INFOMAR

Integrated Mapping for the Sustainable Development of Ireland's Marine Resource

Ireland's Marine Mapping Programme, How & Why?

Koen Verbruggen
Geological Survey of Ireland

Joint INFOMAR Co-Programme Manager (with MI)

GSI
Suirbhéireacht Gheolaíochta Éireann
Geological Survey of Ireland

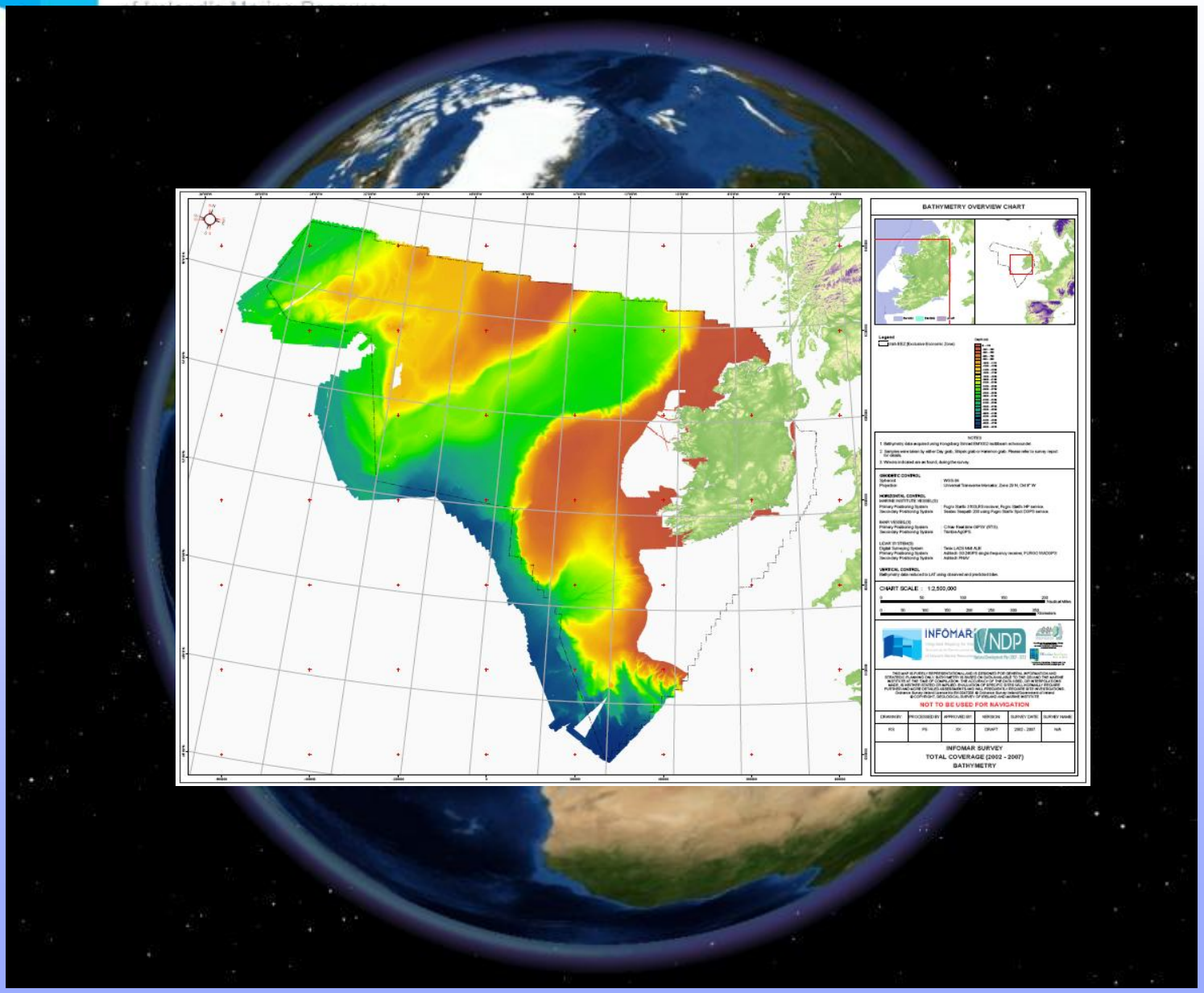
NDP
National Development Plan 2007 - 2013

Marine Institute
Foras na Mara

INFOMAR

Integrated Mapping for the Sustainable Development

Ireland's seabed



1. Irish National Seabed Survey (INSS) 1999-2005

Zone 3 fleet:

S.V. Bligh

S.V. Siren

CIL Granuaile

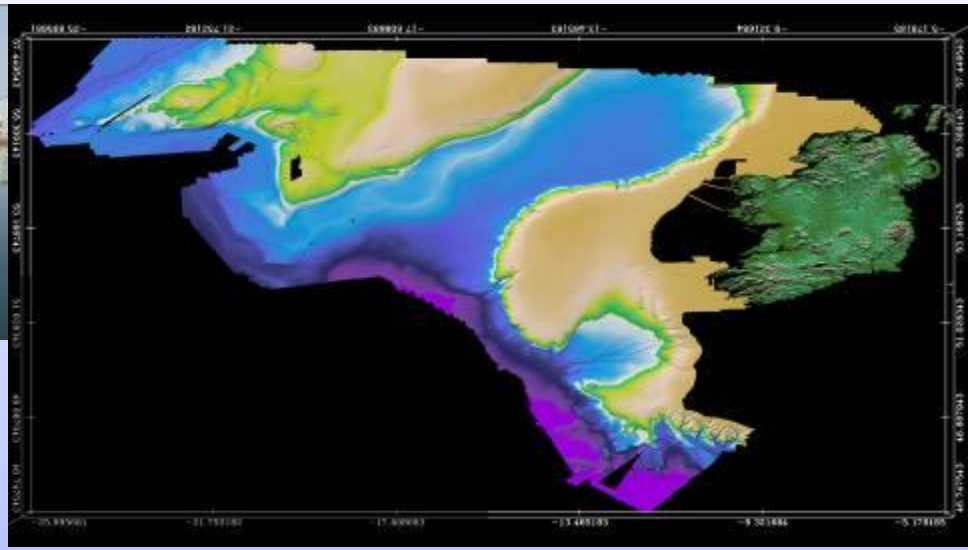
R.V Akademic Boris Petrov

R.V Professor Logachev

R.V. Ocean Seeker

R.V. Celtic Explorer

R.V. Celtic Voyager



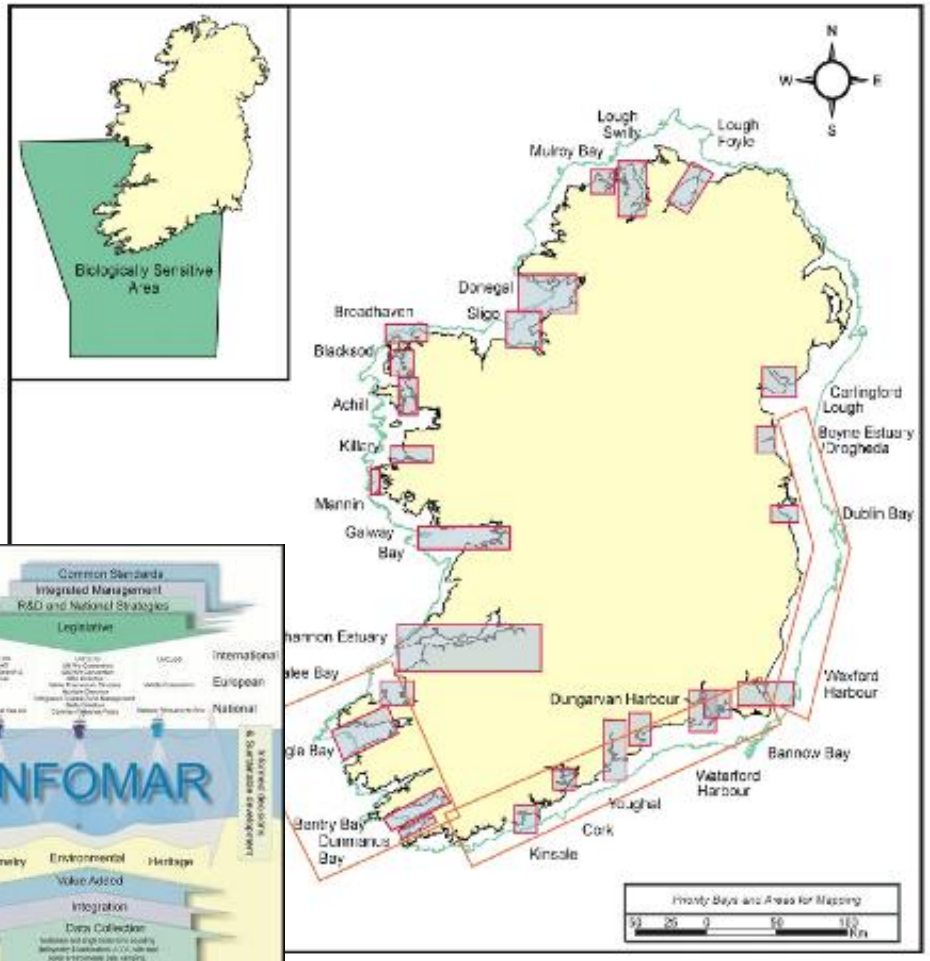
The INSS established an essential national asset:

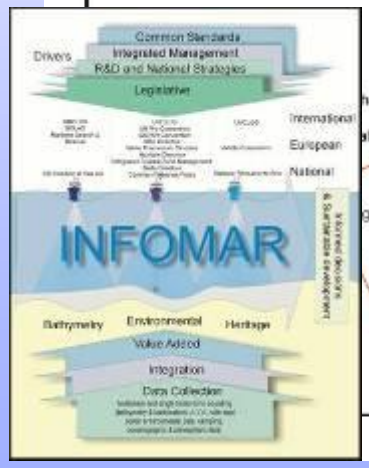
- **A marine BASELINE DATA set to underpin present and future Irish economic, environmental, infrastructural and policy decisions**
- **Upgraded Irish marine surveying infrastructure**
- **The body of knowledge required to design, procure, build and operate a large Exclusive Economic Zone (EEZ) survey**
- **MAPPED ALL OUR WATERS OVER 200m DEEP!**

GSI
Suirbhéireacht Gheolaíochta Éireann
Geological Survey of Ireland

2. INFOMAR 2006-2026

INFOMAR
Integrated Mapping for the Sustainable Development of Ireland's Marine Resource





INtegrated Mapping
FOr the Sustainable
Development of Ireland's
MARine Resource

"Shallow" water survey
Partnership between MI & GSI

Multi platform survey for marine integrated mapping

26 Priority Bays / 3 Priority Areas

1.Acquisition/Management/Interp
2. Data Exchange & Integration
3. Value Added Exploitation

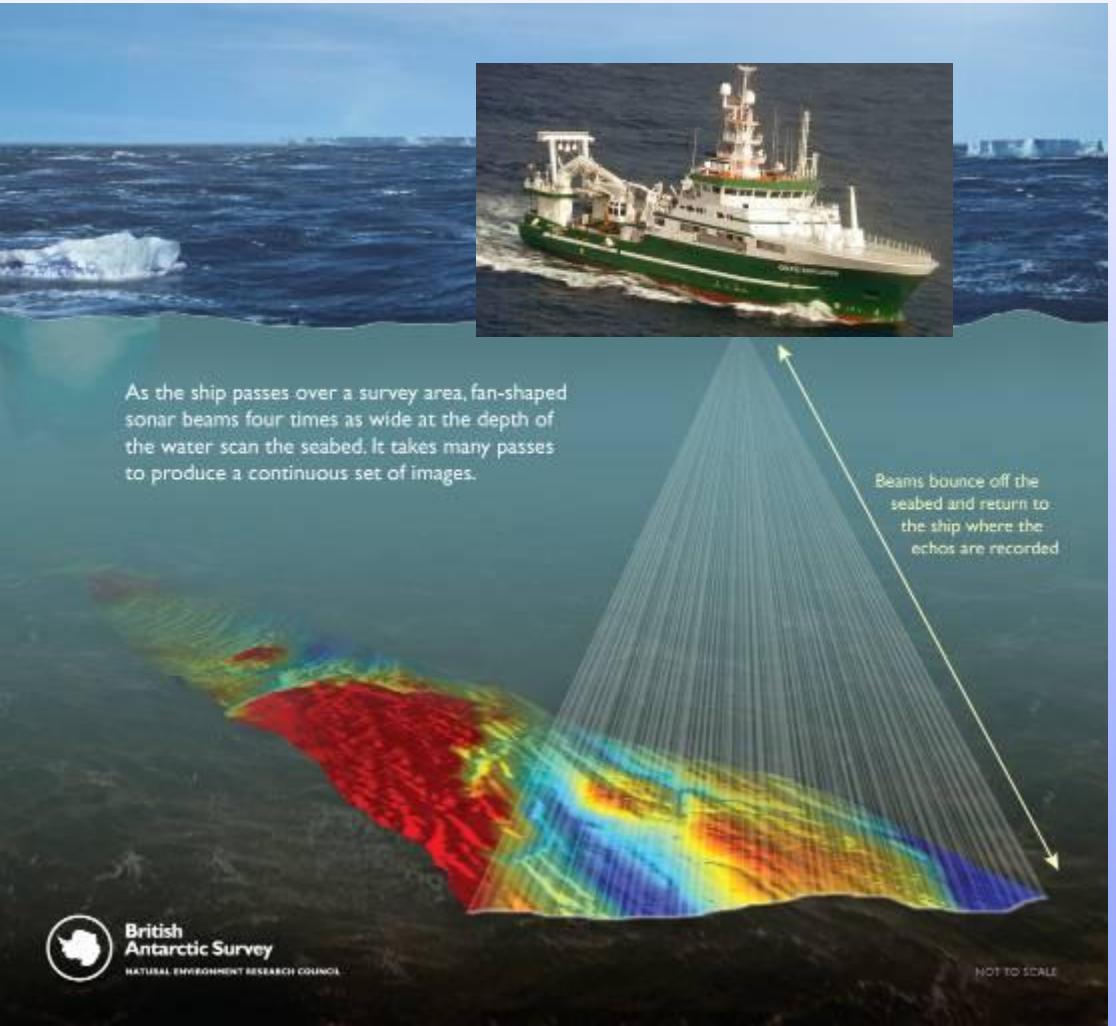
GSI
Suirbhéireacht Gheolaíochta Éireann
Geological Survey of Ireland

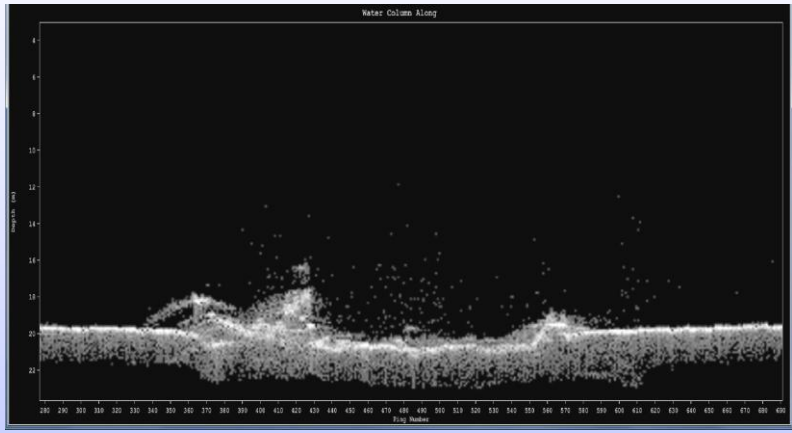
Marine Institute
Foras na Mara

INFOMAR
Integrated Mapping for the Sustainable Development of Ireland's Marine Resource

Bathymetry & Seabed Geology

Now with added water column logging!





SS Topaz, Dundalk Bay

INFOMAR
Integrated Mapping for the Sustainable Development of Ireland's Marine Resource

How? - INFOMAR Platforms (MI)

RV Celtic Explorer	RV Celtic Voyager
65.5m / 15m / 5.8m	31.4m / 8.5m / 3.8m
16 knots - 45 days endurance	10 knots - 14 days endurance
Mapping from 250 to 50m	Mapping from 50 to 15m
Fugro Seis / Ixsea Gaps USBL / SBP / EM1002/3002 / Edge_GeoAc SSS / GeoRes SBP_VC	
c. 20 days pa. –Groundtruthing	c. 100 days pa in 2 week legs

INFOMAR

Integrated Mapping for the Sustainable Development of Ireland's Marine Resource

How? - INFOMAR Platforms (GSI)

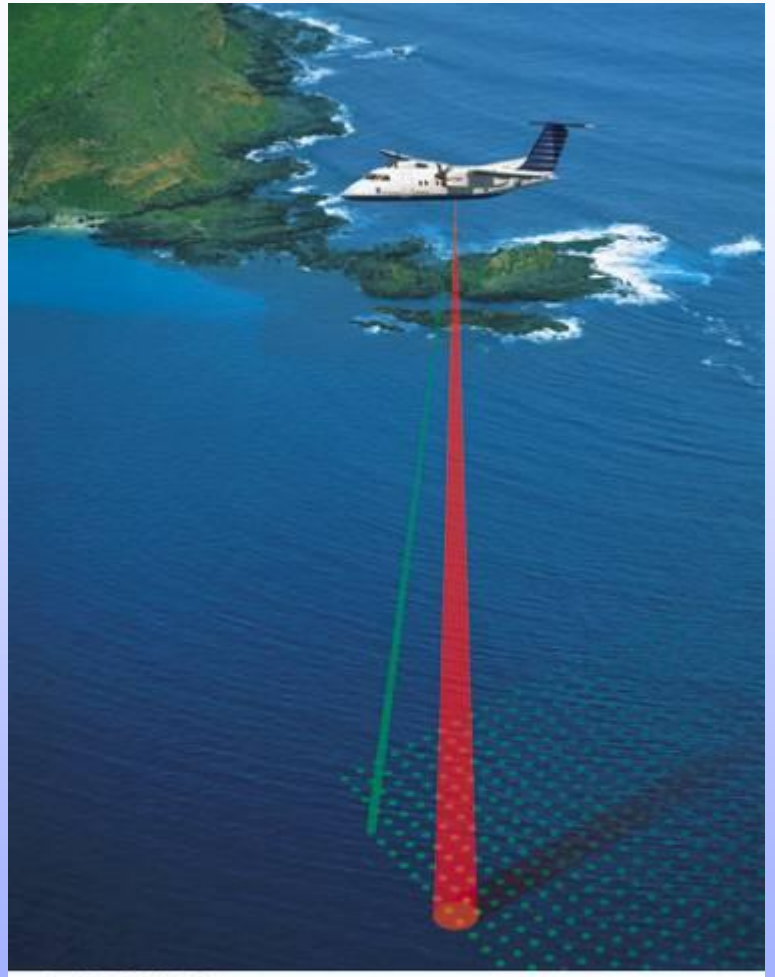
RV Keary	RV Geo
15.5m / 5.6m / 1.5m	7.4m Redbay Rib
22 knots	30 knots / 300 NM
2-3 days endurance	1 day endurance

POS MV inertial navigation systems - Sonardyne USBL - MBES Simrad EA400-EM3002D Marine Magnetics magnetometer - Edgetech 4200 SSS - SBP Chirp profiler -SBP Geo-Resources 200. GEO : SEA Swath Interferometric Mapping system

c. 180 days p.a. each vessel, daylight ops

INFOMAR
Integrated Mapping for the Sustainable Development of Ireland's Marine Resource

How? - Mapping by plane – Airborne Marine LIDAR



Red surface & Green deep Laser

10-30m in clear water (West Coast)

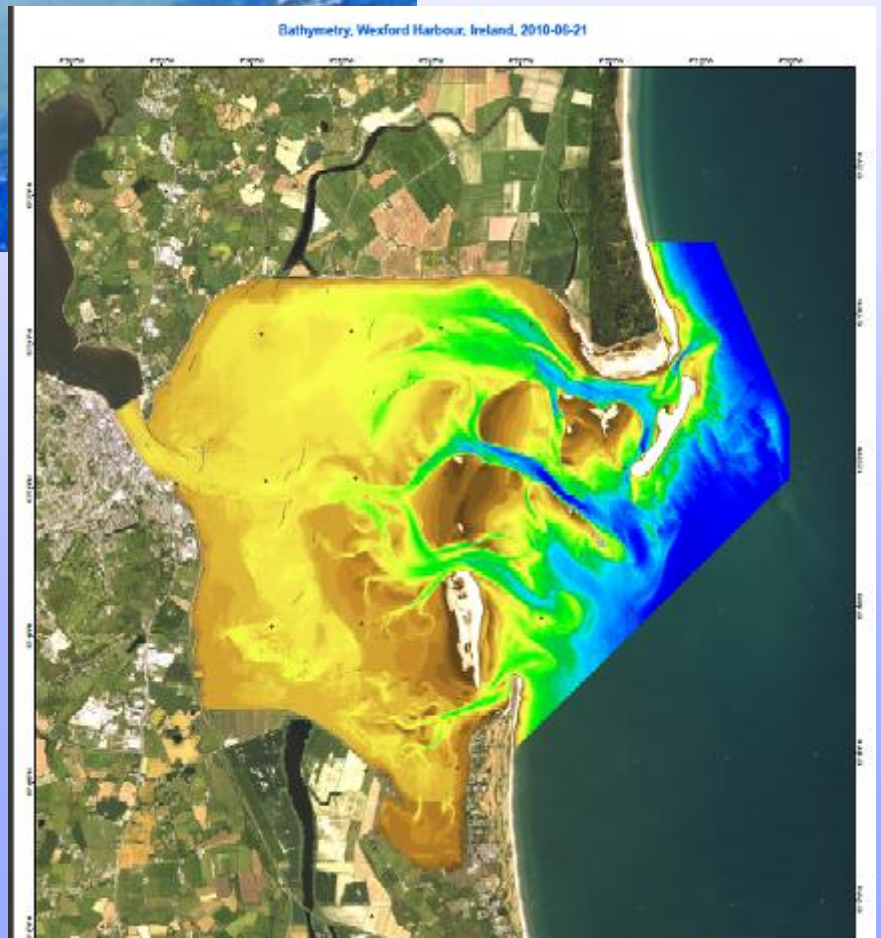
High speed & cost

Safe on shallow rocky coastlines

Waveform analysis – pseudo backscatter

INFOMAR
Integrated Mapping for the Sustainable Development of Ireland's Marine Resource

How? - Satellite mapping!



WorldView-2 Satellite

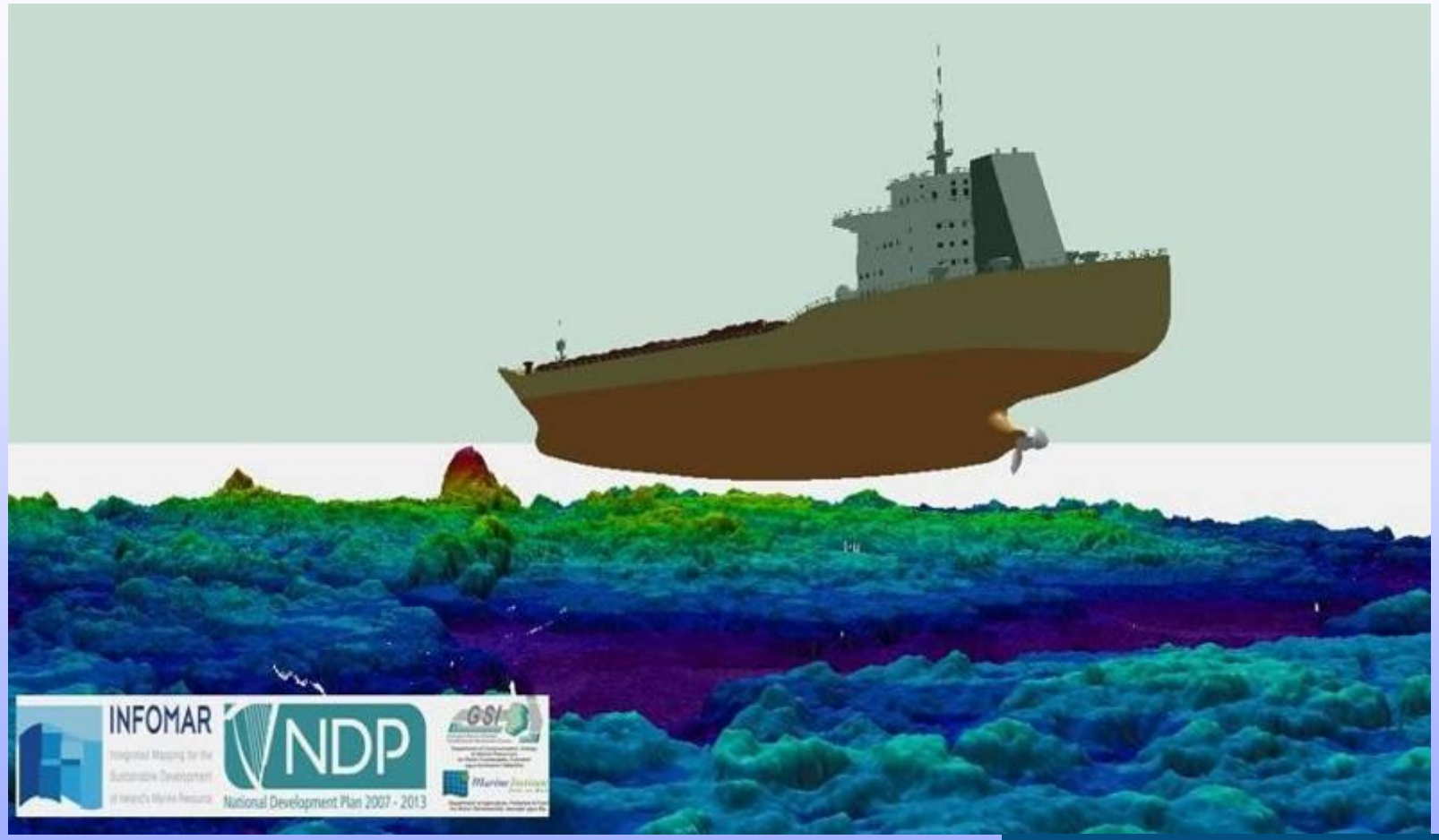
8 Band Multispectral Imagery

Map of Wexford Harbour derived from satellite Imagery

Useful overview but not accurate enough for shipping safety

INFOMAR
Integrated Mapping for the Sustainable Development of Ireland's Marine Resource

Why?
Marine Safety/Charting

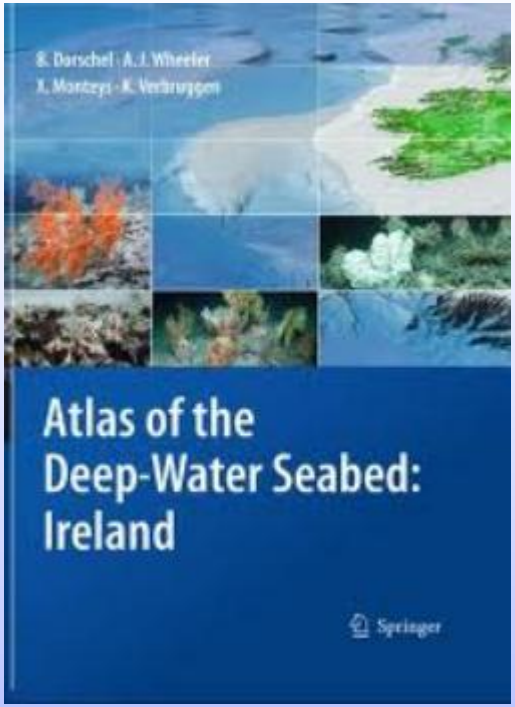


A steep outcrop of rock rising to a chart depth of 12.2 metres in surrounding water depths of 30 to 40 metres (charted as >30m)

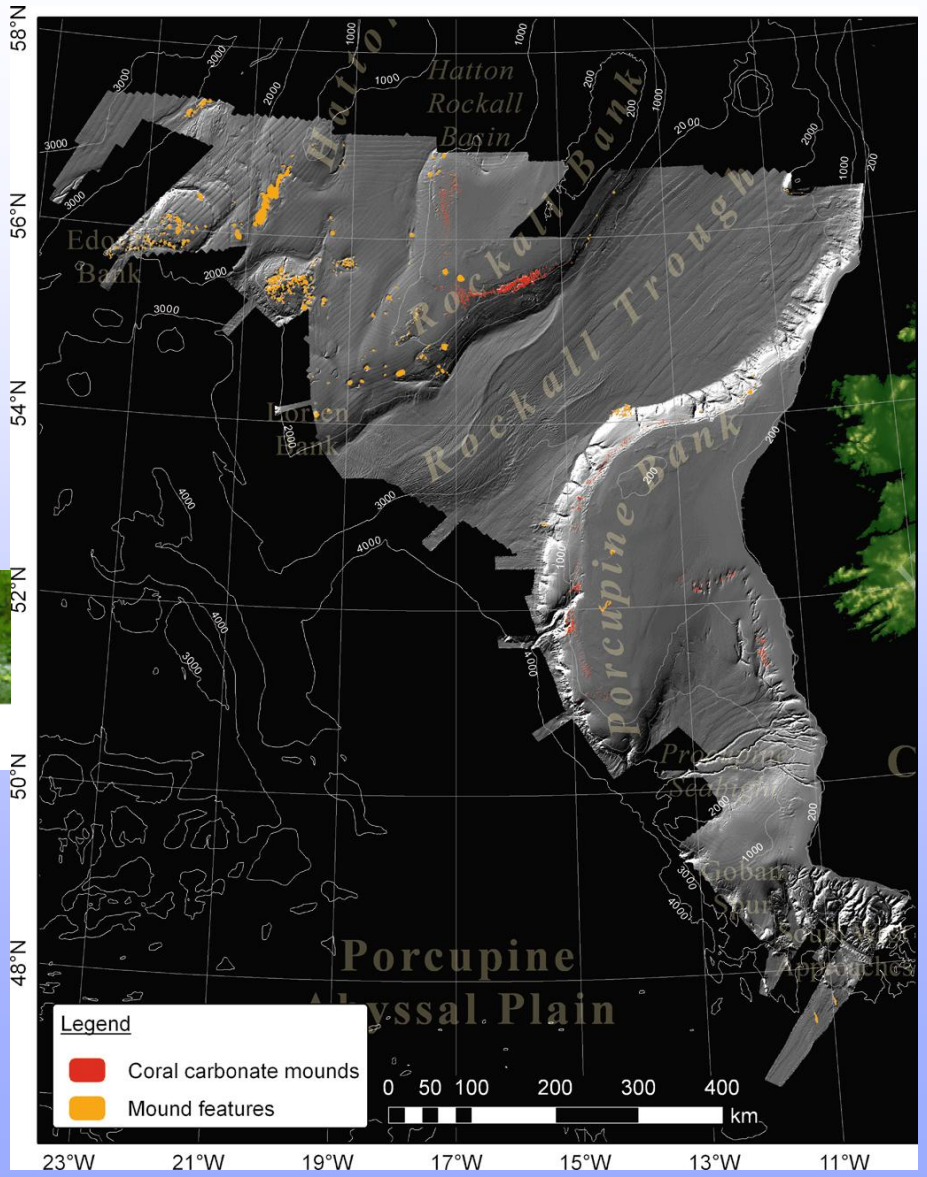
THE UNITED KINGDOM HYDROGRAPHIC OFFICE

INFOMAR
Integrated Mapping for the Sustainable Development of Ireland's Marine Resource

Why? Environmental Protection



National Parks & Wildlife Service



Deepwater Atlas produced with UCC

INSS Inventory of features including mounds & reefs

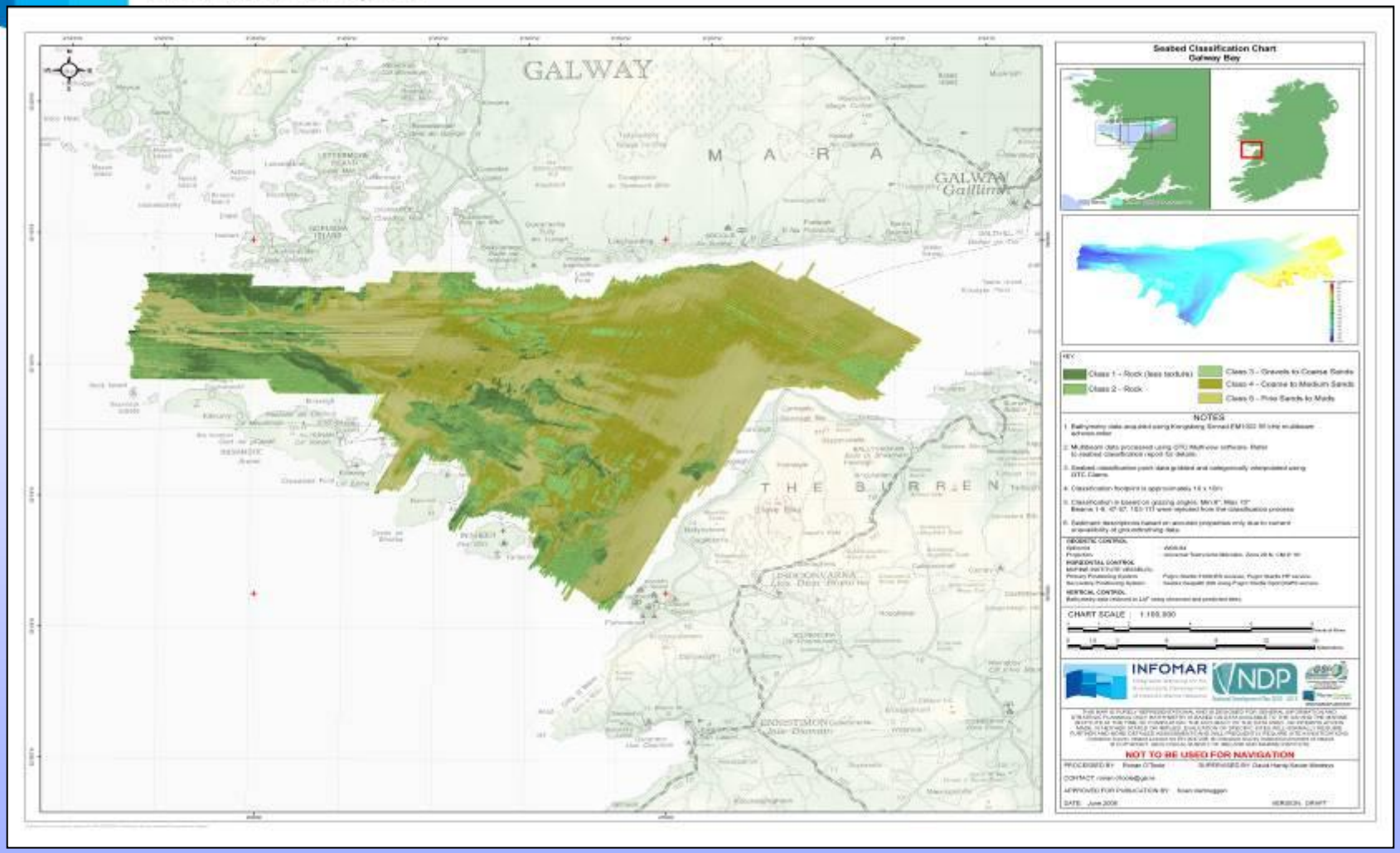
Bathymetry used in Modelling Ocean currents/ Pollution response

Used to designate Offshore SACs

Image courtesy AWI & IFREMER

INFOMAR
Integrated Mapping for the Sustainable Development

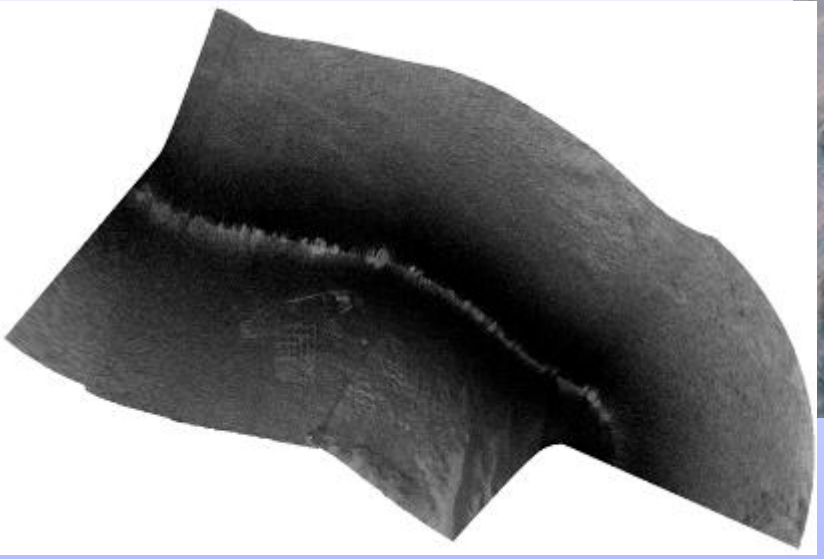
Environmental Protection



Seabed Classification/Physical Habitat Maps, one of key products

Used to guide sampling and environmental mapping
And to designate Marine SACs

Why? Marine Heritage- Shipwrecks

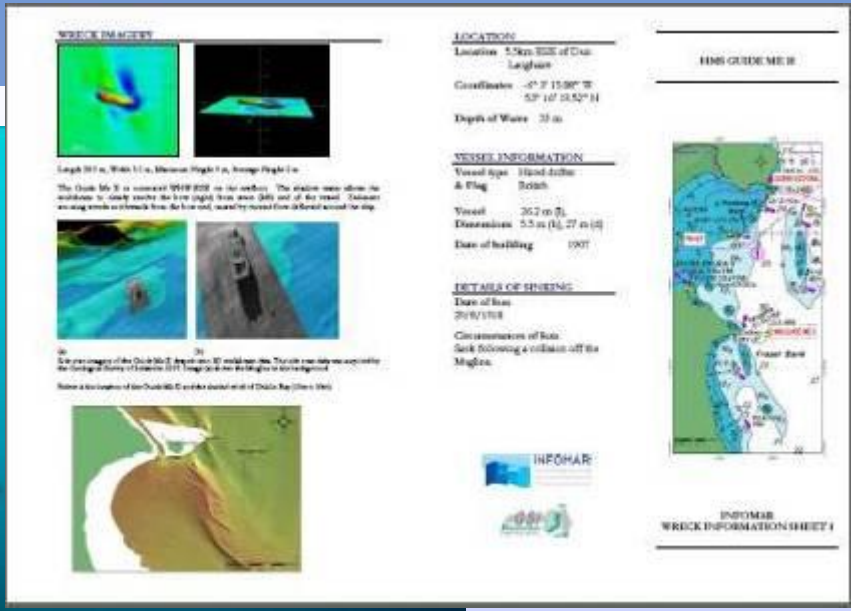


Burtonport Donegal, 2011
Collaboration with
Underwater Archaeology Unit
Possible Armada age wreck

An Roinn
Ealaíon, Oidhreachta agus Gaeltachta
Department of
Arts, Heritage and the Gaeltacht

INFOMAR
Integrated Mapping for Sustainable Development of Ireland's Marine Resource

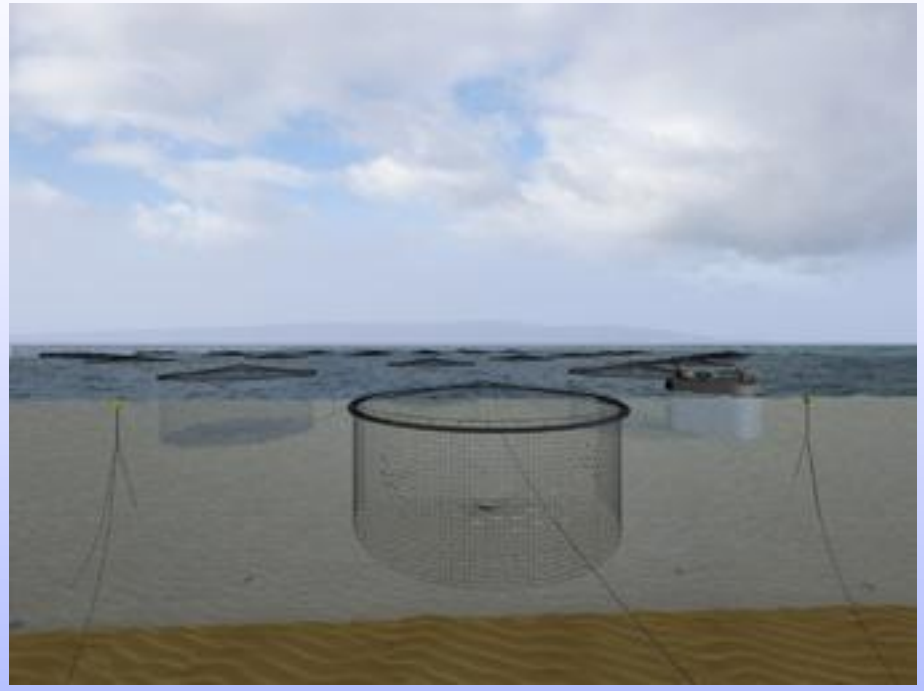
Why? Marine Tourism - Shipwrecks

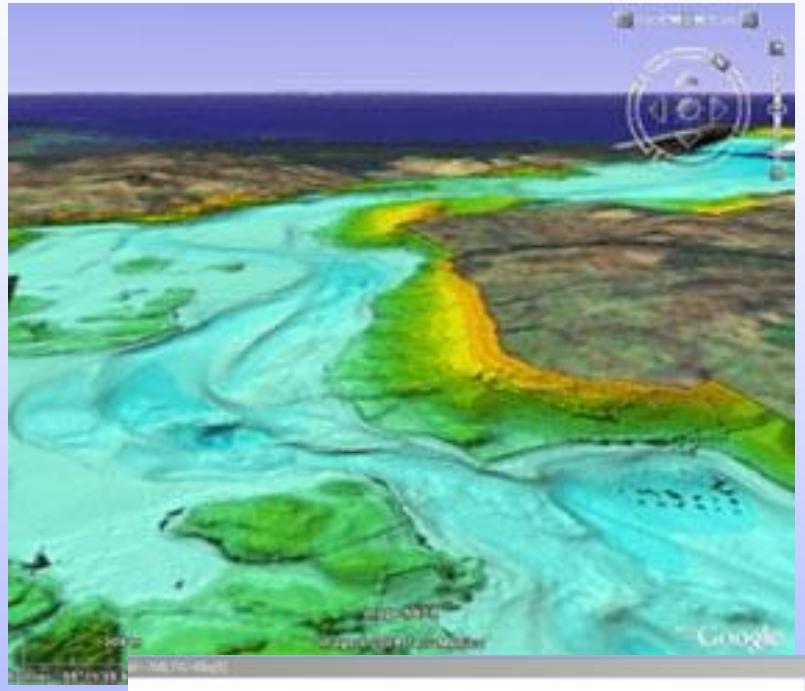


Diving on the Justica, Photo by Barry McGill, a Donegal diver

INFOMAR
Integrated Mapping for the Sustainable Development of Ireland's Marine Resource

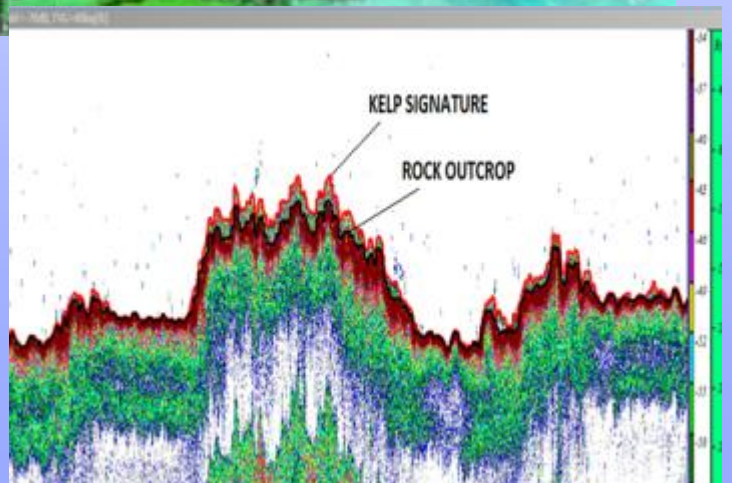
Why? Fishing/Aquaculture





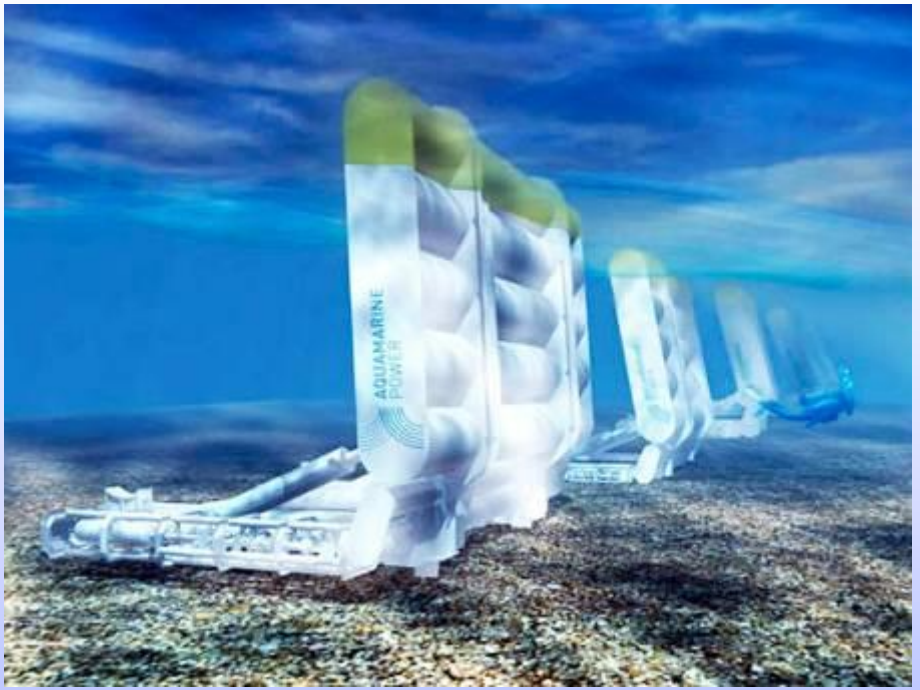
Accurate bathymetry helps modelling and locating of fish farms – HOT TOPIC!
Collaboration with BIM

BIM
Bord Iascaigh Mhara
Irish Sea Fisheries Board



INFOMAR
Integrated Mapping for the Sustainable Development of Ireland's Marine Resource

Ocean Energy – Wind & Wave



Seabed mapping vital to location of Ocean Energy devices - wave & wind

seai SUSTAINABLE ENERGY AUTHORITY OF IRELAND

INFOMAR
Integrated Mapping for the Sustainable Development of Ireland's Marine Resource

Research/ Added Value

Researchers on project team

Fund Research Projects/SMEs
c.20% of budget

Provide equipment
Vibrocore, sparker, magnetics, grabs

Ship Time & advice/knowledge centre
National Research Vessels & Survey staff

International collaboration
e.g OGS Aug 09 Celtic Sea
VENTure MidAtlantic 2011

IODP
Integrated Ocean Drilling Program
United States Implementing Organization

INFOMAR
Integrated Mapping for the Sustainable Development of Ireland's Marine Resource

Added Value

SME funding/ Development

realSIM
REALTIME 3D SIMULATION

SONARSIM

Belco Marine Electronics

TechWorks MARINE

Gaelectric
POWER FROM NATURE

compass informatics

Monterrey Software Solutions

NUMERICS WAREHOUSE
computer simulations of the natural environment

moore

Navigation Systems, Web Portals, 3D simulation, Geotechnical Modelling, Site Selection, In-situ Observatories, hydrodynamic modelling, Outreach, e-Learning, etc

INFOMAR
Integrated Mapping for the Sustainable Development of Ireland's Marine Resource

EU PROJECTS / Leverage

Adding Value through Data Acquisition & Dissemination

INIS Hydro	INTERREG IVA Hydrographic Survey
MESH Atlantic	INTERREG IVB Habitat Mapping Project
ATLANTERRA	INTERREG IVB Geopark / Heritage
EMODNET	DG Mare EU Marine/Observation Data Network
Geo-Seas	FP7 eINFRASTRUCTURE

Current

JIBS	INTERREG III Hydrographic Survey
MESH	INTERREG III Habitat Mapping Project
IMAGIN	INTERREG III Aggregate Mapping
INSTAR	UU / DOENI JIBS Data / PaleoCoast / ShipWrecks

Historic

Non EU

OCEAN ENERGY A WORLD OF POWER

Olex

UNIVERSITY of ULSTER

INFOMAR
Integrated Mapping for the Sustainable Development of Ireland's Marine Resource

But is it worth it?

INSS 1999- 2005	€32m	US$41	C$ 42
INFOMAR 2006-2012	€26m	US$33	C$ 34
Total to date	€58m	US$74	C$ 76

INFOMAR Marine Mapping Study Options Appraisal – July 2008

Pricewaterhouse Coopers

INFOMAR
Integrated Mapping for the Sustainable Development of Ireland's Marine Resource

NPV and Benefit Cost Ratios

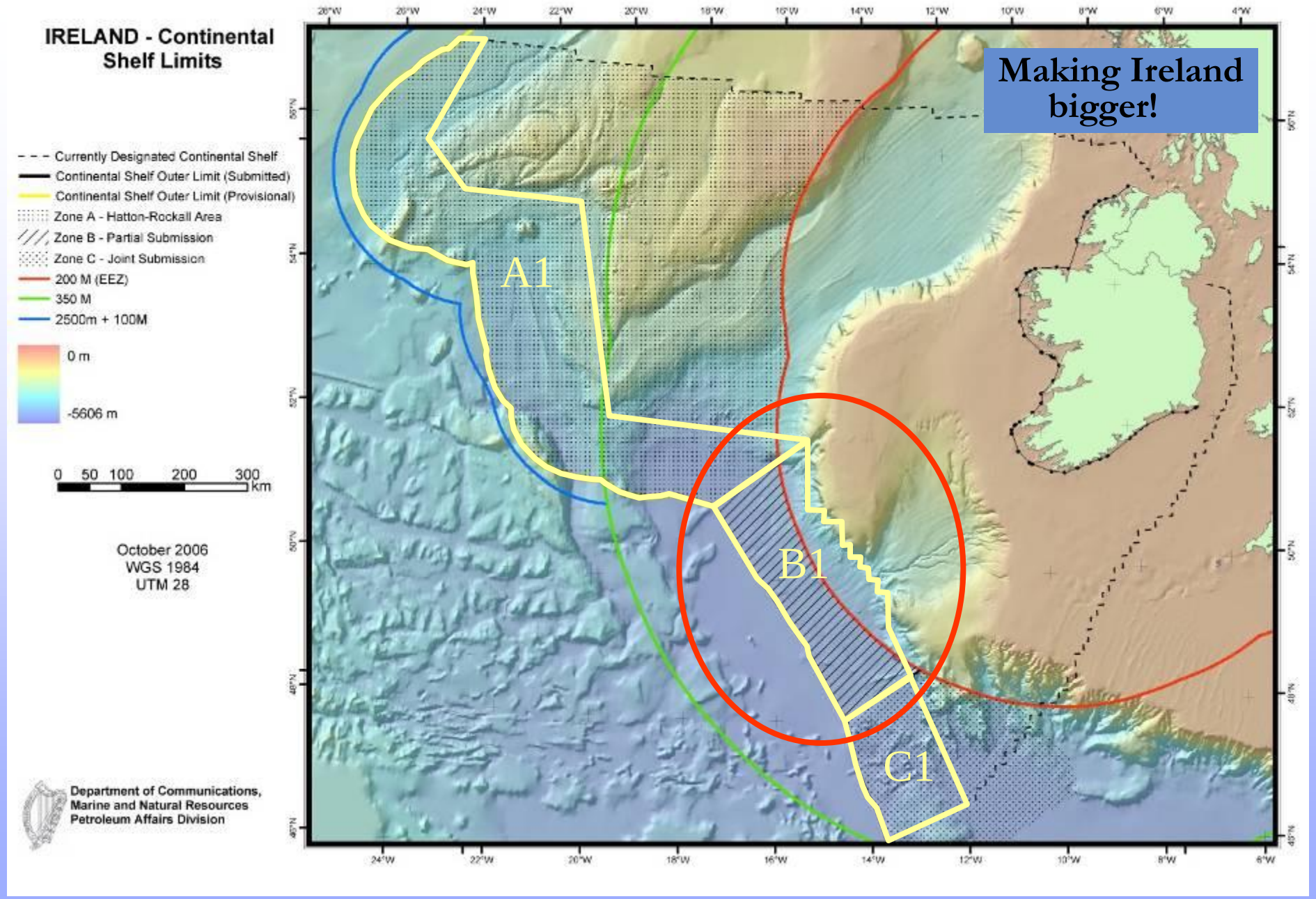
Cost of Completion of Mapping (2026) €000	Value of Mapping NPV €000	Benefit to Cost Ratio BCR
93,855	454,266	4.41

Estimated return on project is 4 to 6 times cost
Based on FREE DATA availability.
Led to decision in 2008 to continue to 2013

Current review will report June 2013, largely positive.

World Wide benchmark for State Marine Mapping

Similar programmes Norway, UK, France and Germany



Zone A1 = 147,375km^2 **Zone B1 = 56,470km^2** Zone C1 =27,590km^2

Previous Trans Atlantic Collaboration

Geological Survey of Ireland, EEZ Program

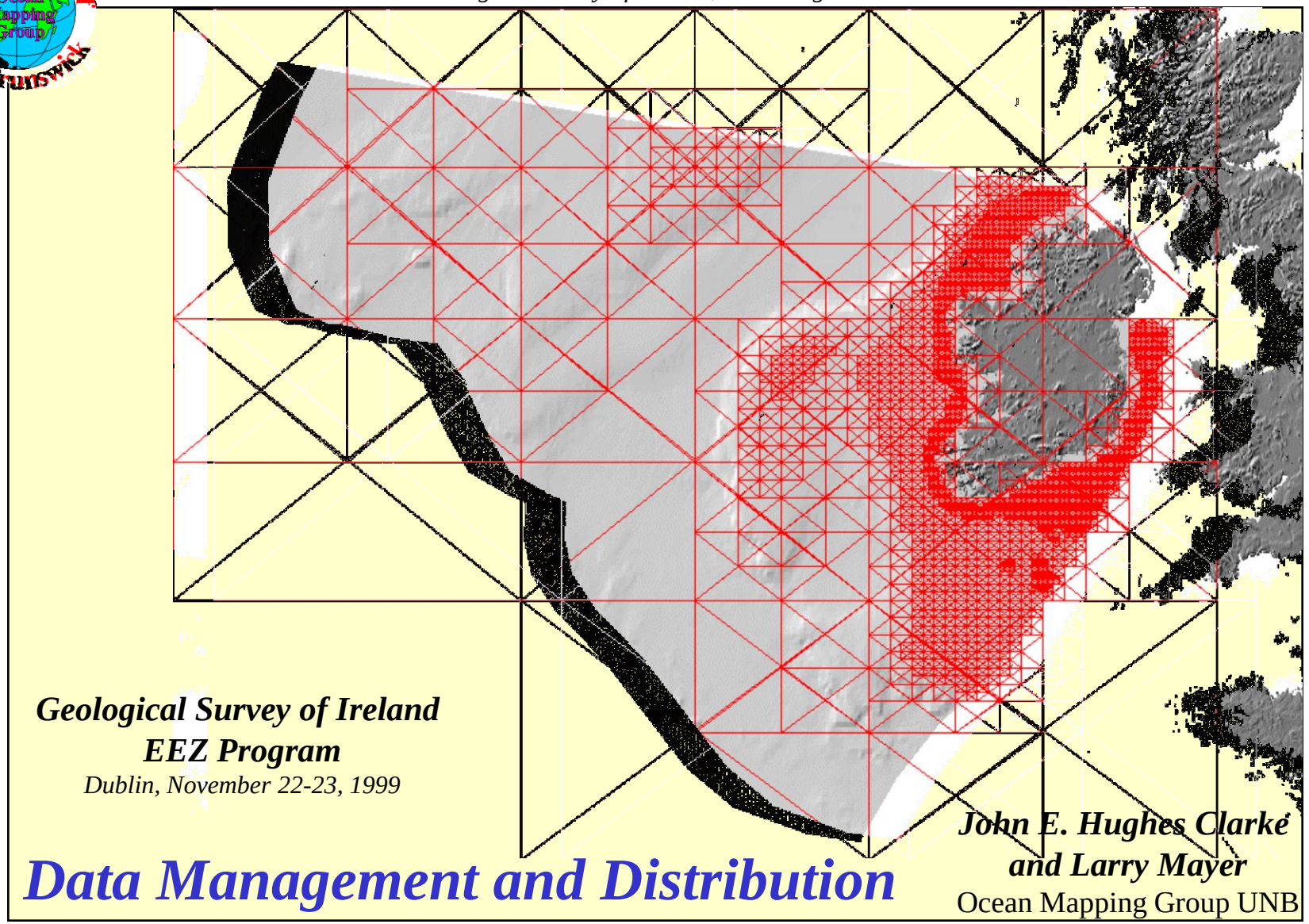


Figure DM:18

© J.E. Hughes Clarke, OMG/UNB

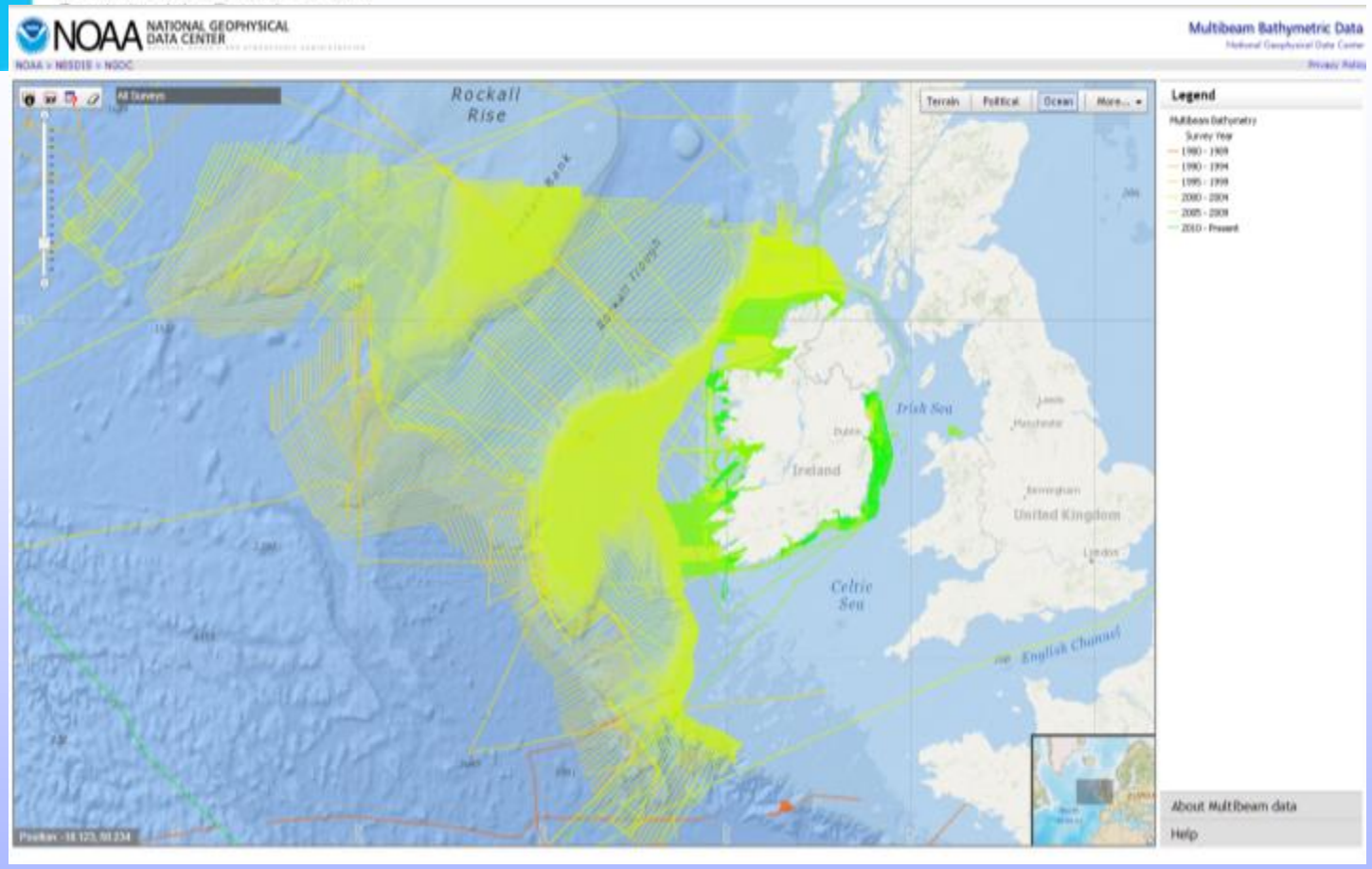
INFOMAR/GSI & US Collaboration

INFOMAR
Integrated Mapping for the Sustainable Development of Ireland's Marine Resource

Integrated Mapping for the

GSI

Marine Institute
Fóras na Mara



The National Geophysical Data Centre (NOAA) is the US archive for all geophysical datasets including multibeam bathymetric data and presently holds over 15.7 million nautical miles of ship tracklines (1187 surveys) received from sources worldwide. The database also includes hydrographic multibeam survey data from NOAA's National Ocean Service (NOS). All INSS and INFOMAR raw data is available for download via this platform, updated annually and this can be accessed at http://maps.ngdc.noaa.gov/viewers/multibeam/. Further information on this international cooperation can also be viewed at http://www.ngdc.noaa.gov/mgg/bathymetry/multibeam/irish_data.html

INFOMAR
Integrated Mapping for the Sustainable Development of Ireland's Marine Resource

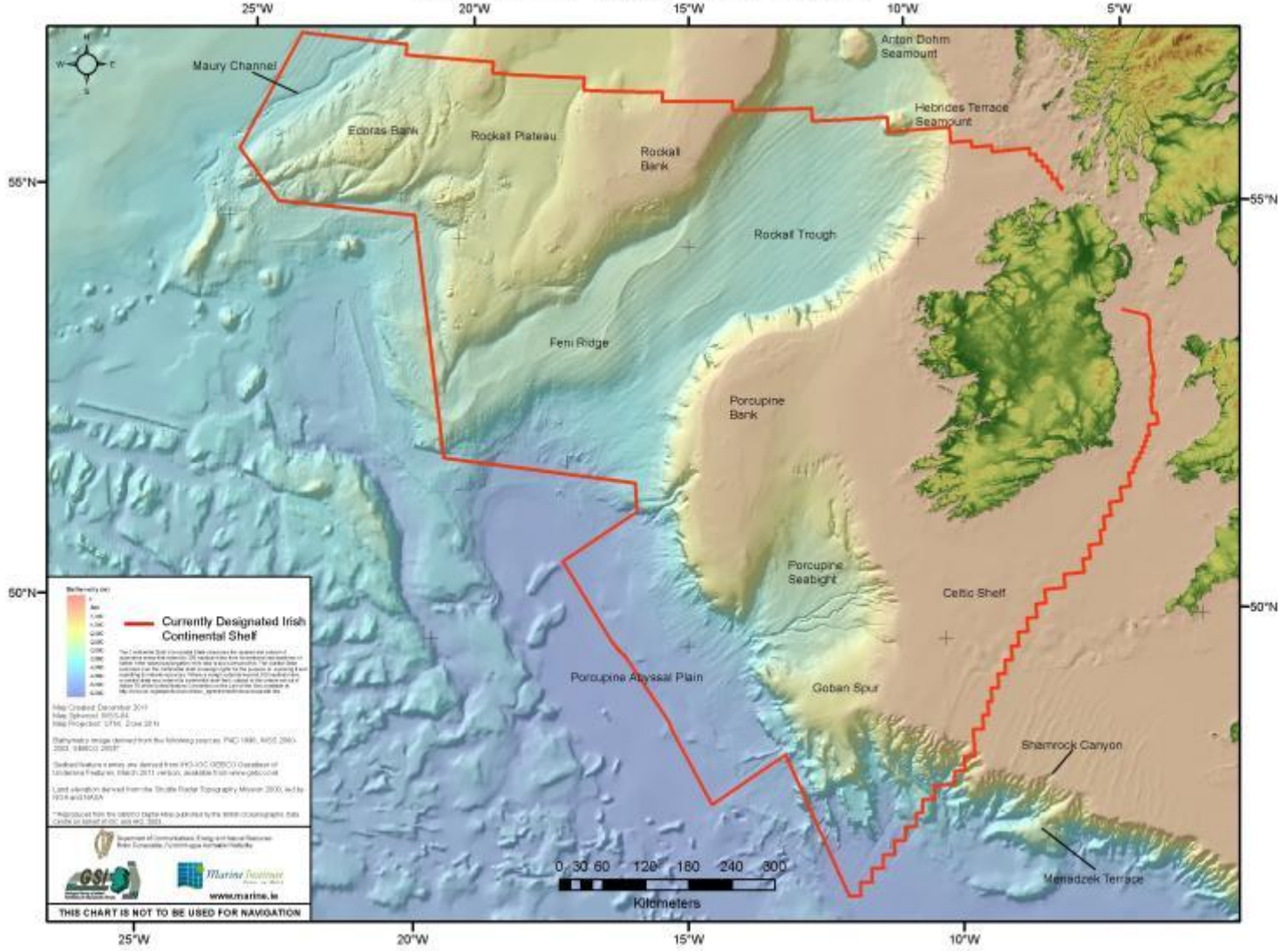
Potential EU/ North American Collaboration

- Trans-Atlantic Mapping Strategy
  - Best Practice, Acquisition (R2R) to Stakeholder Products
  - Data priorities, full seabed mapping vs crowd sourced data
  - Agreed broad scale monitoring requirements & opportunities
  - Value add data & technology opportunities
  - Mapping related research priorities & funding opportunities
  - Possible pilot studies, Mid-Atlantic Ridge/ Vent Fields, Deep water Aquaculture, Renewable Sites?

INFOMAR
Integrated Mapping for the Sustainable Development of Ireland's Marine Resource

Now

The Real Map of Ireland



INFOMAR
Integrated Mapping for the Sustainable Development of Ireland's Marine Resource

Next!

Real Map of the Atlantic

Thank you! Visit INFOMAR.IE to find out more!