Peer Review of the RPII's Environmental Monitoring Programme 2009

Foundation Document

5. Monitoring Performed to Satisfy OSPAR Commitments

1. Background

In 1992 a new convention for the protection of the marine environment for the North-East Atlantic was adopted. This was known as the OSPAR convention as it merged and modernised two previous conventions signed in the 1970's (OSPAR Commission, 2009a):

- The Oslo convention was signed in 1972 for the prevention of marine pollution by dumping from ships and aircraft.
- The Paris convention was signed in 1974 for the prevention of marine pollution from land based sources.

The OSPAR Convention requires that Contracting Parties to 'take all possible steps to prevent and eliminate pollution and take the necessary measures to protect the maritime area against the adverse effects of human activities so as to safeguard health and to conserve marine ecosystems'. Ireland and other European countries with North-East Atlantic coastlines or discharges into the North-East Atlantic via rivers are contracting parties to OSPAR. It should be noted that there are no legal obligations on Contracting Parties.

Radioactivity is one of several factors affecting the marine environment that OSPAR covers and so in 1998 OSPAR adopted a 'Strategy with regard to Radioactive Substances'. The objective of the OSPAR Radioactive Substance Strategy (RSS) requires 'the progressive and substantial reductions in discharges, emissions and losses of radioactive substances so that by 2020 the additional concentrations in the marine environment above historic levels, arising from such discharges, emissions and losses, are close to zero'.

An essential part of the implementation of the RSS is an effective means to measure progress in achieving its objective in accordance with its timeframe (2020). This is being achieved through:

- Determination of a set of values against which progress in implementing the RSS can be evaluated i.e. the baseline values
- Periodic evaluation of progress against baseline values
- The development of a National Plan for Contracting Parties in order to achieve the objectives of the RSS

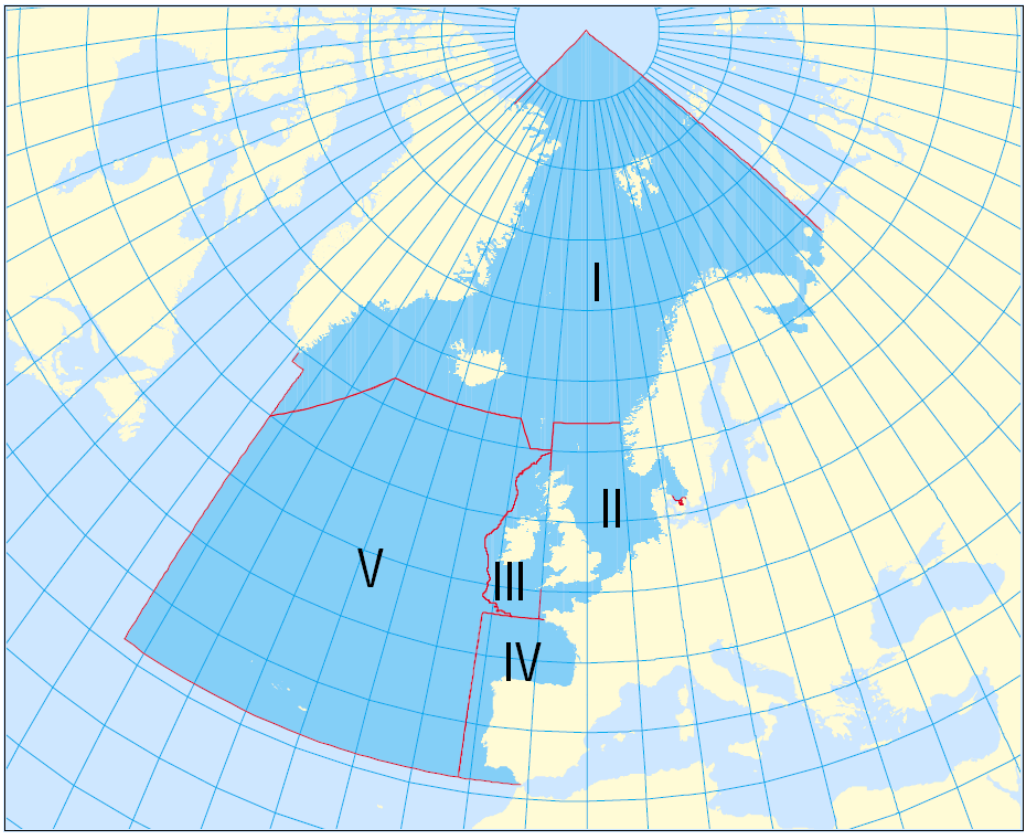
Discharge baselines have been established for the following so-called marker radionuclides[1]:

[1] In the light of what is known about discharges of radioactive substances, and in particular the significance for radiation dose of the various radionuclides studied, OSPAR has selected certain radionuclides and groups of radionuclides (the "marker radionuclides") for each of the sectors, sub-sectors and national groupings as the most significant to observe for the purpose of evaluating, against the

Nuclear: Tc-99, Cs-137, Pu-239/240, total-α and total-β
Offshore oil and gas: Pb-210, Ra-226, Ra-228, Th-228;
Medical sector: Tc-99; I-131

A map of the OSPAR maritime regions is presented in Figure 1. Figure 2 presents the regions used to ensure sufficient data for establishing baselines for radiological concentrations and doses. Region 4 is most relevant for Ireland[2].

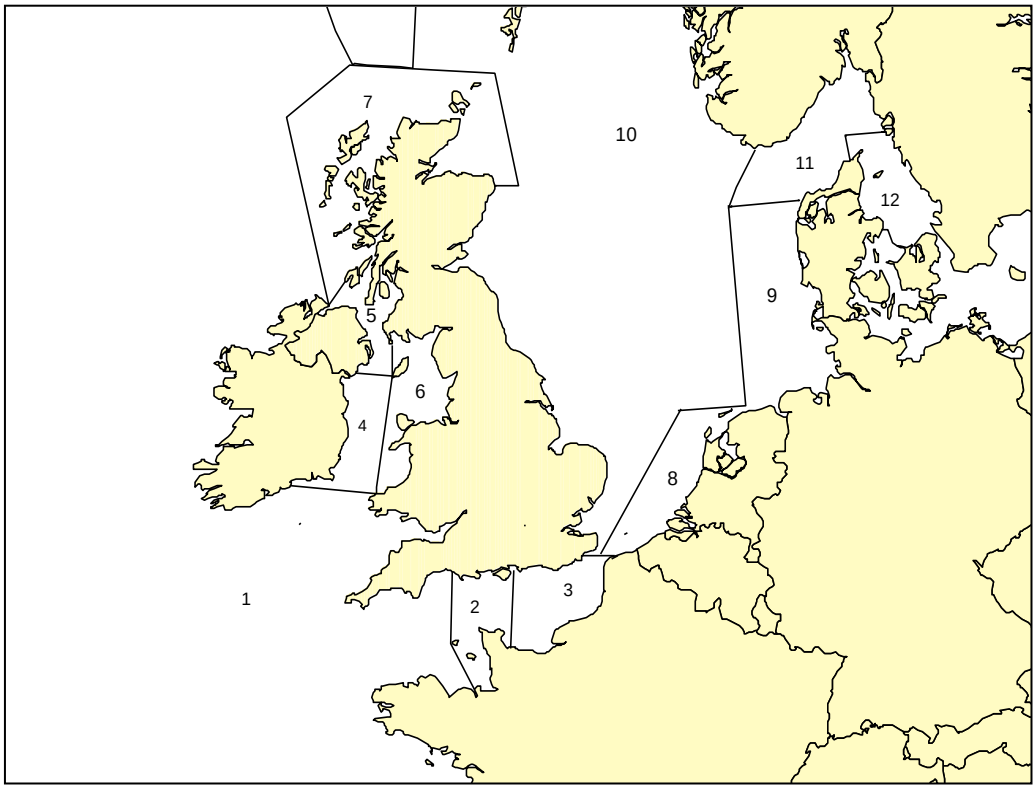
Figure 1: OSPAR Maritime Regions



baseline element for discharges, progress towards the objective of the OSPAR Radioactive Substances Strategy (OSPAR Commission, 2006).

[2] The OSPAR maritime regions were into regions ("subdivisions") where sufficient data were available to enable the calculation of some baseline values (OSPAR Commission, 2007). The overall approach to deriving baseline values was intended to be one of simplicity. The subdivisions were defined taking into account which concentration data are available at this moment of time, and which marine areas have been used in the MARINA II study. Some of the marine areas in the MARINA II study have been grouped together but they do not correspond in all cases.

Figure 2: OSPAR subdivisions in the vicinity of Ireland and UK used for establishing baselines for radiological concentrations and doses



2. OSPAR Commitments

The RPII provides technical support to the Irish delegation to the Radioactive Substances Committee (RSC) of OSPAR including:

- Provision of scientific advice to DEHLG
- Attendance at relevant meetings and participating in intercessional working groups of the Radioactive Substances Committee (RSC)
- Collation and provision of discharge information from Irish medical, educational and research institutions
- Collation and provision of monitoring data from the marine environment

The RPII also assisted in the preparation of Ireland's National Plan for the implementation of the RSS which was submitted to OSPAR in 2002 (Department of Environment, Heritage and Local Government, 2002). The Plan states that the RPII will submit results of measurements made on marine samples taken at various locations throughout the country. This sampling is performed as continuous monitoring in the RPII Marine Monitoring Programme.

The RPII also committed to the provision of H-3 in seawater measurements.

In addition, the RPII also agreed to investigate the possibility of monitoring I-131 at various sampling points to determine the dose to the Irish population from discharges of this radionuclide from Irish hospitals.

In 2005 the RSC agreed a Monitoring Programme for Concentrations of Radioactive Substances in the Marine Environment (OSPAR Commission, 2009b). This agreement (relevant parts reproduced in Annex 2), based in routine monitoring already performed by Contacting Parties, stated that monitoring should be carried out in fifteen subdivisions of the OSPAR maritime area for specified radionuclides in specified compartments in each subdivision at specified sampling stations by stated Contracting Parties. It also provided that Contracting Parties could notify changes in the monitoring stations and frequencies of monitoring, provided that these changes did not undermine the general framework of this monitoring programme. Additionally, Agreement 2005-8 stated that these arrangements should be reviewed after the completion of the overall assessment of radionuclides in the maritime area in 2009.

It is noted that liquid discharge samples from the Irish offshore oil and gas industry are not analysed by the RPII. Instead they are sent to University College Dublin for analysis by gamma spectrometry. The results are verified by the RPII before submission to the OSPAR secretariat.

3. Measurements and Results

The measurements from the Marine Monitoring Programme which are submitted to OSPAR on an annual basis are listed in Annex 1. These include:

- Cs-134, Cs-137, Tc-99 in seawater and seaweed from coastal sampling locations
- Sampling of seawater for H-3 began in late 2008. A method for analysis is in development.
- Cs-134 and Cs-137 results from sediment samples from sediment grab samples/core from the Irish Sea
- Cs-134, Cs-137 and Tc-99 in fish landed at Howth, Clogherhead, Killybegs and Kilmore Quay
- Cs-137. Cs-134 and Tc-99 in shellfish (prawns, mussels and oysters) samples from North-East ports. Mussel samples from Bantry are also collected on a biennial basis

See Foundation Document B for an overview of the results from seawater, seaweed, seafood and sediment samples.

A separate study of I-131 arising from Irish hospital discharges was also carried out between 2003 and 2004 (Akinmboni et al, 2005). This study concluded that, since this radionuclide is short-lived and the amounts discharged relatively small, their impact on the environment was negligible and doses to potentially exposed workers significantly less than the annual dose limit to members of the public from exposure to all controlled sources of ionising radiation of 1 mSv/y. On this basis the decision was made not to conduct routine monitoring of I-131.

See Foundation Document C for more details.

The RSC has published three periodic reviews to date which include sample data from Ireland and other Contracting Parties:

- First periodic review – Discharges (OSPAR Commission, 2006)

- Second periodic – Concentrations and doses (OSPAR Commission, 2007)
- Third periodic review – Impact on Marine Biota (OSPAR Commission, 2008)

4. Issues for Consideration by the Peer Review Group

The terms of reference are laid out in the Overview of the Peer Review. Of particular relevance to monitoring performed to satisfy OSPAR commitments are:

- Consideration of the RPII's capacity to satisfy its requirements for monitoring under OSPAR. It is noted that Ireland's National Plan for OSPAR is currently being reviewed and a revised National Plan will be submitted to OSPAR in early 2010. Views and comment from the group on current and potential future monitoring are therefore opportune and welcome
- OSPAR marker radionuclides have been decided upon by the RSC. Comment from the group on whether these radionuclides are still those most appropriate for monitoring for this purpose are invited

5. Reference

Akinmboni, R., McMahon, C.A., Long, S.C. and Colgan P.A., 2005. Environmental Impact Assessment of Iodine-131 discharged from Hospitals in Ireland. In proceedings of the 3rd International Environmental Radioactivity Conference, Nice, October, 2005.

Department of Environment, Heritage and Local Government, 2002. National Plan for the Implementation of the OSPAR Strategy with regard to Radioactive Substances, Contracting Party: Ireland. OSPAR Convention for the Protection of the Marine Environment of the North East Atlantic, Meeting of the Ad-Hoc Working Group on Radioactive Substances (RSS) London: 1 - 2 October 2002.

OSPAR Commission, 2006. Revised First Periodic Evaluation of Progress Towards the Objective of the OSPAR Radioactive Substances Strategy.

OSPAR Commission, 2007. Second Periodic Evaluation of Progress Towards the Objective of the OSPAR Radioactive Substances Strategy.

OSPAR Commission, 2008. Assessment on Impact of Anthropogenic Sources of Radioactive
Substances on Marine Biota.

OSPAR Commission, 2009a. History (Oslo and Paris Commissions) <Available: http://www.ospar.org/content/content.asp?menu=00350108080000_000000_000000>.

OSPAR Commission, 2009b. Review of reporting arrangements for concentrations of radioactive substances in the marine environment. OSPAR Convention for the Protection of the Marine Environment of the North-East Atlantic, Agenda Item 4, Meeting of the Radioactive Substances Committee (RSC)
Oslo (Norway): 19 23 January 2009.

Annex 1: Continuous Monitoring Measurements Submitted to OSPAR

	Cs-137/ Cs-134	Tc-99	Tritium	Gamma-emitters	Others	Pu-isotopes / Am-241
Seawater	1 location monthly 13 locations quarterly to every 2 years	1 location monthly 13 stations quarterly to every 2 years	Began monthly sampling in 2008			
Seaweed	Monthly on 1 locations quarterly to annually in 3 locations	1 location quarterly		Samples analysed by gamma-spec.	K-40 in all the samples	
Sediment	6 grab samples			3 grab samples		
Fish[3]	4 areas quarterly to annually	2 locations annually			C-14[2]	Pu(α)[4]
Shellfish	4 locations quarterly to annually	2 locations annually				4 locations/ 1 monthly/ 2 quarterly/ 1 every 6 months

[3] Fish includes cod, plaice, whiting, herring, mackerel, ray.
[4] Pu isotopes and C-14 measured in composite samples of whiting, cod, and plaice from two locations.

Annex 2: Agreement on a Monitoring Programme for Concentrations of Radioactive Substances in the Marine Environment (Reference number: 2005-8)

1. This agreement sets out the basis for future monitoring by OSPAR Contracting Parties of concentrations of radioactive substances in the marine environment of the OSPAR maritime area.

2. These arrangements should be reviewed after the completion of the assessments of the overall assessment of radionuclides in the maritime area to be carried out by 2009. In the meantime, Contracting Parties may notify changes in the monitoring stations and frequencies of monitoring, provided that these changes do not undermine the general framework of this monitoring programme.

3. To ensure a clear understanding of quality control arrangements, each Contracting Party (other than the United Kingdom) should present a statement on their quality control arrangements similar to that presented by the United Kingdom in Annex 6 of document RSC 05/4/1.

4. Monitoring should continue to be carried out in the following fifteen subdivisions of the OSPAR maritime area, (which are shown on the maps at Appendix 1):

Subdivision 1	–	Wider Atlantic, Bay of Biscay/Golfe de Gascogne, Iberian Waters and the Western Approaches
Subdivision 2	–	Cap de la Hague Channel
Subdivision 3	–	Channel East
Subdivision 4	–	Irish Sea (Republic of Ireland)
Subdivision 5	–	Irish Sea (Northern Ireland)
Subdivision 6	–	Irish Sea (Sellafield)
Subdivision 7	–	Scottish Waters (Dounreay)
Subdivision 8	–	North Sea South
Subdivision 9	–	German Bight (Limfjord, German Bight and Dollart)
Subdivision 10	–	North Sea (North-West, South-West and Central)
Subdivision 11	–	North Sea (Skaggerrak)
Subdivision 12	–	Kattegat
Subdivision 13	–	Norwegian Coastal Current
Subdivision 14	–	Barents Sea
Subdivision 15	–	West of Spitsbergen

5. In each subdivision, monitoring should be continued as set out below for the specified radionuclides in the specified environmental compartments at the specified sampling stations (coastal monitoring stations in subdivisions 1 and 15, and coastal and marine monitoring stations in subdivisions 2 – 14):

Subdivision 1 – Wider Atlantic, Bay of Biscay/Golfe de Gascogne, Iberian Waters and the Western Approaches

Contracting Party	Location	Environmental Compartment and Radionuclides						
		Seawater*				Fish	Molluscs	Seaweed
		^{3}H	^{137}Cs	^{99}Tc	$^{239/240}Pu$	gamma-spec. (^{137}Cs)	$^{239,240}Pu$ or gamma-spec.	gamma-spec. (^{137}Cs) or ^{99}Tc
France	Dinard	H	H					
	Roscoff							Q / G
	Brest	Q	Q					
	Concarneau							Q / G
	St Jean de Monts	H	H					
	La Rochelle							Q / G
	Biarritz	H	H					
Spain	MAS 01	Q	Q[1]					
	MAS 03	Q	Q G[2]					
	MAS 04	Q	Q G[2]					
	MAS 05	Q	Q G[2]					
	MAS 06	Q	Q G[2]					
	MAB 07	Q	Q G[2]					
	MAS 08	Q	Q G[2]					
Ireland	Castletownbere	#	B	B		A		B / G / Tc
	Galway	#	B	B		A		B / G / Tc
	Killybegs	#	B	B		A		B / G / Tc
	Bantry						A / G	

A = sampling should continue to be done annually.

B – sampling should continue to be done biennially (once in every two years)

H = sampling should continue to be done half-yearly (twice in a year).

Q = sampling should continue to be done quarterly (four times in a year).

Pu = Plutonium-isotopes by alpha spectrometry.

G = Gamma-spectrometry (^{137}Cs determination).

Tc = ^{99}Tc determination.

* Seawater sampling should continue to be done at a depth of 0,5 m to 4 m.

\# Tritium should be monitored in seawater when the technique has been properly validated

1 ^{137}Cs determination after radiochemical separation

2 Gamma-spectrometry of seawater sample without ^{137}Cs radiochemical separation; only elevated levels can be detected.

In addition, the United Kingdom should make available to OSPAR until, at least, 2008 the results of the monitoring which they carry out in the Western Approaches.

The United Kingdom should further consider what monitoring and information-collection arrangements are appropriate for the Bristol Channel in relation to the 2008 and 2009 assessments, and inform RSC 2007 of its conclusions.

Subdivision 4 – Irish Sea (Republic of Ireland)

Contracting Party	Environmental Compartment and Radionuclides				
	Seawater		Molluscs	Seaweed	
	^{137}Cs	^{99}Tc	$^{239,240}Pu$	^{137}Cs	^{99}Tc
Ireland	14 [1]	14 [1]	1 [2]	4 [3]	4 [3]
United Kingdom	10 [4]				

1. 5 stations once every 2 years, 6 stations annually, 1 station bi-annually (twice in each year), 1 station quarterly, 1 station monthly.
2. Station at Carlingford. Sampling frequency: quarterly.
3. Stations at Greenore (quarterly), Balbriggan (monthly), Cahore (bi-annually (twice in each year)) and Dunmore East (biennially (once in two years).
4. Stations every 2 years, surface water.

Subdivision 5 – Irish Sea (Northern Ireland)

Contracting Party	Environmental Compartment and Radionuclides			
	Seawater	Fish	Molluscs	Seaweed
	^{137}Cs	^{137}Cs	$^{239,240}Pu$	^{99}Tc
United Kingdom	3 [1]	2 [2]	2 [3]	3 [4]

1. 2 stations every 2 years, surface water. Coastal station North of Larne, monthly.
2. Catch area along the coast of NI, between 4 and 8 times per year. Station at Hunterston, 2 times per year.
3. Catch area along the coast of NI, between 2 and 4 times per year. Station at Hunterston, 1 - 4 times per year.
4. Stations at Ardglass, Strangford Lough and Carlingford Lough, between 2 to 4 times per year.

Subdivision 6 – Irish Sea (Sellafield)

Contracting Party	Environmental Compartment and Radionuclides					
	Seawater			Molluscs		Seaweed
	^{3}H	^{137}Cs	^{99}Tc	^{137}Cs	$^{239,240}Pu$	^{99}Tc
United Kingdom	27 [1]	26 [2]	1 [3]	6 [4]	5 [5]	4 [6]

1. 23 stations every 2 years, surface water. Coastal stations at Sellafield (monthly), Heysham (annually), Wylfa (annually) and Chapelcross (quarterly).
2. 23 stations every 2 years, surface water. Coastal stations at Sellafield (monthly), Heysham (annually) and Wylfa (annually).
3. Coastal station at Sellafield, monthly.
4. Stations at Sellafield (2 to 4 times per year), Heysham (2 to 4 times per year), Springfields (1 to 2 times per year), Capenhurst (4 times per year), Chapelcross (4 to 8 times per year) and Wylfa ((2 times per year).
5. Stations at Sellafield (2 to 4 times per year), Heysham (2 to 4 times per year), Springfields (1 to 2 times per year), Chapelcross (4 to 8 times per year) and Wylfa ((2 times per year).
6. Stations at Sellafield (2 to 4 times per year), Heysham (2 to 4 times per year), Chapelcross (4 times per year) and Wylfa ((2 times per year).

Figure 1: Seawater in the Greater North Sea and the Celtic Seas.

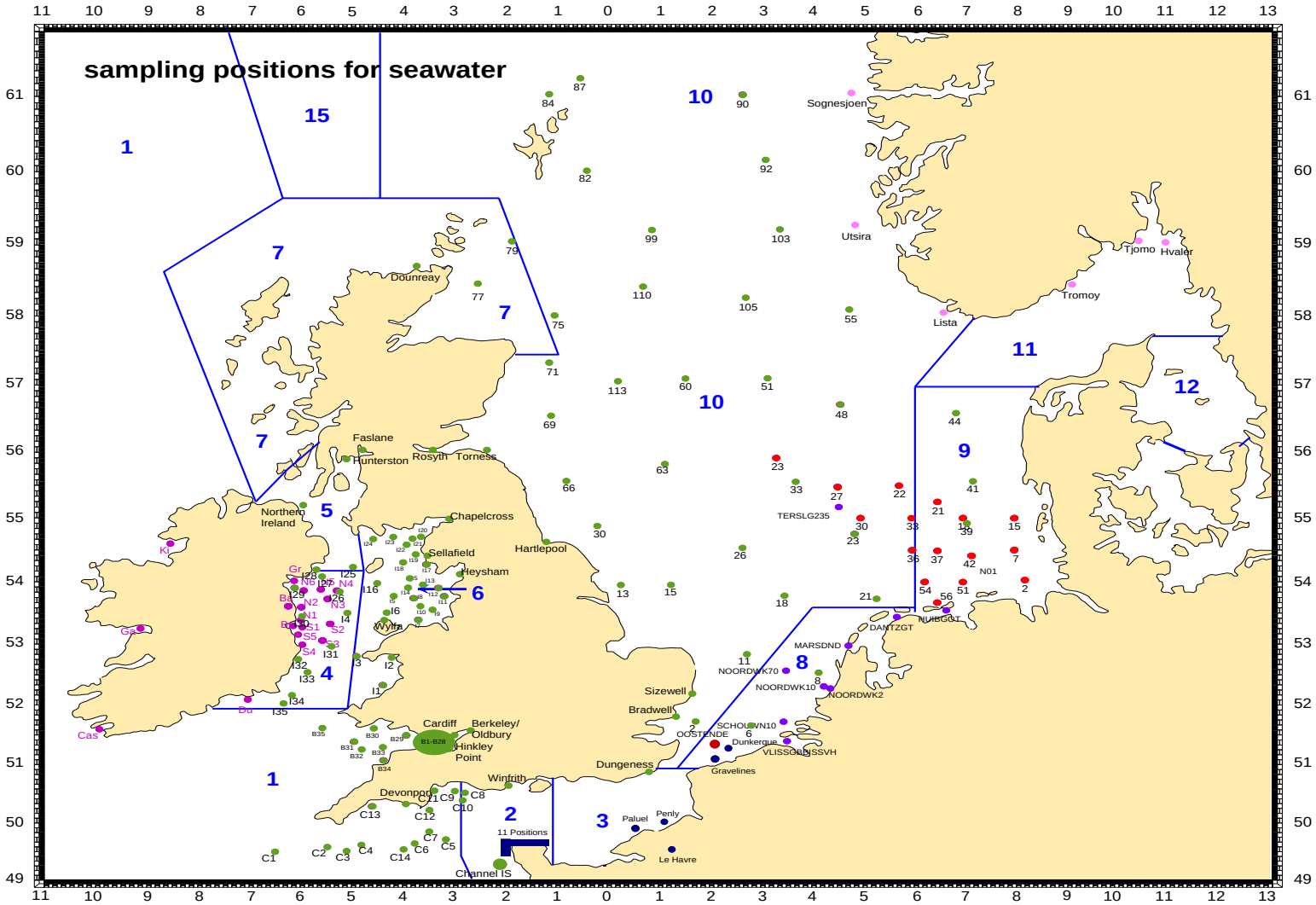


Figure 2: Fish, shellfish and seaweed in the Greater North Sea and the Celtic Seas