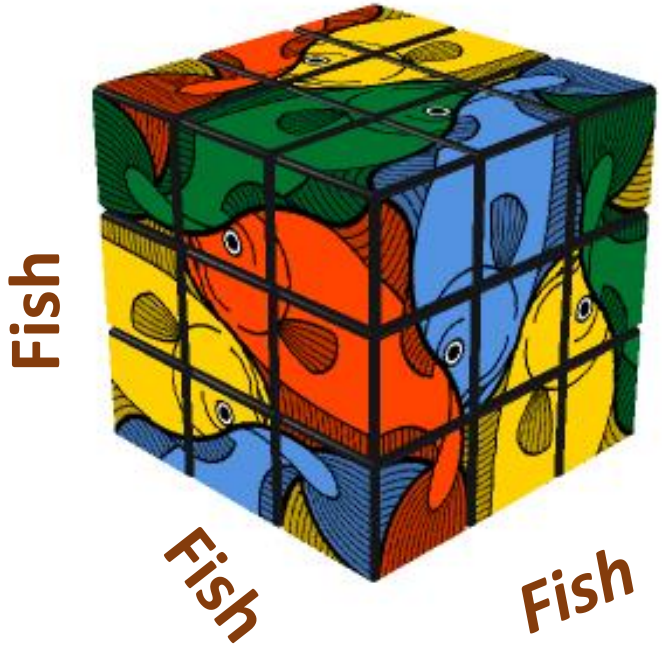
ICES ecosystem knowledge and Ecosystem Overviews

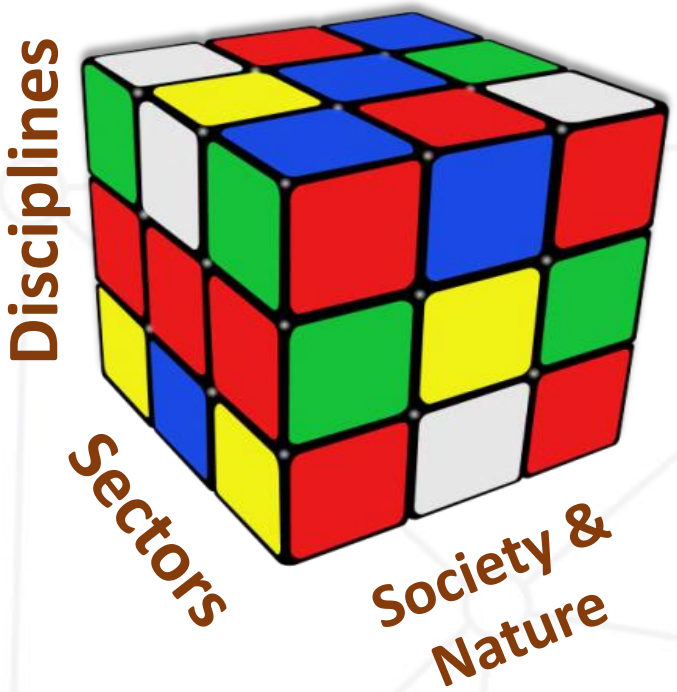
- Yvonne Walther, Chair ICES Science Committee

ICES
CIEM
Science for sustainable seas

ICES has made the commitment to put the ecosystem approach into practice

To advance the scientific understanding of marine ecosystems, and provide information, knowledge, and advice on the sustainable management of human activities affecting, and affected by, marine ecosystems.





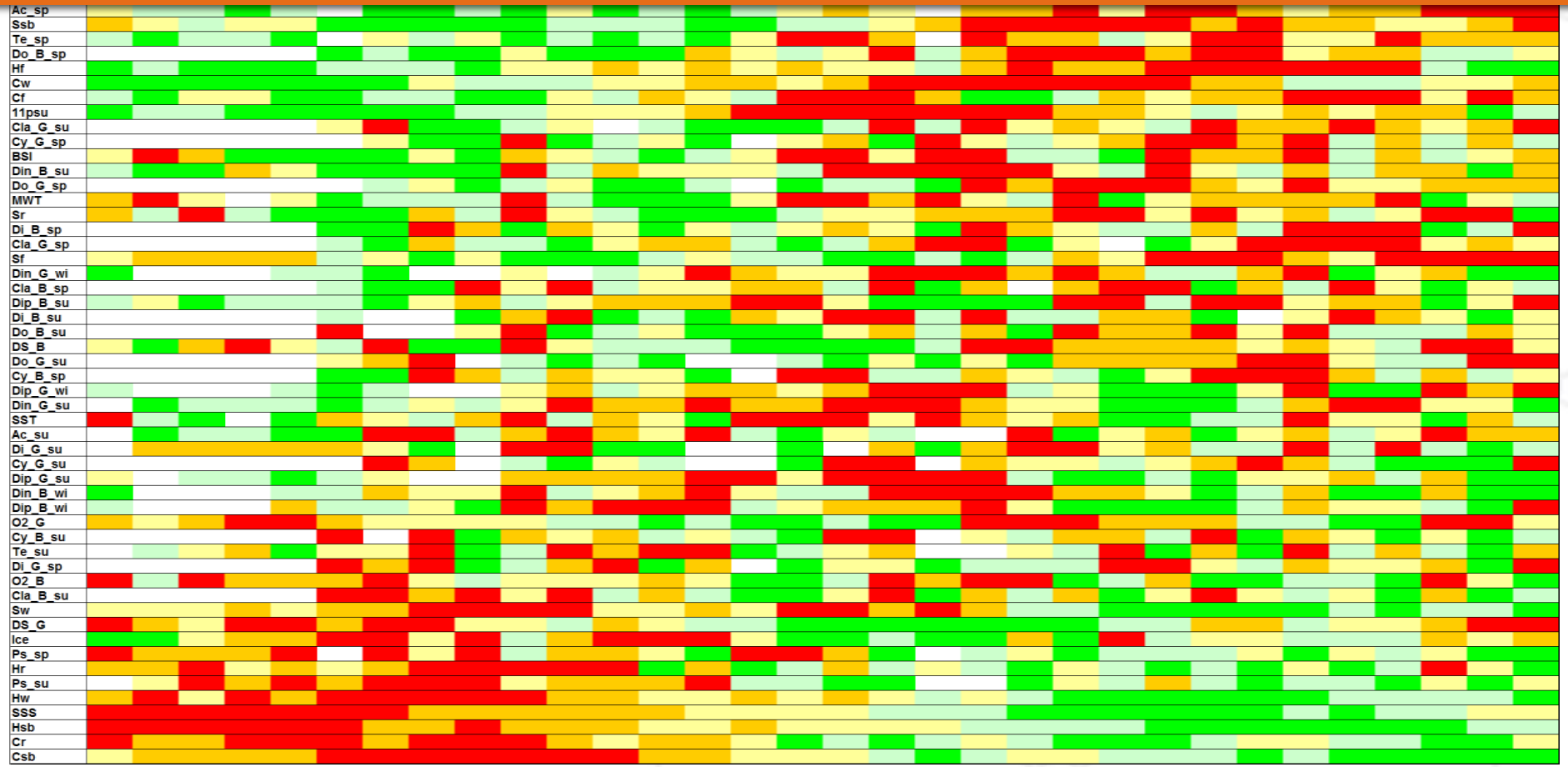
Science for sustainable seas

Areas with ICES Integrated Ecosystem Assessments

ICES is developing integrated ecosystem assessments (IEAs) - quantitative evaluations and synthesis of information on physical, chemical, ecological, and human processes that provide the scientific understanding to deliver advice on societal trade-offs between different policy options.

Not included on map
WGICA - ICES/AMAP/CAFF/PAME Workshop on Integrated Ecosystem Assessment (IEA) for the Central Arctic Ocean

Integrated Ecosystem Assessment … Trend and status assessment



Kenny, et al 2009. An integrated approach for assessing the relative significance of human pressure and environmental forcing on the status of a large marine ecosystem. Progress in Oceanography, 81, 132-148

ICES Ecosystem Overviews a product for EAM

ICES CIEM

The Recipe for ecosystem overviews in ICES
ICES Workshop on Ecosystem Overviews

- to describe the location, scale, management, and assessment boundaries of eco-regions;
- to alert ICES expert groups to situations within the environment and ecosystems that are expected to significantly influence their advice;
- to describe the distribution of human activity and resultant pressure on the environment and ecosystem;
- to describe the state of the ecosystem and to comment on pressures accounting for changes in state.

- Barents Sea ecoregion
- Bay of Biscay and the Iberian Coast ecoregion
- Celtic Seas ecoregion
- Greater North Sea ecoregion

Ecoregion description

to describe the location, scale, management, and assessment boundaries of eco-regions

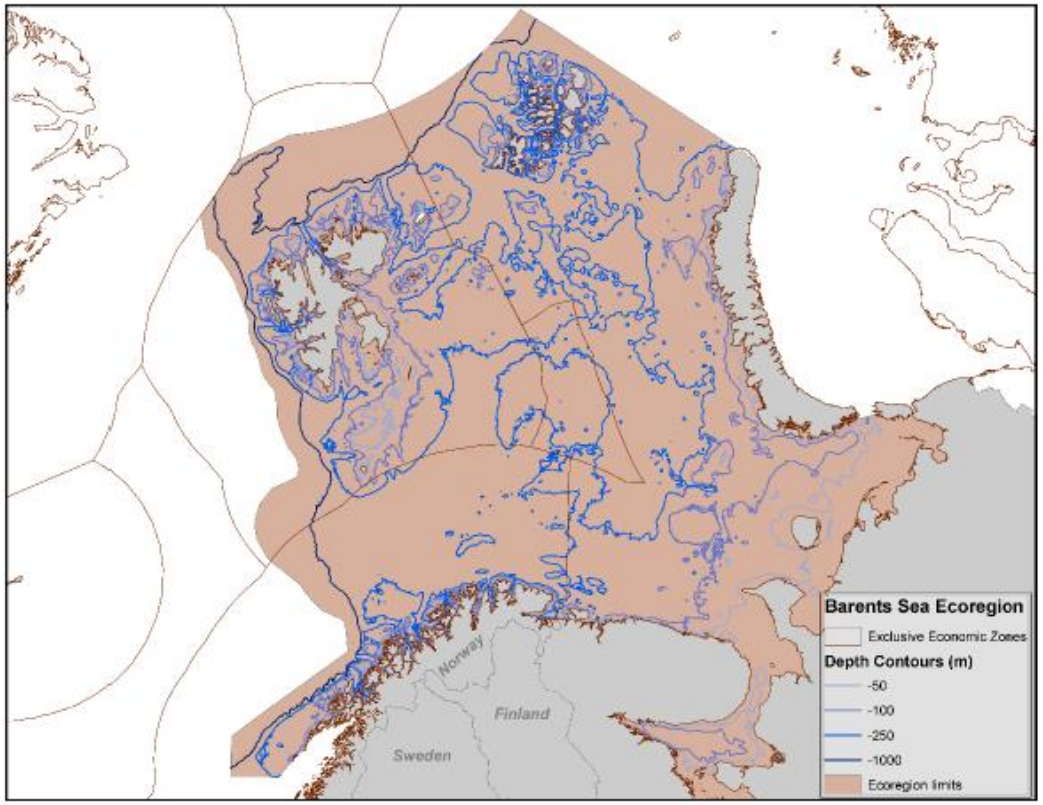


Figure 3.1.1† The Barents Sea ecoregion with EEZ delineations.

Key signals and pressures

- to describe the state of the ecosystem and to comment on pressures accounting for changes in state.

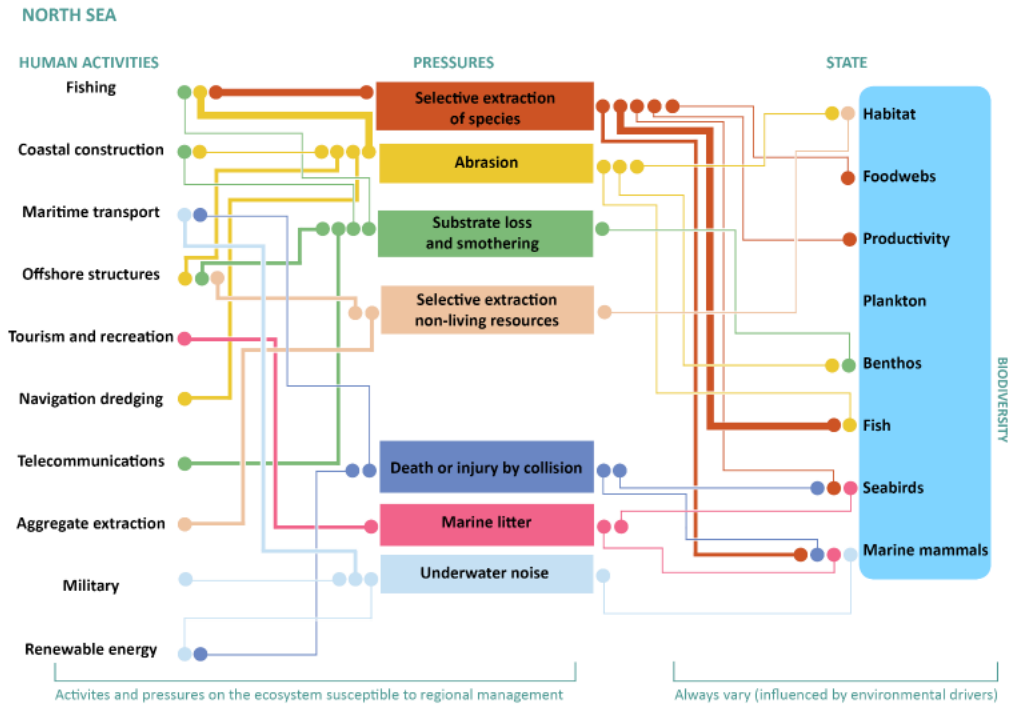


Figure 6.1.3[§] Greater North Sea ecoregion overview with the major regional pressures, human activities, and state of the ecosystem components. The width of lines indicates the relative importance of individual links.

Examples of pressures described

to describe the distribution of human activity and resultant pressure on the environment and ecosystem

- Abrasion
- Substrate loss

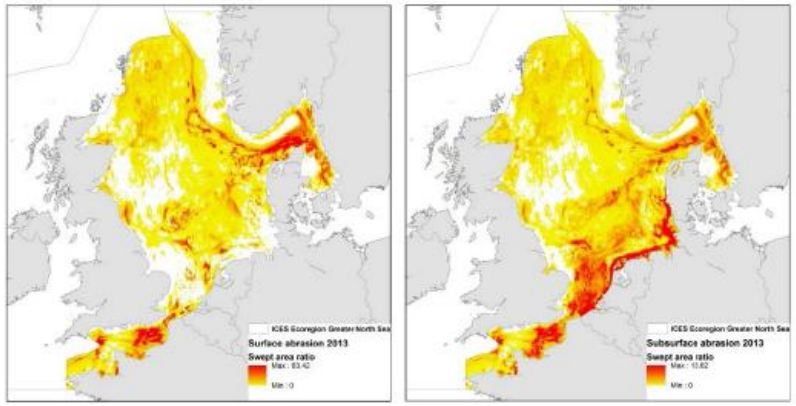


Figure 6.1.4[§§] Surface and subsurface abrasion pressure expressed as the swept-area ratio, developed from 2013 VMS data in the Greater North Sea ecoregion (ICES, 2015b).

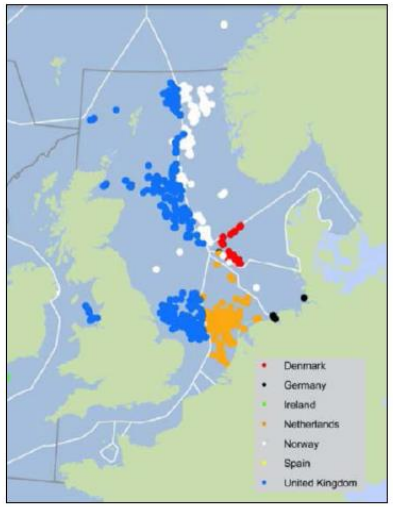


Figure 6.1.5[***] Oil and gas installations in the Greater North Sea, data from OSPAR. The dots are out of scale; in reality the ca. 600 structures with a safety zone (non-fishing area) of 500 m together occupy approx. 500 km², which is less than 0.07% of the total North Sea area. In comparison, the present wind farms, also with non-fished safety zones of 500 m, occupy about 400 km². All authorized wind farms (see Figure 6.1) cover an area of 2 584 km². Due to decommissioning, the area occupied by oil and gas structures will decrease. If the planned increase in power of wind farms to 72 GW is established, the area occupied would be around 12 000 km², representing 1.6% of the total North Sea area.

Status of ecosystem

- Food web
- Productivity
- Plankton
- Benthos
- Fish
- Cephalopods
- Marine Mammals
- Seabirds
- Non indigenous species trends
- Threatened and declining species and habitats

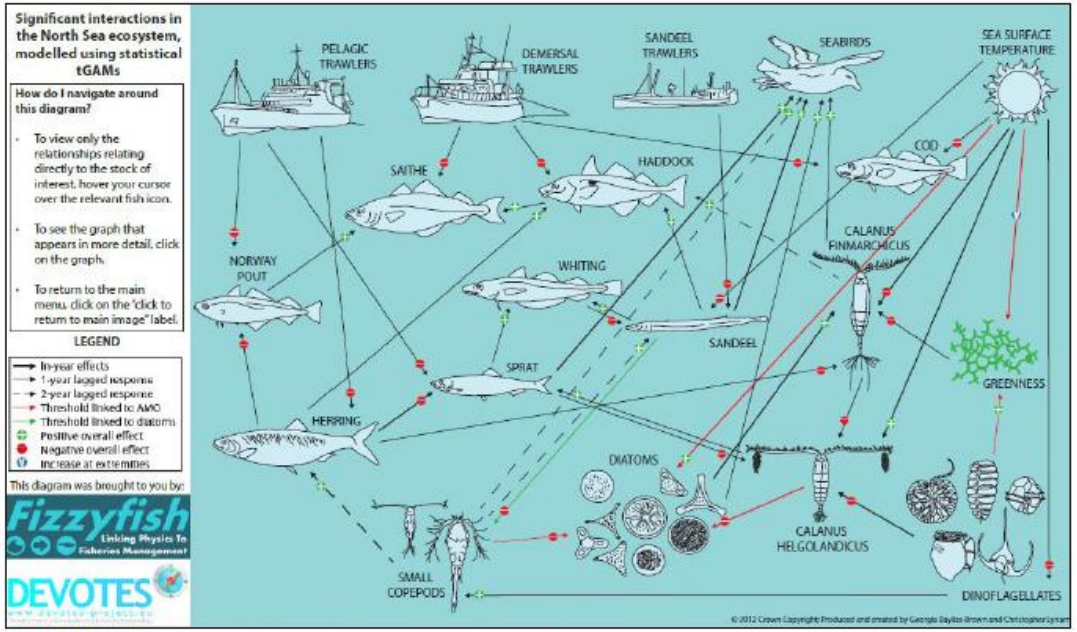


Figure 6.1.12§§§ The major components of the Greater North Sea foodweb. http://www.ices.dk/community/Documents/Expert%20Groups/Lynam_tGAMmodel_key_mov.pdf.

Pressures – top 5 by ecoregion (based on MSFD)

Understanding is of course not uniform across ecosystems and therefore critical processes are better understood in some areas. For this reason, the development of regional overviews ensures that local management objectives can be addressed.

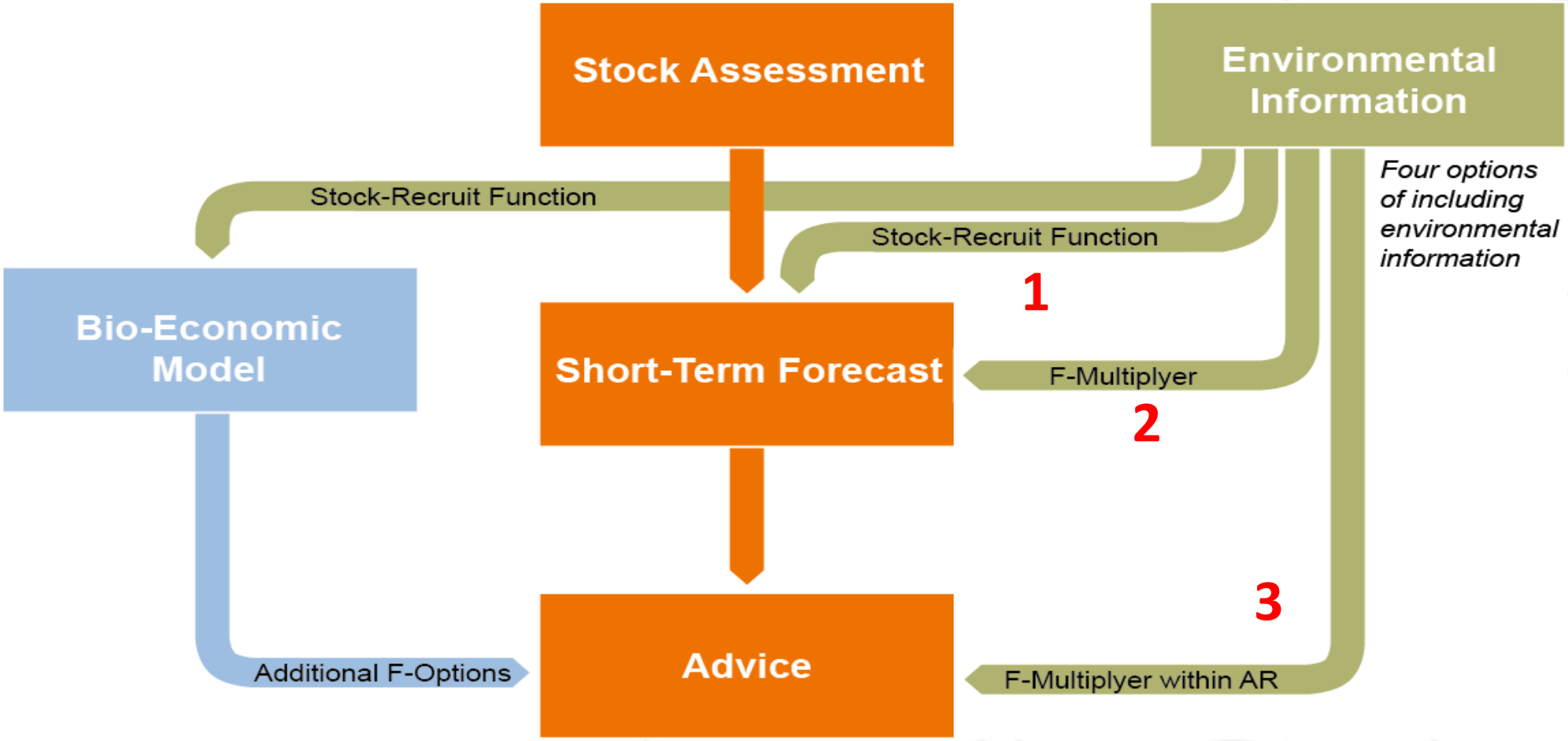
North Sea	Celtic Seas	BoB/Iberian	Baltic Sea
Abrasion	Abrasion	Extraction Species	Extraction Species
Smoothering	Extraction Species	Abrasion	Nutrient Input
Substrate Loss	Smoothering	Smoothering	Contaminants
Extraction Species	Substrate Loss	Nutrient input	Substrate Loss
Extraction non-living	Contaminants	Contaminants	Invasive Species

Ecosystem Overviews a

Ecosystem overviews are a tool to aid integration

– provide a route for sustainable management

WKDEICE: How to include environmental information?



ICES a knowledge provider

Ecosystem overviews and regional IEAs highlight ICES capacity to provide integrated advice, which is expected to meet the future needs of advice on the environmental status of the marine ecosystem.

In development with partners:

- HELCOM
- OSPAR Commission
- European Environment Agency (EEA)
- European Commission