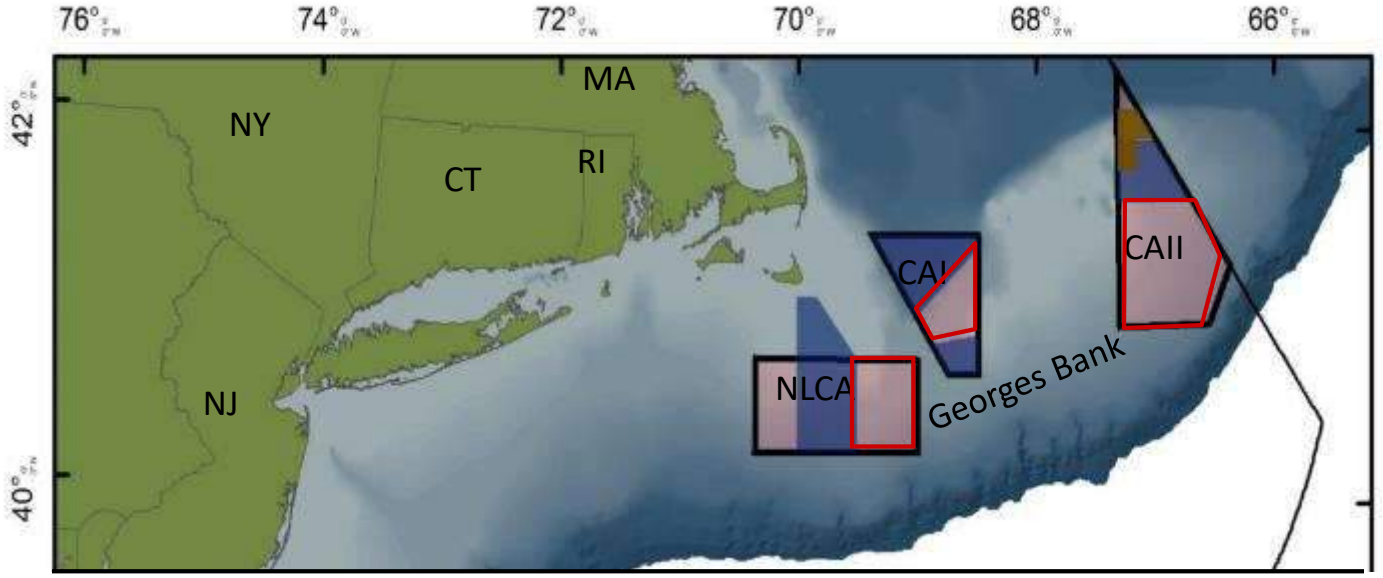
USA Sea Scallop Harvest



Scallop fisheries fall outside the stable category. . . and are either cyclic or irregular with peaks at apparently random intervals, or simply spasmodic (Caddy 1989).

Source: Serchuk et al, 1979 Nat. Shellfish Assoc. 161-191; 39th SAW, 2004, NERSC, NMFS; NMFS NE Fisheries Statistics Report May 2006.
Hart and Rago, 2006, 26:490-501

1994-1997



Open Area, Northern Edge, F/V *Friendship* 1997

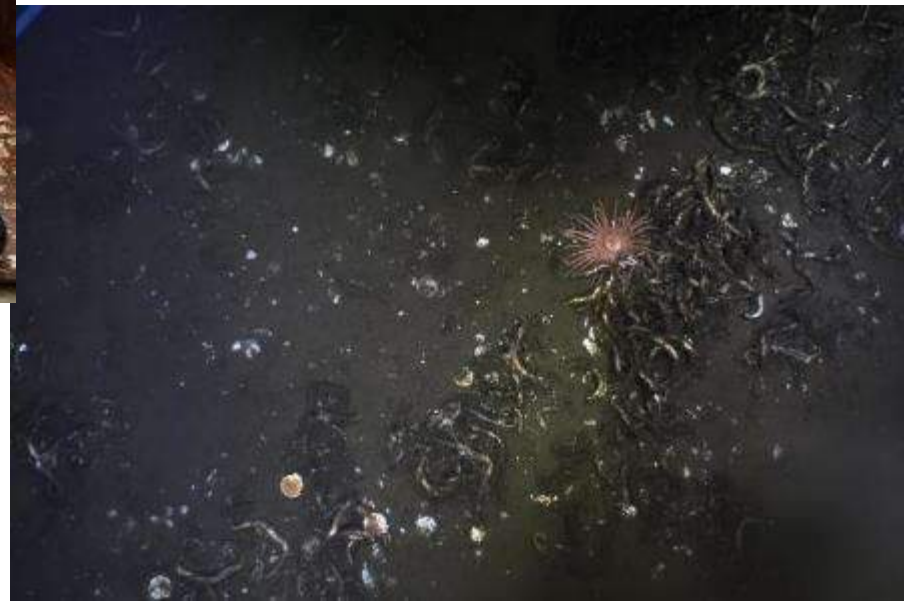
Marine Fisheries Field Research Group

Scallops

Drop Camera

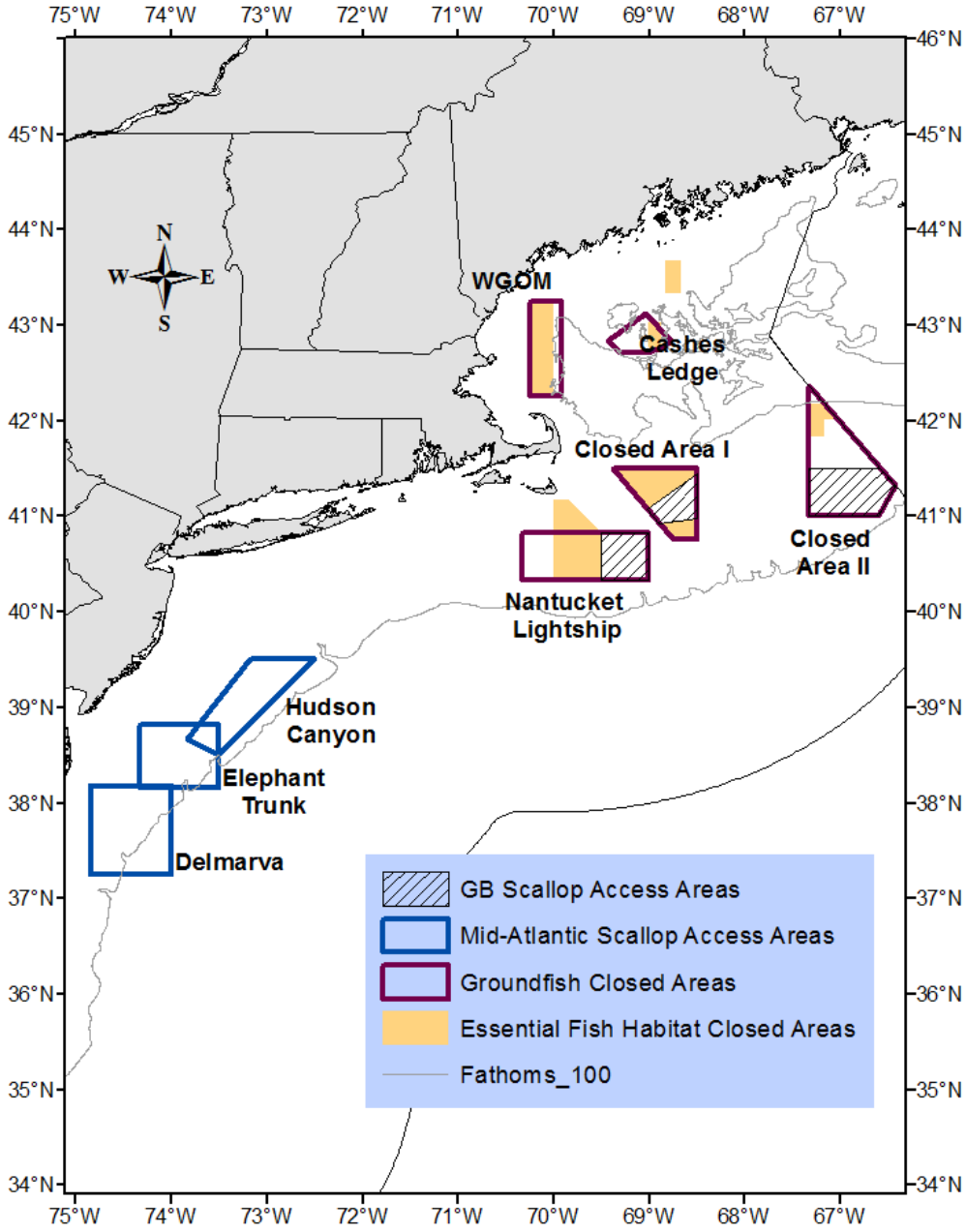
Sea cucumbers

Habitat

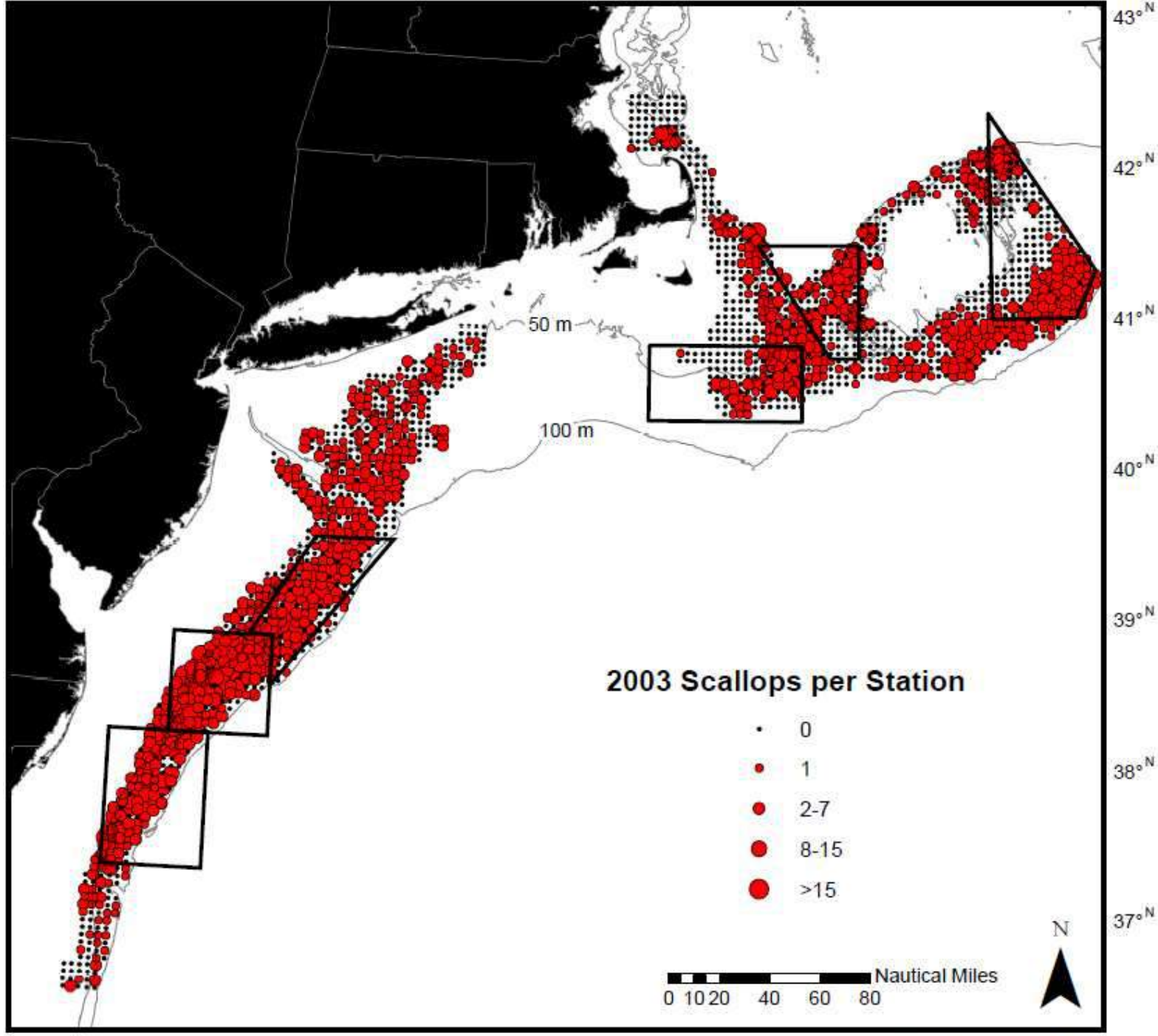


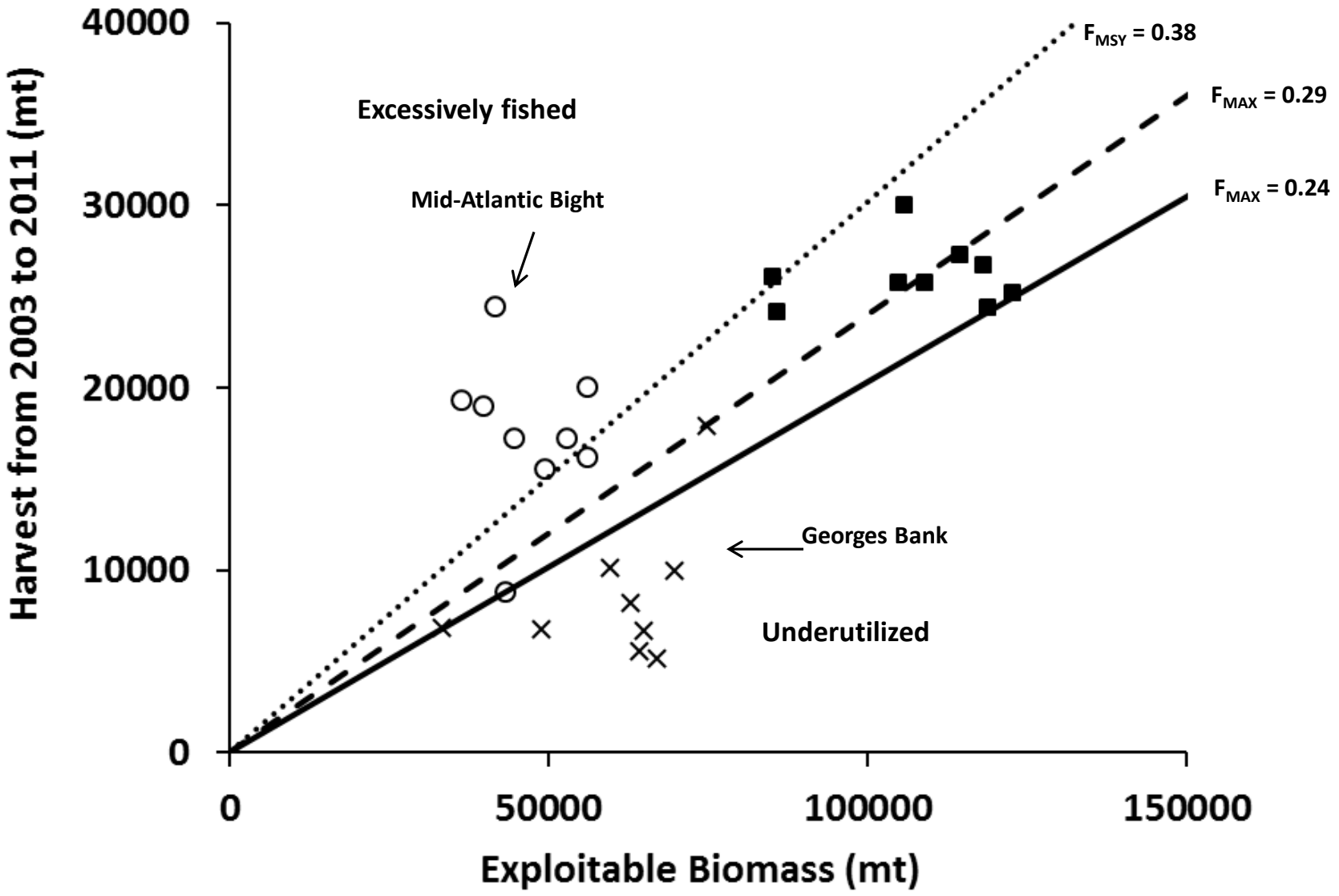
Benthic Communities

2004 Amendment 10, Rotational management, 102 mm ring, 7 crew

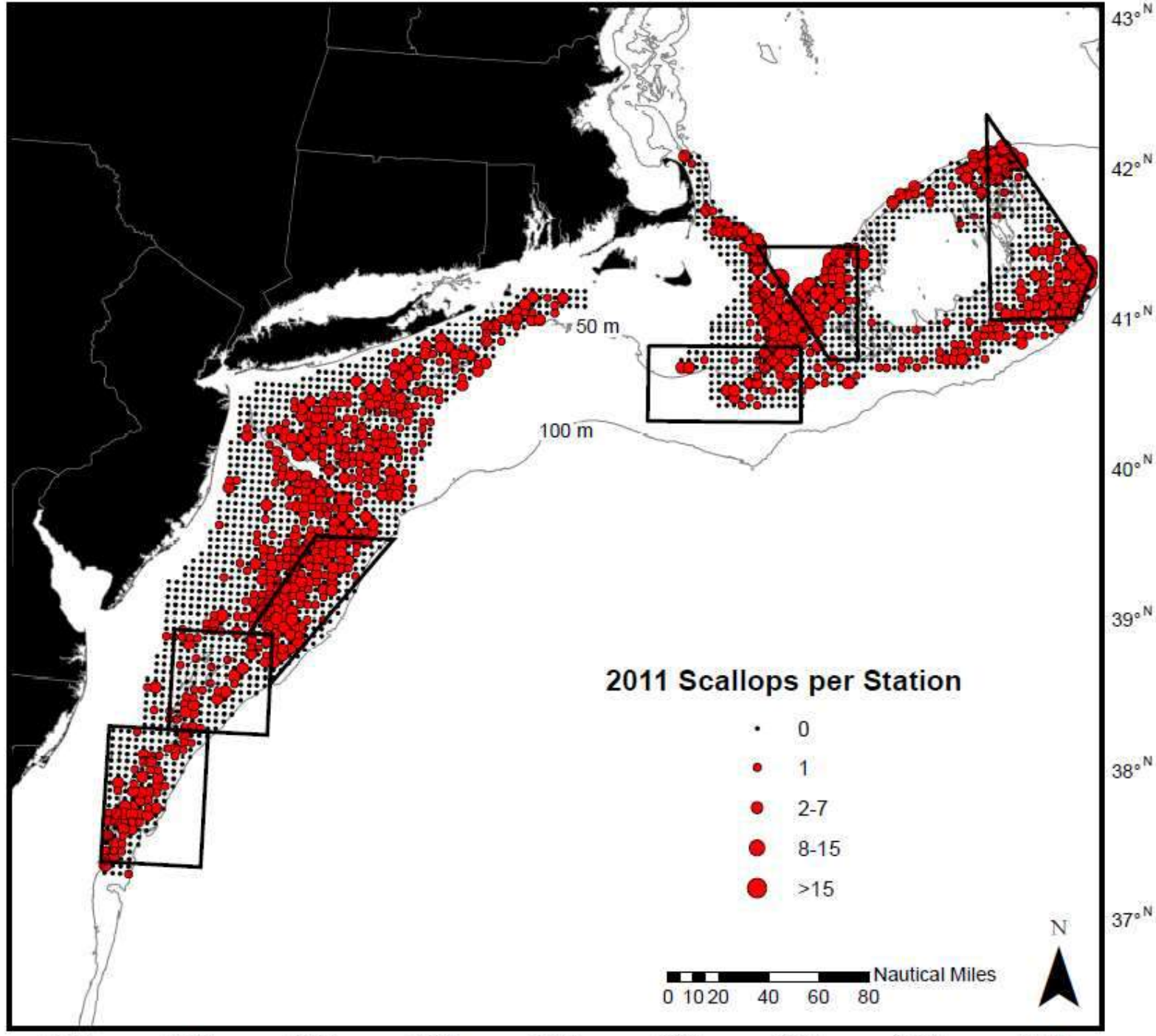


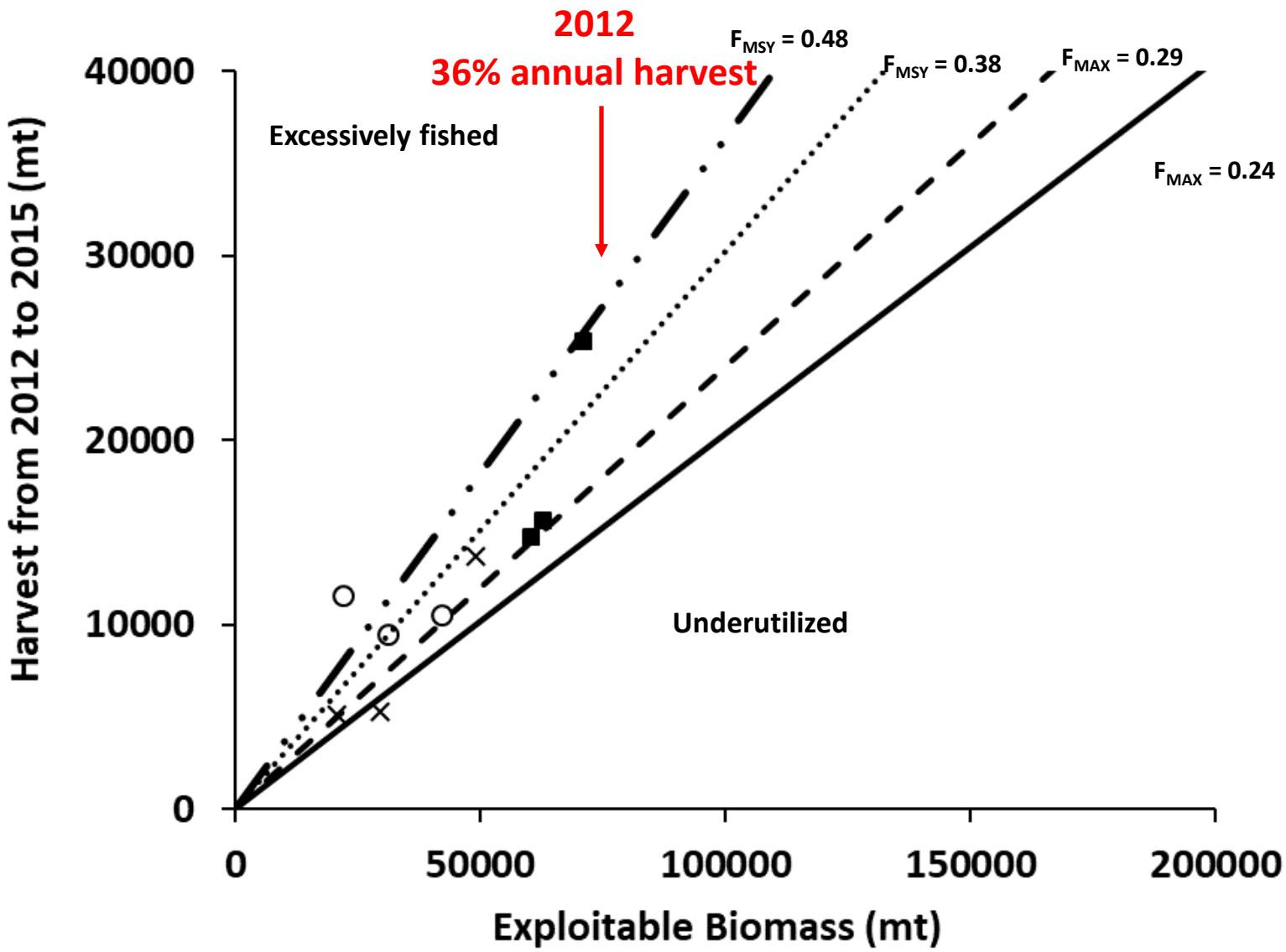
Source: NEFMC

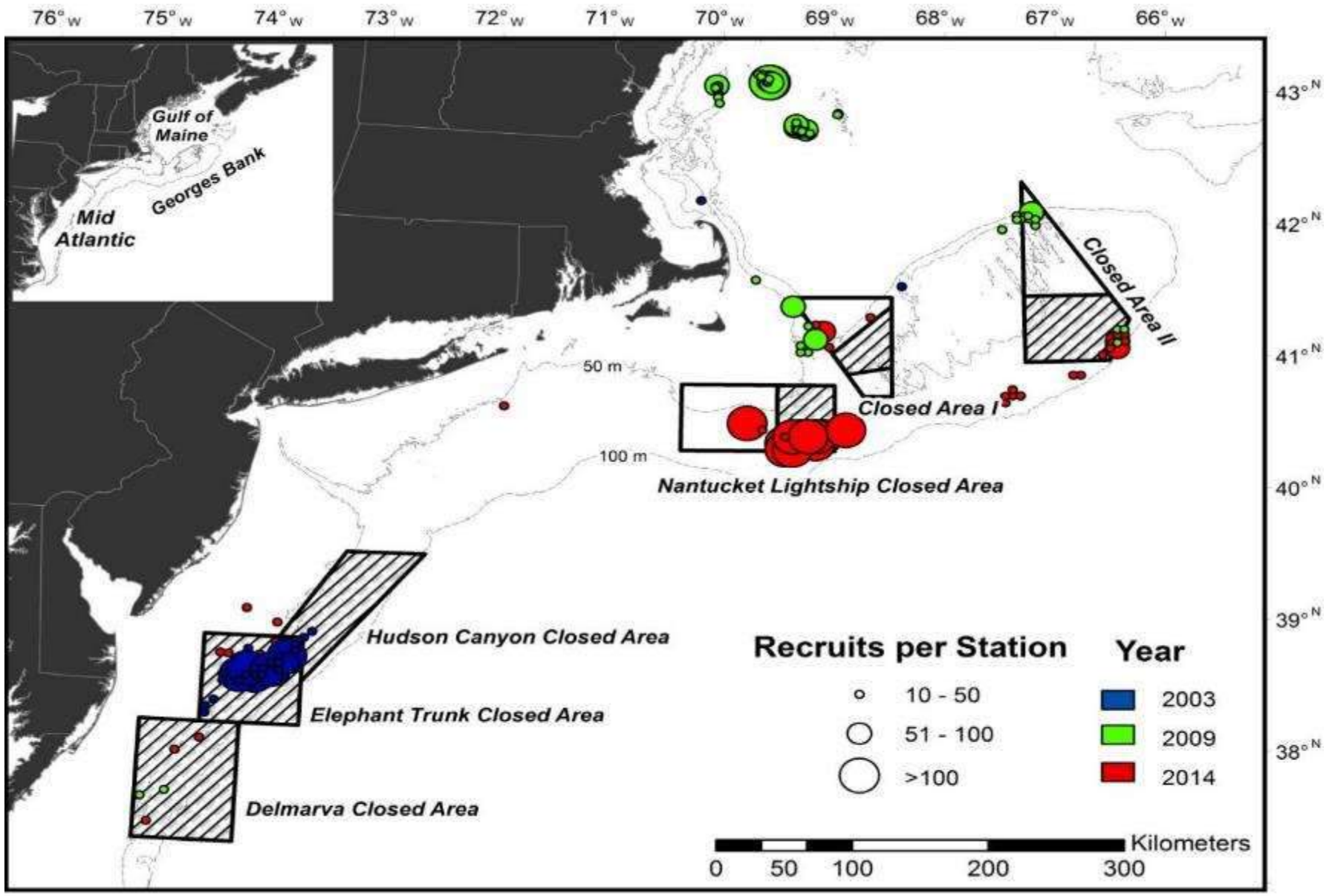

50 m
100 m
2003 Scallops per Station
0
1
2-7
8-15
>15
N
Nautical Miles
0 10 20 40 60 80
43°N
42°N
41°N
40°N
39°N
38°N
37°N
75°W
74°W
73°W
72°W
71°W
70°W
69°W
68°W
67°W



Stokesbury, K.D.E. 2012. Stock definition and recruitment: Implications for the US sea scallop (*Placopecten magellanicus*) fishery from 2003 to 2011. Rev. Fish. Sci. 20:154-164.


50 m
100 m
2011 Scallops per Station
0
1
2-7
8-15
>15
N
Nautical Miles
0 10 20 40 60 80
43°N
42°N
41°N
40°N
39°N
38°N
37°N
75°W
74°W
73°W
72°W
71°W
70°W
69°W
68°W
67°W

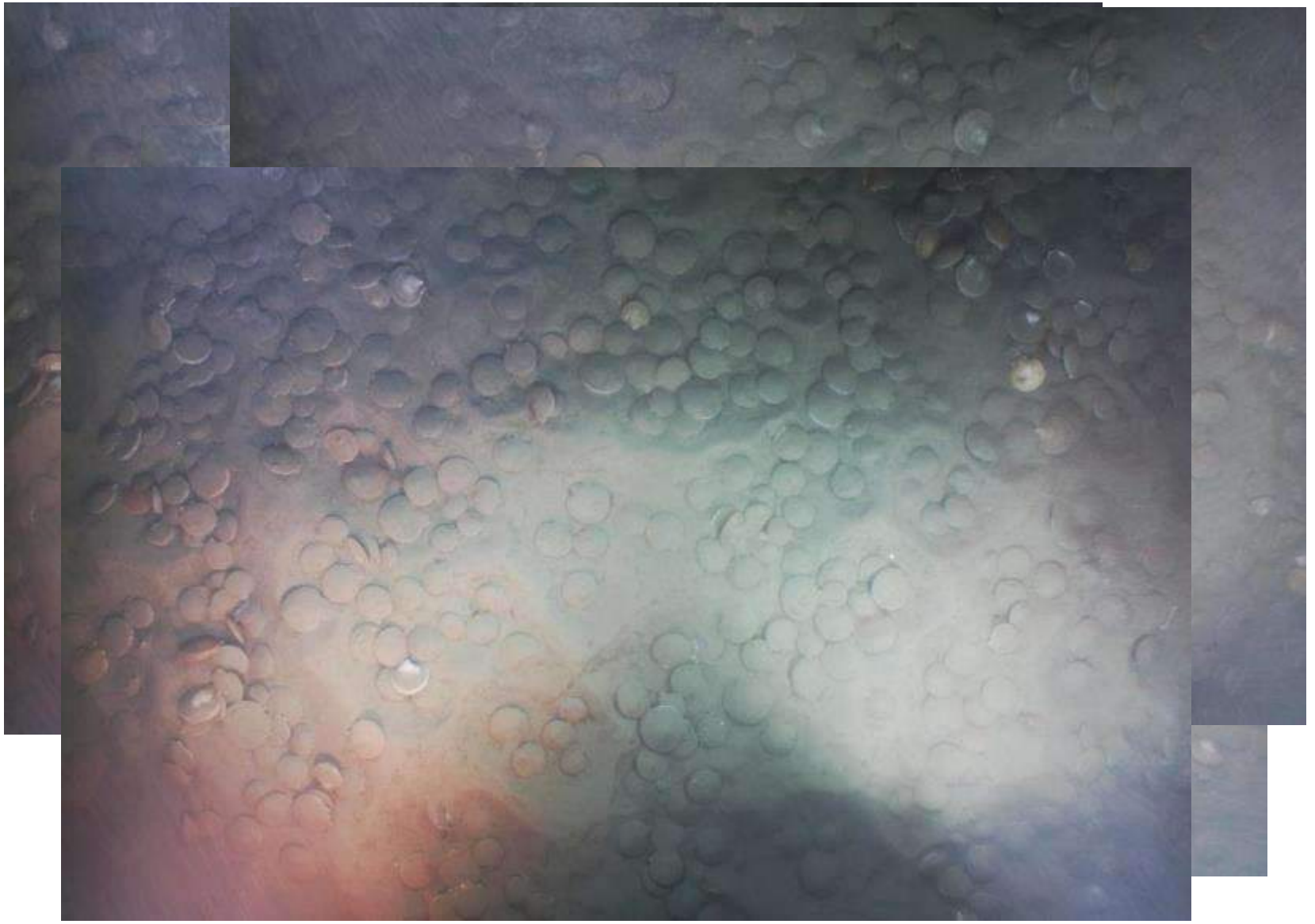

2012
36% annual harvest
F_{MSY} = 0.48
F_{MSY} = 0.38
F_{MAX} = 0.29
F_{MAX} = 0.24
Excessively fished
Underutilized
Harvest from 2012 to 2015 (mt)
40000
30000
20000
10000
0
0
50000
100000
150000
200000
Exploitable Biomass (mt)

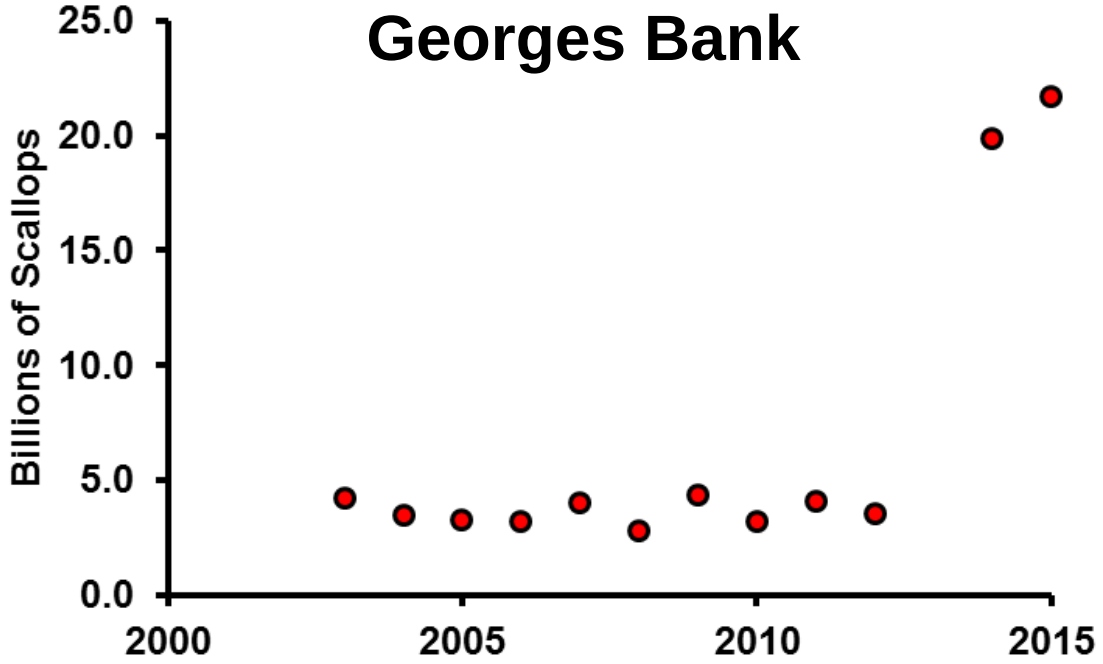


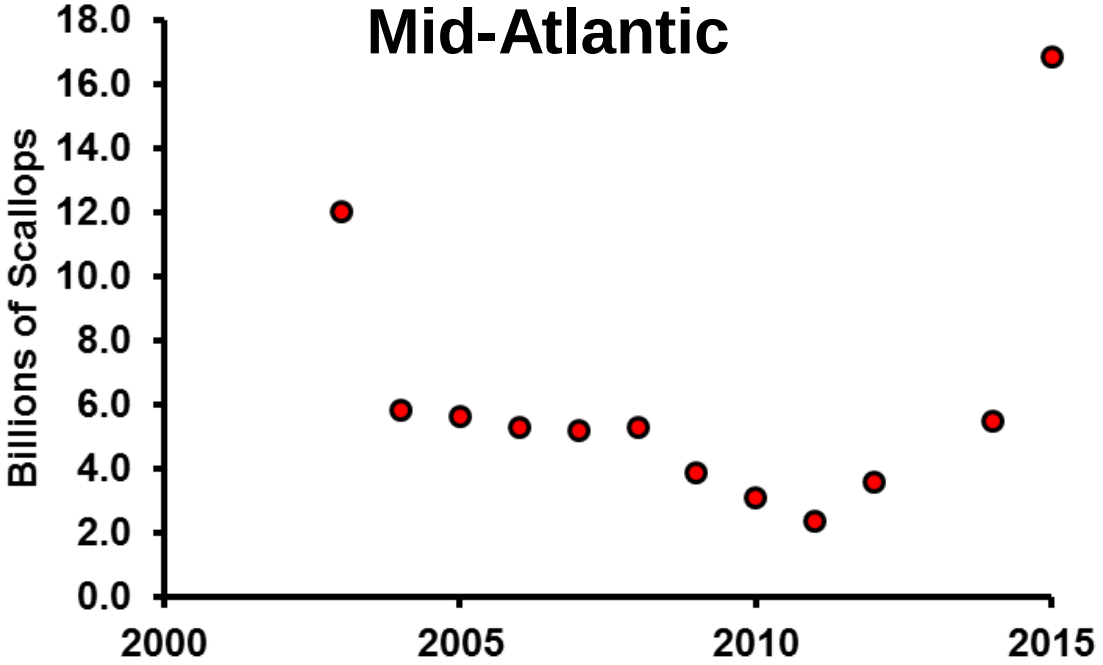
Bethoney N.D., S.C. Asci, and K.D.E. Stokesbury. 2016. Implications of extremely high recruitment events into the US sea scallop fishery. Mar. Ecol. Prog. Ser. 547:137-147

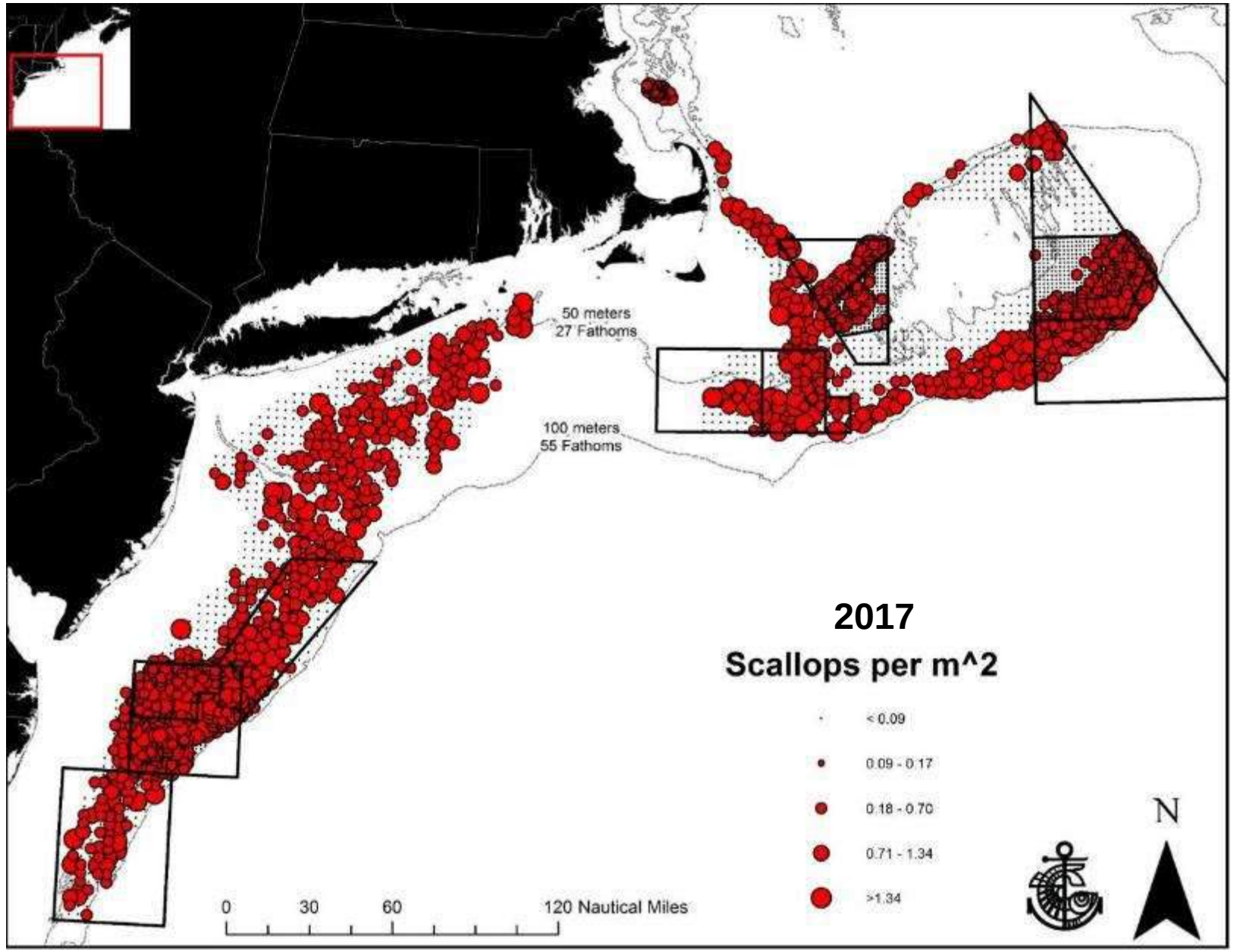
Commercially Fishable Red Dot Images

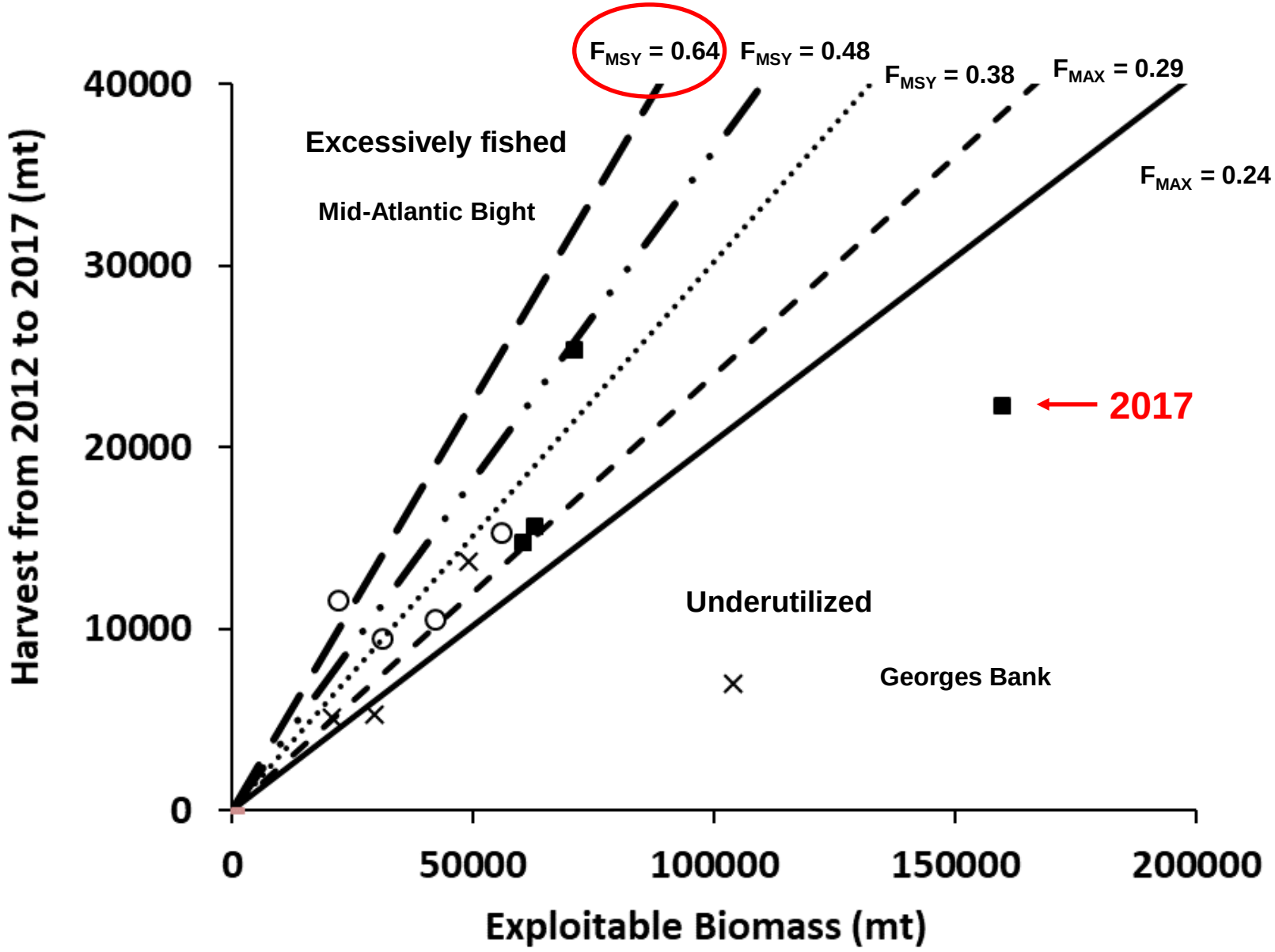
High Densities Areas

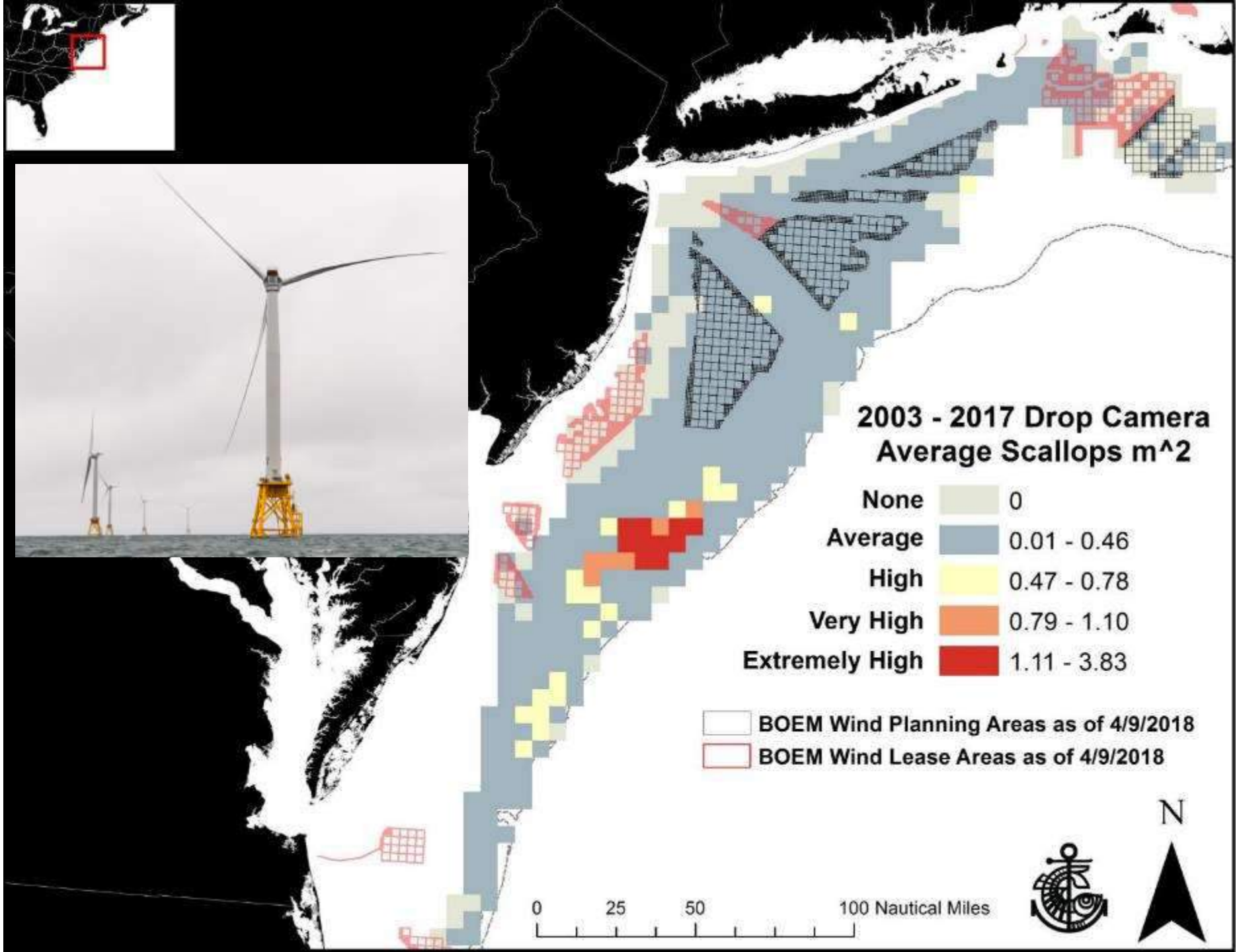


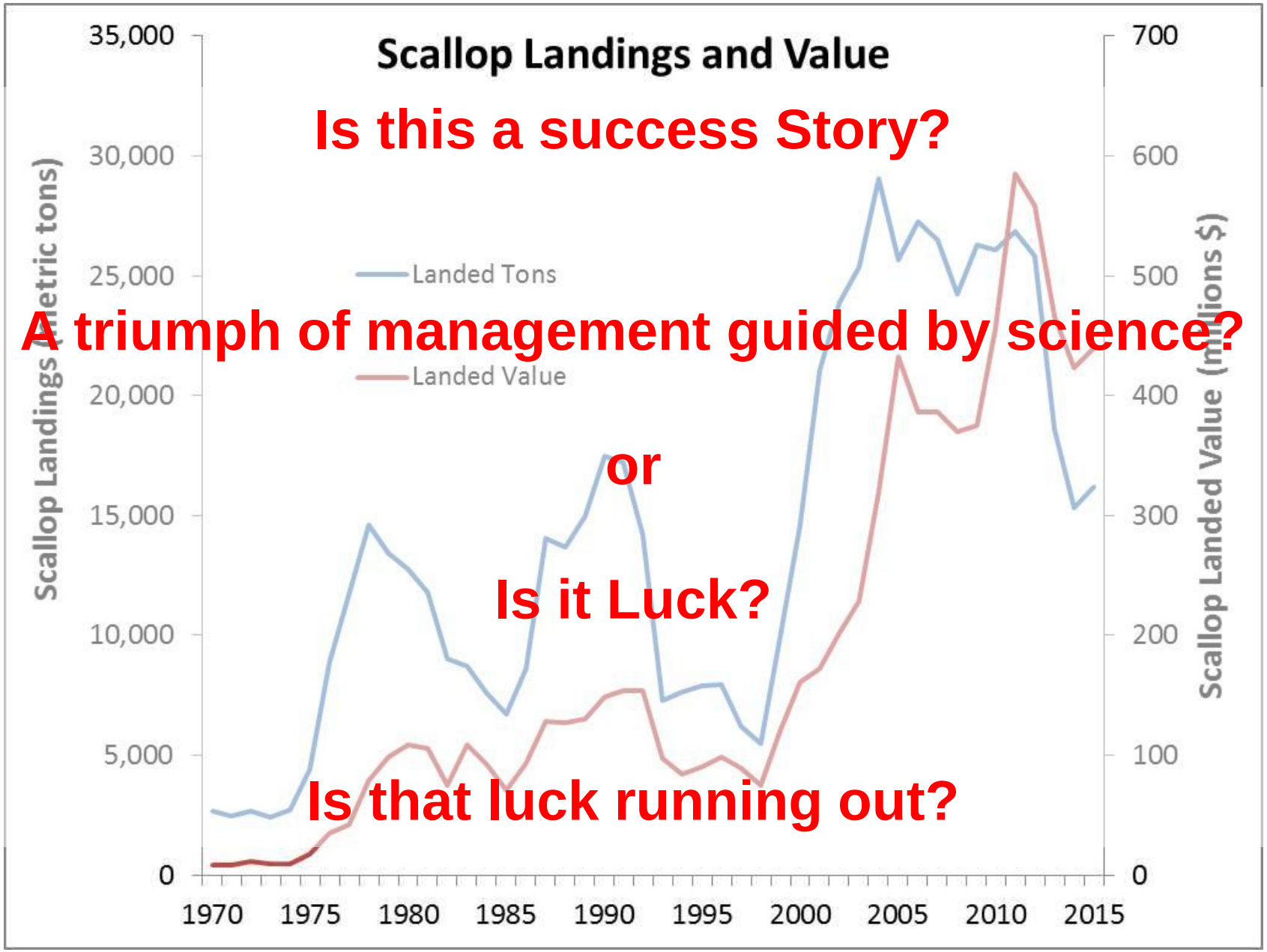

Georges Bank
Billions of Scallops
25.0
20.0
15.0
10.0
5.0
0.0
2000
2005
2010
2015


Mid-Atlantic
Billions of Scallops
18.0
16.0
14.0
12.0
10.0
8.0
6.0
4.0
2.0
0.0
2000
2005
2010
2015


50 meters
27 Fathoms
100 meters
55 Fathoms
2017
Scallops per m^2
< 0.09
0.09 - 0.17
0.18 - 0.70
0.71 - 1.34
>1.34
N
0
30
60
120 Nautical Miles


F_{MSY} = 0.64
F_{MSY} = 0.48
F_{MSY} = 0.38
F_{MAX} = 0.29
F_{MAX} = 0.24
Excessively fished
Mid-Atlantic Bight
Underutilized
Georges Bank
2017
Harvest from 2012 to 2017 (mt)
40000
30000
20000
10000
0
0
50000
100000
150000
200000
Exploitable Biomass (mt)


2003 - 2017 Drop Camera
Average Scallops m^2
None 0
Average 0.01 - 0.46
High 0.47 - 0.78
Very High 0.79 - 1.10
Extremely High 1.11 - 3.83
BOEM Wind Planning Areas as of 4/9/2018
BOEM Wind Lease Areas as of 4/9/2018
N
0 25 50 100 Nautical Miles


Scallop Landings and Value
Is this a success Story?
A triumph of management guided by science?
or
Is it Luck?
Is that luck running out?
Landed Tons
Landed Value
Scallop Landings (Metric tons)
Scallop Landed Value (millions $)
35,000
30,000
25,000
20,000
15,000
10,000
5,000
0
700
600
500
400
300
200
100
0
1970
1975
1980
1985
1990
1995
2000
2005
2010
2015


Thank You

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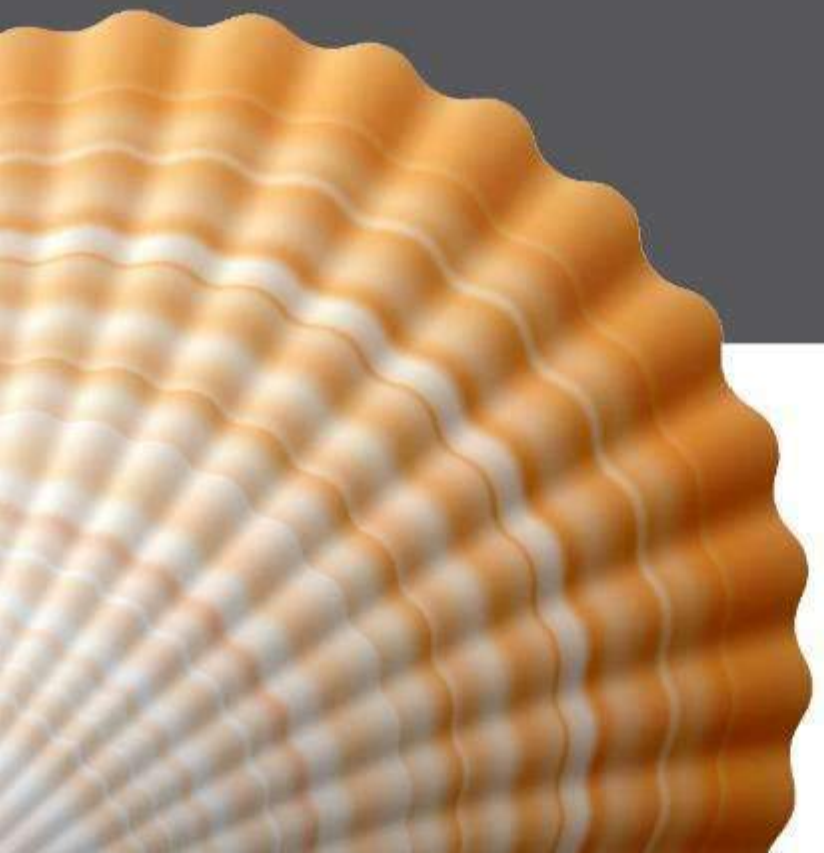

Alan Reeves

Fishery Manager
Georges Bank Sea Scallop Fishery

Canadian Case Study

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The Canadian Georges Bank Scallop Fishery: A Co-Management Success Story

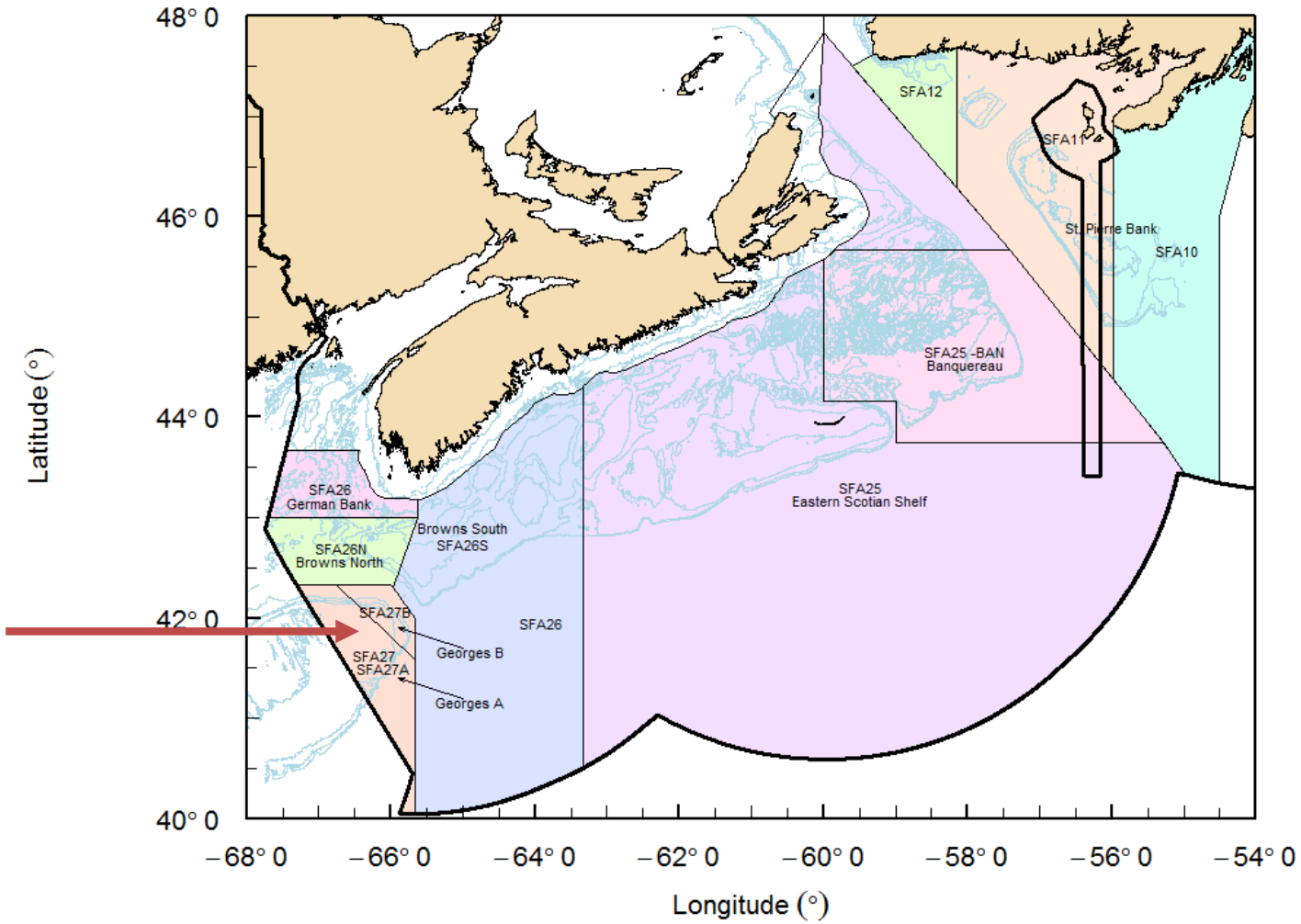
Department of Fisheries and Oceans, Canada (DFO)

- Responsible for meeting the Government of Canada's priorities and mandate to sustainably manage fisheries

- Sustainable management is accomplished through the development and implementation of policies and programs such as the Sustainable Fisheries Framework which provides the basis for ensuring that Canadian fisheries support conservation and sustainable use of resources

http://www.dfo-mpo.gc.ca/about-notre-sujet/org/mandate-mandat-eng.htm

Where is Georges Bank?



- **Fisheries Management Milestones**
- **Current Management Strategy**
- **Current Stock Status**
- **Future Direction**

Fisheries Management Milestones

- **1973** - Limited Entry - 76 vessels >65'
- **1974** - Meat count regulations applied
- **1984** - International Court of Justice (ICJ) decision
  - Canada awarded the northeast portion of Georges Bank
- **1986** - Fleet separation –inshore and offshore
- **1986** - Enterprise Allocation program began
  - currently 6 companies with 12 active vessels
- **1986** - Total Allowable Catches (TACs), Individual Transferable Quotas (ITQs)
- **1989** - Bycatch monitoring initiated
- **1998** - Bank partitioned based on recruitment and growth – GB 'A' and 'B'
- **1998** - Voluntary closures to protect juveniles initiated by the fleet
- **1998** - Vessel Monitoring System (VMS) initiated
- **2006** - Area/time closures to protect spawning fish aggregations initiated

Tools Required for Milestone Achievements

- **TAC -** DFO Science annual dredge survey initiated in 1978
- **EA, ITQ -** Dockside Monitoring Program (DMP) – third party 100% catch monitoring; mandatory monitoring documents
- **Meat Counts -** port samples following all trips began in 1995
- **Bycatch Monitoring -** observer coverage, Species at Risk reporting
- **Spawning Fish Area/Time Closures -** DFO surveys, bycatch information from other fleets

Current Management Strategy

- Science-based approach to decision making
- Precautionary Approach (PA) Framework under the Sustainable Fisheries Framework http://www.dfo-mpo.gc.ca/reports-rapports/regs/sff-cpd/overview-cadre-eng.htm
    - Stock Status Zones, Reference Points, Harvest Control Rules based on stock and ecosystem indicators
- 2 Reference Points applied for Georges Bank 'A' based on commercial biomass index
    - **Lower Reference Point (LRP) -** level below which there is potentially serious harm to stock; set at 30% of the mean commercial biomass from 1986-2009
    - **Upper Stock Reference (USR) -** must be sufficiently above LRP to allow system to react to declines; set at 80% of the mean commercial biomass from 1986-2009

Stock Status Zones and Harvest Control Rules (HCRs)

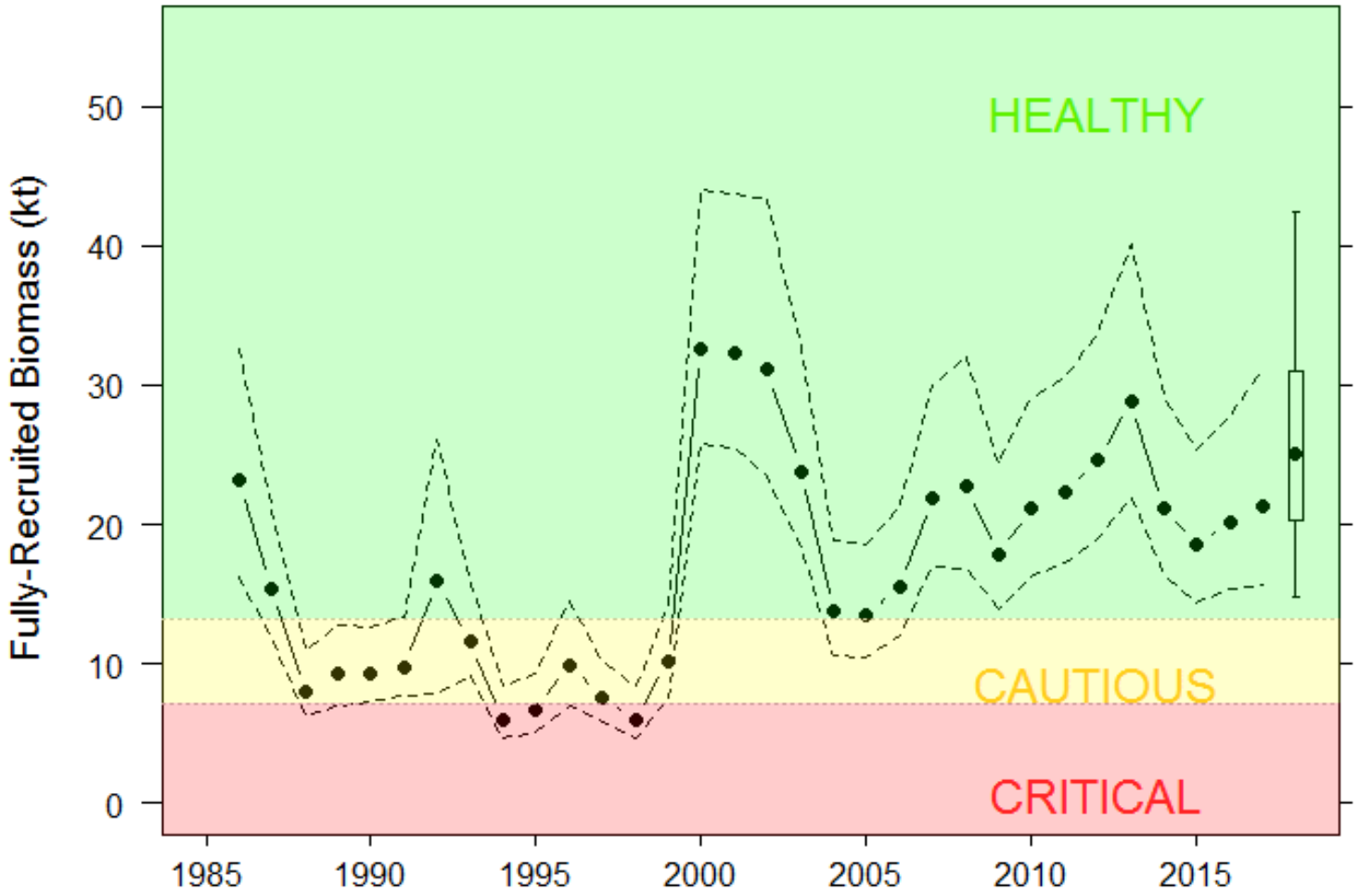
- **Healthy Zone**
  - above the Upper Stock Reference Point (USR)
  - HCRs set to promote maintaining biomass above the USR
  - Target exploitation rate at 25%

- **Cautious Zone**
  - between USR and Lower Reference Point
  - HCRs set to promote rebuilding of biomass toward the USR

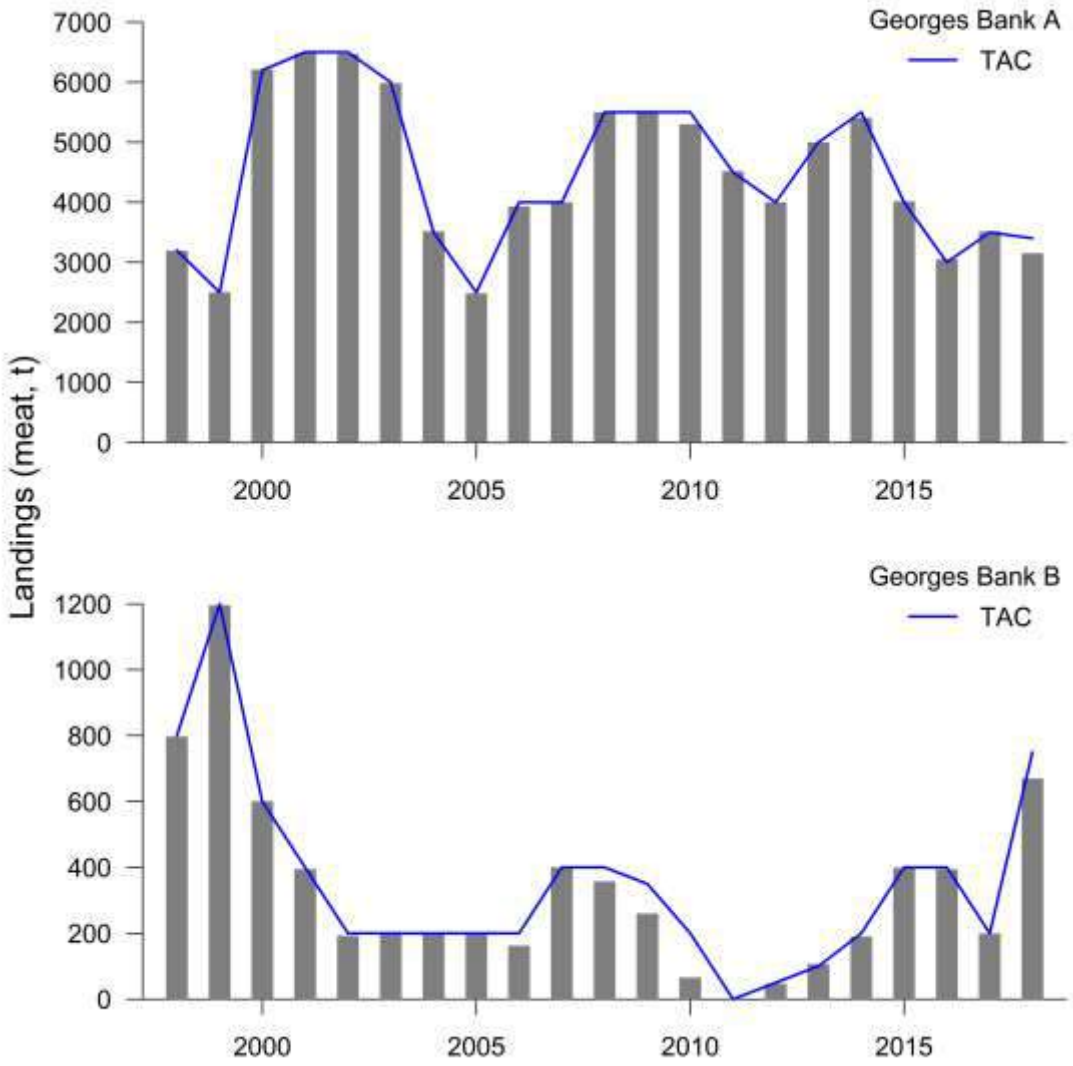
- **Critical Zone**
  - below Lower Reference Point
  - HCRs must explicitly promote biomass increase
  - Exploitation rate in the context of a Rebuilding Plan

Current Stock Status

- Georges Bank 'A' is in the Healthy Zone and has been since 2000



Landings and Total Allowable Catch



- 2018 final TAC for GB was **4150 mt**
- 2019 interim TAC is **4800 mt**

Future Direction (more science)

- Directly incorporate spatial information (variability in growth, survival, exploitation, etc.) in assessment methodology
- Move to using spatial survey data directly, opposed to overall biomass mean and variance
- Habitat information integrated into models
- Create maps of modelled biomass – improved resolution

For more information on the Canadian Offshore Scallop Fishery please refer to the Integrated Fisheries Management Plan
http://www.dfo-mpo.gc.ca/fm-gp/peches-fisheries/ifmp-gmp/scallop-petoncle/2018/index-eng.htm

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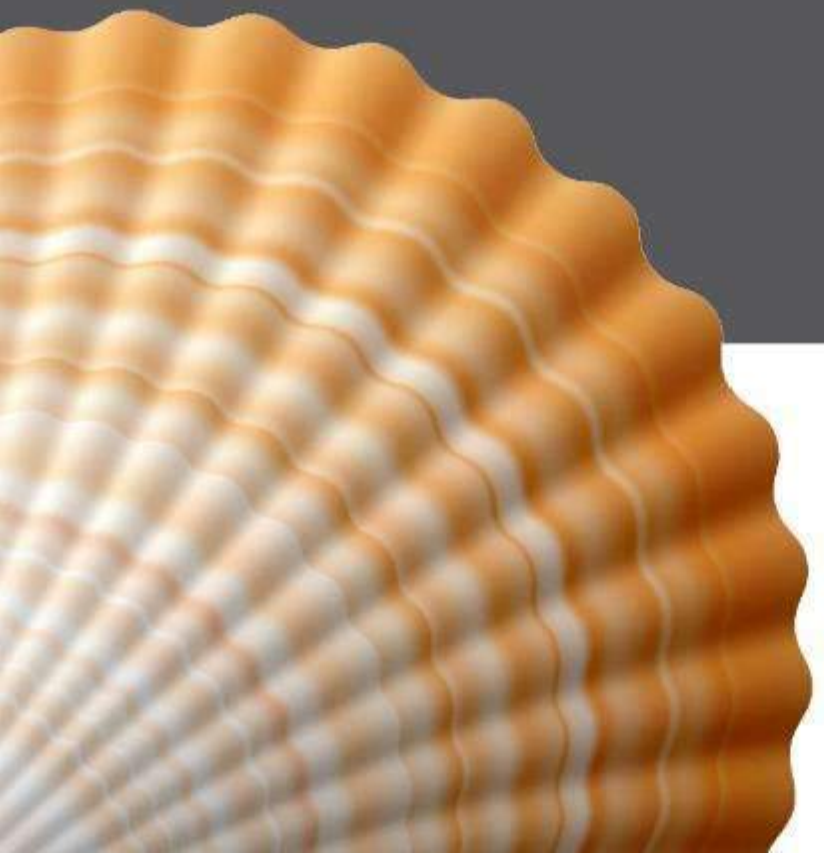

Session 3 – Panel Q & A and Live Polling

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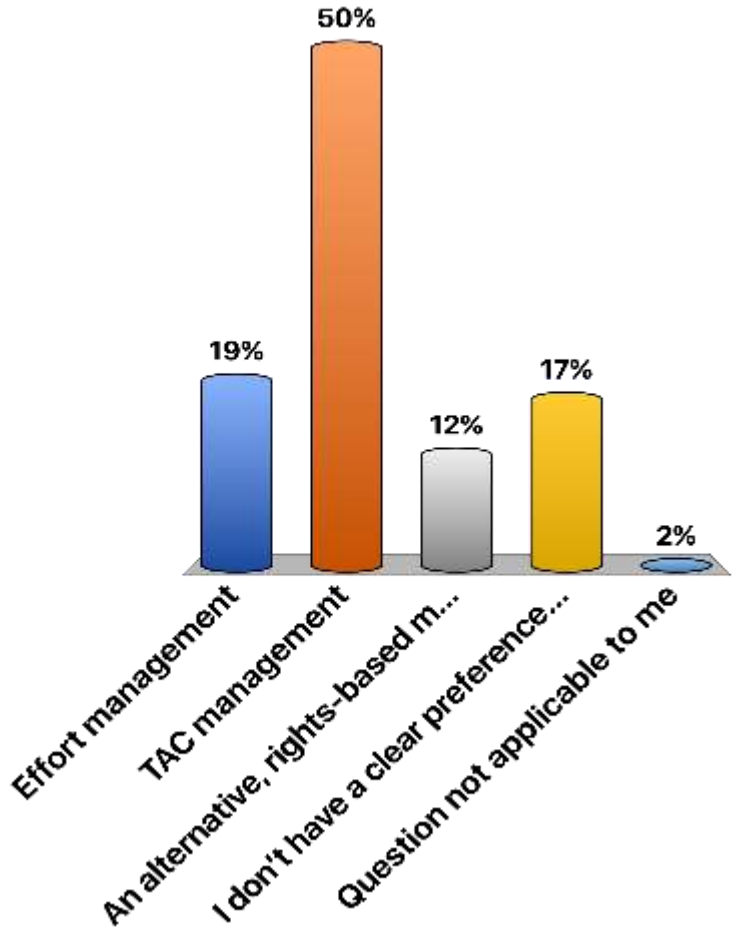
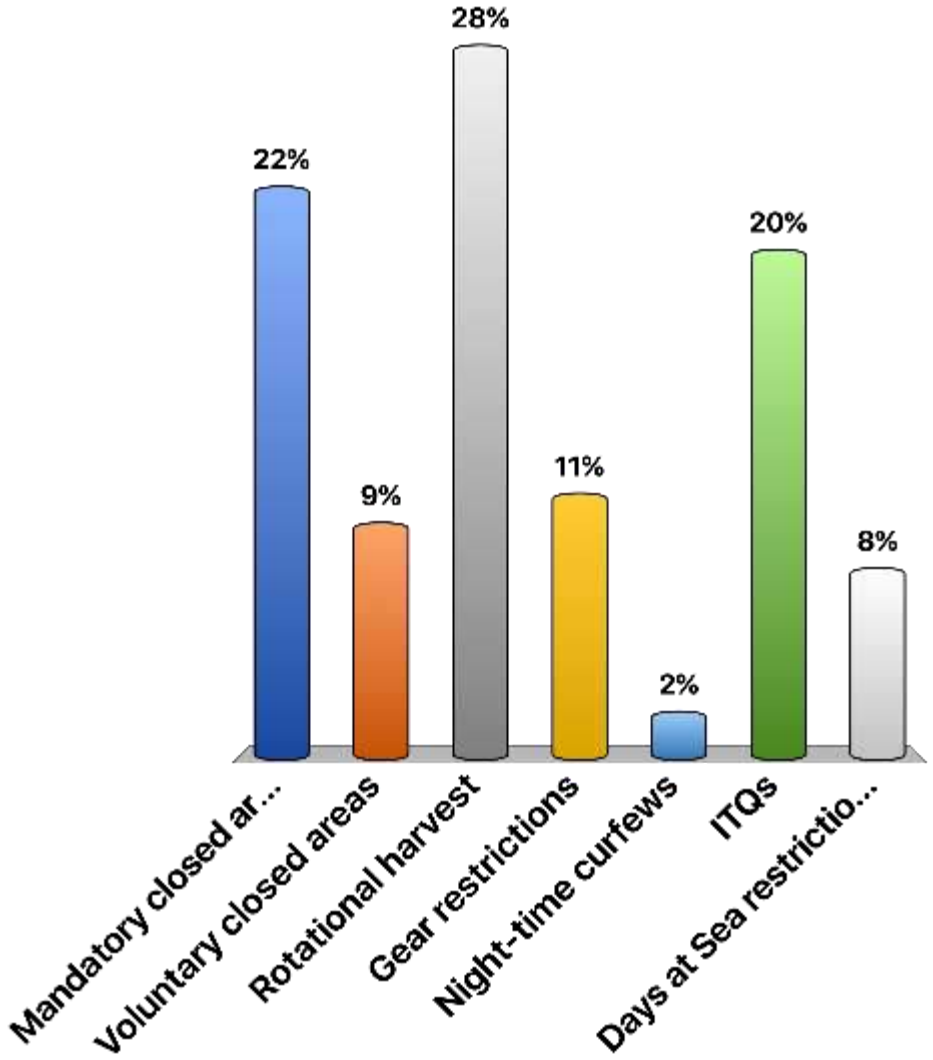
From what you've just heard, which over-arching management model appears the most attractive given your experience of UK offshore scallop fishing? Please select one.

A. Effort management
B. TAC management
C. An alternative, rights-based model
D. I don't have a clear preference yet
E. Question not applicable to me



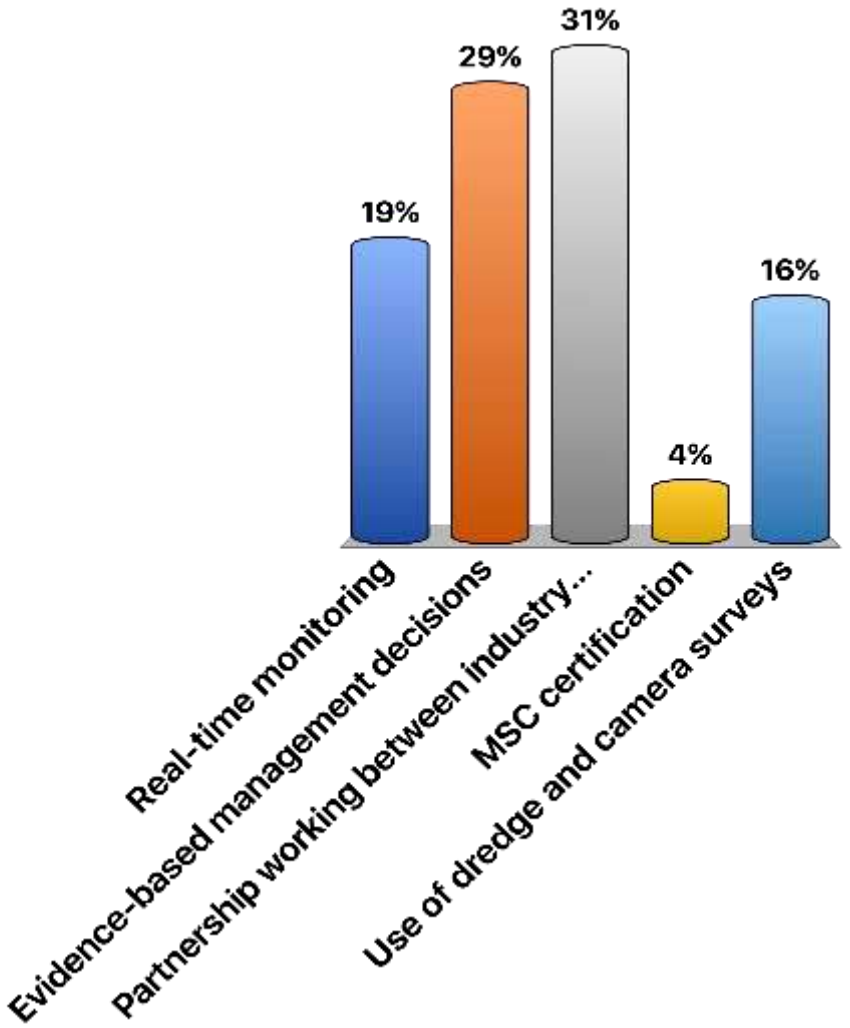
What specific measures work best for offshore scallop fishing, in your view? Please rank your top three.

A. Mandatory closed areas
B. Voluntary closed areas
C. Rotational harvest
D. Gear restrictions
E. Night-time curfews
F. ITQs
G. Days at Sea restrictions



What were the most appealing aspects of the case studies presented on offshore fishing, in your view? Please rank your top three.

A. Real-time monitoring
B. Evidence-based management decisions
C. Partnership working between industry and regulators
D. MSC certification
E. Use of dredge and camera surveys



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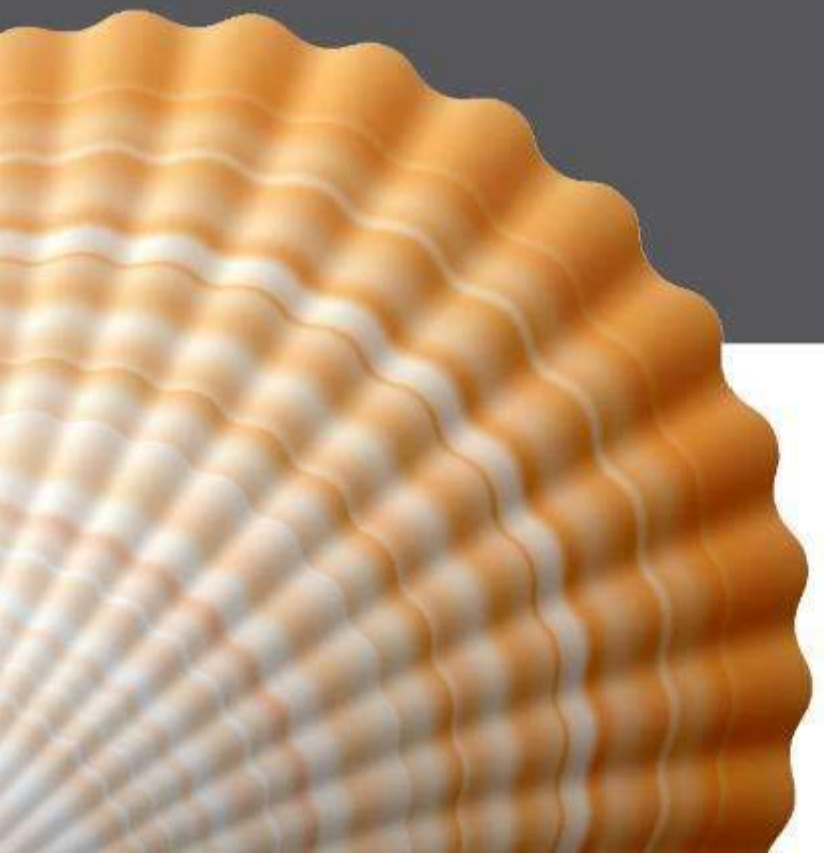

Session 3
Table Discussions & Feedback

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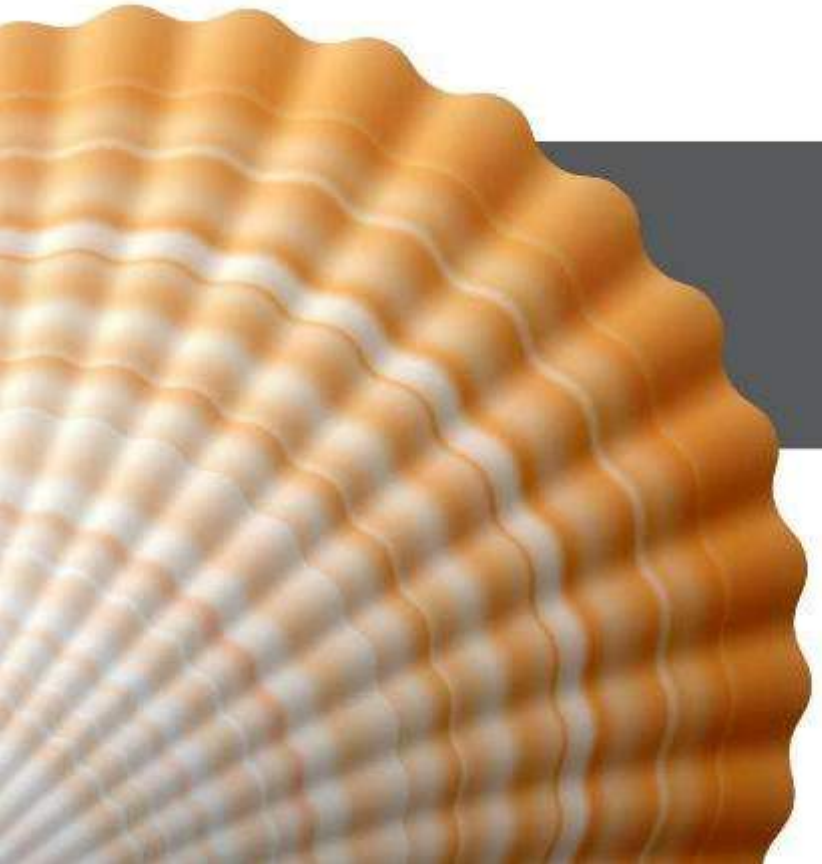

Thank you for attending –
We look forward to seeing you tomorrow

INFORMING THE FUTURE OF
SUSTAINABLE FISHERIES MANAGEMENT

4-5 February | Fishmongers' Hall, London

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