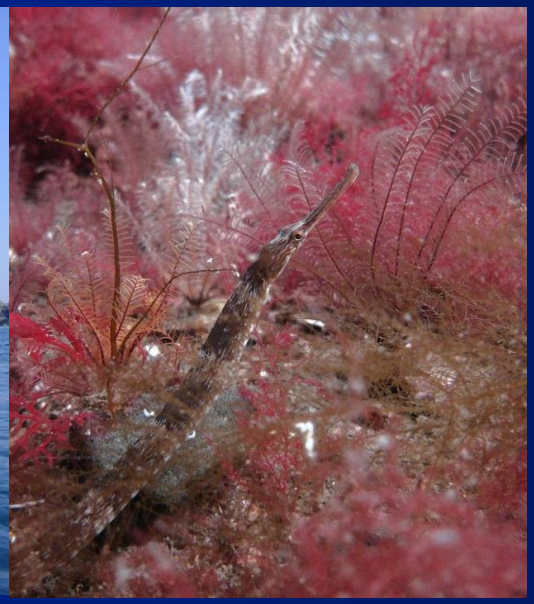
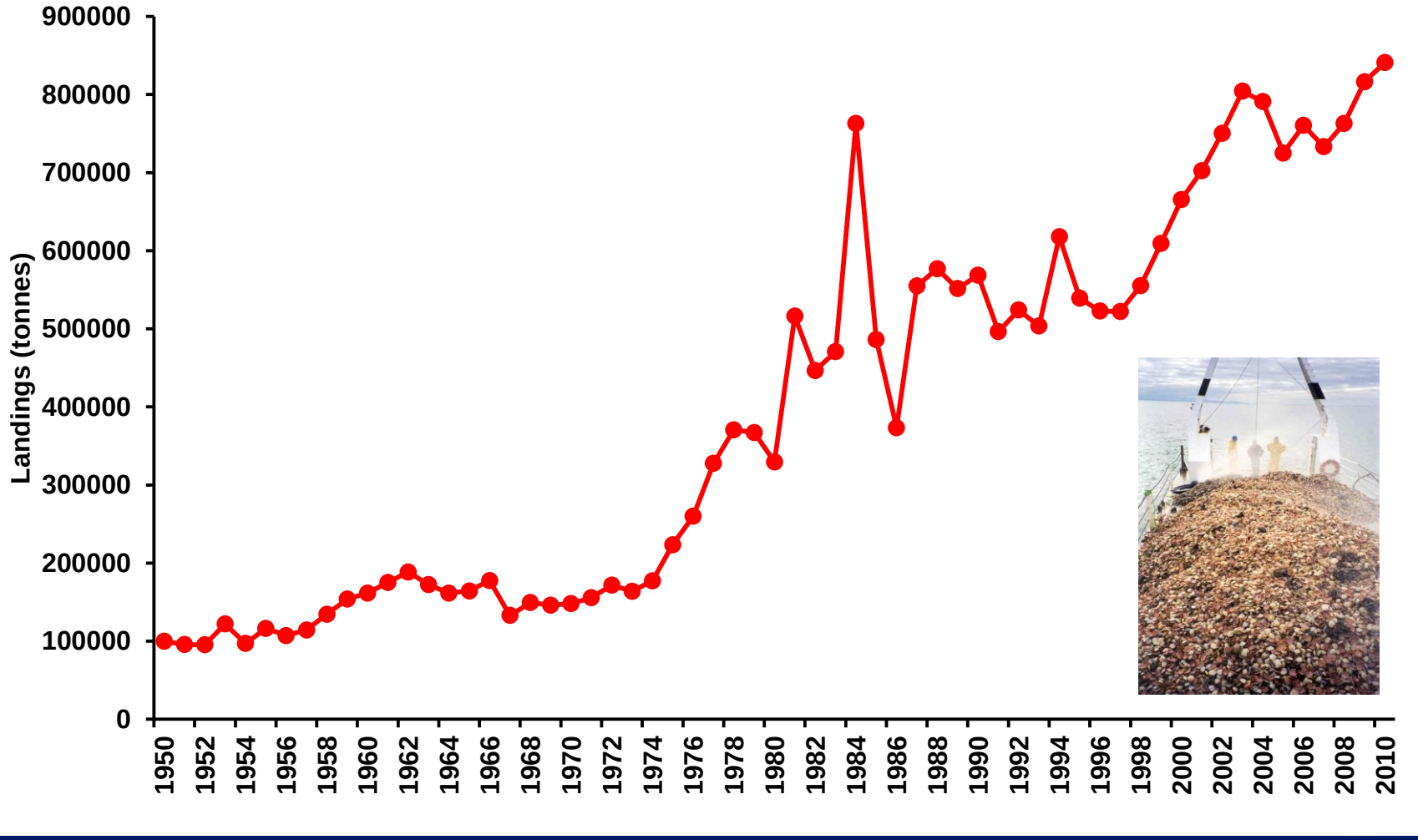
Opening up about using Closed Areas to Manage Scallop Fisheries





Bryce Stewart, Leigh Howarth, Marija Sciberras, Katherine Yates & Miles Hoskin

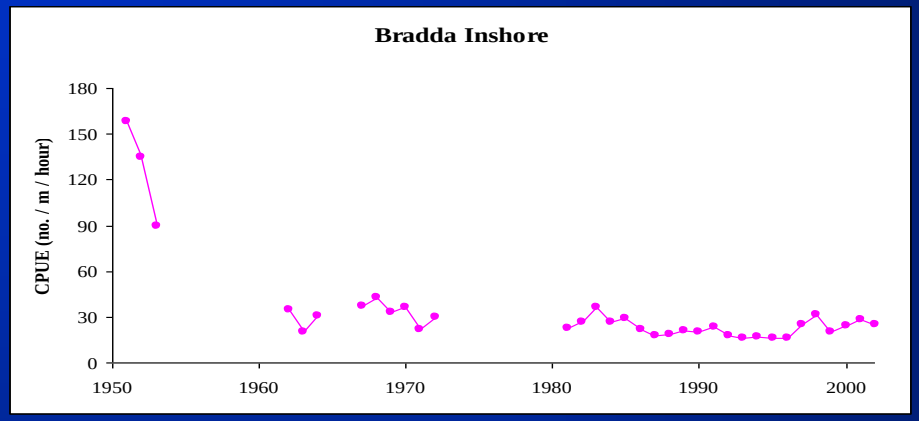
Sustainability of Global Scallop Fisheries



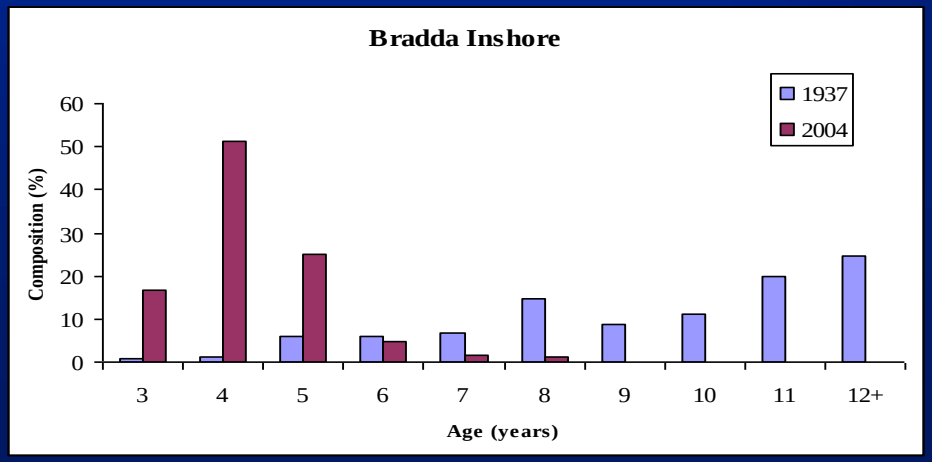
UN FAO Fisheries & Aquaculture Department (2013)

The Effect of Fishing on Scallops

Catch per unit effort for scallops



Age composition of scallops



The Effect of Fishing on Scallops

Ecosystem Effects of Scallop Fisheries

Biodiversity

Settlement Habitat

Public Pressure

http://www.youtube.com/watch?v=nkfz5fOPSck

Principles for Improving the Management of Scallop Inshore Fisheries

1. Encourage industry stewardship of the resource (spatial or catch based ownership) – *reduce the "race for fish"*

2. Allow stocks to recover towards more natural size / age structures – *improve yield per recruit & reproductive output*

3. Provide spawning refuges – *high densities of large individuals*

4. Minimise the effects of the fishery on juveniles – *improve future yields*

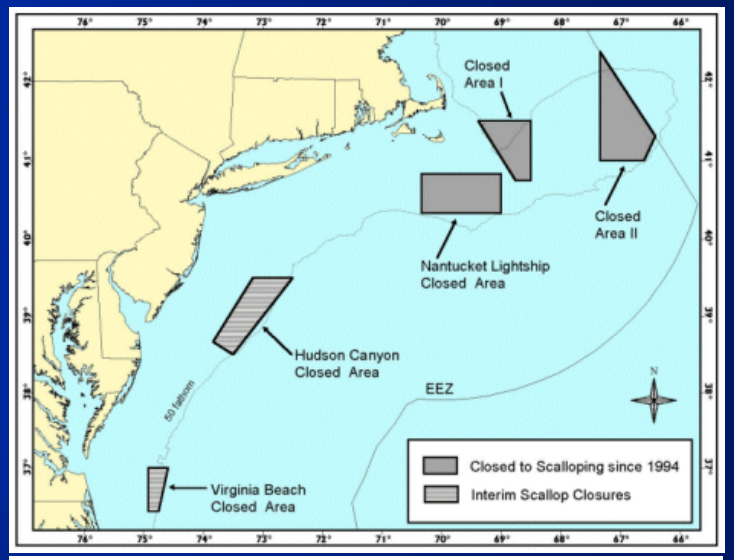
5. Reduce by-catch *& conflicts with other fisheries*

6. Reduce the effect of fisheries on benthic habitats – *maintain / recover biodiversity & improve recruitment*

Beukers-Stewart & Beukers-Stewart (2009)

Are Closed Areas The Solution?

Georges Bank / NE USA



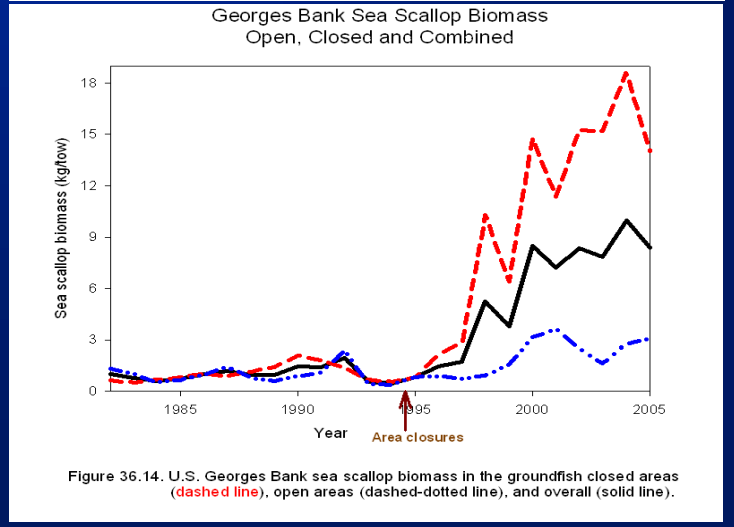
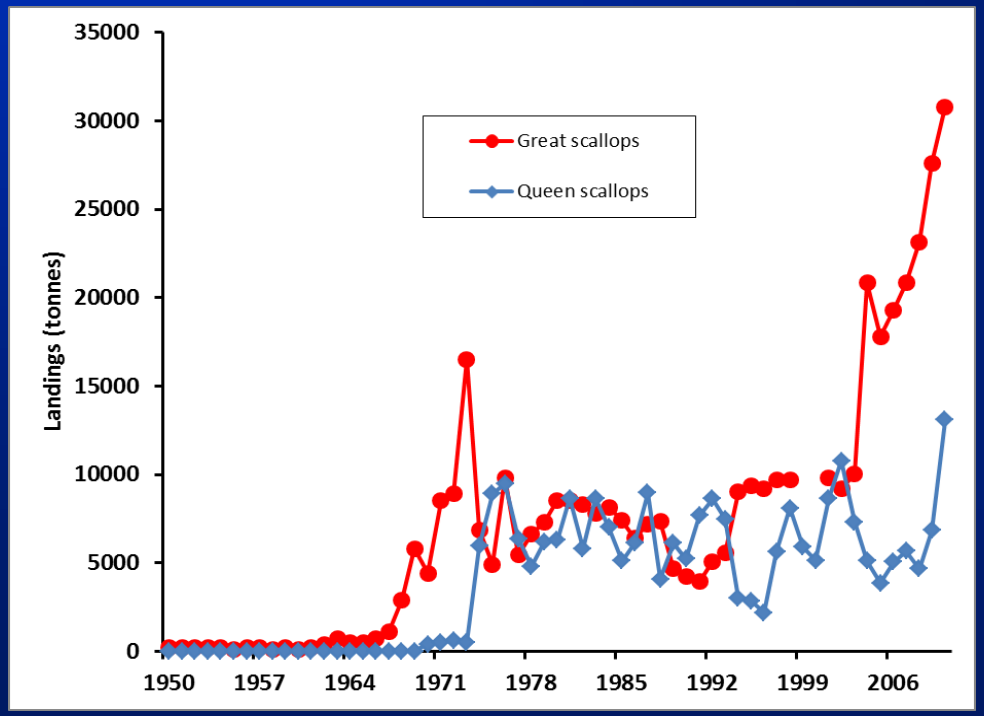


Figure 36.14. U.S. Georges Bank sea scallop biomass in the groundfish closed areas (dashed line), open areas (dashed-dotted line), and overall (solid line).

Case Study: UK Scallop Fisheries

Great or King scallops *Pecten maximus*

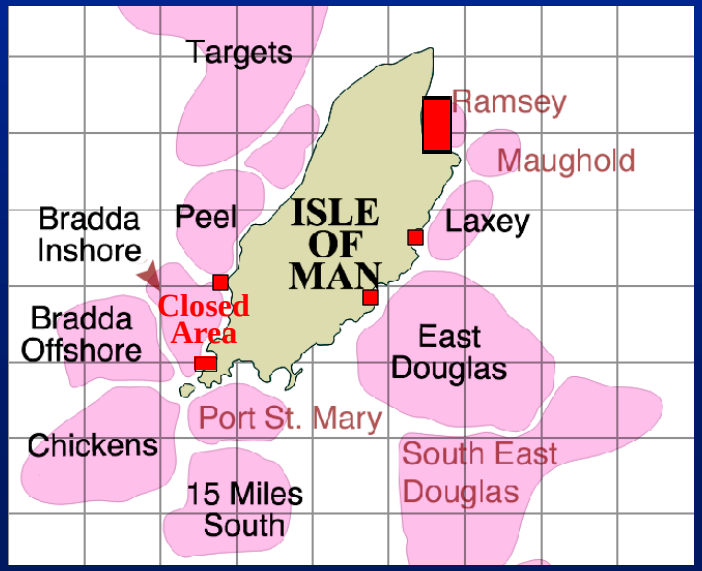
Queen scallops *Aequipecten opercularis*



UN FAO Fisheries & Aquaculture Department (2013)


Arran
(NTZ)
Scotland
Northern
Ireland
IRELAND
Port Erin (CA)
UNITED
KINGDOM
Llyn Peninsula
(SAC)
Cardigan Bay
(SAC)
Wales
England
Skomer
Island (MNR)
Lundy Island
(NTZ)
Devon (IPA)

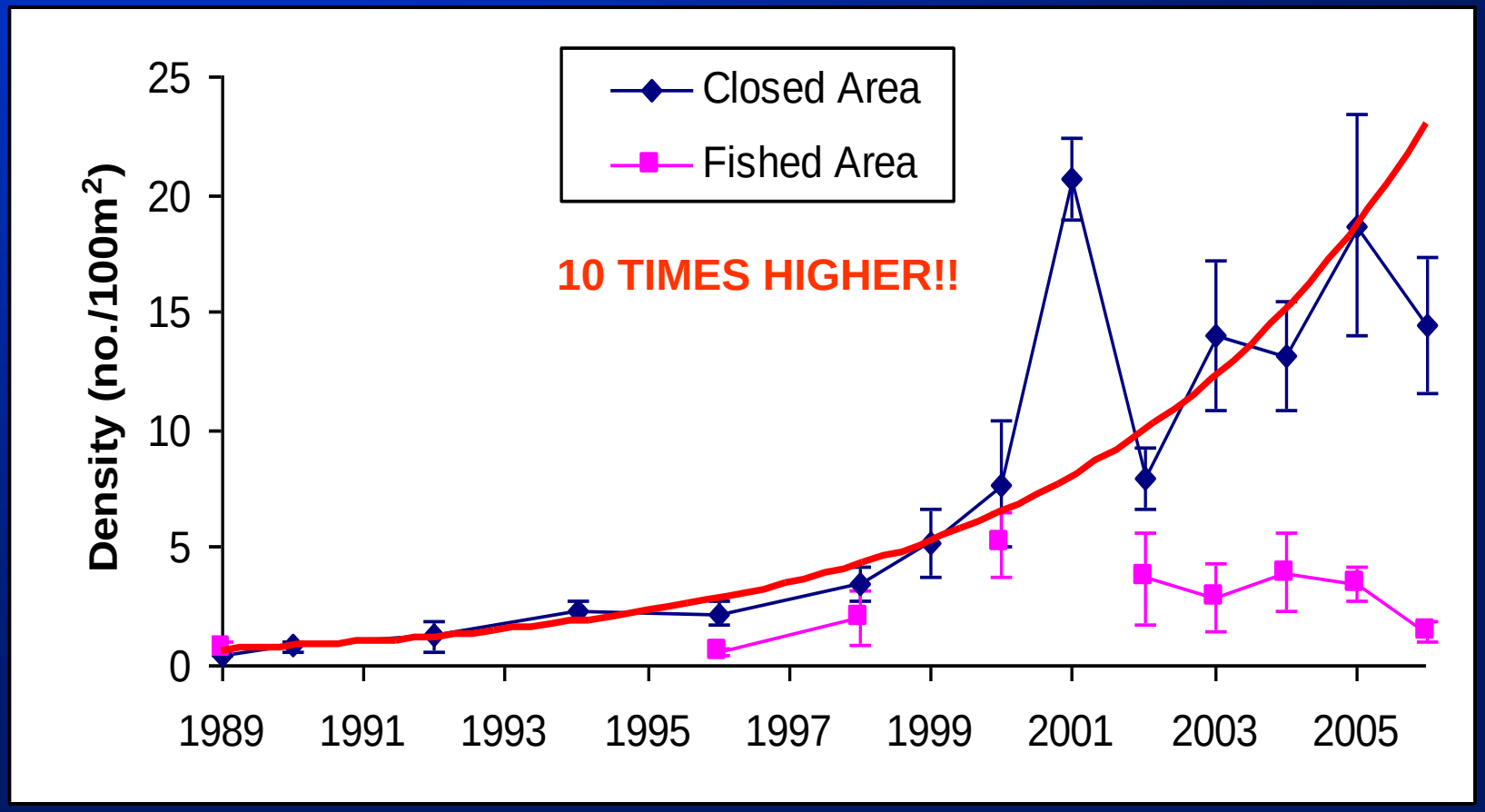
Isle of Man Scallop Fishery



- Scallops dominate fisheries landings into the Isle of Man
- Fishery appears sustainable but is much less productive than in the past
- Dredging for scallops has reduced biodiversity & habitat complexity on the main fishing grounds
- IoM have set up a network of marine protected areas to improve fisheries sustainability

Scallop Recovery in Port Erin Closed Area

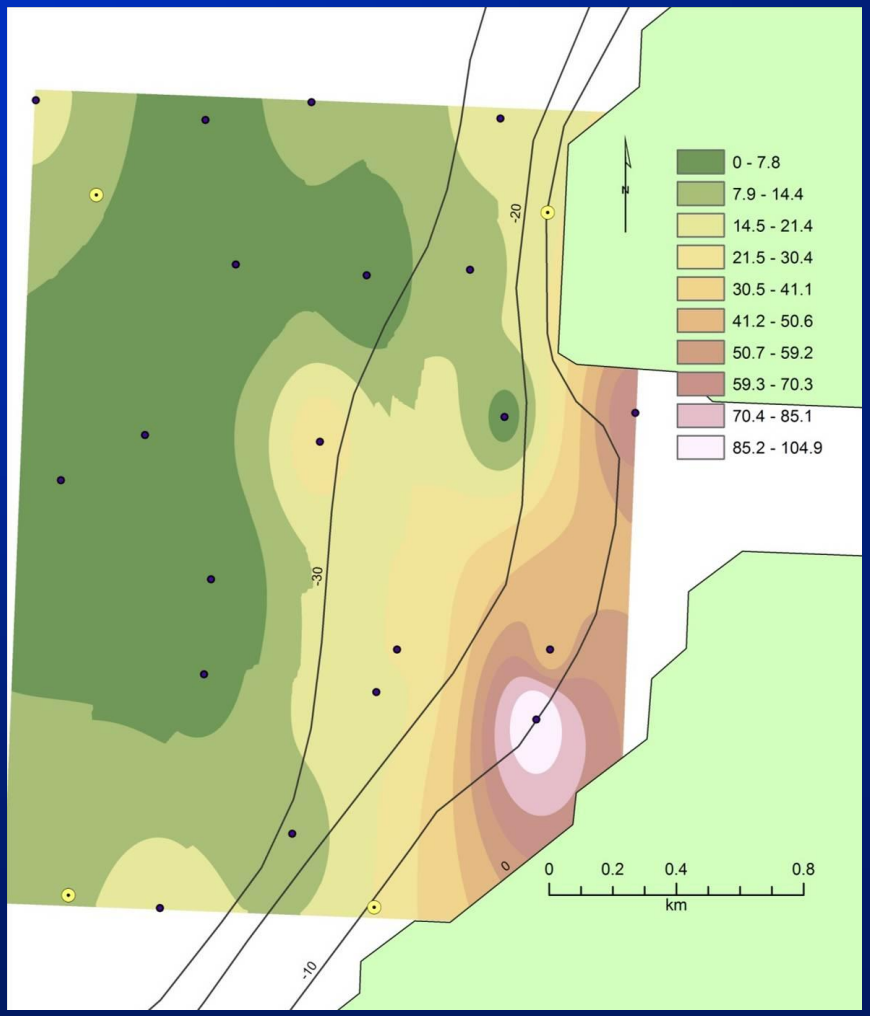
Density (1989-2006)



Beukers-Stewart et al. (2005) MEPS

Scallop Recovery in Port Erin Closed Area

Density (2008)

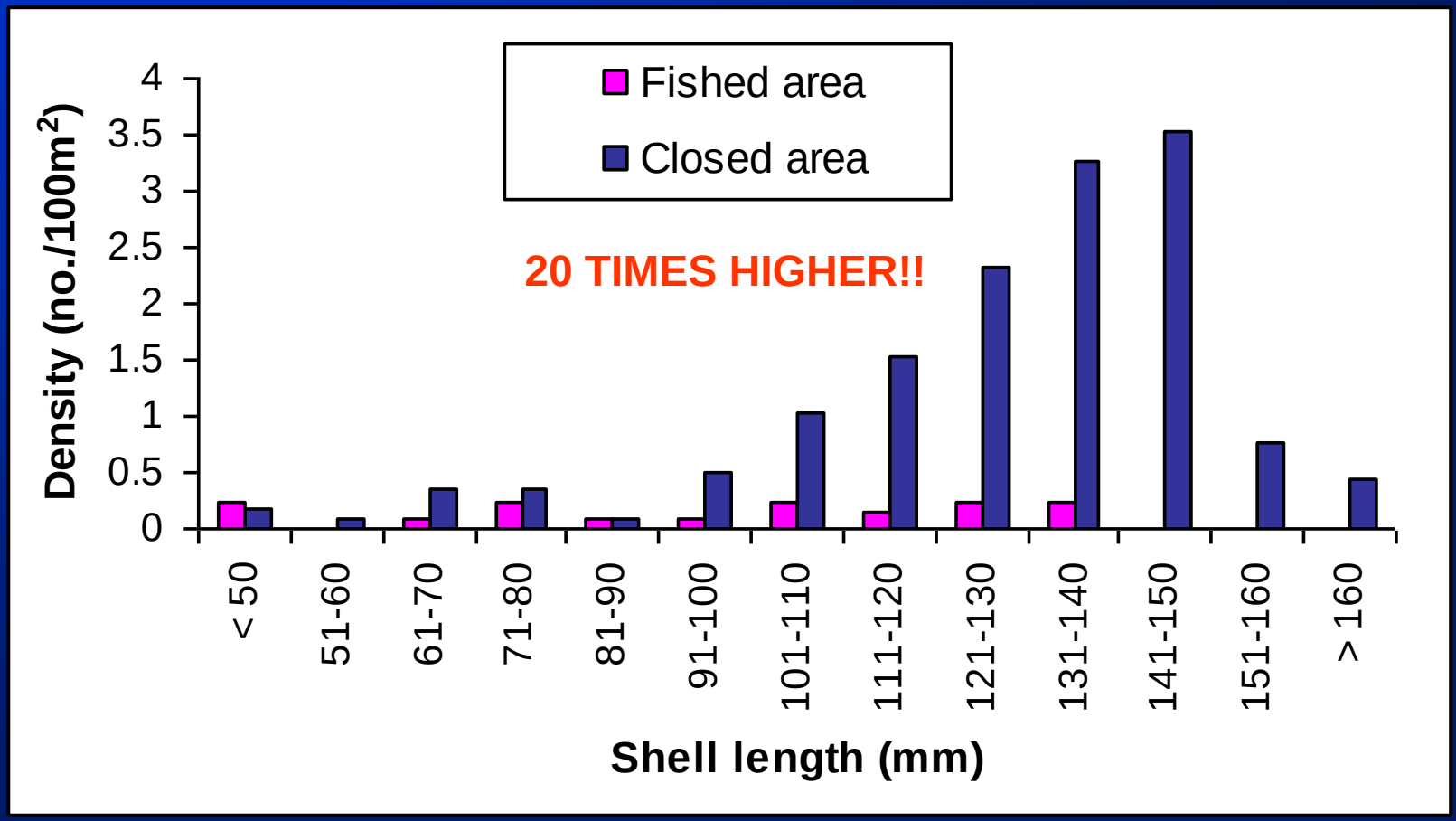


Murray, Hinz & Kaiser (2009)

BANGOR UNIVERSITY 1884

Scallop Recovery in Port Erin Closed Area

Biomass (2006)



Scallop Biomass & Reproduction

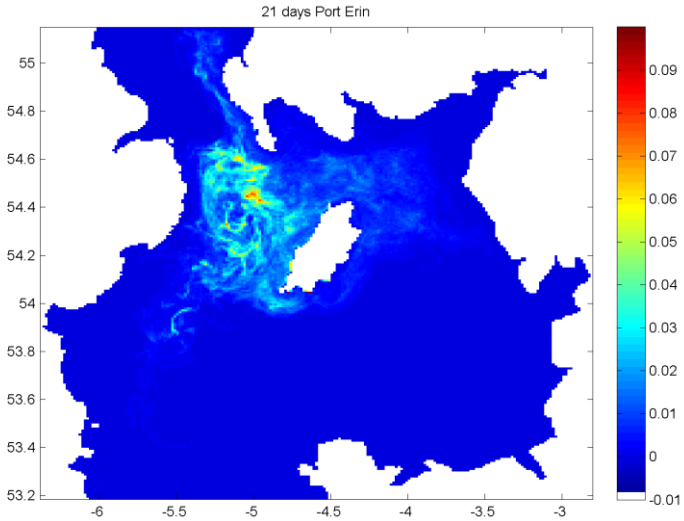
(2006)

Closed area Fished area

- Large scallops ↑
  Egg production
  (33 x fished area)
- High densities ↑
  Fertilisation
- Combination ↑↑
  Larval production
  (100 x fished area?)

Fisheries Benefits?

Larval Export?

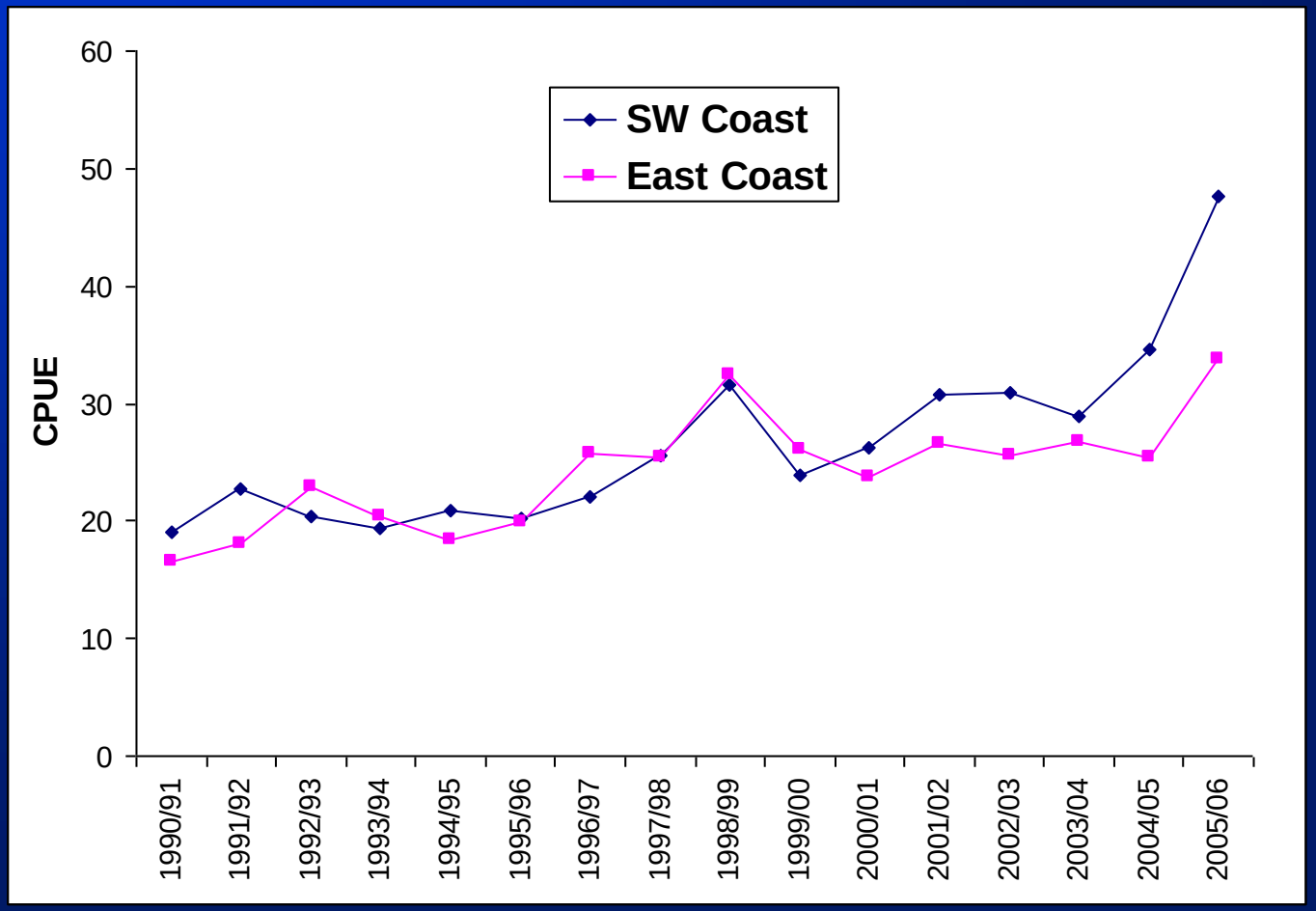


Neill & Kaiser 2008

Spill-over?

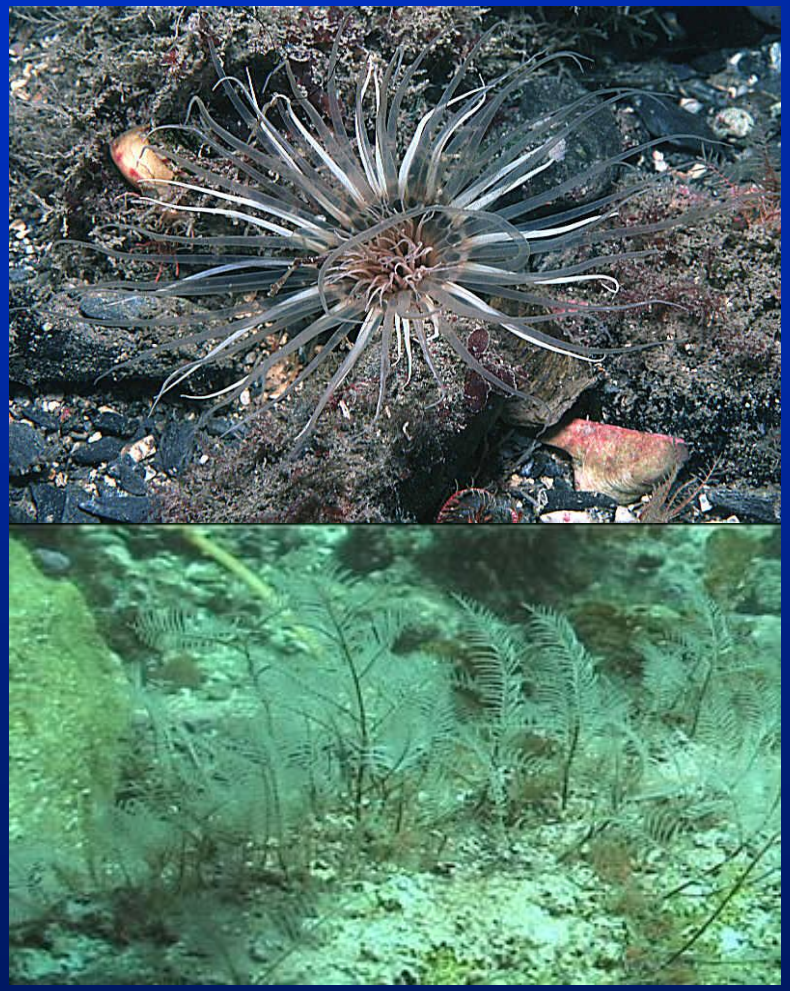
Fisheries Benefits?

Commercial Catch Rates



Beukers-Stewart et al. (2003) ICES J Mar Sci; **Beukers-Stewart** et al. (2006) J Shellfish Res

Conservation Benefits
Closed Area



- Increased biodiversity
- More long-lived and fragile animals
- Increased habitat complexity (upright hydroids, bryozoans etc)
- Feedback to commercial species

Bradshaw et al. (2001; 2003)

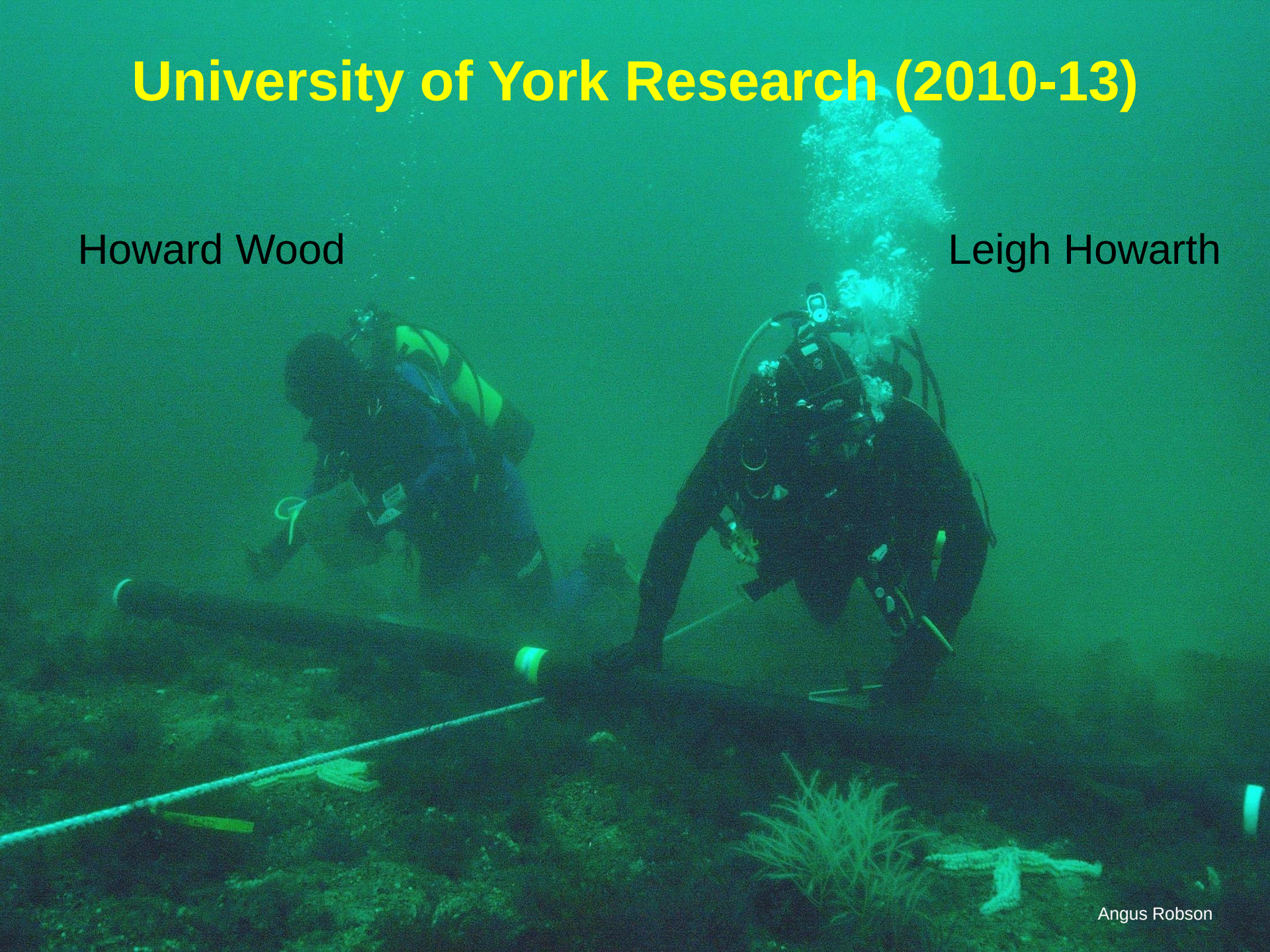
Arran No-Take Zone (NTZ)

- Scotland's first No-take Zone (October 2008)
- Passed by Scottish parliament after years of campaigning by COAST
- Designed to benefit both fisheries and conservation

University of York Research (2010-13)

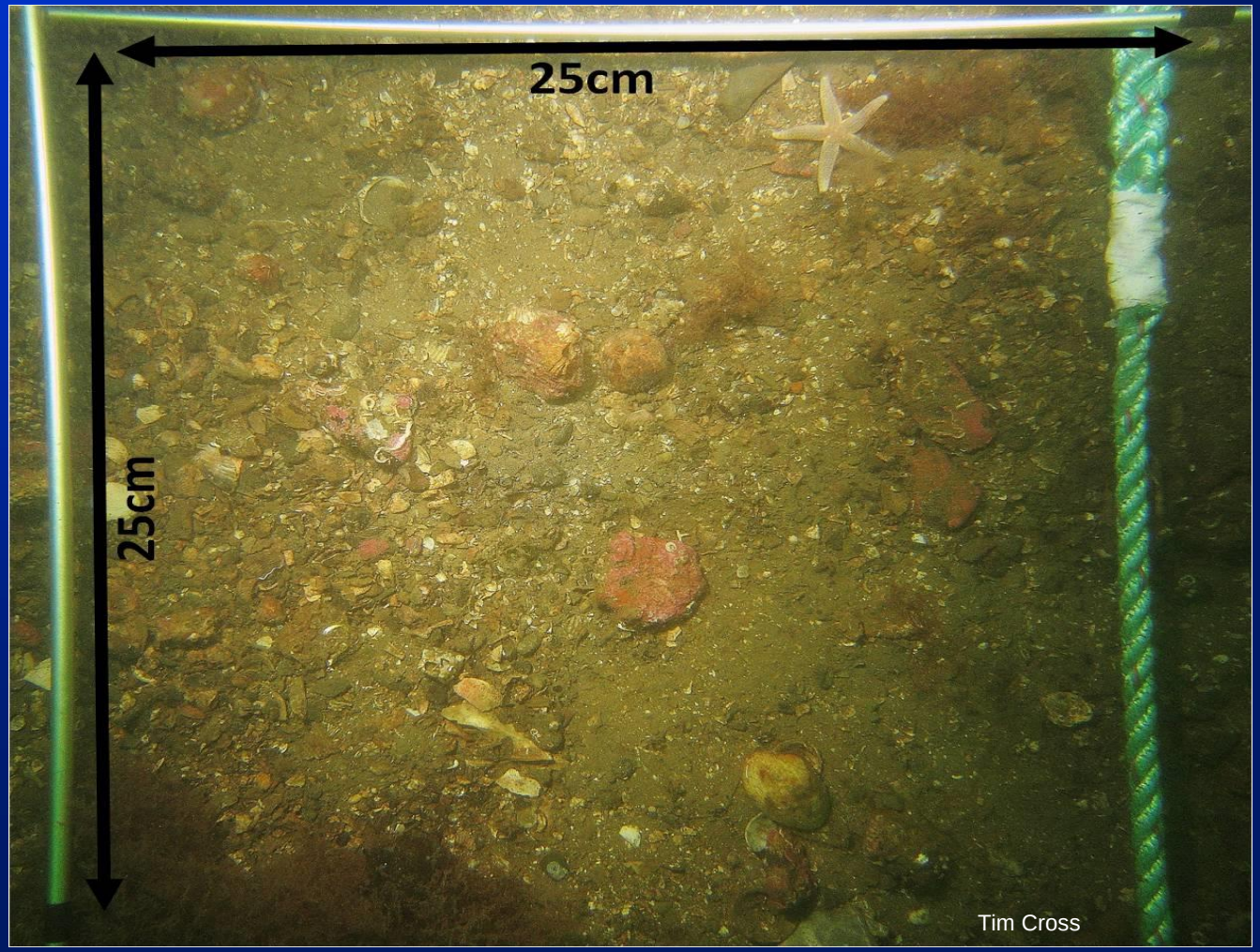
Howard Wood

Leigh Howarth

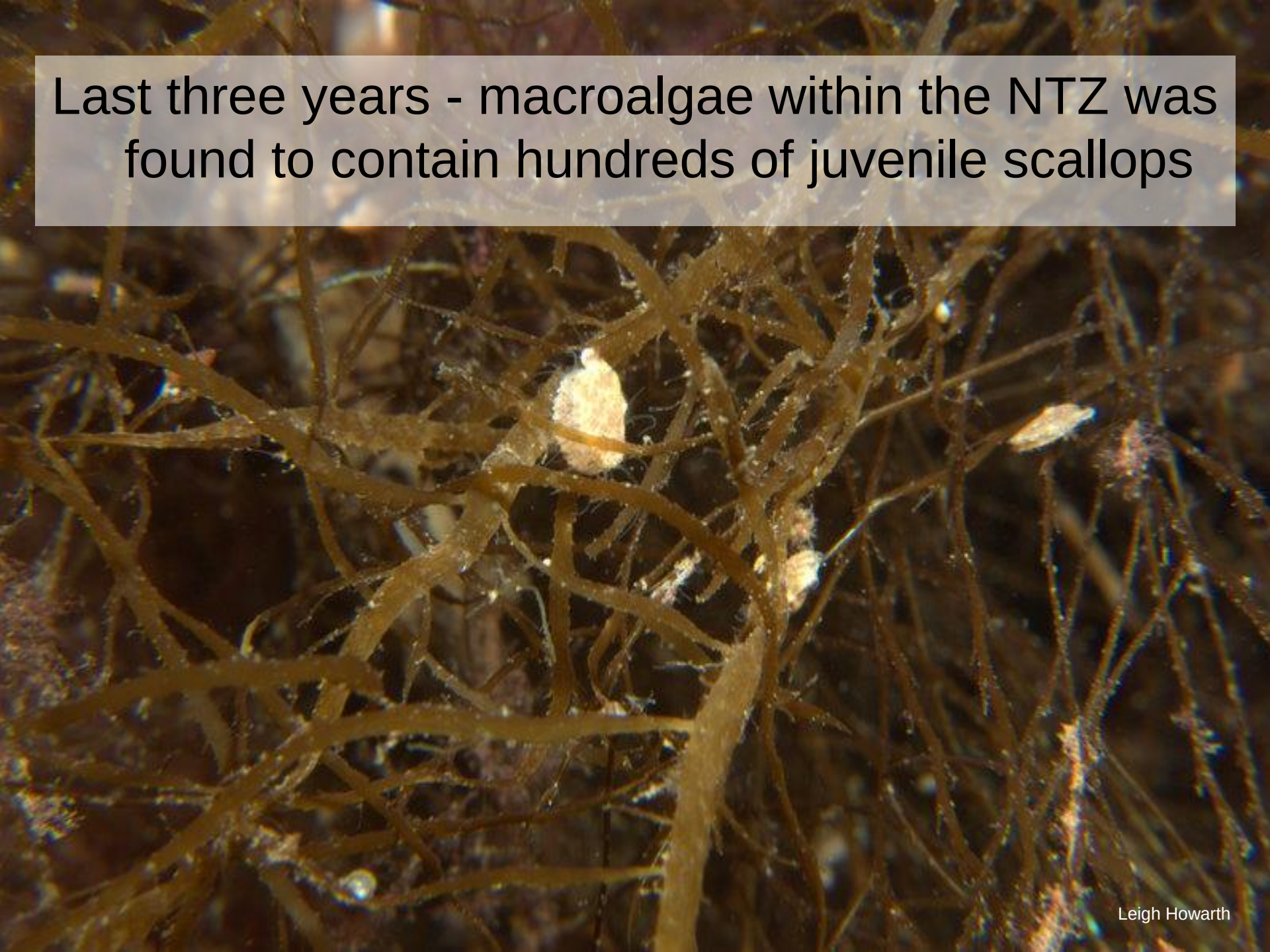


Angus Robson

Habitat - Photoquadrats

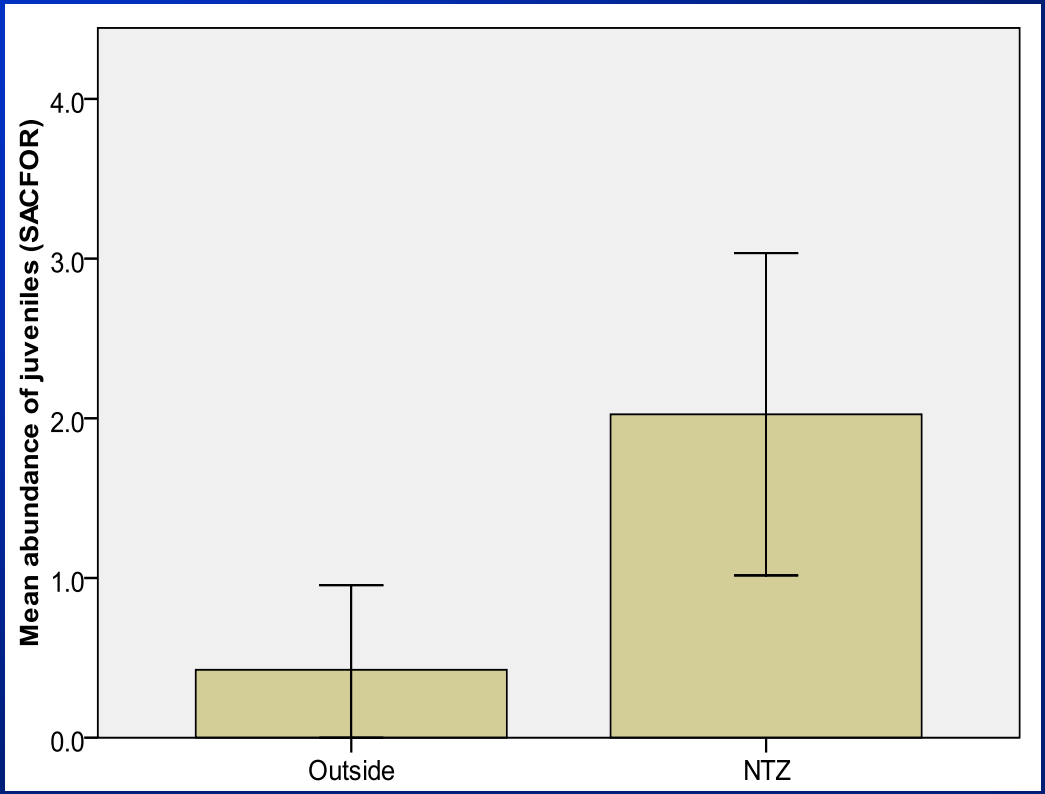


Last three years - macroalgae within the NTZ was found to contain hundreds of juvenile scallops



Leigh Howarth

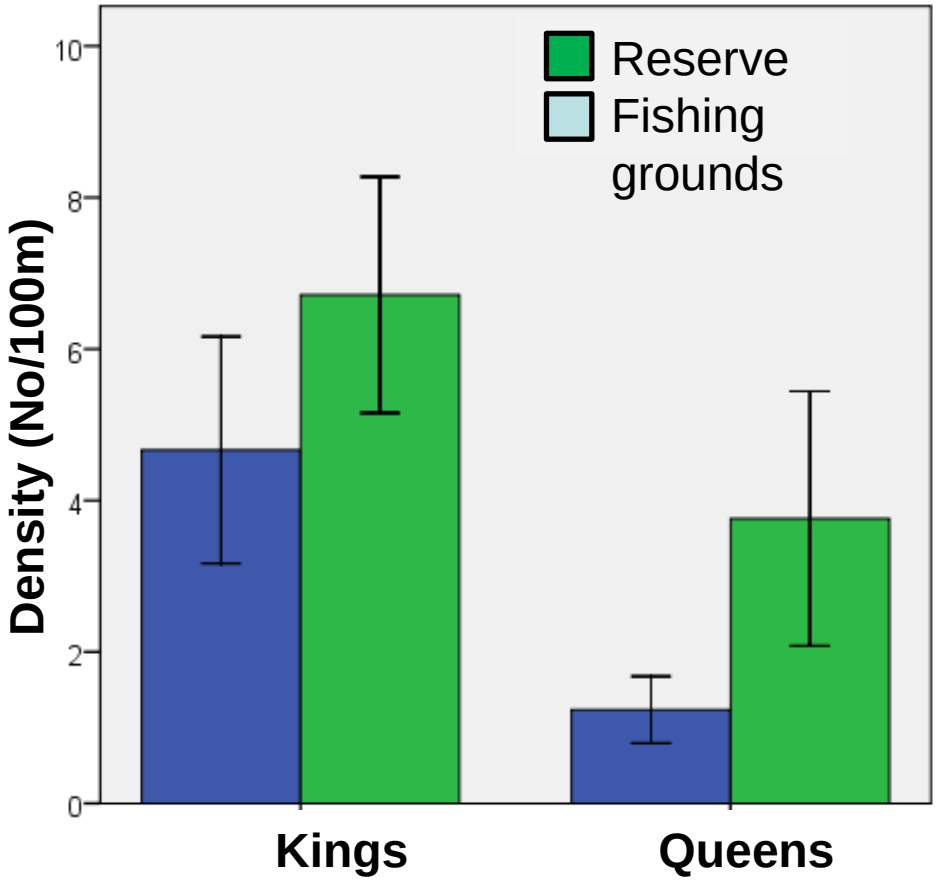
Juvenile Scallop Density



- Abundance of scallop settlement was significantly greater inside the reserve

Howarth *et al*., (2011)

Adult Scallops

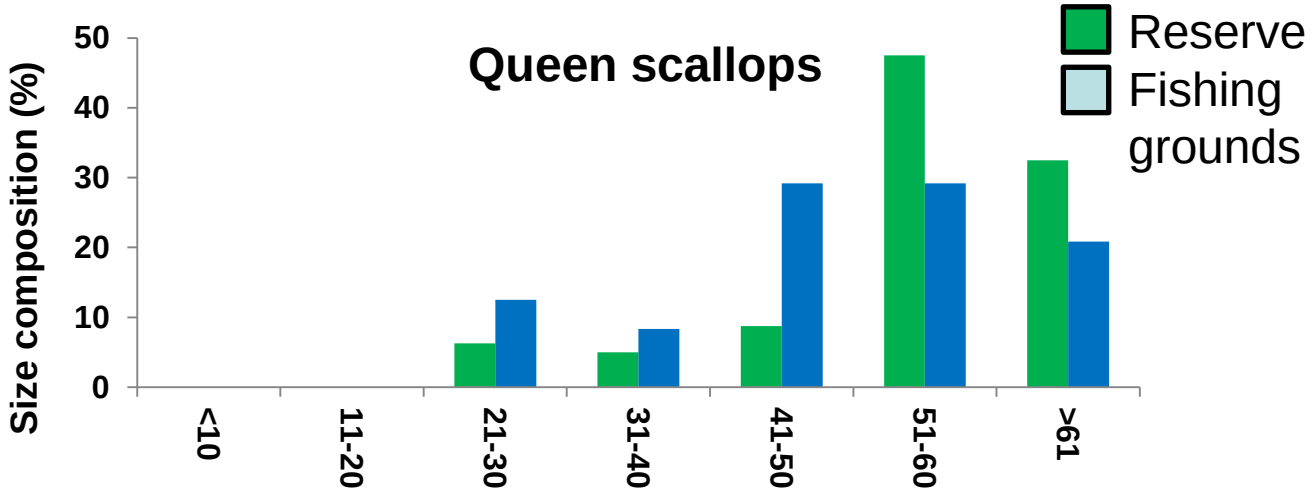


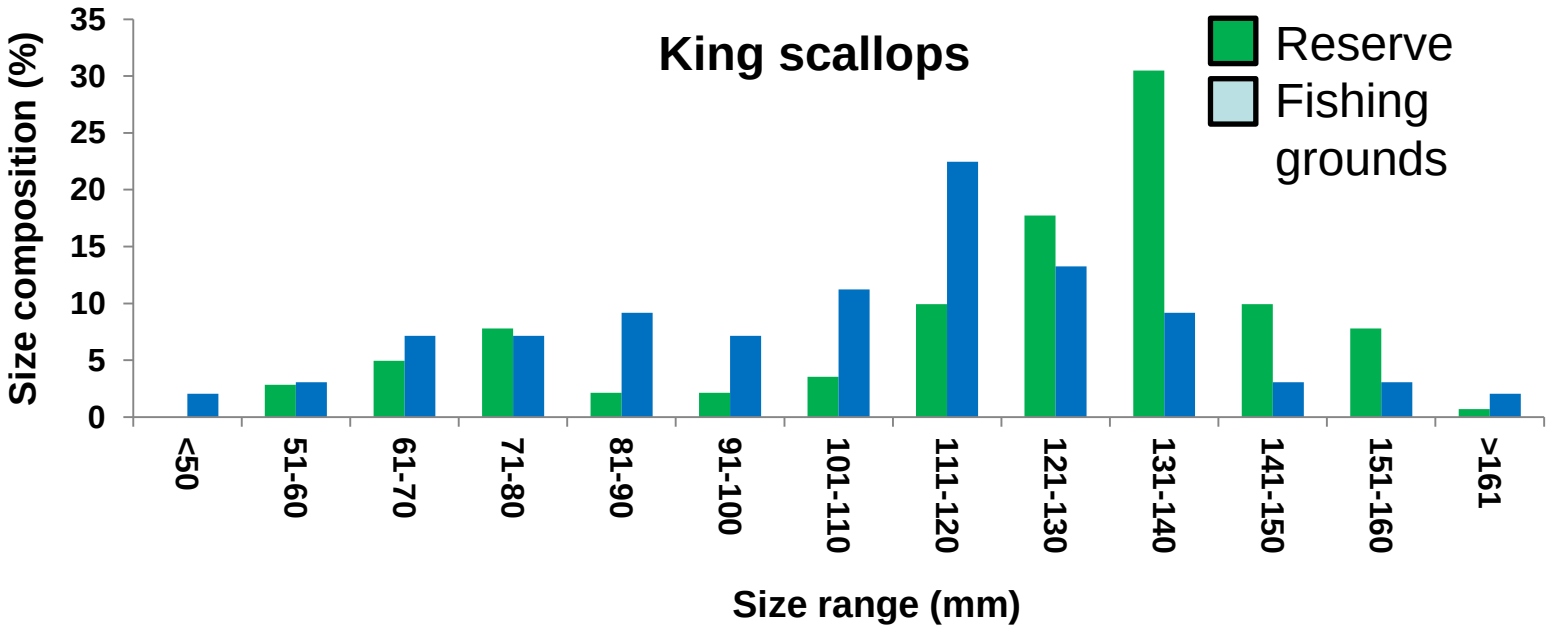
*Error bars represent ±1 SE.

Over 3 years

- Scallop density higher in reserve for 3 years year running
- Kings 1.5 times greater inside reserve
- Queens over 3 times greater inside reserve

Scallops older and larger within reserve





Scallops & Closed Areas in the UK

Area	Species	Response	Factors
Arran NTZ	*P. maximus*	Moderately higher densities, size and age inside	Variable settlement, moderate fishing pressure outside, some illegal fishing, short duration of protection.
Arran NTZ	*A. opercularis*	Moderately higher densities, size & age inside	As above
Port Erin CA	*P. maximus*	Much higher densities, size and age inside	Regular settlement, high natural densities, high fishing pressure outside, well enforced, long history of protection
Port Erin CA	*A. opercularis*	Higher densities outside	Variable settlement, low natural densities, low fishing pressure.
Llyn Peninsula SAC	*P. maximus*	Higher densities inside	Moderate fishing pressure outside, some illegal fishing, long duration of protection
Llyn Peninsula SAC	*A. opercularis*	Higher densities outside	As above

Continued…

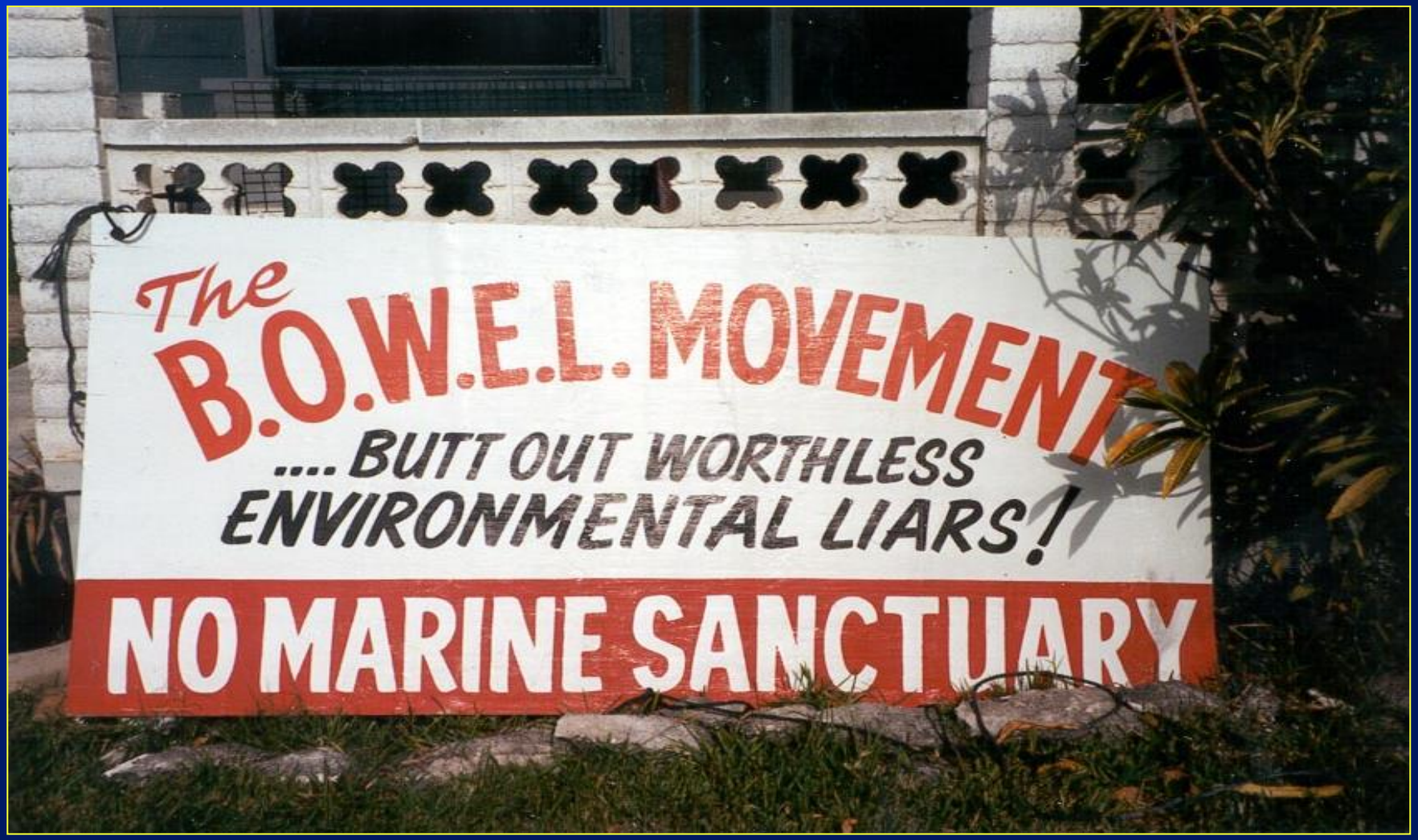
Area	Species	Response	Factors
Cardigan Bay SAC	*P. maximus*	Similar densities inside & outside	High natural disturbance, short duration of protection.
Cardigan Bay SAC	*A. opercularis*	Similar densities inside & outside, highly variable	As above
Skomer MNR	*P. maximus*	Higher densities inside	Negligible fishing for scallops outside, long duration of protection
Skomer MNR	*A. opercularis*	Similar densities inside & outside	As above
Lundy NTZ	*P. maximus*	Similar densities and population structure inside & outside	Very low natural densities, low settlement, low fishing pressure outside, some illegal fishing.
Devon IPA	*P. maximus*	Much higher densities, size and age inside	High natural densities, well enforced, long duration of protection.

Key Messages… So Far

- Species biology is important
  - permanent closures for long lived species
  - flexible closures for short lived species
- Location is important – you need to understand
  - distribution of suitable habitat
  - larval dispersal and settlement patterns
  - patterns of fishing pressure
- Recovery may be a lengthy process
- Levels of natural disturbance are important
- Enforcement is important
  - industry and stakeholder buy-in is key

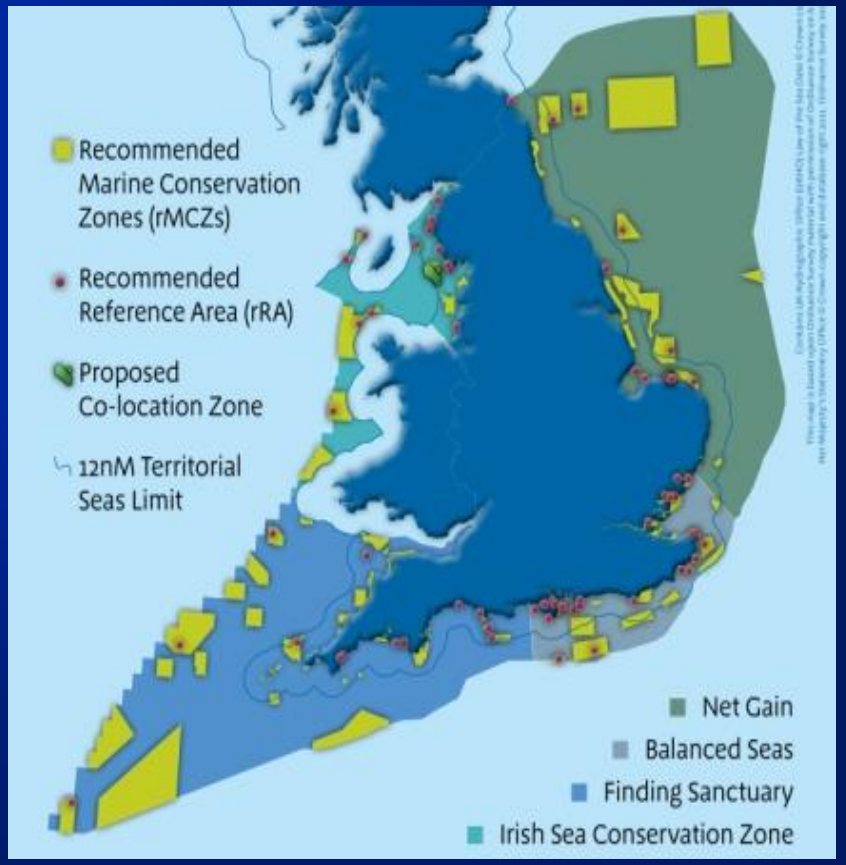
Implementation & Management

The Real Challenge



The English Experience

Marine Conservation Zones (MCZs)

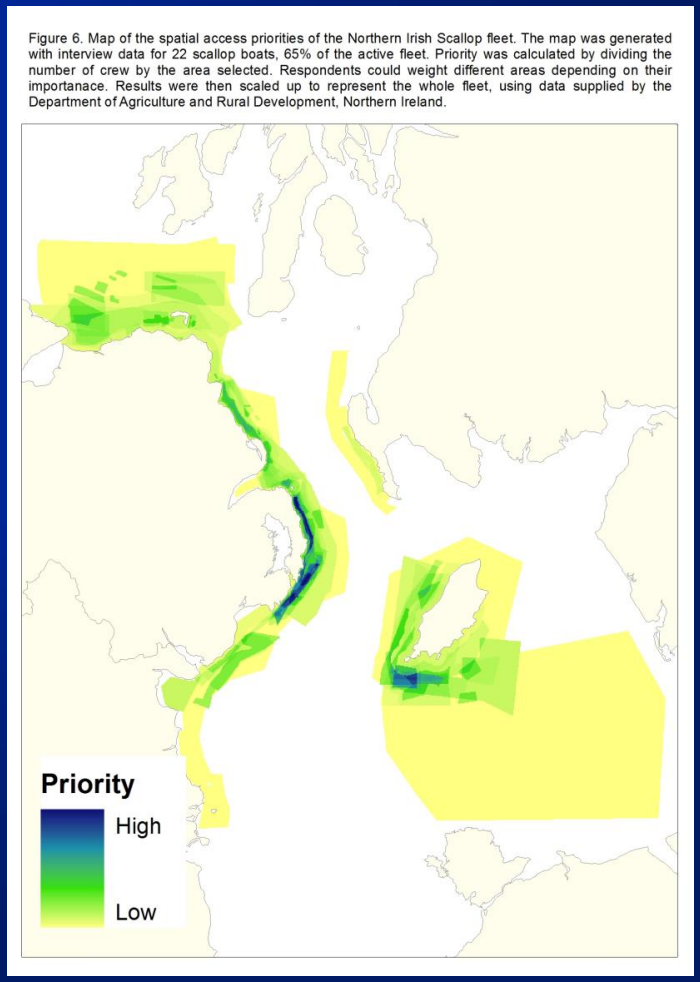


127 MCZs recommended – but now only 31 being consulted on

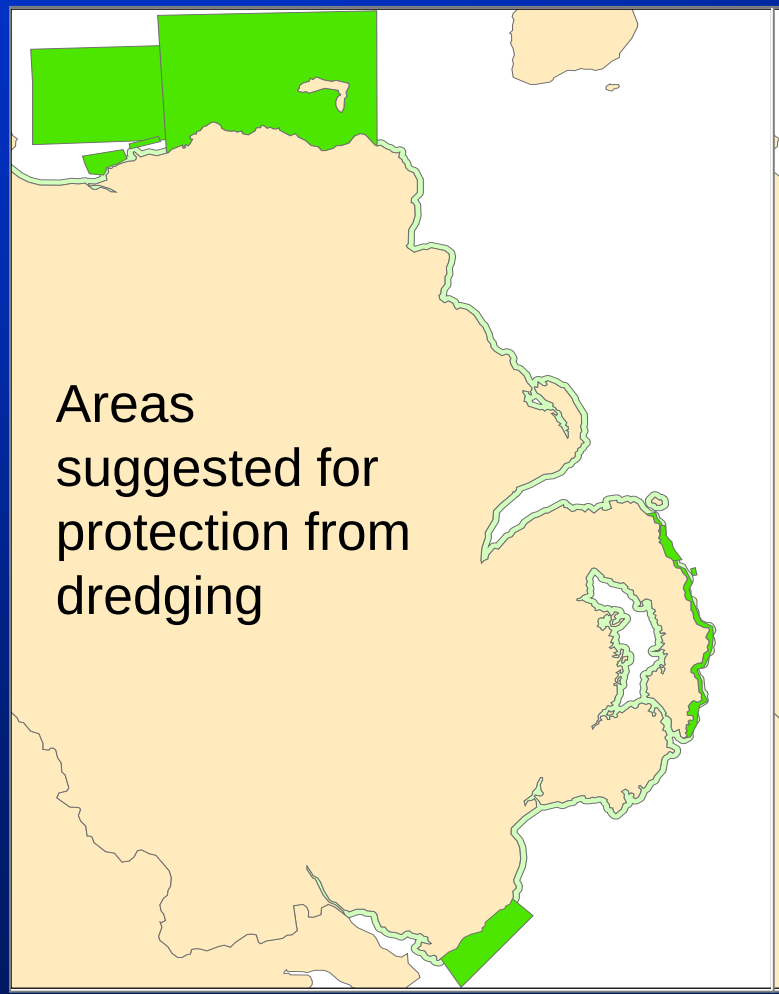
The Northern Ireland Experience

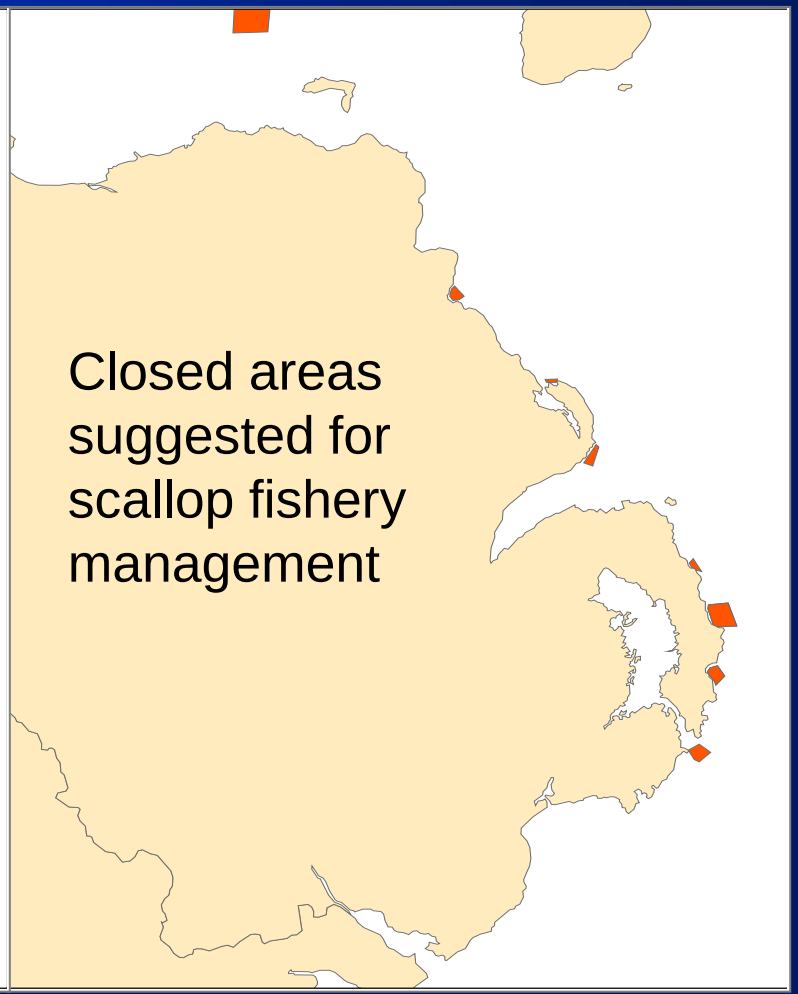
Access priorities of the
Northern Ireland Scallop Fleet

Yates (2012)



The Northern Ireland Experience





Are Closed Areas the Solution?

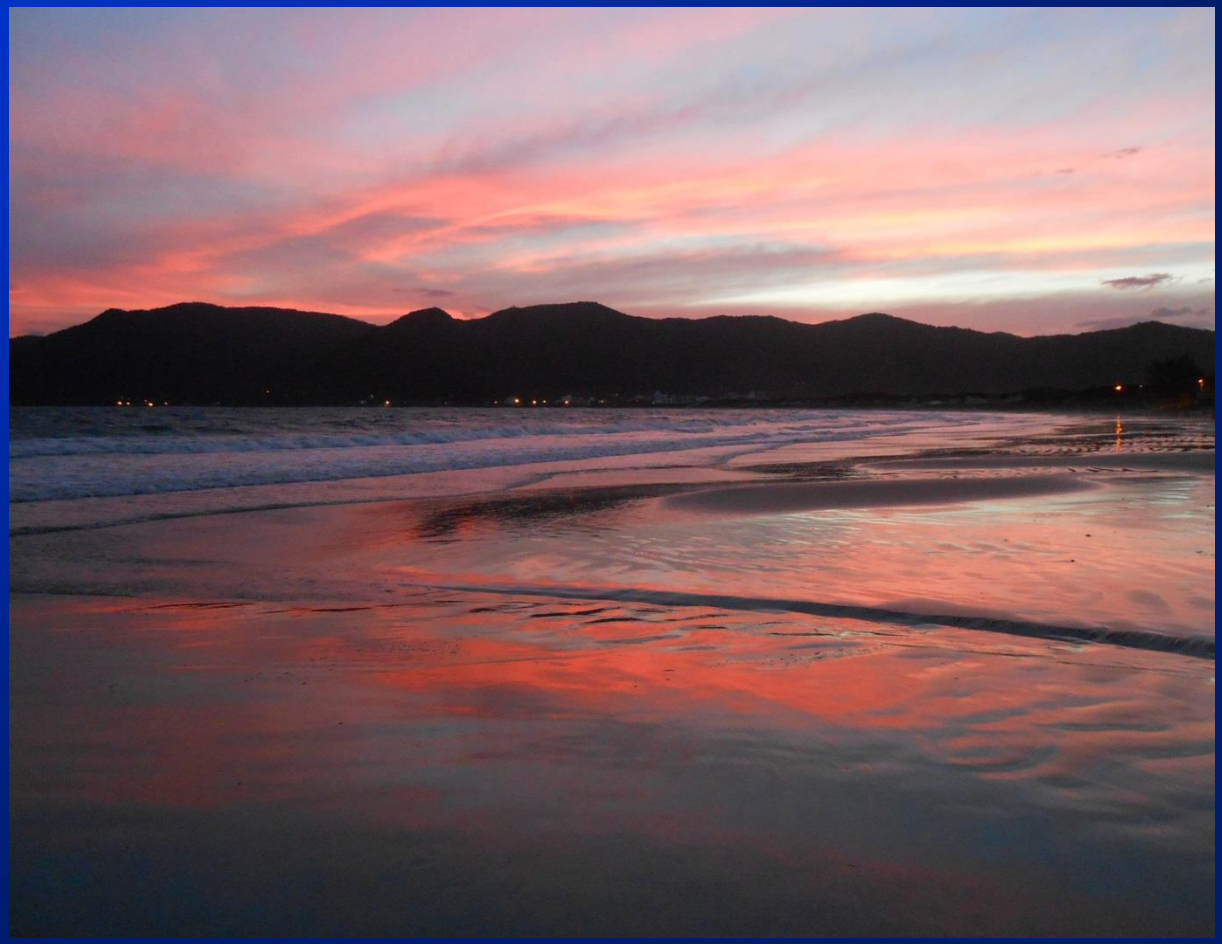
- Scallop fisheries appear ideally suited to management with networks of closed areas

- BUT… effective management outside MPAs is also essential
- A suite of tools are often needed (e.g. minimum sizes, gear modifications, effort restriction, stock enhancement)

- Mapping of benthic habitats, larval dispersal, fishing activity and resources is key to developing effective networks of closed areas
- Closed areas should be set up to benefit both fisheries & conservation wherever possible
- Industry and stakeholder involvement will improve effectiveness and reduce management costs

We All Want Sustainable Seafood

Obrigado!



Science without Borders

http://sciencewithoutborders.international.ac.uk