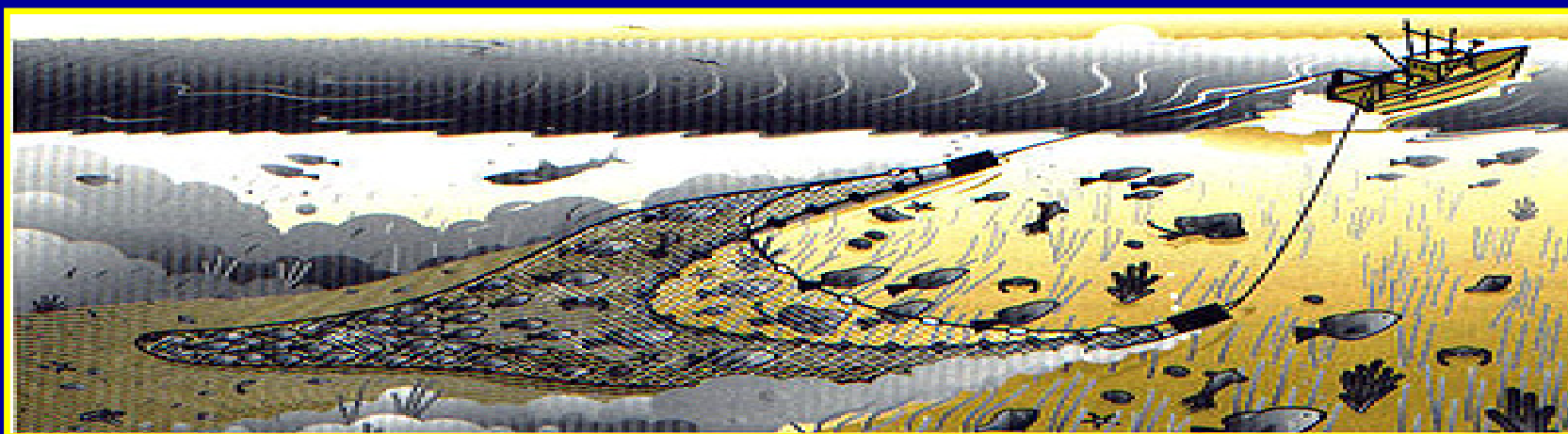




Llywodraeth Cynulliad Cymru  
Welsh Assembly Government

# **Fisheries sensitivity mapping - to support management of SACs**



**Dr Clare Eno - Countryside Council for Wales**

Marine Protected Areas workshop, Liverpool, 28 October 2008

# Fisheries sensitivity mapping to support management of SACs: outline

- Why? - Wildlife responsibilities
- Seabed habitat sensitivity assessment methodology
- Application to Welsh inter-tidal & sub-tidal habitats – mapping at different fishing intensities
- Interpretative tool to aid decision making



# Fishing Activity in Welsh waters




## All Fishing Types

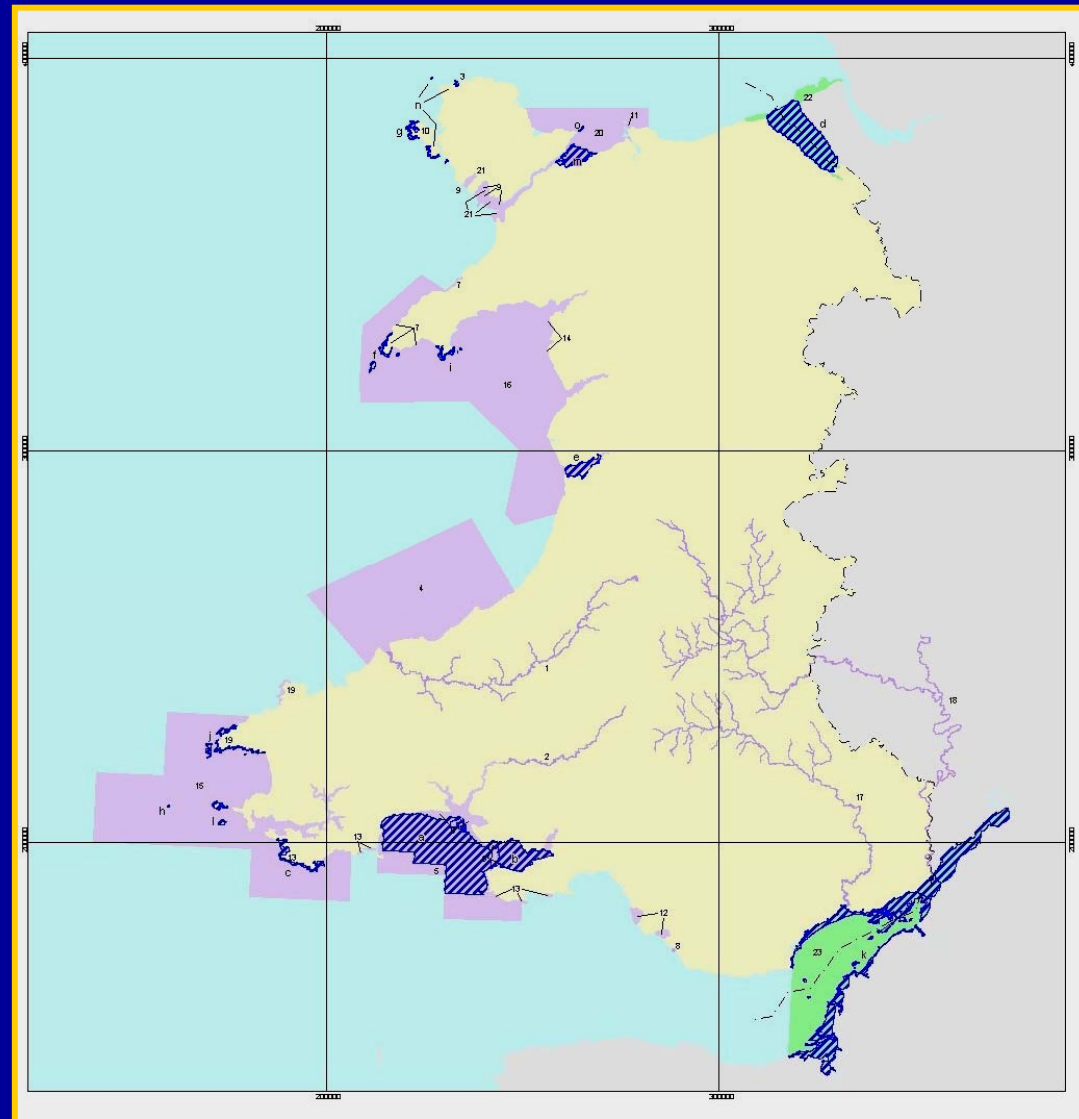
	Lobster and Crab Pots
	Set Nets
	Handlines
	Whelk Pots
	Prawn Pots
	Beach Seining
	Beach Nets
	Longlines
	Shrimp Stake Nets
	Heavy Beam Trawl
	Light Beam Trawl
	Light Otter Trawl
	Mid Water Trawl
	Rock Hopper Trawl
	Scallop Dredging
	Mussel Seed Dredging
	Hydraulic Dredging
	Oyster Dredging
	Spear Fishing

	Hand Gathering - Scallops
	Hand Gathering - Clams (Venerupis)
	Hand Gathering - Cockles
	Hand Gathering - Razor Clams
	Spider Crab
	Hand Gathering - Mussels
	Hand Gathering - Periwinkles
	Prawns
	Oyster Cultivation
	Mussel Cultivation (Several Order Sites)

List of activities  
recorded in  
December 2005

# Aquatic Natura 2000 sites in Wales

-  SAC
-  c SAC
-  SPA



# Developing a methodology

- Fishing has a range of ecosystem effects
- Benthic effects addressed first
- Habitats & fishing activities were grouped
- Scientifically robust approach developed with contractors & through workshops which engaged specialists



# Impacts of fishing

Fishing can damage benthos:



Different gears have different effects and the effects will vary between habitats

# Impacts of fishing

Whether fishing has an impact depends on the features' sensitivity



The intensity of the activity will affect the severity of the effect or impact

# Marine SAC

## Habitat features

Sandbanks - covered all time

Estuaries

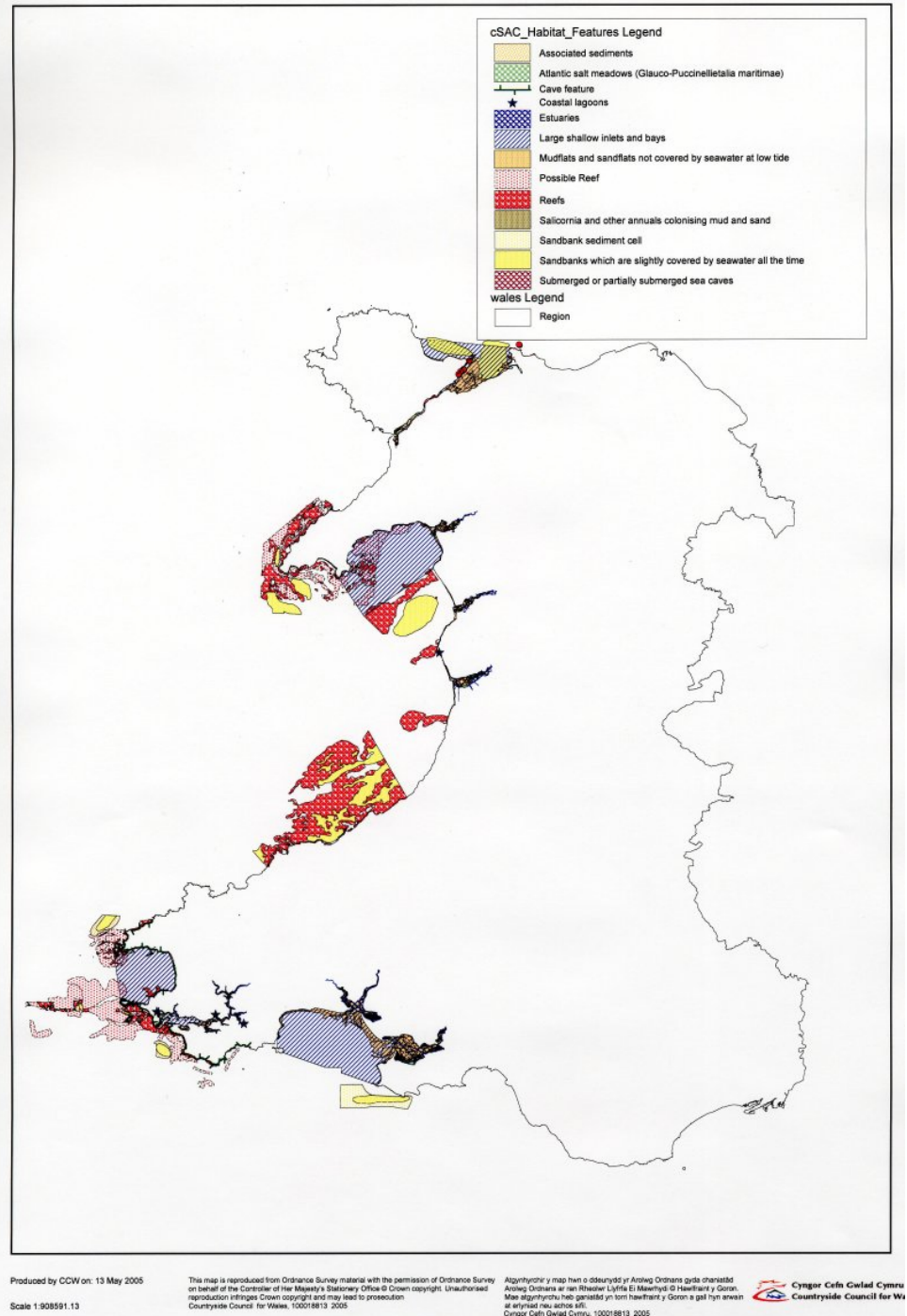
Mudflats & sandflats not covered at low water

Reefs

Large shallow inlets & bays

*Salicornia* beds

Sea caves





# Variety of seabed habitats found in Welsh 'Large shallow inlets and bays' SAC feature



# Grouping of Biotopes into Habitats (according to similar response to fishing)

> 300 biotopes grouped to 30 Habitats e.g.

1. Upper shore stable rock with lichens and algal crusts

2. Wave exposed intertidal stable rock

15. Erect and branching subtidal species that are very slow growing

24. Dynamic, shallow water fine sands

30. Seagrass beds



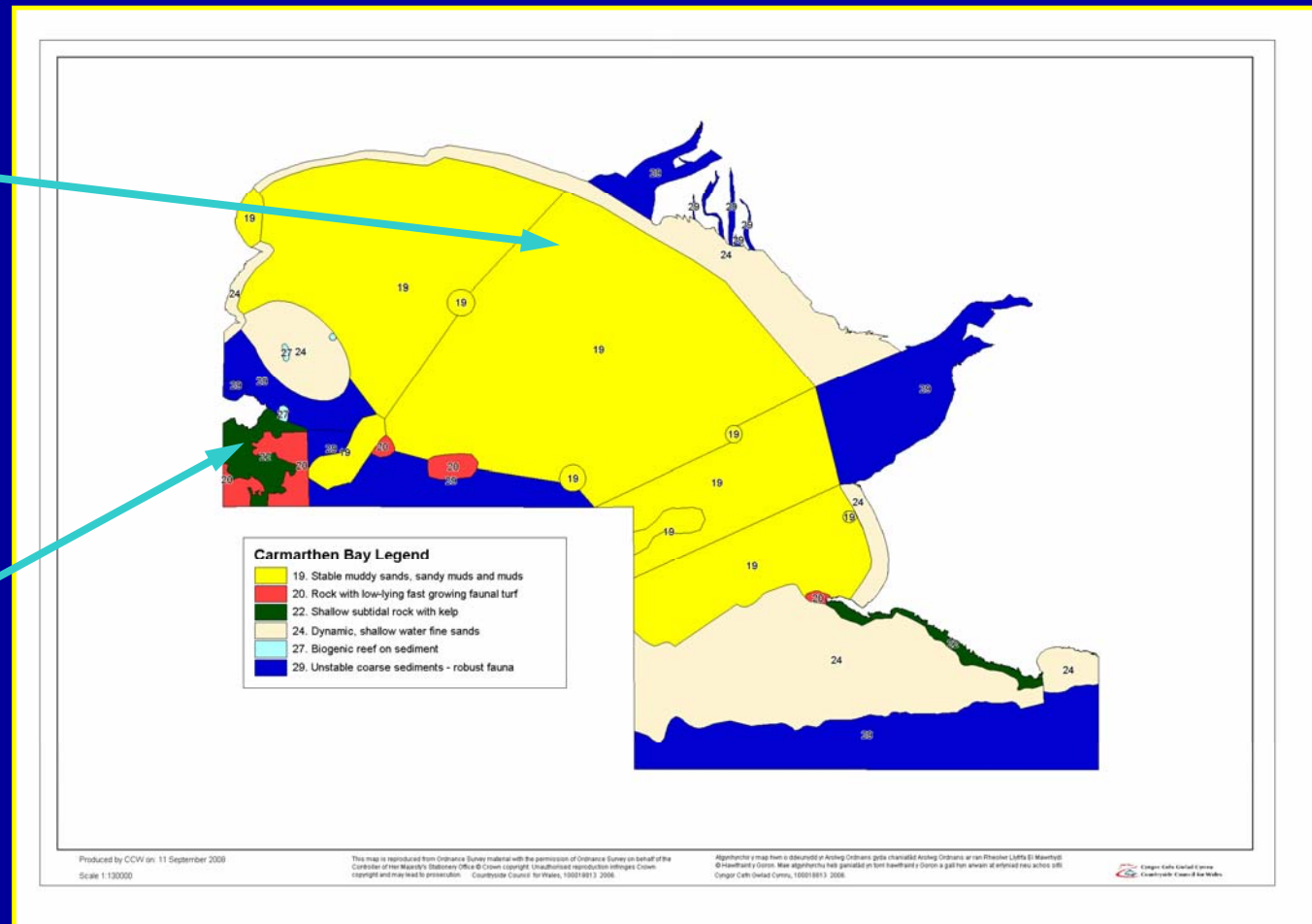
# Carmarthen Bay SAC seabed habitats



Stable muddy  
sand



Shallow sub-tidal  
rock with kelp





# Subtidal fishing gear grouped by effect:

Type 1 – Beam trawls & scallop dredges

Type 2 – Rockhopper trawls

Type 3 – Oyster/mussel dredge/prospecting

Type 4/5 – Demersal trawls & seines

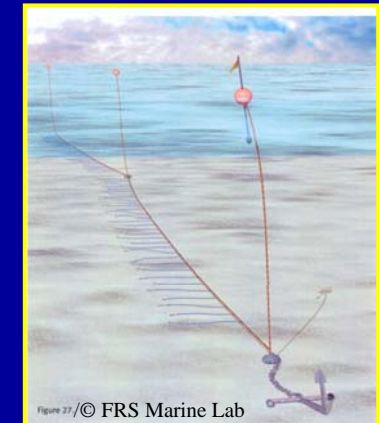
Type 6 – Hydraulic suction dredges

Type 7 – Pelagic trawls

Type 8/9 – Static gear (pots, nets, long lines)

Type 10 – Rod and line fishing

Type 14 – Aquaculture (cages)





# Intertidal fishing gear grouped by effect:

Type 10 – Rod and line fishing

Type 11/12 – Hand Gathering (eg cockles, mussels, bait etc)

Type 13 – Aquaculture (shore based)

Type 15 a, b – Access to & across foreshore



# Fishing Gear Intensity - e.g.

## Type 10. Professional Hand Gathering

**Heavy** >10 people fishing per hectare often using vehicles. Large numbers of individuals mainly concentrated in one area, with the activity occurring daily.

**Moderate** 3-9 people fishing per hectare

**Light** 1-2 people fishing per hectare

**Single visit** Single visit by individual



# Sensitivity assessment methodology

- Matrix approach preferred option of CCW, fishery scientists & managers - developed using expert judgement and scoring systems
- Scoring systems have been quoted “... as neither validated, quantitative nor repeatable”
- Yet are Valid – basis of fisheries management for over 100 years & validated retrospectively
- Can be semi-quantitative in judgements
- Are repeatable – if you get a large enough and knowledgeable group of experts
- Caution – second best!

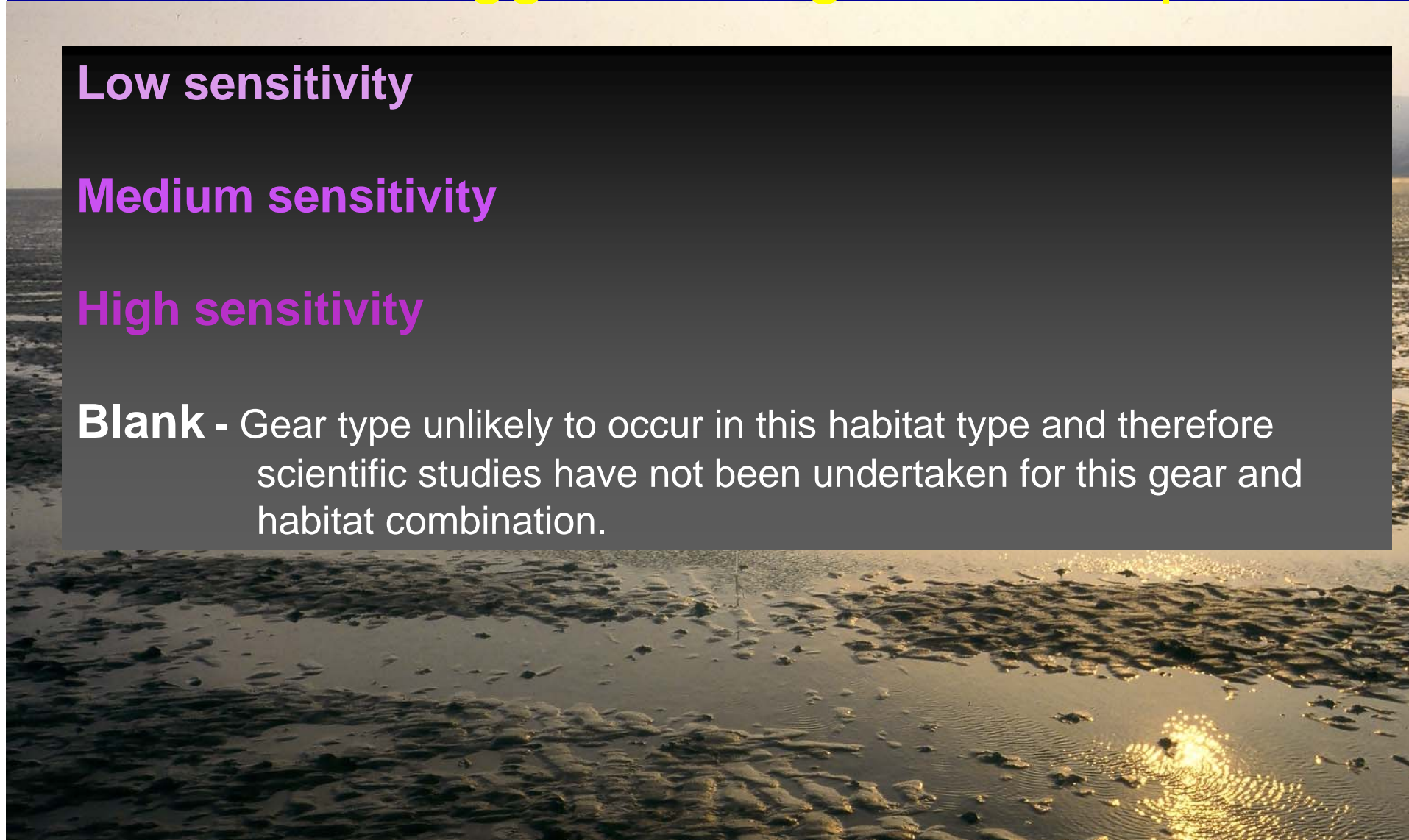
# Classification scheme developed: - could trigger management response

**Low sensitivity**

**Medium sensitivity**

**High sensitivity**

**Blank** - Gear type unlikely to occur in this habitat type and therefore scientific studies have not been undertaken for this gear and habitat combination.





# Application of sensitivity assessment method to sites:

- Map habitats (inter- & sub-tidal)
- Apply sensitivity for each fishing activity at defined intensities

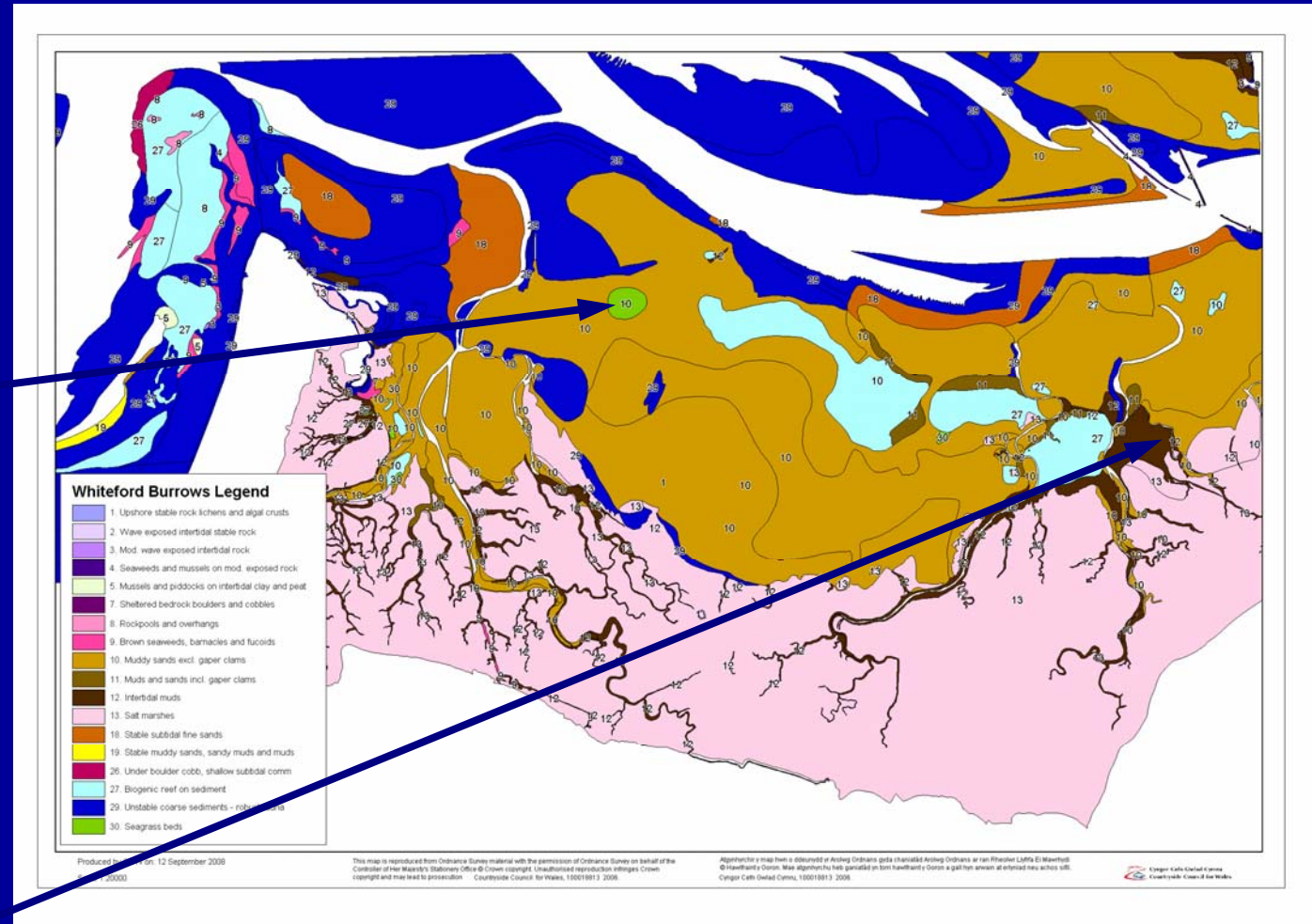
Provides single layer maps of seabed sensitivity to specified fishing activities (shows cumulative effect of repeat fishing events)

## Map Intertidal habitats e.g. Whiteford Burrows

# 'Seagrass beds'



# 'Intertidal muds'



# Develop sensitivity of inter-tidal habitat to fishing at various intensities

Habitat Type	12. Intertidal Muds				30. Seagrass Beds			
Fishing Gear Intensity	H	M	L	S	H	M	L	S
Fishing Gear Type								
(10) Rod and line hand-fishing								
(11) Casual hand gathering								
(12) Professional hand gathering								
(13) Aquaculture - trellises, groundlays & traps								
(15a) Foot access								
(15b) Vehicle access								

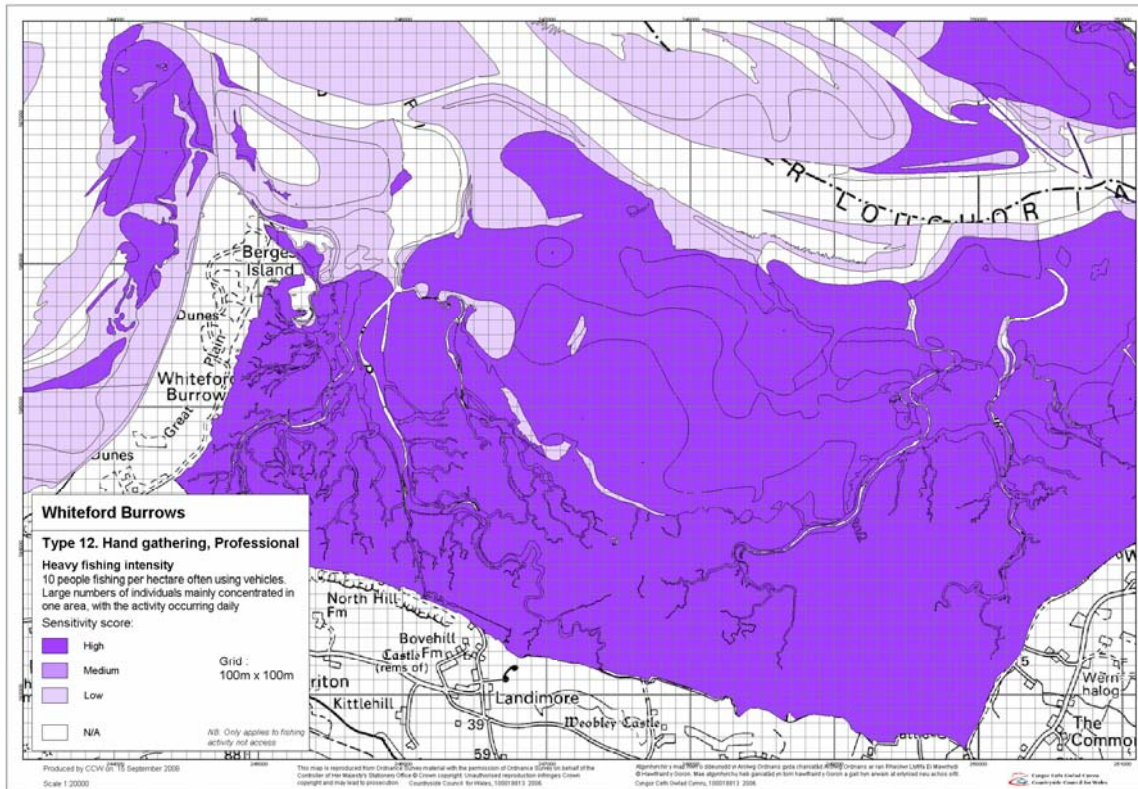
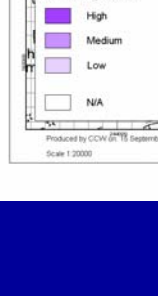
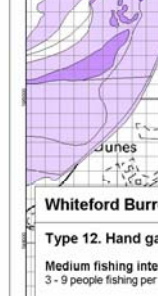
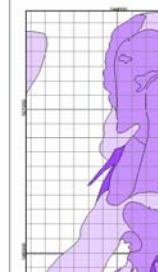
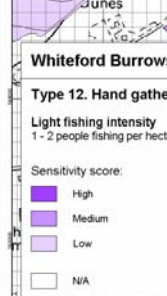
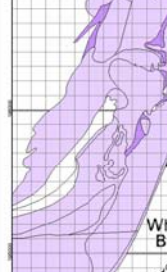
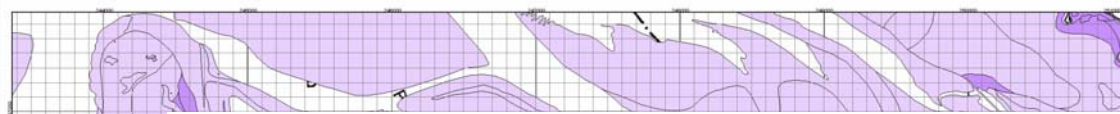
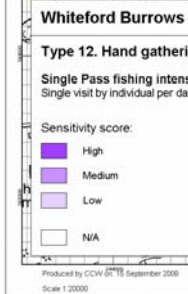
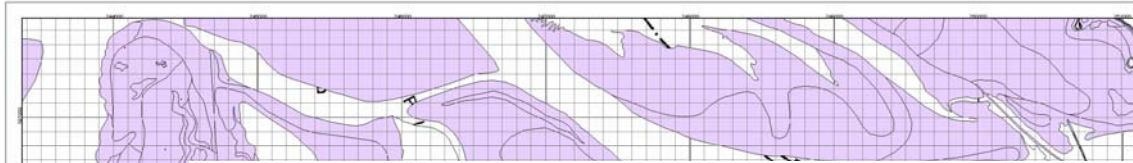
Deep Purple = most sensitive, Blank = Fishing n/a

H, M, L = heavy, moderate or light fishing activity

S = single / accidental pass



# Whiteford Professional hand - gathering



Single pass

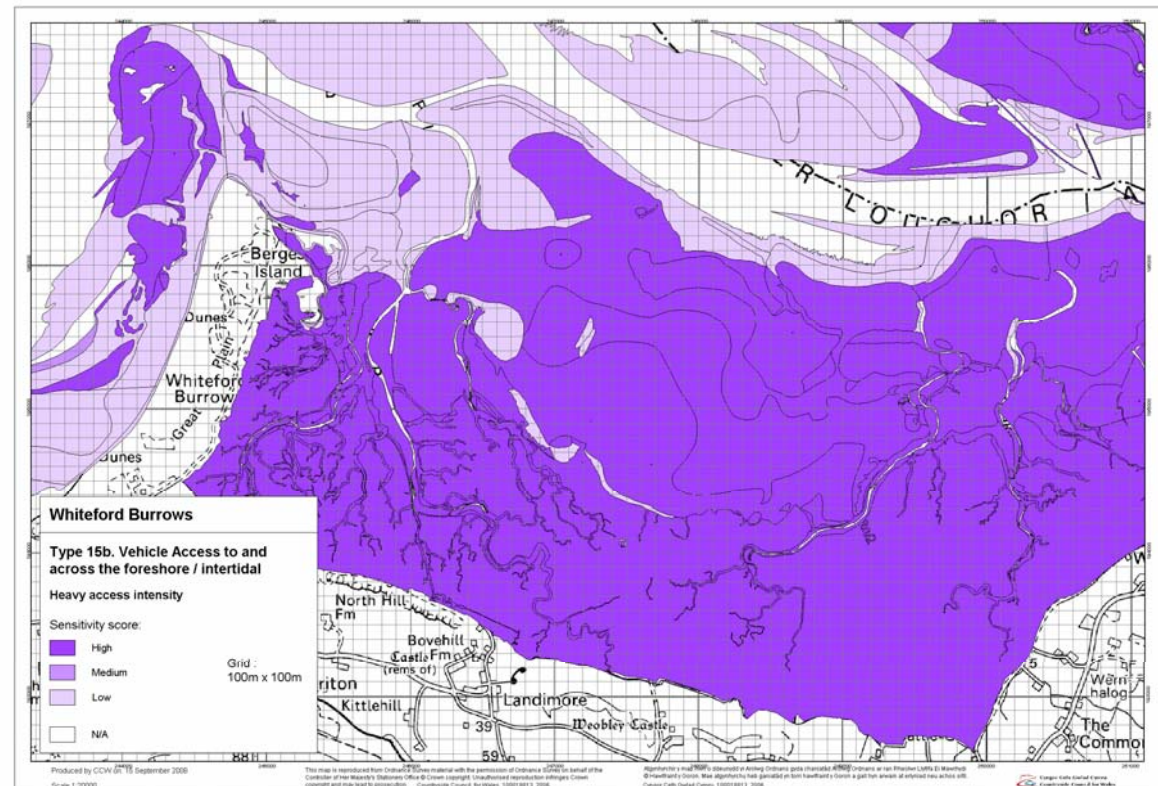
Light

Moderate

Heavy  
fishing intensity

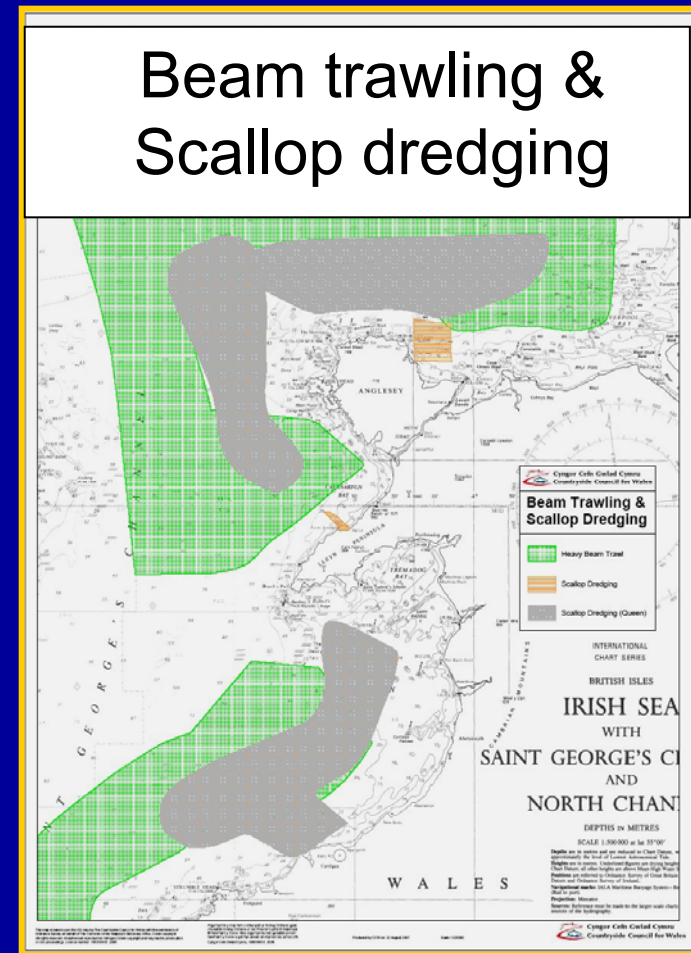


Heavy  
fishing intensity



# Interpretation tool as aid to decision making

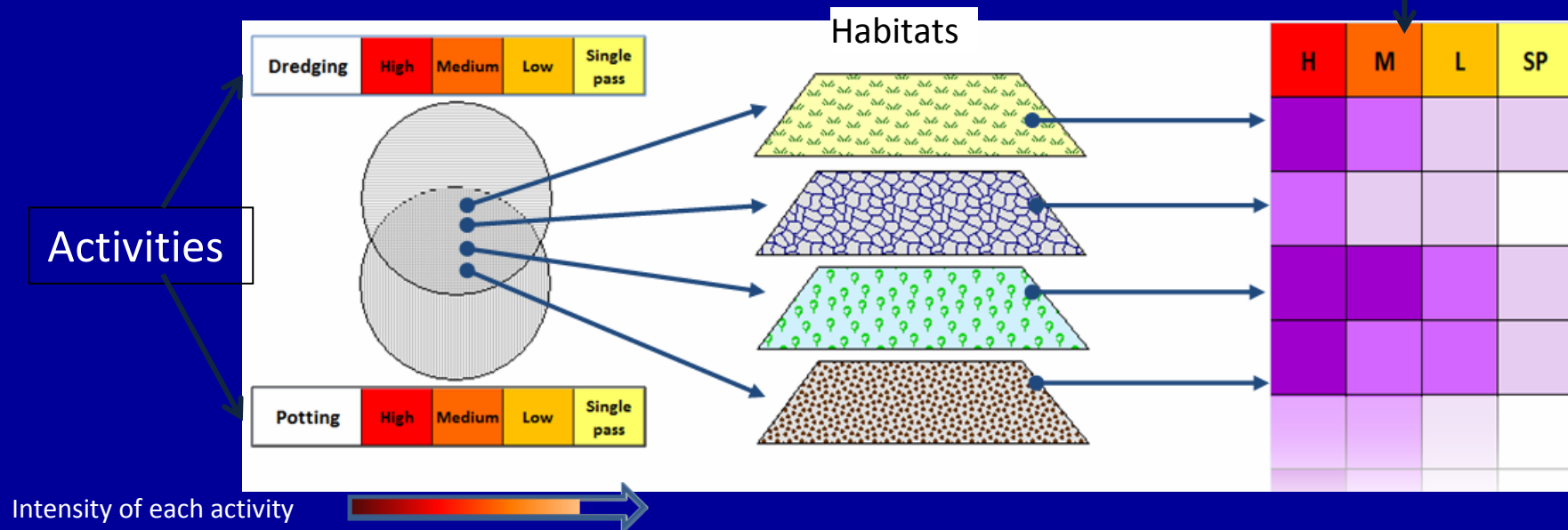
- Relate sensitivity scores to actual or likely fishing activity to show habitat vulnerability
- Combine effects of different activities
- Consider other nature conservation features



# HABITAT SENSITIVITY to FISHING ACTIVITIES

## Combined effects: How do they add up?

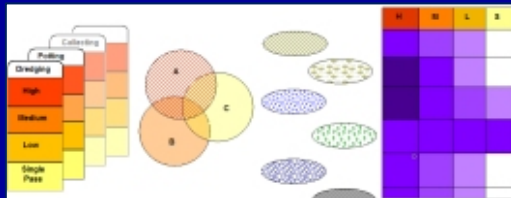
Sensitivity matrix: rating for each combination of activity



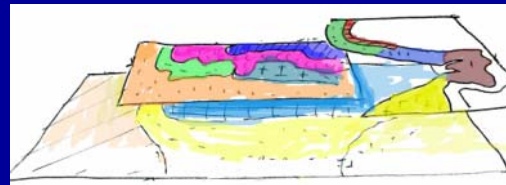
We need to estimate how the effects of different activities combine where they occur together

# Use assessments to map likely seabed habitat sensitivities

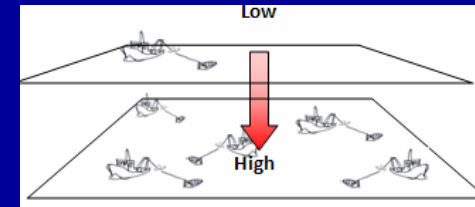
Use GIS to translate data into a spatial context



Matrices

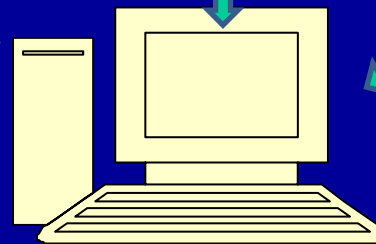


Habitat Maps



Distribution of activities

**Interactive  
model**

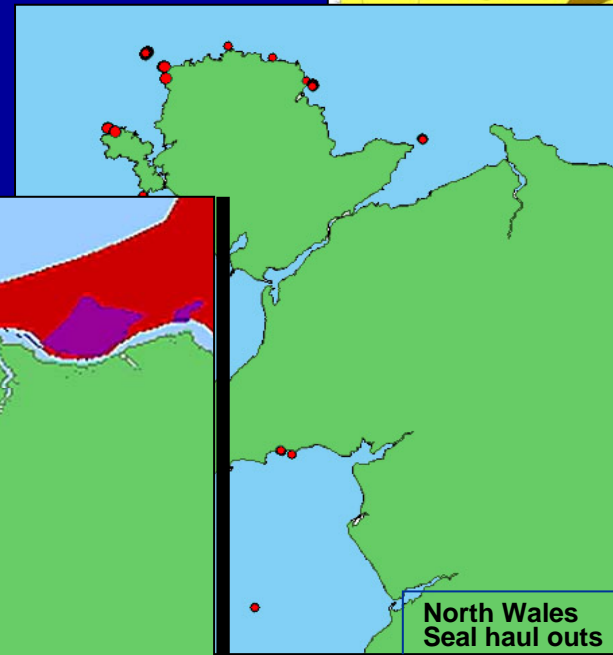
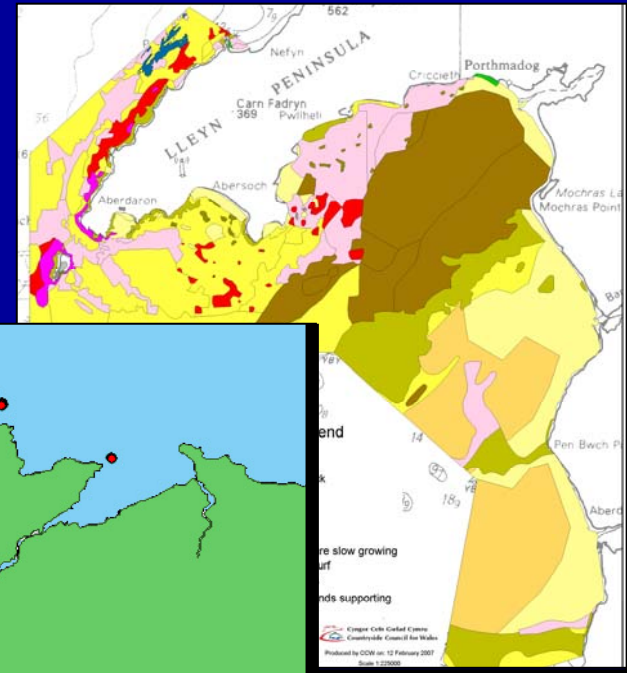


maps



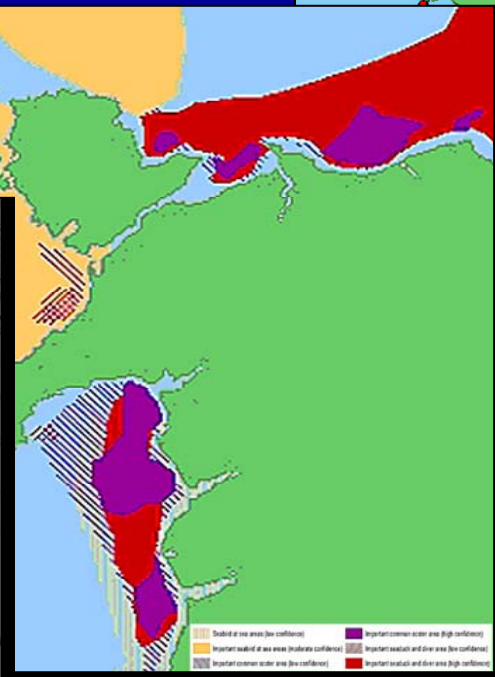
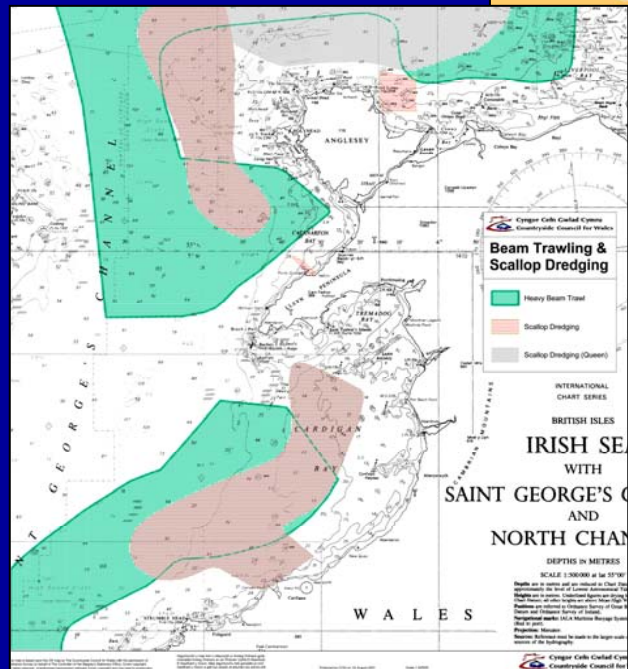
# Mapping layers (& sensitivities) - build into model e.g.

Seabed  
Habitats



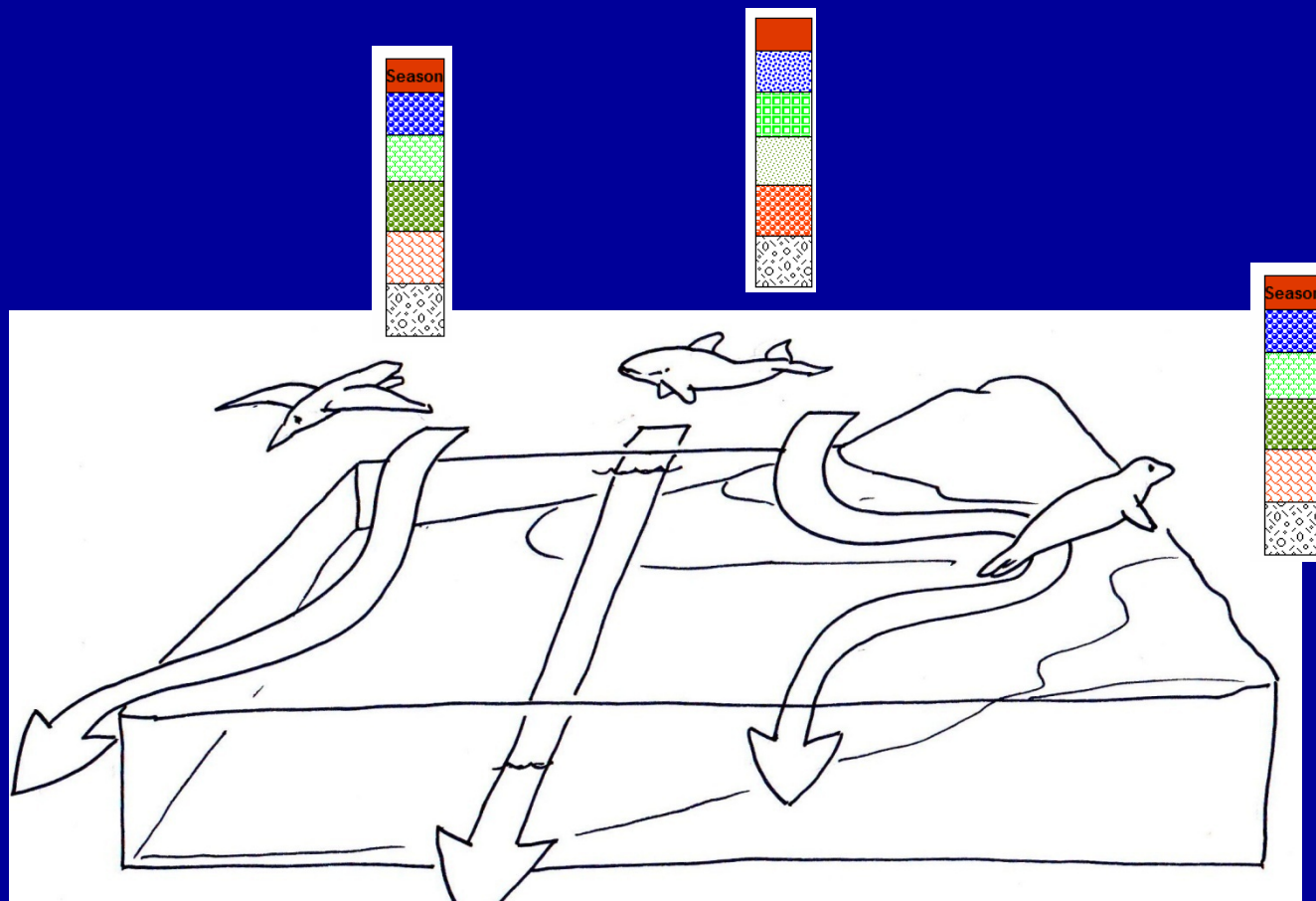
Marine  
Mammals

Important  
seabird areas



Fish – EFH /  
Fishing activity

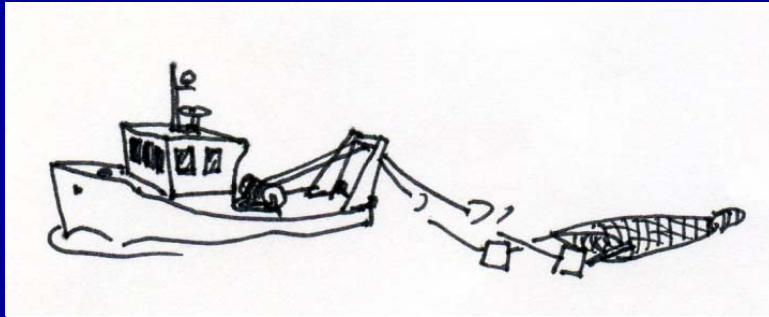
# SEASONAL USE OF ECOSYSTEM by TOP PREDATORS



**Seasonal**  
presence &  
behaviours  
e.g. pupping,  
feeding,  
moulting etc.

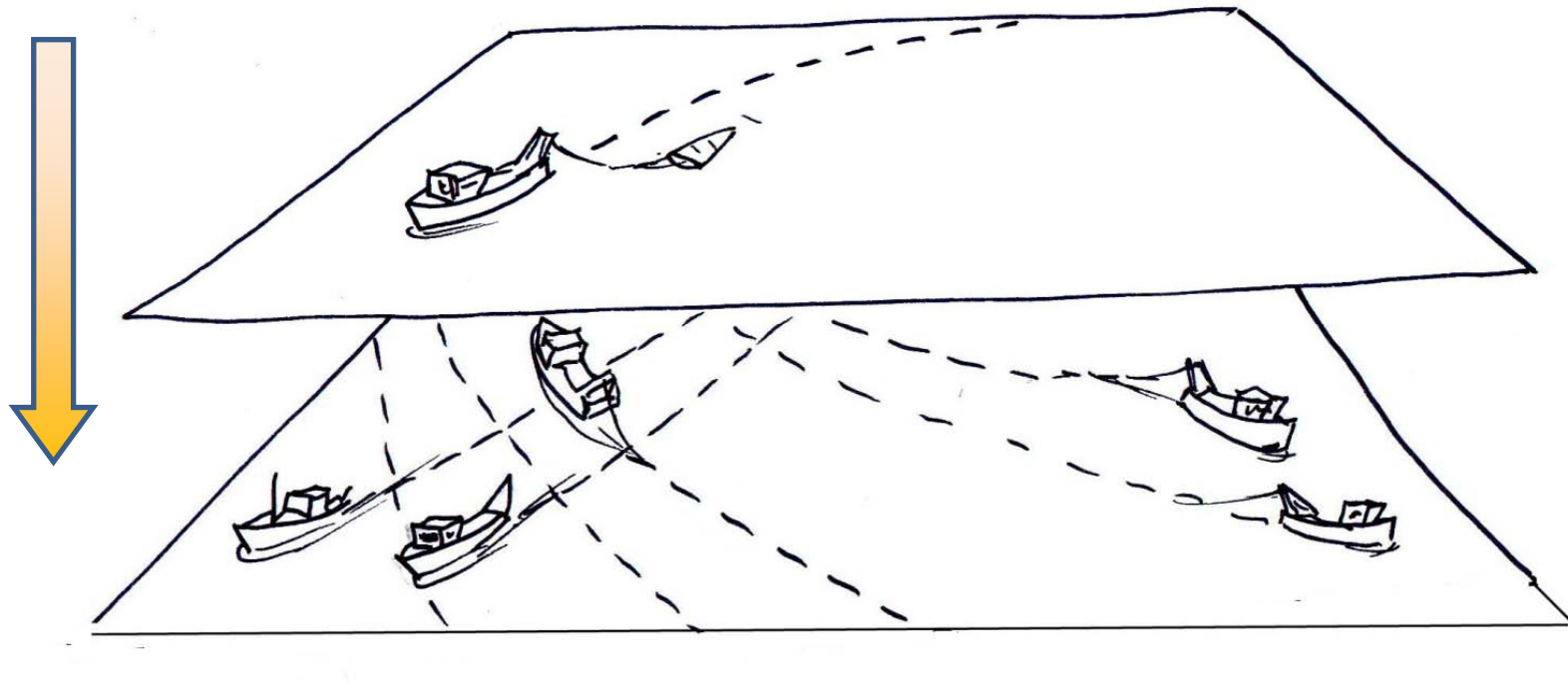
We need to understand how top predators use the ecosystem through the seasons

# Seasonal Intensity of Each Activity



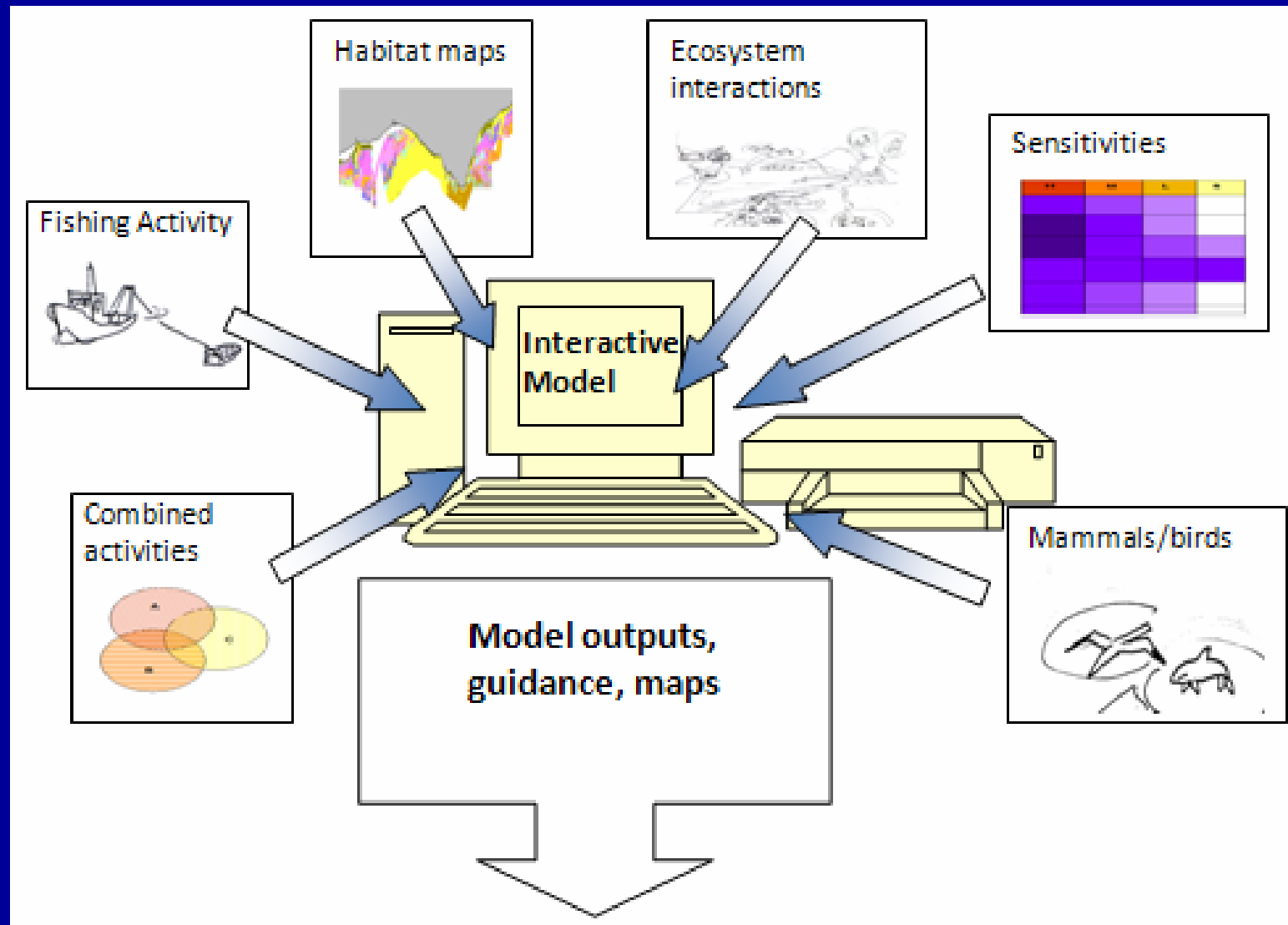
Example: Trawling

Trawling	High	Medium	Low	Single pass
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We need information on fishing activity: where, when & how much?

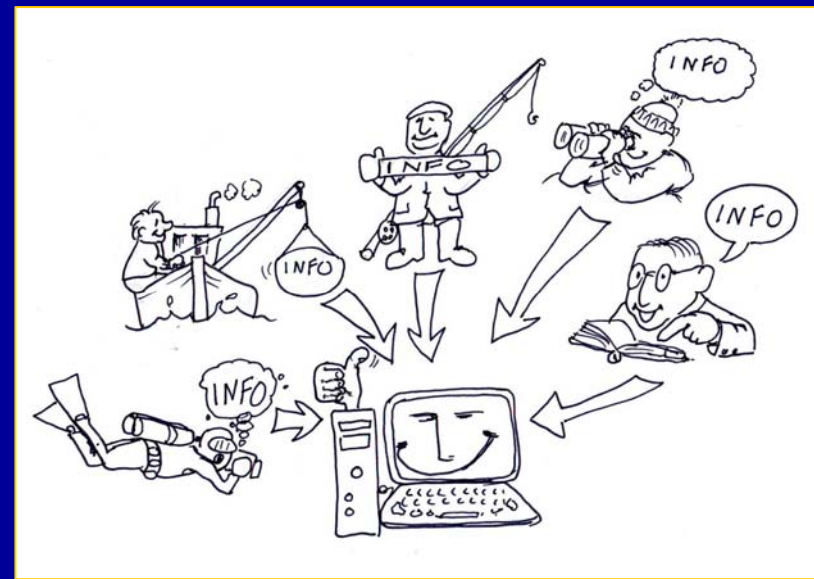
# System requirements for providing Management support information





# Fisheries sensitivity mapping - to support management of SACs

- Sensitivity to fishing needed a systematic approach
- Grouped biotopes (into habitats) & fishing activity
- An expert judgement method was developed
- Sensitivity scores - applied to inter- & sub-tidal maps
- Decision making tool – will expand with species layers



**We need your knowledge!**

The background of the slide is a photograph of a sunset or sunrise over a body of water. The sky is a mix of blue and orange, with some clouds. Two boats are visible on the water: a smaller one on the left and a larger one on the right. The water is calm, reflecting the sky and the boats.

# Diolch / Thank you

## Acknowledgements:

### CCW:

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