

Planning & Science for Offshore Renewable Energy in Scottish Waters



Dr. Ian Davies

Marine Scotland Science - Renewables

David Pratt

Marine and Offshore Renewable Energy
Branch

marinescotland

Marine Scotland and The Crown Estate

marinescotland

**Marine Planning
and Licensing
Authority**



**Seabed Leasing
Agency**

Blues Seas Green Energy (BSGE) Plan for Offshore Wind Energy - 2011

Projects at Licensing Stage

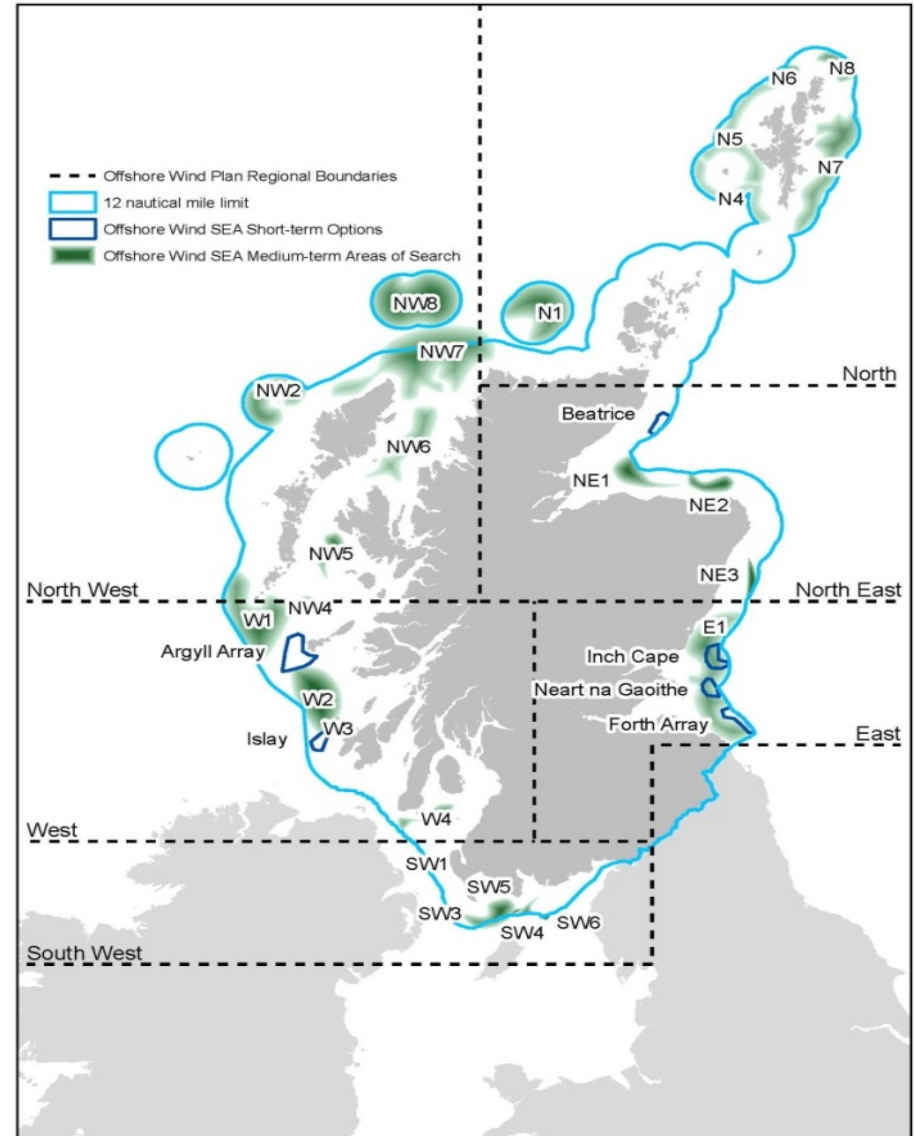
- Islay
- Inch Cape
- Neart na Gaoithe
- Forth Array
- Beatrice

25 Medium-Term Areas of Search

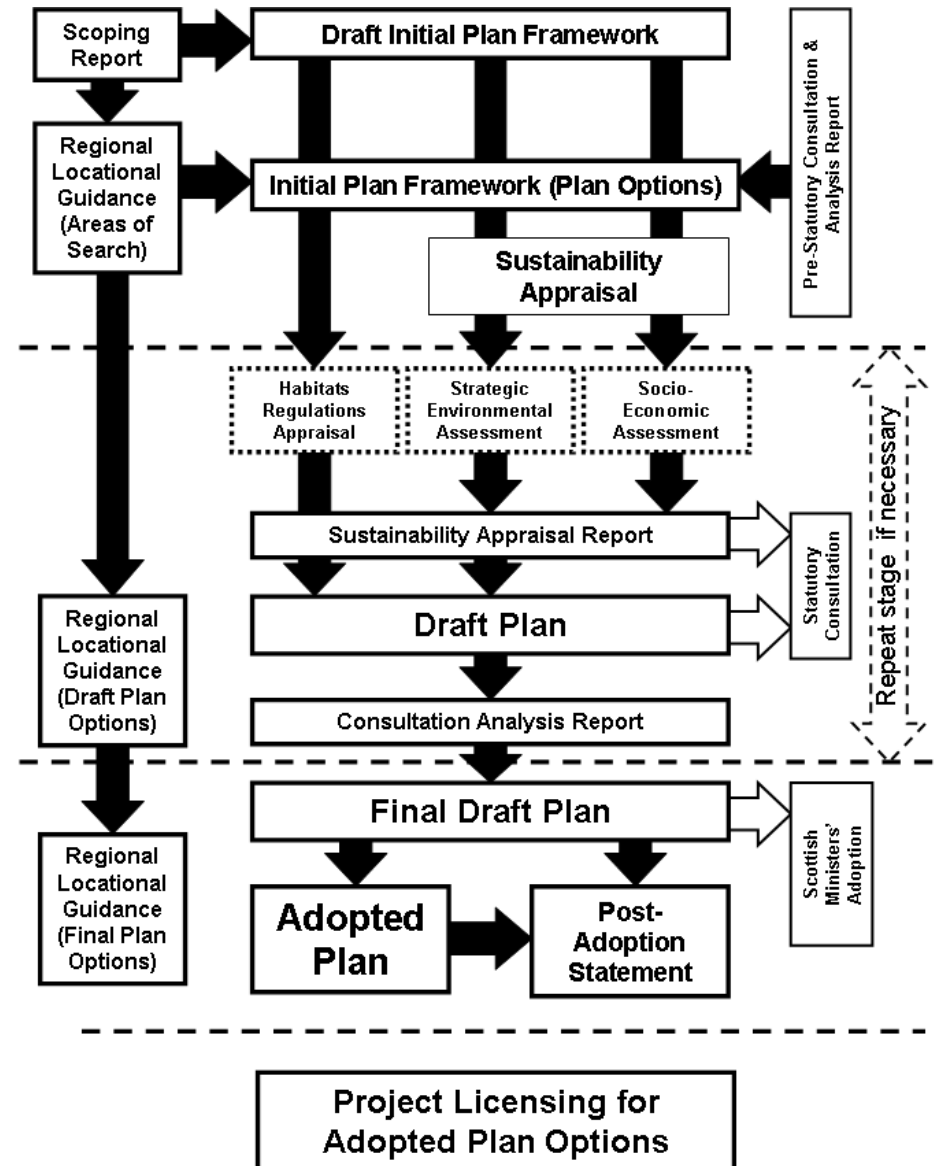
– starting point for current Sectoral Plan
development process

In addition to BSGE:

- 2 Round 3 Zones
 - Seagreen
 - MORL



Sectoral Marine Planning Process



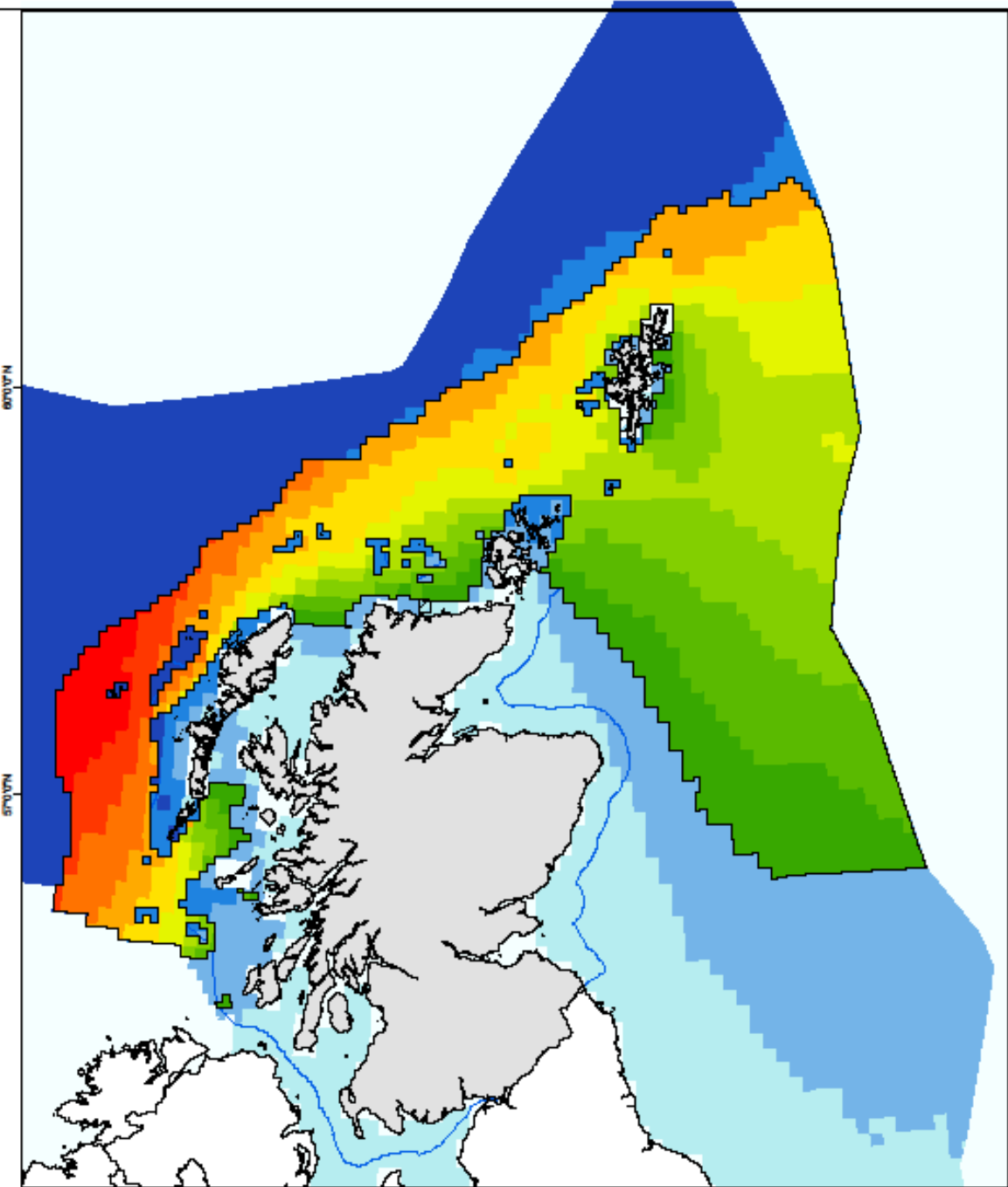
Stage 1: Scoping studies

Scoping Studies for marine renewable energy using TCE MaRS modelling.

- A) Identify broad availability of resource (wind, wave, tidal stream and technical constraints (e.g. distance from shore))



Wave Resource Areas (>20 kW/m, to 200 m depth)



marinescotland
science

Wave energy resource



Scoping Studies for marine renewable energy using TCE MaRS modelling.

B) Identified constraints that make consenting more difficult. Grouped them as:

Environmental factors

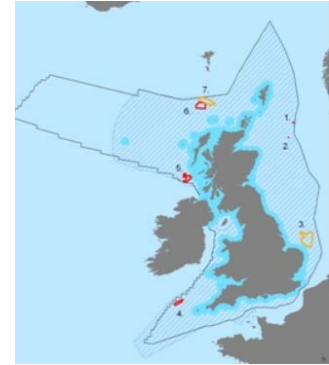
Industrial factors

**Socio-cultural (heritage)
factors**



Layers included into each theme

Environmental Theme



Industrial Theme

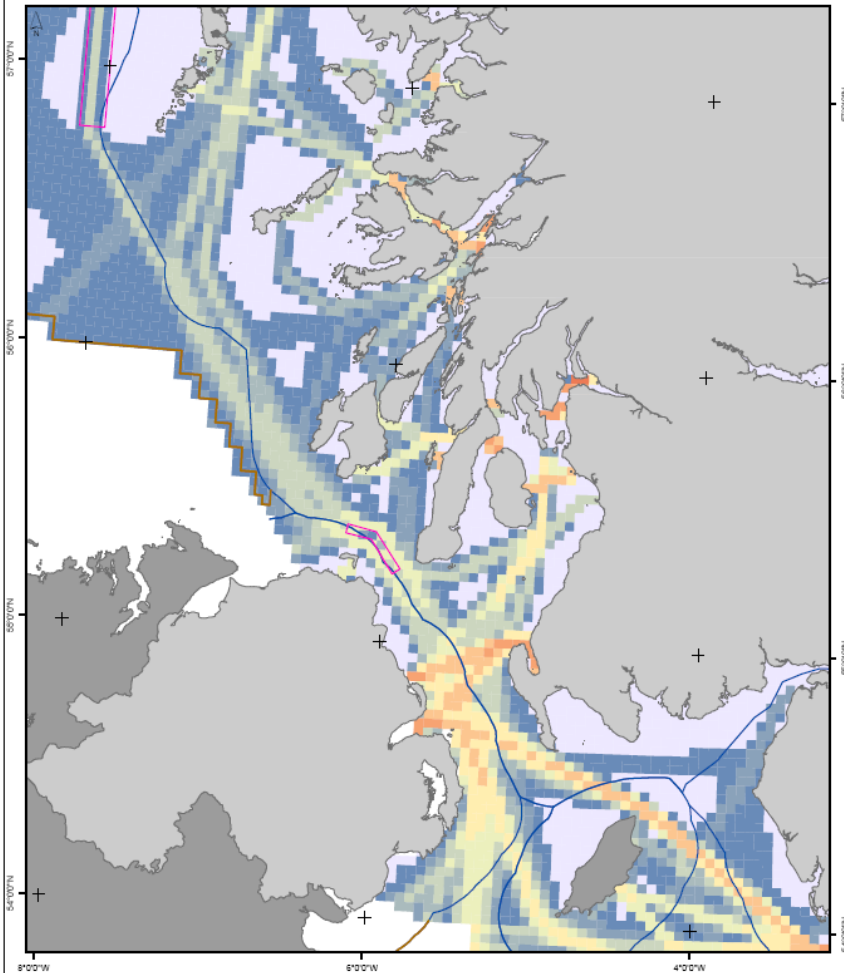


Socio-cultural theme



Constraints - shipping

MaRS- Marine Scotland - Shipping Density



Shipping Density - Predicted Ships Per Year

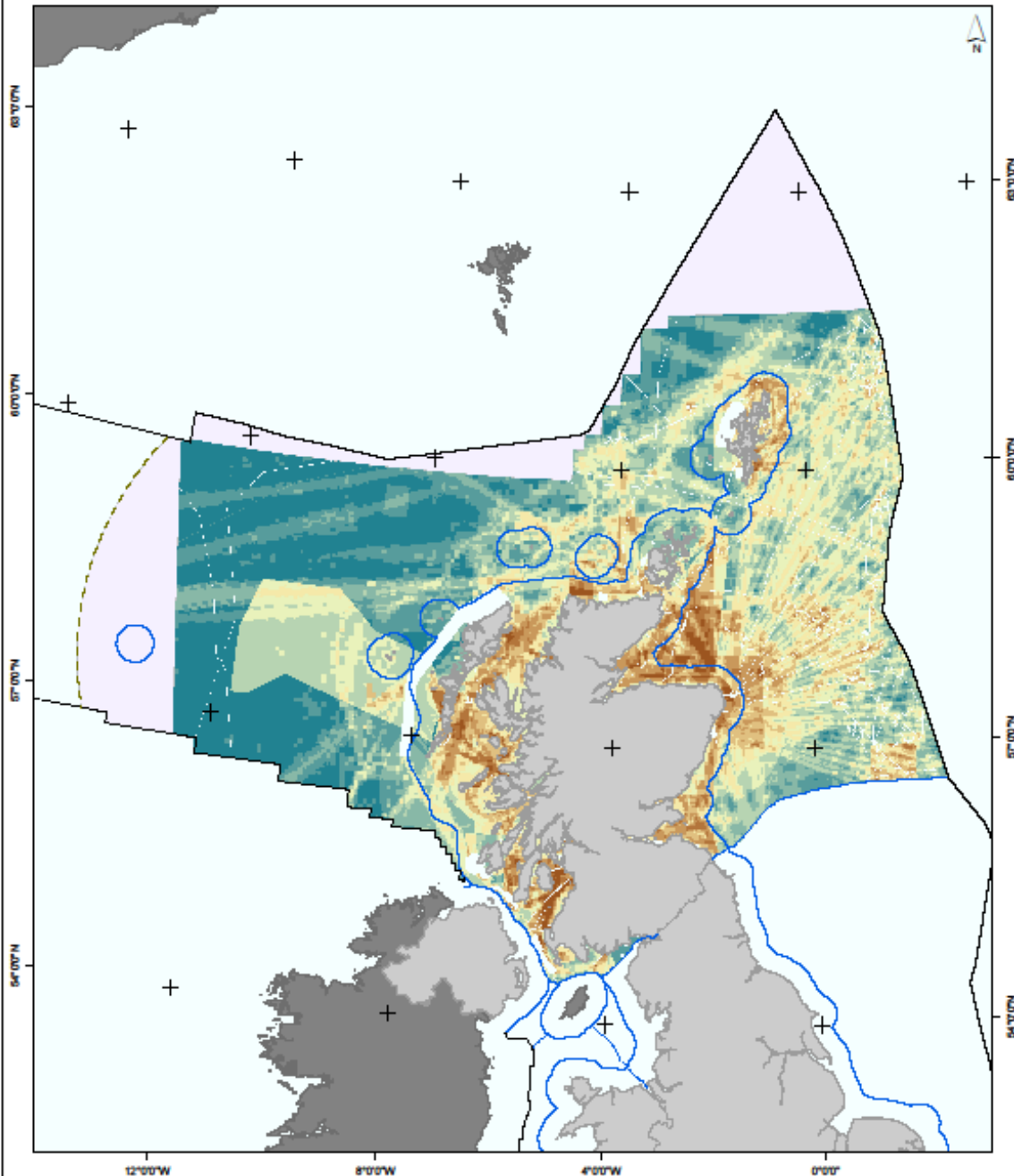
	0		366 - 730 (1 - 2 per Day)
	1 - 12 (<1 per Month)		731 - 1,825 (2 - 5 per Day)
	13 - 52 (<1 per Week)		1,826 - 3,650 (5 - 10 per Day)
	53 - 104 (1 - 2 per Week)		3,651 - 7,300 (10 - 20 per Day)
	105 - 208 (2 - 4 per Week)		7,301 - 10,950 (20 - 30 per Day)
	209 - 365 (4 - 7 per Week)		10,951 - 23,599 (>30 per Day)

Shipping (predicted ships per year)	Weighting	Rank		W * S
		Range	Score	
0 - 93	90	1 - 12	2	180
93 - 311	90	12 - 52	3	270
311 - 687	90	52 - 104	5	450
687 - 1278	90	104 - 208	7	630
1278 - 2174	90	208 - 300	8	720
2174 - 3304	90	300 - 365	10	900
3304 - 4606	90	365 - 500	11	990
4606 - 6612	90	500 - 730	13	1170
6612 - 11183	90	730 - 23599	15	1350
11183 - 23600	90	730 - 23599	16	1440
Harbour Admin Area	100	All Features	10	1000

Weighting of conservation designations

Data layer	Weighting
RAMSAR sites	H
Special Areas of Conservation	H
Special Protection Areas	H
Offshore candidate, draft or possible SACs and SPAs	H
Sites of Special Scientific Interest	H/M
Possible sea haul out sites	M/H
Bird reserves	M
Local nature reserves	M
Important Bird Areas	L

Industry Model Output



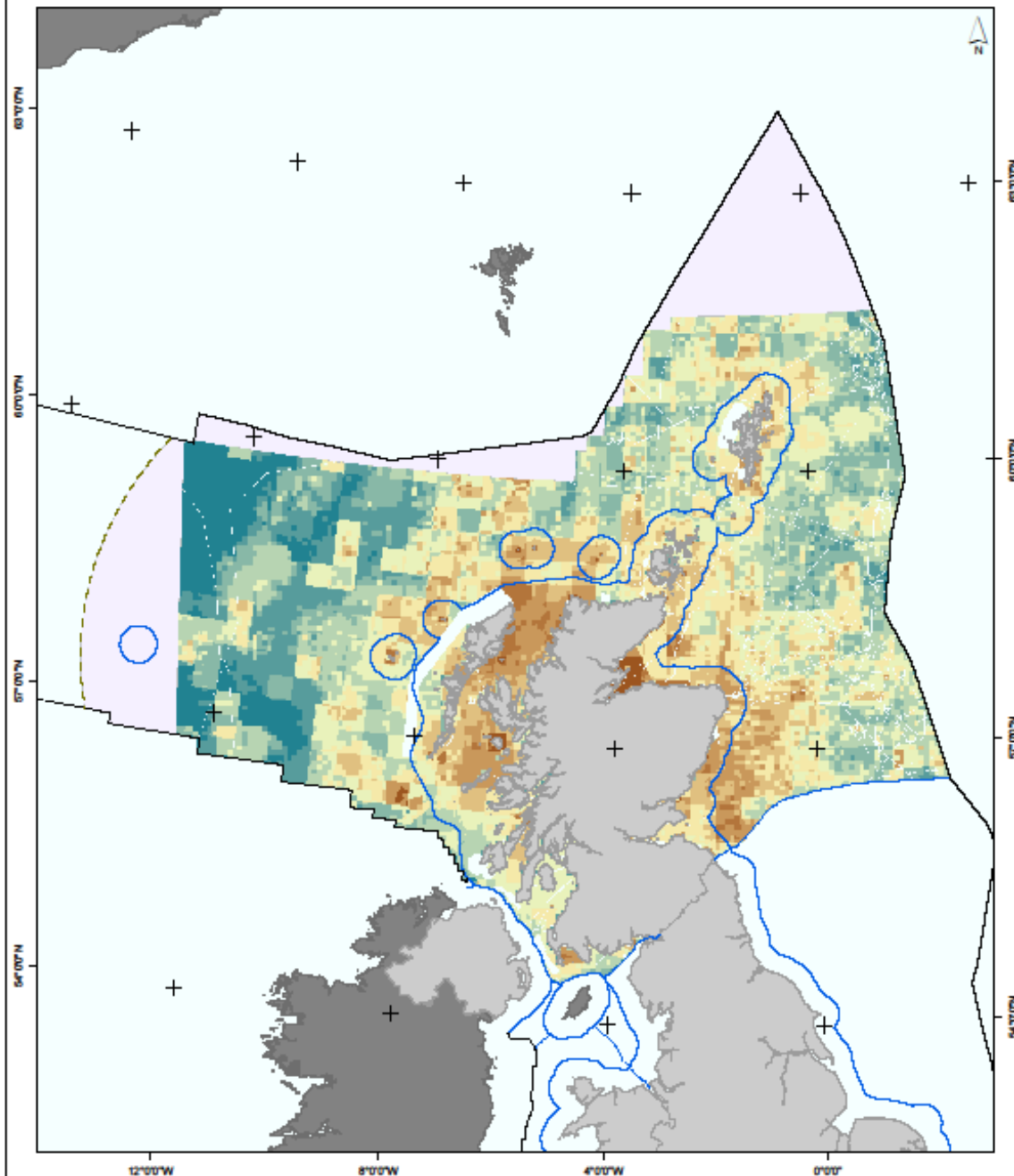
marinescotland
science

Offshore wind:

Industry model



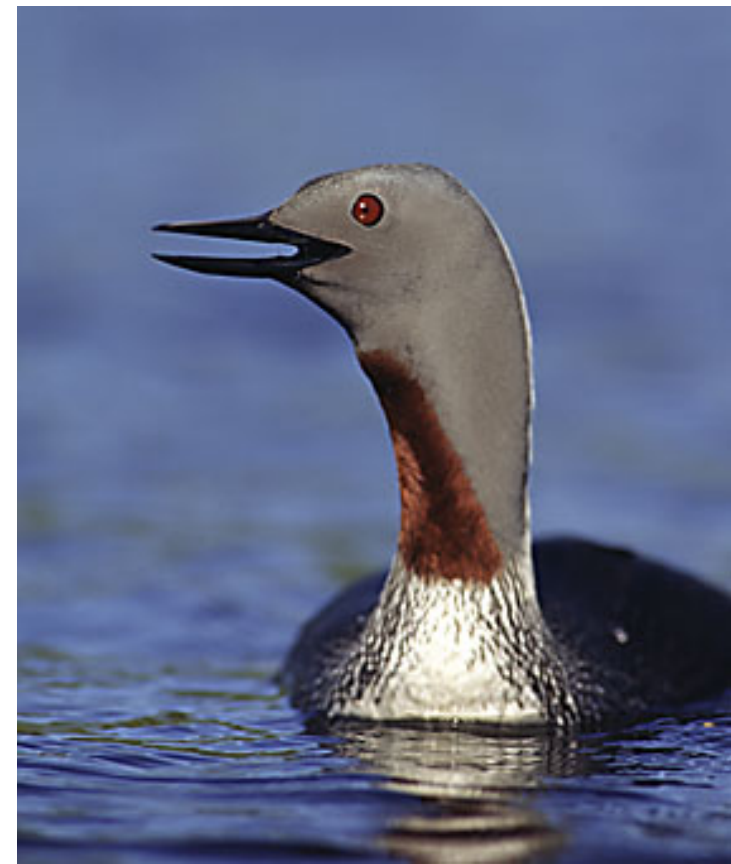
Environmental Model Output



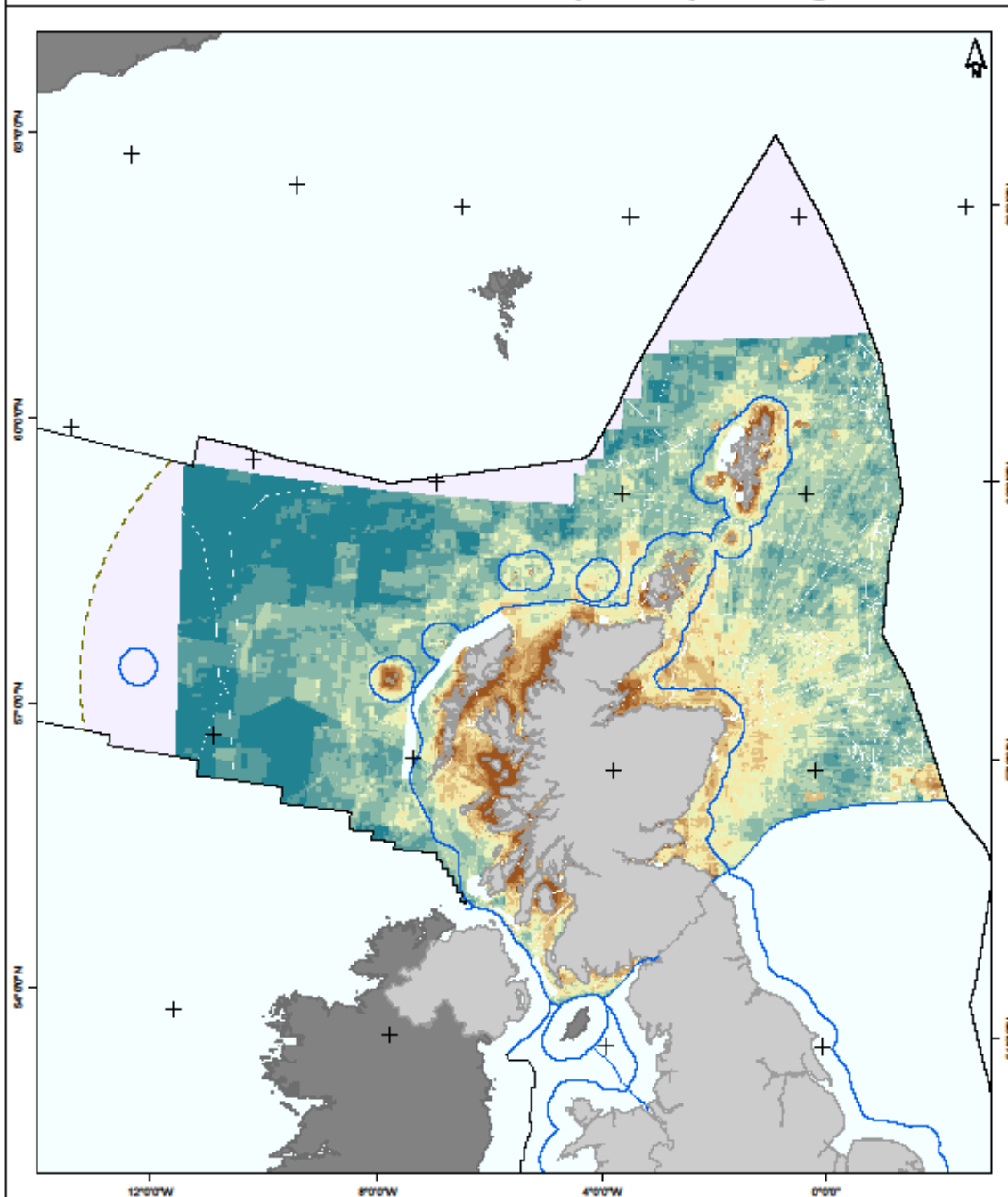
marinescotland
science

Offshore wind:

Environment model



Combined Constraint Model Output - Equal Weight - REZ



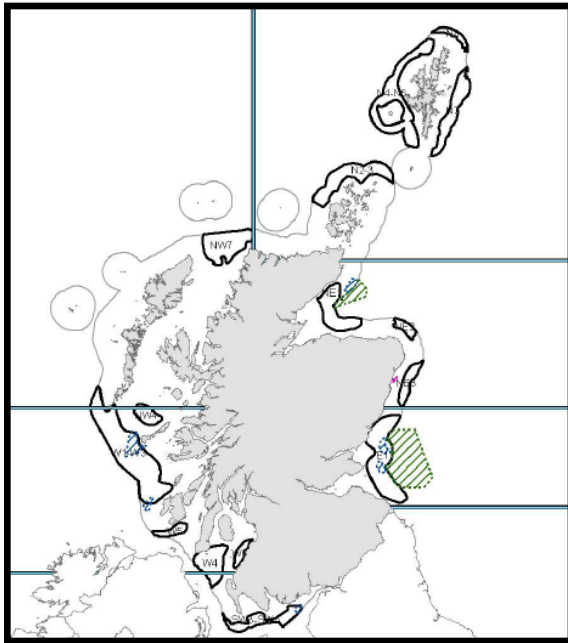
marinescotland
science

Offshore wind:
Equal weighting
combined
model

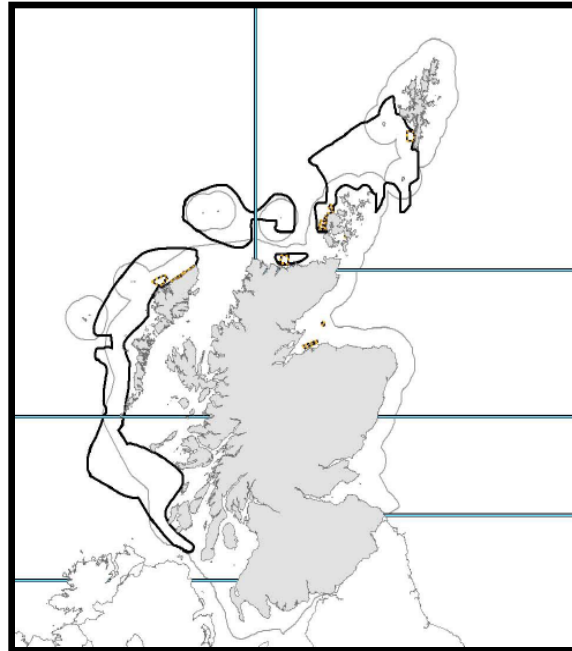
Early stage consultation

- Scoping exercises undertaken in late 2011 – early 2012
- Pre-statutory consultation – August 2012

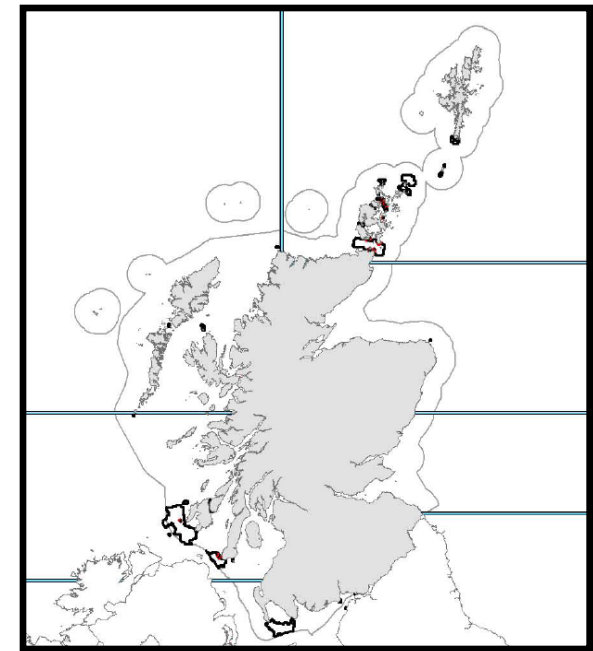
OFFSHORE WIND



WAVE



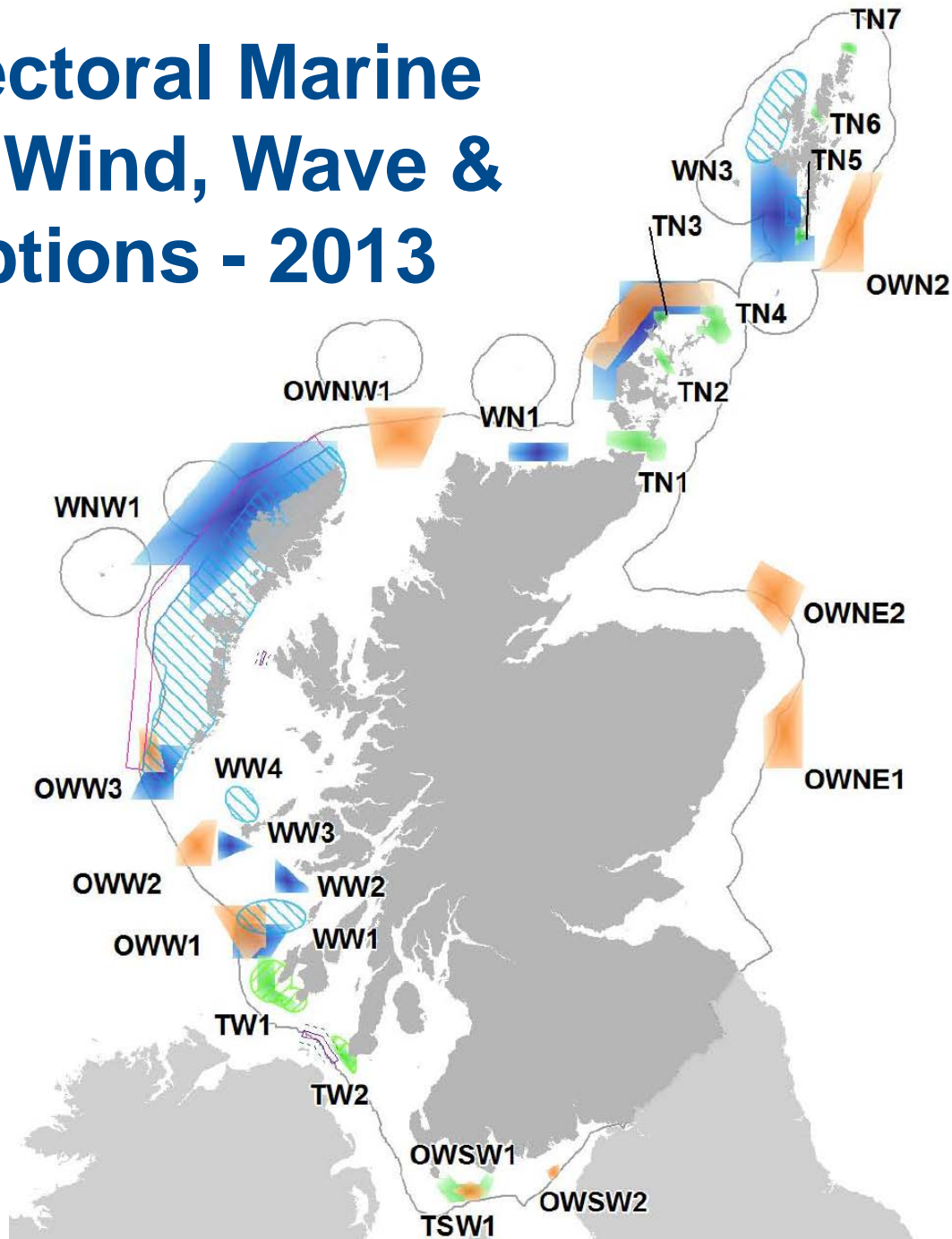
TIDAL



Developing the Draft Sectoral Plans

- Draft 'Plan Options' identified
- Draft Plan Options subject to sustainability appraisal:
 - Strategic Environmental Assessment
 - Habitats Regulations Appraisal
 - Socio-economic Impact Assessment
- The assessment findings contained the Draft Plans

Draft Sectoral Marine Plans – Wind, Wave & Tidal Options - 2013



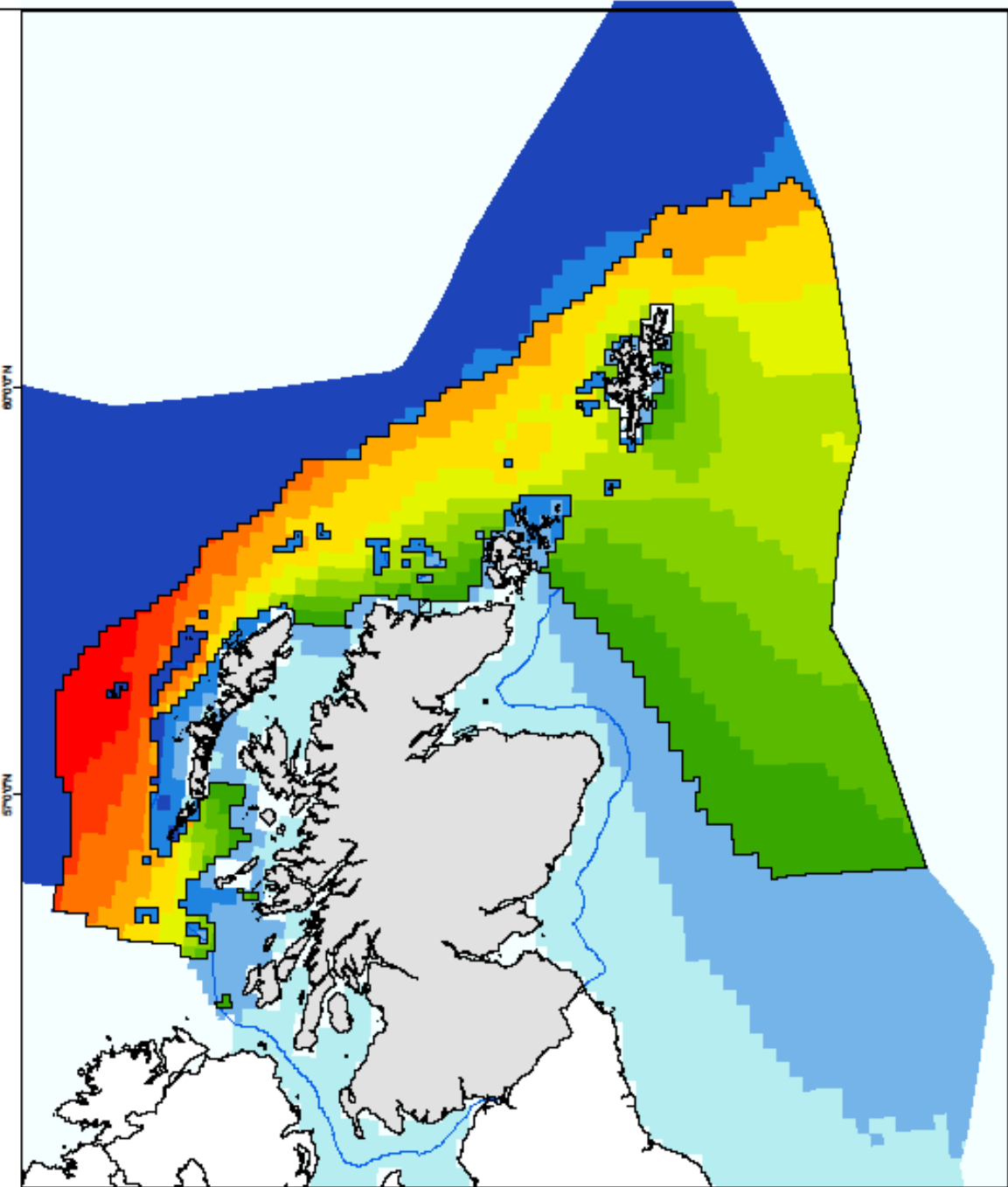
Plan Implementation - Review

- Target date for adoption – July 2014
 - Issues - Leasing – EMR – NMP Adoption
- Post-Adoption Statement
 - Key outcomes of SEA, HRA, Socio-economics
- Review Period to be determined
 - Current Plan reviewed over 2 year period
- Strategic Grid Plan
 - DPO rationalisation
- Strategic Monitoring & Research
 - Addressing data baseline data-gaps
 - Learning lessons from Project Licence Applications

DATA QUALITY !



Wave Resource Areas (>20 kW/m, to 200 m depth)

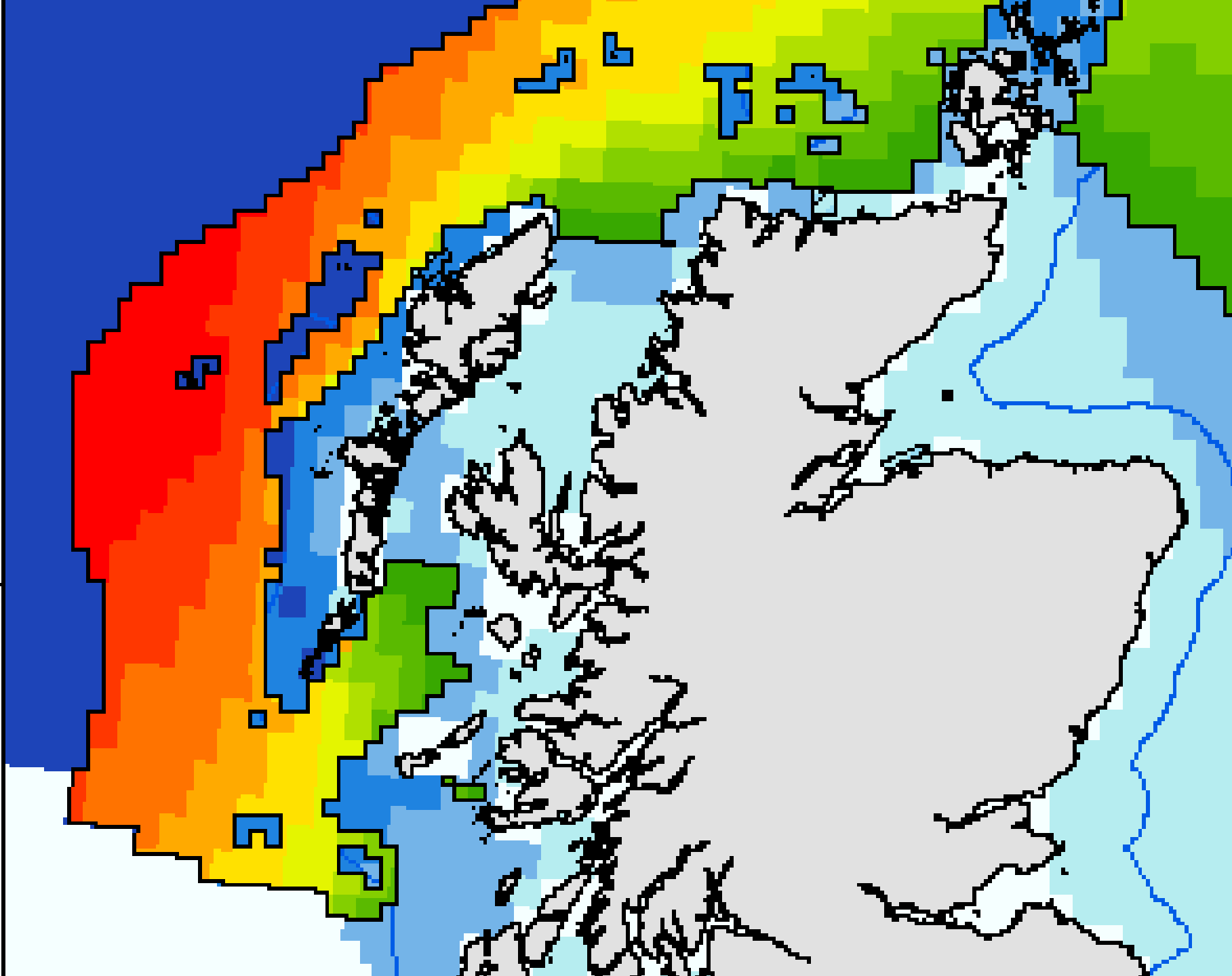


marinescotland
science

Wave energy resource

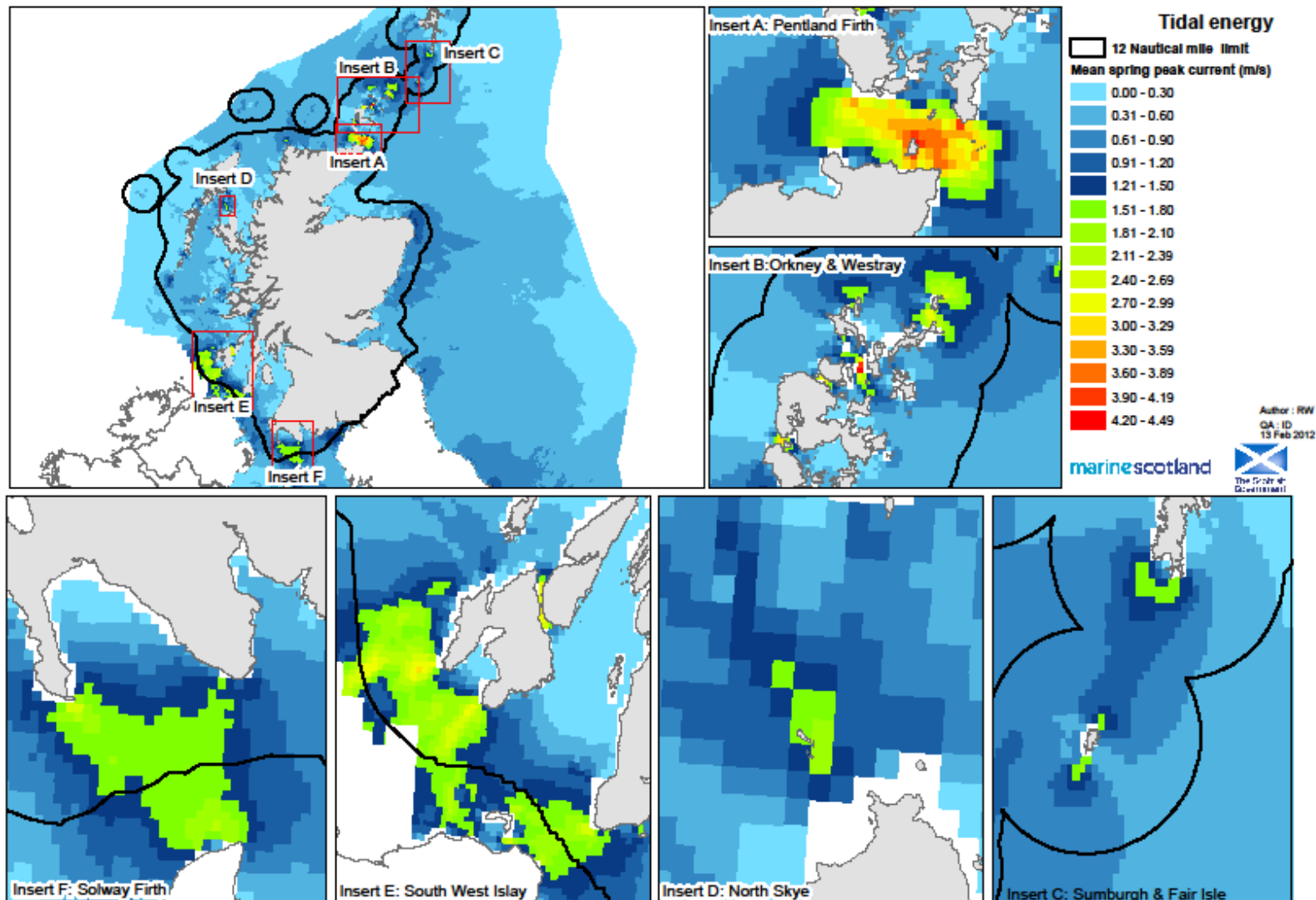


MAP 0.15



Tidal stream energy resource

(>1.5 m/s mean spring peak current)



Field survey work

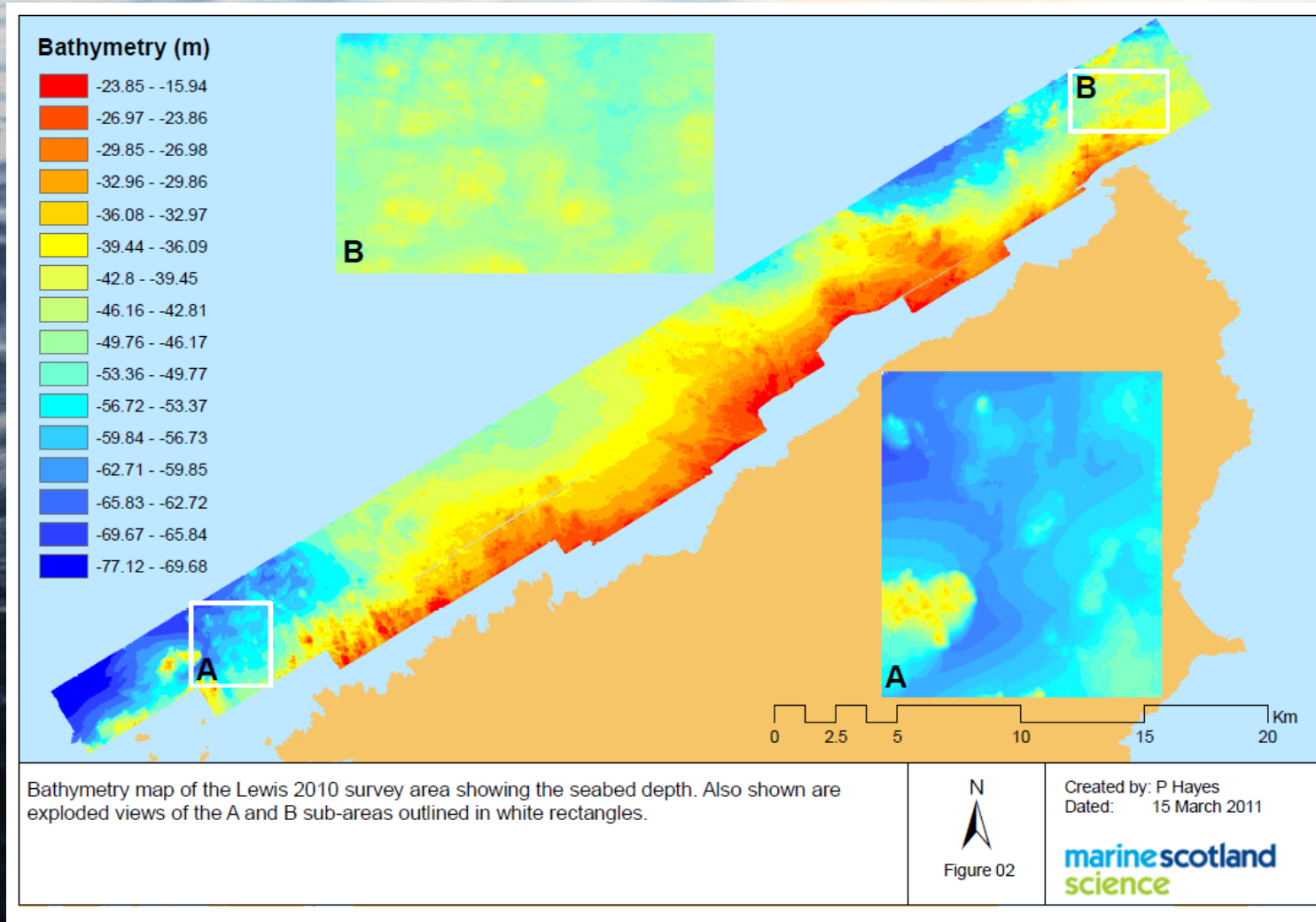


- Bathymetry and backscatter obtained using a multibeam echosounder system (dual frequency Reson 7125 system)



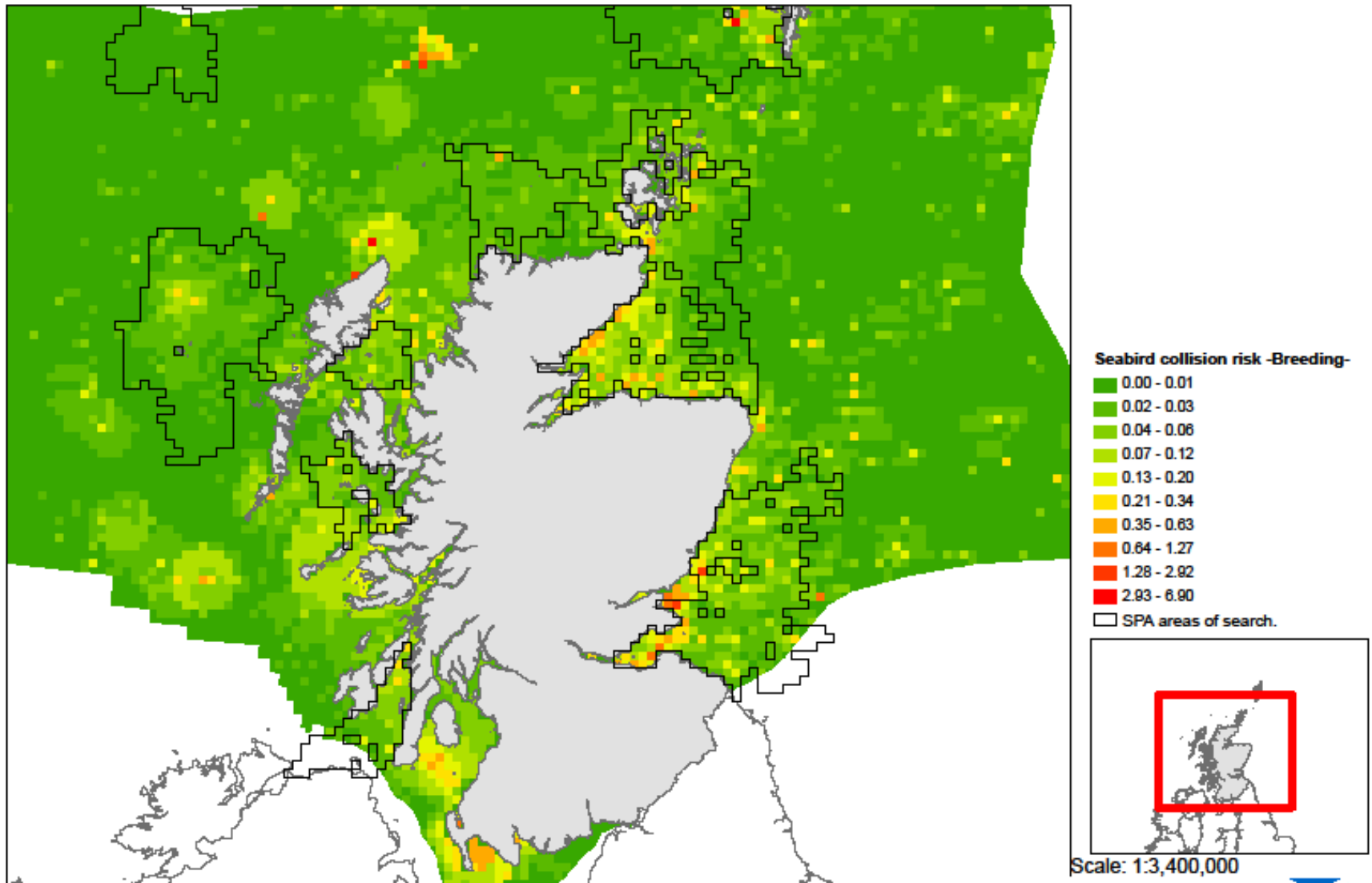
- Videos and photographs obtained by towing a dropframe TV and stills camera behind the vessel

Bathymetry

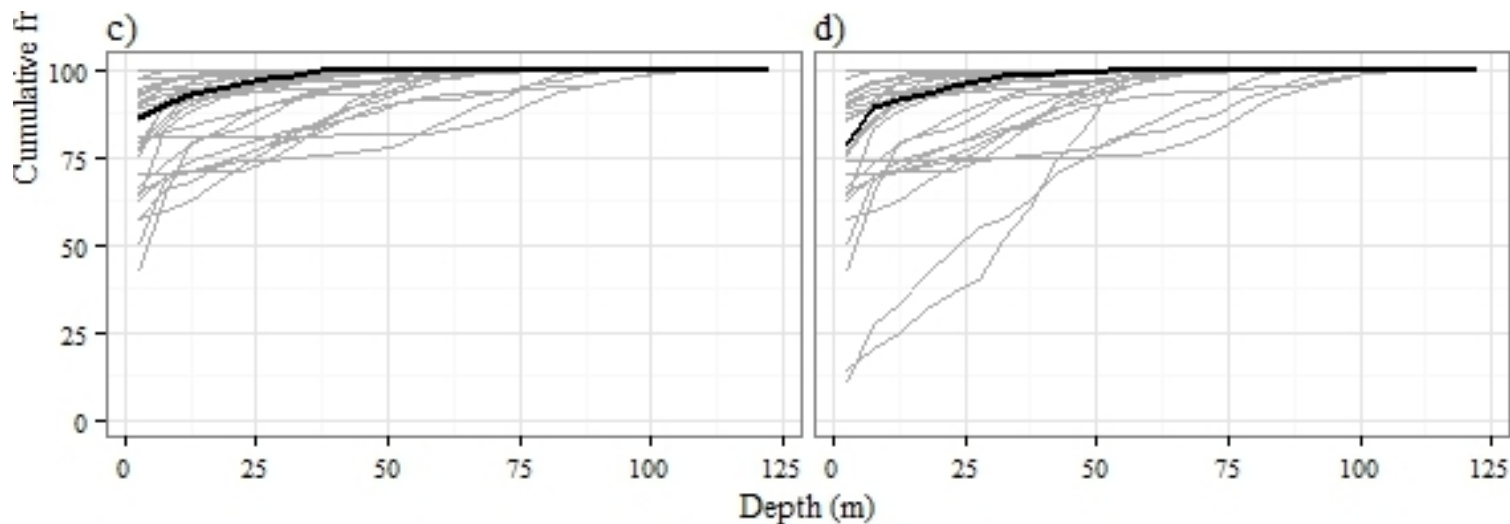
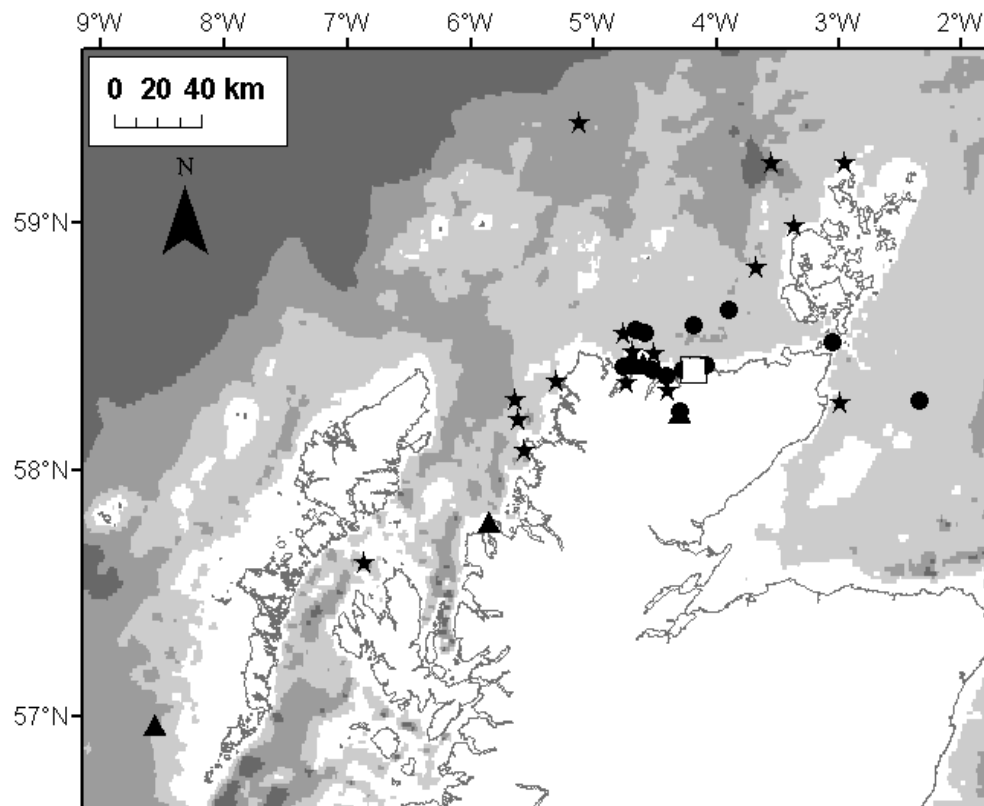


Windfarm risk to seabirds – ESAS/ McArthur Green

Seabirds at sea, Risk factor calculated by flight height and 5% aggregation layer.

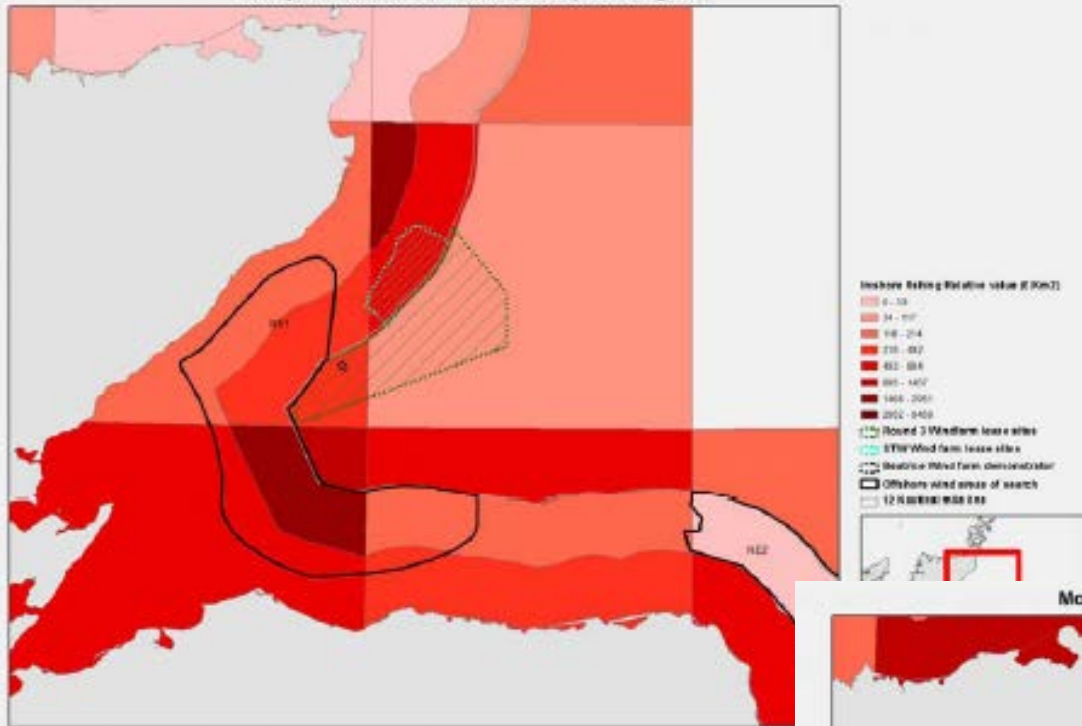


Swimming depths of returning Atlantic salmon in coastal waters

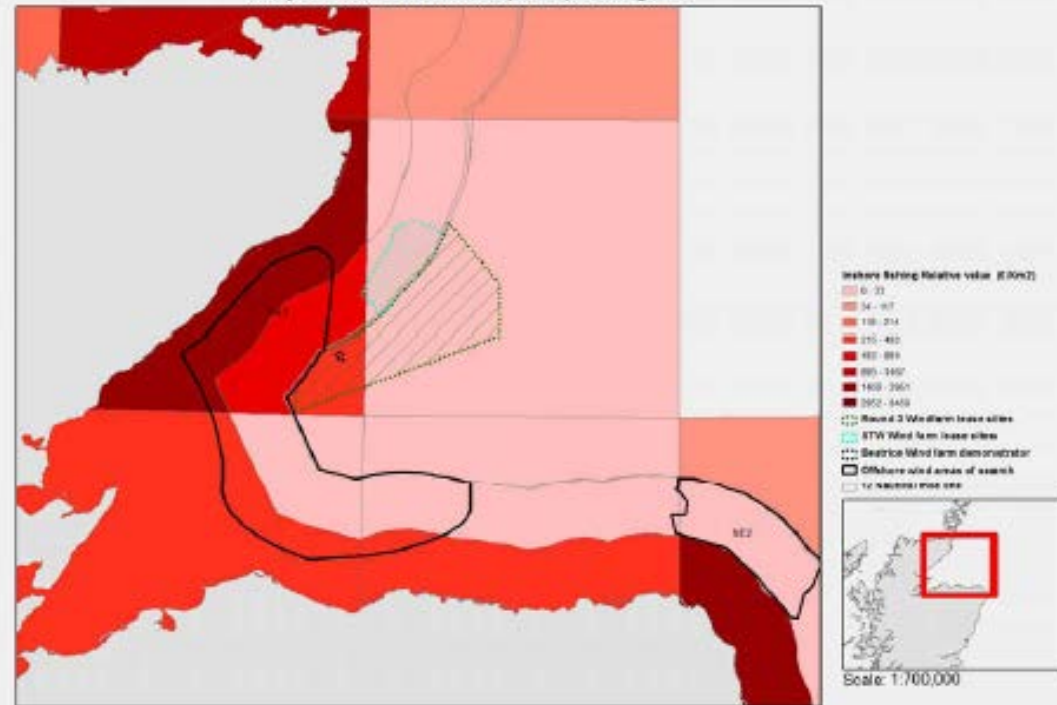


Moray Firth Inshore fisheries

Moray Firth. Inshore fisheries (<15 m). Mobile gears



Moray Firth. Inshore fisheries (<15 m). Static gears



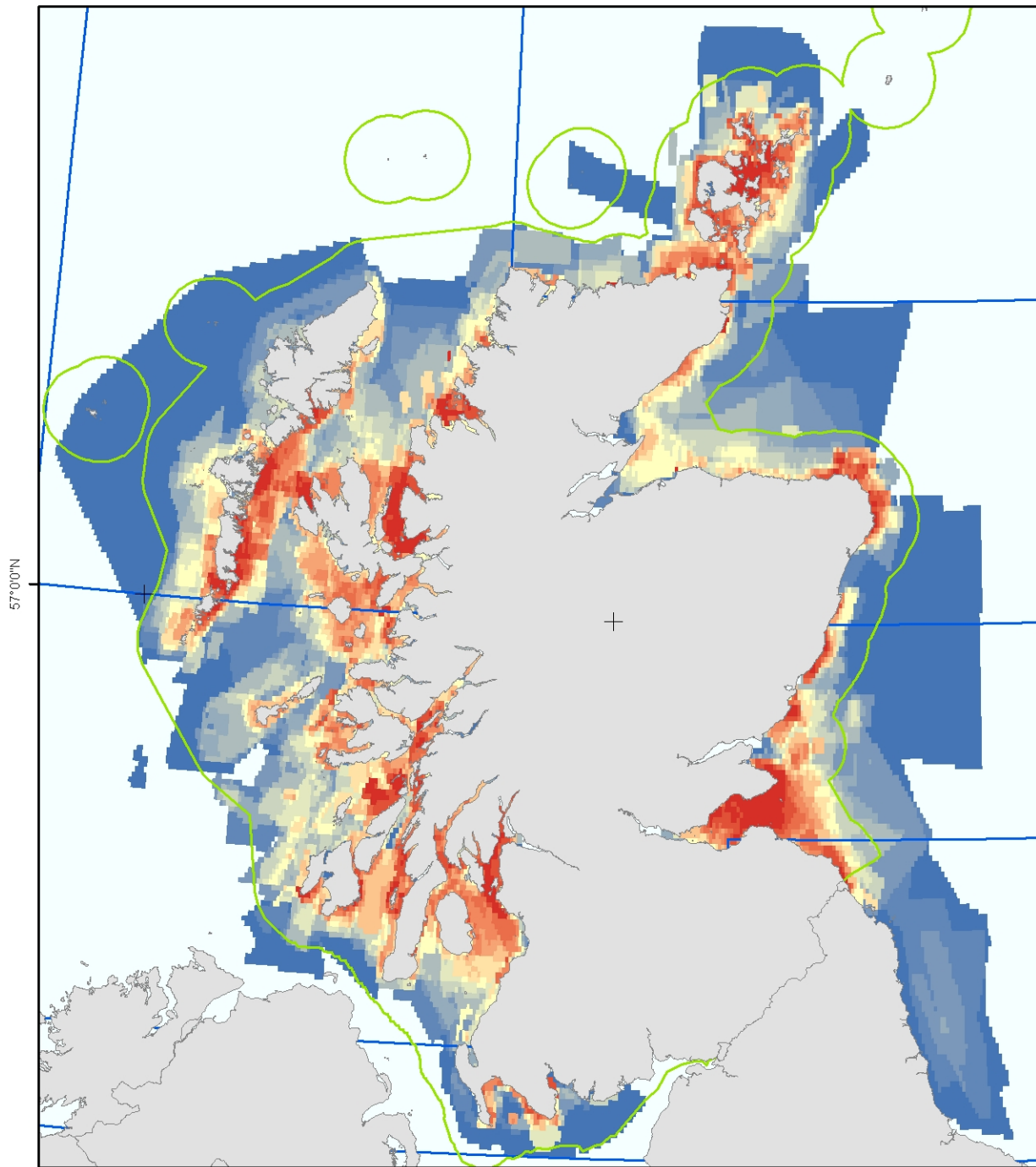
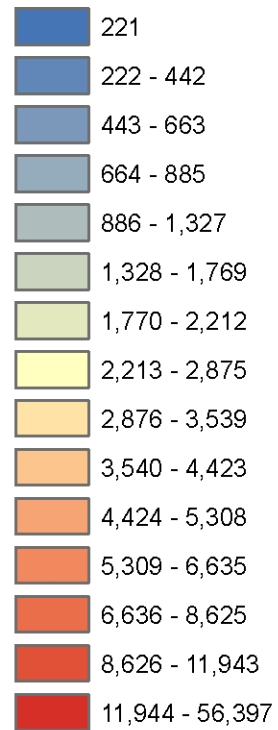
Landings, as
value per km²

Monetary Value

All interviews April 2013

- 12 Nm
- Adjusted OWPR boundaries

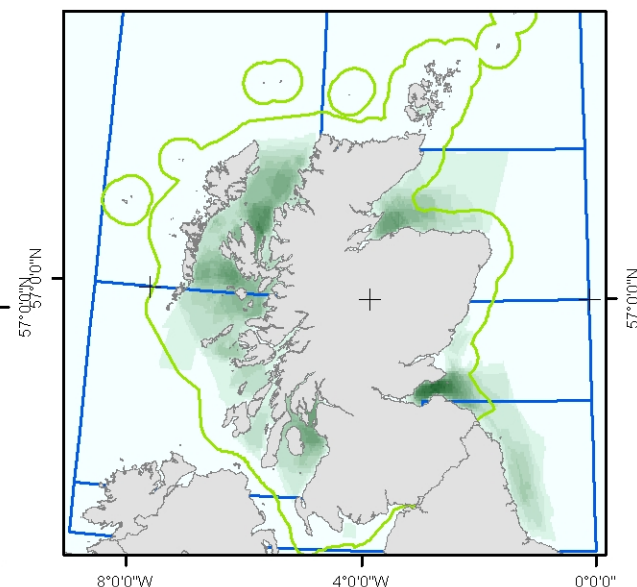
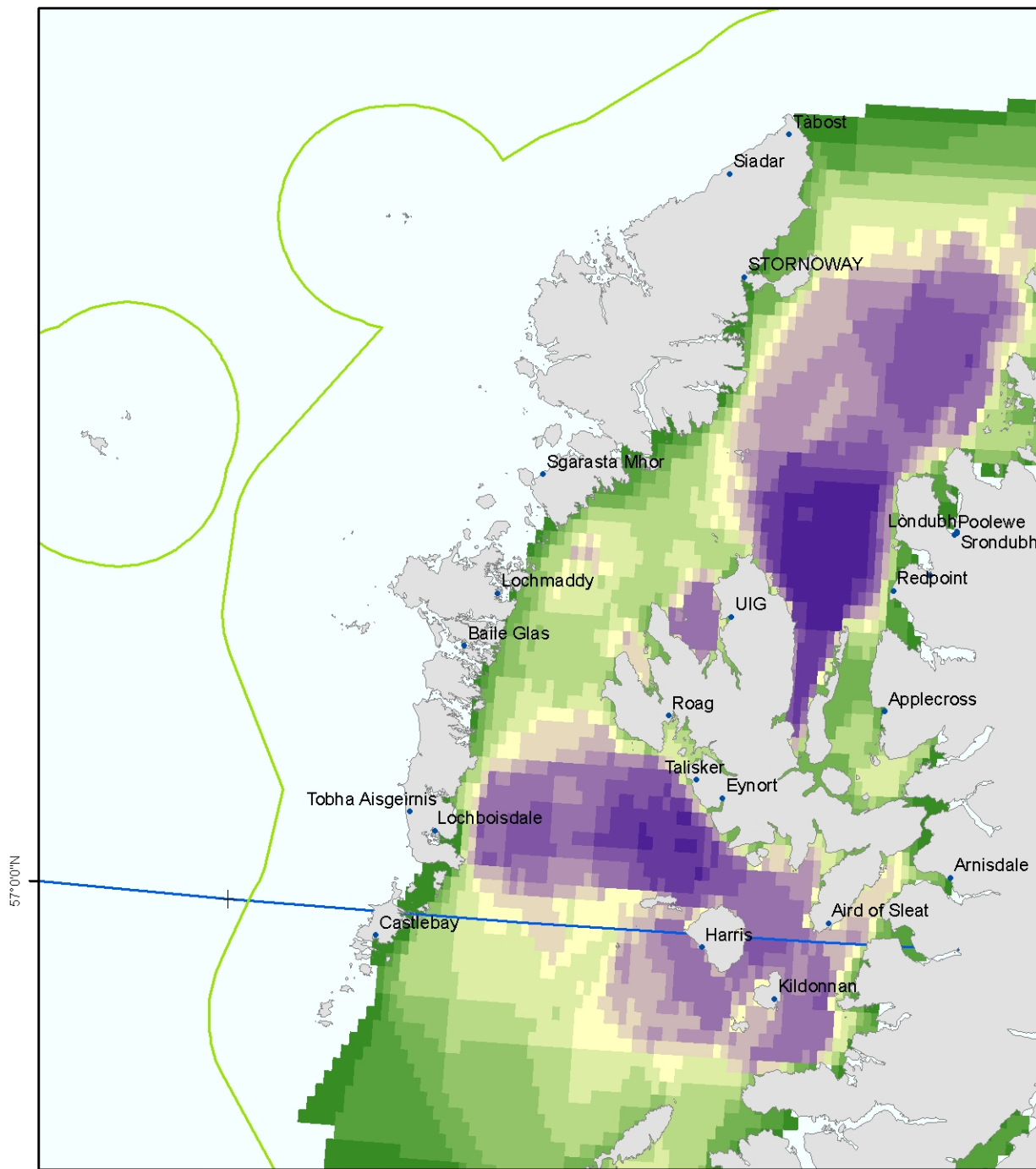
£s per cell



Number of Vessels

Trawl Nephrops

All interviews April 2013



'Cultural heritage'

- World Heritage Sites
- Scheduled Ancient Monuments
- Wrecks
- Marine archaeology potential
 - Land 10,000 years ago
 - + Soft sediments that might preserve remains

marinescotland
science

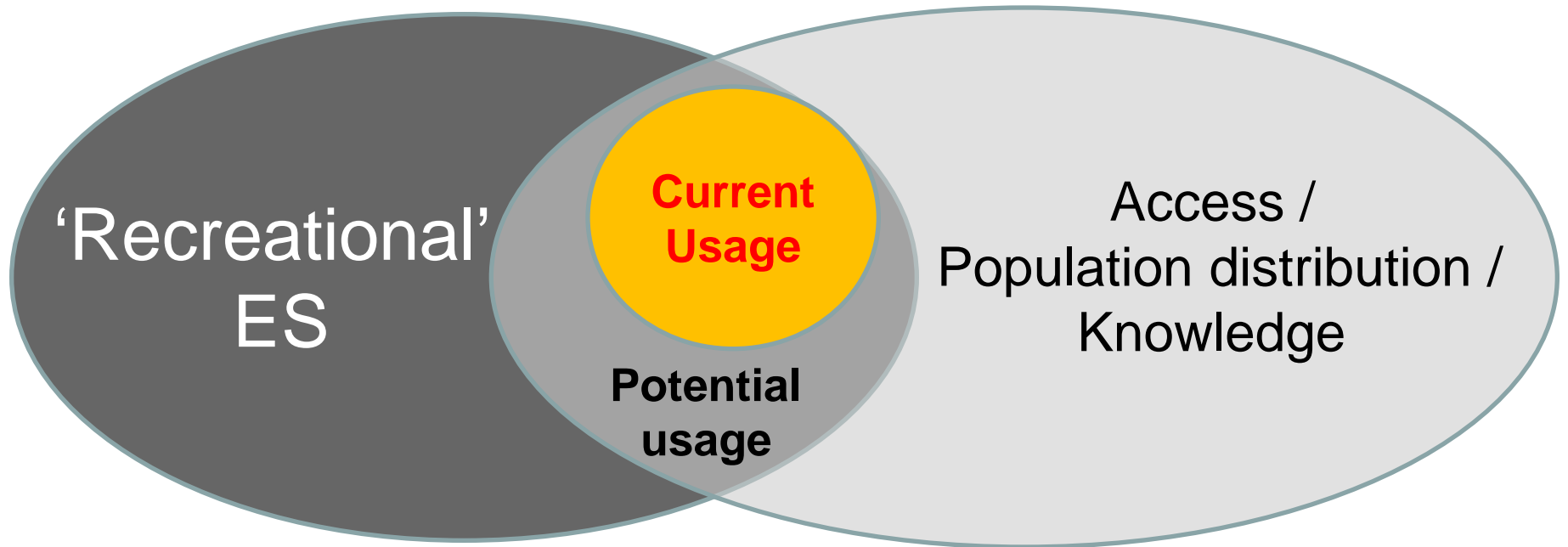


Aesthetic values - Landscape

- Regions of coast have different sensitivity to landscape impacts
 - National Scenic Areas
 - Local Landscape designations
 - Other coastline
 - Heritage areas (WHS, SAM)



Mapping Recreational Use of Scotland's Seas

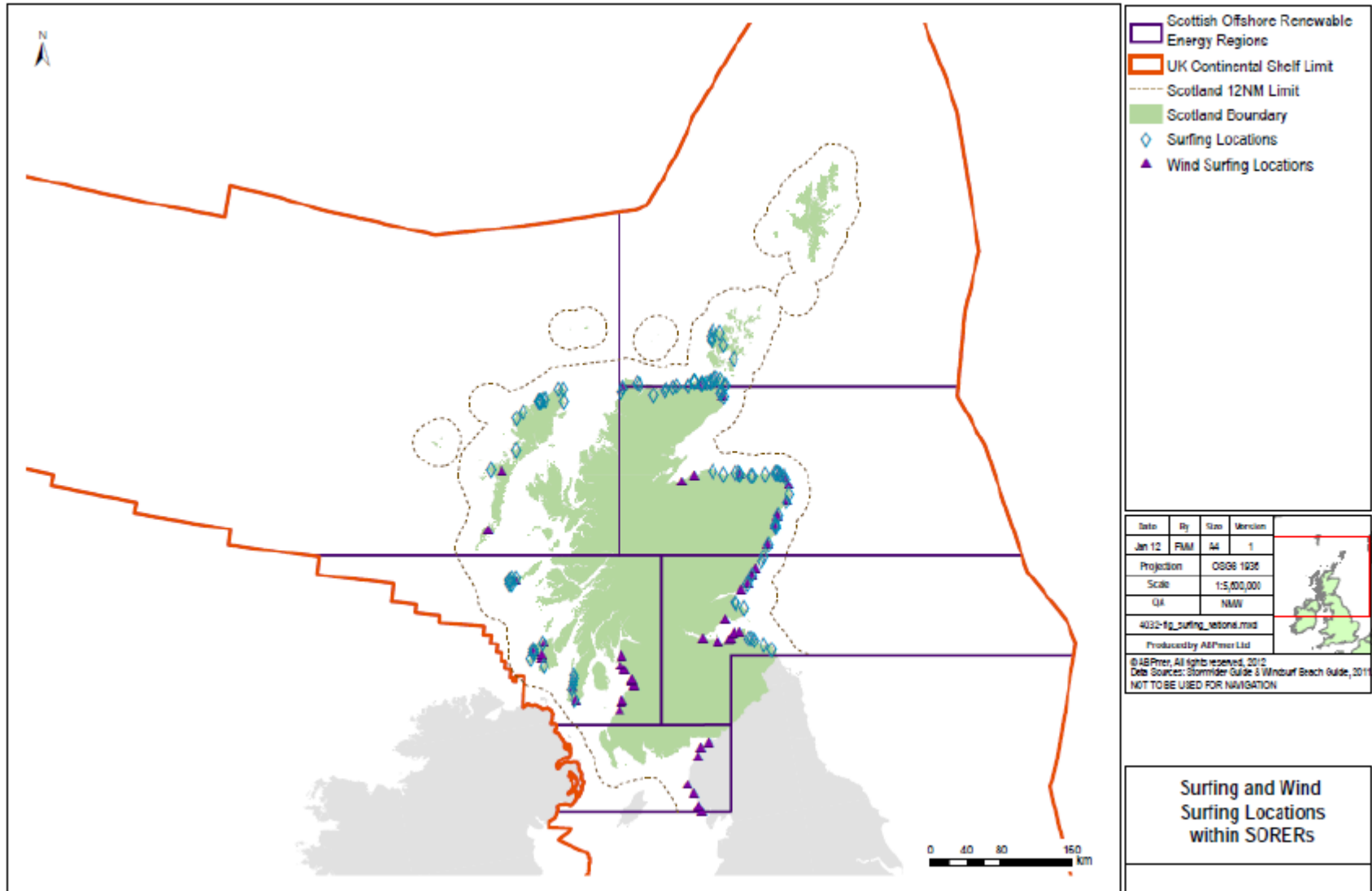


Surfing and Windsurfing

- 53,000 surfers and 24,000 windsurfers in 2008
- Remote locations sought out (Lazorow, 2008)
- Expenditure estimates £16.4 M annually



Surfing and Windsurfing



Other recreational use

- **Wildlife watching**

- Expenditure £160 M, Income £92 M
- 224,000 cetacean watchers: 27% of European total a doubling in the last decade (IFAW 2009)



Questions?

- **Further Information -**
- **Offshore Renewable Energy Planning Webpage**
- **<http://www.scotland.gov.uk/Topics/marine/marineenergy/Planning>**
- **Offshore Renewable Energy Planning Mailbox**
- **offshorerenewableenergy@scotland.gsi.gov.uk**